

## RESEARCH ARTICLE

# Structural and molecular characterization of paraventricular thalamic glucokinase-expressing neuronal circuits in the mouse

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## Abstract

The thalamic paraventricular nucleus (PVT) is a structure highly interconnected with several nuclei ranging from forebrain to hypothalamus and brainstem. Numerous rodent studies have examined afferent and efferent connections of the PVT and their contribution to behavior, revealing its important role in the integration of arousal cues. However, the majority of these studies used a region-oriented approach, without considering the neuronal subtype diversity of the nucleus. In the present study, we provide the anatomical and transcriptomic characterization of a subpopulation of PVT neurons molecularly defined by the expression of glucokinase (Gck). Combining a genetically modified mouse model with viral tracing approaches, we mapped both the anterograde and the retrograde projections of Gck-positive neurons of the anterior PVT (Gck<sup>aPVT</sup>). Our results demonstrated that Gck<sup>aPVT</sup> neurons innervate several nuclei throughout the brain axis. The strongest connections are with forebrain areas associated with reward and stress and with hypothalamic structures involved in energy balance and feeding regulation. Furthermore, transcriptomic analysis of the Gck-expressing neurons revealed that they are enriched in receptors for hypothalamic-derived neuropeptides, adhesion molecules, and obesity and diabetes susceptibility transcription factors. Using retrograde labeling combined with immunohistochemistry and in situ hybridization, we identify that Gck<sup>aPVT</sup> neurons receive direct inputs from well-defined hypothalamic populations, including arginine-vasopressin-, melanin-concentrating hormone-, orexin-, and proopiomelanocortin-expressing neurons. This detailed anatomical and transcriptomic characterization of Gck<sup>aPVT</sup> neurons provides a basis for functional studies of the integration of homeostatic and hedonic aspects of energy homeostasis, and for deciphering the potential role of these neurons in obesity and diabetes development.

**Abbreviations:** AAV, adeno-associated virus; AD, anterodorsal nucleus; AHN, anterior hypothalamic nucleus; aPVT, anterior paraventricular nucleus of the thalamus; ARH, arcuate nucleus of the hypothalamus; AVP, arginine-vasopressin; BLA, basolateral amygdaloid nucleus, anterior part; BNST, bed nucleus of the stria terminalis; ceA, central amygdaloid nucleus; CeL, central amygdaloid nucleus, lateral division; Cg, cingulate cortex; CM, centromedial nucleus; CRH, corticotropin-releasing hormone; DMH, dorsomedial nucleus of the hypothalamus; DTT, dorsal tenia tecta; Ect, ectorhinal cortex; Gck, glucokinase; IL, infralimbic cortex; LHA, lateral hypothalamic area; MCH, melanin-concentrating hormone; MPO, medial preoptic nucleus; NAc, nucleus accumbens; ORX, orexin; PAG, periaqueductal gray; PBS, phosphate-buffered saline; PFA, paraformaldehyde; POMC, proopiomelanocortin; PrL, prelimbic cortex; PT, paratenial thalamic nucleus; PVH, paraventricular nucleus of the hypothalamus; PVT, paraventricular nucleus of the thalamus; SST, somatostatin; TH, tyrosine hydroxylase; TRH, thyrotropin-releasing hormone; VMH, ventromedial nucleus of the hypothalamus

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## KEYWORDS

anterograde and retrograde tract tracing, glucokinase-expressing neurons, hypothalamic nuclei, neurohormones, neuropeptides, neurotransmitters, paraventricular nucleus of the thalamus, TRAP

## 1 | INTRODUCTION

The paraventricular nucleus of the thalamus (PVT) belongs to a complex neuronal network that involves a large number of brain sites implicated in a broad range of functions from rewarding to aversive behaviors (Choi et al., 2019; Millan et al., 2017; Zhou & Zhu, 2019). While the afferent and efferent projections of the anterior PVT (aPVT) have been described in great detail in rats (Kirouac, 2015; Li & Kirouac, 2008, 2012), similar studies in mice or based on specific subpopulations of aPVT neurons are less developed.

The aPVT is well connected to brain areas controlling goal-oriented and decision-making behaviors such as the prefrontal cortex, the nucleus accumbens (NAc), and the lateral hypothalamic area (LHA) (Li & Kirouac, 2008; Li & Kirouac, 2012). In line with these anatomical properties, functional studies showed a preponderant role of the aPVT neurons in cue-motivated behaviors (Millan et al., 2017). Indeed, several studies reported a role of aPVT neurons in drug- and food-seeking behaviors (Choi & McNally, 2017; Choi et al., 2019; Millan et al., 2017; Otis et al., 2019). Moreover, recent work from our laboratory showed a role for Glut2 neurons of the aPVT, which are activated by hypoglycemia and that project to the NAc in regulating sucrose-seeking behavior (Labouèbe et al., 2016). More recently, we identified another neuronal population of the aPVT, which expresses the glycolytic enzyme glucokinase (Gck). The Gck-expressing neurons of the aPVT (Gck<sup>aPVT</sup>) are activated by hyperglycemia and negatively control sucrose-seeking behavior through their projections to the NAc (Kessler et al., 2021). The precise description of the overall networks formed by the glucose responsive neurons of the aPVT and the molecular characterization of their upstream and downstream neuronal populations are still unknown.

In this study, we used viral anterograde and retrograde tracing methods combined with transcriptomic analysis, immunohistochemistry, and in situ hybridization, to describe the Gck<sup>aPVT</sup> neuronal network. We focused our study on forebrain structures involved in motivated behavior, in particular, the NAc, the amygdala, and the bed nucleus of the stria terminalis (BNST), and on hypothalamic nuclei involved in energy and glucose homeostasis such as the paraventricular (PVH), the dorsomedial (DMH), the ventromedial (VMH), the arcuate nuclei (ARH), and the LHA (Christoffel et al., 2021; Ruud et al., 2017; Smith et al., 2019; Stuber & Wise, 2016; Timper & Brüning, 2017). Our transcriptomic characterization revealed that Gck<sup>aPVT</sup> neurons are enriched in mRNAs encoding for a subset of neuroactive receptors, axon guidance molecules, and obesity- and diabetes-related genes. Based on these hints for neurotransmitter responsiveness, we showed that presynaptic neurons to GCK<sup>aPVT</sup> neurons express

arginine-vasopressin (AVP), melanin-concentrating hormone (MCH), orexin (ORX), and pro-opiomelanocortin (POMC) and were GABAergic or glutamatergic.

## 2 | RESULTS

### 2.1 | GCK<sup>aPVT</sup> neuronal outputs

#### 2.1.1 | Viral targeting of the aPVT

For viral-based tracing experiments, we used Gck<sup>Cre/+</sup> mice, which express the Cre recombinase in all Gck neurons (Kessler et al., 2021).

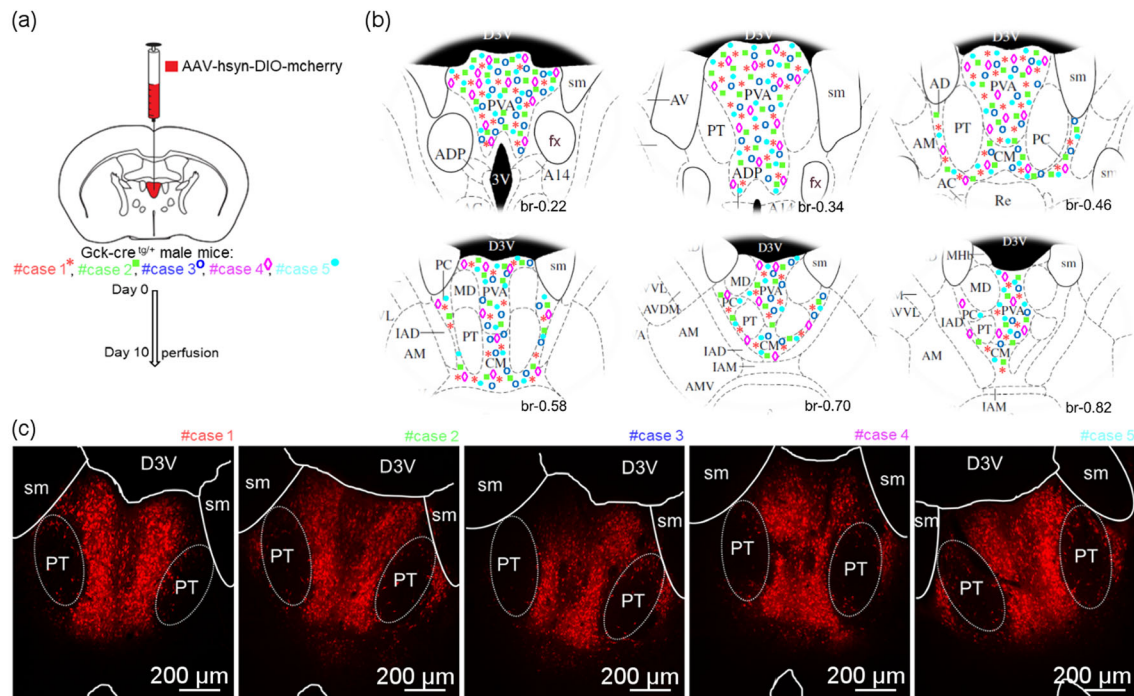
Five Gck<sup>Cre/+</sup> male mice were used for anterograde tracing analysis. Mice were injected in the aPVT with an adeno-associated virus (AAV) allowing for the Cre-dependent expression of mCherry (AAV-hSyn-DIO-mCherry) (Figure 1a). Ten days later, the mice were perfused fixed and their brain collected for injection site verification and projection tracing. In all five cases, viral targeting was mainly localized in aPVT with some spreading observed in anterodorsal nucleus (AD) and centromedial thalamus (CM) (Figure 1b). Representative pictures of the infected areas for the five mice are presented in Figure 1c.

#### 2.1.2 | Anterograde projections of the GCK<sup>aPVT</sup> neurons

Our analysis was focused on brain sections extending from the anterior cortex to the midbrain. The majority of the GCK<sup>aPVT</sup> fibers were observed in forebrain areas and the hypothalamus, with very few labeled fibers identified at the midbrain level. An overview of the output projection areas for GCK<sup>aPVT</sup> neurons from mouse #1 is presented in Figures 2 and 19.

#### Forebrain

The GCK<sup>aPVT</sup> neurons provide inputs to several forebrain areas (Figures 2a–o and 3; Table 1). Numerous projections were observed in cortical areas, with the strongest ones appearing in prelimbic (PrL) and infralimbic cortex (IL) (Figures 2a–d and 3a,b; Table 1) and some localized at the level of cingulate cortex (Cg) (predominantly Cg, area 2 [Cg2]) (Figure 3c). A small but consistent number of mCherry-labeled fibers were also observed at the ectorhinal cortex (Ect) (Figure 3d; Table 1), and the septum along the lateral ventricle (Figure 2e–f; Table 1). Lastly, fewer fibers, but consistent over all the



**FIGURE 1** (a) Experimental approach. AAV-hSyn-DIO-mCherry was injected into the aPVT of 16–20-week-old  $Gck^{Cre/+}$  male mice that were sacrificed 10 days later. Schematic representation of the viral distribution across the anteroposterior axis of the PVT (b) and representative images of the injection site at bregma  $-0.4$  (c) in all five cases used (#1 to #5). A14, dopaminergic group A14; AC, anterior commissural nucleus; ADP, anterodorsal preoptic nucleus; AM, anteromedial nucleus; AV, anteroventral nucleus; AVDM, anteroventral nucleus, dorsomedial part; D3V, dorsal 3rd ventricle; fx, fornix; IAD, interanterodorsal thalamic nucleus; IAM, interanteromedial thalamic nucleus; MD, medial dorsal nucleus; PC, paracentral thalamic nucleus; PT, paratenial thalamic nucleus; PVA, paraventricular thalamic nucleus, anterior part; Re, reuniens thalamic nucleus; sm, stria medullaris

five cases reported, were observed in the subiculum of the hippocampus (Figures 2o and 3e). The densest projection sites appeared to be the NAc and the BNST (Figures 2c–h and 3f–i; Table 1). In all cases,  $Gck^{aPVT}$  fibers were observed throughout the anteroposterior axis with emphasis in the accumbens shell (Figures 2d–f and 3f,g; Table 1) and the dorsomedial and dorsolateral divisions of the anterior part of the BNST (Figures 2g and 3h,i; Table 1). Another important output target of  $Gck^{aPVT}$  neurons was the amygdala, with strong projections observed in both central (CeL) and basolateral (BL) amygdala, extended until its very posterior division (Figures 2k–n and 3j–m; Table 1).

### Hypothalamus

In the hypothalamus, sparse projections were present in the anterior nucleus of hypothalamus (AHN), the LHA, the PVH, and the ARH (Figures 2j–m and 4). The nuclei that received the densest projections were the dorsomedial divisions of the DMH (Figure 4b,c) and the dorsomedial division of the VMH (Figure 4b,c).

### Olfactory structures and midbrain

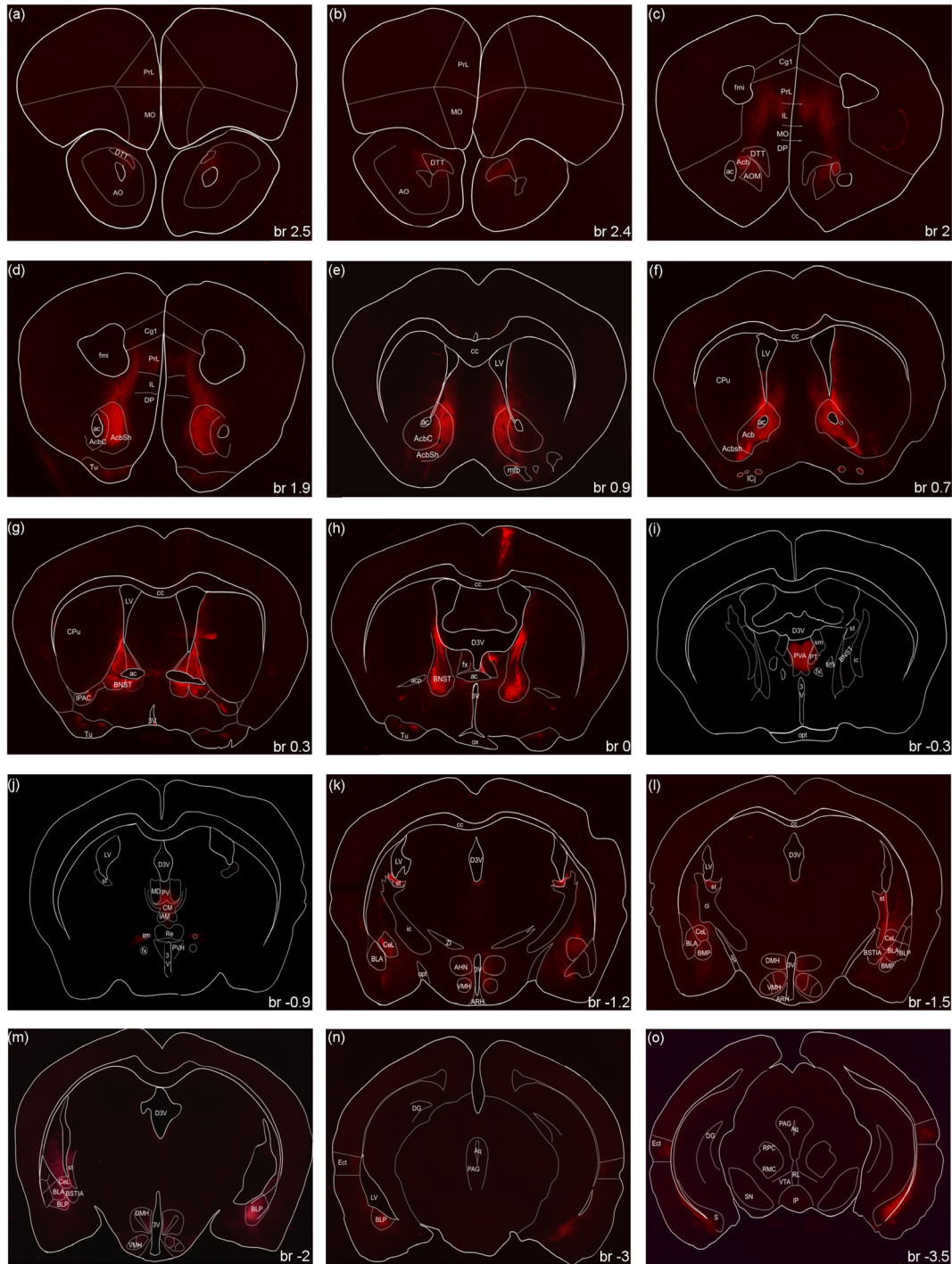
Sparse fibers were detected in the dorsal tenia tecta (DTT) (Figure 5a; Table 1). The inputs from  $GCK^{aPVT}$  neurons were minimal in the midbrain, including the superior colliculus and the periaqueductal gray (PAG; Figure 5b).

## 2.2 | $GCK^{aPVT}$ neuronal inputs

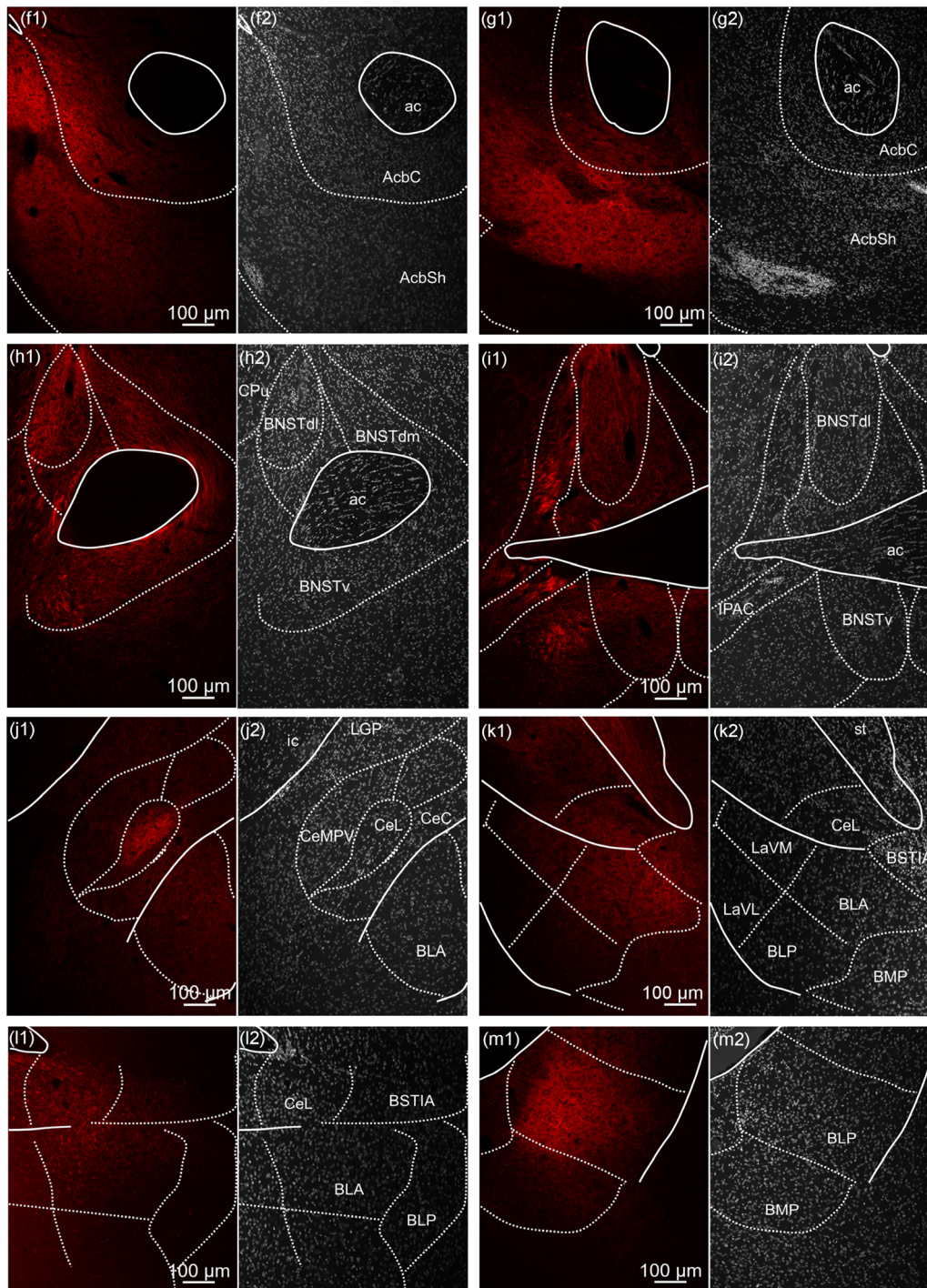
### 2.2.1 | Virus injection sites into the aPVT

For monosynaptic retrograde tracing of  $Gck^{aPVT}$  neuronal inputs, eight  $Gck^{Cre/+}$  mice were injected first with an AAV directing the expression of the avian tumor virus receptor A (TVA) for the avian sarcoma leucosis virus glycoprotein (EnvA; AAV-TREtight-mTagBFP2-B19G) and an AAV allowing for the Cre-dependent expression of the rabies envelop glycoprotein (RG; AAV-syn-FLEX-splitTVA-EGFP-tTA) followed a week later by the injection of an EnvA-G-deleted-mCherry pseudotyped rabies virus (Figure 6a). A week later, mice were perfusion fixed and their brain prepared to assess the distribution of the mCherry-positive signal on brain sections from the anterior cortex to the midbrain. No mCherry-positive neurons were observed in  $Gck^{Cre/+}$  mice that were injected only with the pseudotyped rabies virus, nor in control  $Gck^{+/+}$  littermates injected with the helper virus and the pseudotyped rabies virus.

Out of the eight mice studied, two (#1092 and #84290; Figure 6b) had injection sites exclusively restricted to the aPVT (Bregma  $-0.22$  to  $-0.82$  of the Franklin and Paxinos Mouse Atlas, 2001). In five mice (#1077, #1091, #1076, #783, and #4; Figure 6b,c), the injections were centered in the aPVT (Bregma  $-0.22$  to  $-0.58$ ) but also involved part



**FIGURE 2** (a–o) Stereomicroscope images showing the overall distribution of mCherry-positive projections arising from GCK<sup>αPVT</sup> from Bregma 2.5 to –3.5 (case #1). 3V, 3rd ventricle; ac, anterior commissure; Acb, accumbens nucleus; AcbC, accumbens nucleus core; AcbSh, accumbens nucleus shell; acp, posterior part of anterior commissure; AHN, anterior hypothalamic nucleus; AO, anterior olfactory; AOM, anterior olfactory area, medial part; aq, aqueduct; ARH, arcuate nucleus of the hypothalamus; BLA, basolateral amygdaloid nucleus, anterior part; BLP, basolateral amygdaloid nucleus, posterior part; BMP, basolateral amygdaloid nucleus, posterior part; BNST, bed nucleus of the stria terminalis; BSTIA, nucleus of stria terminalis; cc, corpus callosum; CeL, central amygdaloid nucleus, lateral part; Cg1, cingulate cortex, area 1; CM, central medial nucleus; CPu, caudate putamen; D3V, dorsal 3rd ventricle; DG, dentate gyrus; DMH, dorsomedial nucleus of the hypothalamus; DP, dorsal part of the corpus callosum; DTT, dorsal tenia tecta; Ect, ectothalamic cortex; fmi, fornix; IAM, interanteromedial thalamic nucleus; ic, internal capsule; ICj, islands of Calleja; IL, infralimbic cortex; IP, interpeduncular nucleus; IPAC, interstitial nucleus of posterior limb of anterior commissure; LV, lateral ventricle; MD, medial dorsal nucleus; mfb, medial forebrain bundle; MO, medial orbital cortex; opt, optic tract; ox, optic chiasm; PAG, periaqueductal gray; PrL, prelimbic cortex; PT, paratenial nucleus; PVH, paraventricular nucleus of the hypothalamus; Re, reuniens thalamic nucleus; RL, rostral linear nucleus of the raphe; RMC, red nucleus, magnocellular part; RPC, red nucleus parvocellular part; S, subiculum; sm, stria medullaris; SN, substantia nigra; st, stria terminalis; Tu, olfactory tubercle; VMH, ventromedial nucleus of the hypothalamus; VTA, ventral tegmental area; ZI, zona incerta



**FIGURE 3** Fluorescent photomicrographs illustrating the distribution of mCherry-positive axons from GCK<sup>aPVT</sup> neurons in the prefrontal (a1, b1), cingulate (Cg, c1), and ectorhinal (Ect, d1) cortex, in the subiculum (e1), the NAc (f1, g1), the BNST (h1, i1), and in the amygdala (j1–m1). The latest receive both light (BLA) and more intense (CeL and BLP) innervation from the GCK<sup>aPVT</sup> neurons. The case #1 is illustrated. (a2–m2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Scale bars are shown in the figure. ac, anterior commissure; AcbC, accumbens nucleus core; AcbSh, accumbens nucleus shell; AHIPM, amygdalohippocampal area, posteromedial part; APir, amygdalopiriform transition area; BLA, basolateral amygdaloid nucleus, anterior part; BLP, basolateral amygdaloid nucleus, posterior part; BMP, basomedial amygdaloid nucleus, posterior part; BNSTdl, bed nucleus of the stria terminalis, dorsolateral part; BNSTdm, bed nucleus of the stria terminalis, dorsomedial part; BNSTv, bed nucleus of the stria terminalis, ventral part; BNSTIA, nucleus of the stria terminalis; CA1, field CA1 of the hippocampus; CeC, central amygdaloid nucleus, capsular part; CeL, central amygdaloid nucleus, lateral division; CeMPV, central amygdaloid nucleus, medial posterovenral part; Cg1, cingulate cortex, area 1; Cg2, cingulate cortex, area 2; CPU, caudate putamen; DP, dorsal penduncular cortex; ec, external capsule; Ect, ectorhinal cortex; gcc, genu of the corpus callosum; ic, internal capsule; IL, infralimbic cortex; IPAC, interstitial nucleus of the posterior limb of anterior commissure; LaVL, lateral amygdaloid nucleus, ventrolateral part; LaVM, lateral amygdaloid nucleus, ventromedial part; LGP, lateral globus pallidus; LV, lateral ventricle; MO, medial orbital cortex; PrL, prelimbic cortex; S, subiculum; st, stria terminalis; TeA, temporal association cortex

**TABLE 1** Quantification of Gck<sup>aPVT</sup> fiber density in each target area

| Gck <sup>aPVT</sup><br>Projection areas | Gck <sup>aPVT</sup><br>Fiber intensity |
|---|--|
| DTT                                     | ++                                     |
| PrL                                     | +++                                    |
| IL                                      | +++                                    |
| LS                                      | ++                                     |
| NAc                                     | +++++                                  |
| BNST                                    | ++++                                   |
| ZI                                      | +++                                    |
| DMH                                     | ++                                     |
| VMH                                     | ++                                     |
| ceA                                     | +++                                    |
| BLA                                     | +++                                    |
| Ect                                     | +                                      |
| S                                       | ++                                     |

Note: Projection intensity equivalence: +++++, very dense; ++++, dense; +++, moderate; ++, light; +, very light. BLA, basolateral amygdaloid nucleus, anterior part; BNST, bed nucleus of the stria terminalis; ceA, central amygdaloid nucleus; DMH, dorsomedial nucleus of the hypothalamus; DTT, dorsal tenia tecta; Ect, ectorhinal cortex; IL, infralimbic cortex; LS, lateral septal nucleus; NAc, nucleus accumbens; PrL, prelimbic cortex; S, subiculum; VMH, ventromedial nucleus of the hypothalamus; ZI, zona incerta

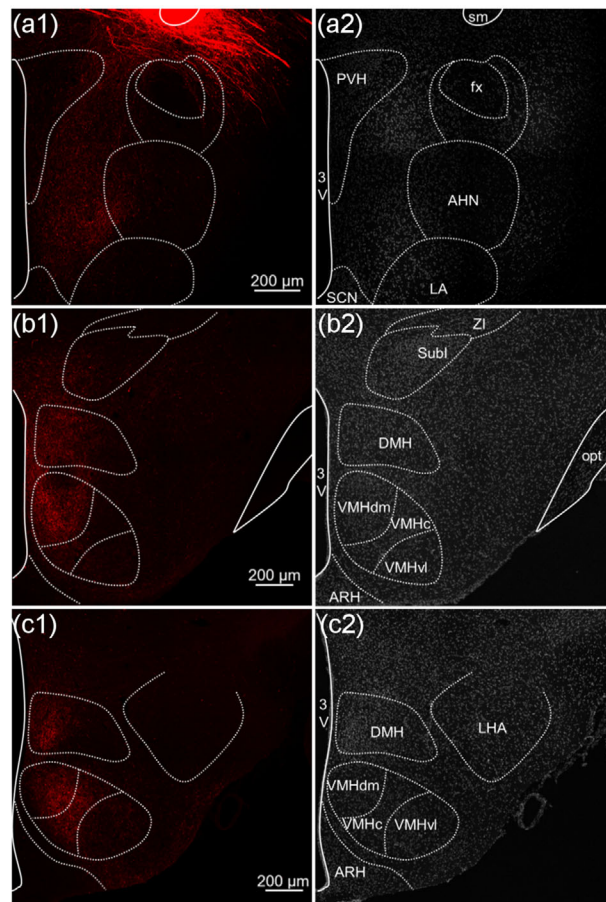
of the paratenial thalamic nucleus (PT, Bregma  $-0.34$  to  $-0.58$ ) and the AD (Bregma  $-0.46$ ). The last injection site involved the aPVT (Bregma  $-0.34$  to  $-0.82$ , #1088; Figure 6b) and a part of the CM.

## 2.2.2 | General input pattern of the Gck<sup>aPVT</sup> neurons

In Gck<sup>Cre/+</sup> animals injected with the three viruses, mCherry-labeled presynaptic neurons were observed in telencephalic, hypothalamic, and mesencephalic structures (Figure 19). No major labeling was found in most of the cortical areas nor in the thalamus. The four brains used for the quantification displayed viral contamination outside the aPVT, notably in the PT, and this was considered in our analyses. On average, Gck<sup>aPVT</sup> neurons received projections from  $831 \pm 144$  neurons (mean  $\pm$  SEM) from the studied areas ( $n = 4$  brains; Figure 7). Quantification of the number of presynaptic neurons from each nucleus and division of the brain was then performed and normalized to the total number of presynaptic inputs received by Gck<sup>aPVT</sup> neurons (Figure 7).

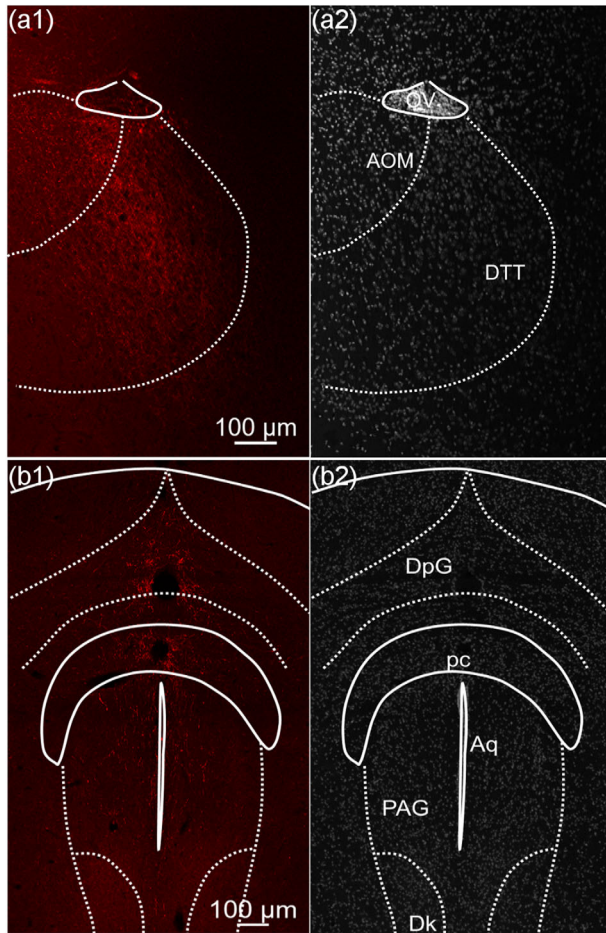
### Forebrain

The Gck<sup>aPVT</sup> neurons received inputs from numerous telencephalic areas (Figure 8). The largest number of monosynaptic inputs was found in the medial prefrontal cortex (PrL and IL, 2.2 and 1.5%, respectively; Figures 7 and 8a). To a lesser extent, labeled neurons were found in other cortical areas, including the cingulate, insular, peduncular, and



**FIGURE 4** Fluorescent photomicrographs illustrating the distribution of mCherry-positive axons from Gck<sup>aPVT</sup> neurons in the anterior division of the hypothalamus and notably in the PVH and AHN (a1), and in the tuberal division of the hypothalamus, mostly in the VMHdm (b1) and in the LHA (c1). The case #1 is illustrated. (a2–c2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Scale bars are shown in the figure. 3V, 3rd ventricle; AHN, anterior hypothalamic nucleus; ARH, arcuate nucleus of the hypothalamus; DMH, dorsomedial nucleus of the hypothalamus; fx, fornix; LA, lateroanterior hypothalamic nucleus; LHA, lateral hypothalamic area; opt, optic tract; PVH, paraventricular nucleus of the hypothalamus; SCN, supra-chiasmatic nucleus of the hypothalamus; sm, stria medullaris; Subl, subincertal nucleus; VMHc, ventromedial hypothalamic nucleus, central part; VMHdm, ventromedial hypothalamic nucleus, dorsomedial part; VMHvl, ventromedial hypothalamic nucleus, ventrolateral part; ZI, zona incerta

motor cortex (Figure 8). Labeled neurons were consistently seen in the intermediate and the ventral parts of the septum (0.8% and 0.7%, respectively; Figures 7, 8b–d, and 9a). A larger proportion of presynaptic neurons was observed in the shell of the NAc when compared to the core (2.8% vs. 0.8%; Figures 7 and 8b), and in several divisions of the amygdala including the CeL, and the anterior and the posterior parts of the BL (1.5% in total; Figures 7 and 9d,e). A number of presynaptic neurons was observed in the dorsal divisions of the anterior BNST (2.5%) and to a lesser extent in the ventral divisions (0.3%) and in the posterior part (1.5%) (Figures 7, 8c,d, and 9a,b).



**FIGURE 5** Fluorescent photomicrographs illustrating the distribution of mCherry-positive axons from  $Gck^{aPVT}$  neurons in the tectum (a1, a2) and in the PAG (b1, b2). These areas receive light (PAG) to moderate (tectum) innervation from the  $Gck^{aPVT}$  neurons. The case #1 is illustrated. (a2, b2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Scale bars are shown in the figure. AOM, anterior olfactory area, medial part; aq, aqueduct; Dk, nucleus of Darkschewitsch; DpG, deep gray layer of the superior colliculus; DTT, dorsal tenia tecta; OV, olfactory part of lateral ventricle; PAG, periaqueductal gray; pc, posterior commissure

### Hypothalamus

The  $Gck^{aPVT}$  neurons received most of their inputs from hypothalamic areas (72.3%; Figures 7 and 9), including the PVH (14.4%; Figures 7 and 9c), the AHN (11.7%; Figures 7 and 9c-e), the LHA, the perifornical area (10%; Figures 7 and 9c-g), and the medial preoptic nucleus (8.3%; Figures 7 and 9a,b). A smaller number of labeled neurons was found in the periventricular nucleus (3.3%; Figures 7 and 9c,d), the ARH (4.3%; Figures 7 and 9f-h), the DMH (3.1%; Figures 7 and 9f,g), the VMH (3.2%; Figures 7 and 9e-g), the tuberal nucleus (4.1%; Figures 7 and 9e-g), and the mammillary bodies (4%; Figures 7 and 9j). Other nuclei of the hypothalamus, such as the retrochiasmatic area (1.7%), the supraoptic (0.7%), the suprachiasmatic (2.5%), the parasubthalamic (0.3%), the posterior hypothalamic (3.2%), and the dorsal and ventral parts of the premammillary nuclei (0.5% and 1.3%, respectively), contained sparsely distributed labeled neurons (Figure 9).

### Thalamus

Abundant retrogradely labeled neurons were consistently found in the reticular nucleus of the thalamus (6%; Figures 7 and 9c) and in a smaller proportion in the zona incerta (3.1%; Figures 7 and 9d,e). We did not observe any additional accumulation of mCherry-labeled neurons in the other thalamic nuclei.

### Midbrain

The density of mCherry-positive neurons in the midbrain was low (Figure 10) with 0.8% and 0.2% of the total number of presynaptic neurons localized in the substantia nigra and the ventral tegmental area, respectively (Figures 7 and 10a). mCherry-positive neurons were also found in the roof of the midbrain in the superior colliculus (0.4%; Figures 7 and 9a,b). In the very posterior part of the midbrain, presynaptic neurons were detected in several divisions of the PAG, including the dorsolateral (0.2%), the ventrolateral (0.2%), and the lateral (0.07%) areas (Figures 7 and 9a-d).

## 2.2.3 | Transcript profiling of $Gck^{aPVT}$ neurons

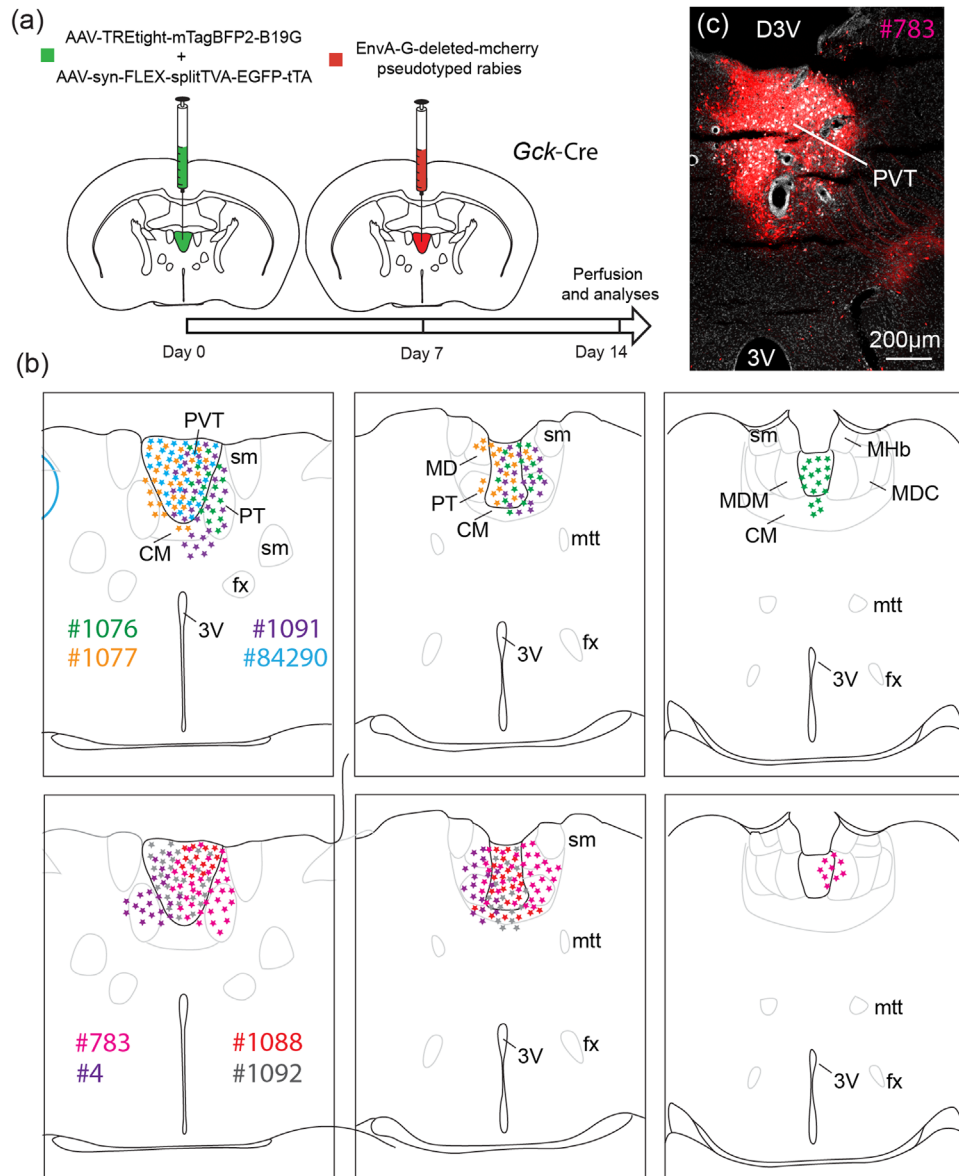
### General information and control

To determine the transcriptome of  $Gck^{aPVT}$  neurons, we used a Transcribing Ribosome Affinity Purification (TRAP) approach (Figure 11).  $Gck^{Cre/+}$  mice were injected in the aPVT with an AAV-DIO-L10-GFP encoding an L10 ribosomal protein-GFP fusion protein that integrates in ribosomes. Ten days later, after an overnight fast, aPVT was dissected, lysed, and the ribosomes were immunoprecipitated with an anti-GFP antibody. RNA sequencing (RNA-seq) was then performed on the immunoprecipitated ribosomal fraction (output) and on the non-immunoprecipitated (input) material. RNA-seq data were analyzed and for each mRNA, we measured their enrichment in the immunoprecipitated fraction (ratio of output vs. input). Out of 14,646 detected genes, 3121 were significantly enriched in  $Gck^{aPVT}$  neurons and 3245 were significantly depleted (adjusted  $p$ -value  $\leq .05$ ; Appendix Table A1). The volcano plot of Figure 11a shows the distribution of the mRNAs enriched in (red dots) and depleted from (blue dots) the immunoprecipitated fraction. The heat map of Figure 11b shows that, as expected, the immunoprecipitated ribosomes are enriched in ribosomal L10 (*Rpl10a*) and *Gck* mRNAs, as well as in the mRNA encoding the vesicular glutamate transporter (*Slc17a6*). It also shows that the output fraction was depleted in the key markers of oligodendrocytes, astrocytes, microglia, and endothelial cells.

### Identification of mRNAs expressed by $Gck^{aPVT}$ neurons

KEGG pathway analysis of the mRNAs enriched in the  $Gck^{aPVT}$  neurons (Figure 11c) shows that they encoded for essential components of neurotransmitter-based synapses, neuroactive ligand-receptor interaction, axon guidance, and cell-to-cell communication proteins.

**Neurotransmitter receptors.** They were, in particular, enriched in serotonin receptors (*Htr5b*, *Htr7*, *Htr1d*, *Htr1b*), glycine receptors (*Gla1*,



**FIGURE 6** (a) Experimental approach. A mix of AAV-TREtight-mTagBFP2-B19G and AAV-syn-FLEX-splitTVA-EGFP-tTA was injected at day 0 in the anterior PVT of 13- to 20-week-old  $Gck^{Cre/+}$  male mice. Seven days later, mice received injection of EnvA-G-deleted-mCherry pseudotyped rabies. Drawings (b) and photomicrograph (c) illustrating the injection sites of viruses in the anterior PVT in experiments #1076 (green stars), #1077 (orange stars), #84290 (blue stars), #1088 (red stars), #1091 (purple stars upper panel), #1092 (gray stars), #4 (purple stars, lower panel), and #783 (pink stars) (c). Scale bar is shown in the figure. 3V, 3rd ventricle; CM, central medial nucleus; D3V, dorsal 3rd ventricle; fx, fornix; MDC, medial dorsal nucleus, central part; MDM, medial dorsal nucleus, medial part; MHb, medial habenular nucleus; mtt, mammillothalamic tract; PT, paratenial nucleus; PVT, paraventricular nucleus of the thalamus; sm, stria medullaris

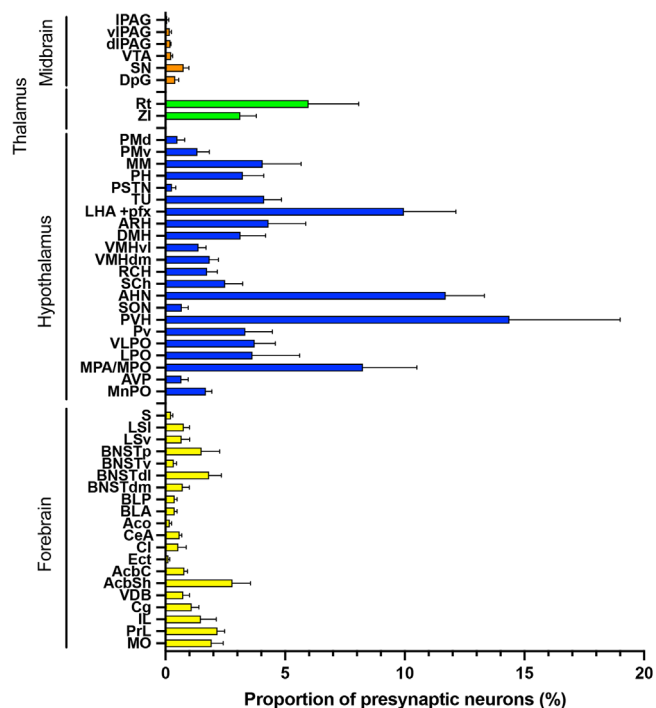
*Gla3*), ionotropic glutamate and GABA receptors (NMDA, AMPA, Kainate,  $GABA_A$ ), and metabotropic glutamate and  $GABA_B$  receptors (Figure 11d).

**Neuropeptide/neurohormone receptors.** They also included the neuropeptide/neurohormone receptors for oxytocin (*Oxtr*), galanin (*Galr1*), melanocortin (*Mc3r*), neuropeptide Y (*Npy2r*), tachykinin (*Tacr3*), melanin-concentrating hormone (*Mchr1*), hypocretin/orexin (*Hcrtr2*), dopamine (*Drd2*), neurotensin (*Ntsr1*), and opioids (*Oprk1*, *Oprm1*).

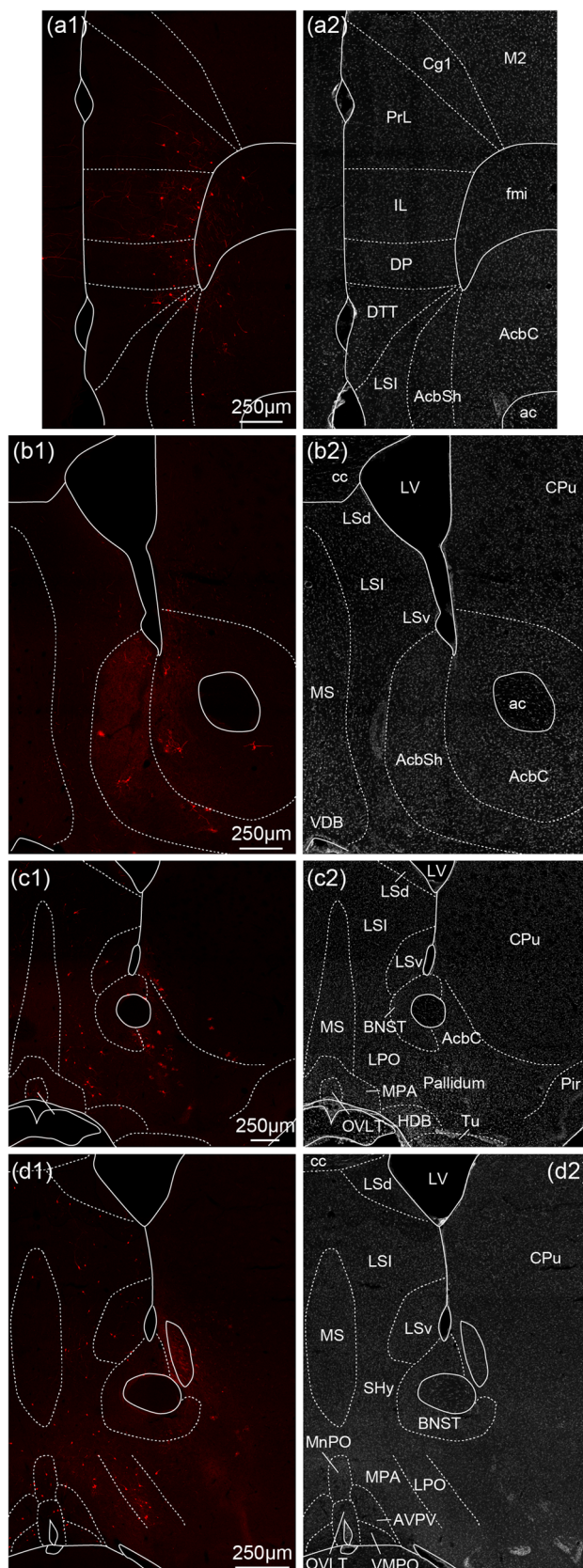
**Axon guidance and synaptic plasticity.** Axon guidance mRNAs were found to encode the four major guidance protein families, Semaphorin (*Sema3a*, *Sema3f*, *Sema4f*, *Sema4g*, *Sema5a*, *Sema6b*), Ephrin (*Efna5*, *Efnb2*, *Epha4*, *Epha5*, *Epha6*), Slit (*Slit1*, *Slit3*), and Netrin G1 (*Ntng1*). Of note, these Semaphorin and Ephrin family members, in addition to their role in axon guidance, are also involved in synaptic plasticity (Hruska & Dalva, 2012; Koropouli & Kolodkin, 2014).

**Glucose-sensing-, diabetes-, and obesity-related genes.** Differential gene expression analysis showed an enrichment of mRNAs involved in





**FIGURE 7** Quantification of presynaptic inputs of GCK<sup>aPVT</sup> neurons performed on four independent experiments (#1077, #1076, #1091, and #783). Most of presynaptic neurons are found in hypothalamic areas (blue). Quantification in the telencephalon is shown in yellow, the thalamus in green, and the midbrain in orange. AcbC, accumbens nucleus core; AcbSh, accumbens nucleus shell; Aco, anterior cortical nucleus of amygdala; AHN, anterior hypothalamic nucleus; ARH, arcuate nucleus of the hypothalamus; AVP, anteroventral periventricular nucleus; BLA, basolateral amygdaloid nucleus, anterior part; BLP, basolateral amygdaloid nucleus, posterior part; BNSTdl, bed nucleus of the stria terminalis, dorsolateral part; BNSTdm, bed nucleus of the stria terminalis, dorsomedial part; BNSTv, bed nucleus of the stria terminalis, ventral part; ceA, central amygdaloid nucleus; Cg, cingulate cortex; Cl, clostrum; diPAG, periaqueductal gray, dorsolateral part; DMH, dorsomedial nucleus of the hypothalamus; DpG, deep gray layer of the superior colliculus; Ect, ectorhinal cortex; IL, infralimbic cortex; LHA, lateral hypothalamic area; IPAG, periaqueductal gray, lateral part; LPO, lateral preoptic area; LSI, lateral septal nucleus, intermediate part; LSv, lateral septal nucleus, ventral part; MM, medial mammillary nucleus; MnPO, median preoptic nucleus; MO, medial orbital cortex; MPA/MPO, medial preoptic area/medial preoptic nucleus; pfx, perifornical area; PH, posterior hypothalamic nucleus; PMd, premammillary nucleus, dorsal part; PMv, premammillary nucleus, ventral part; PrL, prelimbic cortex; PSTN, parasubthalamic nucleus; Pv, periventricular nucleus of the hypothalamus; PVH, paraventricular nucleus of the hypothalamus; RCH, retrochiasmatic area; Rt, reticular thalamic nucleus; S, subiculum; Sch, suprachiasmatic nucleus; SN, substantia nigra; SON, supraoptic nucleus; TU, tuberal nucleus; VDB, nucleus of the verticle limb of the diagonal band; vIPAG, periaqueductal gray, ventrolateral part; VLPO, ventrolateral preoptic nucleus; VMHdm, ventromedial hypothalamic nucleus, dorsomedial part; VMHvl, ventromedial hypothalamic nucleus, ventrolateral part; VTA, ventral tegmental area; ZI, zona incerta



**FIGURE 8** Confocal photomicrographs illustrating direct inputs to GCK<sup>aPVT</sup> neurons in the telencephalon (a1–d1, Case #783) and in preoptic hypothalamic areas (c1, d1). (a2–d2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Important number of presynaptic inputs is observed in the prefrontal

obesity and diabetes physiopathology (Figure 11b; Appendix Table A1) such as the fat mass and obesity gene *Fto*, as well as the type 2 diabetes susceptibility gene *Tcf7l2*, the neuropeptide B/W receptor 1 (*Npbwr1*), the insulin receptor substrates 1 and 2 (*Irs1*, *Irs2*), and the MAP kinases *Mpak1*, *Mpak9*, and *Mpak10*.

#### Identification of the neuronal inputs to *Gck<sup>aPVT</sup>* neurons

To identify the neuronal source of neurotransmitters and neuropeptides targeting *Gck<sup>aPVT</sup>* neurons, we prepared brains from *Gck<sup>Cre/+</sup>* mice previously injected with the pseudorabies virus retrograde labeling system described above and searched for mCherry-positive neurons co-labeled by in situ hybridization or immunohistochemistry for neurotransmitter markers (tyrosine hydroxylase, TH, *Gad1*) or selected neuropeptides.

**Forebrain.** We identified extrahypothalamic sources of GABAergic inputs onto *Gck<sup>aPVT</sup>* neurons, by performing in situ hybridization detection of the mRNAs for *Gad1* (*Gad67*) and for *Slc17a6* (Figure 12). We found mCherry-expressing GABAergic neurons but no glutamatergic neurons in the BNST (Figure 12a).

**Anterior hypothalamic nuclei.** Several nuclei of the anterior hypothalamus displayed exclusively glutamatergic neurons such as the PVH or both glutamatergic and GABAergic neurons, such as the preoptic area. By using in situ hybridization approach, we found mCherry-expressing GABAergic neurons in the medial preoptic area (Figure 12c), and mCherry-expressing glutamatergic neurons in the PVH (Figure 13a) and in the medial preoptic nucleus (Figure 13b).

The neuroendocrine PVH is composed of magnocellular (AVP, OXT) and parvocellular (corticotropin-releasing hormone, CRH; thyrotropin-releasing hormone, TRH; Somatostatin, SST; TH) neurons (Biag et al., 2012). Despite a significant enrichment of *Oxtr* mRNA in the *Gck<sup>aPVT</sup>* neurons (Figure 11d; Table 2), we only detected one OXT and mCherry-double-positive neuron in the most rostral part of the PVH out of

all five studied animals (Figure 14a–c). We found numerous AVP and mCherry-positive neurons in the neuroendocrine part of the PVH (Figure 14d), and one in the supraoptic nucleus. In this structure, no mCherry-positive neurons were found to express OXT. By in situ hybridization, we observed numerous mCherry-positive neurons that were also positive for either *Crh* or *Galanin* (Figure 14e). Thus, in the PVH, retrogradely labeled neurons are mostly parvocellular.

#### Posterior hypothalamic nuclei

The posterior hypothalamus is composed of several nuclei such as the DMH, the VMH, the ARH, and the LHA. In addition to the anterior hypothalamic nuclei, we found mCherry-expressing GABAergic neurons also in the LHA (Figure 12b), the ARH (Figure 12d), the DMH (Figure 12e), and the tuberal nucleus (not shown). mCherry-expressing glutamatergic neurons were seen in the VMH (Figure 13c,d) and the retrochiasmatic area and ARH (Figure 15b,c).

mCherry-positive neurons positive for TH were found in the ARH (group A12; Figure 15a) but not in the DMH nor in the zona incerta (group A13; Figure 16e). As the melanocortin receptor *Mc3r* was enriched in *Gck<sup>aPVT</sup>* neurons, we assessed whether mCherry was found in POMC or AgRP (labeled with NPY) neurons of the ARH. POMC, but not AgRP/NPY, neurons were found to express mCherry (Figure 15b–d). In addition, although we immunodetected NPY-expressing neurons in the DMH, none of them was in contact with *Gck<sup>aPVT</sup>* neurons. *Leprb* mRNA was also found to be expressed by *Gck<sup>aPVT</sup>* presynaptic neurons in the ARH (Figure 15d2).

The dorsomedial division of the VMH was enriched for mCherry-positive cells when compared to the ventrolateral part (Figure 9e–g). This division is known to include leptin receptor b (*Leprb*)- and estrogen receptor alpha (*ER $\alpha$* )-expressing neurons. We revealed by in situ hybridization that VMH presynaptic neurons expressed both receptors (Figure 17).

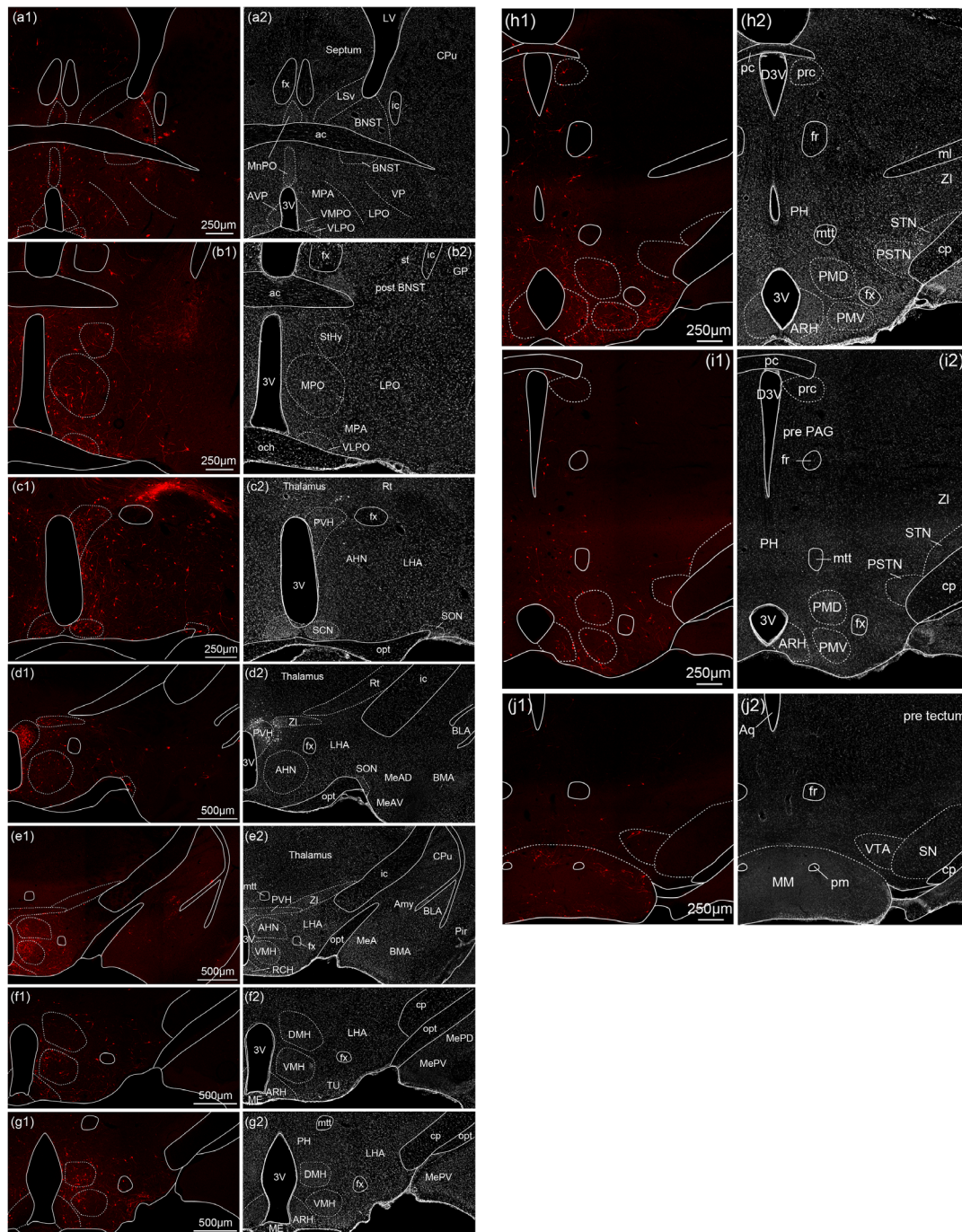
Then, we immunodetected orexin (ORX) and MCH in the LHA and found that both neuropeptide-expressing neurons have direct inputs to *Gck<sup>aPVT</sup>* neurons (Figure 16a–c). However, no mCherry-positive neurons were found to express MCH in the capsule of the VMH (Figure 16d).

Finally, we identified, by immunofluorescence microscopy, the terminals/fibers in the aPVT that expressed TH, OXT, AVP, ORX, MCH, POMC, and AgRP. Figure 18 illustrates that there is a high density of TH fibers in the aPVT (Figure 18a). AgRP and POMC fibers showed a more lateral, symmetric distribution (Figure 18b,c); MCH and ORX fibers were sparse (Figure 18d,e). OXT fibers showed a striking localization close to the ventricle (Figure 18f), and AVP fibers were present bilaterally in relatively narrow regions of the PVT (Figure 18g).

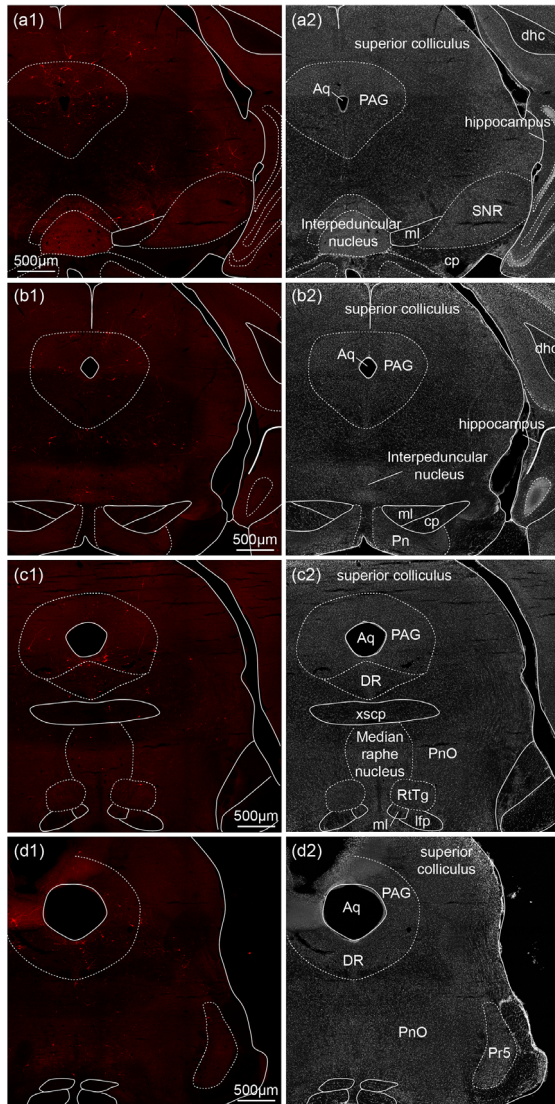
### 3 | DISCUSSION

The PVT is generally considered a hub for integration of signals from diverse neuronal circuits. Its afferent and efferent connections have been thoroughly characterized in rat (Kirouac, 2015; Vertes et al., 2015), and functional studies have highlighted its important role in

cortex (a1), and in the preoptic areas (c1, d1). Scale bars are shown in the figure. (c–e) Microphotographs illustrating the distribution of neurons projecting onto MCH neurons of the DMH and the capsule of the VMH (tRFP, red), at several levels of the anterior bed nucleus of the stria terminalis (BNST). tRFP-positive cells are observed in the dorsomedial and lateral division of the BNST as well as in the ventral division. Scale bars are shown in the figure. ac, anterior commissure; AcbC, accumbens nucleus core; AcbSh, accumbens nucleus shell; AVPV, anteroventral periventricular nucleus, ventral part; BNST, bed nucleus of the stria terminalis; cc, corpus callosum; Cg1, cingulate cortex, area 1; CPu, caudate putamen; DP, dorsal peduncular cortex; DTT, dorsal tenia tecta; fmi, forceps minor of the corpus callosum; IL, infralimbic cortex; LPO, lateral preoptic area; LSd, lateral septal nucleus, dorsal part; LSI, lateral septal nucleus, intermediate part; LSv, lateral septal nucleus, ventral part; LV, lateral ventricle; M2, secondary motor cortex; MPA, medial preoptic area; MS, medial septum; OVLT, organum vasculosum of the lamina terminalis; Pir, piriform cortex; PrL, prelimbic cortex; StHy, striohypothalamic nucleus; Tu, tubercle; VDB, nucleus of the verticle limb of the diagonal band; VMPO, ventromedial preoptic nucleus



**FIGURE 9** Confocal photomicrographs illustrating direct inputs to  $GCK^{aPVT}$  neurons in the hypothalamus (a1–j1, Case #783). (a2–j2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Important number of presynaptic inputs is observed in preoptic areas (a1, b1), in the PVH (c1–e1), in the VMHdm (e1), in the DMH (f1, g1), and in the premammillary nuclei and mammillary bodies (h1–j1). Scale bars are shown in the figure. 3V, 3rd ventricle; ac, anterior commissure; AHN, anterior hypothalamic nucleus; Amy, amygdaloid nucleus; ARH, arcuate nucleus of the hypothalamus; AVP, anteroventral periventricular nucleus; BLA, basolateral amygdaloid nucleus, anterior part; BMA, accessory basal amygdaloid nucleus; BNST, bed nucleus of the stria terminalis; CPu, caudate putamen; D3V, dorsal 3rd ventricle; DMH, dorsomedial nucleus of the hypothalamus; fr, fasciculus retroflexus; fx, fornix; GP, globus pallidus; LHA, lateral hypothalamic area; LPO, lateral preoptic area; LSv, lateral septal nucleus, ventral part; ME, median eminence; MeAD, medial amygdaloid nucleus, anterodorsal part; MeAV, medial amygdaloid nucleus, anteroventral part; MePD, medial amygdaloid nucleus, posterodorsal part; MePV, medial amygdaloid nucleus, posteroventral part; ml, medial lemniscus; MM, medial mammillary nucleus; MPA, medial preoptic area; MPO, medial preoptic nucleus; mtt, mammillothalamic tract; och, optic chiasm; opt, optic tract; PAG, periaqueductal gray; pc, posterior commissure; PH, posterior hypothalamic nucleus; Pir, piriform cortex; pm, principal mammillary tract; PMD, premammillary nucleus, dorsal part; PMV, premammillary nucleus, ventral part; prc, precommissural nucleus; PSTN, parasubthalamic nucleus; PVH, paraventricular nucleus of the hypothalamus; RCH, retrochiasmatic area; Rt, reticular thalamic nucleus; sm, stria medullaris; SN, substantia nigra; SON, supraoptic nucleus; StHy, striohypothalamic nucleus; TU, tuberal nucleus; VLPO, ventrolateral preoptic area; VMH, ventromedial nucleus of the hypothalamus; VMPO, ventromedial preoptic nucleus; VTA, ventral tegmental area; ZI, zona incerta



**FIGURE 10** Confocal photomicrographs illustrating direct inputs to GCK<sup>aPVT</sup> neurons in the midbrain (Case #783). (a2–d2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Abundant presynaptic inputs are observed in the PAG (a1–d1). Scale bars are shown in the figure. Aq, aqueduct; cp, cerebral peduncle; dhc, dorsal hippocampal commissure; lfp, longitudinal fasciculus of the pons; ml, medial lemniscus; PAG, periaqueductal gray; Pn, pontine nuclei; PnO, pontine reticular nucleus, oral part; Pr5, principal sensory trigeminal nucleus; RtTg, reticulotegmental nucleus of the pons; SNR, substantia nigra, reticular part; xscp, decussation of the superior cerebral peduncle

the integration of arousal cues, including rewarding and aversive stimuli (Choi et al., 2019; Millan et al., 2017; Petrovich, 2021). The majority of these studies examined PVT as a unit, using a region-oriented approach. Only recently studies have started to dissect individual subpopulations with distinct expression markers and functional outputs (Clark et al., 2017; Hua et al., 2018; Kessler et al., 2021; Labouèbe et al., 2016; Luo et al., 2018). Given the multifactorial implication of the region in behavioral outcomes, focusing on particular neuronal subpopulations is essential for untangling the underlying neuronal net-

works. Toward this direction, we examined the aPVT neurons that are characterized by the expression of *Gck*. In the current study, we provide a detailed anatomical description of the neuronal network formed by Gck<sup>aPVT</sup> neurons using viral anterograde and retrograde tracing experiments, and we define the transcriptomic profile of these neurons by using TRAP RNAseq analysis combined with histological approaches.

### 3.1 | Methodological considerations

The viral-mediated tracing approaches we used are well established (Nectow & Nestler, 2020). Nevertheless, methodological limitations must be considered. One of the main challenges is the accuracy of the injection sites and the viral spread. In the present study, the sites of injection in the different animals displayed very low variability leading to consistent anterograde or retrograde tracing results. However, the viral spread in the areas surrounding the PVT (including CM, PT, and AD) should be considered during result interpretation. In particular, the consistent contamination from CM Gck-expressing neurons in the animals used for anterograde tracing (Figure 1b,c) is contributing to the list of identified target areas. PrL, IL, central amygdaloid nucleus (ceA), basolateral amygdaloid nucleus, anterior part (BLA), NAc, and Ect have all been identified as output areas of CM-residing neurons in rat (Vertes et al., 2012). Thus, some of the fibers detected could be due to the contribution of projections from CM Gck-expressing neurons.

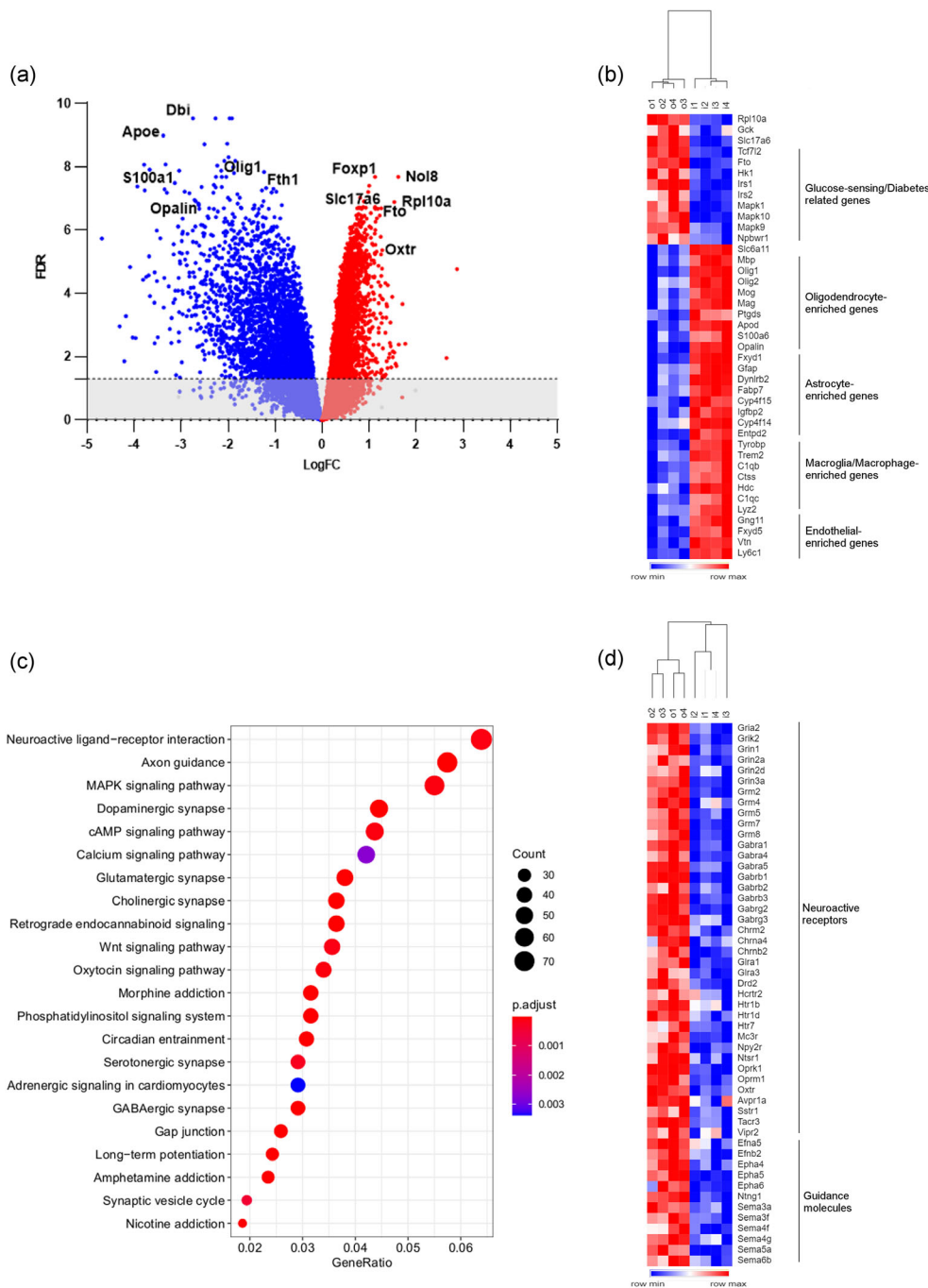
For retrograde studies, we also observed a viral spread in the PT that could explain the detection of mCherry-positive presynaptic neurons in the NAc. Indeed, such projections have been already described in the literature (Williams et al., 1977).

A second point of consideration is the limited capacity for long-range diffusion of the B19 rabies strain used (Reardon et al., 2016). Thus, for instance, the high density of retrogradely labeled neurons in hypothalamic areas may reflect their close location to the aPVT injection sites, and more distant sites may not be as efficiently labeled.

### 3.2 | Gck<sup>Cre/+</sup> mice to characterize the Gck<sup>aPVT</sup> neuronal network and functional interpretation

A collective view of both anterograde and retrograde results suggests that Gck<sup>aPVT</sup> neurons are part of a highly interconnected network consisting of reciprocal projections that may form feedback loops as described for thalamocortical circuits (Bannister, 2005; Briggs & Usrey, 2008; Kirouac, 2015).

Indeed, this study provides an exhaustive description of Gck<sup>aPVT</sup> neuronal outputs and inputs throughout the brain from the PrL to midbrain areas. The intensity of Gck<sup>aPVT</sup> neuronal projections ranges from low to high. The strongest innervation is in telencephalic structures such as the NAc, amygdala, and the BNST, and in hypothalamic nuclei such as the VMH. Weaker projections are observed in the



**FIGURE 11** (a) Volcano plot showing the differential gene expression in output (*Gck* expressing cells of the aPVT) versus input (non-*Gck* expressing cells of the aPVT). Dashed line represents the significance cutoff of False Discovery Rate (FDR) > 1.3. (b) Heat map representation of the differentially expressed genes between input and output. Each sample is represented by a single column and hierarchical clustering verifies the clear separation of the two distinct transcriptional profiles. (c) KEGG pathway analysis for the *Gck*<sup>aPVT</sup>-enriched genes. Only pathways with an adjusted *p*-value lower than .01 are shown. (d) Heat map representation of the *Gck*<sup>aPVT</sup>-enriched neuroactive receptors and guidance molecules

telencephalic subiculum and in the hypothalamic DMH. The projection areas identified for *Gck*<sup>aPVT</sup> neurons are in line with data previously reported from rodent studies (Kessler et al., 2021; Kirouac, 2015; Labouèbe et al., 2016; Otis et al., 2019; Ren et al., 2018; Vertes & Hoover, 2008; Zhu et al., 2016).

On the other hand, our monosynaptic retrograde tracing approach revealed terminals deriving from a wide spectrum of areas, including

telencephalic (BNST, cortical areas), hypothalamic (LHA, DMH), and midbrain (PAG) regions. Most areas innervated by *Gck*<sup>aPVT</sup> projections also send reciprocal projections. While we cannot quantify the level of reciprocity with the techniques we used, the prefrontal cortex, the NAc, the BNST, and the dorsomedial part of the VMH and the DMH appear as major sites of reciprocal projections with *Gck*<sup>aPVT</sup> neurons, while the PVH does not seem to be a major actor of this reciprocal

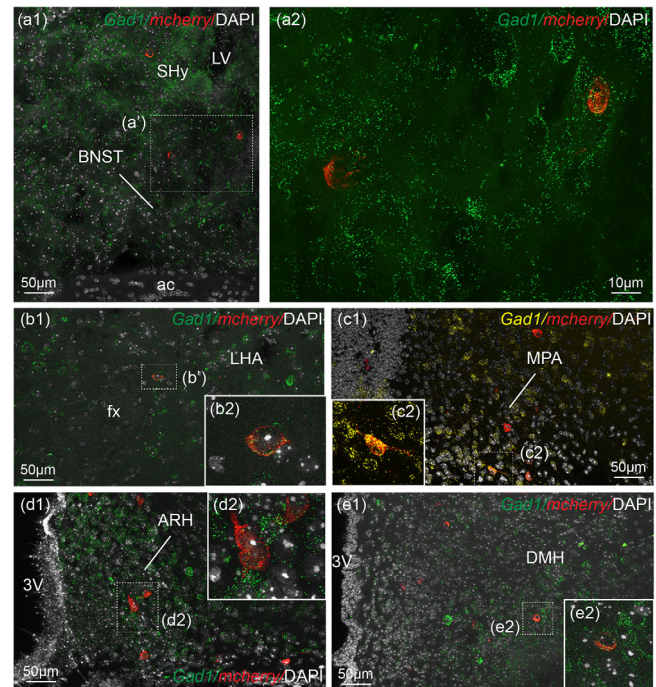
network. This observation is in line with previous reports of reciprocal projections from the PVT in rats (Kirouac, 2015) and mice (Clark et al., 2017).

Collective research effort over the years has established PVT as an integrator that modulates motivated behaviors based on the interoceptive signals received (Millan et al., 2017). Interoceptive signals are transmitted through afferent connections from the brainstem and hypothalamus and modulation is a result of efferent signals on cortical and limbic areas (Kirouac, 2015). Through these various afferent and efferent projections, PVT has been linked with a plethora of motivated behaviors, including cue-dependent reward learning (Choi & McNally, 2017; Kessler et al., 2021; Labouèbe et al., 2016; Otis et al., 2019), addiction (Hamlin et al., 2009; Kuhn et al., 2018; Matzeu et al., 2017; Zhu et al., 2016), and feeding (Christoffel et al., 2021; Luo et al., 2018; Zhang & van den Pol, 2017). The fact that  $Gck^{aPVT}$  neurons present a connectome pattern highly similar to that obtained through whole PVT tracing approaches implies their involvement in several aspects of the PVT-regulated behaviors. We have so far confirmed their contribution to sucrose seeking behavior through their projections to the NAc (Kessler et al., 2021). Further functional studies are required in order to untangle the complex involvement of PVT neuronal subpopulations in behavioral responses and the detailed characterization of  $Gck^{aPVT}$  neurons provided with the current study is setting the basis for exploration of additional circuits involved.

### 3.3 | Transcriptomic characterization of $Gck^{aPVT}$ neurons and functional interpretation

Our transcriptomic analysis of  $Gck^{aPVT}$  neurons revealed that they are enriched in mRNAs involved in neurotransmitter-based synapses, neuroactive ligand–receptor interaction, axon guidance, cell-to-cell communication, and obesity and diabetes physiopathology.

This provides important information notably regarding neurotransmitter and neuropeptide responsiveness. Indeed, TRAP data analysis revealed that  $Gck^{aPVT}$  neurons express receptors for GABA, glutamate, serotonin, and glycine neurotransmitters, but also for various neuropeptides and neuromodulators known to control goal-oriented behavior including feeding and water intake such as NPY, POMC, MCH, AVP, neurotensin, galanin, among others (Crawley, 1999; Diniz & Bittencourt, 2017; Pei et al., 2014; Schroeder & Leininger, 2018; Timper & Brüning, 2017). Using in situ hybridization and immunohistochemistry approaches to detect neurotransmitters and neuropeptides in retrogradely labeled neurons, we confirmed the existence of direct inputs from several forebrain and hypothalamic subpopulations, notably POMC-, CRH-, ORX-, and MCH-expressing neurons. On the contrary, while OXT receptor was highly enriched in  $Gck^{aPVT}$  neurons, we were not able to observe evident colocalization of OXT in mCherry-positive presynaptic neurons in the PVH and supraoptic nucleus of the hypothalamus. Interestingly, significant OXT-positive fibers were observed close to the surface of the dorsal part of the third ventri-

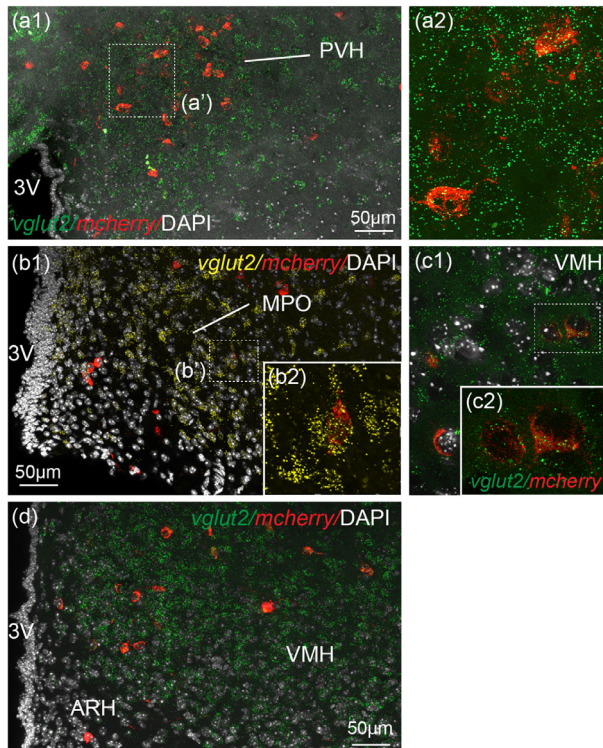


**FIGURE 12** Microscope images illustrating the expression of  $Gad1$  mRNA in  $Gck^{aPVT}$  presynaptic neurons labeled with mCherry (red, case #1092) in the BNST (a1, a2), in the LHA (b1, b2), in the MPA (c1, c2), in the ARH (d1, d2), and in the DMH (e1, e2). DAPI-stained nuclei allow illustration of cytoarchitectonic purposes. Scale bars are shown in the figure. 3V, 3rd ventricle; ac, anterior commissure; ARH, arcuate nucleus of the hypothalamus; BNST, bed nucleus of the stria terminalis; DMH, dorsomedial nucleus of the hypothalamus; LHA, lateral hypothalamic area; LV, lateral ventricle; MPA, medial preoptic area; SHy, septohypothalamic nucleus

cle, suggesting it may be released in the cerebrospinal fluid. Furthermore, OXT is also released in the bloodstream by the posterior pituitary (Samson & Schell, 1995). Therefore, an explanation for the high enrichment of *Oxtr* in  $Gck^{aPVT}$  neurons could be that they are responsive to circulating OXT.

Our transcriptomic data show that genes controlling axon guidance and synaptic plasticity are expressed at a relatively high level in  $Gck^{aPVT}$  neurons. Because this analysis was performed using overnight food-deprived mice, this may suggest that synaptic remodeling is activated in the fasted state. This would be compatible with these neurons being glucose responsive (Kessler et al., 2021) and with the observation that synaptic remodeling is activated by fasting in hypothalamic neurons involved in feeding control (Kong et al., 2016; Liu et al., 2012).

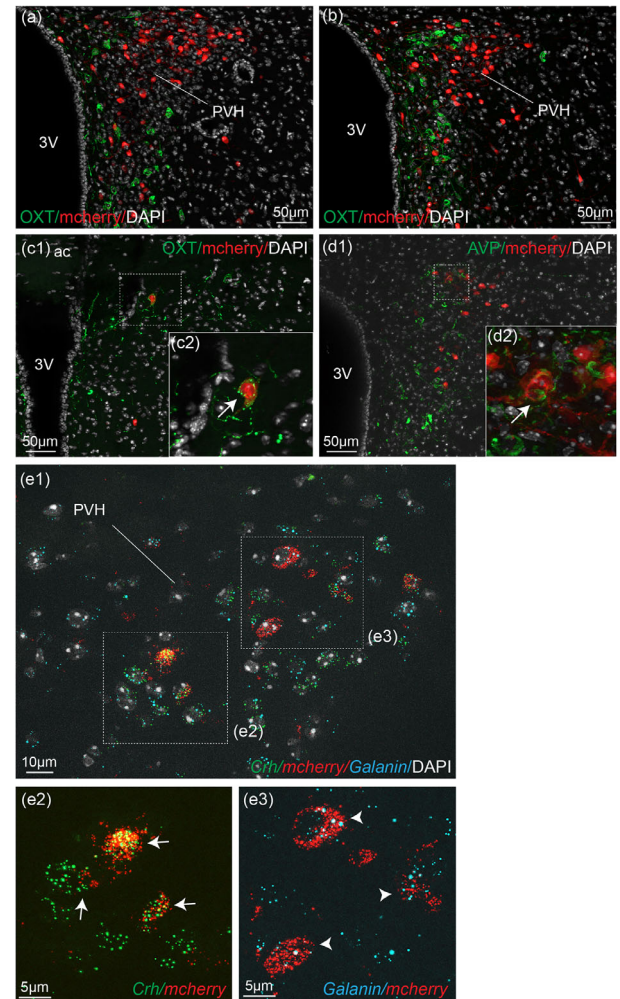
In line with the indication that  $Gck^{aPVT}$  neurons play an important role in linking the animal energy status with goal-oriented behavior is the observation that these neurons are enriched in *Fto* and *Npbwr1* genes, both involved in feeding-related behavior (Chottova Dvorakova, 2018; Fawcett & Barroso, 2010). Furthermore, they express *Tcf7l2*, identified in human genome-wide association studies as a type 2 diabetes susceptibility gene (Grant et al., 2006) suggesting that the central expression of *Tcf7l2* plays a role in glucoregulation. Of note, the major



**FIGURE 13** Microscope images illustrating the expression of *vglut2* (*Slc17a6*) mRNA in  $Gck^{aPVT}$  presynaptic neurons positive for mCherry (red, case #84290) in the PVH (a1, a2), in the MPO (b1, b2), and in the VMH (c1, c2, d). DAPI-stained nuclei allow illustration of cytoarchitectonic purposes. Scale bars are shown in the figure. ARH, arcuate nucleus of the hypothalamus; MPO, medial preoptic nucleus; PVH, paraventricular nucleus of the hypothalamus; VMH, ventromedial nucleus of the hypothalamus

site of expression of *Tcf7l2* within the brain is the thalamus that encompasses the PVT (Allen brain mouse atlas) (Lein et al., 2007).

Collectively, the  $Gck^{Cre/+}$  mouse line used here proved to be an excellent model to define the precise projection sites of the  $Gck^{aPVT}$  neurons as well as to support the identification of their neuronal inputs. Analysis of the inputs into  $Gck^{aPVT}$  neurons shows that they receive rich information coming, in large part, from distinct hypothalamic nuclei and using a diversity of neurotransmitters/neuropeptides. Mapping of these inputs in the PVT shows some neuropeptide-based regional selectivity. Our transcriptomic analysis further indicate that the  $Gck^{aPVT}$  neurons express a large number of neurotransmitter/neuropeptide receptors. This suggests that subpopulations of  $Gck^{aPVT}$  neurons may exist that are characterized by the expression of various combinations of these receptors. It may be hypothesized that such subpopulations may also display some functional specificities. Thus, our study provides more detailed information about the topographic and functional connectivity of  $Gck^{aPVT}$  neurons and their molecular make-up. This information will help further untangle how the PVT participates in the control of behavioral responses and to explore additional circuits involved in goal-oriented behaviors.



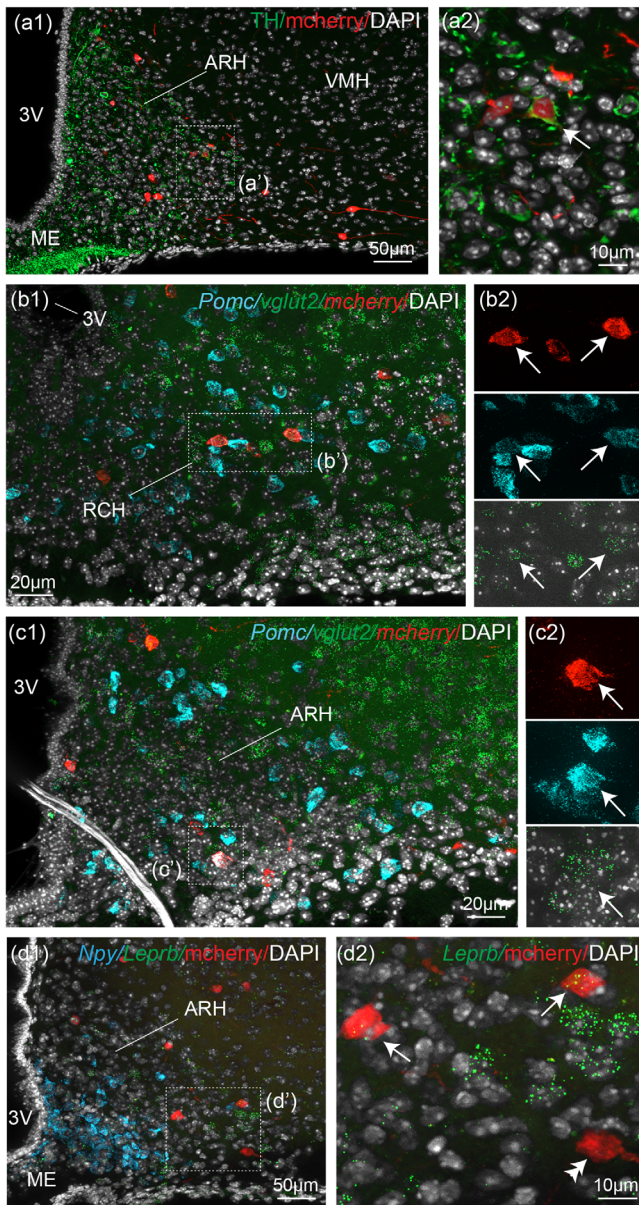
**FIGURE 14** Photomicrographs showing immunodetection of OXT (a–c1, cases #1088 and #1091) and AVP (d1, Case #1088) in mCherry-positive  $Gck^{aPVT}$  presynaptic neurons in the PVH. (e1) Photomicrographs illustrating detection of *Crh* (green, case #84290) and galanin (blue, case #84290) mRNA colocalized in mCherry-positive  $Gck^{aPVT}$  presynaptic neurons in the PVH. Nuclei are stained with DAPI (white). (e2 and e3) High magnifications of the insets shown in panel e1. Scale bars are shown in the figure. 3V, 3rd ventricle; PVH, paraventricular nucleus of the hypothalamus

## 4 | METHODS

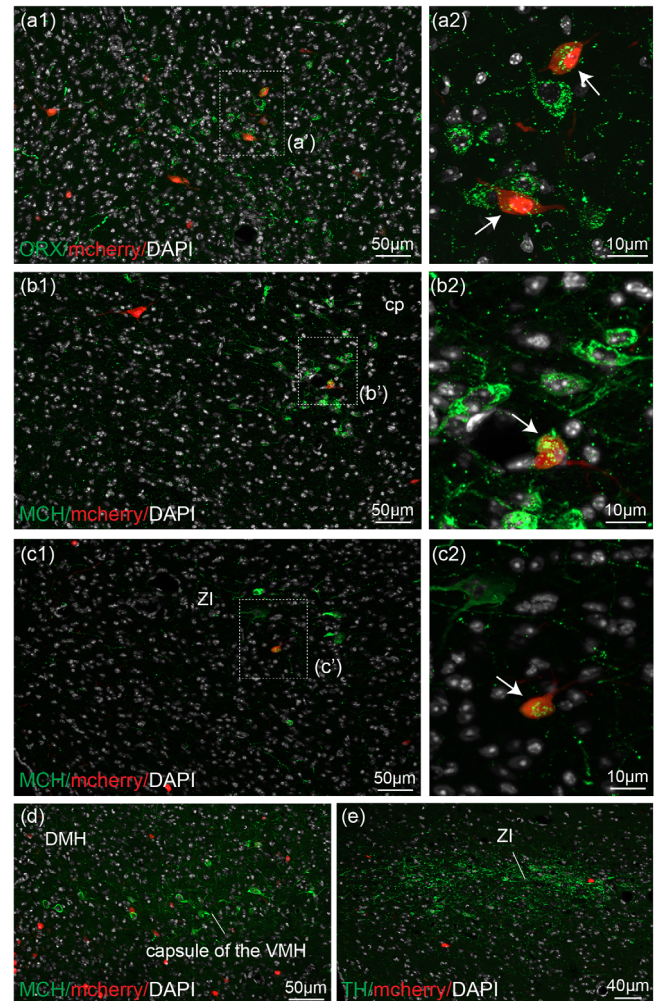
### 4.1 | Animals

#### 4.1.1 | Ethics statement

All procedures were conducted in accordance with the Swiss National Institutional Guidelines of Animal Experimentation (OExA; 455.163) with license approval (VD3184, VD3340) issued by the Cantonal Veterinary Authorities (Vaud, Switzerland). Mice were group housed in individual cages and maintained in a temperature-controlled room with a 12-h light/dark cycle and provided ad libitum access to water and standard laboratory chow (Kliba Nafag).



**FIGURE 15** Photomicrographs showing immunodetection of TH (a1, case #1077) in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the ARH. (a2) High magnification of the inset shown in panel a1. Photomicrographs illustrating detection of vglut2 (Slc17a6, green, case #84290) and Pomc mRNA (blue, case #84290) colocalized in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the retrochiasmatic area (RCH) (b1, b2) and in the ARH (c1). (b2) High magnifications of the insets shown in panel b1. (b2) Arrows show mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons expressing Leprb mRNA. (c2) High magnifications of the insets shown in panel c1. (c2) Arrows show mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons expressing both Pomc and vglut2 mRNA in the ARH. (d1) Photomicrographs illustrating detection of Leprb mRNA (green, case #1092) and Npy mRNA (blue, case #1092) colocalized in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the ARH. (d2) High magnifications of the insets shown in panel d1. Double arrowhead shows mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons that do not express Leprb mRNA. Nuclei are stained with DAPI (white). Scale bars are shown in the figure. ARH, arcuate nucleus of the hypothalamus; ME, median eminence; RCH, retrochiasmatic area; VMH, ventromedial nucleus of the hypothalamus



**FIGURE 16** (a1) Photomicrographs showing immunodetection of ORX (green, case #1092) in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the lateral hypothalamic area (LHA). (a2) High magnification of the inset shown in panel a1. Photomicrographs showing immunodetection of MCH (green, case #1091) in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the LHA (b1) and in the ZI (c1). (b') High magnification of the inset shown in panel b1. (c2) High magnification of the inset shown in panel c1. (d) Photomicrographs showing immunodetection of MCH (green, case #1091) in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the capsule of the VMH. No colocalization has been observed in our material. (e) Photomicrographs showing immunodetection of TH (green, case #1091) in mCherry-positive GCK<sup>aPVT</sup> presynaptic neurons in the ZI. No colocalization has been observed in our material. Nuclei are stained with DAPI (white). Scale bars are shown in the figure. DMH, dorsomedial nucleus of the hypothalamus; VMH, ventromedial nucleus of the hypothalamus; ZI, zona incerta

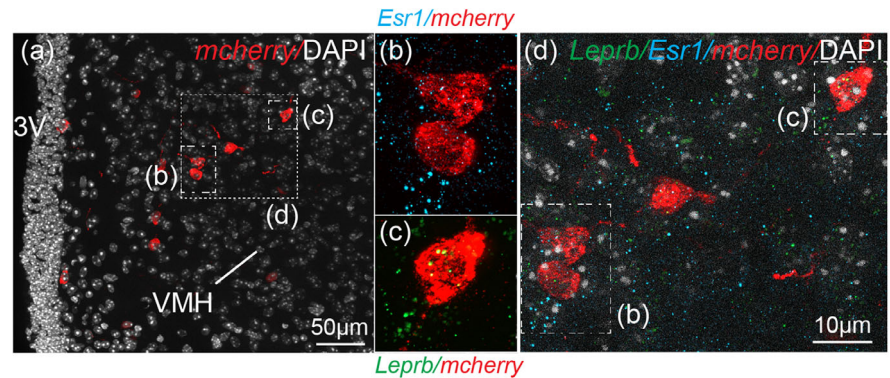
## 4.2 | Surgery

### 4.2.1 | Anterograde tracing

16 to 20 weeks old male Gck<sup>Cre/+</sup> mice were used for the anterograde tracing experiments. A total of 300 nl of AAV2-hsyn-DIO-mCherry (titer  $9 \times 10^{11}$  VG/ml) was injected in aPVT (from Bregma,



**FIGURE 17** Microscope images illustrating the expression of *Esr1* (blue, a, b) and *Leprb* (green, c, d) mRNA in  $GCK^{aPVT}$  presynaptic neurons positive for mCherry (a–d, red, case #4) in the VMH. DAPI-stained nuclei allow illustration of cytoarchitectonic purposes. Scale bars are shown in the figure. VMH, ventromedial nucleus of the hypothalamus



anteroposterior (AP):  $-0.4$  mm, mediolateral (ML):  $+0.7$  mm, dorsoventral (DV):  $-3.5$  mm, with an angle of  $10^\circ$ ). Ten days after injection, mice were transcardially perfused with phosphate-buffered saline (PBS) followed by 4% paraformaldehyde (PFA; Electron Microscopy Sciences, Hatfield, US). Brains were postfixed O/N in 4% PFA at  $4^\circ\text{C}$  and then cryopreserved in 30% sucrose (Sigma, Merck, Darmstadt, Germany) solution in PBS for at least 24 h at  $4^\circ\text{C}$  (until completely sunk to the bottom of the container). Cryopreserved brains were frozen using powdered dry-ice and sliced in  $25\text{-}\mu\text{m}$  thick sections.

#### 4.2.2 | Monosynaptic retrograde tracing

##### Virus

pAAV-syn-FLEX-splitTVA-EGFP-tTA (Addgene viral prep # 100798-AAV1; <http://n2t.net/addgene:100798>; RRID:Addgene\_100798) and pAAV-TREtight-mTagBFP2-B19G were a gift from Ian Wickersham (Addgene viral prep # 100799-AAV1; <http://n2t.net/addgene:100799>; RRID:Addgene\_100799).

##### Surgery

Monosynaptic retrograde tracing using rabies virus was performed as follow: 13- to 20-week-old adult male  $Gck^{Cre/+}$  mice were anesthetized with a mix of xylazine ketamine. Viruses were injected with a Nanofil microsyringe (World Precisions, Sarasota, FL, USA, 35G) and microinjection pump (World Precisions, Sarasota, FL, USA, rate at 100 nl/min). Mice receive 300 nl of mixed AAV1-Syn-FLEX-splitTVA-eGFP-tTA and AAV1-TREtight-BFP2-B19G in the aPVT (from Bregma, AP:  $-0.4$  mm; ML:  $+0.65$  mm; DV:  $-3.4$  mm,  $10^\circ$ ). After 7 days, the same mice received a second injection of 300 nl of pseudotyped rabies virus EnvA-SADdG-mCherry (Salk Institute, La Jolla, CA, USA) using the same coordinates. Control mice were injected with EnvA-SADdG-mCherry alone. One week later, mice were anesthetized and transcardially perfused with 0.9% NaCl followed by 4% PFA (Applichem, Darmstadt, Germany). Brains were postfixed 4 h in 4% PFA/20% sucrose at  $4^\circ\text{C}$  and then cryopreserved in 20% sucrose solution in PBS overnight at  $4^\circ\text{C}$ . Thirty-micrometer-thick brain cryosections were processed for immunofluorescence and in situ hybridization using standard procedures.

### 4.3 | Immunohistochemistry

#### 4.3.1 | Characterization of the primary antisera

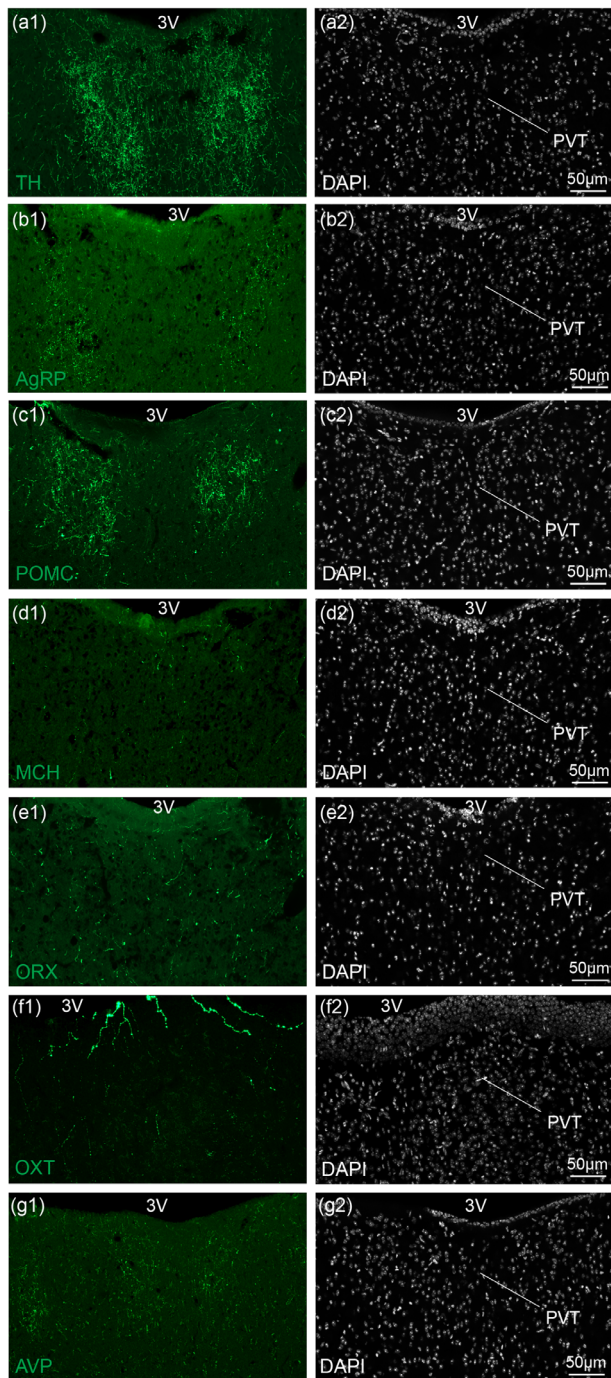
Table 2 lists the antigen, immunogen, manufacturer, catalog number, species in which the antibodies were raised, and working dilution for each of the primary antibodies. Information about the specificity of the antibodies in the following paragraphs is from the manufacturers and/or the cited references.

The rabbit polyclonal TH antibody (Merck Millipore, Darmstadt, Germany, AB152, RRID: AB\_390204) has been produced against denatured tyrosine hydroxylase from rat pheochromocytoma and targets catecholamine neurons. Sections of liver have been used as negative control and brain sections (corpus striatum) and adrenal glands as positive control and produced a pattern of staining similar to that reported elsewhere in the literature (Goff et al., 2015).

The rabbit polyclonal salmon MCH (sMCH) antibody (Risold Laboratory, RRID: AB\_2616562) recognized the synthetic sMCH (full17-amino-acid, sequence: DTMKVMVGRVYRPCWEV). The specificity of the sMCH antisera was tested by blotting (Risold et al., 1992). The sMCH antibody has been tested on hypothalamic sections from several species (Chometton et al., 2014; Croizier et al., 2013). Its specificity has been verified by liquid-phase inhibition, dot blot, and affinity column analyses (Fellmann et al., 1987; Risold et al., 1992). The labeling was observed exclusively in MCH-GFP cells in the lateral hypothalamus of mice (Croizier et al., 2011). Moreover, double labeling experiments detecting the prepro-MCH mRNA by in situ hybridization and MCH peptides by indirect immunofluorescence were performed in pigs and highlighted the same cell bodies in the posterior LHA (Chometton et al., 2014).

The mouse monoclonal ORX antibody (Angio-Proteomie, Boston, MA, USA, Cat# hAP-0500, ABIN1983384) was produced from a hybridoma (mouse myeloma fused with spleen cells from a mouse immunized with a peptide, aa 35–65, O43612) from human Orexin-A protein. The immunohistochemistry produced a pattern of staining similar to that described elsewhere in the literature (Barbier et al., 2018).

The rabbit polyclonal AVP antibody (Peninsula Lab International, San Carlos, CA, USA, T-4563, RRID: AB\_518673) was made against



**FIGURE 18** Photomicrographs illustrating TH (a1), AgRP (b1), POMC (c1), MCH (d1), ORX (e1), OXT (f1), and AVP (g1)-positive fibers in the anterior PVT. (a2–g2) Photomicrographs showing DAPI-stained nuclei to illustrate cytoarchitectonic purposes. Scale bars are shown in the figure. 3V, 3rd ventricle; PVT, paraventricular nucleus of the thalamus

synthetic human (Arg8)-vasopressin peptide. The immunohistochemistry highlights immunoreactive cells in the PVH and the supraoptic nucleus, similar to that described elsewhere in the literature (Castillo-Ruiz et al., 2018).

The rabbit polyclonal POMC antibody (Phoenix Pharmaceuticals, Mannheim, Germany, H-029-30, RRID:AB\_2307442) made against the porcine POMC precursor (amino acids 27–52) was further confirmed by immunofluorescence of POMC neurons in tau-topaz GFP mice. As expected, the POMC neurons labeled with this antiserum colocalized with GFP-expressing POMC neurons (Pinto et al., 2004).

The rabbit polyclonal AgRP antibody (Phoenix Pharmaceutical, Mannheim, Germany, H-003-53, RRID:AB\_2313908) was made against the human Agouti-Related Protein (83-132) amide. Preabsorption with the immunizing peptide AgRP (83-132) blocks the staining reaction (Haskell-Luevano et al., 1999).

The rabbit monoclonal OXT antibody (Abcam, Cambridge, UK, ab\_212193) was made against the recombinant fragment of Human Oxytocin aa 1 to the C-terminus. This antibody recognizes oxytocin protein by western blotting performed with mouse and rat pituitary tissue lysates. Oxytocin is immunodetected in the paraventricular nucleus of the hypothalamus (PVH) of rats and mice (Zhou et al., 2020).

#### 4.3.2 | Immunofluorescent staining

After rinsing in PBS, sections were incubated with primary antibodies (Table 2) dissolved in working solution (PBS, 2% goat serum, 0.3% Triton) for 48 h at 4°C. Tissues were washed three times with PBS (5 min each) and incubated for 1 h with appropriate secondary antibodies (Table 3) diluted in the working solution at room temperature. Finally, sections were washed with PBS, mounted using DAPI-fluoromount (SouthernBiotech®, Birmingham, AL, USA) solution.

#### 4.4 | In situ hybridization (RNAscope)

On 30- $\mu$ m-thick brain coronal cryosections, in situ hybridization for *Pomc* (Cat# 314081), *Npy* (Cat# 313321), *Leprb* (Cat# 402731), *Crh* (Cat# 316091), *Slc17a6* (*vglut2*, Cat# 319171), *Gad1* (Cat# 400951), *Galanin* (Cat# 400961), *mcherry* (Cat# 431201), and *Esr1* (Cat# 478201) was processed using RNAscope probes and RNAscope Fluorescent Multiplex Detection Reagents (Advanced Cell Diagnostics, Newark, CA, USA) following manufacturer's instructions. As negative control, we used the negative control probe-DapB (Cat #310043).

#### 4.5 | Translating ribosomes affinity purification

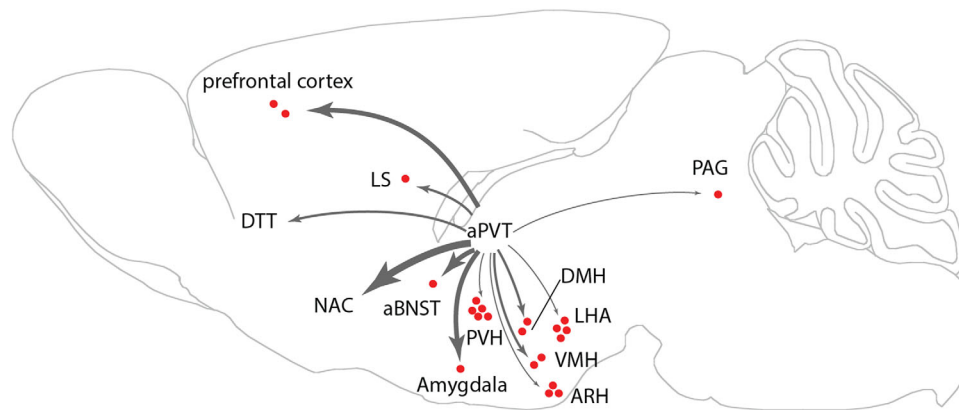
TRAP was performed as described (Heiman et al., 2008; Heiman et al., 2014) with minor modifications. Briefly, *Gck<sup>Cre/+</sup>* mice were injected in the PVT twice with 200 nl of AAV8-DIO-L10-eGFP (Nectow et al., 2017) (AP:  $-0.4$ , DV:  $-3.5$ , and ML:  $\pm 0.7$ ,  $10^\circ$  angle). Ten days later, mice were fasted overnight, and killed by decapitation, and the PVT were microdissected under binoculars in ice-cold PBS, directly frozen in liquid nitrogen and stored at  $-150^\circ\text{C}$ . TRAP extractions were

**TABLE 2** List of primary antibodies used in the study

| Antibody             | Immunogen  | Source  | Dilution |
|----------------------|--|---|----------|
| Anti-TH              | Denatured tyrosine hydroxylase from rat pheochromocytoma             | Rabbit, polyclonal, Merck Millipore, AB152, RRID:AB_390204              | 1:500    |
| Anti-MCH             | Synthetic salmon MCH; full 17-amino-acid sequence: DTRKMKVGRVYRPCWEV | Rabbit, polyclonal, Risold et al. (1992), RRID:AB_2616562               | 1:1000   |
| Anti-Orexin A (Hcrt) | Human Orexin A, immunogen AA 35–65, clone MM0500-8G22                | Mouse, monoclonal IgG1, Angio-Proteomie, Cat# hAP-0500, ABIN1983384     | 1:1000   |
| Anti-AVP             | Human (Arg8)-Vasopressin   | Rabbit, polyclonal, T-4563, Peninsula Lab International, RRID:AB_518673 | 1:500    |
| Anti-POMC            | Porcine POMC precursor (amino acids 27–52)                           | Rabbit, polyclonal, Phoenix Pharmaceuticals, H-029-30, RRID:AB_2307442  | 1:2000   |
| Anti-AgRP            | Human Agouti-Related Protein (83-132) amide                          | Rabbit, polyclonal, Phoenix Pharmaceuticals, H-003-53, RRID:AB_2313908  | 1:2000   |
| Anti-OXT             | Recombinant fragment of Human Oxytocin aa 1 to the C-terminus        | Rabbit, monoclonal, Abcam, ab_212193                                    | 1:500    |

**TABLE 3** List of secondary antibodies used in the study

| Secondary antibodies   | Conjugated      | Manufacturer  | Cat Number | RRID       | Dilution |
|--|-----------------|---------------|------------|------------|----------|
| Goat anti-mouse IgG (H+L) cross-adsorbed secondary antibody  | Alexa Fluor 488 | Thermo Fisher | A11001     | AB_2534069 | 1:500    |
| Goat anti-rabbit IgG (H+L) cross-adsorbed secondary antibody | Alexa Fluor 488 | Thermo Fisher | A11008     | AB_143165  | 1:500    |



**FIGURE 19** Sagittal view of a brain showing general organization of the inputs and outputs to GCK-expressing neurons in the anterior PVT (aPVT). The relative strength of each pathway is proportional to the thickness of the gray lines. Projections from the aPVT innervate the prefrontal cortex, the dorsal tectum (DTT), the nucleus accumbens (NAC), the lateral septum (LS), the anterior part of the BNST (aBNST), the amygdala, and hypothalamic nuclei including the paraventricular (PVH), the dorsomedial (DMH), the ventromedial (VMH), the arcuate (ARH), the lateral hypothalamic area (LHA), and the periaqueductal gray (PAG). They also receive reciprocal projections from the prefrontal cortex, the LS, aBNST, the amygdala, the PVH, DMH, VMH, ARH, LHA, and PAG. The relative number of red dots is proportional to the abundance of presynaptic neurons

performed on four pools of five PVTs, lysed in 500  $\mu$ l of ice-cold lysis buffer (20 mM HEPES pH 7.3, 150 mM KCl, 10 mM MgCl<sub>2</sub>, 1% NP40, cycloheximide 100  $\mu$ g/ml, 0.5 mM DTT, Supersasin [ThermoFischer, Waltham, MA, USA] and RNasin [Promega, Madison, WI, USA]) using a Potter and insoluble material was cleared by centrifugation (10 min at 10,000  $\times$  g). The supernatants were saved, 5.6  $\mu$ g of anti-GFP antibody (Sigma Aldrich, Merck, Darmstadt, Germany) was added, and the tubes were kept for 4 h at 4°C with constant rotation. This mixture

was coupled with 200  $\mu$ l of magnetic bead suspension (ThermoFischer, Waltham, MA, USA) as 30  $\mu$ l sample of this suspension was kept as control (input). Magnetic beads were then separated using a magnet and washed once in lysis buffer and three times with lysis buffer containing 350 mM KCl. RNAs attached to beads or present in the control input fractions were purified using the Nucleospin RNA mini kit (Macherey-Nagel, Allentown, PA, USA). RNAs were then subjected to fragment analysis and amplified by single primer isothermal amplification with

the Ovation RNA-Amplification System V2 (NuGEN), providing DNA libraries for RNA sequencing. The number of reads were between 50 and 65 million per library.

#### 4.6 | RNA-sequencing analysis

Reads were aligned against *Mus musculus* GRCm38.82 genome using STAR (v. 2.4.2a [Dobin et al., 2013]). The number of read counts per gene locus was summarized with htseq-count (v. 0.6.1 [Anders et al., 2015]) using *Mus musculus* GRCm38.82 gene annotation. Quality of the RNA-sequencing (RNA-seq) data alignment was assessed using RSeQC (v. 2.3.7 [Wang et al., 2012]). Genes with less than 1 count per million (CPM) across samples were removed. Library sizes were scaled using TMM normalization (EdgeR package version 3.16.3 [Robinson et al., 2010]) and log-transformed with Limma voom function (Limma package version 3.30.4 [Law et al., 2014]). Differential expression analysis was performed for the immunoprecipitated output samples versus the remaining PVT input samples; *p*-values were adjusted for multiple comparisons using the Benjamini Hochberg procedure (Hochberg & Benjamini, 1990) and those genes with an expression that differ with an adjusted *p*-value  $\leq .05$  were considered as differentially expressed. Heatmaps were generated using Morpheus online software (<https://software.broadinstitute.org/orpheus>). KEGG pathway analysis was performed with the “clusterProfiler” R package (Yu et al., 2012) and those pathways with an adjusted *p*-value  $\leq .05$  were overrepresented. RNA-seq data are available in a public repository (GEO). Accession # GSE185964.

#### 4.7 | Image acquisition and processing

Images for the anterograde and retrograde tracing study were acquired on a confocal LSM 710 (Zeiss, Germany) equipped with lasers for excitation of Alexa 488 (488 nm), Alexa 568 (561 nm), Alexa 647 (633 nm), and DAPI (405 nm) and Plan Aplanachromat 10 × 0.45 DIC and Plan Aplanachromat 20 × 0.8 DIC. Images were obtained by using the Zen black 2012 software. Immunofluorescent sections were acquired on a ZEISS Axio Imager.M2 microscope, equipped with ApoTome.2 and a Camera AxioCam 702 mono (Zeiss, Germany). Specific filter sets were used for the visualization of green (Filter set 38 HE eGFP shift free [E] EX BP 470/40, BS FT 495, EM BP 525/50), red (Filter set 43 HE Cy 3 shift free [E] EX BP 550/25, BS FT 570, EM BP 605/70), blue (Filter set 49 DAPI shift free [E] EX G 365, BS FT 395, EM BP 445/50) and far red (Filter set 50 Cy 5 shift free [E] EX BP 640/30, BS FT 660, EM BP 690/50) fluorescence. Different magnifications were selected using a Zeiss ×20 objective (Objective Plan-Aplanachromat 20×/0.8 M27, FWD = 0.55 mm) and a ×40 oil-immersion objective (Objective C Plan-Aplanachromat × 40/1.4 Oil DIC M27 [Free working distance, FWD = 0.13 mm]).

The overall distribution of mCherry-positive projections arising from GCK<sup>aPVT</sup> from Bregma 2.5 to −3.5 (case #1) has been imaged with

a stereomicroscope (Nikon SMZ-25 equipped with Plan-Apochromat 1X SHR WD 60 mm).

Neither additional treatment was made, except to enhance fluorescent intensity. We based our nomenclature and nuclear parcellation on Mouse Brain Atlas from Franklin and Paxinos (Paxinos & Franklin, 2001), on Rat Brain Atlas from Swanson (Swanson, 2004) and on the work of Barbier and colleagues (Barbier et al., 2021).

#### 4.8 | Quantification

##### 4.8.1 | Anterograde tracing

The density of Gck<sup>aPVT</sup> fibers in each target area was quantified approximately based on a 5-point scale adopted from Li and Kirouac (2008). The equivalence for projection intensity was as follows: +++++, very dense; ++++, dense; +++, moderate; ++, light; +, very light. The data presented in Table 1 are deriving from collective quantification of all five anterograde tracing cases.

##### 4.8.2 | Monosynaptic retrograde tracing

The total number of mCherry-positive neurons were quantified on the four brains (cases #1076, #1077, #1091, and #783) from confocal microscope images of sections including the IL to sections including the PAG. We did not analyze more anterior and posterior sections. We then quantified the number of mCherry-positive neurons in every brain area where cells have been observed. We expressed the results as percentage of total mCherry-positive cells.

#### 4.9 | Statistics

All values were represented as the mean  $\pm$  SEM (standard error of the mean). Numbers for every experiment are found in the relevant part of Section 4. Statistical analyses were conducted using GraphPad Prism (v. 8); *p*  $\leq .05$  was considered statistically significant.

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All the authors contributed to perform the experiments. SG, SQ, BT, and SC designed the experiments. SG, SQ, ARSA, and SC analyzed the data. SG and SC wrote the paper. SG, SQ, ARSA, BT, and SC edited the manuscript. This work was supported by an Advanced Grant from the European Research Council (INTEGRATE, No. 694798) and a grant from the Swiss National Science Foundation (grant # 310030-182496) to BT and grants from the Swiss National Science Foundation (PZ00P3\_167934/1) and the Novartis Foundation for medical-biological research (19B145) to SC.

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#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1002/cne.25312>.

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## APPENDIX

**TABLE A1** List of differentially expressed genes in GCK<sup>aPVT</sup> neurons compared to aPVT cells not expressing Gck. All differentially expressed genes with an adjusted *p*-value  $\leq .05$  are included. A total of 3121 genes were enriched in GCK<sup>aPVT</sup> neurons and 3245 were depleted

| Gene name     | LogFC | Adjusted <i>p</i> -value | Average expression (AveExpr) | Gene full name  |
|---------------|-------|--------------------------|------------------------------|---|
| Gtf2i         | 2.87  | $1.74 \times 10^{-5}$    | 9.108413                     | General transcription factor II I (Gtf2i)   |
| Tfap2d        | 2.65  | .011292057               | 0.410732                     | Transcription factor AP-2, delta (Tfap2d)   |
| Grhl3         | 1.77  | .004006759               | 0.14564                      | Grainyhead-like 3 (Grhl3)   |
| Ddias         | 1.71  | .000218273               | 1.865183                     | DNA damage-induced apoptosis suppressor (Ddias)   |
| Acpp          | 1.63  | .004126485               | 0.427175                     | Acid phosphatase, prostate (Acpp)   |
| Nol8          | 1.62  | $2.08 \times 10^{-8}$    | 6.491834                     | Nucleolar protein 8 (Nol8)  |
| Tead4         | 1.58  | .019985699               | 0.103252                     | TEA domain family member 4 (Tead4)  |
| Chrdl2        | 1.56  | .016825785               | 0.006153                     | Chordin-like 2 (Chrdl2)   |
| Rpl10a        | 1.54  | $1.30 \times 10^{-7}$    | 7.235633                     | Ribosomal protein L10A (Rpl10a)   |
| Met           | 1.54  | .00732905                | 0.605268                     | Met proto-oncogene (Met)  |
| Gm16565       | 1.50  | .006784345               | 1.023606                     | Predicted gene 16565 (Gm16565)  |
| Plscr5        | 1.50  | .010521615               | 0.059025                     | Phospholipid scramblase family, member 5 (Plscr5)   |
| Slc10a4       | 1.49  | .000129292               | 2.572029                     | Solute carrier family 10 (sodium/bile acid cotransporter family), member 4 (Slc10a4)                    |
| Gm14057       | 1.47  | .021899313               | -0.05272                     | Ppp1r14c pseudogene (Gm14057)   |
| Ppef1         | 1.46  | .004659662               | 1.42743                      | Protein phosphatase with EF hand calcium-binding domain 1 (Ppef1)                                       |
| Fosb          | 1.45  | .000841378               | 2.561443                     | FBJ osteosarcoma oncogene B (Fosb)  |
| Avpr1a        | 1.44  | .003681061               | 1.422                        | Arginine vasopressin receptor 1A (Avpr1a)   |
| Gtse1         | 1.44  | .008213577               | 1.094765                     | G two S phase expressed protein 1 (Gtse1)   |
| Gm37356       | 1.42  | .01089818                | 0.305063                     | Predicted gene 37356 (Gm37356)  |
| Csrnp1        | 1.40  | $5.63 \times 10^{-5}$    | 2.561621                     | Cysteine-serine-rich nuclear protein 1 (Csrnp1)   |
| Grpr          | 1.39  | .022676509               | 1.534775                     | Gastrin releasing peptide receptor (Grpr)   |
| Zfp975        | 1.38  | .000259201               | 2.349293                     | Zinc finger protein 975 (Zfp975)  |
| Slc35d3       | 1.38  | .014007594               | 0.795903                     | Solute carrier family 35, member D3 (Slc35d3)   |
| Cdh24         | 1.37  | .000216578               | 2.569775                     | Cadherin-like 24 (Cdh24)  |
| Slco4c1       | 1.36  | .000582403               | 2.365296                     | Solute carrier organic anion transporter family, member 4C1 (Slco4c1)                                   |
| Adamts8       | 1.35  | .037037781               | -0.13248                     | A disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 8 (Adamts8) |
| Apc2          | 1.35  | $4.82 \times 10^{-5}$    | 7.192544                     | Adenomatosis polyposis coli 2 (Apc2)  |
| Sp9           | 1.34  | .001796092               | 2.973311                     | Trans-acting transcription factor 9 (Sp9)   |
| Kbtbd6        | 1.32  | .040299298               | 0.283291                     | Kelch repeat and BTB (POZ) domain containing 6 (Kbtbd6)   |
| Gm20518       | 1.32  | .043972042               | -0.0947                      | Predicted gene 20518 (Gm20518)  |
| Rbm46         | 1.31  | .039406932               | 0.193756                     | RNA binding motif protein 46 (Rbm46)  |
| Prr15         | 1.29  | .005489492               | 1.034567                     | Proline rich 15 (Prr15)   |
| Xkrx          | 1.29  | .000159027               | 2.973101                     | X-linked Kx blood group related, X-linked (Xkrx)  |
| Drd3          | 1.29  | .000570654               | 1.793582                     | Dopamine receptor D3 (Drd3)   |
| Oxtr          | 1.28  | $4.36 \times 10^{-6}$    | 4.642701                     | Oxytocin receptor (Oxtr)  |
| 4930426D05Rik | 1.28  | .043430898               | -0.02356                     | RIKEN cDNA 4930426D05 gene (4930426D05Rik)  |
| Ext2          | 1.28  | $1.66 \times 10^{-5}$    | 6.427251                     | Exostosin (multiple) 2 (Ext2)   |



**TABLE A1** Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| St14      | 1.27  | .000143473            | 3.055597 | Suppression of tumorigenicity 14 (colon carcinoma) (St14)                                       |
| Gm5466    | 1.26  | .025877944            | -0.05832 | Poly(A) binding protein, cytoplasmic 4 pseudogene (Gm5466)                                      |
| Al606181  | 1.26  | .000869949            | 2.822355 | Expressed sequence Al606181 (Al606181)  |
| Bmp3      | 1.26  | $2.81 \times 10^{-5}$ | 3.508207 | Bone morphogenetic protein 3 (Bmp3)   |
| Gm17096   | 1.26  | .027777784            | -0.0146  | Predicted gene 17096 (Gm17096)  |
| Oprk1     | 1.26  | $2.05 \times 10^{-7}$ | 5.706194 | Opioid receptor, kappa 1 (Oprk1)  |
| Slc38a4   | 1.26  | .028154112            | 0.619424 | Solute carrier family 38, member 4 (Slc38a4)  |
| Tacr3     | 1.25  | $5.88 \times 10^{-6}$ | 4.388588 | Tachykinin receptor 3 (Tacr3)   |
| Zfp92     | 1.25  | $1.63 \times 10^{-6}$ | 4.735225 | Zinc finger protein 92 (Zfp92)  |
| Acot3     | 1.24  | .033222174            | 0.027654 | Acyl-CoA thioesterase 3 (Acot3)   |
| Nrap      | 1.24  | .000435793            | 2.108514 | Nebulin-related anchoring protein (Nrap)  |
| Mycn      | 1.24  | $5.69 \times 10^{-5}$ | 3.42305  | V-myc avian myelocytomatosis viral related oncogene, neuroblastoma derived (Mycn)               |
| Dchs2     | 1.23  | .000118811            | 3.378319 | Dachsous 2 (Dchs2)  |
| Prickle1  | 1.22  | $3.50 \times 10^{-7}$ | 6.095453 | Prickle planar cell polarity protein 1 (Prickle1)   |
| Pthlh     | 1.21  | .004157208            | 1.467854 | Parathyroid hormone-like peptide (Pthlh)  |
| Uts2r     | 1.20  | .001720957            | 1.837421 | Urotensin 2 receptor (Uts2r)  |
| Ube4a     | 1.20  | .000206451            | 6.754708 | Ubiquitination factor E4A (Ube4a)   |
| Gm45623   | 1.20  | .001246157            | 2.353854 | Predicted gene 45623 (Gm45623)  |
| Gpr176    | 1.20  | $4.45 \times 10^{-5}$ | 4.360506 | G protein-coupled receptor 176 (Gpr176)   |
| Tmem132a  | 1.19  | $1.34 \times 10^{-5}$ | 4.390167 | Transmembrane protein 132A (Tmem132a)   |
| Rab3b     | 1.18  | $2.12 \times 10^{-7}$ | 7.439507 | RAB3B, member RAS oncogene family (Rab3b)   |
| Gm15379   | 1.17  | .015294905            | 0.679995 | Zinc finger and SCAN domain containing 12 pseudogene (Gm15379)                                  |
| Tox3      | 1.16  | $4.28 \times 10^{-7}$ | 6.661831 | TOX high-mobility group box family member 3 (Tox3)  |
| Atp8b3    | 1.16  | .031885543            | 0.422582 | ATPase, class I, type 8B, member 3 (Atp8b3)   |
| Nudt12    | 1.16  | $4.88 \times 10^{-6}$ | 4.365229 | Nudix (nucleoside diphosphate linked moiety X)-type motif 12 (Nudt12)                           |
| Sema3f    | 1.15  | .000629233            | 2.910066 | Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3F (Sema3f) |
| Doc2a     | 1.14  | .011497985            | 1.268657 | Double C2, alpha (Doc2a)  |
| Fto       | 1.14  | $2.12 \times 10^{-7}$ | 7.342707 | Fat mass and obesity associated (Fto)   |
| Trpc5     | 1.13  | $5.46 \times 10^{-7}$ | 6.407225 | Transient receptor potential cation channel, subfamily C, member 5 (Trpc5)                      |
| Pter      | 1.13  | $1.00 \times 10^{-6}$ | 7.327025 | Phosphotriesterase related (Pter)   |
| Dlgap2    | 1.13  | $2.90 \times 10^{-6}$ | 4.60807  | Discs, large homolog-associated protein 2 (Dlgap2)  |
| Foxp2     | 1.13  | $1.87 \times 10^{-7}$ | 8.115582 | Forkhead box P2 (Foxp2)   |
| Zfp442    | 1.13  | .03719428             | 1.664221 | Zinc finger protein 442 (Zfp442)  |
| Pcsk5     | 1.13  | $5.74 \times 10^{-6}$ | 4.997306 | Proprotein convertase subtilisin/kexin type 5 (Pcsk5)   |
| P2rx3     | 1.13  | .013162914            | 0.790749 | Purinergic receptor P2X, ligand-gated ion channel, 3 (P2rx3)                                    |
| C1ql3     | 1.12  | $2.05 \times 10^{-7}$ | 6.023888 | C1q-like 3 (C1ql3)  |
| Foxp1     | 1.12  | $2.08 \times 10^{-8}$ | 7.821432 | Forkhead box P1 (Foxp1)   |
| Gprn3     | 1.12  | $1.28 \times 10^{-6}$ | 5.961733 | GPRIN family member 3 (Gprn3)   |
| Dgkg      | 1.12  | $5.36 \times 10^{-6}$ | 5.054086 | Diacylglycerol kinase, gamma (Dgkg)   |
| Bdnf      | 1.11  | $2.89 \times 10^{-5}$ | 4.795036 | Brain-derived neurotrophic factor (Bdnf)  |
| Lancl3    | 1.11  | .013321046            | 2.039189 | LanC lantibiotic synthetase component C-like 3 (bacterial) (Lancl3)                             |
| Dlk1      | 1.11  | $3.14 \times 10^{-5}$ | 5.72567  | Delta-like 1 homolog (Dlk1)   |
| Pdzrn3    | 1.11  | .000158774            | 4.509556 | PDZ domain containing RING finger 3 (Pdzrn3)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Fam199x       | 1.11  | $1.10 \times 10^{-5}$    | 4.484698 | Family with sequence similarity 199, X-linked (Fam199x)                  |
| Pcdh18        | 1.10  | $9.18 \times 10^{-6}$    | 5.579679 | Protocadherin 18 (Pcdh18)  |
| Nkd2          | 1.10  | .000431903               | 3.670481 | Naked cuticle 2 homolog (Nkd2)   |
| Htr1d         | 1.10  | .000101607               | 3.706647 | 5-Hydroxytryptamine (serotonin) receptor 1D (Htr1d)                      |
| Pdyn          | 1.09  | .000504797               | 3.255823 | Prodynorphin (Pdyn)  |
| Esr1          | 1.09  | .00422765                | 1.990281 | Estrogen receptor 1 (alpha) (Esr1)                                       |
| Zfp74         | 1.09  | $2.93 \times 10^{-6}$    | 5.54294  | Zinc finger protein 74 (Zfp74)   |
| Gm14403       | 1.08  | $9.06 \times 10^{-5}$    | 3.723878 | Predicted gene 14403 (Gm14403)   |
| Snx9          | 1.08  | $3.04 \times 10^{-5}$    | 4.241231 | Sorting nexin 9 (Snx9)   |
| Zdhhc23       | 1.08  | .009262626               | 1.622974 | Zinc finger, DHHC domain containing 23 (Zdhhc23)                         |
| Epha1         | 1.08  | .001150661               | 2.04453  | Eph receptor A1 (Epha1)  |
| 5033406O09Rik | 1.07  | .013174575               | 1.43022  | RIKEN cDNA 5033406O09 gene (5033406O09Rik)                               |
| Cpne6         | 1.06  | $2.70 \times 10^{-6}$    | 6.673036 | Copine VI (Cpne6)  |
| A730046J19Rik | 1.06  | .030412458               | 1.892526 | RIKEN cDNA A730046J19 gene (A730046J19Rik)                               |
| Efcc1         | 1.06  | .008304718               | 2.074031 | EF hand and coiled-coil domain containing 1 (Efcc1)                      |
| Doc2b         | 1.05  | $8.93 \times 10^{-6}$    | 6.451608 | Double C2, beta (Doc2b)  |
| Sfrp2         | 1.05  | $6.18 \times 10^{-5}$    | 3.713566 | Secreted frizzled-related protein 2 (Sfrp2)                              |
| Gm26805       | 1.04  | .00130816                | 2.269391 | Predicted gene   |
| Gabra5        | 1.04  | $8.58 \times 10^{-7}$    | 7.085249 | Gamma-aminobutyric acid (GABA) A receptor, subunit alpha 5 (Gabra5)      |
| AW551984      | 1.04  | $1.77 \times 10^{-6}$    | 6.006546 | Expressed sequence AW551984 (AW551984)                                   |
| Ldb2          | 1.04  | $2.88 \times 10^{-7}$    | 7.114963 | LIM domain binding 2 (Ldb2)  |
| Pom121        | 1.03  | $1.20 \times 10^{-5}$    | 7.190722 | Nuclear pore membrane protein 121 (Pom121)                               |
| Aloxe3        | 1.03  | .000479377               | 2.991306 | Arachidonate lipoxygenase 3 (Aloxe3)                                     |
| Etl4          | 1.03  | .000163311               | 6.360278 | Enhancer trap locus 4 (Etl4)   |
| Fos           | 1.03  | .000738545               | 4.517408 | FBJ osteosarcoma oncogene (Fos)  |
| Dact2         | 1.02  | .013209915               | 1.070964 | Dishevelled-binding antagonist of beta-catenin 2 (Dact2)                 |
| Gm15672       | 1.02  | .032203827               | 0.58211  | Predicted gene 15672 (Gm15672)   |
| Prlr          | 1.02  | $7.09 \times 10^{-6}$    | 5.164952 | Prolactin receptor (Prlr)  |
| Rpp25         | 1.01  | .007425239               | 1.888958 | Ribonuclease P/MRP 25 subunit (Rpp25)                                    |
| Magel2        | 1.01  | .001656002               | 2.737994 | Melanoma antigen, family L, 2 (Magel2)                                   |
| Tmem132e      | 1.01  | .0003504                 | 3.082943 | Transmembrane protein 132E (Tmem132e)                                    |
| Cdh6          | 1.01  | $7.75 \times 10^{-7}$    | 6.197736 | Cadherin 6 (Cdh6)  |
| Nts           | 1.01  | .001374874               | 3.234018 | Neurotensin (Nts)  |
| Mybl1         | 1.00  | $2.80 \times 10^{-5}$    | 5.13412  | Myeloblastosis oncogene-like 1 (Mybl1)                                   |
| Mc3r          | 1.00  | .000502705               | 3.693045 | Melanocortin 3 receptor (Mc3r)   |
| Klf5          | 1.00  | .002627598               | 3.086911 | Kruppel-like factor 5 (Klf5)   |
| Ogfod1        | 1.00  | $3.99 \times 10^{-8}$    | 8.192083 | 2-Oxoglutarate and iron-dependent oxygenase domain containing 1 (Ogfod1) |
| Drd2          | 1.00  | $3.37 \times 10^{-5}$    | 4.922051 | Dopamine receptor D2 (Drd2)  |
| N4bp2l2       | 1.00  | $5.84 \times 10^{-6}$    | 6.027103 | NEDD4 binding protein 2-like 2 (N4bp2l2)                                 |
| Arhgap6       | 1.00  | .001545653               | 2.653602 | Rho GTPase activating protein 6 (Arhgap6)                                |
| Zfp983        | 0.99  | .000102509               | 3.549722 | Zinc finger protein 983 (Zfp983)   |
| Crtac1        | 0.99  | .000791988               | 4.090499 | Cartilage acidic protein 1 (Crtac1)                                      |
| Fam159b       | 0.99  | .006360216               | 1.887299 | Family with sequence similarity 159, member B (Fam159b)                  |
| Exph5         | 0.99  | $1.30 \times 10^{-5}$    | 5.47877  | Exophilin 5 (Exph5)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|---------------|-------|-----------------------|----------|--|
| Gm6981        | 0.98  | .022449139            | 1.179357 | Glyceraldehyde-3-phosphate dehydrogenase pseudogene (Gm6981)                 |
| Nrsn2         | 0.98  | $6.37 \times 10^{-8}$ | 9.589449 | Neurensin 2 (Nrsn2)  |
| Plcx3         | 0.98  | $4.91 \times 10^{-5}$ | 4.856254 | Phosphatidylinositol-specific phospholipase C, X domain containing 3 (Plcx3) |
| Pcdha11       | 0.97  | .03706643             | 0.884052 | Protocadherin alpha 11 (Pcdha11)   |
| Zik1          | 0.97  | .000123278            | 3.449682 | Zinc finger protein interacting with K protein 1 (Zik1)                      |
| Bmp2          | 0.97  | .000192173            | 3.842189 | Bone morphogenetic protein 2 (Bmp2)  |
| Galr1         | 0.97  | .00089192             | 4.604638 | Galanin receptor 1 (Galr1)   |
| Gm20735       | 0.97  | .01634046             | 0.873205 | Predicted gene, 20735 (Gm20735)  |
| Rtl5          | 0.97  | $4.02 \times 10^{-5}$ | 5.228496 | Retrotransposon Gag Like 5 (Rtl5)  |
| Vil1          | 0.97  | .016368768            | 3.340394 | Villin 1 (Vil1)  |
| C130083M11Rik | 0.96  | .002849927            | 3.632053 | RIKEN cDNA C130083M11 gene (C130083M11Rik)                                   |
| Ak5           | 0.96  | $4.97 \times 10^{-5}$ | 5.18943  | Adenylate kinase 5 (Ak5)   |
| Gprasp2       | 0.96  | $1.41 \times 10^{-6}$ | 7.914679 | G protein-coupled receptor-associated sorting protein 2 (Gprasp2)            |
| Gla2          | 0.96  | $1.53 \times 10^{-5}$ | 5.922126 | Glycine receptor, alpha 2 subunit (Gla2)                                     |
| Slc30a3       | 0.96  | $1.13 \times 10^{-5}$ | 4.964123 | Solute carrier family 30 (zinc transporter), member 3 (Slc30a3)              |
| Map3k20       | 0.95  | $8.11 \times 10^{-6}$ | 5.852169 | Mitogen-activated protein kinase kinase kinase 20                            |
| Ripk4         | 0.95  | .005677703            | 2.860979 | Receptor-interacting serine-threonine kinase 4 (Ripk4)                       |
| Slitrk6       | 0.95  | $4.33 \times 10^{-7}$ | 8.084594 | SLIT and NTRK-like family, member 6 (Slitrk6)                                |
| Aldh3b2       | 0.95  | .000238358            | 4.015348 | Aldehyde dehydrogenase 3 family, member B2 (Aldh3b2)                         |
| Ptger3        | 0.95  | $1.49 \times 10^{-5}$ | 4.512245 | Prostaglandin E receptor 3 (subtype EP3) (Ptger3)                            |
| Hcrtr1        | 0.94  | .011599886            | 1.687169 | Hypocretin (orexin) receptor 1 (Hcrtr1)                                      |
| Nptxr         | 0.94  | $7.14 \times 10^{-6}$ | 10.66128 | Neuronal pentraxin receptor (Nptxr)  |
| Zfp788        | 0.94  | $4.44 \times 10^{-6}$ | 6.20602  | Zinc finger protein 788 (Zfp788)   |
| Pkmyt1        | 0.94  | .044531571            | 0.38337  | Protein kinase, membrane-associated tyrosine/threonine 1 (Pkmyt1)            |
| Cdh18         | 0.94  | $2.44 \times 10^{-5}$ | 5.541691 | Cadherin 18 (Cdh18)  |
| 4930513N10Rik | 0.94  | .036164296            | 0.782688 | RIKEN cDNA 4930513N10 gene (4930513N10Rik)                                   |
| Gm37811       | 0.94  | .045603114            | 1.339915 | Predicted gene   |
| Ankrd55       | 0.94  | .000176486            | 3.59533  | Ankyrin repeat domain 55 (Ankrd55)   |
| Pdzrn4        | 0.94  | .000350378            | 3.212135 | PDZ domain containing RING finger 4 (Pdzrn4)                                 |
| Ankrd34b      | 0.94  | $2.98 \times 10^{-5}$ | 6.500705 | Ankyrin repeat domain 34B (Ankrd34b)   |
| Zfp970        | 0.93  | .002380137            | 3.53278  | Zinc finger protein 970 (Zfp970)   |
| Chl1          | 0.93  | $1.98 \times 10^{-7}$ | 8.415267 | Cell adhesion molecule L1-like (Chl1)  |
| Tmem255a      | 0.93  | $3.24 \times 10^{-5}$ | 7.727587 | Transmembrane protein 255A (Tmem255a)  |
| Zfr2          | 0.93  | .000535846            | 5.118793 | Zinc finger RNA binding protein 2 (Zfr2)                                     |
| Klhl14        | 0.93  | .003699522            | 2.298974 | Kelch-like 14 (Klhl14)   |
| Zfp804b       | 0.93  | .000201806            | 4.383883 | Zinc finger protein 804B (Zfp804b)   |
| Car8          | 0.93  | $3.14 \times 10^{-5}$ | 5.972933 | Carbonic anhydrase 8 (Car8)  |
| Pdxk          | 0.93  | $1.74 \times 10^{-6}$ | 5.946843 | Pyridoxal (pyridoxine, vitamin B6) kinase (Pdxk)                             |
| Fam210b       | 0.92  | $9.66 \times 10^{-7}$ | 7.894178 | Family with sequence similarity 210, member B (Fam210b)                      |
| Syt10         | 0.92  | $2.05 \times 10^{-5}$ | 5.996295 | Synaptotagmin X (Syt10)  |
| Hcn1          | 0.92  | $1.84 \times 10^{-6}$ | 6.215878 | Hyperpolarization-activated, cyclic nucleotide-gated K+ 1 (Hcn1)             |
| Pcdha7        | 0.92  | .033047577            | 0.96439  | Protocadherin alpha 7 (Pcdha7)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Lhx2          | 0.92  | $6.06 \times 10^{-6}$    | 6.181249 | LIM homeobox protein 2 (Lhx2)   |
| Vgf           | 0.92  | $4.47 \times 10^{-5}$    | 5.867988 | VGF nerve growth factor inducible (Vgf)   |
| Cntnap3       | 0.92  | .000132337               | 5.556513 | Contactin-associated protein-like 3 (Cntnap3)   |
| Jade3         | 0.92  | .000148791               | 4.0821   | Jade family PHD finger 3 (Jade3)  |
| Penk          | 0.92  | .000989107               | 3.714957 | Preproenkephalin (Penk)   |
| Dusp4         | 0.91  | .005419347               | 2.69197  | Dual-specificity phosphatase 4 (Dusp4)  |
| Npbwr1        | 0.91  | .004871065               | 2.716596 | Neuropeptides B/W receptor 1 (Npbwr1)   |
| Prrg4         | 0.91  | $1.72 \times 10^{-5}$    | 5.446763 | Proline-rich Gla (G-carboxyglutamic acid) 4 (transmembrane) (Prrg4)                               |
| Fhod3         | 0.91  | $9.18 \times 10^{-6}$    | 6.486289 | Formin homology 2 domain containing 3 (Fhod3)   |
| Kcna4         | 0.91  | $2.24 \times 10^{-6}$    | 6.267314 | Potassium voltage-gated channel, shaker-related subfamily, member 4 (Kcna4)                       |
| Marchf1       | 0.91  | $8.04 \times 10^{-6}$    | 5.537262 | Membrane-associated ring-CH-type finger 1 (Marchf1)   |
| Fam196b       | 0.91  | $5.36 \times 10^{-6}$    | 5.962515 | Family with sequence similarity 196, member B (Fam196b)   |
| C230021G24Rik | 0.91  | .038954561               | 1.753545 | RIKEN cDNA C230021G24 gene (C230021G24Rik)  |
| Pcdha9        | 0.90  | .00640222                | 1.861305 | Protocadherin alpha 9 (Pcdha9)  |
| Dclk3         | 0.90  | $4.45 \times 10^{-5}$    | 4.603524 | Doublecortin-like kinase 3 (Dclk3)  |
| Ntng1         | 0.90  | $3.54 \times 10^{-7}$    | 10.20391 | Netrin G1 (Ntng1)   |
| Fosl2         | 0.90  | .000183049               | 4.611854 | Fos-like antigen 2 (Fosl2)  |
| Kcnh7         | 0.90  | $1.22 \times 10^{-7}$    | 7.520495 | Potassium voltage-gated channel, subfamily H (eag-related), member 7 (Kcnh7)                      |
| Prr7          | 0.90  | .028793942               | 0.846388 | Proline rich 7 (synaptic) (Prr7)  |
| Prokr2        | 0.90  | $9.48 \times 10^{-6}$    | 7.126944 | Prokineticin receptor 2 (Prokr2)  |
| AI504432      | 0.90  | $1.21 \times 10^{-6}$    | 6.970405 | Expressed sequence AI504432 (AI504432)  |
| Pcdh8         | 0.90  | .000769077               | 3.123033 | Protocadherin 8 (Pcdh8)   |
| Sik2          | 0.89  | $8.60 \times 10^{-6}$    | 5.817372 | Salt inducible kinase 2 (Sik2)  |
| Gm18194       | 0.89  | .016904859               | 1.371147 | Zinc finger protein 329 pseudogene (Gm18194)  |
| Slc7a14       | 0.89  | $1.88 \times 10^{-6}$    | 7.360957 | Solute carrier family 7 (cationic amino acid transporter, $\gamma$ + system), member 14 (Slc7a14) |
| Lypd6         | 0.89  | $3.61 \times 10^{-5}$    | 6.141801 | LY6/PLAUR domain containing 6 (Lypd6)   |
| Pgm211        | 0.89  | $1.25 \times 10^{-7}$    | 10.00328 | Phosphoglucomutase 2-like 1 (Pgm211)  |
| Kcnq5         | 0.89  | $1.49 \times 10^{-5}$    | 5.553086 | Potassium voltage-gated channel, subfamily Q, member 5 (Kcnq5)                                    |
| Pcdha6        | 0.89  | .036091936               | 0.834258 | Protocadherin alpha 6 (Pcdha6)  |
| Rtl9          | 0.89  | .005562011               | 2.380772 | Retrotransposon Gag Like 9 (Rtl9)   |
| Gla3          | 0.89  | .000324033               | 4.641539 | Glycine receptor, alpha 3 subunit (Gla3)  |
| Gm14305       | 0.89  | .00040773                | 3.648955 | Predicted gene 14305 (Gm14305)  |
| Htr1b         | 0.89  | .002771705               | 2.7422   | 5-Hydroxytryptamine (serotonin) receptor 1B (Htr1b)   |
| Bhlhe22       | 0.89  | .000380202               | 3.82147  | Basic helix-loop-helix family, member e22 (Bhlhe22)   |
| Npy2r         | 0.89  | .000165258               | 4.276263 | Neuropeptide Y receptor Y2 (Npy2r)  |
| Srrm1         | 0.89  | $5.62 \times 10^{-7}$    | 7.296156 | Serine/arginine repetitive matrix 1 (Srrm1)   |
| Kcna3         | 0.88  | $4.25 \times 10^{-5}$    | 4.279568 | Potassium voltage-gated channel, shaker-related subfamily, member 3 (Kcna3)                       |
| Klhl34        | 0.88  | .001632556               | 2.741492 | Kelch-like 34 (Klhl34)  |
| Sema3a        | 0.88  | .000212314               | 3.869159 | Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3A (Sema3a)   |
| Chrm2         | 0.88  | $1.21 \times 10^{-5}$    | 5.716374 | Cholinergic receptor, muscarinic 2, cardiac (Chrm2)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Zfp948        | 0.88  | .003123444            | 3.131175 | Zinc finger protein 948 (Zfp948)  |
| Tcerg1l       | 0.88  | .000195902            | 3.835645 | Transcription elongation regulator 1-like (Tcerg1l)                       |
| Dsel          | 0.87  | $6.95 \times 10^{-6}$ | 5.896692 | Dermatan sulfate epimerase-like (Dsel)                                    |
| Slc29a4       | 0.87  | .000195766            | 3.820495 | Solute carrier family 29 (nucleoside transporters), member 4 (Slc29a4)    |
| Ass1          | 0.87  | $7.70 \times 10^{-6}$ | 5.960647 | Argininosuccinate synthetase 1 (Ass1)                                     |
| Prickle2      | 0.87  | $1.88 \times 10^{-7}$ | 8.116082 | Prickle planar cell polarity protein 2 (Prickle2)                         |
| Neu3          | 0.87  | .004756242            | 2.382245 | Neuraminidase 3 (Neu3)  |
| Sstr1         | 0.87  | .005966396            | 2.295697 | Somatostatin receptor 1 (Sstr1)   |
| Gm4430        | 0.87  | .0190868              | 1.380589 | Predicted gene 4430 (Gm4430)  |
| Stk26         | 0.87  | .013647122            | 2.033307 | Serine/threonine kinase 26 (Stk26)  |
| Efnb2         | 0.87  | .000136603            | 4.793325 | Ephrin B2 (Efnb2)   |
| Sulf1         | 0.87  | $8.60 \times 10^{-6}$ | 6.34694  | Sulfatase 1 (Sulf1)   |
| Grm8          | 0.87  | .000134227            | 4.655248 | Glutamate receptor, metabotropic 8 (Grm8)                                 |
| Ntsr1         | 0.86  | .001773132            | 3.267929 | Neurotensin receptor 1 (Ntsr1)  |
| Tfcp2l1       | 0.86  | .026439114            | 1.583365 | Transcription factor CP2-like 1 (Tfcp2l1)                                 |
| Slit3         | 0.86  | .000766163            | 4.877223 | Slit homolog 3 (Slit3)  |
| Ufsp1         | 0.86  | .000541743            | 3.542221 | UFM1-specific peptidase 1 (Ufsp1)   |
| C130013H08Rik | 0.86  | .0023674              | 2.754867 | RIKEN cDNA C130013H08 gene (C130013H08Rik)                                |
| Mycl          | 0.86  | .001375265            | 3.458158 | V-myc avian myelocytomatosis viral oncogene lung carcinoma derived (Mycl) |
| Cntnap5a      | 0.86  | $1.04 \times 10^{-5}$ | 5.614878 | Contactin-associated protein-like 5A (Cntnap5a)                           |
| 9330118I20Rik | 0.86  | .009896459            | 2.098238 | RIKEN cDNA 9330118I20 gene (9330118I20Rik)                                |
| Zfp184        | 0.86  | .008381585            | 1.82656  | Zinc finger protein 184 (Kruppel-like) (Zfp184)                           |
| Rerg          | 0.86  | .000792803            | 3.421739 | RAS-like, estrogen-regulated, growth-inhibitor (Rerg)                     |
| Fam126b       | 0.86  | $6.29 \times 10^{-7}$ | 8.394283 | Family with sequence similarity 126, member B (Fam126b)                   |
| St8sia3       | 0.86  | $1.98 \times 10^{-7}$ | 8.845072 | ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 3 (St8sia3)    |
| Gpx3          | 0.85  | $8.36 \times 10^{-6}$ | 6.926573 | Glutathione peroxidase 3 (Gpx3)   |
| Dnajc6        | 0.85  | $3.93 \times 10^{-7}$ | 9.422685 | DnaJ heat shock protein family (Hsp40) member C6 (Dnajc6)                 |
| Serac1        | 0.85  | .000208784            | 4.925157 | Serine active site containing 1 (Serac1)                                  |
| Ripor2        | 0.85  | $1.60 \times 10^{-6}$ | 7.444225 | RHO Family Interacting Cell Polarization Regulator 2 (Ripor2)             |
| Hap1          | 0.85  | $8.19 \times 10^{-6}$ | 6.913632 | Huntingtin-associated protein 1 (Hap1)                                    |
| Gm14412       | 0.85  | .029890659            | 1.191549 | Predicted gene 14412 (Gm14412)  |
| Gbx2          | 0.85  | .000308797            | 6.131154 | Gastrulation brain homeobox 2 (Gbx2)                                      |
| Tubb3         | 0.85  | $2.03 \times 10^{-6}$ | 8.200261 | Tubulin, beta 3 class III (Tubb3)   |
| Pcdhb4        | 0.85  | .002688834            | 2.931132 | Protocadherin beta 4 (Pcdhb4)   |
| Syn2          | 0.85  | $7.66 \times 10^{-6}$ | 9.391139 | Synapsin II (Syn2)  |
| Cbl1          | 0.85  | $1.34 \times 10^{-5}$ | 5.396486 | Casitas B-lineage lymphoma-like 1 (Cbl1)                                  |
| Tuba8         | 0.85  | .002405336            | 3.520265 | Tubulin, alpha 8 (Tuba8)  |
| Palm2         | 0.84  | $1.56 \times 10^{-5}$ | 5.63211  | Paralemmin 2 (Palm2)  |
| Aff3          | 0.84  | $2.93 \times 10^{-6}$ | 7.21474  | AF4/FMR2 family, member 3 (Aff3)  |
| Adar          | 0.84  | $4.98 \times 10^{-6}$ | 6.384341 | Adenosine deaminase, RNA specific (Adar)                                  |
| Wscd2         | 0.84  | .001197488            | 3.217625 | WSC domain containing 2 (Wscd2)   |
| Gpr22         | 0.84  | $2.01 \times 10^{-5}$ | 4.951858 | G protein-coupled receptor 22 (Gpr22)                                     |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Lmtk3     | 0.84  | .000283311            | 5.247359 | Lemur tyrosine kinase 3 (Lmtk3)  |
| Rusc2     | 0.84  | $3.93 \times 10^{-7}$ | 7.77667  | RUN and SH3 domain containing 2 (Rusc2)                                    |
| Unc5d     | 0.84  | $2.19 \times 10^{-5}$ | 5.78479  | Unc-5 netrin receptor D (Unc5d)  |
| Coro2a    | 0.84  | $1.29 \times 10^{-5}$ | 5.591802 | Coronin, actin binding protein 2A (Coro2a)                                 |
| Neto1     | 0.84  | $1.21 \times 10^{-5}$ | 5.643227 | Neuropilin (NRP) and tolloid (TLL)-like 1 (Neto1)                          |
| Igf2bp3   | 0.84  | .000658733            | 3.49969  | Insulin-like growth factor 2 mRNA binding protein 3 (Igf2bp3)              |
| Pcsk2     | 0.84  | $2.12 \times 10^{-7}$ | 9.042811 | Proprotein convertase subtilisin/kexin type 2 (Pcsk2)                      |
| Hsf4      | 0.84  | .019194704            | 3.032579 | Heat shock transcription factor 4 (Hsf4)                                   |
| Ptpru     | 0.84  | .000363762            | 4.750676 | Protein tyrosine phosphatase, receptor type, U (Ptpru)                     |
| Caln1     | 0.83  | $1.83 \times 10^{-5}$ | 5.270753 | Calneuron 1 (Caln1)  |
| Capn2     | 0.83  | $1.77 \times 10^{-5}$ | 6.523454 | Calpain 2 (Capn2)  |
| Nkrf      | 0.83  | $7.79 \times 10^{-6}$ | 6.406208 | NF-kappaB repressing factor (Nkrf)   |
| Syt5      | 0.83  | $6.00 \times 10^{-6}$ | 6.971576 | Synaptotagmin V (Syt5)   |
| Gm12592   | 0.83  | .049266826            | 1.224875 | Predicted gene 12592 (Gm12592)   |
| Add2      | 0.82  | $3.37 \times 10^{-7}$ | 7.7095   | Adducin 2 (beta) (Add2)  |
| Cnr1      | 0.82  | $1.52 \times 10^{-6}$ | 7.277001 | Cannabinoid receptor 1 (brain) (Cnr1)                                      |
| Zfp709    | 0.82  | .000223098            | 4.253372 | Zinc finger protein 709 (Zfp709)   |
| Zfp597    | 0.82  | .000180711            | 4.65163  | Zinc finger protein 597 (Zfp597)   |
| Gaa       | 0.82  | $5.51 \times 10^{-7}$ | 8.894274 | Glucosidase, alpha, acid (Gaa)   |
| Nxph1     | 0.82  | $7.97 \times 10^{-7}$ | 8.18269  | Neurexophilin 1 (Nxph1)  |
| Flrt3     | 0.82  | $2.85 \times 10^{-5}$ | 4.785715 | Fibronectin leucine-rich transmembrane protein 3 (Flrt3)                   |
| Rasgrf2   | 0.82  | $4.40 \times 10^{-6}$ | 7.62645  | RAS protein-specific guanine nucleotide-releasing factor 2 (Rasgrf2)       |
| Tdrd1     | 0.82  | .002425254            | 2.983741 | Tudor domain containing 1 (Tdrd1)  |
| Cdh7      | 0.82  | $1.77 \times 10^{-6}$ | 6.570878 | Cadherin 7, type 2 (Cdh7)  |
| Xkr4      | 0.82  | $4.43 \times 10^{-6}$ | 7.686759 | X-linked Kx blood group related 4 (Xkr4)                                   |
| Nkain3    | 0.82  | .000116269            | 4.180711 | Na <sup>+</sup> /K <sup>+</sup> transporting ATPase interacting 3 (Nkain3) |
| Dzank1    | 0.82  | $4.73 \times 10^{-7}$ | 9.77219  | Double zinc ribbon and ankyrin repeat domains 1 (Dzank1)                   |
| Bag4      | 0.82  | $5.64 \times 10^{-6}$ | 6.016898 | BCL2-associated athanogene 4 (Bag4)  |
| Vwc2l     | 0.81  | $1.95 \times 10^{-5}$ | 5.876002 | Von Willebrand factor C domain-containing protein 2-like (Vwc2l)           |
| Fstl5     | 0.81  | $1.99 \times 10^{-5}$ | 6.035747 | Follistatin-like 5 (Fstl5)   |
| Cntn4     | 0.81  | $9.41 \times 10^{-6}$ | 7.365417 | Contactin 4 (Cntn4)  |
| Calr      | 0.81  | $2.05 \times 10^{-7}$ | 7.696007 | Calreticulin (Calr)  |
| Sidt1     | 0.81  | .00017668             | 5.414384 | SID1 transmembrane family, member 1 (Sidt1)                                |
| Pcdh17    | 0.81  | $1.63 \times 10^{-6}$ | 8.163728 | Protocadherin 17 (Pcdh17)  |
| Gabrb1    | 0.81  | $9.51 \times 10^{-8}$ | 9.545682 | Gamma-aminobutyric acid (GABA) A receptor, subunit beta 1 (Gabrb1)         |
| Grp       | 0.81  | .048479912            | 0.910113 | Gastrin releasing peptide (Grp)  |
| Gpr68     | 0.81  | .000126347            | 4.690113 | G protein-coupled receptor 68 (Gpr68)                                      |
| Ccdc92    | 0.81  | $5.51 \times 10^{-7}$ | 7.863169 | Coiled-coil domain containing 92 (Ccdc92)                                  |
| Phyhip    | 0.81  | $1.28 \times 10^{-5}$ | 7.124608 | Phytanoyl-CoA hydroxylase interacting protein (Phyhip)                     |
| Tmem114   | 0.81  | .009119772            | 3.017253 | Transmembrane protein 114 (Tmem114)  |
| Ahi1      | 0.81  | $7.58 \times 10^{-7}$ | 8.706869 | Abelson helper integration site 1 (Ahi1)                                   |
| Tmem26    | 0.80  | .008976874            | 3.244882 | Transmembrane protein 26 (Tmem26)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Wnt10a        | 0.80  | .048886099            | 1.569495 | Wingless-type MMTV integration site family, member 10A (Wnt10a)                                   |
| A830018L16Rik | 0.80  | $3.32 \times 10^{-6}$ | 6.367862 | RIKEN cDNA A830018L16 gene (A830018L16Rik)  |
| Arl15         | 0.80  | $4.55 \times 10^{-5}$ | 5.68925  | ADP-ribosylation factor-like 15 (Arl15)   |
| Cpne5         | 0.80  | .001902752            | 4.470284 | Copine V (Cpne5)  |
| Egr1          | 0.80  | $4.22 \times 10^{-5}$ | 6.638808 | Early growth response 1 (Egr1)  |
| Trim41        | 0.80  | .000291431            | 4.596958 | Tripartite motif-containing 41 (Trim41)   |
| Gm26794       | 0.80  | .035044154            | 1.009837 | Predicted gene  |
| Scn3b         | 0.80  | $5.51 \times 10^{-7}$ | 8.35461  | Sodium channel, voltage-gated, type III, beta (Scn3b)   |
| Prag1         | 0.80  | $9.40 \times 10^{-5}$ | 5.814942 | PEAK1-related, kinase-activating pseudokinase 1 (Prag1)   |
| Gm2824        | 0.80  | .001833285            | 3.02034  | Predicted gene 2824 (Gm2824)  |
| Rab11fip3     | 0.80  | $4.16 \times 10^{-6}$ | 6.705717 | RAB11 family interacting protein 3 (class II) (Rab11fip3)   |
| Rab9b         | 0.80  | $1.34 \times 10^{-5}$ | 7.077013 | RAB9B, member RAS oncogene family (Rab9b)   |
| Lrfrn2        | 0.79  | .002700511            | 3.494055 | Leucine-rich repeat and fibronectin type III domain containing 2 (Lrfrn2)                         |
| A930024N18Rik | 0.79  | .005188067            | 3.387857 | RIKEN cDNA A930024N18 gene (A930024N18Rik)  |
| Smyd2         | 0.79  | .000455514            | 3.994763 | SET and MYND domain containing 2 (Smyd2)  |
| Tbc1d8        | 0.79  | $1.96 \times 10^{-5}$ | 4.923096 | TBC1 domain family, member 8 (Tbc1d8)   |
| Unc5a         | 0.79  | .000103447            | 5.017059 | Unc-5 netrin receptor A (Unc5a)   |
| Gm30400       | 0.79  | .00925654             | 2.715838 | Predicted gene, 30400 (Gm30400)   |
| Gm22771       | 0.79  | .037361988            | 2.514284 | Predicted gene 22771 (Gm22771)  |
| Atf6          | 0.79  | $1.70 \times 10^{-6}$ | 6.61476  | Activating transcription factor 6 (Atf6)  |
| Zfp850        | 0.79  | .000585926            | 3.427017 | Zinc finger protein 850 (Zfp850)  |
| Trerf1        | 0.79  | .00068304             | 4.955618 | Transcriptional regulating factor 1 (Trerf1)  |
| Cngb1         | 0.79  | .009659964            | 2.063689 | Cyclic nucleotide gated channel beta 1 (Cngb1)  |
| Gse1          | 0.79  | .00017046             | 4.886704 | Genetic suppressor element 1, coiled-coil protein (Gse1)  |
| Slc17a6       | 0.79  | $1.94 \times 10^{-7}$ | 10.27893 | Solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter), member 6 (Slc17a6) |
| Gal           | 0.79  | .019488819            | 3.280992 | Galanin (Gal)   |
| Csrnp3        | 0.79  | $2.63 \times 10^{-6}$ | 7.934411 | Cysteine-serine-rich nuclear protein 3 (Csrnp3)   |
| Serpini1      | 0.79  | $1.65 \times 10^{-6}$ | 6.742263 | Serine (or cysteine) peptidase inhibitor, clade I, member 1 (Serpini1)                            |
| Slc39a6       | 0.78  | $1.17 \times 10^{-5}$ | 6.204157 | Solute carrier family 39 (metal ion transporter), member 6 (Slc39a6)                              |
| Maob          | 0.78  | $3.67 \times 10^{-6}$ | 7.688161 | Monoamine oxidase B (Maob)  |
| Slitrk4       | 0.78  | $2.69 \times 10^{-6}$ | 6.155861 | SLIT and NTRK-like family, member 4 (Slitrk4)   |
| Fbln1         | 0.78  | .000456249            | 5.953307 | Fibulin 1 (Fbln1)   |
| Bace2         | 0.78  | .013390273            | 3.168904 | Beta-site APP-cleaving enzyme 2 (Bace2)   |
| A430033K04Rik | 0.78  | $5.14 \times 10^{-5}$ | 5.277219 | RIKEN cDNA A430033K04 gene (A430033K04Rik)  |
| 4921507P07Rik | 0.78  | .016036425            | 1.809603 | RIKEN cDNA 4921507P07 gene (4921507P07Rik)  |
| Nav3          | 0.78  | $3.77 \times 10^{-6}$ | 7.27041  | Neuron navigator 3 (Nav3)   |
| Jazf1         | 0.78  | $2.58 \times 10^{-5}$ | 5.545079 | JAZF zinc finger 1 (Jazf1)  |
| Nexmif        | 0.78  | $1.31 \times 10^{-6}$ | 6.951173 | Neurite extension and migration factor (Nexmif)   |
| Exoc3l        | 0.78  | .010623906            | 2.005843 | Exocyst complex component 3-like (Exoc3l)   |
| Ttc4          | 0.78  | .000240505            | 4.946025 | Tetratricopeptide repeat domain 4 (Ttc4)  |
| Fndc3b        | 0.78  | .000466302            | 4.763828 | Fibronectin type III domain containing 3B (Fndc3b)  |
| Wasf1         | 0.78  | $1.95 \times 10^{-5}$ | 7.027768 | WAS protein family, member 1 (Wasf1)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Chn2      | 0.78  | $1.06 \times 10^{-5}$ | 6.845428 | Chimerin 2 (Chn2)   |
| Syt17     | 0.78  | $7.03 \times 10^{-6}$ | 7.287321 | Synaptotagmin XVII (Syt17)  |
| Susd2     | 0.78  | .000161226            | 4.965493 | Sushi domain containing 2 (Susd2)   |
| Dcaf12l1  | 0.78  | $7.58 \times 10^{-6}$ | 5.863629 | DDB1 and CUL4-associated factor 12-like 1 (Dcaf12l1)  |
| Lrrtm3    | 0.78  | $3.73 \times 10^{-6}$ | 6.343442 | Leucine-rich repeat transmembrane neuronal 3 (Lrrtm3)   |
| Gm14399   | 0.77  | .005702486            | 2.497228 | Predicted gene 14399 (Gm14399)  |
| Zfp28     | 0.77  | .002058658            | 3.278972 | Zinc finger protein 28 (Zfp28)  |
| Ythdf2    | 0.77  | $6.57 \times 10^{-5}$ | 4.819728 | YTH domain family 2 (Ythdf2)  |
| Lonrf2    | 0.77  | $3.12 \times 10^{-7}$ | 9.289771 | LON peptidase N-terminal domain and ring finger 2 (Lonrf2)  |
| Gng4      | 0.77  | .000120235            | 5.057658 | Guanine nucleotide binding protein (G protein), gamma 4 (Gng4)  |
| Best1     | 0.77  | .007631204            | 2.500206 | Bestrophin 1 (Best1)  |
| Gla1      | 0.77  | .000249468            | 4.105361 | Glycine receptor, alpha 1 subunit (Gla1)  |
| Fam189a1  | 0.77  | $2.45 \times 10^{-5}$ | 6.576458 | Family with sequence similarity 189, member A1 (Fam189a1)   |
| Smarcc2   | 0.77  | $5.04 \times 10^{-6}$ | 8.515464 | SWI/SNF-related, matrix-associated, actin-dependent regulator of chromatin, subfamily c, member 2 (Smarcc2) |
| Syndig1   | 0.77  | .00118697             | 3.83913  | Synapse differentiation inducing 1 (Syndig1)  |
| Lingo2    | 0.77  | $5.51 \times 10^{-6}$ | 5.805379 | Leucine-rich repeat and Ig domain containing 2 (Lingo2)   |
| Fam196a   | 0.77  | .002200659            | 3.821054 | Family with sequence similarity 196, member A (Fam196a)   |
| Dpysl3    | 0.77  | $5.78 \times 10^{-6}$ | 7.251192 | Dihydropyrimidinase-like 3 (Dpysl3)   |
| Setd2     | 0.77  | $5.10 \times 10^{-5}$ | 7.360029 | SET domain containing 2 (Setd2)   |
| Slc22a3   | 0.77  | .007545927            | 2.541069 | Solute carrier family 22 (organic cation transporter), member 3 (Slc22a3)                                   |
| Lrrc7     | 0.76  | $1.84 \times 10^{-6}$ | 8.294683 | Leucine-rich repeat containing 7 (Lrrc7)  |
| Astn2     | 0.76  | .000115921            | 5.417058 | Astrotactin 2 (Astn2)   |
| Rnf220    | 0.76  | $6.53 \times 10^{-7}$ | 8.714815 | Ring finger protein 220 (Rnf220)  |
| Cherp     | 0.76  | $3.37 \times 10^{-5}$ | 5.505594 | Calcium homeostasis endoplasmic reticulum protein (Cherp)   |
| Cdh12     | 0.76  | $2.17 \times 10^{-5}$ | 5.856131 | Cadherin 12 (Cdh12)   |
| Zfp873    | 0.76  | .00448633             | 3.244932 | Zinc finger protein 873 (Zfp873)  |
| Lrrc32    | 0.76  | .000945488            | 3.82761  | Leucine-rich repeat containing 32 (Lrrc32)  |
| Zfp518a   | 0.76  | .000484519            | 5.211478 | Zinc finger protein 518A (Zfp518a)  |
| Pxdn      | 0.76  | .000389255            | 3.740633 | Peroxidasin (Pxdn)  |
| Rtl4      | 0.76  | .008432487            | 3.120882 | Retrotransposon Gag Like 4 (Rtl4)   |
| Pcdhb3    | 0.76  | .010270502            | 2.449302 | Protocadherin beta 3 (Pcdhb3)   |
| Slit1     | 0.76  | .000318988            | 5.361473 | Slit homolog 1 (Slit1)  |
| Zfp40     | 0.76  | .001792056            | 4.01039  | Zinc finger protein 40 (Zfp40)  |
| Zfp248    | 0.76  | $3.02 \times 10^{-5}$ | 4.789605 | Zinc finger protein 248 (Zfp248)  |
| Dpysl5    | 0.76  | $6.69 \times 10^{-6}$ | 7.828146 | Dihydropyrimidinase-like 5 (Dpysl5)   |
| Baiap3    | 0.76  | .000101312            | 5.293981 | BAI1-associated protein 3 (Baiap3)  |
| Camk1g    | 0.76  | .001624859            | 3.641922 | Calcium/calmodulin-dependent protein kinase I gamma (Camk1g)  |
| Zfp160    | 0.76  | .00086458             | 3.969734 | Zinc finger protein 160 (Zfp160)  |
| Pnma2     | 0.76  | $1.11 \times 10^{-6}$ | 6.936649 | Paraneoplastic antigen MA2 (Pnma2)  |
| Rarb      | 0.76  | .008900815            | 2.784143 | Retinoic acid receptor, beta (Rarb)   |
| Mllt3     | 0.76  | $3.82 \times 10^{-6}$ | 7.136245 | Myeloid/lymphoid or mixed-lineage leukemia; translocated to, 3 (Mllt3)                                      |
| Slc5a5    | 0.75  | $1.77 \times 10^{-5}$ | 5.516773 | Solute carrier family 5 (sodium iodide symporter), member 5 (Slc5a5)  |



TABLE A1 Continued

| Gene name  | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|------------|-------|-----------------------|----------|--|
| Arhgap20   | 0.75  | $7.33 \times 10^{-6}$ | 6.437691 | Rho GTPase activating protein 20 (Arhgap20)  |
| Hdac9      | 0.75  | $1.60 \times 10^{-6}$ | 7.610087 | Histone deacetylase 9 (Hdac9)  |
| AC156802.1 | 0.75  | .007375812            | 2.683187 | Neuritin 1 (Nrn1)  |
| Hcn3       | 0.75  | $2.43 \times 10^{-5}$ | 5.116666 | Hyperpolarization-activated, cyclic nucleotide-gated K <sup>+</sup> 3 (Hcn3)                               |
| Tcf7l2     | 0.75  | $2.05 \times 10^{-7}$ | 10.61683 | Transcription factor 7 like 2, T cell-specific, HMG box (Tcf7l2)   |
| Ldah       | 0.75  | $6.96 \times 10^{-5}$ | 5.556648 | Lipid droplet-associated hydrolase (Ldah)  |
| Zfp300     | 0.75  | .017296158            | 2.493119 | Zinc finger protein 300 (Zfp300)   |
| Acvr2a     | 0.75  | $7.09 \times 10^{-6}$ | 6.074906 | Activin receptor IIA (Acvr2a)  |
| Ptprm      | 0.75  | $8.01 \times 10^{-6}$ | 7.144231 | Protein tyrosine phosphatase, receptor type, M (Ptprm)   |
| Prox1      | 0.75  | $4.48 \times 10^{-7}$ | 8.506191 | Prospero homeobox 1 (Prox1)  |
| Cacng3     | 0.75  | .000149502            | 7.019381 | Calcium channel, voltage-dependent, gamma subunit 3 (Cacng3)   |
| Pi4k2a     | 0.75  | $3.48 \times 10^{-6}$ | 6.571447 | Phosphatidylinositol 4-kinase type 2 alpha (Pi4k2a)  |
| Cntn6      | 0.75  | $5.07 \times 10^{-5}$ | 5.577599 | Contactin 6 (Cntn6)  |
| Zfp638     | 0.75  | .000242589            | 7.655059 | Zinc finger protein 638 (Zfp638)   |
| Ets2       | 0.75  | $3.18 \times 10^{-5}$ | 5.814854 | E26 avian leukemia oncogene 2, 3' domain (Ets2)  |
| Kcnb2      | 0.75  | $1.87 \times 10^{-5}$ | 6.159632 | Potassium voltage-gated channel, Shab-related subfamily, member 2 (Kcnb2)                                  |
| Epb41l4a   | 0.74  | $8.89 \times 10^{-6}$ | 5.794072 | Erythrocyte membrane protein band 4.1 like 4a (Epb41l4a)   |
| Lgr5       | 0.74  | .005372489            | 3.044548 | Leucine-rich repeat containing G protein coupled receptor 5 (Lgr5)   |
| Atg7       | 0.74  | $2.81 \times 10^{-5}$ | 5.710862 | Autophagy-related 7 (Atg7)   |
| Ndst3      | 0.74  | $1.08 \times 10^{-5}$ | 5.609031 | N-deacetylase/N-sulfotransferase (heparan glucosaminy) 3 (Ndst3)   |
| Adamts2    | 0.74  | .000317285            | 4.072643 | A disintegrin-like and metallopeptidase (repolysin type) with thrombospondin type 1 motif, 2 (Adamts2)     |
| Tox        | 0.74  | $2.69 \times 10^{-5}$ | 7.915995 | Thymocyte selection-associated high-mobility group box (Tox)   |
| Pak3       | 0.74  | $3.19 \times 10^{-6}$ | 8.064688 | p21 protein (Cdc42/Rac)-activated kinase 3 (Pak3)  |
| Gprasp1    | 0.74  | $6.85 \times 10^{-7}$ | 10.20803 | G protein-coupled receptor-associated sorting protein 1 (Gprasp1)  |
| Pcdhgc4    | 0.74  | .000589095            | 4.525818 | Protocadherin gamma subfamily C, 4 (Pcdhgc4)   |
| Ptprt      | 0.74  | $2.03 \times 10^{-6}$ | 7.295216 | Protein tyrosine phosphatase, receptor type, T (Ptprt)   |
| Atp6v1a    | 0.74  | $3.54 \times 10^{-7}$ | 9.471663 | ATPase, H <sup>+</sup> transporting, lysosomal V1 subunit A (Atp6v1a)                                      |
| Perp       | 0.74  | .002407655            | 3.907358 | PERP, TP53 apoptosis effector (Perp)   |
| Lrp8os2    | 0.74  | .006688024            | 2.716208 | Low-density lipoprotein receptor-related protein 8, apolipoprotein e receptor, opposite strand 2 (Lrp8os2) |
| Fndc1      | 0.74  | .010432832            | 2.481106 | Fibronectin type III domain containing 1 (Fndc1)   |
| Nell2      | 0.74  | $1.61 \times 10^{-5}$ | 8.514992 | NEL-like 2 (Nell2)   |
| Creg2      | 0.74  | $7.14 \times 10^{-6}$ | 6.611656 | Cellular repressor of E1A-stimulated genes 2 (Creg2)   |
| Tubg2      | 0.74  | $7.30 \times 10^{-5}$ | 5.338106 | Tubulin, gamma 2 (Tubg2)   |
| Syt4       | 0.74  | $1.37 \times 10^{-6}$ | 9.039083 | Synaptotagmin IV (Syt4)  |
| Drd5       | 0.73  | .006425118            | 2.714526 | Dopamine receptor D5 (Drd5)  |
| Slco5a1    | 0.73  | .009407404            | 2.480001 | Solute carrier organic anion transporter family, member 5A1 (Slco5a1)                                      |
| Tspyl5     | 0.73  | $1.32 \times 10^{-5}$ | 6.165507 | Testis-specific protein, Y-encoded-like 5 (Tspyl5)   |
| Pcdhb16    | 0.73  | .000382616            | 4.775287 | Protocadherin beta 16 (Pcdhb16)  |
| Rcan3      | 0.73  | $1.01 \times 10^{-5}$ | 7.296392 | Regulator of calcineurin 3 (Rcan3)   |
| Fam102b    | 0.73  | $2.79 \times 10^{-6}$ | 7.731735 | Family with sequence similarity 102, member B (Fam102b)  |
| Zfp455     | 0.73  | .038564227            | 1.739184 | Zinc finger protein 455 (Zfp455)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Nedd4         | 0.73  | $3.37 \times 10^{-7}$ | 9.79824  | Neural precursor cell expressed, developmentally downregulated 4 (Nedd4)  |
| Ptpro         | 0.73  | $9.88 \times 10^{-6}$ | 5.498865 | Protein tyrosine phosphatase, receptor type, O (Ptpro)  |
| Tenm1         | 0.73  | $1.91 \times 10^{-6}$ | 8.677358 | Teneurin transmembrane protein 1 (Tenm1)  |
| Sdk1          | 0.73  | .003488016            | 3.764472 | Sidekick cell adhesion molecule 1 (Sdk1)  |
| Sdk2          | 0.73  | $2.69 \times 10^{-5}$ | 6.235304 | Sidekick cell adhesion molecule 2 (Sdk2)  |
| Syt16         | 0.73  | $5.73 \times 10^{-5}$ | 6.023805 | Synaptotagmin XVI (Syt16)   |
| Pja2          | 0.73  | $9.40 \times 10^{-7}$ | 9.256879 | Praja 2, RING-H2 motif containing (Pja2)  |
| Satb2         | 0.73  | .033744533            | 3.52513  | Special AT-rich sequence binding protein 2 (Satb2)  |
| Irs4          | 0.73  | .007758385            | 2.876162 | Insulin receptor substrate 4 (Irs4)   |
| D430019H16Rik | 0.73  | $8.35 \times 10^{-6}$ | 8.001078 | RIKEN cDNA D430019H16 gene (D430019H16Rik)  |
| Gpr101        | 0.73  | .005584713            | 3.578388 | G protein-coupled receptor 101 (Gpr101)   |
| Rab27b        | 0.73  | $1.16 \times 10^{-5}$ | 5.669068 | RAB27B, member RAS oncogene family (Rab27b)   |
| Nell1         | 0.73  | $7.87 \times 10^{-5}$ | 6.828975 | NEL-like 1 (Nell1)  |
| Zfp712        | 0.73  | .00613382             | 3.000179 | Zinc finger protein 712 (Zfp712)  |
| Nyap2         | 0.73  | $9.88 \times 10^{-6}$ | 6.247907 | Neuronal tyrosine-phosphorylated phosphoinositide 3-kinase adaptor 2 (Nyap2)  |
| Zfp971        | 0.73  | .000684523            | 3.625595 | Zinc finger protein 971 (Zfp971)  |
| Kcnh1         | 0.73  | .002814285            | 3.55106  | Potassium voltage-gated channel, subfamily H (eag-related), member 1 (Kcnh1)  |
| Pttn20        | 0.73  | .029241536            | 2.221325 | Protein tyrosine phosphatase, nonreceptor type 20 (Pttn20)  |
| Ar            | 0.72  | $8.81 \times 10^{-6}$ | 6.271874 | Androgen receptor (Ar)  |
| Pja1          | 0.72  | $1.21 \times 10^{-6}$ | 7.784125 | Praja ring finger 1, E3 ubiquitin protein ligase (Pja1)   |
| Plppr2        | 0.72  | $6.20 \times 10^{-6}$ | 6.547971 | Phospholipid phosphatase related 2 (Plppr2)   |
| Dcc           | 0.72  | $4.71 \times 10^{-5}$ | 5.209965 | Deleted in colorectal carcinoma (Dcc)   |
| Sema5a        | 0.72  | $2.91 \times 10^{-6}$ | 8.406449 | Sema domain, seven thrombospondin repeats (type 1 and type 1-like), transmembrane domain (TM), and short cytoplasmic domain, (semaphorin) 5A (Sema5a) |
| Taf5l         | 0.72  | .00048829             | 4.214711 | TATA-box binding protein-associated factor 5 like (Taf5l)   |
| Zfp958        | 0.72  | .012627234            | 3.242134 | Zinc finger protein 958 (Zfp958)  |
| Ccdc87        | 0.72  | .009634176            | 2.748689 | Coiled-coil domain containing 87 (Ccdc87)   |
| Rit1          | 0.72  | .000119843            | 4.659273 | Ras-like without CAAX 1 (Rit1)  |
| Cd55          | 0.72  | .000598025            | 3.933316 | CD55 molecule, decay accelerating factor for complement (Cd55)  |
| Grm2          | 0.72  | $5.63 \times 10^{-6}$ | 6.84357  | Glutamate receptor, metabotropic 2 (Grm2)   |
| Foxred2       | 0.72  | .000336364            | 4.584256 | FAD-dependent oxidoreductase domain containing 2 (Foxred2)  |
| Rundc3b       | 0.72  | $5.48 \times 10^{-5}$ | 5.567494 | RUN domain containing 3B (Rundc3b)  |
| Tmem132c      | 0.72  | .002533602            | 4.719406 | Transmembrane protein 132C (Tmem132c)   |
| Pgr           | 0.72  | $6.29 \times 10^{-5}$ | 5.235948 | Progesterone receptor (Pgr)   |
| D3Ertd254e    | 0.72  | $6.29 \times 10^{-5}$ | 6.041762 | DNA segment, Chr 3, ERATO Doi 254, expressed (D3Ertd254e)   |
| Amph          | 0.72  | $1.65 \times 10^{-6}$ | 8.207338 | Amphiphysin (Amph)  |
| Rgs17         | 0.72  | $1.05 \times 10^{-6}$ | 8.693556 | Regulator of G-protein signaling 17 (Rgs17)   |
| Hps6          | 0.71  | .019824798            | 2.486721 | Hermansky-Pudlak syndrome 6 (Hps6)  |
| Ythdf3        | 0.71  | $1.20 \times 10^{-5}$ | 6.418722 | YTH domain family 3 (Ythdf3)  |
| Zbtb33        | 0.71  | .000355134            | 5.272728 | Zinc finger and BTB domain containing 33 (Zbtb33)   |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tspyl2        | 0.71  | $8.01 \times 10^{-6}$    | 7.85734  | TSPY-like 2 (Tspyl2)  |
| Auts2         | 0.71  | $2.79 \times 10^{-6}$    | 7.513667 | Autism susceptibility candidate 2 (Auts2)   |
| Slc8a2        | 0.71  | .000248828               | 5.228934 | Solute carrier family 8 (sodium/calcium exchanger), member 2 (Slc8a2)                   |
| Cbln4         | 0.71  | .001215332               | 7.097208 | Cerebellin 4 precursor protein (Cbln4)  |
| Alkbh8        | 0.71  | $1.13 \times 10^{-5}$    | 6.749302 | AlkB homolog 8, tRNA methyltransferase (Alkbh8)   |
| Btbd3         | 0.71  | $8.18 \times 10^{-6}$    | 8.978045 | BTB (POZ) domain containing 3 (Btbd3)   |
| L3mbtl2       | 0.71  | $4.93 \times 10^{-5}$    | 4.712922 | I (3)mbt-like 2 (L3mbtl2)   |
| Lrrtm2        | 0.71  | $6.85 \times 10^{-7}$    | 8.042463 | Leucine-rich repeat transmembrane neuronal 2 (Lrrtm2)                                   |
| Slc16a6       | 0.71  | .000729261               | 3.806251 | Solute carrier family 16 (monocarboxylic acid transporters), member 6 (Slc16a6)         |
| Rasal1        | 0.71  | .004866842               | 3.826241 | RAS protein activator like 1 (GAP1 like) (Rasal1)                                       |
| Rorb          | 0.71  | $3.07 \times 10^{-6}$    | 8.644884 | RAR-related orphan receptor beta (Rorb)   |
| St6gal2       | 0.71  | .000196586               | 5.900034 | Beta galactoside alpha 2,6 sialyltransferase 2 (St6gal2)                                |
| Efhc2         | 0.70  | .004644489               | 2.89958  | EF-hand domain (C-terminal) containing 2 (Efhc2)  |
| Zfp758        | 0.70  | .001170498               | 3.161529 | Zinc finger protein 758 (Zfp758)  |
| Ksr2          | 0.70  | $1.55 \times 10^{-5}$    | 7.123772 | Kinase suppressor of ras 2 (Ksr2)   |
| Hmgcs1        | 0.70  | $2.75 \times 10^{-6}$    | 8.209323 | 3-Hydroxy-3-methylglutaryl-Coenzyme A synthase 1 (Hmgcs1)                               |
| Wnt9a         | 0.70  | .000399912               | 4.720925 | Wingless-type MMTV integration site family, member 9A (Wnt9a)                           |
| Oxr1          | 0.70  | $6.44 \times 10^{-7}$    | 9.301846 | Oxidation resistance 1 (Oxr1)   |
| 1700001L05Rik | 0.70  | .011682413               | 2.684811 | RIKEN cDNA 1700001L05 gene (1700001L05Rik)  |
| Foxp4         | 0.70  | $4.22 \times 10^{-5}$    | 5.913491 | Forkhead box P4 (Foxp4)   |
| Oprm1         | 0.70  | $8.04 \times 10^{-6}$    | 7.474937 | Opioid receptor, mu 1 (Oprm1)   |
| B3gat2        | 0.70  | .000129323               | 5.463953 | Beta-1,3-glucuronyltransferase 2 (glucuronosyltransferase 5) (B3gat2)                   |
| Unc5c         | 0.70  | $2.44 \times 10^{-5}$    | 7.477314 | Unc-5 netrin receptor C (Unc5c)   |
| Kcnq3         | 0.70  | $1.36 \times 10^{-5}$    | 9.780823 | Potassium voltage-gated channel, subfamily Q, member 3 (Kcnq3)                          |
| Gnaz          | 0.70  | $8.67 \times 10^{-6}$    | 6.95241  | Guanine nucleotide binding protein, alpha z subunit (Gnaz)                              |
| Pgbd5         | 0.70  | $8.74 \times 10^{-5}$    | 7.534544 | PiggyBac transposable element derived 5 (Pgbd5)   |
| Nmbr          | 0.70  | .000178865               | 5.107571 | Neuromedin B receptor (Nmbr)  |
| Plxna2        | 0.70  | $8.91 \times 10^{-6}$    | 6.966121 | Plexin A2 (Plxna2)  |
| Brinp1        | 0.70  | $4.45 \times 10^{-5}$    | 7.448675 | Bone morphogenic protein/retinoic acid inducible neural specific 1 (Brinp1)             |
| Sec16a        | 0.70  | .000788978               | 6.995678 | SEC16 homolog A, endoplasmic reticulum export factor (Sec16a)                           |
| Fam13c        | 0.70  | $4.82 \times 10^{-5}$    | 5.354801 | Family with sequence similarity 13, member C (Fam13c)                                   |
| Epha5         | 0.69  | $5.64 \times 10^{-6}$    | 7.26791  | Eph receptor A5 (Epha5)   |
| Slc7a8        | 0.69  | $9.18 \times 10^{-6}$    | 7.620459 | Solute carrier family 7 (cationic amino acid transporter, y+ system), member 8 (Slc7a8) |
| Vgll3         | 0.69  | .043363172               | 1.593746 | Vestigial like family member 3 (Vgll3)  |
| Nanos1        | 0.69  | $1.10 \times 10^{-5}$    | 5.745121 | Nanos homolog 1 (Nanos1)  |
| Gabra1        | 0.69  | $1.74 \times 10^{-6}$    | 8.626545 | Gamma-aminobutyric acid (GABA) A receptor, subunit alpha 1 (Gabra1)                     |
| Nhs           | 0.69  | .00571752                | 3.295677 | Nance-Horan syndrome (human) (Nhs)  |
| Gabrg3        | 0.69  | $2.79 \times 10^{-5}$    | 7.200887 | Gamma-aminobutyric acid (GABA) A receptor, subunit gamma 3 (Gabrg3)                     |
| Tubb5         | 0.69  | $2.63 \times 10^{-5}$    | 8.990945 | Tubulin, beta 5 class I (Tubb5)   |

TABLE A1 Continued

| Gene name  | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|------------|-------|--------------------------|----------|---|
| Hrh3       | 0.69  | $7.81 \times 10^{-5}$    | 6.940781 | Histamine receptor H3 (Hrh3)  |
| Slitrk5    | 0.69  | $8.21 \times 10^{-5}$    | 5.995581 | SLIT and NTRK-like family, member 5 (Slitrk5)                                   |
| Evpl       | 0.69  | .00781795                | 3.359515 | Envoplakin (Evpl)   |
| Pak6       | 0.69  | .000694143               | 5.414874 | p21 protein (Cdc42/Rac)-activated kinase 6 (Pak6)                               |
| Gm340      | 0.69  | .013158512               | 3.642348 | Predicted gene 340 (Gm340)  |
| Fam171a2   | 0.69  | .00928351                | 3.749679 | Family with sequence similarity 171, member A2 (Fam171a2)                       |
| Grm7       | 0.69  | $2.53 \times 10^{-5}$    | 5.89921  | Glutamate receptor, metabotropic 7 (Grm7)                                       |
| Pcdh1      | 0.69  | $9.57 \times 10^{-6}$    | 8.114862 | Protocadherin 1 (Pcdh1)   |
| Igfbp3     | 0.69  | .012277511               | 3.676685 | Insulin-like growth factor binding protein 3 (Igfbp3)                           |
| Gda        | 0.69  | .042943058               | 5.020327 | Guanine deaminase (Gda)   |
| Gm14410    | 0.69  | .029285353               | 2.557606 | Predicted gene 14410 (Gm14410)  |
| Fut9       | 0.69  | $3.22 \times 10^{-5}$    | 7.372647 | Fucosyltransferase 9 (Fut9)   |
| Ackr1      | 0.69  | .00127376                | 4.87562  | Atypical chemokine receptor 1 (Duffy blood group) (Ackr1)                       |
| Glt1d1     | 0.69  | .010933903               | 3.240601 | Glycosyltransferase 1 domain containing 1 (Glt1d1)                              |
| Rlim       | 0.69  | $2.39 \times 10^{-6}$    | 7.93932  | Ring finger protein, LIM domain interacting (Rlim)                              |
| Sh3rf1     | 0.69  | .004119142               | 4.228434 | SH3 domain containing ring finger 1 (Sh3rf1)                                    |
| Wnt4       | 0.69  | .006318783               | 4.184562 | Wingless-type MMTV integration site family, member 4 (Wnt4)                     |
| Igsf8      | 0.69  | .000305057               | 6.640093 | Immunoglobulin superfamily, member 8 (Igsf8)                                    |
| Zfp804a    | 0.69  | $2.69 \times 10^{-5}$    | 7.346291 | Zinc finger protein 804A (Zfp804a)  |
| Necab1     | 0.68  | $2.85 \times 10^{-5}$    | 10.05045 | N-terminal EF-hand calcium binding protein 1 (Necab1)                           |
| Lingo3     | 0.68  | .000307701               | 4.196679 | Leucine-rich repeat and Ig domain containing 3 (Lingo3)                         |
| Myt1l      | 0.68  | $1.73 \times 10^{-6}$    | 8.471961 | Myelin transcription factor 1-like (Myt1l)                                      |
| Ttpal      | 0.68  | $1.70 \times 10^{-5}$    | 6.151854 | Tocopherol (alpha) transfer protein-like (Ttpal)                                |
| Sorcs3     | 0.68  | .000215834               | 4.819786 | Sortilin-related VPS10 domain containing receptor 3 (Sorcs3)                    |
| Slx4ip     | 0.68  | .000868438               | 4.263561 | SLX4 interacting protein (Slx4ip)   |
| Pcdhb10    | 0.68  | .005864134               | 3.159176 | Protocadherin beta 10 (Pcdhb10)   |
| Slc39a10   | 0.68  | $6.77 \times 10^{-6}$    | 8.084488 | Solute carrier family 39 (zinc transporter), member 10 (Slc39a10)               |
| Cd200      | 0.68  | $5.80 \times 10^{-5}$    | 7.964093 | CD200 antigen (Cd200)   |
| Nppc       | 0.68  | .011216946               | 3.785836 | Natriuretic peptide type C (Nppc)   |
| Zfp354c    | 0.68  | $4.89 \times 10^{-5}$    | 6.403903 | Zinc finger protein 354C (Zfp354c)  |
| Lingo1     | 0.68  | $2.87 \times 10^{-5}$    | 8.272062 | Leucine-rich repeat and Ig domain containing 1 (Lingo1)                         |
| Slc16a7    | 0.68  | $1.09 \times 10^{-5}$    | 6.243917 | Solute carrier family 16 (monocarboxylic acid transporters), member 7 (Slc16a7) |
| Wdr6       | 0.68  | $1.47 \times 10^{-5}$    | 6.573184 | WD repeat domain 6 (Wdr6)   |
| Rxrg       | 0.68  | .045115431               | 1.690986 | Retinoid X receptor gamma (Rxrg)  |
| Gabrg2     | 0.68  | $2.91 \times 10^{-6}$    | 7.063949 | Gamma-aminobutyric acid (GABA) A receptor, subunit gamma 2 (Gabrg2)             |
| AC118639.1 | 0.68  | .04062694                | 1.947444 | Predicted gene (Gm48956)  |
| Flrt1      | 0.68  | $9.04 \times 10^{-5}$    | 6.882979 | Fibronectin leucine-rich transmembrane protein 1 (Flrt1)                        |
| Gabra3     | 0.68  | $6.76 \times 10^{-6}$    | 7.241671 | Gamma-aminobutyric acid (GABA) A receptor, subunit alpha 3 (Gabra3)             |
| Ankfn1     | 0.67  | .002541825               | 4.130064 | Ankyrin-repeat and fibronectin type III domain containing 1 (Ankfn1)            |
| Kcnj5      | 0.67  | .000596952               | 6.457383 | Potassium inwardly-rectifying channel, subfamily J, member 5 (Kcnj5)            |
| Zfp458     | 0.67  | .009941695               | 4.083015 | Zinc finger protein 458 (Zfp458)  |
| Fam131c    | 0.67  | .025588008               | 2.917946 | Family with sequence similarity 131, member C (Fam131c)                         |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Rtn4r1l       | 0.67  | $5.68 \times 10^{-6}$ | 8.455866 | Reticulon 4 receptor-like 1 (Rtn4r1l)   |
| Slitrk1       | 0.67  | $3.15 \times 10^{-5}$ | 6.92584  | SLIT and NTRK-like family, member 1 (Slitrk1)   |
| Gpr83         | 0.67  | .010787571            | 3.46233  | G protein-coupled receptor 83 (Gpr83)   |
| Pcdhac2       | 0.67  | .000464785            | 5.425964 | Protocadherin alpha subfamily C, 2 (Pcdhac2)  |
| Pip5k1b       | 0.67  | .000770792            | 4.331728 | Phosphatidylinositol-4-phosphate 5-kinase, type 1 beta (Pip5k1b)  |
| Zfp292        | 0.67  | $3.61 \times 10^{-6}$ | 7.456565 | Zinc finger protein 292 (Zfp292)  |
| Irs1          | 0.67  | $4.10 \times 10^{-5}$ | 5.28191  | Insulin receptor substrate 1 (Irs1)   |
| Edaradd       | 0.67  | .000153222            | 4.592007 | EDAR (ectodysplasin-A receptor)-associated death domain (Edaradd)                                       |
| Nudt17        | 0.67  | .029205333            | 2.296977 | Nudix (nucleoside diphosphate linked moiety X)-type motif 17 (Nudt17)                                   |
| Clcn5         | 0.67  | .000128435            | 5.712055 | Chloride channel, voltage-sensitive 5 (Clcn5)   |
| Gnb4          | 0.67  | $5.27 \times 10^{-5}$ | 5.705785 | Guanine nucleotide binding protein (G protein), beta 4 (Gnb4)   |
| Dhcr24        | 0.66  | $3.26 \times 10^{-5}$ | 6.245905 | 24-Dehydrocholesterol reductase (Dhcr24)  |
| Pacs1         | 0.66  | $1.77 \times 10^{-5}$ | 6.956356 | Phosphofurin acidic cluster sorting protein 1 (Pacs1)   |
| Kctd16        | 0.66  | .031485849            | 2.596755 | Potassium channel tetramerisation domain containing 16 (Kctd16)   |
| Rcn1          | 0.66  | .000118658            | 6.101657 | Reticulocalbin 1 (Rcn1)   |
| Cdh13         | 0.66  | $6.28 \times 10^{-5}$ | 6.8159   | Cadherin 13 (Cdh13)   |
| Naaladl2      | 0.66  | .03685715             | 2.410721 | N-acetylated alpha-linked acidic dipeptidase-like 2 (Naaladl2)  |
| Zfp9          | 0.66  | $4.14 \times 10^{-5}$ | 6.1228   | Zinc finger protein 9 (Zfp9)  |
| Micu3         | 0.66  | $2.78 \times 10^{-6}$ | 7.961959 | Mitochondrial calcium uptake family, member 3 (Micu3)   |
| St8sia6       | 0.66  | .000974263            | 3.896571 | ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 6 (St8sia6)                                  |
| P4ha2         | 0.66  | .001261355            | 4.292084 | Procollagen-proline, 2-oxoglutarate 4-dioxygenase (proline 4-hydroxylase), alpha II polypeptide (P4ha2) |
| B3galt1       | 0.66  | $1.47 \times 10^{-5}$ | 6.602279 | UDP-Gal:betaGlcNAc beta 1,3-galactosyltransferase, polypeptide 1 (B3galt1)                              |
| Lsm12         | 0.66  | $6.74 \times 10^{-6}$ | 6.63163  | LSM12 homolog (Lsm12)   |
| Epb41l4b      | 0.66  | $5.78 \times 10^{-6}$ | 7.025423 | Erythrocyte membrane protein band 4.1 like 4b (Epb41l4b)  |
| Pcdhgc5       | 0.66  | .002865607            | 4.463242 | Protocadherin gamma subfamily C, 5 (Pcdhgc5)  |
| Tubb2a        | 0.66  | .000169512            | 8.653741 | Tubulin, beta 2A class IIA (Tubb2a)   |
| Cnm1          | 0.66  | $7.11 \times 10^{-6}$ | 7.342593 | Cyclin M1 (Cnm1)  |
| Tubb6         | 0.66  | .012627234            | 2.864865 | Tubulin, beta 6 class V (Tubb6)   |
| Rnf169        | 0.66  | $1.94 \times 10^{-5}$ | 6.788594 | Ring finger protein 169 (Rnf169)  |
| Cxadr         | 0.66  | .001717986            | 4.539335 | Coxsackie virus and adenovirus receptor (Cxadr)   |
| Zc3h12c       | 0.66  | $1.70 \times 10^{-5}$ | 6.673134 | Zinc finger CCCH type containing 12C (Zc3h12c)  |
| Stac2         | 0.66  | .009323545            | 3.823554 | SH3 and cysteine-rich domain 2 (Stac2)  |
| Pcdh7         | 0.66  | $3.95 \times 10^{-5}$ | 6.546222 | Protocadherin 7 (Pcdh7)   |
| D430041D05Rik | 0.66  | $4.67 \times 10^{-5}$ | 8.003882 | RIKEN cDNA D430041D05 gene (D430041D05Rik)  |
| Sertad4       | 0.66  | .000174129            | 5.221712 | SERTA domain containing 4 (Sertad4)   |
| Pten          | 0.65  | $7.14 \times 10^{-6}$ | 8.316894 | Phosphatase and tensin homolog (Pten)   |
| Shisa9        | 0.65  | $1.15 \times 10^{-5}$ | 8.321552 | Shisa family member 9 (Shisa9)  |
| Acap3         | 0.65  | .00029248             | 5.159862 | ArfGAP with coiled-coil, ankyrin repeat, and PH domains 3 (Acap3)                                       |
| Tenm4         | 0.65  | $1.09 \times 10^{-5}$ | 7.405197 | Teneurin transmembrane protein 4 (Tenm4)  |
| Sfmbt2        | 0.65  | .003016668            | 4.232257 | Scm-like with four mbt domains 2 (Sfmbt2)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Zfp605    | 0.65  | .001673274            | 4.621752 | Zinc finger protein 605 (Zfp605)  |
| Tox2      | 0.65  | .000161226            | 7.262289 | TOX high-mobility group box family member 2 (Tox2)  |
| Gpr63     | 0.65  | .000788978            | 3.825422 | G protein-coupled receptor 63 (Gpr63)   |
| Ythdf1    | 0.65  | $1.95 \times 10^{-5}$ | 6.328597 | YTH domain family 1 (Ythdf1)  |
| Slc25a22  | 0.65  | $7.93 \times 10^{-5}$ | 7.237398 | Solute carrier family 25 (mitochondrial carrier, glutamate), member 22 (Slc25a22)               |
| Pik3cb    | 0.65  | .000240897            | 6.360441 | Phosphatidylinositol 3-kinase, catalytic, beta polypeptide (Pik3cb)                             |
| Rwdd2a    | 0.65  | .000322361            | 4.960711 | RWD domain containing 2A (Rwdd2a)   |
| Adgrg2    | 0.65  | .006265713            | 4.091805 | Adhesion G protein-coupled receptor G2 (Adgrg2)   |
| Cers6     | 0.65  | $1.22 \times 10^{-5}$ | 6.809188 | Ceramide synthase 6 (Cers6)   |
| L1cam     | 0.65  | $8.11 \times 10^{-6}$ | 9.2205   | L1 cell adhesion molecule (L1cam)   |
| Mef2d     | 0.65  | $1.21 \times 10^{-6}$ | 8.413944 | Myocyte enhancer factor 2D (Mef2d)  |
| Runx1t1   | 0.65  | $2.17 \times 10^{-6}$ | 7.447176 | Runt-related transcription factor 1; translocated to, 1 (cyclin D-related) (Runx1t1)            |
| Ap1s3     | 0.65  | .015481813            | 3.015614 | Adaptor-related protein complex AP-1, sigma 3 (Ap1s3)   |
| Stk32b    | 0.65  | .030728504            | 2.727759 | Serine/threonine kinase 32B (Stk32b)  |
| Srrm4     | 0.65  | $6.21 \times 10^{-6}$ | 7.058903 | Serine/arginine repetitive matrix 4 (Srrm4)   |
| Gmps      | 0.65  | $1.86 \times 10^{-6}$ | 8.156985 | Guanine monophosphate synthetase (Gmps)   |
| Dgkk      | 0.65  | .000390208            | 6.132485 | Diacylglycerol kinase kappa (Dgkk)  |
| Dnm3      | 0.65  | $2.05 \times 10^{-6}$ | 9.291565 | Dynamin 3 (Dnm3)  |
| Ell       | 0.65  | .000916584            | 4.196548 | Elongation factor RNA polymerase II (Ell)   |
| Ankrd6    | 0.65  | $1.10 \times 10^{-5}$ | 6.681168 | Ankyrin repeat domain 6 (Ankrd6)  |
| Nhs12     | 0.65  | $7.86 \times 10^{-7}$ | 8.22565  | NHS-like 2 (Nhs12)  |
| Ddah1     | 0.65  | $3.04 \times 10^{-5}$ | 9.206221 | Dimethylarginine dimethylaminohydrolase 1 (Ddah1)   |
| Taf6      | 0.65  | .002815125            | 4.257428 | TATA-box binding protein-associated factor 6 (Taf6)   |
| Rph3al    | 0.65  | .006897646            | 2.809707 | Rabphilin 3A-like (without C2 domains) (Rph3al)   |
| Mpp3      | 0.65  | .00289915             | 3.412033 | Membrane protein, palmitoylated 3 (MAGUK p55 subfamily member 3) (Mpp3)                         |
| Hpcal4    | 0.64  | $5.74 \times 10^{-6}$ | 9.36387  | Hippocalcin-like 4 (Hpcal4)   |
| Adgra1    | 0.64  | $5.43 \times 10^{-5}$ | 8.661554 | Adhesion G protein-coupled receptor A1 (Adgra1)   |
| Rnf208    | 0.64  | $9.49 \times 10^{-5}$ | 6.292206 | Ring finger protein 208 (Rnf208)  |
| Pde10a    | 0.64  | $2.68 \times 10^{-5}$ | 6.603144 | Phosphodiesterase 10A (Pde10a)  |
| Adamts1   | 0.64  | .001644552            | 3.848228 | ADAMTS-like 1 (Adamts1)   |
| Rab6a     | 0.64  | $1.13 \times 10^{-6}$ | 9.27939  | RAB6A, member RAS oncogene family (Rab6a)   |
| Stim2     | 0.64  | $1.77 \times 10^{-5}$ | 5.843636 | Stromal interaction molecule 2 (Stim2)  |
| Sema3c    | 0.64  | .007511667            | 3.534536 | Sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3C (Sema3c) |
| Clstn3    | 0.64  | $1.66 \times 10^{-5}$ | 6.738189 | Calsyntenin 3 (Clstn3)  |
| Rab39b    | 0.64  | $2.44 \times 10^{-5}$ | 6.625339 | RAB39B, member RAS oncogene family (Rab39b)   |
| Fam163b   | 0.64  | .000351859            | 5.568675 | Family with sequence similarity 163, member B (Fam163b)   |
| Gpr12     | 0.64  | $2.93 \times 10^{-5}$ | 6.274946 | G-protein coupled receptor 12 (Gpr12)   |
| Pcdhb21   | 0.64  | .02296658             | 2.770716 | Protocadherin beta 21 (Pcdhb21)   |
| Rin1      | 0.64  | .049756401            | 2.189064 | Ras and Rab interactor 1 (Rin1)   |
| Urod      | 0.64  | .000644079            | 5.302676 | Uroporphyrinogen decarboxylase (Urod)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Rap1gap2      | 0.64  | $1.10 \times 10^{-5}$    | 7.542295 | RAP1 GTPase activating protein 2 (Rap1gap2)  |
| Gabrb3        | 0.64  | $1.11 \times 10^{-6}$    | 9.440774 | Gamma-aminobutyric acid (GABA) A receptor, subunit beta 3 (Gabrb3)                         |
| Gal3st3       | 0.64  | .002849927               | 5.084091 | Galactose-3-O-sulfotransferase 3 (Gal3st3)   |
| Sept9         | 0.63  | .000567766               | 4.964166 | Septin 9 (Sept9)   |
| Cep170        | 0.63  | $8.91 \times 10^{-6}$    | 7.529605 | Centrosomal protein 170 (Cep170)   |
| Fam171b       | 0.63  | $8.30 \times 10^{-7}$    | 9.147819 | Family with sequence similarity 171, member B (Fam171b)                                    |
| Negr1         | 0.63  | $1.59 \times 10^{-5}$    | 8.822066 | Neuronal growth regulator 1 (Negr1)  |
| 1700037H04Rik | 0.63  | $6.87 \times 10^{-5}$    | 5.809181 | RIKEN cDNA 1700037H04 gene (1700037H04Rik)   |
| Gabrq         | 0.63  | .003992505               | 3.923309 | Gamma-aminobutyric acid (GABA) A receptor, subunit theta (Gabrq)                           |
| Slc1a6        | 0.63  | .010175739               | 2.922441 | Solute carrier family 1 (high affinity aspartate/glutamate transporter), member 6 (Slc1a6) |
| Ptprn         | 0.63  | $1.06 \times 10^{-5}$    | 8.644638 | Protein tyrosine phosphatase, receptor type, N (Ptprn)                                     |
| Cntnap2       | 0.63  | $6.76 \times 10^{-5}$    | 8.762565 | Contactin-associated protein-like 2 (Cntnap2)  |
| Rapgef1       | 0.63  | .000178239               | 6.652976 | Rap guanine nucleotide exchange factor (GEF)-like 1 (Rapgef1)                              |
| Asic2         | 0.63  | $4.03 \times 10^{-5}$    | 5.650784 | Acid-sensing (proton-gated) ion channel 2 (Asic2)  |
| Pamr1         | 0.63  | .002137442               | 4.829015 | Peptidase domain containing associated with muscle regeneration 1 (Pamr1)                  |
| Ehd4          | 0.63  | .000154388               | 5.014108 | EH-domain containing 4 (Ehd4)  |
| Psd           | 0.63  | $6.87 \times 10^{-5}$    | 6.002483 | Pleckstrin and Sec7 domain containing (Psd)  |
| Rnf150        | 0.63  | $3.27 \times 10^{-6}$    | 7.782335 | Ring finger protein 150 (Rnf150)   |
| Frat1         | 0.63  | .030170221               | 2.646394 | Frequently rearranged in advanced T cell lymphomas (Frat1)                                 |
| Agap1         | 0.63  | $3.36 \times 10^{-6}$    | 8.638516 | ArfGAP with GTPase domain, ankyrin repeat, and PH domain 1 (Agap1)                         |
| Kcnh6         | 0.63  | .023715746               | 2.725244 | Potassium voltage-gated channel, subfamily H (eag-related), member 6 (Kcnh6)               |
| Tmem196       | 0.63  | $5.73 \times 10^{-5}$    | 5.932298 | Transmembrane protein 196 (Tmem196)  |
| Lin7a         | 0.63  | .000159816               | 6.286876 | Lin-7 homolog A (C. elegans) (Lin7a)   |
| Dclk1         | 0.63  | $1.21 \times 10^{-6}$    | 10.10786 | Doublecortin-like kinase 1 (Dclk1)   |
| Mal2          | 0.63  | $3.49 \times 10^{-5}$    | 6.901157 | Mal, T cell differentiation protein 2 (Mal2)   |
| Tmem150c      | 0.63  | .000312079               | 6.803565 | Transmembrane protein 150C (Tmem150c)  |
| 2610021A01Rik | 0.63  | .000383143               | 5.077477 | RIKEN cDNA 2610021A01 gene (2610021A01Rik)   |
| Per1          | 0.62  | $6.96 \times 10^{-5}$    | 6.382323 | Period circadian clock 1 (Per1)  |
| Fn1           | 0.62  | .005166726               | 4.220289 | Fibronectin 1 (Fn1)  |
| Pde4b         | 0.62  | $4.49 \times 10^{-6}$    | 8.249465 | Phosphodiesterase 4B, cAMP specific (Pde4b)  |
| Rasd2         | 0.62  | .000134438               | 6.564986 | RASD family, member 2 (Rasd2)  |
| Lrrn2         | 0.62  | $6.19 \times 10^{-5}$    | 7.567448 | Leucine-rich repeat protein 2, neuronal (Lrrn2)  |
| Mkl2          | 0.62  | $6.51 \times 10^{-6}$    | 7.863098 | MKL/myocardin-like 2 (Mkl2)  |
| Smad9         | 0.62  | .000633508               | 5.027931 | SMAD family member 9 (Smad9)   |
| Zfp955a       | 0.62  | .019154935               | 2.964034 | Zinc finger protein 955A (Zfp955a)   |
| Pkd2l2        | 0.62  | .008590702               | 3.111851 | Polycystic kidney disease 2-like 2 (Pkd2l2)  |
| Ccnt1         | 0.62  | $1.35 \times 10^{-5}$    | 7.105512 | Cyclin T1 (Ccnt1)  |
| Zfp182        | 0.62  | .020443942               | 3.871968 | Zinc finger protein 182 (Zfp182)   |
| Prr36         | 0.62  | .000141143               | 5.95632  | Proline rich 36 (Prr36)  |
| Ecel1         | 0.62  | .005734719               | 4.139147 | Endothelin converting enzyme-like 1 (Ecel1)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|---------------|-------|-----------------------|----------|--|
| Apaf1         | 0.62  | .004392997            | 3.772911 | Apoptotic peptidase activating factor 1 (Apaf1)  |
| Gdpgp1        | 0.62  | .006070659            | 3.944582 | GDP-D-glucose phosphorylase 1 (Gdpgp1)   |
| Kmt2a         | 0.62  | $4.42 \times 10^{-5}$ | 8.633229 | Lysine (K)-specific methyltransferase 2A (Kmt2a)   |
| Plxna4        | 0.62  | $7.75 \times 10^{-6}$ | 7.663438 | Plexin A4 (Plxna4)   |
| Cpsf7         | 0.62  | $1.70 \times 10^{-5}$ | 6.368945 | Cleavage and polyadenylation-specific factor 7 (Cpsf7)   |
| Lrfn1         | 0.62  | .000693674            | 4.332964 | Leucine-rich repeat and fibronectin type III domain containing 1 (Lrfn1)   |
| Rnd1          | 0.62  | .009599513            | 2.96585  | Rho family GTPase 1 (Rnd1)   |
| Lrp3          | 0.62  | .000518239            | 5.517911 | Low-density lipoprotein receptor-related protein 3 (Lrp3)  |
| Nyap1         | 0.62  | .000124978            | 5.196396 | Neuronal tyrosine-phosphorylated phosphoinositide 3-kinase adaptor 1 (Nyap1)                                       |
| Amz1          | 0.62  | .023995602            | 3.208148 | Archaeysin family metalloproteinase 1 (Amz1)   |
| Astn1         | 0.62  | $9.97 \times 10^{-7}$ | 9.056476 | Astrotactin 1 (Astn1)  |
| Enc1          | 0.62  | $5.67 \times 10^{-6}$ | 7.995232 | Ectodermal-neural cortex 1 (Enc1)  |
| Parp8         | 0.62  | .000965887            | 5.06552  | Poly(ADP-ribose) polymerase family, member 8 (Parp8)   |
| Ylpm1         | 0.62  | $5.49 \times 10^{-5}$ | 7.977073 | YLP motif containing 1 (Ylpm1)   |
| Ppfia2        | 0.62  | $1.15 \times 10^{-5}$ | 7.677043 | Protein tyrosine phosphatase, receptor type, f polypeptide (PTPRF), interacting protein (liprin), alpha 2 (Ppfia2) |
| Tmem178b      | 0.62  | $3.10 \times 10^{-6}$ | 8.725296 | Transmembrane protein 178B (Tmem178b)  |
| Rnf165        | 0.62  | $4.46 \times 10^{-5}$ | 6.906986 | Ring finger protein 165 (Rnf165)   |
| Lrfn3         | 0.62  | .000791988            | 5.029696 | Leucine-rich repeat and fibronectin type III domain containing 3 (Lrfn3)   |
| Prep          | 0.62  | .000100766            | 5.613128 | Prolyl endopeptidase (Prep)  |
| Zfp933        | 0.62  | .01016329             | 4.072213 | Zinc finger protein 933 (Zfp933)   |
| Prkacb        | 0.62  | $2.23 \times 10^{-6}$ | 9.614677 | Protein kinase, cAMP dependent, catalytic, beta (Prkacb)   |
| Pcdha5        | 0.61  | .044014232            | 2.616261 | Protocadherin alpha 5 (Pcdha5)   |
| Fbxl21        | 0.61  | .000879683            | 4.800861 | F-box and leucine-rich repeat protein 21 (Fbxl21)  |
| Unc13a        | 0.61  | $2.67 \times 10^{-5}$ | 7.336045 | Unc-13 homolog A (C. elegans) (Unc13a)   |
| Sema4f        | 0.61  | .001125939            | 5.459212 | Sema domain, immunoglobulin domain (Ig), TM domain, and short cytoplasmic domain (Sema4f)                          |
| Fam13b        | 0.61  | $9.26 \times 10^{-5}$ | 7.348579 | Family with sequence similarity 13, member B (Fam13b)  |
| Ola1          | 0.61  | $8.60 \times 10^{-6}$ | 7.168847 | Obg-like ATPase 1 (Ola1)   |
| Neto2         | 0.61  | .000743316            | 6.070033 | Neuropilin (NRP) and tolloid (TLL)-like 2 (Neto2)  |
| Map2k4        | 0.61  | $3.79 \times 10^{-6}$ | 8.51202  | Mitogen-activated protein kinase kinase 4 (Map2k4)   |
| Habp4         | 0.61  | $1.34 \times 10^{-5}$ | 7.444208 | Hyaluronic acid binding protein 4 (Habp4)  |
| Rab3c         | 0.61  | $1.85 \times 10^{-6}$ | 11.49458 | RAB3C, member RAS oncogene family (Rab3c)  |
| D130043K22Rik | 0.61  | .000122038            | 5.356186 | RIKEN cDNA D130043K22 gene (D130043K22Rik)   |
| Ipcef1        | 0.61  | .008010838            | 3.646607 | Interaction protein for cytohesin exchange factors 1 (Ipcef1)  |
| Sez6          | 0.61  | .000143923            | 6.272899 | Seizure-related gene 6 (Sez6)  |
| Crim1         | 0.61  | $3.31 \times 10^{-5}$ | 6.659933 | Cysteine-rich transmembrane BMP regulator 1 (chordin like) (Crim1)   |
| Snx31         | 0.61  | .003095396            | 4.438511 | Sorting nexin 31 (Snx31)   |
| Csmd2         | 0.61  | .000257199            | 5.417954 | CUB and Sushi multiple domains 2 (Csmd2)   |
| Etnk1         | 0.61  | $9.15 \times 10^{-6}$ | 8.80845  | Ethanolamine kinase 1 (Etnk1)  |
| Mettl22       | 0.61  | .001804152            | 4.00693  | Methyltransferase like 22 (Mettl22)  |
| Sfmbt1        | 0.61  | $7.54 \times 10^{-5}$ | 6.214588 | Scm-like with four mbt domains 1 (Sfmbt1)  |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Zfp39         | 0.61  | .001604211               | 3.761073 | Zinc finger protein 39 (Zfp39)  |
| Alms1         | 0.61  | .011824028               | 5.337672 | Alstrom syndrome 1 (Alms1)  |
| Rev3l         | 0.61  | $8.33 \times 10^{-5}$    | 7.200502 | REV3 like, DNA directed polymerase zeta catalytic subunit (Rev3l)           |
| Stox1         | 0.61  | .007672367               | 3.153065 | Storkhead box 1 (Stox1)   |
| Tro           | 0.61  | $4.34 \times 10^{-5}$    | 6.489582 | Trophinin (Tro)   |
| Cdyl2         | 0.61  | .015791444               | 2.722594 | Chromodomain protein, Y chromosome-like 2 (Cdyl2)                           |
| Arl10         | 0.61  | .000629233               | 4.317593 | ADP-ribosylation factor-like 10 (Arl10)                                     |
| Grik2         | 0.61  | $2.03 \times 10^{-5}$    | 6.880724 | Glutamate receptor, ionotropic, kainate 2 (beta 2) (Grik2)                  |
| Frmpd4        | 0.61  | $2.23 \times 10^{-5}$    | 7.56353  | FERM and PDZ domain containing 4 (Frmpd4)                                   |
| Zfhx4         | 0.61  | .000885694               | 7.534311 | Zinc finger homeodomain 4 (Zfhx4)   |
| Zfp846        | 0.61  | .000916584               | 5.698572 | Zinc finger protein 846 (Zfp846)  |
| Zfpm2         | 0.60  | .006631642               | 3.799049 | Zinc finger protein, multitype 2 (Zfpm2)                                    |
| Stc1          | 0.60  | .010682162               | 3.040314 | Stanniocalcin 1 (Stc1)  |
| Cpeb4         | 0.60  | $1.70 \times 10^{-5}$    | 7.892134 | Cytoplasmic polyadenylation element binding protein 4 (Cpeb4)               |
| Lmo7          | 0.60  | .000253332               | 5.132992 | LIM domain only 7 (Lmo7)  |
| Plppr4        | 0.60  | $6.87 \times 10^{-6}$    | 7.081929 | Phospholipid phosphatase related 4 (Plppr4)                                 |
| Hcrtr2        | 0.60  | .032252429               | 2.965022 | Hypocretin (orexin) receptor 2 (Hcrtr2)                                     |
| Camsap2       | 0.60  | $1.84 \times 10^{-6}$    | 8.686414 | Calmodulin-regulated spectrin-associated protein family, member 2 (Camsap2) |
| Tug1          | 0.60  | $3.20 \times 10^{-6}$    | 8.239366 | Taurine upregulated gene 1 (Tug1)   |
| Pcdh19        | 0.60  | $1.72 \times 10^{-5}$    | 6.881403 | Protocadherin 19 (Pcdh19)   |
| Camk4         | 0.60  | $7.59 \times 10^{-5}$    | 7.62866  | Calcium/calmodulin-dependent protein kinase IV (Camk4)                      |
| Camta1        | 0.60  | $8.26 \times 10^{-7}$    | 9.965754 | Calmodulin binding transcription activator 1 (Camta1)                       |
| Itga3         | 0.60  | .000541361               | 5.825568 | Integrin alpha 3 (Itga3)  |
| Lpin2         | 0.60  | $2.06 \times 10^{-5}$    | 7.493564 | Lipin 2 (Lpin2)   |
| Cc2d1a        | 0.60  | .000916584               | 4.540942 | Coiled-coil and C2 domain containing 1A (Cc2d1a)                            |
| Nsf           | 0.60  | $1.34 \times 10^{-5}$    | 10.22529 | N-ethylmaleimide sensitive fusion protein (Nsf)                             |
| Ctif          | 0.60  | $3.98 \times 10^{-6}$    | 8.786572 | CBP80/20-dependent translation initiation factor (Ctif)                     |
| Zfp617        | 0.60  | .005078156               | 4.004125 | Zinc finger protein 617 (Zfp617)  |
| Cachd1        | 0.60  | $2.81 \times 10^{-5}$    | 6.127114 | Cache domain containing 1 (Cachd1)  |
| Zfp128        | 0.60  | .003436977               | 3.456041 | Zinc finger protein 128 (Zfp128)  |
| Kbtbd4        | 0.60  | .004194916               | 3.494852 | Kelch repeat and BTB (POZ) domain containing 4 (Kbtbd4)                     |
| 5330417C22Rik | 0.60  | $2.86 \times 10^{-5}$    | 6.264218 | RIKEN cDNA 5330417C22 gene (5330417C22Rik)                                  |
| Tubb4b        | 0.60  | $2.41 \times 10^{-5}$    | 7.428256 | Tubulin, beta 4B class IVB (Tubb4b)   |
| C2cd2l        | 0.60  | $2.18 \times 10^{-5}$    | 7.218547 | C2 calcium-dependent domain containing 2-like (C2cd2l)                      |
| Fndc3a        | 0.60  | $1.06 \times 10^{-5}$    | 6.92535  | Fibronectin type III domain containing 3A (Fndc3a)                          |
| Zc3h6         | 0.60  | .001676411               | 5.076014 | Zinc finger CCCH type containing 6 (Zc3h6)                                  |
| Psd3          | 0.60  | $8.58 \times 10^{-7}$    | 9.862563 | Pleckstrin and Sec7 domain containing 3 (Psd3)                              |
| Ppp1r26       | 0.60  | .000187821               | 5.470116 | Protein phosphatase 1, regulatory subunit 26 (Ppp1r26)                      |
| Atp6v1b2      | 0.60  | $3.92 \times 10^{-6}$    | 9.335858 | ATPase, H+ transporting, lysosomal V1 subunit B2 (Atp6v1b2)                 |
| Rps6ka2       | 0.60  | .00058054                | 5.598592 | Ribosomal protein S6 kinase, polypeptide 2 (Rps6ka2)                        |
| Zbtb38        | 0.60  | $1.15 \times 10^{-5}$    | 7.695768 | Zinc finger and BTB domain containing 38 (Zbtb38)                           |
| Magee1        | 0.60  | .0001143                 | 7.550312 | Melanoma antigen, family E, 1 (Magee1)                                      |
| Tmem203       | 0.60  | .029664061               | 2.42976  | Transmembrane protein 203 (Tmem203)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tenm3         | 0.60  | $3.69 \times 10^{-5}$    | 8.237684 | Teneurin transmembrane protein 3 (Tenm3)  |
| Synj1         | 0.60  | $1.28 \times 10^{-6}$    | 9.775183 | Synaptojanin 1 (Synj1)  |
| Zfp942        | 0.60  | .010897597               | 3.612969 | Zinc finger protein 942 (Zfp942)  |
| Gdap1         | 0.60  | $2.49 \times 10^{-6}$    | 7.781211 | Ganglioside-induced differentiation-associated-protein 1 (Gdap1)                                  |
| 2810474O19Rik | 0.60  | .00080519                | 5.381683 | RIKEN cDNA 2810474O19 gene (2810474O19Rik)  |
| Irgq          | 0.59  | .000361722               | 7.373309 | Immunity-related GTPase family, Q (Irgq)  |
| Rapgef2       | 0.59  | $5.07 \times 10^{-5}$    | 7.559592 | Rap guanine nucleotide exchange factor (GEF) 2 (Rapgef2)  |
| Ndufs1        | 0.59  | $5.07 \times 10^{-5}$    | 7.073996 | NADH dehydrogenase (ubiquinone) Fe-S protein 1 (Ndufs1)   |
| Fam43b        | 0.59  | .011012004               | 3.244153 | Family with sequence similarity 43, member B (Fam43b)   |
| Cdk17         | 0.59  | $2.95 \times 10^{-5}$    | 6.678857 | Cyclin-dependent kinase 17 (Cdk17)  |
| Plppr3        | 0.59  | .000118658               | 5.514628 | Phospholipid phosphatase related 3 (Plppr3)   |
| Zfp382        | 0.59  | .00348391                | 3.924429 | Zinc finger protein 382 (Zfp382)  |
| Ubxn2b        | 0.59  | $9.19 \times 10^{-5}$    | 6.507692 | UBX domain protein 2B (Ubxn2b)  |
| Zic2          | 0.59  | $8.34 \times 10^{-5}$    | 6.279457 | Zinc finger protein of the cerebellum 2 (Zic2)  |
| Zfp53         | 0.59  | .009664109               | 3.361709 | Zinc finger protein 53 (Zfp53)  |
| Mgat5b        | 0.59  | .000300779               | 6.04869  | Mannoside acetylglucosaminyltransferase 5, isoenzyme B (Mgat5b)                                   |
| Dyrk3         | 0.59  | .021927192               | 2.90972  | Dual-specificity tyrosine- (Y)-phosphorylation-regulated kinase 3 (Dyrk3)                         |
| AI593442      | 0.59  | .000199344               | 9.144877 | Expressed sequence AI593442 (AI593442)  |
| Trim26        | 0.59  | .000482957               | 5.369423 | Tripartite motif-containing 26 (Trim26)   |
| Vat1          | 0.59  | .000319818               | 6.589551 | Vesicle amine transport 1 (Vat1)  |
| Nol6          | 0.59  | $4.01 \times 10^{-5}$    | 6.699401 | Nucleolar protein family 6 (RNA-associated) (Nol6)  |
| B4galnt1      | 0.59  | $7.44 \times 10^{-5}$    | 5.598742 | Beta-1,4-N-acetyl-galactosaminyl transferase 1 (B4galnt1)   |
| Klf16         | 0.59  | .040219783               | 2.781972 | Kruppel-like factor 16 (Klf16)  |
| Slc30a4       | 0.59  | .000135712               | 6.218263 | Solute carrier family 30 (zinc transporter), member 4 (Slc30a4)                                   |
| Arhgap5       | 0.59  | $2.50 \times 10^{-5}$    | 8.516669 | Rho GTPase activating protein 5 (Arhgap5)   |
| Hs6st1        | 0.59  | .000350378               | 5.921587 | Heparan sulfate 6-O-sulfotransferase 1 (Hs6st1)   |
| Rnf44         | 0.59  | $3.28 \times 10^{-5}$    | 7.443965 | Ring finger protein 44 (Rnf44)  |
| Adgrl2        | 0.59  | .000197296               | 6.426477 | Adhesion G protein-coupled receptor L2 (Adgrl2)   |
| Kcnn3         | 0.59  | $1.07 \times 10^{-5}$    | 7.473398 | Potassium intermediate/small conductance calcium-activated channel, subfamily N, member 3 (Kcnn3) |
| Cdh10         | 0.59  | .000695798               | 5.911244 | Cadherin 10 (Cdh10)   |
| Htr7          | 0.59  | .001626569               | 5.795722 | 5-Hydroxytryptamine (serotonin) receptor 7 (Htr7)   |
| Igf1          | 0.59  | .000201734               | 5.825477 | Insulin-like growth factor 1 (Igf1)   |
| Rab11fip5     | 0.59  | .005168133               | 6.465298 | RAB11 family interacting protein 5 (class I) (Rab11fip5)  |
| Mctp1         | 0.59  | .001002466               | 5.192876 | Multiple C2 domains, transmembrane 1 (Mctp1)  |
| Prkaca        | 0.59  | $1.36 \times 10^{-5}$    | 7.847747 | Protein kinase, cAMP dependent, catalytic, alpha (Prkaca)   |
| Igsf10        | 0.59  | .002916521               | 4.900188 | Immunoglobulin superfamily, member 10 (Igsf10)  |
| Mcf2          | 0.59  | .000668846               | 5.106316 | Mcf.2 transforming sequence (Mcf2)  |
| Dock11        | 0.59  | .000670272               | 5.216213 | Dedicator of cytokinesis 11 (Dock11)  |
| Il1rapl2      | 0.59  | .030764754               | 2.893582 | Interleukin 1 receptor accessory protein-like 2 (Il1rapl2)  |
| Lypd1         | 0.59  | .001733506               | 5.956347 | Ly6/Plaur domain containing 1 (Lypd1)   |
| Smcr8         | 0.59  | $5.43 \times 10^{-5}$    | 6.434943 | Smith-Magenis syndrome chromosome region, candidate 8 homolog (human) (Smcr8)                     |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Pik3r3        | 0.59  | .000299725            | 6.590621 | Phosphatidylinositol 3 kinase, regulatory subunit, polypeptide 3 (p55) (Pik3r3) |
| Zc3h12b       | 0.59  | .000174509            | 5.956576 | Zinc finger CCCH-type containing 12B (Zc3h12b)                                  |
| Dnajc5        | 0.59  | $3.26 \times 10^{-6}$ | 9.121564 | DnaJ heat shock protein family (Hsp40) member C5 (Dnajc5)                       |
| Zbtb7c        | 0.59  | .041150396            | 2.716289 | Zinc finger and BTB domain containing 7C (Zbtb7c)                               |
| Tsyp13        | 0.59  | .000132522            | 5.241771 | TSPY-like 3 (Tsyp13)  |
| Peg3          | 0.59  | $2.79 \times 10^{-6}$ | 10.19909 | Paternally expressed 3 (Peg3)   |
| Amigo1        | 0.59  | $5.74 \times 10^{-5}$ | 6.913431 | Adhesion molecule with Ig like domain 1 (Amigo1)                                |
| Zim1          | 0.59  | .00248065             | 4.320476 | Zinc finger, imprinted 1 (Zim1)   |
| Bicral        | 0.59  | $1.27 \times 10^{-5}$ | 6.88053  | BRD4-interacting chromatin-remodeling complex-associated protein like (Bicral)  |
| Sgpp2         | 0.59  | .00012281             | 6.155436 | Sphingosine-1-phosphate phosphatase 2 (Sgpp2)                                   |
| 2900055J20Rik | 0.59  | .041526403            | 2.484005 | RIKEN cDNA 2900055J20 gene (2900055J20Rik)                                      |
| Stox2         | 0.59  | $3.49 \times 10^{-5}$ | 8.625542 | Storkhead box 2 (Stox2)   |
| Syt14         | 0.59  | .000555712            | 6.17153  | Synaptotagmin XIV (Syt14)   |
| Pde3a         | 0.58  | .010660414            | 3.686455 | Phosphodiesterase 3A, cGMP inhibited (Pde3a)                                    |
| Hspa12b       | 0.58  | .025496287            | 2.749703 | Heat shock protein 12B (Hspa12b)  |
| Mthfd1l       | 0.58  | .00809865             | 4.22552  | Methylenetetrahydrofolate dehydrogenase (NADP+ dependent) 1-like (Mthfd1l)      |
| Zfp27         | 0.58  | .000888982            | 4.604323 | Zinc finger protein 27 (Zfp27)  |
| Scg2          | 0.58  | $1.66 \times 10^{-5}$ | 8.969157 | Secretogranin II (Scg2)   |
| Gm14322       | 0.58  | .043935869            | 1.995857 | Predicted gene 14322 (Gm14322)  |
| Rasgef1a      | 0.58  | .001357801            | 5.949674 | RasGEF domain family, member 1A (Rasgef1a)                                      |
| Cacng2        | 0.58  | $1.10 \times 10^{-5}$ | 7.113562 | Calcium channel, voltage-dependent, gamma subunit 2 (Cacng2)                    |
| Enpp5         | 0.58  | $8.82 \times 10^{-6}$ | 8.378714 | Ectonucleotide pyrophosphatase/phosphodiesterase 5 (Enpp5)                      |
| Cmip          | 0.58  | $4.09 \times 10^{-5}$ | 7.555249 | c-Maf inducing protein (Cmip)   |
| Prkaa2        | 0.58  | .00017267             | 7.263639 | Protein kinase, AMP-activated, alpha 2 catalytic subunit (Prkaa2)               |
| Ncoa7         | 0.58  | .000181509            | 6.625896 | Nuclear receptor coactivator 7 (Ncoa7)  |
| Zyg11b        | 0.58  | $5.51 \times 10^{-6}$ | 9.174217 | zyg-II family member B, cell cycle regulator (Zyg11b)                           |
| Syn1          | 0.58  | $1.74 \times 10^{-5}$ | 9.347181 | Synapsin I (Syn1)   |
| Fgf12         | 0.58  | .000146824            | 7.89683  | Fibroblast growth factor 12 (Fgf12)   |
| Lrnf5         | 0.58  | .000108876            | 7.313435 | Leucine-rich repeat and fibronectin type III domain containing 5 (Lrnf5)        |
| Sept5         | 0.58  | $9.17 \times 10^{-5}$ | 7.099096 | Septin 5 (Sept5)  |
| Atg9b         | 0.58  | .004834737            | 3.310422 | Autophagy-related 9B (Atg9b)  |
| Frem3         | 0.58  | .003038398            | 4.220175 | Fras1-related extracellular matrix protein 3 (Frem3)                            |
| Pcdhb17       | 0.58  | .001945942            | 4.935722 | Protocadherin beta 17 (Pcdhb17)   |
| Asxl3         | 0.58  | .000206366            | 5.327033 | Additional sex combs like 3 (Asxl3)   |
| Rimbp2        | 0.58  | $3.56 \times 10^{-5}$ | 6.631099 | RIMS binding protein 2 (Rimbp2)   |
| Kcns2         | 0.58  | .000273706            | 6.508744 | K+ voltage-gated channel, subfamily S, 2 (Kcns2)                                |
| Arsj          | 0.58  | .032056865            | 2.937889 | Arylsulfatase J (Arsj)  |
| Id4           | 0.58  | $1.34 \times 10^{-5}$ | 8.265509 | Inhibitor of DNA binding 4 (Id4)  |
| Syn3          | 0.58  | .007041793            | 3.967593 | Synapsin III (Syn3)   |
| Arhgap26      | 0.58  | $4.37 \times 10^{-5}$ | 7.225588 | Rho GTPase activating protein 26 (Arhgap26)                                     |
| Stxbp1        | 0.58  | $2.68 \times 10^{-6}$ | 10.03776 | Syntaxin binding protein 1 (Stxbp1)   |
| Robo2         | 0.58  | .000357931            | 5.710455 | Roundabout guidance receptor 2 (Robo2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Ptpn4         | 0.58  | $9.12 \times 10^{-6}$    | 9.854663 | Protein tyrosine phosphatase, non-receptor type 4 (Ptpn4)                               |
| Kbtbd7        | 0.58  | .000478267               | 5.581395 | Kelch repeat and BTB (POZ) domain containing 7 (Kbtbd7)                                 |
| D630045J12Rik | 0.58  | .001519816               | 7.188121 | RIKEN cDNA D630045J12 gene (D630045J12Rik)  |
| Sh2d3c        | 0.58  | .000186998               | 5.3224   | SH2 domain containing 3C (Sh2d3c)   |
| Tmed8         | 0.58  | $6.41 \times 10^{-5}$    | 6.631109 | Transmembrane p24 trafficking protein 8 (Tmed8)   |
| Gria2         | 0.58  | $8.89 \times 10^{-6}$    | 8.948521 | Glutamate receptor, ionotropic, AMPA2 (alpha 2) (Gria2)                                 |
| Grwd1         | 0.58  | .033490279               | 2.881446 | Glutamate-rich WD repeat containing 1 (Grwd1)   |
| Zkscan16      | 0.58  | .000134227               | 6.431637 | Zinc finger with KRAB and SCAN domains 16 (Zkscan16)                                    |
| Grin3a        | 0.58  | $5.32 \times 10^{-6}$    | 8.211914 | Glutamate receptor ionotropic, NMDA3A (Grin3a)  |
| Zfp65         | 0.58  | .013627975               | 4.152468 | Zinc finger protein 65 (Zfp65)  |
| Senp8         | 0.57  | .003319607               | 5.035098 | SUMO/sentrin-specific peptidase 8 (Senp8)   |
| Lypd6b        | 0.57  | .016997013               | 4.532064 | LY6/PLAUR domain containing 6B (Lypd6b)   |
| Magee2        | 0.57  | .007913771               | 5.146624 | Melanoma antigen, family E, 2 (Magee2)  |
| Togaram1      | 0.57  | $2.87 \times 10^{-5}$    | 6.294807 | TOG array regulator of axonemal microtubules 1 (Togaram1)                               |
| Kdm4b         | 0.57  | .000555947               | 4.326892 | Lysine (K)-specific demethylase 4B (Kdm4b)  |
| Gm21955       | 0.57  | .012835155               | 2.90302  | Predicted gene (Gm21955)  |
| Plekhg5       | 0.57  | .0031454                 | 3.747886 | Pleckstrin homology domain containing, family G (with RhoGef domain) member 5 (Plekhg5) |
| Sntg1         | 0.57  | .004400767               | 4.757658 | Syntrophin, gamma 1 (Sntg1)   |
| Acvr1b        | 0.57  | $2.75 \times 10^{-5}$    | 6.950102 | Activin A receptor, type 1B (Acvr1b)  |
| Fam135b       | 0.57  | .000500821               | 6.047804 | Family with sequence similarity 135, member B (Fam135b)                                 |
| Cdk7          | 0.57  | .001303294               | 4.516558 | Cyclin-dependent kinase 7 (Cdk7)  |
| Rnf126        | 0.57  | .001954802               | 4.729489 | Ring finger protein 126 (Rnf126)  |
| Atl1          | 0.57  | .000244195               | 6.901975 | Atlantin GTPase 1 (Atl1)  |
| Grem2         | 0.57  | .000419938               | 5.878845 | Gremlin 2, DAN family BMP antagonist (Grem2)  |
| Pianp         | 0.57  | $3.09 \times 10^{-5}$    | 7.562343 | PILR alpha-associated neural protein (Pianp)  |
| Mkx           | 0.57  | .011239814               | 3.45046  | Mohawk homeobox (Mkx)   |
| Smim10l2a     | 0.57  | .002230325               | 4.82406  | Small integral membrane protein 10 like 2A (Smim10l2a)                                  |
| Xk            | 0.57  | .000558255               | 5.504815 | X-linked Kx blood group (Xk)  |
| Pcdhb8        | 0.57  | .02212438                | 2.743586 | Protocadherin beta 8 (Pcdhb8)   |
| Pde4a         | 0.57  | $1.80 \times 10^{-5}$    | 7.187419 | Phosphodiesterase 4A, cAMP specific (Pde4a)   |
| Zbtb11        | 0.57  | .000135264               | 6.273462 | Zinc finger and BTB domain containing 11 (Zbtb11)                                       |
| Gm26781       | 0.57  | .049273774               | 2.736648 | Predicted gene (Gm26781)  |
| Gck           | 0.57  | .040056873               | 2.611892 | Glucokinase (Gck)   |
| Klhl29        | 0.57  | .000135149               | 6.006096 | Kelch-like 29 (Klhl29)  |
| Trpc7         | 0.57  | .003795209               | 4.46806  | Transient receptor potential cation channel, subfamily C, member 7 (Trpc7)              |
| Zfp944        | 0.57  | .024248549               | 3.227111 | Zinc finger protein 944 (Zfp944)  |
| Sdc2          | 0.57  | .000131379               | 7.067678 | Syndecan 2 (Sdc2)   |
| Plcx2         | 0.57  | .000831387               | 7.86351  | Phosphatidylinositol-specific phospholipase C, X domain containing 2 (Plcx2)            |
| Vstm2a        | 0.57  | .000159285               | 6.66332  | V-set and transmembrane domain containing 2A (Vstm2a)                                   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Mmp16         | 0.57  | .016005066               | 5.412923 | Matrix metalloproteinase 16 (Mmp16)  |
| Ptchd1        | 0.57  | .024341637               | 4.307233 | Patched domain containing 1 (Ptchd1)   |
| Rph3a         | 0.57  | .000169033               | 9.039468 | Rabphilin 3A (Rph3a)   |
| Endod1        | 0.57  | $1.77 \times 10^{-5}$    | 6.952131 | Endonuclease domain containing 1 (Endod1)  |
| Rad18         | 0.57  | .024392455               | 3.274372 | RAD18 E3 ubiquitin protein ligase (Rad18)  |
| Avl9          | 0.56  | .000159892               | 6.883059 | AVL9 homolog ( <i>S. cerevisiae</i> ) (Avl9)   |
| Rims4         | 0.56  | .007159208               | 4.906962 | Regulating synaptic membrane exocytosis 4 (Rims4)                                      |
| Plxna1        | 0.56  | $5.39 \times 10^{-5}$    | 7.016219 | Plexin A1 (Plxna1)   |
| Srsf12        | 0.56  | .000333777               | 5.638118 | Serine/arginine-rich splicing factor 12 (Srsf12)                                       |
| Chgb          | 0.56  | .000790225               | 8.799665 | Chromogranin B (Chgb)  |
| Cpeb3         | 0.56  | .000100123               | 7.40079  | Cytoplasmic polyadenylation element binding protein 3 (Cpeb3)                          |
| Sacs          | 0.56  | $2.75 \times 10^{-5}$    | 8.199574 | Sacsin (Sacs)  |
| Brinp3        | 0.56  | .000291693               | 5.871998 | Bone morphogenetic protein/retinoic acid inducible neural specific 3 (Brinp3)          |
| Tubgcp6       | 0.56  | .001513104               | 4.63922  | Tubulin, gamma complex-associated protein 6 (Tubgcp6)                                  |
| 2900026A02Rik | 0.56  | .000168046               | 5.772118 | RIKEN cDNA 2900026A02 gene (2900026A02Rik)   |
| Fzd3          | 0.56  | $1.57 \times 10^{-5}$    | 8.835044 | Frizzled class receptor 3 (Fzd3)   |
| Tmem130       | 0.56  | $6.76 \times 10^{-6}$    | 8.003941 | Transmembrane protein 130 (Tmem130)  |
| Gas7          | 0.56  | .000600524               | 7.353036 | Growth arrest specific 7 (Gas7)  |
| Carm1         | 0.56  | .000240505               | 6.13094  | Coactivator-associated arginine methyltransferase 1 (Carm1)                            |
| Ifitm10       | 0.56  | .003550056               | 4.237582 | Interferon-induced transmembrane protein 10 (Ifitm10)                                  |
| Clmp          | 0.56  | .001145146               | 4.78608  | CXADR-like membrane protein (Clmp)   |
| Cbarp         | 0.56  | $8.69 \times 10^{-6}$    | 8.450234 | Calcium channel, voltage-dependent, beta subunit-associated regulatory protein (Cbarp) |
| Arhgef18      | 0.56  | .000166667               | 5.582821 | Rho/rac guanine nucleotide exchange factor (GEF) 18 (Arhgef18)                         |
| Opcml         | 0.56  | $8.47 \times 10^{-6}$    | 8.347491 | Opioid binding protein/cell adhesion molecule-like (Opcml)                             |
| Aak1          | 0.56  | $3.18 \times 10^{-6}$    | 9.413373 | AP2-associated kinase 1 (Aak1)   |
| Cpne7         | 0.56  | .000399365               | 6.400972 | Copine VII (Cpne7)   |
| Gpr165        | 0.56  | .002022066               | 5.139856 | G protein-coupled receptor 165 (Gpr165)  |
| Cdk18         | 0.56  | .001311192               | 5.987593 | Cyclin-dependent kinase 18 (Cdk18)   |
| Tvp23a        | 0.56  | .000996895               | 4.637598 | Trans-golgi network vesicle protein 23A (Tvp23a)                                       |
| Sesn3         | 0.56  | $5.91 \times 10^{-6}$    | 8.859351 | Sestrin 3 (Sesn3)  |
| Tmx4          | 0.56  | $3.95 \times 10^{-6}$    | 9.799199 | Thioredoxin-related transmembrane protein 4 (Tmx4)                                     |
| Epha4         | 0.56  | $6.00 \times 10^{-5}$    | 7.806104 | Eph receptor A4 (Epha4)  |
| Diras2        | 0.56  | $7.99 \times 10^{-5}$    | 8.840377 | DIRAS family, GTP-binding RAS-like 2 (Diras2)  |
| Tbl1x         | 0.56  | $3.95 \times 10^{-6}$    | 8.246198 | Transducin (beta)-like 1 X-linked (Tbl1x)  |
| Zfp72         | 0.56  | .016654776               | 3.245965 | Zinc finger protein 72 (Zfp72)   |
| Kirrel3       | 0.56  | .000821094               | 6.01781  | Kin of IRRE like 3 (Kirrel3)   |
| Larp4b        | 0.56  | $1.34 \times 10^{-5}$    | 7.797157 | La ribonucleoprotein domain family, member 4B (Larp4b)                                 |
| Kif3c         | 0.56  | .000130869               | 7.301565 | Kinesin family member 3C (Kif3c)   |
| Cd47          | 0.56  | $7.97 \times 10^{-5}$    | 9.660572 | CD47 antigen (Rh-related antigen, integrin-associated signal transducer) (Cd47)        |
| Tenm2         | 0.56  | $5.85 \times 10^{-5}$    | 7.675638 | Teneurin transmembrane protein 2 (Tenm2)   |
| Glg1          | 0.56  | $3.96 \times 10^{-6}$    | 8.589533 | Golgi apparatus protein 1 (Glg1)   |
| Ppm1h         | 0.56  | $4.42 \times 10^{-5}$    | 7.320371 | Protein phosphatase 1H (PP2C domain containing) (Ppm1h)                                |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Plcb1         | 0.56  | .000261834               | 6.716171 | Phospholipase C, beta 1 (Plcb1)   |
| Zfp575        | 0.56  | .031612138               | 3.116308 | Zinc finger protein 575 (Zfp575)  |
| Rnf217        | 0.56  | .0007287                 | 5.603589 | Ring finger protein 217 (Rnf217)  |
| Zfp85os       | 0.56  | .037989591               | 2.373383 | Zinc finger protein 85, opposite strand (Zfp85os)   |
| Adcy3         | 0.56  | .001016702               | 4.14201  | Adenylate cyclase 3 (Adcy3)   |
| Morc4         | 0.56  | .038866642               | 2.384992 | Microrchidia 4 (Morc4)  |
| Lta4h         | 0.56  | .00221034                | 4.314422 | Leukotriene A4 hydrolase (Lta4h)  |
| Zkscan1       | 0.56  | $1.37 \times 10^{-5}$    | 7.38472  | Zinc finger with KRAB and SCAN domains 1 (Zkscan1)  |
| Mbd5          | 0.56  | $2.23 \times 10^{-5}$    | 7.611572 | Methyl-CpG binding domain protein 5 (Mbd5)  |
| Flrt2         | 0.56  | .000347683               | 6.384407 | Fibronectin leucine-rich transmembrane protein 2 (Flrt2)  |
| Thrb          | 0.56  | .000221264               | 6.042861 | Thyroid hormone receptor beta (Thrb)  |
| Tcaf1         | 0.55  | $4.97 \times 10^{-6}$    | 8.526619 | TRPM8 channel-associated factor 1 (Tcaf1)   |
| Kcnk10        | 0.55  | .002003369               | 4.42852  | Potassium channel, subfamily K, member 10 (Kcnk10)  |
| Olfm1         | 0.55  | $2.65 \times 10^{-5}$    | 9.568817 | Olfactomedin 1 (Olfm1)  |
| Ache          | 0.55  | .000229445               | 6.154809 | Acetylcholinesterase (Ache)   |
| Pithd1        | 0.55  | .000216578               | 6.269957 | PITH (C-terminal proteasome-interacting domain of thioredoxin-like domain containing 1 (Pithd1) |
| Usp13         | 0.55  | .000330497               | 6.049492 | Ubiquitin-specific peptidase 13 (isopeptidase T-3) (Usp13)                                      |
| Sgsm1         | 0.55  | .000326776               | 6.372506 | Small G protein signaling modulator 1 (Sgsm1)   |
| Stk32c        | 0.55  | .02947797                | 3.410197 | Serine/threonine kinase 32C (Stk32c)  |
| Stxbp6        | 0.55  | .000141739               | 7.953688 | Syntaxin binding protein 6 (amisyn) (Stxbp6)  |
| Ksr2          | 0.55  | $1.96 \times 10^{-5}$    | 7.43066  | Kinase suppressor of ras 2 (Ksr2)   |
| Schip1        | 0.55  | .026929022               | 3.090026 | Schwannomin interacting protein 1 (Schip1)  |
| Ppp2r2b       | 0.55  | .000353493               | 6.897876 | Protein phosphatase 2, regulatory subunit B, beta (Ppp2r2b)                                     |
| Fnbp1l        | 0.55  | .000334109               | 7.121316 | Formin binding protein 1-like (Fnbp1l)  |
| Hspa4         | 0.55  | $5.51 \times 10^{-6}$    | 8.425166 | Heat shock protein 4 (Hspa4)  |
| Zfp955b       | 0.55  | .002551954               | 4.366794 | Zinc finger protein 955B (Zfp955b)  |
| Arhgap35      | 0.55  | $4.40 \times 10^{-6}$    | 9.52948  | Rho GTPase activating protein 35 (Arhgap35)   |
| Zfp93         | 0.55  | .005947679               | 3.426354 | Zinc finger protein 93 (Zfp93)  |
| Scn2a         | 0.55  | $1.50 \times 10^{-5}$    | 9.067337 | Sodium channel, voltage-gated, type II, alpha (Scn2a)   |
| Pnmal2        | 0.55  | $1.34 \times 10^{-5}$    | 8.092527 | PNMA-like 2 (Pnmal2)  |
| Mef2c         | 0.55  | $2.63 \times 10^{-5}$    | 7.660528 | Myocyte enhancer factor 2C (Mef2c)  |
| D130058E05Rik | 0.55  | .021943429               | 4.149882 | RIKEN cDNA D130058E05 gene (D130058E05Rik)  |
| Map3k9        | 0.55  | .00155214                | 5.195465 | Mitogen-activated protein kinase kinase kinase 9 (Map3k9)                                       |
| Fign          | 0.55  | .002106176               | 6.601853 | Fidgetin (Fign)   |
| Xpnpep3       | 0.55  | .002850378               | 5.043502 | X-prolyl aminopeptidase 3, mitochondrial (Xpnpep3)  |
| Ubxn7         | 0.55  | .000432114               | 7.504606 | UBX domain protein 7 (Ubxn7)  |
| Tmtc1         | 0.55  | $4.99 \times 10^{-5}$    | 7.415042 | Transmembrane and tetratricopeptide repeat containing 1 (Tmtc1)                                 |
| Limk1         | 0.55  | .002094901               | 3.881785 | LIM-domain containing, protein kinase (Limk1)   |
| Zfp68         | 0.55  | .000204585               | 5.470606 | Zinc finger protein 68 (Zfp68)  |
| Gabra4        | 0.55  | $3.51 \times 10^{-5}$    | 8.136459 | Gamma-aminobutyric acid (GABA) A receptor, subunit alpha 4 (Gabra4)                             |
| Rai2          | 0.55  | .011037004               | 3.168896 | Retinoic acid-induced 2 (Rai2)  |
| Dab1          | 0.55  | .00107831                | 5.843548 | Disabled 1 (Dab1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Plekhm3       | 0.55  | .000378325               | 6.4861   | Pleckstrin homology domain containing, family M, member 3 (Plekhm3)       |
| Lrrc3         | 0.55  | $3.65 \times 10^{-5}$    | 6.21028  | Leucine-rich repeat containing 3 (Lrrc3)                                  |
| Spata9        | 0.55  | .007219654               | 3.639556 | Spermatogenesis associated 9 (Spata9)                                     |
| Wdr47         | 0.55  | $3.31 \times 10^{-5}$    | 7.223816 | WD repeat domain 47 (Wdr47)   |
| Jade1         | 0.55  | $8.76 \times 10^{-5}$    | 6.607031 | Jade family PHD finger 1 (Jade1)  |
| Stk25         | 0.55  | $3.15 \times 10^{-5}$    | 7.618308 | Serine/threonine kinase 25 (yeast) (Stk25)                                |
| Cd83          | 0.55  | .000946394               | 5.726646 | CD83 antigen (Cd83)   |
| Pcdhb15       | 0.55  | .04757055                | 3.28304  | Protocadherin beta 15 (Pcdhb15)   |
| Nmnat2        | 0.55  | $2.69 \times 10^{-5}$    | 8.371272 | Nicotinamide nucleotide adenyltransferase 2 (Nmnat2)                      |
| Hrk           | 0.55  | .002767959               | 4.712484 | Harakiri, BCL2 interacting protein (contains only BH3 domain) (Hrk)       |
| Dnajc30       | 0.55  | .001945933               | 4.420577 | DnaJ heat shock protein family (Hsp40) member C30 (Dnajc30)               |
| Kcnc4         | 0.55  | .000448204               | 5.16509  | Potassium voltage gated channel, Shaw-related subfamily, member 4 (Kcnc4) |
| Cdh2          | 0.55  | $3.29 \times 10^{-5}$    | 7.543057 | Cadherin 2 (Cdh2)   |
| Lig4          | 0.54  | .001586914               | 4.500516 | Ligase IV, DNA, ATP-dependent (Lig4)                                      |
| Atmin         | 0.54  | $1.77 \times 10^{-5}$    | 7.037499 | ATM interactor (Atmin)  |
| Mtcl1         | 0.54  | .000201853               | 5.335778 | Microtubule crosslinking factor 1 (Mtcl1)                                 |
| Cobl          | 0.54  | .000697017               | 6.772351 | Cordon-bleu WH2 repeat (Cobl)   |
| Ajap1         | 0.54  | .000399735               | 5.562731 | Adherens junction-associated protein 1 (Ajap1)                            |
| 1700025G04Rik | 0.54  | .000192273               | 7.012242 | RIKEN cDNA 1700025G04 gene (1700025G04Rik)                                |
| Usp11         | 0.54  | $3.46 \times 10^{-5}$    | 7.690648 | Ubiquitin-specific peptidase 11 (Usp11)                                   |
| Socs5         | 0.54  | $2.69 \times 10^{-5}$    | 6.890292 | Suppressor of cytokine signaling 5 (Socs5)                                |
| Alg2          | 0.54  | $1.20 \times 10^{-5}$    | 8.65765  | Asparagine-linked glycosylation 2 (alpha-1,3-mannosyltransferase) (Alg2)  |
| Zfp7          | 0.54  | .012596979               | 3.323643 | Zinc finger protein 7 (Zfp7)  |
| Frrs1l        | 0.54  | $1.57 \times 10^{-5}$    | 9.090344 | Ferric-chelate reductase 1 like (Frrs1l)                                  |
| Grb10         | 0.54  | $4.81 \times 10^{-5}$    | 7.448536 | Growth factor receptor bound protein 10 (Grb10)                           |
| Mid2          | 0.54  | .000105858               | 6.504257 | Midline 2 (Mid2)  |
| Gm47163       | 0.54  | .005939431               | 3.80993  | Predicted gene (Gm47163)  |
| Irf2bpl       | 0.54  | .002536116               | 4.754384 | Interferon regulatory factor 2 binding protein-like (Irf2bpl)             |
| Raph1         | 0.54  | $1.10 \times 10^{-5}$    | 7.274408 | Ras-association (RalGDS/AF-6) and pleckstrin homology domains 1 (Raph1)   |
| Jph1          | 0.54  | .005199946               | 3.629205 | Junctophilin 1 (Jph1)   |
| Zfp174        | 0.54  | .028821766               | 3.57378  | Zinc finger protein 174 (Zfp174)  |
| Mtmr4         | 0.54  | $3.93 \times 10^{-5}$    | 6.790946 | Myotubularin-related protein 4 (Mtmr4)                                    |
| Cntn3         | 0.54  | .000678736               | 5.592309 | Contactin 3 (Cntn3)   |
| Adgrl3        | 0.54  | $7.96 \times 10^{-6}$    | 8.18777  | Adhesion G protein-coupled receptor L3 (Adgrl3)                           |
| Zfp563        | 0.54  | .002670409               | 3.98977  | Zinc finger protein 563 (Zfp563)  |
| Dennd1a       | 0.54  | .000124742               | 6.430652 | DENN/MADD domain containing 1A (Dennd1a)                                  |
| Pdpx          | 0.54  | .000285692               | 6.483275 | Pyridoxal (pyridoxine, vitamin B6) phosphatase (Pdpx)                     |
| Spast         | 0.54  | .00012459                | 7.067728 | Spastin (Spast)   |
| Arid5b        | 0.54  | $1.53 \times 10^{-5}$    | 7.200132 | AT-rich interactive domain 5B (MRF1-like) (Arid5b)                        |
| Rab15         | 0.54  | $6.50 \times 10^{-5}$    | 6.567412 | RAB15, member RAS oncogene family (Rab15)                                 |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Nlgn1     | 0.54  | $6.28 \times 10^{-5}$ | 6.782622 | Neuroigin 1 (Nlgn1)   |
| Uhmk1     | 0.54  | $1.31 \times 10^{-5}$ | 10.11173 | U2AF homology motif (UHM) kinase 1 (Uhmk1)                                  |
| Camsap3   | 0.54  | .000831387            | 4.390712 | Calmodulin-regulated spectrin-associated protein family, member 3 (Camsap3) |
| Mpped1    | 0.54  | .022948124            | 3.966913 | Metallophosphoesterase domain containing 1 (Mpped1)                         |
| Prkce     | 0.54  | $1.77 \times 10^{-5}$ | 8.471382 | Protein kinase C, epsilon (Prkce)   |
| Gm42741   | 0.54  | .014831292            | 3.804253 | Predicted gene (Gm42741)  |
| Aaas      | 0.54  | .006740755            | 3.786443 | Achalasia, adrenocortical insufficiency, alacrimia (Aaas)                   |
| Zbtb41    | 0.54  | .000353493            | 6.520061 | Zinc finger and BTB domain containing 41 (Zbtb41)                           |
| Carmil2   | 0.54  | .007291969            | 3.258867 | Capping protein regulator and myosin 1 linker 2 (Carmil2)                   |
| Tada2b    | 0.54  | .001487578            | 4.989134 | Transcriptional adaptor 2B (Tada2b)   |
| Ralgps1   | 0.54  | $8.95 \times 10^{-5}$ | 6.612721 | Ral GEF with PH domain and SH3 binding motif 1 (Ralgps1)                    |
| Lin9      | 0.54  | .028503249            | 3.360965 | Lin-9 homolog (C. elegans) (Lin9)   |
| Shh       | 0.54  | .014755638            | 3.493053 | Sonic hedgehog (Shh)  |
| Rbfox1    | 0.54  | .000176575            | 7.668406 | RNA binding protein, fox-1 homolog (C. elegans) 1 (Rbfox1)                  |
| Zfp81     | 0.54  | .000322361            | 5.630062 | Zinc finger protein 81 (Zfp81)  |
| Tmem145   | 0.54  | .02156513             | 3.644266 | Transmembrane protein 145 (Tmem145)   |
| Erc2      | 0.54  | $1.08 \times 10^{-5}$ | 7.524581 | ELKS/RAB6-interacting/CAST family member 2 (Erc2)                           |
| Pcyox1l   | 0.54  | .014023312            | 3.676339 | Prenylcysteine oxidase 1 like (Pcyox1l)                                     |
| Crmp1     | 0.54  | $7.69 \times 10^{-5}$ | 7.205904 | Collapsin response mediator protein 1 (Crmp1)                               |
| Pcbp3     | 0.54  | .000108867            | 6.558212 | Poly(rC) binding protein 3 (Pcbp3)  |
| Zfp748    | 0.54  | .001010941            | 4.663876 | Zinc finger protein 748 (Zfp748)  |
| Nav1      | 0.54  | $1.32 \times 10^{-5}$ | 7.804273 | Neuron navigator 1 (Nav1)   |
| Elac1     | 0.54  | .001726003            | 5.558953 | elaC ribonuclease Z 1 (Elac1)   |
| Gng2      | 0.53  | $2.52 \times 10^{-5}$ | 8.601891 | Guanine nucleotide binding protein (G protein), gamma 2 (Gng2)              |
| Pcgf5     | 0.53  | .000909697            | 5.797881 | Polycomb group ring finger 5 (Pcgf5)  |
| Celf2     | 0.53  | $2.69 \times 10^{-6}$ | 9.3419   | CUGBP, Elav-like family member 2 (Celf2)                                    |
| Gan       | 0.53  | .00013664             | 6.100883 | Giant axonal neuropathy (Gan)   |
| Rit2      | 0.53  | $3.63 \times 10^{-5}$ | 8.540407 | Ras-like without CAAX 2 (Rit2)  |
| Bend4     | 0.53  | .000558255            | 5.522201 | BEN domain containing 4 (Bend4)   |
| Sphkap    | 0.53  | $1.68 \times 10^{-5}$ | 8.120433 | SPHK1 interactor, AKAP domain containing (Sphkap)                           |
| Podxl2    | 0.53  | .000656732            | 5.217602 | Podocalyxin-like 2 (Podxl2)   |
| Zfp418    | 0.53  | .045862511            | 3.769525 | Zinc finger protein 418 (Zfp418)  |
| Ccser2    | 0.53  | $1.55 \times 10^{-5}$ | 8.361199 | Coiled-coil serine rich 2 (Ccser2)  |
| Ankrd34c  | 0.53  | .000416776            | 6.411261 | Ankyrin repeat domain 34C (Ankrd34c)  |
| Blm       | 0.53  | .021733851            | 3.020316 | Bloom syndrome, RecQ helicase-like (Blm)                                    |
| Akap8     | 0.53  | .00066474             | 5.341209 | A kinase (PRKA) anchor protein 8 (Akap8)                                    |
| Ago2      | 0.53  | $2.03 \times 10^{-5}$ | 8.517953 | Argonaute RISC catalytic subunit 2 (Ago2)                                   |
| Gm42732   | 0.53  | .025744992            | 5.192111 | Predicted gene (Gm42732)  |
| Crtc1     | 0.53  | .000157484            | 6.794349 | CREB-regulated transcription coactivator 1 (Crtc1)                          |
| Nap115    | 0.53  | $6.14 \times 10^{-6}$ | 9.338491 | Nucleosome assembly protein 1-like 5 (Nap115)                               |
| Tmem30a   | 0.53  | $2.25 \times 10^{-5}$ | 8.630783 | Transmembrane protein 30A (Tmem30a)   |
| Ypel2     | 0.53  | $1.66 \times 10^{-5}$ | 7.331298 | Yippee-like 2 (Ypel2)   |
| Chml      | 0.53  | .00068304             | 5.485425 | Choroideremia-like (Chml)   |
| AU040320  | 0.53  | .000166667            | 6.428786 | Expressed sequence AU040320 (AU040320)                                      |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Asxl1         | 0.53  | .00036855                | 5.703834 | Additional sex combs like 1 (Asxl1)   |
| Klhdc8a       | 0.53  | .0059834                 | 4.017285 | Kelch domain containing 8A (Klhdc8a)  |
| Cacul1        | 0.53  | 4.00 × 10 <sup>-5</sup>  | 7.109679 | CDK2-associated, cullin domain 1 (Cacul1)                                   |
| Actr1a        | 0.53  | 2.86 × 10 <sup>-5</sup>  | 7.654551 | ARP1 actin-related protein 1A, contractin alpha (Actr1a)                    |
| Parm1         | 0.53  | .00256652                | 6.121518 | Prostate androgen-regulated mucin-like protein 1 (Parm1)                    |
| Arfgef3       | 0.53  | 1.77 × 10 <sup>-5</sup>  | 8.355611 | ARFGEF family member 3 (Arfgef3)  |
| Kitl          | 0.53  | 8.66 × 10 <sup>-5</sup>  | 7.734027 | Kit ligand (Kitl)   |
| Zfp235        | 0.53  | .005677225               | 3.914763 | Zinc finger protein 235 (Zfp235)  |
| Ttc7b         | 0.53  | 4.18 × 10 <sup>-5</sup>  | 7.374514 | Tetratricopeptide repeat domain 7B (Ttc7b)                                  |
| Slc35f1       | 0.53  | 3.19 × 10 <sup>-5</sup>  | 7.29093  | Solute carrier family 35, member F1 (Slc35f1)                               |
| Garem1        | 0.53  | .001115218               | 5.221918 | GRB2-associated regulator of MAPK1 subtype 1 (Garem1)                       |
| Uba6          | 0.53  | .000247675               | 6.404118 | Ubiquitin-like modifier activating enzyme 6 (Uba6)                          |
| Tlnrd1        | 0.53  | .000706332               | 5.180478 | Talin rod domain containing 1 (Tlnrd1)                                      |
| Cdkl5         | 0.53  | 3.96 × 10 <sup>-5</sup>  | 9.129261 | Cyclin-dependent kinase-like 5 (Cdkl5)                                      |
| Pde12         | 0.53  | .001139352               | 4.561145 | Phosphodiesterase 12 (Pde12)  |
| Usp32         | 0.53  | 1.25 × 10 <sup>-5</sup>  | 8.398708 | Ubiquitin-specific peptidase 32 (Usp32)                                     |
| Zfp869        | 0.53  | .016678993               | 4.23269  | Zinc finger protein 869 (Zfp869)  |
| Ldlrad4       | 0.53  | .003284405               | 4.103629 | Low-density lipoprotein receptor class A domain containing 4 (Ldlrad4)      |
| Sv2a          | 0.53  | 1.70 × 10 <sup>-5</sup>  | 9.120266 | Synaptic vesicle glycoprotein 2 a (Sv2a)                                    |
| Ncam2         | 0.53  | .000188512               | 7.689167 | Neural cell adhesion molecule 2 (Ncam2)                                     |
| Ambra1        | 0.53  | .000319742               | 5.909214 | Autophagy/beclin 1 regulator 1 (Ambra1)                                     |
| Fgf13         | 0.53  | 2.20 × 10 <sup>-5</sup>  | 7.20541  | Fibroblast growth factor 13 (Fgf13)   |
| Reep1         | 0.53  | 5.01 × 10 <sup>-5</sup>  | 8.438474 | Receptor accessory protein 1 (Reep1)  |
| Map9          | 0.53  | 2.87 × 10 <sup>-5</sup>  | 7.868156 | Microtubule-associated protein 9 (Map9)                                     |
| Pnma3         | 0.53  | .000890423               | 5.264541 | Paraneoplastic antigen MA3 (Pnma3)  |
| Adra2b        | 0.53  | .001544389               | 4.531226 | Adrenergic receptor, alpha 2b (Adra2b)                                      |
| Sgip1         | 0.53  | 1.04 × 10 <sup>-5</sup>  | 9.198767 | SH3-domain GRB2-like (endophilin) interacting protein 1 (Sgip1)             |
| Klf11         | 0.53  | .020104078               | 3.577183 | Kruppel-like factor 11 (Klf11)  |
| Sik1          | 0.53  | .001831427               | 5.128565 | Salt inducible kinase 1 (Sik1)  |
| Hspa4l        | 0.52  | 6.20 × 10 <sup>-6</sup>  | 9.067492 | Heat shock protein 4 like (Hspa4l)  |
| Bloc1s6       | 0.52  | .000859819               | 5.114625 | Biogenesis of lysosomal organelles complex-1, subunit 6, pallidin (Bloc1s6) |
| Cop1          | 0.52  | 5.80 × 10 <sup>-5</sup>  | 6.068655 | COP1 E3 Ubiquitin Ligase (Cop1)   |
| Grm4          | 0.52  | .000526071               | 7.151452 | Glutamate receptor, metabotropic 4 (Grm4)                                   |
| Ankrd29       | 0.52  | .000372424               | 5.465121 | Ankyrin repeat domain 29 (Ankrd29)  |
| 9230114K14Rik | 0.52  | .033335482               | 3.428748 | RIKEN cDNA 9230114K14 gene (9230114K14Rik)                                  |
| C2cd4c        | 0.52  | .026485615               | 3.770998 | C2 calcium-dependent domain containing 4C (C2cd4c)                          |
| Atp6v0a1      | 0.52  | 1.45 × 10 <sup>-5</sup>  | 8.937292 | ATPase, H+ transporting, lysosomal V0 subunit A1 (Atp6v0a1)                 |
| Mef2a         | 0.52  | 1.74 × 10 <sup>-5</sup>  | 8.810571 | Myocyte enhancer factor 2A (Mef2a)  |
| B230334C09Rik | 0.52  | .000132522               | 7.596078 | RIKEN cDNA B230334C09 gene (B230334C09Rik)                                  |
| Scaf1         | 0.52  | 8.40 × 10 <sup>-5</sup>  | 5.905375 | SR-related CTD-associated factor 1 (Scaf1)                                  |
| Kpna6         | 0.52  | 3.49 × 10 <sup>-5</sup>  | 7.373171 | Karyopherin (importin) alpha 6 (Kpna6)                                      |
| Shox2         | 0.52  | .000199352               | 7.315399 | Short stature homeobox 2 (Shox2)  |
| Samd12        | 0.52  | .00032414                | 7.274502 | Sterile alpha motif domain containing 12 (Samd12)                           |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Pak1          | 0.52  | .000148143            | 9.293641 | p21 protein (Cdc42/Rac)-activated kinase 1 (Pak1)                                       |
| Gne           | 0.52  | .000197296            | 5.808799 | Glucosamine (UDP-N-acetyl)-2-epimerase/N-acetylmannosamine kinase (Gne)                 |
| Zfp770        | 0.52  | .000319742            | 5.679438 | Zinc finger protein 770 (Zfp770)  |
| Mrpl37        | 0.52  | .013258903            | 5.228043 | Mitochondrial ribosomal protein L37 (Mrpl37)  |
| Ttll1         | 0.52  | .000246398            | 6.64415  | Tubulin tyrosine ligase-like 1 (Ttll1)  |
| Il13ra1       | 0.52  | .014237722            | 3.895478 | Interleukin 13 receptor, alpha 1 (Il13ra1)  |
| B4galnt4      | 0.52  | .002650302            | 5.774207 | Beta-1,4-N-acetyl-galactosaminyl transferase 4 (B4galnt4)                               |
| Cpne2         | 0.52  | .000385               | 6.028711 | Copine II (Cpne2)   |
| Nup54         | 0.52  | .00940916             | 3.909517 | Nucleoporin 54 (Nup54)  |
| Ccdc50        | 0.52  | $2.65 \times 10^{-5}$ | 7.084979 | Coiled-coil domain containing 50 (Ccdc50)   |
| Atp8a2        | 0.52  | $8.31 \times 10^{-5}$ | 7.100838 | ATPase, aminophospholipid transporter-like, class I, type 8A, member 2 (Atp8a2)         |
| Baiap2        | 0.52  | .009169931            | 3.787107 | Brain-specific angiogenesis inhibitor 1-associated protein 2 (Baiap2)                   |
| Bean1         | 0.52  | .006998773            | 4.057834 | Brain expressed, associated with Nedd4, 1 (Bean1)                                       |
| Dnajc28       | 0.52  | .004360612            | 3.941868 | DnaJ heat shock protein family (Hsp40) member C28 (Dnajc28)                             |
| Thbs2         | 0.52  | .034121813            | 4.473553 | Thrombospondin 2 (Thbs2)  |
| D230025D16Rik | 0.52  | .000569011            | 5.864713 | RIKEN cDNA D230025D16 gene (D230025D16Rik)  |
| Cdhr1         | 0.52  | .022329126            | 3.059596 | Cadherin-related family member 1 (Cdhr1)  |
| Dcaf7         | 0.52  | $7.66 \times 10^{-6}$ | 8.216057 | DDB1 and CUL4-associated factor 7 (Dcaf7)   |
| Ssx2ip        | 0.52  | .000223098            | 6.506209 | Synovial sarcoma, X breakpoint 2 interacting protein (Ssx2ip)                           |
| Chpf2         | 0.52  | .012084483            | 3.439515 | Chondroitin polymerizing factor 2 (Chpf2)   |
| Dip2c         | 0.52  | .000109064            | 6.500142 | Disco interacting protein 2 homolog C (Dip2c)   |
| Fam134b       | 0.52  | $3.01 \times 10^{-5}$ | 7.485044 | Family with sequence similarity 134, member B (Fam134b)                                 |
| Pkp4          | 0.52  | $2.18 \times 10^{-5}$ | 8.881393 | Plakophilin 4 (Pkp4)  |
| Slc9a7        | 0.52  | .000154302            | 6.365061 | Solute carrier family 9 (sodium/hydrogen exchanger), member 7 (Slc9a7)                  |
| Zfp800        | 0.52  | .001379238            | 4.987724 | Zinc finger protein 800 (Zfp800)  |
| Xxyt1         | 0.52  | .000523987            | 4.925927 | Xyloside xylosyltransferase 1 (Xxyt1)   |
| Adam22        | 0.52  | $6.47 \times 10^{-6}$ | 8.723296 | A disintegrin and metallopeptidase domain 22 (Adam22)                                   |
| Wipf3         | 0.52  | .003285454            | 5.169738 | WAS/WASL interacting protein family, member 3 (Wipf3)                                   |
| Rap2a         | 0.52  | $1.71 \times 10^{-5}$ | 7.961109 | RAS-related protein 2a (Rap2a)  |
| Slc7a3        | 0.52  | .012309113            | 4.478607 | Solute carrier family 7 (cationic amino acid transporter, y+ system), member 3 (Slc7a3) |
| Gm43597       | 0.52  | .003729114            | 4.091525 | Predicted gene (Gm43597)  |
| Prkcg         | 0.52  | .000576592            | 8.69884  | Protein kinase C, gamma (Prkcg)   |
| Zfp507        | 0.52  | .002814285            | 4.769872 | Zinc finger protein 507 (Zfp507)  |
| Nxpe3         | 0.52  | .001362517            | 4.892595 | Neurexophilin and PC-esterase domain family, member 3 (Nxpe3)                           |
| Zdhhc15       | 0.52  | .01955455             | 3.589362 | Zinc finger, DHHC domain containing 15 (Zdhhc15)  |
| Rgs12         | 0.52  | .004453035            | 3.702477 | Regulator of G-protein signaling 12 (Rgs12)   |
| 1700019D03Rik | 0.52  | .000239287            | 6.142601 | RIKEN cDNA 1700019D03 gene (1700019D03Rik)  |
| Vcpip1        | 0.51  | $3.15 \times 10^{-5}$ | 7.6758   | Valosin containing protein (p97)/p47 complex interacting protein 1 (Vcpip1)             |
| Fbxo11        | 0.51  | $2.47 \times 10^{-5}$ | 7.756129 | F-box protein 11 (Fbxo11)   |
| Mgat4a        | 0.51  | .000192529            | 6.721662 | Mannoside acetylglucosaminyltransferase 4, isoenzyme A (Mgat4a)                         |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Ankrd34a      | 0.51  | .000196935               | 6.423928 | Ankyrin repeat domain 34A (Ankrd34a)  |
| Gls2          | 0.51  | .022248496               | 2.833004 | Glutaminase 2 (liver, mitochondrial) (Gls2)   |
| Usp29         | 0.51  | .000126022               | 7.235744 | Ubiquitin-specific peptidase 29 (Usp29)   |
| Hnrnp2        | 0.51  | .000166655               | 6.670412 | Heterogeneous nuclear ribonucleoprotein H2 (Hnrnp2)   |
| Rala          | 0.51  | .000190641               | 6.495384 | V-ral simian leukemia viral oncogene A (ras related) (Rala)                                 |
| Tsr1          | 0.51  | .006186201               | 4.941772 | TSR1 20S rRNA accumulation (Tsr1)   |
| Zfp30         | 0.51  | .022005703               | 3.827388 | Zinc finger protein 30 (Zfp30)  |
| Ptprn2        | 0.51  | $7.34 \times 10^{-5}$    | 7.979503 | Protein tyrosine phosphatase, receptor type, N polypeptide 2 (Ptprn2)                       |
| Asxl2         | 0.51  | .001555751               | 6.198126 | Additional sex combs like 2 (Asxl2)   |
| Fads3         | 0.51  | .00101211                | 5.19859  | Fatty acid desaturase 3 (Fads3)   |
| Zmiz1         | 0.51  | $1.20 \times 10^{-5}$    | 8.069944 | Zinc finger, MIZ-type containing 1 (Zmiz1)  |
| Apba2         | 0.51  | $9.79 \times 10^{-5}$    | 6.748047 | Amyloid beta (A4) precursor protein-binding, family A, member 2 (Apba2)                     |
| Zswim3        | 0.51  | .018761832               | 3.741888 | Zinc finger SWIM-type containing 3 (Zswim3)   |
| Zfp239        | 0.51  | .001774577               | 5.400692 | Zinc finger protein 239 (Zfp239)  |
| Sgsh          | 0.51  | .019341721               | 3.475588 | N-sulfoglucosamine sulfohydrolase (sulfamidase) (Sgsh)                                      |
| Dgat2         | 0.51  | .000608385               | 6.235325 | Diacylglycerol O-acyltransferase 2 (Dgat2)  |
| Csmd3         | 0.51  | .000625418               | 6.203445 | CUB and Sushi multiple domains 3 (Csmd3)  |
| Tmem132b      | 0.51  | $2.78 \times 10^{-5}$    | 7.323678 | Transmembrane protein 132B (Tmem132b)   |
| Timp2         | 0.51  | $4.33 \times 10^{-5}$    | 9.999863 | Tissue inhibitor of metalloproteinase 2 (Timp2)   |
| Zfp365        | 0.51  | $9.83 \times 10^{-5}$    | 8.796883 | Zinc finger protein 365 (Zfp365)  |
| Vipas39       | 0.51  | .000516594               | 5.736626 | VPS33B interacting protein, apical-basolateral polarity regulator, spe-39 homolog (Vipas39) |
| Kif3b         | 0.51  | .000200157               | 6.335414 | Kinesin family member 3B (Kif3b)  |
| Rnf31         | 0.51  | .040984338               | 4.278394 | Ring finger protein 31 (Rnf31)  |
| Gm14325       | 0.51  | .02836186                | 2.765817 | Predicted gene 14325 (Gm14325)  |
| Hs3st5        | 0.51  | .037133655               | 2.99095  | Heparan sulfate (glucosamine) 3-O-sulfotransferase 5 (Hs3st5)                               |
| 1700017B05Rik | 0.51  | .003441896               | 4.646979 | RIKEN cDNA 1700017B05 gene (1700017B05Rik)  |
| Rhof          | 0.51  | .015257988               | 4.340154 | Ras homolog family member F (in filopodia) (Rhof)   |
| Kcnab1        | 0.51  | .014319962               | 5.415699 | Potassium voltage-gated channel, shaker-related subfamily, beta member 1 (Kcnab1)           |
| Fam168a       | 0.51  | $1.99 \times 10^{-5}$    | 8.661639 | Family with sequence similarity 168, member A (Fam168a)                                     |
| Thsd4         | 0.51  | .020348849               | 4.091881 | Thrombospondin, type I, domain containing 4 (Thsd4)   |
| Sesn2         | 0.51  | .01139073                | 3.700217 | Sestrin 2 (Sesn2)   |
| Syndig1l      | 0.51  | .000243532               | 5.385757 | Synapse differentiation inducing 1 like (Syndig1l)  |
| Wdr7          | 0.51  | $1.66 \times 10^{-5}$    | 8.170967 | WD repeat domain 7 (Wdr7)   |
| Slc36a4       | 0.51  | .000197692               | 7.233313 | Solute carrier family 36 (proton/amino acid symporter), member 4 (Slc36a4)                  |
| Sntb2         | 0.51  | .006064657               | 4.149545 | Syntrophin, basic 2 (Sntb2)   |
| Whrn          | 0.51  | .008615789               | 3.552818 | Whirlin (Whrn)  |
| Alg11         | 0.51  | .000132337               | 7.325538 | Asparagine-linked glycosylation 11 (alpha-1,2-mannosyltransferase) (Alg11)                  |
| Gabrb2        | 0.51  | .000416776               | 7.784328 | Gamma-aminobutyric acid (GABA) A receptor, subunit beta 2 (Gabrb2)                          |
| Grin2d        | 0.51  | .004582498               | 5.300155 | Glutamate receptor, ionotropic, NMDA2D (epsilon 4) (Grin2d)                                 |
| Gatsl2        | 0.51  | .000427987               | 8.095224 | GATS protein-like 2 (Gatsl2)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Mturn     | 0.51  | $3.42 \times 10^{-5}$ | 8.311278 | Maturin, neural progenitor differentiation regulator homolog (Xenopus) (Mturn)     |
| Rhbdd2    | 0.51  | $5.43 \times 10^{-5}$ | 6.409278 | Rhomboid domain containing 2 (Rhbdd2)  |
| G3bp2     | 0.51  | $4.91 \times 10^{-5}$ | 7.595844 | GTPase activating protein (SH3 domain) binding protein 2 (G3bp2)                   |
| Gm43682   | 0.51  | .006833857            | 4.2924   | Predicted gene (Gm43682)   |
| Tab3      | 0.50  | .000799751            | 5.287331 | TGF-beta-activated kinase 1/MAP3K7 binding protein 3 (Tab3)                        |
| Mecp2     | 0.50  | $8.89 \times 10^{-6}$ | 9.016983 | Methyl CpG binding protein 2 (Mecp2)   |
| Klf12     | 0.50  | .000380867            | 7.578726 | Kruppel-like factor 12 (Klf12)   |
| Prrc2b    | 0.50  | $3.73 \times 10^{-6}$ | 9.320837 | Proline-rich coiled-coil 2B (Prrc2b)   |
| Igfbp5    | 0.50  | $8.80 \times 10^{-5}$ | 8.736287 | Insulin-like growth factor binding protein 5 (Igfbp5)                              |
| Gnaq      | 0.50  | $6.76 \times 10^{-6}$ | 8.155164 | Guanine nucleotide binding protein, alpha q polypeptide (Gnaq)                     |
| Zfp655    | 0.50  | .001488064            | 5.611433 | Zinc finger protein 655 (Zfp655)   |
| Pafah1b1  | 0.50  | $6.04 \times 10^{-6}$ | 9.205319 | Platelet-activating factor acetylhydrolase, isoform 1b, subunit 1 (Pafah1b1)       |
| Polk      | 0.50  | .001495063            | 4.969408 | Polymerase (DNA directed), kappa (Polk)  |
| Lrsam1    | 0.50  | .003584629            | 4.441391 | Leucine-rich repeat and sterile alpha motif containing 1 (Lrsam1)                  |
| Ndst4     | 0.50  | .024977903            | 4.943704 | N-deacetylase/N-sulfotransferase (heparin glucosaminyl) 4 (Ndst4)                  |
| Dpp9      | 0.50  | .000504451            | 5.508586 | Dipeptidylpeptidase 9 (Dpp9)   |
| Far2      | 0.50  | .000233834            | 6.117339 | Fatty acyl CoA reductase 2 (Far2)  |
| Rnf10     | 0.50  | .000586147            | 6.302902 | Ring finger protein 10 (Rnf10)   |
| Pura      | 0.50  | .000569585            | 7.795406 | Purine-rich element binding protein A (Pura)                                       |
| Usp22     | 0.50  | $4.25 \times 10^{-5}$ | 8.212736 | Ubiquitin-specific peptidase 22 (Usp22)  |
| Nol10     | 0.50  | .004126718            | 4.021982 | Nucleolar protein 10 (Nol10)   |
| Fam120b   | 0.50  | $4.91 \times 10^{-5}$ | 6.882702 | Family with sequence similarity 120, member B (Fam120b)                            |
| Iqsec1    | 0.50  | $2.25 \times 10^{-5}$ | 8.691885 | IQ motif and Sec7 domain 1 (Iqsec1)  |
| Pdik1l    | 0.50  | .001182316            | 4.9045   | PDLIM1 interacting kinase 1 like (Pdik1l)  |
| Arhgef5   | 0.50  | .030090444            | 4.214326 | Rho guanine nucleotide exchange factor (GEF) 5 (Arhgef5)                           |
| Ocrl      | 0.50  | $3.69 \times 10^{-5}$ | 7.343288 | Oculocerebrorenal syndrome of Lowe (Ocrl)  |
| Zfp599    | 0.50  | .048811796            | 3.457343 | Zinc finger protein 599 (Zfp599)   |
| Gpr61     | 0.50  | .010436237            | 3.50339  | G protein-coupled receptor 61 (Gpr61)  |
| Yme111    | 0.50  | .000567106            | 6.54129  | YME1-like 1 (S. cerevisiae) (Yme111)   |
| Gnl3l     | 0.50  | $2.90 \times 10^{-5}$ | 8.615794 | Guanine nucleotide binding protein-like 3 (nucleolar)-like (Gnl3l)                 |
| Map6      | 0.50  | .000271237            | 7.150213 | Microtubule-associated protein 6 (Map6)  |
| Pank3     | 0.50  | .000312897            | 7.328627 | Pantothenate kinase 3 (Pank3)  |
| Slitrk3   | 0.50  | $6.90 \times 10^{-5}$ | 7.435944 | SLIT and NTRK-like family, member 3 (Slitrk3)                                      |
| Arhgap27  | 0.50  | .003255011            | 4.640164 | Rho GTPase activating protein 27 (Arhgap27)  |
| Eri3      | 0.50  | .000201853            | 6.117831 | Exoribonuclease 3 (Eri3)   |
| Kpna3     | 0.50  | $2.94 \times 10^{-5}$ | 7.022576 | Karyopherin (importin) alpha 3 (Kpna3)   |
| Zcchc2    | 0.50  | .001371504            | 5.550055 | Zinc finger, CCHC domain containing 2 (Zcchc2)                                     |
| Dlc1      | 0.50  | .000141082            | 7.254099 | Deleted in liver cancer 1 (Dlc1)   |
| Armxc2    | 0.50  | $8.77 \times 10^{-5}$ | 6.827135 | Armadillo repeat containing, X-linked 2 (Armxc2)                                   |
| Lrrc4b    | 0.50  | $2.81 \times 10^{-5}$ | 7.593234 | Leucine-rich repeat containing 4B (Lrrc4b)   |
| Fam212b   | 0.50  | .001669081            | 5.301549 | Family with sequence similarity 212, member B (Fam212b)                            |
| Cabyr     | 0.50  | .040331797            | 3.176974 | Calcium-binding tyrosine- (Y)-phosphorylation regulated (fibrousheathin 2) (Cabyr) |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|---------------|-------|-----------------------|----------|--|
| Sntb1         | 0.50  | .002781292            | 6.301121 | Syntrophin, basic 1 (Sntb1)  |
| Tshz3         | 0.49  | .014499583            | 4.271713 | Teashirt zinc finger family member 3 (Tshz3)   |
| Fam110a       | 0.49  | .0142136              | 3.890638 | Family with sequence similarity 110, member A (Fam110a)                                  |
| Hs2st1        | 0.49  | .000114447            | 7.061872 | Heparan sulfate 2-O-sulfotransferase 1 (Hs2st1)  |
| Gm16485       | 0.49  | .003623173            | 4.132776 | Predicted gene 16485 (Gm16485)   |
| Abl2          | 0.49  | .001709309            | 6.284897 | V-abl Abelson murine leukemia viral oncogene 2 (arg, Abelson-related gene) (Abl2)        |
| Stx1a         | 0.49  | .010820006            | 5.648423 | Syntaxin 1A (brain) (Stx1a)  |
| A830082N09Rik | 0.49  | .014671102            | 5.604842 | RIKEN cDNA A830082N09 gene (A830082N09Rik)   |
| Bcl2          | 0.49  | .000326502            | 6.598642 | B cell leukemia/lymphoma 2 (Bcl2)  |
| Zfp825        | 0.49  | .043789614            | 2.964103 | Zinc finger protein 825 (Zfp825)   |
| Scoc          | 0.49  | $4.09 \times 10^{-5}$ | 7.38511  | Short coiled-coil protein (Scoc)   |
| Aldh18a1      | 0.49  | .016067384            | 4.137853 | Aldehyde dehydrogenase 18 family, member A1 (Aldh18a1)                                   |
| Tanc2         | 0.49  | $5.78 \times 10^{-6}$ | 8.781747 | Tetratricopeptide repeat, ankyrin repeat, and coiled-coil containing 2 (Tanc2)           |
| Cdk14         | 0.49  | $3.37 \times 10^{-5}$ | 8.641801 | Cyclin-dependent kinase 14 (Cdk14)   |
| Fam131b       | 0.49  | .006674993            | 6.259977 | Family with sequence similarity 131, member B (Fam131b)                                  |
| St8sia4       | 0.49  | .013647351            | 4.278556 | ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 4 (St8sia4)                   |
| Gpd1l         | 0.49  | .000143473            | 7.304194 | Glycerol-3-phosphate dehydrogenase 1-like (Gpd1l)  |
| Sema6b        | 0.49  | .001929587            | 5.742435 | Sema domain, transmembrane domain (TM), and cytoplasmic domain, (semaphorin) 6B (Sema6b) |
| Skiv2l2       | 0.49  | .000519092            | 6.593657 | Superkiller viralicidic activity 2-like 2 (S. cerevisiae) (Skiv2l2)                      |
| Ntm           | 0.49  | .000107235            | 7.887382 | Neurotrimin (Ntm)  |
| Fem1b         | 0.49  | $6.90 \times 10^{-5}$ | 8.808714 | Feminization 1 homolog b (C. elegans) (Fem1b)  |
| Adam19        | 0.49  | .002402103            | 5.173784 | A disintegrin and metallopeptidase domain 19 (meltrin beta) (Adam19)                     |
| Senp7         | 0.49  | .000178207            | 6.558744 | SUMO1/sentrin-specific peptidase 7 (Senp7)   |
| Hyou1         | 0.49  | $5.64 \times 10^{-5}$ | 6.869923 | Hypoxia up-regulated 1 (Hyou1)   |
| Dcbld1        | 0.49  | .029925528            | 3.206455 | Discoidin, CUB, and LCCL domain containing 1 (Dcbld1)                                    |
| Zfp12         | 0.49  | .002405035            | 4.460931 | Zinc finger protein 12 (Zfp12)   |
| Zfp319        | 0.49  | .001809463            | 4.39925  | Zinc finger protein 319 (Zfp319)   |
| Tfip11        | 0.49  | .002376766            | 4.530287 | Tuftelin interacting protein 11 (Tfip11)   |
| Grin1         | 0.49  | .000492141            | 7.458673 | Glutamate receptor, ionotropic, NMDA1 (zeta 1) (Grin1)                                   |
| Elavl2        | 0.49  | .000118871            | 7.679044 | ELAV (embryonic lethal, abnormal vision, Drosophila)-like 2 (Hu antigen B) (Elavl2)      |
| Papolg        | 0.49  | .002755685            | 4.983342 | Poly(A) polymerase gamma (Papolg)  |
| Map3k12       | 0.49  | $9.61 \times 10^{-5}$ | 6.161915 | Mitogen-activated protein kinase kinase kinase 12 (Map3k12)                              |
| Galns         | 0.49  | .048967797            | 2.741527 | Galactosamine (N-acetyl)-6-sulfate sulfatase (Galns)                                     |
| Cacnb4        | 0.49  | .000315675            | 8.456173 | Calcium channel, voltage-dependent, beta 4 subunit (Cacnb4)                              |
| Mmp15         | 0.49  | .002134924            | 4.807218 | Matrix metallopeptidase 15 (Mmp15)   |
| Lancl2        | 0.49  | $4.83 \times 10^{-5}$ | 7.484846 | LanC (bacterial lantibiotic synthetase component C)-like 2 (Lancl2)                      |
| Akap17b       | 0.49  | .000756082            | 5.363899 | A kinase (PRKA) anchor protein 17B (Akap17b)   |
| Tet1          | 0.49  | .004673112            | 6.654421 | Tet methylcytosine dioxygenase 1 (Tet1)  |
| Akap8l        | 0.49  | .00582108             | 4.125275 | A kinase (PRKA) anchor protein 8-like (Akap8l)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Zfp658        | 0.49  | .03325665                | 2.654369 | Zinc finger protein 658 (Zfp658)  |
| Pip4k2b       | 0.49  | $6.41 \times 10^{-5}$    | 7.180139 | Phosphatidylinositol-5-phosphate 4-kinase, type II, beta (Pip4k2b)                            |
| Efna5         | 0.49  | .001508783               | 5.372957 | Ephrin A5 (Efna5)   |
| Impact        | 0.49  | $4.41 \times 10^{-5}$    | 9.298585 | Impact, RWD domain protein (Impact)   |
| Ckmt1         | 0.49  | .002072442               | 7.072179 | Creatine kinase, mitochondrial 1, ubiquitous (Ckmt1)  |
| Etaa1         | 0.49  | .019446411               | 4.2819   | Ewing tumor-associated antigen 1 (Etaa1)  |
| Pptc7         | 0.49  | .000453199               | 6.393041 | PTC7 protein phosphatase homolog (Pptc7)  |
| Aff2          | 0.49  | .004242701               | 6.154302 | AF4/FMR2 family, member 2 (Aff2)  |
| Robo1         | 0.49  | .000176426               | 7.564692 | Roundabout guidance receptor 1 (Robo1)  |
| Rnf157        | 0.49  | $4.83 \times 10^{-5}$    | 7.930201 | Ring finger protein 157 (Rnf157)  |
| Fnip2         | 0.49  | .000488931               | 4.974987 | Folliculin interacting protein 2 (Fnip2)  |
| Osbpl6        | 0.49  | $6.04 \times 10^{-5}$    | 6.705655 | Oxysterol binding protein-like 6 (Osbpl6)   |
| Atxn3         | 0.49  | .006142459               | 4.733381 | Ataxin 3 (Atxn3)  |
| Gpr173        | 0.49  | .004109817               | 5.094155 | G-protein coupled receptor 173 (Gpr173)   |
| Cpsf2         | 0.49  | .000361722               | 6.309555 | Cleavage and polyadenylation-specific factor 2 (Cpsf2)  |
| Pcdhga2       | 0.49  | .032948298               | 3.101961 | Protocadherin gamma subfamily A, 2 (Pcdhga2)  |
| Rpl10a-ps1    | 0.49  | .034736681               | 3.379423 | Ribosomal protein L10A, pseudogene 1 (Rpl10a-ps1)   |
| Nceh1         | 0.49  | .000361531               | 7.871803 | Neutral cholesterol ester hydrolase 1 (Nceh1)   |
| Cntnap5c      | 0.49  | .005822095               | 3.972982 | Contactin-associated protein-like 5C (Cntnap5c)   |
| 2900011O08Rik | 0.49  | .000101885               | 8.731101 | RIKEN cDNA 2900011O08 gene (2900011O08Rik)  |
| Chst10        | 0.49  | .001380989               | 6.689756 | Carbohydrate sulfotransferase 10 (Chst10)   |
| Rsb1          | 0.48  | .000661433               | 5.599134 | Rosbin, round spermatid basic protein 1 (Rsb1)  |
| Flot1         | 0.48  | .000852881               | 6.474218 | Flotillin 1 (Flot1)   |
| Elovl6        | 0.48  | $8.18 \times 10^{-5}$    | 7.546458 | ELOVL family member 6, elongation of long chain fatty acids (yeast) (Elovl6)                  |
| Zcchc12       | 0.48  | .000119843               | 7.771415 | Zinc finger, CCHC domain containing 12 (Zcchc12)  |
| Cadps         | 0.48  | $3.41 \times 10^{-5}$    | 8.604124 | Ca <sup>2+</sup> -dependent secretion activator (Cadps)                                       |
| Ulk1          | 0.48  | $6.83 \times 10^{-5}$    | 7.028295 | Unc-51 like kinase 1 (Ulk1)   |
| Kif3a         | 0.48  | $2.98 \times 10^{-5}$    | 7.318835 | Kinesin family member 3A (Kif3a)  |
| Sh3pxd2a      | 0.48  | .002622684               | 4.975016 | SH3 and PX domains 2A (Sh3pxd2a)  |
| Pde4d         | 0.48  | .000129589               | 6.069565 | Phosphodiesterase 4D, cAMP specific (Pde4d)   |
| Ddx20         | 0.48  | .019362505               | 4.159312 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 20 (Ddx20)   |
| Trim46        | 0.48  | .000598524               | 5.472668 | Tripartite motif-containing 46 (Trim46)   |
| Phactr2       | 0.48  | $3.14 \times 10^{-5}$    | 7.605588 | Phosphatase and actin regulator 2 (Phactr2)   |
| 3300002P13Rik | 0.48  | .03039879                | 3.45894  | RIKEN cDNA 3300002P13 gene (3300002P13Rik)  |
| Ube3a         | 0.48  | $9.28 \times 10^{-5}$    | 6.456628 | Ubiquitin protein ligase E3A (Ube3a)  |
| Gnai1         | 0.48  | $6.65 \times 10^{-5}$    | 8.536932 | Guanine nucleotide binding protein (G protein), alpha inhibiting 1 (Gnai1)                    |
| Arl5a         | 0.48  | $7.41 \times 10^{-5}$    | 7.538916 | ADP-ribosylation factor-like 5A (Arl5a)   |
| Ssh1          | 0.48  | .001551125               | 5.940402 | Slingshot homolog 1 (Ssh1)  |
| Fam210a       | 0.48  | $5.89 \times 10^{-5}$    | 6.604052 | Family with sequence similarity 210, member A (Fam210a)                                       |
| Galnt14       | 0.48  | .004066876               | 4.713444 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 14 (Galnt14) |
| Nkd1          | 0.48  | .001683621               | 5.621471 | Naked cuticle 1 homolog (Nkd1)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Ppp4r4        | 0.48  | .001022316               | 5.898266 | Protein phosphatase 4, regulatory subunit 4 (Ppp4r4)                                    |
| 2610008E11Rik | 0.48  | .007626304               | 5.003287 | RIKEN cDNA 2610008E11 gene (2610008E11Rik)  |
| Taok1         | 0.48  | $9.34 \times 10^{-5}$    | 9.594352 | TAO kinase 1 (Taok1)  |
| Lsamp         | 0.48  | $1.01 \times 10^{-5}$    | 10.0604  | Limbic system-associated membrane protein (Lsamp)                                       |
| Ppm1l         | 0.48  | $4.60 \times 10^{-5}$    | 8.075955 | Protein phosphatase 1 (formerly 2C)-like (Ppm1l)  |
| 5730455P16Rik | 0.48  | .000138602               | 7.223576 | RIKEN cDNA 5730455P16 gene (5730455P16Rik)  |
| Dcun1d4       | 0.48  | $4.42 \times 10^{-5}$    | 7.299505 | DCN1, defective in cullin neddylation 1, domain containing 4 (S. cerevisiae) (Dcun1d4)  |
| Snx10         | 0.48  | .000238358               | 7.786748 | Sorting nexin 10 (Snx10)  |
| Wdr82         | 0.48  | .000361722               | 7.122292 | WD repeat domain containing 82 (Wdr82)  |
| Drp2          | 0.48  | .000448438               | 6.122819 | Dystrophin-related protein 2 (Drp2)   |
| Bcr           | 0.48  | .000353493               | 6.740512 | Breakpoint cluster region (Bcr)   |
| Asb18         | 0.48  | .014242348               | 3.901873 | Ankyrin repeat and SOCS box-containing 18 (Asb18)                                       |
| Ccdc85c       | 0.48  | .000347683               | 6.074509 | Coiled-coil domain containing 85C (Ccdc85c)   |
| Marchf9       | 0.48  | .012442623               | 3.491126 | Membrane-associated ring-CH-type finger 9 (Marchf9)                                     |
| Setd5         | 0.48  | .000123441               | 8.079494 | SET domain containing 5 (Setd5)   |
| Fam110b       | 0.48  | .002813096               | 4.964441 | Family with sequence similarity 110, member B (Fam110b)                                 |
| St8sia1       | 0.48  | .002536116               | 7.55041  | ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 1 (St8sia1)                  |
| Acsl4         | 0.48  | $6.61 \times 10^{-5}$    | 7.018562 | Acyl-CoA synthetase long-chain family member 4 (Acsl4)                                  |
| Zdhhc2        | 0.48  | .000150122               | 6.447595 | Zinc finger, DHHC domain containing 2 (Zdhhc2)  |
| Plk4          | 0.48  | .015921625               | 3.559392 | Polo-like kinase 4 (Plk4)   |
| Kif21a        | 0.48  | $3.15 \times 10^{-5}$    | 8.756079 | Kinesin family member 21A (Kif21a)  |
| Capn5         | 0.48  | .000245613               | 6.53773  | Calpain 5 (Capn5)   |
| Syng3         | 0.48  | .000457092               | 7.845531 | Synaptogyrin 3 (Syng3)  |
| Ppp3ca        | 0.48  | $2.48 \times 10^{-5}$    | 8.194396 | Protein phosphatase 3, catalytic subunit, alpha isoform (Ppp3ca)                        |
| Rab30         | 0.48  | .00045447                | 6.274733 | RAB30, member RAS oncogene family (Rab30)   |
| Pold3         | 0.48  | .00162611                | 4.537717 | Polymerase (DNA-directed), delta 3, accessory subunit (Pold3)                           |
| Peg10         | 0.48  | .045165099               | 6.32874  | Paternally expressed 10 (Peg10)   |
| Nhlrc1        | 0.48  | .011364489               | 4.664779 | NHL repeat containing 1 (Nhlrc1)  |
| Panx1         | 0.48  | .009188406               | 4.124741 | Pannexin 1 (Panx1)  |
| Paqr3         | 0.48  | .020457072               | 3.302473 | Progesterin and adipoQ receptor family member III (Paqr3)                               |
| Nrxn1         | 0.48  | $7.21 \times 10^{-6}$    | 10.09364 | Neurexin I (Nrxn1)  |
| Myadm         | 0.48  | .000225905               | 7.180534 | Myeloid-associated differentiation marker (Myadm)                                       |
| Atg9a         | 0.47  | .001371444               | 5.680156 | Autophagy-related 9A (Atg9a)  |
| Rapgef6       | 0.47  | .000758396               | 6.696876 | Rap guanine nucleotide exchange factor (GEF) 6 (Rapgef6)                                |
| Ildr2         | 0.47  | $5.23 \times 10^{-5}$    | 9.271105 | Immunoglobulin-like domain containing receptor 2 (Ildr2)                                |
| Pim2          | 0.47  | .002380137               | 4.793028 | Proviral integration site 2 (Pim2)  |
| Cbfa2t2       | 0.47  | .000431868               | 6.165581 | Core-binding factor, runt domain, alpha subunit 2, translocated to, 2 (human) (Cbfa2t2) |
| Morc3         | 0.47  | .00729517                | 4.860046 | Microrchidia 3 (Morc3)  |
| Pdp1          | 0.47  | .000418113               | 8.646689 | Pyruvate dehydrogenase phosphatase catalytic subunit 1 (Pdp1)                           |
| Stard9        | 0.47  | .015474813               | 4.451757 | START domain containing 9 (Stard9)  |
| Ppp1r12b      | 0.47  | .000426478               | 6.31093  | Protein phosphatase 1, regulatory (inhibitor) subunit 12B (Ppp1r12b)                    |
| Cacnb1        | 0.47  | .000922069               | 5.247032 | Calcium channel, voltage-dependent, beta 1 subunit (Cacnb1)                             |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Tubb4a        | 0.47  | $7.10 \times 10^{-5}$ | 10.66785 | Tubulin, beta 4A class IVA (Tubb4a)   |
| Foxj3         | 0.47  | .000246304            | 7.336126 | Forkhead box J3 (Foxj3)   |
| Cadm3         | 0.47  | $3.22 \times 10^{-5}$ | 8.49621  | Cell adhesion molecule 3 (Cadm3)  |
| Smarca5       | 0.47  | .000373709            | 6.516099 | SWI/SNF-related, matrix-associated, actin-dependent regulator of chromatin, subfamily a, member 5 (Smarca5) |
| Tlk1          | 0.47  | .000115631            | 7.259236 | Tousled-like kinase 1 (Tlk1)  |
| Bahd1         | 0.47  | .029630347            | 3.804144 | Bromo adjacent homology domain containing 1 (Bahd1)   |
| Zfp874b       | 0.47  | .022261006            | 3.870412 | Zinc finger protein 874b (Zfp874b)  |
| Hspa13        | 0.47  | .002637907            | 5.6085   | Heat shock protein 70 family, member 13 (Hspa13)  |
| Dbpht2        | 0.47  | .000816609            | 7.519871 | DNA binding protein with his-thr domain (Dbpht2)  |
| Ccsap         | 0.47  | .029852464            | 3.287806 | Centriole, cilia, and spindle-associated protein (Ccsap)  |
| Pkp2          | 0.47  | .017749935            | 3.86237  | Plakophilin 2 (Pkp2)  |
| Camta2        | 0.47  | $9.57 \times 10^{-5}$ | 7.698291 | Calmodulin binding transcription activator 2 (Camta2)   |
| Gm10010       | 0.47  | .025167712            | 3.552928 | Predicted gene 10010 (Gm10010)  |
| Got1          | 0.47  | $1.71 \times 10^{-5}$ | 8.76152  | Glutamic-oxaloacetic transaminase 1, soluble (Got1)   |
| Dhx9          | 0.47  | $7.25 \times 10^{-5}$ | 6.752181 | DEAH (Asp-Glu-Ala-His) box polypeptide 9 (Dhx9)   |
| Vipr2         | 0.47  | .014772082            | 4.962402 | Vasoactive intestinal peptide receptor 2 (Vipr2)  |
| Arrb1         | 0.47  | $7.68 \times 10^{-5}$ | 8.359226 | Arrestin, beta 1 (Arrb1)  |
| Usp5          | 0.47  | .001334561            | 6.362961 | Ubiquitin-specific peptidase 5 (isopeptidase T) (Usp5)  |
| Epha3         | 0.47  | .03702333             | 3.274886 | Eph receptor A3 (Epha3)   |
| Lclat1        | 0.47  | .000375366            | 6.384792 | Lysocardiolipin acyltransferase 1 (Lclat1)  |
| Nectin1       | 0.47  | .006772183            | 4.613636 | Nectin cell adhesion molecule 1 (Nectin1)   |
| Nlgn2         | 0.47  | $4.32 \times 10^{-5}$ | 7.497194 | Neuroigin 2 (Nlgn2)   |
| Ptprf         | 0.47  | .000994875            | 6.206784 | Protein tyrosine phosphatase, receptor type, F (Ptprf)  |
| Slc5a3        | 0.47  | .002759123            | 7.089417 | Solute carrier family 5 (inositol transporters), member 3 (Slc5a3)  |
| Hmgcr         | 0.47  | .000321323            | 6.999178 | 3-Hydroxy-3-methylglutaryl-Coenzyme A reductase (Hmgcr)   |
| Man1a2        | 0.47  | $3.10 \times 10^{-5}$ | 8.005426 | Mannosidase, alpha, class 1A, member 2 (Man1a2)   |
| Spata2        | 0.47  | .00017551             | 6.18663  | Spermatogenesis associated 2 (Spata2)   |
| Siae          | 0.47  | .003832065            | 4.787912 | Sialic acid acetyltransferase (Siae)  |
| Mtss1         | 0.47  | $2.69 \times 10^{-5}$ | 7.502453 | Metastasis suppressor 1 (Mtss1)   |
| Begain        | 0.47  | .001796092            | 6.177032 | Brain-enriched guanylate kinase-associated (Begain)   |
| A830073O21Rik | 0.47  | .036602063            | 3.155212 | RIKEN cDNA A830073O21 gene (A830073O21Rik)  |
| Nrg3          | 0.47  | .000506278            | 6.329965 | Neuregulin 3 (Nrg3)   |
| Arhgap1       | 0.47  | .000328088            | 6.414455 | Rho GTPase activating protein 1 (Arhgap1)   |
| Sobp          | 0.47  | .000597382            | 6.54442  | Sine oculis-binding protein homolog (Sobp)  |
| Slc9a1        | 0.47  | .000294425            | 6.621043 | Solute carrier family 9 (sodium/hydrogen exchanger), member 1 (Slc9a1)                                      |
| Mrap2         | 0.47  | .01937184             | 4.517835 | Melanocortin 2 receptor accessory protein 2 (Mrap2)   |
| Prrg3         | 0.47  | .000763509            | 7.106886 | Proline-rich Gla (G-carboxyglutamic acid) 3 (transmembrane) (Prrg3)   |
| Slc41a2       | 0.47  | .001113675            | 6.106604 | Solute carrier family 41, member 2 (Slc41a2)  |
| Pcdh10        | 0.47  | $2.14 \times 10^{-5}$ | 8.439189 | Protocadherin 10 (Pcdh10)   |
| Thoc3         | 0.47  | .004992511            | 4.945442 | THO complex 3 (Thoc3)   |
| Mapk1         | 0.47  | $4.34 \times 10^{-5}$ | 8.247123 | Mitogen-activated protein kinase 1 (Mapk1)  |
| Ctc1          | 0.47  | .001413903            | 4.81425  | CTS telomere maintenance complex component 1 (Ctc1)   |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Gpr137c       | 0.47  | .000105527               | 7.007863 | G protein-coupled receptor 137C (Gpr137c)   |
| Jmy           | 0.47  | .000518855               | 6.857806 | Junction-mediating and regulatory protein (Jmy)   |
| Disp2         | 0.47  | $6.53 \times 10^{-5}$    | 9.524808 | Dispatched homolog 2 (Disp2)  |
| Trim32        | 0.47  | $8.40 \times 10^{-5}$    | 8.054434 | Tripartite motif-containing 32 (Trim32)   |
| Rab6b         | 0.46  | $1.63 \times 10^{-5}$    | 10.9938  | RAB6B, member RAS oncogene family (Rab6b)   |
| Pak7          | 0.46  | .002322536               | 4.612248 | p21 protein (Cdc42/Rac)-activated kinase 7 (Pak7)   |
| Wdr4          | 0.46  | .034842102               | 3.876873 | WD repeat domain 4 (Wdr4)   |
| Paqr9         | 0.46  | $7.00 \times 10^{-5}$    | 6.747874 | Progesterin and adipoQ receptor family member IX (Paqr9)                                    |
| Jakmip3       | 0.46  | .003666263               | 5.01624  | Janus kinase and microtubule interacting protein 3 (Jakmip3)                                |
| Ptcd3         | 0.46  | .001035567               | 5.049192 | Pentatricopeptide repeat domain 3 (Ptcd3)   |
| Slc9a5        | 0.46  | .015216513               | 3.480971 | Solute carrier family 9 (sodium/hydrogen exchanger), member 5 (Slc9a5)                      |
| Peli3         | 0.46  | .031733638               | 3.351909 | Pellino 3 (Peli3)   |
| Coro1c        | 0.46  | .00145067                | 6.223458 | Coronin, actin binding protein 1C (Coro1c)  |
| A230056P14Rik | 0.46  | .007990944               | 4.062623 | RIKEN cDNA A230056P14 gene (A230056P14Rik)  |
| Paf1          | 0.46  | .001197514               | 5.107284 | Paf1, RNA polymerase II complex component (Paf1)  |
| Top1          | 0.46  | .000319818               | 6.206782 | Topoisomerase (DNA) I (Top1)  |
| Vps33a        | 0.46  | .000274867               | 6.674283 | VPS33A CORVET/HOPS core subunit (Vps33a)  |
| Braf          | 0.46  | $3.61 \times 10^{-5}$    | 8.555082 | Braf transforming gene (Braf)   |
| Tpgs2         | 0.46  | .000257427               | 6.716296 | Tubulin polyglutamylase complex subunit 2 (Tpgs2)   |
| Tmem158       | 0.46  | .040591569               | 4.232921 | Transmembrane protein 158 (Tmem158)   |
| Smg8          | 0.46  | .007075088               | 4.782751 | Smg-8 homolog, nonsense mediated mRNA decay factor ( <i>C. elegans</i> ) (Smg8)             |
| Ero1l         | 0.46  | .000314173               | 6.606825 | ERO1-like ( <i>S. cerevisiae</i> ) (Ero1l)  |
| Taf1          | 0.46  | .000118896               | 7.125911 | TATA-box binding protein-associated factor 1 (Taf1)   |
| Nup43         | 0.46  | .025642564               | 3.367705 | Nucleoporin 43 (Nup43)  |
| Ube2o         | 0.46  | .000224403               | 6.088197 | Ubiquitin-conjugating enzyme E2O (Ube2o)  |
| Prepl         | 0.46  | .000108867               | 8.42021  | Prolyl endopeptidase-like (Prepl)   |
| Arhgef9       | 0.46  | $1.95 \times 10^{-5}$    | 9.060455 | CDC42 guanine nucleotide exchange factor (GEF) 9 (Arhgef9)                                  |
| Sult4a1       | 0.46  | .000171289               | 8.20612  | Sulfotransferase family 4A, member 1 (Sult4a1)  |
| Skil          | 0.46  | .001375994               | 6.342489 | SKI-like (Skil)   |
| AC125351.1    | 0.46  | .003332304               | 4.913767 | Predicted gene (Gm49654)  |
| Supt5         | 0.46  | .000137379               | 6.312683 | Suppressor of Ty 5 (Supt5)  |
| Reep6         | 0.46  | .005572999               | 4.256648 | Receptor accessory protein 6 (Reep6)  |
| Dusp1         | 0.46  | .014428159               | 5.495226 | Dual-specificity phosphatase 1 (Dusp1)  |
| Galnt9        | 0.46  | .012384396               | 5.670193 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 9 (Galnt9) |
| Zfp266        | 0.46  | .000378676               | 6.804585 | Zinc finger protein 266 (Zfp266)  |
| Slc36a1       | 0.46  | .000809945               | 6.298076 | Solute carrier family 36 (proton/amino acid symporter), member 1 (Slc36a1)                  |
| Csnk1g3       | 0.46  | .000327953               | 6.915622 | Casein kinase 1, gamma 3 (Csnk1g3)  |
| Arhgef11      | 0.46  | .000267473               | 6.849974 | Rho guanine nucleotide exchange factor (GEF) 11 (Arhgef11)                                  |
| Wnk3          | 0.46  | $9.08 \times 10^{-5}$    | 7.629332 | WNK lysine-deficient protein kinase 3 (Wnk3)  |
| Tuba4a        | 0.46  | $5.89 \times 10^{-5}$    | 7.871474 | Tubulin, alpha 4A (Tuba4a)  |
| Klhl11        | 0.46  | .000214376               | 6.310354 | Kelch-like 11 (Klhl11)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Amer2     | 0.46  | .000699764            | 7.917886 | APC membrane recruitment 2 (Amer2)  |
| Lrtm2     | 0.46  | .000510564            | 8.186492 | Leucine-rich repeats and transmembrane domains 2 (Lrtm2)                        |
| Capn1     | 0.46  | .020549481            | 3.954359 | Calpain 1 (Capn1)   |
| Fbxw7     | 0.46  | .000114281            | 7.130542 | F-box and WD-40 domain protein 7 (Fbxw7)  |
| Grid2ip   | 0.46  | .00139493             | 5.517545 | Glutamate receptor, ionotropic, delta 2 (Grid2) interacting protein 1 (Grid2ip) |
| Cx3cl1    | 0.46  | .001182316            | 8.722243 | Chemokine (C-X3-C motif) ligand 1 (Cx3cl1)                                      |
| Pip5k1c   | 0.46  | .000232317            | 6.554507 | Phosphatidylinositol-4-phosphate 5-kinase, type 1 gamma (Pip5k1c)               |
| Pcdhb20   | 0.46  | .037450276            | 3.72872  | Protocadherin beta 20 (Pcdhb20)   |
| Rps6ka4   | 0.46  | .015589952            | 3.449031 | Ribosomal protein S6 kinase, polypeptide 4 (Rps6ka4)                            |
| Btbd9     | 0.46  | .00014267             | 6.425872 | BTB (POZ) domain containing 9 (Btbd9)   |
| Alcam     | 0.46  | .002022066            | 7.790447 | Activated leukocyte cell adhesion molecule (Alcam)                              |
| Orai2     | 0.46  | .000609841            | 5.680543 | ORAI calcium release-activated calcium modulator 2 (Orai2)                      |
| Gpr158    | 0.46  | .000118591            | 8.246984 | G protein-coupled receptor 158 (Gpr158)   |
| Supt6     | 0.46  | $9.34 \times 10^{-5}$ | 7.659551 | Suppressor of Ty 6 (Supt6)  |
| Zfp704    | 0.46  | .000932051            | 6.557274 | Zinc finger protein 704 (Zfp704)  |
| Jag2      | 0.46  | .01578007             | 4.308178 | Jagged 2 (Jag2)   |
| Mpped2    | 0.46  | .002299506            | 5.342379 | Metallophosphoesterase domain containing 2 (Mpped2)                             |
| Tram1l1   | 0.46  | .001395869            | 6.330943 | Translocation-associated membrane protein 1-like 1 (Tram1l1)                    |
| Appl2     | 0.45  | $4.42 \times 10^{-5}$ | 9.326656 | Amyloid beta (A4) precursor-like protein 2 (Appl2)                              |
| Ergic1    | 0.45  | .000604031            | 6.743439 | Endoplasmic reticulum-golgi intermediate compartment (ERGIC) 1 (Ergic1)         |
| Tmem131   | 0.45  | .000186284            | 7.811875 | Transmembrane protein 131 (Tmem131)   |
| Slc2a3    | 0.45  | .000223704            | 6.820721 | Solute carrier family 2 (facilitated glucose transporter), member 3 (Slc2a3)    |
| Zbtb43    | 0.45  | .005423168            | 4.635901 | Zinc finger and BTB domain containing 43 (Zbtb43)                               |
| Pcbp1     | 0.45  | .001299413            | 6.732799 | Poly(rC) binding protein 1 (Pcbp1)  |
| Rapgef5   | 0.45  | .00107492             | 5.677724 | Rap guanine nucleotide exchange factor (GEF) 5 (Rapgef5)                        |
| Asf1a     | 0.45  | .021448062            | 4.578955 | Anti-silencing function 1A histone chaperone (Asf1a)                            |
| Tmem198   | 0.45  | .015827317            | 3.279203 | Transmembrane protein 198 (Tmem198)   |
| Prkar1b   | 0.45  | .000163613            | 8.538815 | Protein kinase, cAMP dependent regulatory, type I beta (Prkar1b)                |
| Prkg1     | 0.45  | .003907831            | 4.216822 | Protein kinase, cGMP-dependent, type I (Prkg1)                                  |
| Erlin1    | 0.45  | .007319519            | 4.626003 | ER lipid raft associated 1 (Erlin1)   |
| Klhl32    | 0.45  | .007578091            | 4.462452 | Kelch-like 32 (Klhl32)  |
| Amer1     | 0.45  | .015053408            | 4.04839  | APC membrane recruitment 1 (Amer1)  |
| Tmod2     | 0.45  | $1.57 \times 10^{-5}$ | 10.47214 | Tropomodulin 2 (Tmod2)  |
| Susd4     | 0.45  | $9.50 \times 10^{-5}$ | 7.444392 | Sushi domain containing 4 (Susd4)   |
| Arhgap44  | 0.45  | .000133152            | 7.961015 | Rho GTPase activating protein 44 (Arhgap44)                                     |
| Adam23    | 0.45  | .000124023            | 7.615026 | A disintegrin and metallopeptidase domain 23 (Adam23)                           |
| Sik3      | 0.45  | .000114447            | 8.250367 | SIK family kinase 3 (Sik3)  |
| Apc       | 0.45  | .000316176            | 9.360161 | Adenomatosis polyposis coli (Apc)   |
| Zmat1     | 0.45  | .003894461            | 4.896193 | Zinc finger, matrin type 1 (Zmat1)  |
| Gm42433   | 0.45  | .014755638            | 3.359426 | Predicted gene (Gm42433)  |
| Fbxo42    | 0.45  | .00064226             | 5.424557 | F-box protein 42 (Fbxo42)   |
| Tmem63c   | 0.45  | .003672551            | 5.203675 | Transmembrane protein 63c (Tmem63c)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Gdap2         | 0.45  | .003726249            | 4.981501 | Ganglioside-induced differentiation-associated-protein 2 (Gdap2)              |
| Cep295        | 0.45  | .003604952            | 4.679063 | Centrosomal protein 295 (Cep295)  |
| Clic5         | 0.45  | .009159755            | 4.251669 | Chloride intracellular channel 5 (Clic5)                                      |
| Fbxo10        | 0.45  | .000997786            | 5.814775 | F-box protein 10 (Fbxo10)   |
| Gnptab        | 0.45  | .000353493            | 7.163864 | N-acetylglucosamine-1-phosphate transferase, alpha and beta subunits (Gnptab) |
| Map3k13       | 0.45  | .002666968            | 5.541207 | Mitogen-activated protein kinase kinase kinase 13 (Map3k13)                   |
| Vldlr         | 0.45  | .000800046            | 7.07396  | Very-low-density lipoprotein receptor (Vldlr)                                 |
| Cep170b       | 0.45  | .000160426            | 8.478236 | Centrosomal protein 170B (Cep170b)  |
| Dhx57         | 0.45  | .000569554            | 5.807644 | DEAH (Asp-Glu-Ala-Asp/His) box polypeptide 57 (Dhx57)                         |
| Sos1          | 0.45  | .000275022            | 7.407906 | Son of sevenless homolog 1 (Sos1)   |
| Srm           | 0.45  | .001780703            | 5.413557 | Spermidine synthase (Srm)   |
| Grik3         | 0.45  | .002200659            | 6.288374 | Glutamate receptor, ionotropic, kainate 3 (Grik3)                             |
| Vwc2          | 0.45  | .007734216            | 5.115704 | Von Willebrand factor C domain containing 2 (Vwc2)                            |
| Gm9938        | 0.45  | .02189059             | 4.053592 | Predicted gene 9938 (Gm9938)  |
| Gng7          | 0.45  | .001929587            | 5.662525 | Guanine nucleotide binding protein (G protein), gamma 7 (Gng7)                |
| Spock3        | 0.45  | .00104562             | 7.361705 | Sparc/osteonectin, cwcv, and kazal-like domains proteoglycan 3 (Spock3)       |
| Clec16a       | 0.45  | .000333446            | 6.771369 | C-type lectin domain family 16, member A (Clec16a)                            |
| Atf2          | 0.45  | .000399684            | 9.359601 | Activating transcription factor 2 (Atf2)                                      |
| 6430548M08Rik | 0.45  | $8.66 \times 10^{-5}$ | 8.081681 | RIKEN cDNA 6430548M08 gene (6430548M08Rik)                                    |
| Prmt7         | 0.45  | .005243557            | 4.707293 | Protein arginine N-methyltransferase 7 (Prmt7)                                |
| Rufy3         | 0.45  | $3.63 \times 10^{-5}$ | 9.147298 | RUN and FYVE domain containing 3 (Rufy3)                                      |
| Vash2         | 0.45  | .008494097            | 4.328322 | Vasohibin 2 (Vash2)   |
| Atcay         | 0.45  | .000128435            | 6.992892 | Ataxia, cerebellar, Cayman type (Atcay)                                       |
| Ube2ql1       | 0.45  | .001150661            | 6.564043 | Ubiquitin-conjugating enzyme E2Q family-like 1 (Ube2ql1)                      |
| Btbd11        | 0.45  | .000353493            | 6.84126  | BTB (POZ) domain containing 11 (Btbd11)                                       |
| Pitpnm3       | 0.45  | .000213184            | 7.121084 | PITPNM family member 3 (Pitpnm3)  |
| Mcub          | 0.45  | .023564862            | 3.78699  | Mitochondrial calcium uniporter dominant negative subunit beta (Mcub)         |
| Sqle          | 0.45  | .000146824            | 7.297657 | Squalene epoxidase (Sqle)   |
| Cnot4         | 0.45  | .002098121            | 6.369317 | CCR4-NOT transcription complex, subunit 4 (Cnot4)                             |
| Ube4b         | 0.45  | $6.29 \times 10^{-5}$ | 7.659399 | Ubiquitination factor E4B (Ube4b)   |
| Spock2        | 0.45  | $1.27 \times 10^{-5}$ | 10.63308 | Sparc/osteonectin, cwcv and kazal-like domains proteoglycan 2 (Spock2)        |
| Fzr1          | 0.45  | .006425957            | 5.099393 | Fizzy/cell division cycle 20 related 1 (Fzr1)                                 |
| Ppm1a         | 0.45  | $2.50 \times 10^{-5}$ | 8.508332 | Protein phosphatase 1A, magnesium dependent, alpha isoform (Ppm1a)            |
| Smad2         | 0.45  | .000757973            | 6.061977 | SMAD family member 2 (Smad2)  |
| Anks1b        | 0.45  | $4.78 \times 10^{-5}$ | 9.21956  | Ankyrin repeat and sterile alpha motif domain containing 1B (Anks1b)          |
| Zfp35         | 0.45  | .025050269            | 4.45114  | Zinc finger protein 35 (Zfp35)  |
| Wipf2         | 0.45  | .000189599            | 7.834029 | WAS/WASL interacting protein family, member 2 (Wipf2)                         |
| Cbln2         | 0.44  | .02947797             | 6.97697  | Cerebellin 2 precursor protein (Cbln2)  |
| Fstl4         | 0.44  | .009962535            | 4.4189   | Follistatin-like 4 (Fstl4)  |
| Pomk          | 0.44  | .002730156            | 5.190687 | Protein-O-mannose kinase (Pomk)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Dzip3     | 0.44  | .000130869            | 7.149074 | DAZ interacting protein 3, zinc finger (Dzip3)                             |
| Spin1     | 0.44  | $6.28 \times 10^{-5}$ | 8.539658 | Spindlin 1 (Spin1)   |
| Pygo2     | 0.44  | .016061634            | 4.497364 | Pygopus 2 (Pygo2)  |
| Kras      | 0.44  | .000261877            | 7.447538 | Kirsten rat sarcoma viral oncogene homolog (Kras)                          |
| Zfp386    | 0.44  | .003123444            | 5.167368 | Zinc finger protein 386 (Kruppel-like) (Zfp386)                            |
| Sv2b      | 0.44  | $1.28 \times 10^{-5}$ | 8.943629 | Synaptic vesicle glycoprotein 2 b (Sv2b)                                   |
| Osbpl8    | 0.44  | $9.91 \times 10^{-5}$ | 7.217165 | Oxysterol binding protein-like 8 (Osbpl8)                                  |
| Tsc22d2   | 0.44  | .001066802            | 6.475675 | TSC22 domain family, member 2 (Tsc22d2)                                    |
| Pygo1     | 0.44  | .003285454            | 6.348431 | Pygopus 1 (Pygo1)  |
| Zfp280d   | 0.44  | .001082328            | 5.872884 | Zinc finger protein 280D (Zfp280d)   |
| Maged1    | 0.44  | .000157484            | 9.503322 | Melanoma antigen, family D, 1 (Maged1)                                     |
| Coq5      | 0.44  | .003719834            | 5.931892 | Coenzyme Q5 methyltransferase (Coq5)                                       |
| Klf9      | 0.44  | .00130816             | 6.591094 | Kruppel-like factor 9 (Klf9)   |
| Mak16     | 0.44  | .012430955            | 3.824748 | MAK16 homolog (Mak16)  |
| Dlgap1    | 0.44  | $8.51 \times 10^{-5}$ | 8.487934 | Discs, large homolog-associated protein 1 (Dlgap1)                         |
| Adam15    | 0.44  | .000926517            | 5.886278 | A disintegrin and metallopeptidase domain 15 (metargidin) (Adam15)         |
| Tomm70a   | 0.44  | .000339184            | 7.42258  | Translocase of outer mitochondrial membrane 70 homolog A (yeast) (Tomm70a) |
| Ttc27     | 0.44  | .005612815            | 4.373225 | Tetratricopeptide repeat domain 27 (Ttc27)                                 |
| Fam155a   | 0.44  | .000170379            | 7.298223 | Family with sequence similarity 155, member A (Fam155a)                    |
| Por       | 0.44  | .000418113            | 6.368509 | P450 (cytochrome) oxidoreductase (Por)                                     |
| Rgs7      | 0.44  | .001389948            | 7.32774  | Regulator of G protein signaling 7 (Rgs7)                                  |
| Vkorc111  | 0.44  | .000315675            | 6.741713 | Vitamin K epoxide reductase complex, subunit 1-like 1 (Vkorc111)           |
| Ppat      | 0.44  | .003285454            | 4.541544 | Phosphoribosyl pyrophosphate amidotransferase (Ppat)                       |
| Gpr135    | 0.44  | .008329523            | 4.65335  | G protein-coupled receptor 135 (Gpr135)                                    |
| Zdbf2     | 0.44  | $8.19 \times 10^{-5}$ | 7.808305 | Zinc finger, DBF-type containing 2 (Zdbf2)                                 |
| Clvs2     | 0.44  | .00194191             | 4.928738 | Clavesin 2 (Clvs2)   |
| BC005561  | 0.44  | .01465253             | 3.86681  | cDNA sequence BC005561 (BC005561)  |
| Zfp444    | 0.44  | .005068922            | 4.490709 | Zinc finger protein 444 (Zfp444)   |
| Nol4l     | 0.44  | .00114897             | 6.799403 | Nucleolar protein 4-like (Nol4l)   |
| Nipal3    | 0.44  | .000119643            | 7.088298 | NIPA-like domain containing 3 (Nipal3)                                     |
| Fam43a    | 0.44  | .012147442            | 4.163479 | Family with sequence similarity 43, member A (Fam43a)                      |
| Apbb1     | 0.44  | $7.67 \times 10^{-5}$ | 7.128024 | Amyloid beta (A4) precursor protein-binding, family B, member 1 (Apbb1)    |
| Klhl18    | 0.44  | .003477372            | 5.200045 | Kelch-like 18 (Klhl18)   |
| Lgi1      | 0.44  | .000353493            | 6.981183 | Leucine-rich repeat LGI family, member 1 (Lgi1)                            |
| Syt13     | 0.44  | $8.76 \times 10^{-5}$ | 8.860435 | Synaptotagmin XIII (Syt13)   |
| Zfp141    | 0.44  | .012480857            | 3.921562 | Zinc finger protein 141 (Zfp141)   |
| Fgd4      | 0.44  | .000864431            | 6.619991 | FYVE, RhoGEF, and PH domain containing 4 (Fgd4)                            |
| B3galt2   | 0.44  | .00142528             | 6.288489 | UDP-Gal:betaGlcNAc beta 1,3-galactosyltransferase, polypeptide 2 (B3galt2) |
| Camkmt    | 0.44  | .029828927            | 3.294356 | Calmodulin-lysine N-methyltransferase (Camkmt)                             |
| Dock9     | 0.44  | .000750569            | 7.175141 | Dedicator of cytokinesis 9 (Dock9)   |
| Matr3     | 0.44  | .000122525            | 7.984909 | Matrin 3 (Matr3)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Prkch     | 0.44  | .00483422             | 6.154338 | Protein kinase C, eta (Prkch)   |
| Rps6ka5   | 0.44  | .002532045            | 5.156039 | Ribosomal protein S6 kinase, polypeptide 5 (Rps6ka5)                    |
| Nr4a3     | 0.44  | .025918873            | 5.377708 | Nuclear receptor subfamily 4, group A, member 3 (Nr4a3)                 |
| Csdc2     | 0.44  | .000463921            | 8.042956 | Cold shock domain containing C2, RNA binding (Csdc2)                    |
| Dlgap4    | 0.44  | .000210513            | 7.970795 | Discs, large homolog-associated protein 4 (Dlgap4)                      |
| Immt      | 0.44  | .000101532            | 7.176855 | Inner membrane protein, mitochondrial (Immt)                            |
| Marf1     | 0.44  | $7.22 \times 10^{-5}$ | 8.936939 | Meiosis arrest female 1 (Marf1)   |
| Arsa      | 0.44  | .012152036            | 4.043013 | Arylsulfatase A (Arsa)  |
| Fxyd6     | 0.44  | .000169887            | 6.671847 | FXID domain-containing ion transport regulator 6 (Fxyd6)                |
| Nomo1     | 0.44  | .000988982            | 6.660549 | Nodal modulator 1 (Nomo1)   |
| Map3k2    | 0.44  | .008630197            | 5.528723 | Mitogen-activated protein kinase kinase kinase 2 (Map3k2)               |
| Timm17a   | 0.44  | $6.83 \times 10^{-5}$ | 7.376256 | Translocase of inner mitochondrial membrane 17a (Timm17a)               |
| Ddn       | 0.44  | .007381789            | 4.874246 | Dendrin (Ddn)   |
| Ccdc71    | 0.44  | .013183398            | 4.801451 | Coiled-coil domain containing 71 (Ccdc71)                               |
| Celf6     | 0.44  | .00130816             | 5.286741 | CUGBP, Elav-like family member 6 (Celf6)                                |
| Dnm1      | 0.43  | .000201118            | 9.021393 | Dynamin 1 (Dnm1)  |
| Rcan2     | 0.43  | $8.21 \times 10^{-5}$ | 8.868202 | Regulator of calcineurin 2 (Rcan2)                                      |
| Tmed5     | 0.43  | .004158745            | 5.814851 | Transmembrane p24 trafficking protein 5 (Tmed5)                         |
| Yae1d1    | 0.43  | .004906307            | 6.118438 | Yae1 domain containing 1 (Yae1d1)                                       |
| Rc3h1     | 0.43  | .000583495            | 8.025294 | RING CCCH (C3H) domains 1 (Rc3h1)                                       |
| Mapk9     | 0.43  | $7.36 \times 10^{-5}$ | 8.610604 | Mitogen-activated protein kinase 9 (Mapk9)                              |
| Pex1      | 0.43  | .011075063            | 5.068015 | Peroxisomal biogenesis factor 1 (Pex1)                                  |
| Papd5     | 0.43  | .000188077            | 6.346729 | PAP-associated domain containing 5 (Papd5)                              |
| Chrn2     | 0.43  | .000292433            | 6.787899 | Cholinergic receptor, nicotinic, beta polypeptide 2 (neuronal) (Chrn2)  |
| Lrif1     | 0.43  | .027486813            | 4.383491 | Ligand dependent nuclear receptor interacting factor 1 (Lrif1)          |
| Exoc8     | 0.43  | .003792173            | 4.986242 | Exocyst complex component 8 (Exoc8)                                     |
| Ttc13     | 0.43  | .006235333            | 4.333293 | Tetratricopeptide repeat domain 13 (Ttc13)                              |
| Snap91    | 0.43  | .000369437            | 9.139188 | Synaptosomal-associated protein 91 (Snap91)                             |
| Scn2b     | 0.43  | .000382616            | 8.373498 | Sodium channel, voltage-gated, type II, beta (Scn2b)                    |
| Camsap1   | 0.43  | $7.23 \times 10^{-5}$ | 7.025738 | Calmodulin-regulated spectrin-associated protein 1 (Camsap1)            |
| Cdk1      | 0.43  | .012360932            | 3.551885 | Cyclin-dependent kinase-like 1 (CDC2-related kinase) (Cdk1)             |
| Ldb1      | 0.43  | .001685832            | 5.424585 | LIM domain binding 1 (Ldb1)   |
| Fam46a    | 0.43  | .046809332            | 3.57504  | Family with sequence similarity 46, member A (Fam46a)                   |
| Cntnap4   | 0.43  | .006225374            | 5.416949 | Contactin-associated protein-like 4 (Cntnap4)                           |
| Fam124a   | 0.43  | .0039276              | 5.284341 | Family with sequence similarity 124, member A (Fam124a)                 |
| Ccdc92b   | 0.43  | .001955352            | 5.225566 | Coiled-coil domain containing 92B (Ccdc92b)                             |
| Cblb      | 0.43  | .001530817            | 6.279503 | Casitas B-lineage lymphoma b (Cblb)                                     |
| Hecw1     | 0.43  | .000196935            | 7.01028  | HECT, C2 and WW domain containing E3 ubiquitin protein ligase 1 (Hecw1) |
| Gpc1      | 0.43  | .012526707            | 5.628209 | Glypican 1 (Gpc1)   |
| Snx2      | 0.43  | .008599471            | 6.306734 | Sorting nexin 2 (Snx2)  |
| Sh2d5     | 0.43  | .003692731            | 4.910603 | SH2 domain containing 5 (Sh2d5)   |
| Smpd1     | 0.43  | .000104861            | 6.8518   | Sphingomyelin phosphodiesterase 1, acid lysosomal (Smpd1)               |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value        | AveExpr  | Gene full name   |
|-----------|-------|-------------------------|----------|--|
| Nln       | 0.43  | .004642324              | 5.075862 | Neurolysin (metallopeptidase M3 family) (Nln)                              |
| Lmln      | 0.43  | .012967738              | 4.160177 | Leishmanolysin-like (metallopeptidase M8 family) (Lmln)                    |
| Nr2c2     | 0.43  | .000515894              | 7.388217 | Nuclear receptor subfamily 2, group C, member 2 (Nr2c2)                    |
| Cops7b    | 0.43  | .031726709              | 3.940877 | COP9 signalosome subunit 7B (Cops7b)                                       |
| Pde1b     | 0.43  | .005769041              | 6.845212 | Phosphodiesterase 1B, Ca <sup>2+</sup> -calmodulin dependent (Pde1b)       |
| Map1s     | 0.43  | .003935793              | 5.429615 | Microtubule-associated protein 1S (Map1s)                                  |
| Kcnip4    | 0.43  | 6.99 × 10 <sup>-5</sup> | 7.745294 | Kv channel interacting protein 4 (Kcnip4)                                  |
| Scai      | 0.43  | .000150079              | 7.447409 | Suppressor of cancer cell invasion (Scai)                                  |
| Entpd6    | 0.43  | .004872538              | 4.974699 | Ectonucleoside triphosphate diphosphohydrolase 6 (Entpd6)                  |
| Ephb2     | 0.43  | .017895843              | 3.981996 | Eph receptor B2 (Ephb2)  |
| Cacnb2    | 0.43  | .000264641              | 7.794138 | Calcium channel, voltage-dependent, beta 2 subunit (Cacnb2)                |
| Nfe2l3    | 0.43  | .00765485               | 4.456725 | Nuclear factor, erythroid derived 2, like 3 (Nfe2l3)                       |
| Uevld     | 0.43  | .005045879              | 4.64237  | UEV and lactate/malate dehydrogenase domains (Uevld)                       |
| Asns      | 0.43  | .000210513              | 6.676927 | Asparagine synthetase (Asns)   |
| Calm1     | 0.43  | 1.77 × 10 <sup>-5</sup> | 11.75562 | Calmodulin 1 (Calm1)   |
| Jade2     | 0.43  | .00194776               | 5.578605 | Jade family PHD finger 2 (Jade2)   |
| Secisbp2  | 0.43  | .022687498              | 3.828273 | SECIS binding protein 2 (Secisbp2)   |
| Rabgap1l  | 0.43  | .000909733              | 7.916433 | RAB GTPase activating protein 1-like (Rabgap1l)                            |
| Tbc1d30   | 0.43  | .004821913              | 6.02772  | TBC1 domain family, member 30 (Tbc1d30)                                    |
| Ezh1      | 0.43  | .000265751              | 6.336819 | Enhancer of zeste 1 polycomb repressive complex 2 subunit (Ezh1)           |
| B4galt6   | 0.43  | 3.80 × 10 <sup>-5</sup> | 7.86362  | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 6 (B4galt6) |
| Reps2     | 0.43  | .000120466              | 9.4364   | RALBP1-associated Eps domain containing protein 2 (Reps2)                  |
| Cep120    | 0.43  | .001407815              | 6.037168 | Centrosomal protein 120 (Cep120)   |
| Spata2l   | 0.43  | .005347344              | 4.482877 | Spermatogenesis associated 2-like (Spata2l)                                |
| Map4k3    | 0.43  | .00124002               | 6.234116 | Mitogen-activated protein kinase kinase kinase kinase 3 (Map4k3)           |
| Wars      | 0.43  | .000848083              | 6.517416 | Tryptophanyl-tRNA synthetase (Wars)  |
| Jph4      | 0.43  | .000567763              | 7.64848  | Junctophilin 4 (Jph4)  |
| Trim23    | 0.43  | .000320941              | 6.782246 | Tripartite motif-containing 23 (Trim23)                                    |
| Pld3      | 0.42  | .000189164              | 8.21538  | Phospholipase D family, member 3 (Pld3)                                    |
| Nap1l3    | 0.42  | .003180073              | 5.883284 | Nucleosome assembly protein 1-like 3 (Nap1l3)                              |
| Zfp949    | 0.42  | .010130044              | 4.534784 | Zinc finger protein 949 (Zfp949)   |
| Usf3      | 0.42  | .002454392              | 7.349885 | Upstream transcription factor family member 3 (Usf3)                       |
| Nmt2      | 0.42  | .000179903              | 7.75941  | N-myristoyltransferase 2 (Nmt2)  |
| Dctn4     | 0.42  | 8.07 × 10 <sup>-5</sup> | 7.680103 | Dynactin 4 (Dctn4)   |
| Cdh11     | 0.42  | .002539964              | 6.508878 | Cadherin 11 (Cdh11)  |
| Camkk2    | 0.42  | .003976126              | 4.645568 | Calcium/calmodulin-dependent protein kinase kinase 2, beta (Camkk2)        |
| Zfr       | 0.42  | 4.60 × 10 <sup>-5</sup> | 8.485964 | Zinc finger RNA binding protein (Zfr)                                      |
| Grid2     | 0.42  | .005274743              | 5.182087 | Glutamate receptor, ionotropic, delta 2 (Grid2)                            |
| Tmem59l   | 0.42  | .001058251              | 7.158039 | Transmembrane protein 59-like (Tmem59l)                                    |
| Atxn2     | 0.42  | 3.84 × 10 <sup>-5</sup> | 7.751776 | Ataxin 2 (Atxn2)   |
| Gpr45     | 0.42  | .041670715              | 3.873933 | G protein-coupled receptor 45 (Gpr45)                                      |
| Fbxo30    | 0.42  | .037518357              | 4.915909 | F-box protein 30 (Fbxo30)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Cep126        | 0.42  | .002151061               | 5.481591 | Centrosomal protein 126 (Cep126)   |
| Ywhab         | 0.42  | $4.18 \times 10^{-5}$    | 9.901608 | Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, beta polypeptide (Ywhab) |
| Elk1          | 0.42  | .006475162               | 5.246195 | ELK1, member of ETS oncogene family (Elk1)   |
| Phf20         | 0.42  | .000244925               | 6.74512  | PHD finger protein 20 (Phf20)  |
| Sipa1l3       | 0.42  | .000791988               | 6.117184 | Signal-induced proliferation-associated 1 like 3 (Sipa1l3)                                       |
| Atxn1         | 0.42  | $5.07 \times 10^{-5}$    | 8.765492 | Ataxin 1 (Atxn1)   |
| Zfp280b       | 0.42  | .002834919               | 5.290124 | Zinc finger protein 280B (Zfp280b)   |
| Actr1b        | 0.42  | $5.45 \times 10^{-5}$    | 8.470857 | ARP1 actin-related protein 1B, contractin beta (Actr1b)  |
| Ube2d3        | 0.42  | $9.23 \times 10^{-5}$    | 8.120334 | Ubiquitin-conjugating enzyme E2D 3 (Ube2d3)  |
| B3galnt1      | 0.42  | .000945488               | 6.296487 | UDP-GalNAc:betaGlcNAc beta 1,3-galactosaminyltransferase, polypeptide 1 (B3galnt1)               |
| Armcx1        | 0.42  | .000922069               | 6.298535 | Armadillo repeat containing, X-linked 1 (Armcx1)   |
| Spred2        | 0.42  | .001901057               | 6.580296 | Sprouty-related, EVH1 domain containing 2 (Spred2)   |
| Mdga2         | 0.42  | .000688805               | 7.284115 | MAM domain containing glycosylphosphatidylinositol anchor 2 (Mdga2)                              |
| Cntnap5b      | 0.42  | .00738221                | 5.156516 | Contactin-associated protein-like 5B (Cntnap5b)  |
| Ppp3cb        | 0.42  | .000290574               | 8.718173 | Protein phosphatase 3, catalytic subunit, beta isoform (Ppp3cb)                                  |
| Herc3         | 0.42  | .000967774               | 6.778989 | Hect domain and RLD 3 (Herc3)  |
| Nos1          | 0.42  | .00222539                | 5.591106 | Nitric oxide synthase 1, neuronal (Nos1)   |
| Mtpn          | 0.42  | $2.77 \times 10^{-5}$    | 9.067882 | Myotrophin (Mtpn)  |
| Peg13         | 0.42  | .000100509               | 8.381342 | Paternally expressed 13 (Peg13)  |
| Ube2f         | 0.42  | .005636848               | 5.580955 | Ubiquitin-conjugating enzyme E2F (putative) (Ube2f)  |
| Sorl1         | 0.42  | $3.15 \times 10^{-5}$    | 8.494836 | Sortilin-related receptor, LDLR class A repeats-containing (Sorl1)                               |
| Zfp760        | 0.42  | .01226005                | 4.300275 | Zinc finger protein 760 (Zfp760)   |
| Zfp157        | 0.42  | .001096691               | 5.199262 | Zinc finger protein 157 (Zfp157)   |
| Magi1         | 0.42  | .000303517               | 6.631189 | Membrane-associated guanylate kinase, WW and PDZ domain containing 1 (Magi1)                     |
| Rnf112        | 0.42  | .001085536               | 6.691979 | Ring finger protein 112 (Rnf112)   |
| Pcsk4         | 0.42  | .025762705               | 3.350632 | Proprotein convertase subtilisin/kexin type 4 (Pcsk4)  |
| Csnk1g1       | 0.42  | .000740466               | 6.240842 | Casein kinase 1, gamma 1 (Csnk1g1)   |
| Nrxn2         | 0.42  | .000633508               | 7.256182 | Neurexin II (Nrxn2)  |
| Nt5dc3        | 0.42  | .000407855               | 7.357036 | 5'-nucleotidase domain containing 3 (Nt5dc3)   |
| Ina           | 0.42  | $8.30 \times 10^{-5}$    | 8.627539 | Internexin neuronal intermediate filament protein, alpha (Ina)                                   |
| Irf2bp1       | 0.42  | .01302126                | 4.320516 | Interferon regulatory factor 2 binding protein 1 (Irf2bp1)                                       |
| Tmem248       | 0.42  | .000752914               | 6.402601 | Transmembrane protein 248 (Tmem248)  |
| Tub           | 0.42  | .002313842               | 7.774356 | Tubby candidate gene (Tub)   |
| Dclk2         | 0.42  | .001508783               | 5.746545 | Doublecortin-like kinase 2 (Dclk2)   |
| Rbm15b        | 0.42  | .003847455               | 5.596457 | RNA binding motif protein 15B (Rbm15b)   |
| Ldha          | 0.42  | .000974263               | 7.614148 | Lactate dehydrogenase A (Ldha)   |
| Glb1          | 0.42  | .045702512               | 4.501572 | Galactosidase, beta 1 (Glb1)   |
| 6330403K07Rik | 0.42  | .000127815               | 8.840355 | RIKEN cDNA 6330403K07 gene (6330403K07Rik)   |
| Prmt2         | 0.42  | .000317567               | 6.740401 | Protein arginine N-methyltransferase 2 (Prmt2)   |
| Soga3         | 0.42  | .000239929               | 6.974049 | SOGA family member 3 (Soga3)   |
| Larp1         | 0.42  | .000125131               | 7.865978 | La ribonucleoprotein domain family, member 1 (Larp1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Kpna1         | 0.42  | .000351351               | 7.297605 | Karyopherin (importin) alpha 1 (Kpna1)                                 |
| Os9           | 0.42  | .000341985               | 6.488189 | Amplified in osteosarcoma (Os9)  |
| Spryd3        | 0.42  | .001462413               | 5.536067 | SPRY domain containing 3 (Spryd3)                                      |
| Sec23a        | 0.42  | .000460253               | 6.979861 | SEC23 homolog A, COPII coat complex component (Sec23a)                 |
| Evl           | 0.42  | .012360533               | 5.781625 | Ena-vasodilator stimulated phosphoprotein (Evl)                        |
| Rybp          | 0.42  | .020074269               | 4.730474 | RING1 and YY1 binding protein (Rybp)                                   |
| Ttll11        | 0.42  | .005061781               | 4.322861 | Tubulin tyrosine ligase-like family, member 11 (Ttll11)                |
| Zfp810        | 0.42  | .00893466                | 4.605542 | Zinc finger protein 810 (Zfp810)                                       |
| Crb1          | 0.42  | .018350619               | 4.967249 | Crumbs family member 1, photoreceptor morphogenesis associated (Crb1)  |
| Satb1         | 0.41  | .008004366               | 6.437933 | Special AT-rich sequence binding protein 1 (Satb1)                     |
| Rab11b        | 0.41  | .000246082               | 7.271167 | RAB11B, member RAS oncogene family (Rab11b)                            |
| Zfp260        | 0.41  | .00348391                | 6.159883 | Zinc finger protein 260 (Zfp260)                                       |
| Vamp2         | 0.41  | .000110793               | 10.63948 | Vesicle-associated membrane protein 2 (Vamp2)                          |
| E2f3          | 0.41  | .003402187               | 5.297308 | E2F transcription factor 3 (E2f3)                                      |
| Garnl3        | 0.41  | .000610895               | 5.835878 | GTPase activating RANGAP domain-like 3 (Garnl3)                        |
| Rusc1         | 0.41  | .006977418               | 5.719132 | RUN and SH3 domain containing 1 (Rusc1)                                |
| Tnfaip1       | 0.41  | .000583495               | 6.050021 | Tumor necrosis factor, alpha-induced protein 1 (endothelial) (Tnfaip1) |
| Htr2c         | 0.41  | .000189599               | 7.479748 | 5-Hydroxytryptamine (serotonin) receptor 2C (Htr2c)                    |
| Trim66        | 0.41  | .000209083               | 6.952454 | Tripartite motif-containing 66 (Trim66)                                |
| 3110043O21Rik | 0.41  | .017013884               | 4.526678 | RIKEN cDNA 3110043O21 gene (3110043O21Rik)                             |
| Faxc          | 0.41  | .006103042               | 7.381361 | Failed axon connections homolog (Faxc)                                 |
| Myo9a         | 0.41  | .000970233               | 8.107909 | Myosin IXa (Myo9a)   |
| Ogdh          | 0.41  | $6.23 \times 10^{-5}$    | 8.262061 | Oxoglutarate (alpha-ketoglutarate) dehydrogenase (lipoamide) (Ogdh)    |
| Nos1ap        | 0.41  | .045906963               | 4.441692 | Nitric oxide synthase 1 (neuronal) adaptor protein (Nos1ap)            |
| Ube2i         | 0.41  | .003953601               | 5.233666 | Ubiquitin-conjugating enzyme E2I (Ube2i)                               |
| Eipr1         | 0.41  | .015977461               | 4.440447 | EARP complex and GARP complex interacting protein 1 (Eipr1)            |
| Ap2m1         | 0.41  | .000743671               | 7.135462 | Adaptor-related protein complex 2, mu 1 subunit (Ap2m1)                |
| Slc45a4       | 0.41  | .003111388               | 5.556437 | Solute carrier family 45, member 4 (Slc45a4)                           |
| Cadm1         | 0.41  | .002292781               | 7.227528 | Cell adhesion molecule 1 (Cadm1)                                       |
| Chm           | 0.41  | .000164147               | 7.020188 | Choroideremia (RAB escort protein 1) (Chm)                             |
| Ap3m2         | 0.41  | .000299954               | 7.43152  | Adaptor-related protein complex 3, mu 2 subunit (Ap3m2)                |
| Nudt21        | 0.41  | .001834782               | 5.497201 | Nudix (nucleoside diphosphate linked moiety X)-type motif 21 (Nudt21)  |
| Nus1          | 0.41  | .000251771               | 7.650265 | NUS1 dehydrodolichyl diphosphate synthase subunit (Nus1)               |
| Pcnx4         | 0.41  | .00064264                | 6.146426 | Pecanex homolog 4 (Pcnx4)  |
| Slc35e4       | 0.41  | .035189543               | 3.70476  | Solute carrier family 35, member E4 (Slc35e4)                          |
| Hipk3         | 0.41  | .000201734               | 7.426973 | Homeodomain interacting protein kinase 3 (Hipk3)                       |
| Nr1d2         | 0.41  | .000320933               | 6.891923 | Nuclear receptor subfamily 1, group D, member 2 (Nr1d2)                |
| Ifngr2        | 0.41  | .003320395               | 5.708341 | Interferon gamma receptor 2 (Ifngr2)                                   |
| Lcor          | 0.41  | .014232243               | 5.1884   | Ligand-dependent nuclear receptor corepressor (Lcor)                   |
| Ythdc2        | 0.41  | .007274336               | 5.311801 | YTH domain containing 2 (Ythdc2)                                       |
| Ddx3x         | 0.41  | $6.82 \times 10^{-5}$    | 8.291241 | DEAD/H (Asp-Glu-Ala-Asp/His) box polypeptide 3, X-linked (Ddx3x)       |
| Usp45         | 0.41  | .003910116               | 6.15416  | Ubiquitin-specific peptidase 45 (Usp45)                                |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Sel1l         | 0.41  | $7.15 \times 10^{-5}$    | 8.219756 | Sel-1 suppressor of lin-12-like (C. elegans) (Sel1l)                      |
| Ptcd2         | 0.41  | .005060581               | 5.04595  | Pentatricopeptide repeat domain 2 (Ptcd2)                                 |
| Kcnj12        | 0.41  | .005726545               | 5.539139 | Potassium inwardly-rectifying channel, subfamily J, member 12 (Kcnj12)    |
| 4833422C13Rik | 0.41  | .026490141               | 3.260002 | RIKEN cDNA 4833422C13 gene (4833422C13Rik)                                |
| Celf4         | 0.41  | .000246082               | 10.36565 | CUGBP, Elav-like family member 4 (Celf4)                                  |
| Usp46         | 0.41  | .00064538                | 6.695928 | Ubiquitin-specific peptidase 46 (Usp46)                                   |
| Fem1c         | 0.41  | .000161732               | 6.763606 | Fem-1 homolog c (C.elegans) (Fem1c)                                       |
| Skiv2l        | 0.41  | .00294054                | 5.253537 | Superkiller viralicidic activity 2-like (S. cerevisiae) (Skiv2l)          |
| Mapk1ip1l     | 0.41  | .00113131                | 6.190469 | Mitogen-activated protein kinase 1 interacting protein 1-like (Mapk1ip1l) |
| Mboat7        | 0.41  | .000322398               | 7.298973 | Membrane bound O-acyltransferase domain containing 7 (Mboat7)             |
| Mtmr7         | 0.41  | .001246157               | 5.647186 | Myotubularin-related protein 7 (Mtmr7)                                    |
| Cnot6l        | 0.41  | .00130488                | 6.551036 | CCR4-NOT transcription complex, subunit 6-like (Cnot6l)                   |
| Arhgap39      | 0.41  | .002670998               | 5.737399 | Rho GTPase activating protein 39 (Arhgap39)                               |
| Cptp          | 0.41  | .011616227               | 4.827148 | Ceramide-1-phosphate transfer protein (Cptp)                              |
| Uba1          | 0.41  | $4.18 \times 10^{-5}$    | 8.57995  | Ubiquitin-like modifier activating enzyme 1 (Uba1)                        |
| Larp4         | 0.41  | .000437718               | 6.640701 | La ribonucleoprotein domain family, member 4 (Larp4)                      |
| Ankrd13b      | 0.41  | .009562188               | 4.910464 | Ankyrin repeat domain 13b (Ankrd13b)                                      |
| Sh3rf3        | 0.41  | .028409871               | 3.870381 | SH3 domain containing ring finger 3 (Sh3rf3)                              |
| Kcnc1         | 0.41  | .000354443               | 7.625379 | Potassium voltage-gated channel, Shaw-related subfamily, member 1 (Kcnc1) |
| Tgs1          | 0.41  | .003840463               | 5.979315 | Trimethylguanosine synthase 1 (Tgs1)                                      |
| Psm5          | 0.41  | .000276441               | 6.78018  | Proteasome (prosome, macropain) 26S subunit, non-ATPase, 5 (Psm5)         |
| Snx13         | 0.41  | .000832183               | 7.408004 | Sorting nexin 13 (Snx13)  |
| Ube2d2a       | 0.41  | .000340555               | 7.084271 | Ubiquitin-conjugating enzyme E2D 2A (Ube2d2a)                             |
| Lmtk2         | 0.41  | .000914788               | 7.69932  | Lemur tyrosine kinase 2 (Lmtk2)   |
| Basp1         | 0.41  | .002566908               | 7.88251  | Brain abundant, membrane-attached signal protein 1 (Basp1)                |
| Mettl16       | 0.41  | .001037059               | 6.530504 | Methyltransferase like 16 (Mettl16)                                       |
| Stmn2         | 0.41  | .000266989               | 9.088422 | Stathmin-like 2 (Stmn2)   |
| Epm2a         | 0.41  | .011952121               | 4.678135 | Epilepsy, progressive myoclonic epilepsy, type 2 gene alpha (Epm2a)       |
| Dpysl2        | 0.41  | .000357931               | 10.1531  | Dihydropyrimidinase-like 2 (Dpysl2)                                       |
| Dgke          | 0.41  | .000753062               | 6.65971  | Diacylglycerol kinase, epsilon (Dgke)                                     |
| Ncald         | 0.41  | .000140278               | 8.235053 | Neurocalcin delta (Ncald)   |
| Wac           | 0.41  | $9.68 \times 10^{-5}$    | 7.818489 | WW domain containing adaptor with coiled-coil (Wac)                       |
| Rgs7bp        | 0.41  | .000818636               | 8.625809 | Regulator of G-protein signalling 7 binding protein (Rgs7bp)              |
| Noct          | 0.41  | .007008639               | 5.847895 | Nocturnin (Noct)  |
| Ap3s2         | 0.41  | .00080526                | 6.7904   | Adaptor-related protein complex 3, sigma 2 subunit (Ap3s2)                |
| Pgap1         | 0.41  | .000437718               | 7.50112  | Post-GPI attachment to proteins 1 (Pgap1)                                 |
| Sept3         | 0.41  | .000163613               | 9.840756 | Septin 3 (Sept3)  |
| Grm5          | 0.41  | .000361531               | 7.230056 | Glutamate receptor, metabotropic 5 (Grm5)                                 |
| Spock1        | 0.41  | .000340555               | 9.134854 | Sparc/osteonectin, cwcv, and kazal-like domains proteoglycan 1 (Spock1)   |
| Zfp763        | 0.41  | .018932095               | 4.359049 | Zinc finger protein 763 (Zfp763)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|---------------|-------|-----------------------|----------|--|
| Otub1         | 0.41  | .002861436            | 7.101114 | OTU domain, ubiquitin aldehyde binding 1 (Otub1)   |
| Ptpn5         | 0.41  | .000637681            | 7.590373 | Protein tyrosine phosphatase, non-receptor type 5 (Ptpn5)                                  |
| Frmd3         | 0.41  | .028269613            | 3.344021 | FERM domain containing 3 (Frmd3)   |
| Adam10        | 0.41  | .00277358             | 5.974151 | A disintegrin and metallopeptidase domain 10 (Adam10)                                      |
| Cxxc4         | 0.41  | .000647762            | 6.915197 | CXXC finger 4 (Cxxc4)  |
| Fam169a       | 0.41  | .000441285            | 6.842918 | family with sequence similarity 169, member A (Fam169a)                                    |
| Sike1         | 0.41  | .000781423            | 7.039712 | Suppressor of IKBKE 1 (Sike1)  |
| Bcor          | 0.41  | .007257251            | 4.828124 | BCL6 interacting corepressor (Bcor)  |
| Ccdc186       | 0.41  | .000307701            | 7.0388   | Coiled-coil domain containing 186 (Ccdc186)  |
| Hs6st3        | 0.41  | .045700226            | 3.270171 | Heparan sulfate 6-O-sulfotransferase 3 (Hs6st3)  |
| Lpgat1        | 0.41  | $4.91 \times 10^{-5}$ | 8.205279 | Lysophosphatidylglycerol acyltransferase 1 (Lpgat1)  |
| Ube2g2        | 0.41  | .005002434            | 4.920817 | Ubiquitin-conjugating enzyme E2G 2 (Ube2g2)  |
| Dab2ip        | 0.40  | .000429372            | 7.198355 | Disabled 2 interacting protein (Dab2ip)  |
| Dnm1l         | 0.40  | $2.85 \times 10^{-5}$ | 8.630402 | Dynamin 1-like (Dnm1l)   |
| Hsph1         | 0.40  | .000197296            | 9.169802 | Heat shock 105kDa/110kDa protein 1 (Hsph1)   |
| Madd          | 0.40  | $5.27 \times 10^{-5}$ | 8.183483 | MAP-kinase activating death domain (Madd)  |
| Trpv2         | 0.40  | .044463496            | 4.366328 | Transient receptor potential cation channel, subfamily V, member 2 (Trpv2)                 |
| Slc6a17       | 0.40  | .00048829             | 9.454072 | Solute carrier family 6 (neurotransmitter transporter), member 17 (Slc6a17)                |
| Ppargc1a      | 0.40  | .003548535            | 6.91468  | Peroxisome proliferative activated receptor, gamma, coactivator 1 alpha (Ppargc1a)         |
| Usp10         | 0.40  | .002730156            | 5.868576 | Ubiquitin-specific peptidase 10 (Usp10)  |
| 2610002M06Rik | 0.40  | .000234481            | 7.464064 | RIKEN cDNA 2610002M06 gene (2610002M06Rik)   |
| Vat1l         | 0.40  | .001244935            | 7.700007 | Vesicle amine transport protein 1 like (Vat1l)   |
| Camk1d        | 0.40  | .000600906            | 7.52445  | Calcium/calmodulin-dependent protein kinase 1D (Camk1d)                                    |
| Zfp398        | 0.40  | .003061616            | 5.797577 | Zinc finger protein 398 (Zfp398)   |
| Trp53         | 0.40  | .032436189            | 4.699861 | Transformation-related protein 53 (Trp53)  |
| Ripor1        | 0.40  | .004169398            | 6.606152 | RHO family interacting cell polarization regulator 1 (Ripor1)                              |
| Mrs2          | 0.40  | .000399735            | 6.762866 | MRS2 magnesium transporter (Mrs2)  |
| Klf7          | 0.40  | .001150661            | 6.427431 | Kruppel-like factor 7 (ubiquitous) (Klf7)  |
| Tmtc4         | 0.40  | .034545704            | 4.031828 | Transmembrane and tetratricopeptide repeat containing 4 (Tmtc4)                            |
| Cul3          | 0.40  | .000191831            | 8.552255 | Cullin 3 (Cul3)  |
| Agtppb1       | 0.40  | .000135161            | 8.786645 | ATP/GTP binding protein 1 (Agtppb1)  |
| Arhgap33      | 0.40  | .010617797            | 6.305063 | Rho GTPase activating protein 33 (Arhgap33)  |
| Tgfbr3        | 0.40  | .016050198            | 3.84926  | Transforming growth factor, beta receptor III (Tgfbr3)                                     |
| Bclaf3        | 0.40  | .034152331            | 3.483499 | BCLAF1 And THRAP3 Family Member 3 (Bclaf3)   |
| Slc4a8        | 0.40  | .000353493            | 7.572343 | Solute carrier family 4 (anion exchanger), member 8 (Slc4a8)                               |
| Msl3          | 0.40  | .04826703             | 3.754659 | Male-specific lethal 3 homolog (Msl3)  |
| Trove2        | 0.40  | .013171265            | 7.298462 | TROVE domain family, member 2 (Trove2)   |
| Pik3c3        | 0.40  | .001935342            | 6.166008 | Phosphoinositide-3-kinase, class 3 (Pik3c3)  |
| Cited2        | 0.40  | .001552945            | 6.203174 | Cbp/p300-interacting transactivator, with Glu/Asp-rich carboxy-terminal domain, 2 (Cited2) |
| Zmat3         | 0.40  | .000284543            | 8.922481 | Zinc finger matrix type 3 (Zmat3)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Zfp1      | 0.40  | .023373455            | 4.180946 | Zinc finger protein 1 (Zfp1)   |
| Plppr1    | 0.40  | .022523673            | 4.129302 | Phospholipid phosphatase related 1 (Plppr1)                                    |
| Mast1     | 0.40  | .006070659            | 6.259003 | Microtubule-associated serine/threonine kinase 1 (Mast1)                       |
| Rps6ka6   | 0.40  | .03900665             | 4.08833  | Ribosomal protein S6 kinase polypeptide 6 (Rps6ka6)                            |
| Syng1     | 0.40  | .000206246            | 7.983049 | Synaptogyrin 1 (Syng1)   |
| Rnf152    | 0.40  | .004220257            | 6.75536  | Ring finger protein 152 (Rnf152)   |
| Fam208b   | 0.40  | .001720872            | 6.147619 | Family with sequence similarity 208, member B (Fam208b)                        |
| Slc2a13   | 0.40  | .000624082            | 8.124894 | Solute carrier family 2 (facilitated glucose transporter), member 13 (Slc2a13) |
| Pwp2      | 0.40  | .033241896            | 3.754613 | PWP2 periodic tryptophan protein homolog (yeast) (Pwp2)                        |
| Ap2a1     | 0.40  | .00195702             | 6.022989 | Adaptor-related protein complex 2, alpha 1 subunit (Ap2a1)                     |
| Wdr1      | 0.40  | .001959813            | 6.738987 | WD repeat domain 1 (Wdr1)  |
| Bmpr2     | 0.40  | .000206246            | 9.707483 | Bone morphogenetic protein receptor, type II (serine/threonine kinase) (Bmpr2) |
| B4galt3   | 0.40  | .021448062            | 3.857196 | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 3 (B4galt3)     |
| Fnip1     | 0.40  | .006699296            | 5.508866 | Folliculin interacting protein 1 (Fnip1)                                       |
| Homer1    | 0.40  | .004965641            | 5.483874 | Homer scaffolding protein 1 (Homer1)   |
| Dcp2      | 0.40  | .000508478            | 8.00343  | Decapping mRNA 2 (Dcp2)  |
| Atxn7l1   | 0.40  | .001271538            | 5.766965 | Ataxin 7-like 1 (Atxn7l1)  |
| Gfod1     | 0.40  | .002669903            | 6.539738 | Glucose-fructose oxidoreductase domain containing 1 (Gfod1)                    |
| Cmtm4     | 0.40  | .000371635            | 7.60407  | CKLF-like MARVEL transmembrane domain containing 4 (Cmtm4)                     |
| Magi3     | 0.40  | .000824068            | 6.774429 | Membrane-associated guanylate kinase, WW and PDZ domain containing 3 (Magi3)   |
| Acot7     | 0.40  | .002910472            | 8.590637 | Acyl-CoA thioesterase 7 (Acot7)  |
| Ralgps2   | 0.40  | .010757334            | 6.614903 | Ral GEF with PH domain and SH3 binding motif 2 (Ralgps2)                       |
| Rab22a    | 0.40  | .00065807             | 6.528343 | RAB22A, member RAS oncogene family (Rab22a)                                    |
| Ablim3    | 0.40  | .000602178            | 6.180118 | Actin binding LIM protein family, member 3 (Ablim3)                            |
| Wars2     | 0.40  | .037196124            | 3.951539 | Tryptophanyl tRNA synthetase 2 (mitochondrial) (Wars2)                         |
| Scn9a     | 0.40  | .015339166            | 5.230321 | Sodium channel, voltage-gated, type IX, alpha (Scn9a)                          |
| Nprl2     | 0.40  | .023773621            | 4.527652 | Nitrogen permease regulator-like 2 (Nprl2)                                     |
| Prr12     | 0.40  | .000778073            | 6.371128 | Proline rich 12 (Prr12)  |
| Elmsan1   | 0.40  | .007672367            | 5.096321 | ELM2 and Myb/SANT-like domain containing 1 (Elmsan1)                           |
| Hdgfl3    | 0.40  | .001019541            | 7.465852 | HDGF Like 3 (Hdgfl3)   |
| Zic1      | 0.40  | $7.09 \times 10^{-5}$ | 9.325685 | Zinc finger protein of the cerebellum 1 (Zic1)                                 |
| Asb7      | 0.40  | .007337365            | 5.629812 | Ankyrin repeat and SOCS box-containing 7 (Asb7)                                |
| Dgkh      | 0.40  | .000511567            | 7.007993 | Diacylglycerol kinase, eta (Dgkh)  |
| Tomm20    | 0.40  | .000138669            | 8.772307 | Translocase of outer mitochondrial membrane 20 homolog (yeast) (Tomm20)        |
| Zdhhc8    | 0.40  | .002248331            | 6.109384 | Zinc finger, DHHC domain containing 8 (Zdhhc8)                                 |
| Egfem1    | 0.40  | .014384793            | 4.018775 | EGF-like and EMI domain containing 1 (Egfem1)                                  |
| Syp       | 0.40  | .000381879            | 9.840388 | Synaptophysin (Syp)  |
| Myrip     | 0.40  | .000455215            | 6.467419 | Myosin VIIA and Rab interacting protein (Myrip)                                |
| Pcdhb22   | 0.40  | .01159523             | 4.261345 | Protocadherin beta 22 (Pcdhb22)  |
| Klhl26    | 0.40  | .025929274            | 4.273419 | Kelch-like 26 (Klhl26)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Ctnna2    | 0.40  | .000411788            | 6.621573 | Catenin (cadherin-associated protein), alpha 2 (Ctnna2)                           |
| Ube2q2    | 0.40  | .002387793            | 6.473931 | Ubiquitin-conjugating enzyme E2Q family member 2 (Ube2q2)                         |
| Arl5b     | 0.39  | .041338926            | 5.501197 | ADP-ribosylation factor-like 5B (Arl5b)   |
| Abca3     | 0.39  | .003260808            | 6.006602 | ATP-binding cassette, sub-family A (ABC1), member 3 (Abca3)                       |
| Kdm6a     | 0.39  | .003623173            | 5.852303 | Lysine (K)-specific demethylase 6A (Kdm6a)  |
| Ccdc25    | 0.39  | .033584168            | 5.451267 | Coiled-coil domain containing 25 (Ccdc25)   |
| L2hgdh    | 0.39  | .010270502            | 6.220135 | L-2-hydroxyglutarate dehydrogenase (L2hgdh)                                       |
| Ociad1    | 0.39  | .000205316            | 8.188277 | OCIA domain containing 1 (Ociad1)   |
| Gpr161    | 0.39  | .030363759            | 4.351626 | G protein-coupled receptor 161 (Gpr161)   |
| Samd8     | 0.39  | .001485232            | 6.430399 | Sterile alpha motif domain containing 8 (Samd8)                                   |
| Sez6l     | 0.39  | .000969632            | 7.90195  | Seizure-related 6 homolog like (Sez6l)  |
| Rac1      | 0.39  | $5.88 \times 10^{-5}$ | 9.511204 | RAS-related C3 botulinum substrate 1 (Rac1)                                       |
| Spryd7    | 0.39  | .002555745            | 6.47831  | SPRY domain containing 7 (Spryd7)   |
| Frs2      | 0.39  | .001650842            | 7.108316 | Fibroblast growth factor receptor substrate 2 (Frs2)                              |
| Tmem167   | 0.39  | .005639071            | 6.600933 | Transmembrane protein 167 (Tmem167)   |
| Pogz      | 0.39  | .000558255            | 7.295534 | Pogo transposable element with ZNF domain (Pogz)                                  |
| Rab3a     | 0.39  | .000617378            | 8.68367  | RAB3A, member RAS oncogene family (Rab3a)   |
| Tmem87b   | 0.39  | .000513786            | 6.33683  | Transmembrane protein 87B (Tmem87b)   |
| Pias1     | 0.39  | .000598025            | 6.669742 | Protein inhibitor of activated STAT 1 (Pias1)                                     |
| Gstm7     | 0.39  | .00820685             | 6.579326 | Glutathione S-transferase, mu 7 (Gstm7)   |
| Prune1    | 0.39  | .016286848            | 4.91235  | Prune exopolyphosphatase (Prune1)   |
| Trmt6     | 0.39  | .013314284            | 4.681655 | tRNA methyltransferase 6 (Trmt6)  |
| Arl4c     | 0.39  | .000399735            | 7.287712 | ADP-ribosylation factor-like 4C (Arl4c)   |
| Rab5a     | 0.39  | .002062208            | 6.359248 | RAB5A, member RAS oncogene family (Rab5a)   |
| Pgrmc1    | 0.39  | .000522071            | 7.896982 | Progesterone receptor membrane component 1 (Pgrmc1)                               |
| Deptor    | 0.39  | .006565451            | 6.809982 | DEP domain containing MTOR-interacting protein (Deptor)                           |
| Ranbp6    | 0.39  | .001352556            | 6.756168 | RAN binding protein 6 (Ranbp6)  |
| Tmem206   | 0.39  | .005728789            | 4.420408 | Transmembrane protein 206 (Tmem206)   |
| Usp27x    | 0.39  | .013039787            | 5.188612 | Ubiquitin-specific peptidase 27, X chromosome (Usp27x)                            |
| Gm1043    | 0.39  | .026998457            | 4.064295 | Predicted gene 1043 (Gm1043)  |
| Erc1      | 0.39  | .005570031            | 6.867958 | ELKS/RAB6-interacting/CAST family member 1 (Erc1)                                 |
| Pde8b     | 0.39  | .00924387             | 4.681265 | Phosphodiesterase 8B (Pde8b)  |
| Kif1a     | 0.39  | $1.46 \times 10^{-5}$ | 10.94517 | Kinesin family member 1A (Kif1a)  |
| Cul9      | 0.39  | .013630894            | 5.197991 | Cullin 9 (Cul9)   |
| Adss      | 0.39  | .000676472            | 6.782127 | Adenylosuccinate synthetase, non muscle (Adss)                                    |
| Stard4    | 0.39  | .001278463            | 6.245919 | StAR-related lipid transfer (START) domain containing 4 (Stard4)                  |
| Kctd20    | 0.39  | .002627598            | 5.571934 | potassium channel tetramerisation domain containing 20 (Kctd20)                   |
| Atp8a1    | 0.39  | .000271237            | 7.442854 | ATPase, aminophospholipid transporter (APLT), class I, type 8A, member 1 (Atp8a1) |
| Lrrtm1    | 0.39  | .001418482            | 7.231168 | Leucine-rich repeat transmembrane neuronal 1 (Lrrtm1)                             |
| Bach2     | 0.39  | .033903378            | 4.7012   | BTB and CNC homology, basic leucine zipper transcription factor 2 (Bach2)         |
| Cers1     | 0.39  | .023529659            | 4.859025 | Ceramide synthase 1 (Cers1)   |
| Mier3     | 0.39  | .005004174            | 5.057826 | MIER family member 3 (Mier3)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Klhdc10   | 0.39  | .000960391            | 7.471712 | Kelch domain containing 10 (Klhdc10)  |
| Napb      | 0.39  | $2.43 \times 10^{-5}$ | 9.946545 | N-ethylmaleimide sensitive fusion protein attachment protein beta (Napb)        |
| Ash1l     | 0.39  | .000815174            | 8.584471 | Ash1 (absent, small, or homeotic)-like (Ash1l)                                  |
| Tigar     | 0.39  | .040550101            | 4.333218 | Trp53-induced glycolysis regulatory phosphatase (Tigar)                         |
| Ahr       | 0.39  | .041824553            | 3.57323  | Aryl-hydrocarbon receptor (Ahr)   |
| Sec31a    | 0.39  | .000447698            | 7.026089 | Sec31 homolog A ( <i>S. cerevisiae</i> ) (Sec31a)                               |
| Ube2q1    | 0.39  | .000589745            | 6.80179  | Ubiquitin-conjugating enzyme E2Q family member 1 (Ube2q1)                       |
| Snap47    | 0.39  | .000214927            | 8.118025 | Synaptosomal-associated protein, 47 (Snap47)                                    |
| Itpr1     | 0.39  | .000581338            | 8.756343 | Inositol 1,4,5-trisphosphate receptor 1 (Itpr1)                                 |
| Kcnj6     | 0.39  | .00924387             | 4.959728 | Potassium inwardly-rectifying channel, subfamily J, member 6 (Kcnj6)            |
| Daam1     | 0.39  | .000781236            | 6.576575 | Dishevelled-associated activator of morphogenesis 1 (Daam1)                     |
| Pcmt1     | 0.39  | .001120233            | 7.793165 | Protein-L-isoaspartate (D-aspartate) O-methyltransferase 1 (Pcmt1)              |
| Zmym3     | 0.39  | .000406553            | 6.59546  | Zinc finger, MYM-type 3 (Zmym3)   |
| Rasgrf1   | 0.39  | .000120925            | 9.154793 | RAS protein-specific guanine nucleotide-releasing factor 1 (Rasgrf1)            |
| Scyl2     | 0.39  | .002970504            | 5.780771 | SCY1-like 2 ( <i>S. cerevisiae</i> ) (Scyl2)                                    |
| Hrh1      | 0.39  | .017296158            | 4.299951 | Histamine receptor H1 (Hrh1)  |
| Ln timer  | 0.39  | .041288677            | 3.583226 | Ligand of numb-protein X 1 (Ln timer)   |
| Rfx3      | 0.39  | .004066876            | 6.646315 | Regulatory factor X, 3 (influences HLA class II expression) (Rfx3)              |
| Dnajc21   | 0.39  | .006972324            | 4.964601 | DnaJ heat shock protein family (Hsp40) member C21 (Dnajc21)                     |
| Gripap1   | 0.39  | .008322044            | 5.18345  | GRIP1-associated protein 1 (Gripap1)  |
| Zfand2a   | 0.39  | .002246428            | 7.22935  | Zinc finger, AN1-type domain 2A (Zfand2a)                                       |
| Plk2      | 0.39  | .002029562            | 5.633857 | Polo-like kinase 2 (Plk2)   |
| Marchf6   | 0.39  | .006722751            | 9.227888 | Membrane-associated ring-CH-type finger 6 (Marchf6)                             |
| Akap11    | 0.39  | .000511567            | 9.066586 | A kinase (PRKA) anchor protein 11 (Akap11)                                      |
| Pex26     | 0.39  | .045196493            | 4.573043 | Peroxisomal biogenesis factor 26 (Pex26)  |
| Iqsec2    | 0.39  | .001319795            | 5.521739 | IQ motif and Sec7 domain 2 (Iqsec2)   |
| Dmwd      | 0.39  | .003452337            | 6.659372 | Dystrophia myotonica-containing WD repeat motif (Dmwd)                          |
| Ccar2     | 0.39  | .00588487             | 5.306415 | Cell cycle activator and apoptosis regulator 2 (Ccar2)                          |
| Plxdc2    | 0.39  | .001018189            | 7.064167 | Plexin domain containing 2 (Plxdc2)   |
| Plppr5    | 0.38  | .037482567            | 4.558783 | Phospholipid phosphatase related 5 (Plppr5)                                     |
| Srgap1    | 0.38  | .001343411            | 7.439655 | SLIT-ROBO Rho GTPase activating protein 1 (Srgap1)                              |
| Zfp868    | 0.38  | .024817473            | 4.811467 | Zinc finger protein 868 (Zfp868)  |
| Wdr77     | 0.38  | .013442886            | 5.356346 | WD repeat domain 77 (Wdr77)   |
| Fam49a    | 0.38  | .000918182            | 7.801208 | Family with sequence similarity 49, member A (Fam49a)                           |
| Rad17     | 0.38  | .034179821            | 3.500613 | RAD17 checkpoint clamp loader component (Rad17)                                 |
| Dusp3     | 0.38  | .000778073            | 6.928349 | Dual-specificity phosphatase 3 (vaccinia virus phosphatase VH1-related) (Dusp3) |
| Pdgfra    | 0.38  | .001508783            | 5.888216 | Platelet-derived growth factor, alpha (Pdgfra)                                  |
| Exoc4     | 0.38  | .001431219            | 6.120506 | Exocyst complex component 4 (Exoc4)   |
| Ssr1      | 0.38  | .000140202            | 8.046873 | Signal sequence receptor, alpha (Ssr1)  |
| Ntrk3     | 0.38  | .000550893            | 7.933633 | Neurotrophic tyrosine kinase, receptor, type 3 (Ntrk3)                          |
| Ap1g1     | 0.38  | .000356252            | 7.161984 | Adaptor protein complex AP-1, gamma 1 subunit (Ap1g1)                           |
| Zfp827    | 0.38  | .000460576            | 7.181611 | Zinc finger protein 827 (Zfp827)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Suv39h1   | 0.38  | .026738436            | 4.941476 | Suppressor of variegation 3-9 homolog 1 (Suv39h1)  |
| Ap2a2     | 0.38  | .000909697            | 8.616947 | Adaptor-related protein complex 2, alpha 2 subunit (Ap2a2)   |
| Nr3c1     | 0.38  | .000965144            | 7.316474 | Nuclear receptor subfamily 3, group C, member 1 (Nr3c1)  |
| Wasl      | 0.38  | .000551795            | 7.691481 | Wiskott–Aldrich syndrome-like (human) (Wasl)   |
| Pnmal1    | 0.38  | .001109304            | 7.918768 | PNMA-like 1 (Pnmal1)   |
| Zfp426    | 0.38  | .008614762            | 6.01399  | Zinc finger protein 426 (Zfp426)   |
| Akap6     | 0.38  | $8.49 \times 10^{-5}$ | 8.679331 | A kinase (PRKA) anchor protein 6 (Akap6)   |
| Gclc      | 0.38  | .002332824            | 6.248144 | Glutamate-cysteine ligase, catalytic subunit (Gclc)  |
| Wdr17     | 0.38  | .0098259              | 5.00254  | WD repeat domain 17 (Wdr17)  |
| Zer1      | 0.38  | .004130319            | 6.659646 | Zyg-11 related, cell cycle regulator (Zer1)  |
| Oxct1     | 0.38  | .000526278            | 8.446575 | 3-Oxoacid CoA transferase 1 (Oxct1)  |
| Nek6      | 0.38  | .003478068            | 5.609307 | NIMA (never in mitosis gene a)-related expressed kinase 6 (Nek6)                                       |
| Rnf14     | 0.38  | $5.13 \times 10^{-5}$ | 8.896845 | Ring finger protein 14 (Rnf14)   |
| Hivep2    | 0.38  | .000113642            | 7.792137 | Human immunodeficiency virus type I enhancer binding protein 2 (Hivep2)                                |
| Zfp420    | 0.38  | .019654656            | 4.499588 | Zinc finger protein 420 (Zfp420)   |
| Tbc1d22b  | 0.38  | .003393207            | 5.706938 | TBC1 domain family, member 22B (Tbc1d22b)  |
| Cask      | 0.38  | .000231785            | 7.799764 | Calcium/calmodulin-dependent serine protein kinase (MAGUK family) (Cask)                               |
| Nacc1     | 0.38  | .001657218            | 7.005599 | Nucleus accumbens-associated 1, BEN and BTB (POZ) domain containing (Nacc1)                            |
| Cdh4      | 0.38  | .044048868            | 5.35753  | Cadherin 4 (Cdh4)  |
| Agpat1    | 0.38  | .001405493            | 7.094615 | 1-Acylglycerol-3-phosphate O-acyltransferase 1 (lysophosphatidic acid acyltransferase, alpha) (Agpat1) |
| Zfp865    | 0.38  | .014715837            | 5.290492 | zinc finger protein 865 (Zfp865)   |
| Tti2      | 0.38  | .008852765            | 4.790209 | TELO2 interacting protein 2 (Tti2)   |
| Klhl24    | 0.38  | .002238044            | 7.552421 | Kyelch-like 24 (Klhl24)  |
| Mrpl46    | 0.38  | .011970613            | 4.525147 | Mitochondrial ribosomal protein L46 (Mrpl46)   |
| Spata5    | 0.38  | .011247545            | 4.496077 | Spermatogenesis associated 5 (Spata5)  |
| Socs7     | 0.38  | .001267838            | 6.229826 | Suppressor of cytokine signaling 7 (Socs7)   |
| Afg3l2    | 0.38  | .001354681            | 6.658424 | AFG3-like AAA ATPase 2 (Afg3l2)  |
| Sfxn1     | 0.38  | .00062286             | 7.07671  | Sideroflexin 1 (Sfxn1)   |
| Gspt2     | 0.38  | .01139073             | 4.885882 | G1 to S phase transition 2 (Gspt2)   |
| Dusp8     | 0.38  | .000490167            | 6.780799 | Dual-specificity phosphatase 8 (Dusp8)   |
| Kif2a     | 0.38  | .000386344            | 7.482954 | Kinesin family member 2A (Kif2a)   |
| Rab3gap1  | 0.38  | .002165084            | 5.807806 | RAB3 GTPase activating protein subunit 1 (Rab3gap1)  |
| Kif26b    | 0.38  | .004282258            | 5.826603 | Kinesin family member 26B (Kif26b)   |
| Fpgt      | 0.38  | .008073829            | 5.066639 | Fucose-1-phosphate guanylyltransferase (Fpgt)  |
| Fbxl2     | 0.38  | .001893443            | 5.605073 | F-box and leucine-rich repeat protein 2 (Fbxl2)  |
| Galnt16   | 0.38  | .00142622             | 6.880426 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 16 (Galnt16)          |
| Cdr2      | 0.38  | .031032057            | 4.638756 | Cerebellar degeneration-related 2 (Cdr2)   |
| Carmil3   | 0.38  | .015385824            | 4.540358 | Capping protein regulator and myosin 1 linker 3 (Carmil3)  |
| Cib2      | 0.38  | .042871766            | 5.011568 | Calcium and integrin binding family member 2 (Cib2)  |
| Ppp2r5b   | 0.38  | .001669081            | 5.849584 | Protein phosphatase 2, regulatory subunit B', beta (Ppp2r5b)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Vps26b    | 0.38  | .000466302            | 7.15158  | VPS26 retromer complex component B (Vps26b)   |
| Dctd      | 0.38  | .02220035             | 4.356909 | dCMP deaminase (Dctd)   |
| Smyd5     | 0.38  | .041878616            | 4.120509 | SET and MYND domain containing 5 (Smyd5)  |
| Gyg       | 0.38  | .004078923            | 5.467725 | Glycogenin (Gyg)  |
| Mapk10    | 0.38  | $4.12 \times 10^{-5}$ | 9.614797 | Mitogen-activated protein kinase 10 (Mapk10)  |
| Hk1       | 0.38  | .000610531            | 7.307773 | Hexokinase 1 (Hk1)  |
| Got2      | 0.38  | .000354889            | 7.489109 | Glutamic-oxaloacetic transaminase 2, mitochondrial (Got2)                           |
| Arhgap24  | 0.38  | .004226451            | 6.295242 | Rho GTPase activating protein 24 (Arhgap24)   |
| Rbbp5     | 0.38  | .007852118            | 6.166738 | Retinoblastoma binding protein 5 (Rbbp5)  |
| Lhx9      | 0.38  | .00028176             | 7.483671 | LIM homeobox protein 9 (Lhx9)   |
| Dmtn      | 0.38  | .002856573            | 7.274989 | Dematin actin binding protein (Dmtn)  |
| Clock     | 0.38  | .001963162            | 7.820407 | Circadian locomotor output cycles kaput (Clock)                                     |
| Zfp109    | 0.38  | .030357657            | 3.611124 | Zinc finger protein 109 (Zfp109)  |
| Tmem170b  | 0.38  | .002222102            | 8.175563 | Transmembrane protein 170B (Tmem170b)   |
| Rangap1   | 0.38  | .002197729            | 7.567514 | RAN GTPase activating protein 1 (Rangap1)   |
| Tm9sf4    | 0.38  | .002605991            | 6.197603 | Transmembrane 9 superfamily protein member 4 (Tm9sf4)                               |
| Clgn      | 0.38  | .017619173            | 4.643581 | Calmegin (Clgn)   |
| Prmt6     | 0.38  | .011239814            | 4.57337  | Protein arginine N-methyltransferase 6 (Prmt6)                                      |
| Ctps2     | 0.38  | .009659835            | 6.147911 | Cytidine 5'-triphosphate synthase 2 (Ctps2)   |
| Naa60     | 0.38  | .002785319            | 5.275267 | N(alpha)-acetyltransferase 60, NatF catalytic subunit (Naa60)                       |
| Champ1    | 0.38  | .003714132            | 5.522917 | Chromosome alignment maintaining phosphoprotein 1 (Champ1)                          |
| Kcnk3     | 0.38  | .01641655             | 5.688003 | Potassium channel, subfamily K, member 3 (Kcnk3)                                    |
| Purg      | 0.37  | .017095265            | 5.384766 | Purine-rich element binding protein G (Purg)  |
| Clpb      | 0.37  | .006435035            | 5.644833 | ClpB caseinolytic peptidase B (Clpb)  |
| Hlf       | 0.37  | .000844806            | 8.947513 | Hepatic leukemia factor (Hlf)   |
| Smim13    | 0.37  | .000295715            | 8.416634 | Small integral membrane protein 13 (Smim13)   |
| Pgam1     | 0.37  | .015322053            | 4.47991  | Phosphoglycerate mutase 1 (Pgam1)   |
| Fam20a    | 0.37  | .007275208            | 4.83608  | Family with sequence similarity 20, member A (Fam20a)                               |
| Rbbp7     | 0.37  | .000619461            | 6.459454 | Retinoblastoma binding protein 7 (Rbbp7)  |
| Cops2     | 0.37  | .000177307            | 7.480547 | COP9 signalosome subunit 2 (Cops2)  |
| Ndr3      | 0.37  | .000150313            | 8.932865 | N-myc downstream-regulated gene 3 (Ndr3)  |
| Ccny      | 0.37  | .001709309            | 6.825673 | Cyclin Y (Ccny)   |
| Usp31     | 0.37  | .000519326            | 8.100655 | Ubiquitin-specific peptidase 31 (Usp31)   |
| Gm5113    | 0.37  | .015710461            | 5.261749 | Predicted gene 5113 (Gm5113)  |
| Sncb      | 0.37  | .011230492            | 6.455265 | Synuclein, beta (Sncb)  |
| Celf5     | 0.37  | .000784094            | 7.329359 | CUGBP, Elav-like family member 5 (Celf5)  |
| Kihl9     | 0.37  | .002972648            | 7.226019 | Kelch-like 9 (Kihl9)  |
| Stum      | 0.37  | .000186276            | 9.800934 | Mechanosensory transduction mediator (Stum)   |
| Slc4a10   | 0.37  | .000637681            | 7.913263 | Solute carrier family 4, sodium bicarbonate cotransporter-like, member 10 (Slc4a10) |
| Nefl      | 0.37  | .000108876            | 8.424022 | Neurofilament, light polypeptide (Nefl)   |
| Atp1a3    | 0.37  | .000129197            | 11.54334 | ATPase, Na <sup>+</sup> /K <sup>+</sup> transporting, alpha 3 polypeptide (Atp1a3)  |
| Ppp1r7    | 0.37  | .000212799            | 7.593926 | Protein phosphatase 1, regulatory (inhibitor) subunit 7 (Ppp1r7)                    |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Dis3l2        | 0.37  | .038658881               | 4.286777 | DIS3 like 3'-5' exoribonuclease 2 (Dis3l2)  |
| Faim2         | 0.37  | .000526975               | 9.308829 | Fas apoptotic inhibitory molecule 2 (Faim2)   |
| 2700062C07Rik | 0.37  | .018226696               | 4.197054 | RIKEN cDNA 2700062C07 gene (2700062C07Rik)  |
| Uqcrc1        | 0.37  | .026044985               | 6.872075 | Ubiquinol-cytochrome c reductase core protein 1 (Uqcrc1)  |
| Rptor         | 0.37  | .005245347               | 6.093816 | Regulatory-associated protein of MTOR, complex 1 (Rptor)  |
| Mgat5         | 0.37  | .000198745               | 7.631562 | Mannoside acetylglucosaminyltransferase 5 (Mgat5)   |
| Ddx3y         | 0.37  | .005570031               | 6.266427 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 3, Y-linked (Ddx3y)  |
| Steap2        | 0.37  | .002939966               | 5.887588 | Six transmembrane epithelial antigen of prostate 2 (Steap2)                                       |
| Sorcs1        | 0.37  | .013039048               | 4.67083  | Sortilin-related VPS10 domain containing receptor 1 (Sorcs1)                                      |
| Clstn2        | 0.37  | .003492165               | 6.971484 | Calsyntenin 2 (Clstn2)  |
| Chst12        | 0.37  | .042970443               | 3.689379 | Carbohydrate sulfotransferase 12 (Chst12)   |
| Gpr85         | 0.37  | .00467955                | 5.307286 | G protein-coupled receptor 85 (Gpr85)   |
| Brsk2         | 0.37  | .00245959                | 6.419603 | BR serine/threonine kinase 2 (Brsk2)  |
| Abhd8         | 0.37  | .000467941               | 7.402932 | Abhydrolase domain containing 8 (Abhd8)   |
| Osbpl2        | 0.37  | .000666754               | 6.593087 | Oxysterol binding protein-like 2 (Osbpl2)   |
| Parp11        | 0.37  | .039739777               | 4.58598  | Poly(ADP-ribose) polymerase family, member 11 (Parp11)  |
| Ahdc1         | 0.37  | .011583164               | 5.721648 | AT hook, DNA binding motif, containing 1 (Ahdc1)  |
| Eif5a2        | 0.37  | .001051251               | 6.930435 | Eukaryotic translation initiation factor 5A2 (Eif5a2)   |
| Vdac1         | 0.37  | .000183049               | 8.321191 | Voltage-dependent anion channel 1 (Vdac1)   |
| Ywhah         | 0.37  | .008124275               | 9.471084 | Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, eta polypeptide (Ywhah)   |
| Fam8a1        | 0.37  | .000330962               | 8.143484 | Family with sequence similarity 8, member A1 (Fam8a1)   |
| Rnf24         | 0.37  | .002093535               | 6.28988  | Ring finger protein 24 (Rnf24)  |
| Ica1l         | 0.37  | .002067599               | 6.191748 | Islet cell autoantigen 1-like (Ica1l)   |
| Smim10l1      | 0.37  | .008963428               | 7.368187 | Small integral membrane protein 10 like 1 (Smim10l1)  |
| Ywhag         | 0.37  | .000165368               | 10.64164 | Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, gamma polypeptide (Ywhag) |
| Ids           | 0.37  | .000197296               | 10.11878 | Iduronate 2-sulfatase (Ids)   |
| Ddhd2         | 0.37  | .002750408               | 6.097995 | DDHD domain containing 2 (Ddhd2)  |
| Ppp2r2a       | 0.37  | .000322361               | 7.217106 | Protein phosphatase 2, regulatory subunit B, alpha (Ppp2r2a)                                      |
| Mmab          | 0.37  | .005781317               | 5.425931 | Methylmalonic aciduria (cobalamin deficiency) cblB type homolog (human) (Mmab)                    |
| Mga           | 0.37  | .005957175               | 7.557385 | MAX gene associated (Mga)   |
| Epm2aip1      | 0.37  | .000309174               | 8.509031 | EPM2A (laforin) interacting protein 1 (Epm2aip1)  |
| Wdtdc1        | 0.37  | .005453244               | 6.403556 | WD and tetratricopeptide repeats 1 (Wdtdc1)   |
| Pik3r4        | 0.37  | .006779461               | 5.083617 | Phosphatidylinositol 3 kinase, regulatory subunit, polypeptide 4, p150 (Pik3r4)                   |
| Rraga         | 0.37  | .004618014               | 6.479664 | Ras-related GTP binding A (Rraga)   |
| Cry2          | 0.37  | .000495163               | 7.474626 | Cryptochrome 2 (photolyase-like) (Cry2)   |
| Crkl          | 0.37  | .000739731               | 6.409162 | V-crk avian sarcoma virus CT10 oncogene homolog-like (Crkl)                                       |
| Rbbp4         | 0.37  | .002858818               | 5.332119 | Retinoblastoma binding protein 4 (Rbbp4)  |
| H2-T24        | 0.37  | .03030658                | 4.232162 | Histocompatibility 2, T region locus 24 (H2-T24)  |
| Rae1          | 0.37  | .028603764               | 4.660956 | Ribonucleic acid export 1 (Rae1)  |
| Dr1           | 0.37  | .00455895                | 5.340356 | Downregulator of transcription 1 (Dr1)  |



TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Eid1      | 0.37  | .000606027            | 7.906883 | EP300 interacting inhibitor of differentiation 1 (Eid1)   |
| Glce      | 0.37  | .004670094            | 7.095472 | Glucuronyl C5-epimerase (Glce)  |
| Dcx       | 0.37  | .025600204            | 5.942022 | Doublecortin (Dcx)  |
| Pum2      | 0.37  | .002551954            | 8.358474 | Pumilio RNA-binding family member 2 (Pum2)  |
| Exosc9    | 0.37  | .018073043            | 4.136168 | Exosome component 9 (Exosc9)  |
| Klhl23    | 0.37  | .011993127            | 5.15791  | Kelch-like 23 (Klhl23)  |
| Chpf      | 0.37  | .008550744            | 5.334079 | Chondroitin polymerizing factor (Chpf)  |
| Elavl4    | 0.37  | .001681934            | 7.315395 | ELAV (embryonic lethal, abnormal vision, Drosophila)-like 4 (Hu antigen D) (Elavl4)                                       |
| Ak4       | 0.37  | .004799863            | 5.128456 | Adenylate kinase 4 (Ak4)  |
| Tmem245   | 0.37  | .001133361            | 7.548487 | Transmembrane protein 245 (Tmem245)   |
| Sema4g    | 0.37  | .002817336            | 5.974901 | Sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytoplasmic domain, (semaphorin) 4G (Sema4g) |
| Sprn      | 0.37  | .000699007            | 6.782088 | Shadow of prion protein (Sprn)  |
| Ip6k1     | 0.37  | .002202281            | 6.88511  | Inositol hexaphosphate kinase 1 (Ip6k1)   |
| Tmem127   | 0.37  | .000607923            | 7.665402 | Transmembrane protein 127 (Tmem127)   |
| Nlgn3     | 0.37  | .001563872            | 7.317001 | Neuroigin 3 (Nlgn3)   |
| Tacc2     | 0.37  | .014831292            | 6.090831 | Transforming, acidic coiled-coil containing protein 2 (Tacc2)   |
| Ogfr1     | 0.37  | .000303058            | 8.901961 | Opioid growth factor receptor-like 1 (Ogfr1)  |
| Usp37     | 0.37  | .01135863             | 5.641885 | Ubiquitin-specific peptidase 37 (Usp37)   |
| Elmo1     | 0.37  | .000629586            | 8.313981 | Engulfment and cell motility 1 (Elmo1)  |
| Kcnd2     | 0.37  | .001016395            | 8.067926 | Potassium voltage-gated channel, Shal-related family, member 2 (Kcnd2)  |
| Men1      | 0.37  | .006743078            | 5.461226 | Multiple endocrine neoplasia 1 (Men1)   |
| Dync1li1  | 0.37  | .011800881            | 6.866456 | Dynein cytoplasmic 1 light intermediate chain 1 (Dync1li1)  |
| Stx1b     | 0.36  | .000209778            | 8.846847 | Syntaxin 1B (Stx1b)   |
| Usp12     | 0.36  | .004189515            | 5.433712 | Ubiquitin-specific peptidase 12 (Usp12)   |
| Rab6      | 0.36  | .002516156            | 6.791307 | RAB, member RAS oncogene family-like 6 (Rab6)   |
| Mllt11    | 0.36  | .000637693            | 8.503762 | Myeloid/lymphoid or mixed-lineage leukemia; translocated to, 11 (Mllt11)  |
| Atg5      | 0.36  | .012345737            | 4.68906  | Autophagy related 5 (Atg5)  |
| Lrrc49    | 0.36  | .006761116            | 5.269223 | Leucine-rich repeat containing 49 (Lrrc49)  |
| Pcm1      | 0.36  | .000878934            | 8.166669 | Pericentriolar material 1 (Pcm1)  |
| Fbxo25    | 0.36  | .020892819            | 5.46722  | F-box protein 25 (Fbxo25)   |
| Cnot11    | 0.36  | .01402629             | 4.632022 | CCR4-NOT transcription complex, subunit 11 (Cnot11)   |
| Stau1     | 0.36  | .00169732             | 6.405388 | Staufen (RNA binding protein) homolog 1 (Stau1)   |
| Pdk3      | 0.36  | .009445138            | 4.820113 | Pyruvate dehydrogenase kinase, isoenzyme 3 (Pdk3)   |
| Sfxn3     | 0.36  | .003272337            | 7.142365 | Sideroflexin 3 (Sfxn3)  |
| Fam222b   | 0.36  | .002547353            | 7.046005 | Family with sequence similarity 222, member B (Fam222b)   |
| App       | 0.36  | $7.56 \times 10^{-5}$ | 10.24304 | Amyloid beta (A4) precursor protein (App)   |
| Megf9     | 0.36  | .000969837            | 8.415736 | Multiple EGF-like-domains 9 (Megf9)   |
| Fam69a    | 0.36  | .015534765            | 4.997594 | Family with sequence similarity 69, member A (Fam69a)   |
| Ate1      | 0.36  | .003536161            | 6.666896 | Arginyltransferase 1 (Ate1)   |
| Gga3      | 0.36  | .007685283            | 5.417507 | Golgi-associated, gamma adaptin ear containing, ARF binding protein 3 (Gga3)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Kcnd3     | 0.36  | .004115371       | 7.710207 | Potassium voltage-gated channel, Shal-related family, member 3 (Kcnd3)              |
| Dnajb14   | 0.36  | .001520373       | 8.084609 | DnaJ heat shock protein family (Hsp40) member B14 (Dnajb14)                         |
| Crbn      | 0.36  | .003478127       | 5.701735 | Cereblon (Crbn)   |
| Appbp2    | 0.36  | .001689861       | 7.608243 | Amyloid beta precursor protein (cytoplasmic tail) binding protein 2 (Appbp2)        |
| Vps36     | 0.36  | .02901795        | 4.81758  | Vacuolar protein sorting 36 (Vps36)   |
| Ubal1     | 0.36  | .008735797       | 5.582003 | UBA-like domain containing 1 (Ubal1)  |
| Iffo2     | 0.36  | .029431927       | 4.598901 | Intermediate filament family orphan 2 (Iffo2)                                       |
| Otud5     | 0.36  | .002405336       | 6.291592 | OTU domain containing 5 (Otud5)   |
| Neur11b   | 0.36  | .006704587       | 5.27958  | Neuralized E3 ubiquitin protein ligase 1B (Neur11b)                                 |
| Wdr18     | 0.36  | .005753898       | 5.167957 | WD repeat domain 18 (Wdr18)   |
| Lrrc61    | 0.36  | .006704746       | 5.612023 | Leucine-rich repeat containing 61 (Lrrc61)  |
| Chrm3     | 0.36  | .028420636       | 4.549551 | Cholinergic receptor, muscarinic 3, cardiac (Chrm3)                                 |
| Zic5      | 0.36  | .00348391        | 6.362145 | Zinc finger protein of the cerebellum 5 (Zic5)                                      |
| Rab14     | 0.36  | .000361613       | 8.314045 | RAB14, member RAS oncogene family (Rab14)   |
| Ppa1      | 0.36  | .035547244       | 5.940441 | Pyrophosphatase (inorganic) 1 (Ppa1)  |
| Pdpk1     | 0.36  | .004301064       | 8.241213 | 3-Phosphoinositide dependent protein kinase 1 (Pdpk1)                               |
| Deaf1     | 0.36  | .001209867       | 6.969719 | Deformed epidermal autoregulatory factor 1 (Deaf1)                                  |
| Glr3b     | 0.36  | .00294086        | 7.400061 | Glycine receptor, beta subunit (Glr3b)  |
| Klf6      | 0.36  | .00064147        | 7.025194 | Kruppel-like factor 6 (Klf6)  |
| Ssca1     | 0.36  | .029796566       | 4.26011  | Sjogren's syndrome/scleroderma autoantigen 1 homolog (human) (Ssca1)                |
| Lrp11     | 0.36  | .000530053       | 6.986426 | Low-density lipoprotein receptor-related protein 11 (Lrp11)                         |
| Ptprs     | 0.36  | .000325877       | 8.438693 | Protein tyrosine phosphatase, receptor type, S (Ptprs)                              |
| Rab40b    | 0.36  | .046849681       | 3.788966 | Rab40B, member RAS oncogene family (Rab40b)   |
| Fig4      | 0.36  | .009168298       | 4.493732 | FIG4 phosphoinositide 5-phosphatase (Fig4)  |
| Mpp2      | 0.36  | .003387279       | 6.627087 | Membrane protein, palmitoylated 2 (MAGUK p55 subfamily member 2) (Mpp2)             |
| Dcn1      | 0.36  | .004030992       | 5.655104 | DCN1, defective in cullin neddylation 1, domain containing 1 (S. cerevisiae) (Dcn1) |
| Hectd1    | 0.36  | .001603387       | 7.408835 | HECT domain containing 1 (Hectd1)   |
| Dnajc16   | 0.36  | .002681468       | 5.506702 | DnaJ heat shock protein family (Hsp40) member C16 (Dnajc16)                         |
| Caprin1   | 0.36  | .000383762       | 8.711232 | Cell cycle-associated protein 1 (Caprin1)   |
| Lsm11     | 0.36  | .007768519       | 5.490697 | U7 snRNP-specific Sm-like protein LSM11 (Lsm11)                                     |
| Abi2      | 0.36  | .001154546       | 8.384549 | abl-interactor 2 (Abi2)   |
| Slc25a12  | 0.36  | .000233834       | 7.943166 | Solute carrier family 25 (mitochondrial carrier, Aralar), member 12 (Slc25a12)      |
| Dennd5b   | 0.36  | .001489016       | 6.665903 | DENN/MADD domain containing 5B (Dennd5b)  |
| Kbtbd2    | 0.36  | .001555751       | 6.334365 | Kelch repeat and BTB (POZ) domain containing 2 (Kbtbd2)                             |
| Gpr26     | 0.36  | .049187748       | 7.76117  | G protein-coupled receptor 26 (Gpr26)   |
| Gsk3b     | 0.36  | .000100955       | 9.72979  | Glycogen synthase kinase 3 beta (Gsk3b)   |
| Adra1b    | 0.36  | .036121091       | 5.146998 | Adrenergic receptor, alpha 1b (Adra1b)  |
| Opr1      | 0.36  | .016613076       | 5.607268 | Opioid receptor-like 1 (Opr1)   |
| Dcaf6     | 0.36  | .001209176       | 6.229638 | DDB1 and CUL4-associated factor 6 (Dcaf6)   |
| Sbno1     | 0.36  | .000634172       | 8.159213 | Strawberry notch homolog 1 (Sbno1)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Dkk3          | 0.36  | .013442886               | 5.382548 | Dickkopf WNT signaling pathway inhibitor 3 (Dkk3)   |
| Ppp3r1        | 0.36  | .000352905               | 8.261941 | Protein phosphatase 3, regulatory subunit B, alpha isoform (calcineurin B, type I) (Ppp3r1) |
| Gpr75         | 0.36  | .033163217               | 4.898318 | G protein-coupled receptor 75 (Gpr75)   |
| Fam53c        | 0.36  | .000627708               | 7.305789 | Family with sequence similarity 53, member C (Fam53c)                                       |
| Rtn4r         | 0.36  | .012506108               | 5.100161 | Reticulon 4 receptor (Rtn4r)  |
| 2810021J22Rik | 0.36  | .047201391               | 4.040623 | RIKEN cDNA 2810021J22 gene (2810021J22Rik)  |
| Efr3b         | 0.36  | .000464102               | 7.62011  | EFR3 homolog B (Efr3b)  |
| Polr3a        | 0.36  | .014991223               | 4.489951 | Polymerase (RNA) III (DNA directed) polypeptide A (Polr3a)                                  |
| Noa1          | 0.36  | .017237481               | 5.179052 | Nitric oxide associated 1 (Noa1)  |
| Dync1i1       | 0.36  | .014327052               | 5.348554 | Dynein cytoplasmic 1 intermediate chain 1 (Dync1i1)   |
| Acp2          | 0.36  | .001855749               | 7.02571  | Acid phosphatase 2, lysosomal (Acp2)  |
| Zfp281        | 0.36  | .004640413               | 5.699421 | Zinc finger protein 281 (Zfp281)  |
| Rasa1         | 0.35  | .002174483               | 6.21255  | RAS p21 protein activator 1 (Rasa1)   |
| Irs2          | 0.35  | .001560274               | 7.023199 | Insulin receptor substrate 2 (Irs2)   |
| Csde1         | 0.35  | .000138602               | 9.267221 | Cold shock domain containing E1, RNA binding (Csde1)  |
| BC037034      | 0.35  | .014464768               | 5.150164 | cDNA sequence BC037034 (BC037034)   |
| Mink1         | 0.35  | .004799863               | 5.554809 | Misshapen-like kinase 1 (zebrafish) (Mink1)   |
| Orc3          | 0.35  | .00064538                | 6.705536 | Origin recognition complex, subunit 3 (Orc3)  |
| Mrgpre        | 0.35  | .008130724               | 5.256879 | MAS-related GPR, member E (Mrgpre)  |
| Mmachc        | 0.35  | .020957117               | 5.100531 | Methylmalonic aciduria cblC type, with homocystinuria (Mmachc)                              |
| Igf2r         | 0.35  | .007072378               | 5.608049 | Insulin-like growth factor 2 receptor (Igf2r)   |
| AW554918      | 0.35  | .012739351               | 5.357931 | Expressed sequence AW554918 (AW554918)  |
| Vsnl1         | 0.35  | .003786951               | 10.69616 | Visinin-like 1 (Vsnl1)  |
| Slc12a5       | 0.35  | .000367124               | 8.967207 | Solute carrier family 12, member 5 (Slc12a5)  |
| Gm14295       | 0.35  | .022261006               | 4.4088   | Predicted gene 14295 (Gm14295)  |
| Scyl1         | 0.35  | .010993944               | 5.035249 | SCY1-like 1 ( <i>S. cerevisiae</i> ) (Scyl1)  |
| Kif5c         | 0.35  | $5.71 \times 10^{-5}$    | 9.497055 | Kinesin family member 5C (Kif5c)  |
| Cyp46a1       | 0.35  | .00624965                | 7.009203 | Cytochrome P450, family 46, subfamily a, polypeptide 1 (Cyp46a1)                            |
| Nedd4l        | 0.35  | .000390244               | 8.108562 | Neural precursor cell expressed, developmentally down-regulated gene 4-like (Nedd4l)        |
| Snx30         | 0.35  | .005884773               | 6.228242 | Sorting nexin family member 30 (Snx30)  |
| Uprt          | 0.35  | .033051412               | 5.006643 | Uracil phosphoribosyltransferase (Uprt)   |
| Eif1ax        | 0.35  | .000445992               | 8.322756 | Eukaryotic translation initiation factor 1A, X-linked (Eif1ax)                              |
| Grin2a        | 0.35  | .000535846               | 8.14468  | Glutamate receptor, ionotropic, NMDA2A (epsilon 1) (Grin2a)                                 |
| Napepld       | 0.35  | .015381659               | 6.692038 | N-acyl phosphatidylethanolamine phospholipase D (Napepld)                                   |
| Peak1         | 0.35  | .004526907               | 6.859878 | Pseudopodium-enriched atypical kinase 1 (Peak1)   |
| B630019K06Rik | 0.35  | .00830029                | 5.255739 | Novel protein similar to F-box and leucine-rich repeat protein 17 (Fbxl17) (B630019K06Rik)  |
| Cul7          | 0.35  | .027246122               | 4.327029 | Cullin 7 (Cul7)   |
| Armcx5        | 0.35  | .025997015               | 4.702874 | Armadillo repeat containing, X-linked 5 (Armcx5)  |
| Rims3         | 0.35  | .00125375                | 8.297773 | Regulating synaptic membrane exocytosis 3 (Rims3)   |
| Purb          | 0.35  | .002165084               | 9.947348 | Purine-rich element binding protein B (Purb)  |
| Gad2          | 0.35  | .026477297               | 7.019773 | Glutamic acid decarboxylase 2 (Gad2)  |
| Zfp866        | 0.35  | .017206437               | 4.774467 | Zinc finger protein 866 (Zfp866)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Tmem8         | 0.35  | .038871651               | 3.854879 | Transmembrane protein 8 (five membrane-spanning domains) (Tmem8)         |
| Mtrr          | 0.35  | .037465993               | 3.728381 | 5-Methyltetrahydrofolate-homocysteine methyltransferase reductase (Mtrr) |
| Mast2         | 0.35  | .001456677               | 7.084286 | Microtubule-associated serine/threonine kinase 2 (Mast2)                 |
| Ppip5k1       | 0.35  | .002067599               | 6.439583 | Diphosphoinositol pentakisphosphate kinase 1 (Ppip5k1)                   |
| Gm26782       | 0.35  | .022005703               | 4.916513 | Predicted gene, 26782 (Gm26782)  |
| Mgat3         | 0.35  | .000448907               | 7.131476 | Mannoside acetylglucosaminyltransferase 3 (Mgat3)                        |
| Mest          | 0.35  | .002516156               | 6.321029 | Mesoderm-specific transcript (Mest)                                      |
| Fam117b       | 0.35  | .002091306               | 6.894619 | Family with sequence similarity 117, member B (Fam117b)                  |
| Slmap         | 0.35  | .000350171               | 7.494475 | Sarcolemma-associated protein (Slmap)                                    |
| Srp72         | 0.35  | .001234869               | 7.367705 | Signal recognition particle 72 (Srp72)                                   |
| Dgki          | 0.35  | .004879997               | 5.554104 | Diacylglycerol kinase, iota (Dgki)                                       |
| Ranbp2        | 0.35  | .003706567               | 7.174896 | RAN binding protein 2 (Ranbp2)   |
| Nr1d1         | 0.35  | .00269514                | 7.264514 | Nuclear receptor subfamily 1, group D, member 1 (Nr1d1)                  |
| Bace1         | 0.35  | .001931456               | 6.638903 | Beta-site APP cleaving enzyme 1 (Bace1)                                  |
| Tef           | 0.35  | .001531814               | 6.964537 | Thyrotroph embryonic factor (Tef)  |
| Pcdh11x       | 0.35  | .037129423               | 5.622228 | Protocadherin 11 X-linked (Pcdh11x)                                      |
| Mpp5          | 0.35  | .004526907               | 7.03449  | Membrane protein, palmitoylated 5 (MAGUK p55 subfamily member 5) (Mpp5)  |
| Zfp790        | 0.35  | .019962109               | 4.442604 | Zinc finger protein 790 (Zfp790)   |
| Meaf6         | 0.35  | .001584324               | 7.044282 | MYST/Esa1-associated factor 6 (Meaf6)                                    |
| Uxs1          | 0.35  | .04098874                | 3.926531 | UDP-glucuronate decarboxylase 1 (Uxs1)                                   |
| Zfp451        | 0.35  | .010223951               | 7.301546 | Zinc finger protein 451 (Zfp451)   |
| Zfp780b       | 0.35  | .010759339               | 4.865991 | Zinc finger protein 780B (Zfp780b)                                       |
| Nup88         | 0.35  | .001495063               | 6.336652 | Nucleoporin 88 (Nup88)   |
| Osbp2         | 0.35  | .006245947               | 5.503138 | Oxysterol binding protein 2 (Osbp2)                                      |
| Sybu          | 0.35  | .002090998               | 6.064859 | Syntabulin (syntaxin-interacting) (Sybu)                                 |
| Chst11        | 0.35  | .003452337               | 6.710195 | Carbohydrate sulfotransferase 11 (Chst11)                                |
| Usp15         | 0.35  | .000743316               | 7.027629 | Ubiquitin-specific peptidase 15 (Usp15)                                  |
| Phf24         | 0.35  | .003557218               | 7.746974 | PHD finger protein 24 (Phf24)  |
| Ap1s2         | 0.35  | .011651497               | 5.580224 | Adaptor-related protein complex 1, sigma 2 subunit (Ap1s2)               |
| Zfp644        | 0.35  | .008016303               | 8.429209 | Zinc finger protein 644 (Zfp644)   |
| Eif4b         | 0.35  | .000404679               | 8.088581 | Eukaryotic translation initiation factor 4B (Eif4b)                      |
| 6030458C11Rik | 0.35  | .02307615                | 5.189214 | RIKEN cDNA 6030458C11 gene (6030458C11Rik)                               |
| Klhl42        | 0.35  | .03248473                | 5.526105 | Kelch-like 42 (Klhl42)   |
| Opa1          | 0.35  | .000247428               | 7.97903  | Optic atrophy 1 (Opa1)   |
| Samm50        | 0.35  | .003726249               | 6.378779 | SAMM50 sorting and assembly machinery component (Samm50)                 |
| Kcnt2         | 0.35  | .013875706               | 5.158658 | Potassium channel, subfamily T, member 2 (Kcnt2)                         |
| Fip1l1        | 0.35  | .004182573               | 6.405926 | FIP1 like 1 ( <i>S. cerevisiae</i> ) (Fip1l1)                            |
| LnPk          | 0.35  | .00367203                | 5.511197 | Lunapark, ER Junction Formation Factor (LnPk)                            |
| Med16         | 0.35  | .011660604               | 5.33717  | Mediator complex subunit 16 (Med16)                                      |
| Camk2a        | 0.35  | .00066288                | 9.476952 | Calcium/calmodulin-dependent protein kinase II alpha (Camk2a)            |
| Usp14         | 0.35  | .001235525               | 7.172434 | Ubiquitin-specific peptidase 14 (Usp14)                                  |
| Fbxo31        | 0.35  | .007276141               | 5.362865 | F-box protein 31 (Fbxo31)  |
| Ccdc71l       | 0.35  | .049471758               | 4.300721 | Coiled-coil domain containing 71 like (Ccdc71l)                          |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Rnf41     | 0.35  | .005056229       | 5.803367 | Ring finger protein 41 (Rnf41)  |
| Hnrnpul1  | 0.35  | .001545653       | 7.162949 | Heterogeneous nuclear ribonucleoprotein U-like 1 (Hnrnpul1)   |
| Prrc1     | 0.35  | .017996957       | 4.97921  | Proline-rich coiled-coil 1 (Prrc1)  |
| Gbbp1     | 0.35  | .000567921       | 7.093257 | GC-rich promoter binding protein 1 (Gbbp1)  |
| Dnajc10   | 0.35  | .004662883       | 6.829364 | DnaJ heat shock protein family (Hsp40) member C10 (Dnajc10)   |
| Ss18l1    | 0.35  | .000826034       | 6.998793 | Synovial sarcoma translocation gene on chromosome 18-like 1 (Ss18l1)                                      |
| Zfp60     | 0.35  | .012140696       | 6.131928 | Zinc finger protein 60 (Zfp60)  |
| Ttc9      | 0.35  | .003342827       | 6.508368 | Tetratricopeptide repeat domain 9 (Ttc9)  |
| Mbtps2    | 0.35  | .015921625       | 5.1381   | Membrane-bound transcription factor peptidase, site 2 (Mbtps2)  |
| Rgs20     | 0.35  | .026738436       | 5.053718 | Regulator of G-protein signaling 20 (Rgs20)   |
| Zfp629    | 0.35  | .015385824       | 4.769682 | Zinc finger protein 629 (Zfp629)  |
| Slc30a9   | 0.35  | .000345572       | 7.962516 | Solute carrier family 30 (zinc transporter), member 9 (Slc30a9)   |
| Phlpp2    | 0.35  | .005273465       | 5.998871 | PH domain and leucine-rich repeat protein phosphatase 2 (Phlpp2)  |
| Pigk      | 0.34  | .003739687       | 6.748365 | Phosphatidylinositol glycan anchor biosynthesis, class K (Pigk)   |
| Prkci     | 0.34  | .006364795       | 6.450559 | Protein kinase C, iota (Prkci)  |
| Smarcal1  | 0.34  | .002670409       | 6.052173 | SWI/SNF-related, matrix-associated, actin-dependent regulator of chromatin, subfamily a-like 1 (Smarcal1) |
| Ptprg     | 0.34  | .004228954       | 7.032648 | Protein tyrosine phosphatase, receptor type, G (Ptprg)  |
| Map2k1    | 0.34  | .000533592       | 7.49615  | Mitogen-activated protein kinase kinase 1 (Map2k1)  |
| Ddi2      | 0.34  | .02296658        | 5.655336 | DNA-damage inducible protein 2 (Ddi2)   |
| Dnaja3    | 0.34  | .004754794       | 5.775977 | DnaJ heat shock protein family (Hsp40) member A3 (Dnaja3)   |
| Fam120c   | 0.34  | .001400225       | 6.373015 | Family with sequence similarity 120, member C (Fam120c)   |
| Lrrc20    | 0.34  | .005683854       | 5.101476 | Leucine-rich repeat containing 20 (Lrrc20)  |
| Igfbp2    | 0.34  | .007778585       | 5.395362 | Immunoglobulin superfamily, member 21 (Igfbp2)  |
| Arvcf     | 0.34  | .013129488       | 4.826695 | Armadillo repeat gene deleted in velo-cardio-facial syndrome (Arvcf)                                      |
| Erlec1    | 0.34  | .007731433       | 5.539583 | Endoplasmic reticulum lectin 1 (Erlec1)   |
| Epha6     | 0.34  | .008720223       | 5.627232 | Eph receptor A6 (Epha6)   |
| Carf      | 0.34  | .023411535       | 5.042398 | Calcium response factor (Carf)  |
| Npas2     | 0.34  | .017708814       | 5.393393 | Neuronal PAS domain protein 2 (Npas2)   |
| Kdm4a     | 0.34  | .045685535       | 3.874372 | Lysine (K)-specific demethylase 4A (Kdm4a)  |
| Wwp1      | 0.34  | .007362769       | 7.188323 | WW domain containing E3 ubiquitin protein ligase 1 (Wwp1)   |
| Dpp10     | 0.34  | .000475613       | 8.008104 | Dipeptidylpeptidase 10 (Dpp10)  |
| Medag     | 0.34  | .047961055       | 4.563169 | Mesenteric estrogen dependent adipogenesis (Medag)  |
| Stat5b    | 0.34  | .015701214       | 4.762782 | Signal transducer and activator of transcription 5B (Stat5b)  |
| Dyrk1a    | 0.34  | .001646502       | 7.123454 | Dual-specificity tyrosine-(Y)-phosphorylation-regulated kinase 1a (Dyrk1a)                                |
| Arhgef3   | 0.34  | .020470938       | 5.142464 | Rho guanine nucleotide exchange factor (GEF) 3 (Arhgef3)  |
| Ap3d1     | 0.34  | .004866842       | 7.302974 | Adaptor-related protein complex 3, delta 1 subunit (Ap3d1)  |
| Jmjd4     | 0.34  | .012709877       | 5.085019 | Jumonji domain containing 4 (Jmjd4)   |
| Prr14l    | 0.34  | .003288547       | 7.568868 | Proline rich 14-like (Prr14l)   |
| Lrrn3     | 0.34  | .001717986       | 7.112464 | Leucine-rich repeat protein 3, neuronal (Lrrn3)   |
| Epc2      | 0.34  | .006250277       | 6.016396 | Enhancer of polycomb homolog 2 (Epc2)   |
| Hectd3    | 0.34  | .025050269       | 5.213093 | HECT domain containing 3 (Hectd3)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Lemd3     | 0.34  | .010790798       | 5.150001 | LEM domain containing 3 (Lemd3)  |
| F8a       | 0.34  | .048159565       | 3.890194 | Factor 8-associated gene A (F8a)   |
| Zfp667    | 0.34  | .028936172       | 4.993482 | Zinc finger protein 667 (Zfp667)   |
| Ncam1     | 0.34  | .000282765       | 8.827575 | Neural cell adhesion molecule 1 (Ncam1)  |
| C2cd2     | 0.34  | .02152809        | 4.716592 | C2 calcium-dependent domain containing 2 (C2cd2)                                     |
| Zfp84     | 0.34  | .03480973        | 4.893699 | Zinc finger protein 84 (Zfp84)   |
| Rai1      | 0.34  | .004202566       | 6.289163 | Retinoic acid induced 1 (Rai1)   |
| Bcl2l13   | 0.34  | .015332036       | 5.388948 | BCL2-like 13 (apoptosis facilitator) (Bcl2l13)                                       |
| Man2a1    | 0.34  | .020476299       | 5.009561 | Mannosidase 2, alpha 1 (Man2a1)  |
| Farsb     | 0.34  | .01056694        | 6.614422 | Phenylalanyl-tRNA synthetase, beta subunit (Farsb)                                   |
| Rasal2    | 0.34  | .004753754       | 7.636933 | RAS protein activator like 2 (Rasal2)  |
| Slx4      | 0.34  | .01565113        | 5.064388 | SLX4 structure-specific endonuclease subunit homolog ( <i>S. cerevisiae</i> ) (Slx4) |
| Prkcz     | 0.34  | .001586312       | 6.727901 | Protein kinase C, zeta (Prkcz)   |
| Haus2     | 0.34  | .034814818       | 5.653202 | HAUS augmin-like complex, subunit 2 (Haus2)  |
| Lrp12     | 0.34  | .014794905       | 5.024759 | Low-density lipoprotein-related protein 12 (Lrp12)                                   |
| Fam81a    | 0.34  | .018482899       | 6.73415  | Family with sequence similarity 81, member A (Fam81a)                                |
| Nrxn3     | 0.34  | .004473838       | 7.946289 | Neurexin III (Nrxn3)   |
| Rbfox2    | 0.34  | .005031819       | 7.904836 | RNA binding protein, fox-1 homolog ( <i>C. elegans</i> ) 2 (Rbfox2)                  |
| Stambpl1  | 0.34  | .044931661       | 4.372332 | STAM binding protein like 1 (Stambpl1)   |
| Fytd1     | 0.34  | .000726232       | 7.175533 | Forty-two-three domain containing 1 (Fytd1)  |
| Rab11fip2 | 0.34  | .002596521       | 6.519804 | RAB11 family interacting protein 2 (class I) (Rab11fip2)                             |
| Tpp2      | 0.34  | .002555745       | 6.299213 | Tripeptidyl peptidase II (Tpp2)  |
| Ap5m1     | 0.34  | .036991553       | 4.659891 | Adaptor-related protein complex 5, mu 1 subunit (Ap5m1)                              |
| Erlin2    | 0.34  | .011668467       | 6.576248 | ER lipid raft associated 2 (Erlin2)  |
| Frmf5     | 0.34  | .001487578       | 6.185836 | FERM domain containing 5 (Frmf5)   |
| Atxn1l    | 0.34  | .026490141       | 5.92882  | Ataxin 1-like (Atxn1l)   |
| Miga1     | 0.34  | .000987507       | 7.157113 | Mitoguardin 1 (Miga1)  |
| Asb8      | 0.34  | .001524515       | 6.515174 | Ankyrin repeat and SOCS box-containing 8 (Asb8)                                      |
| Inpp4b    | 0.34  | .004101439       | 6.219087 | Inositol polyphosphate-4-phosphatase, type II (Inpp4b)                               |
| Spty2d1   | 0.34  | .017044137       | 4.820448 | SPT2, suppressor of Ty, domain containing 1 ( <i>S. cerevisiae</i> ) (Spty2d1)       |
| Tm9sf2    | 0.34  | .001639272       | 7.045575 | Transmembrane 9 superfamily member 2 (Tm9sf2)  |
| Zfp654    | 0.34  | .018785801       | 5.767026 | Zinc finger protein 654 (Zfp654)   |
| Fam160a2  | 0.34  | .001704302       | 6.573145 | Family with sequence similarity 160, member A2 (Fam160a2)                            |
| Gm42372   | 0.34  | .000591057       | 8.531127 | Predicted gene, 42372 (Gm42372)  |
| Chrna4    | 0.34  | .00563968        | 7.652275 | Cholinergic receptor, nicotinic, alpha polypeptide 4 (Chrna4)                        |
| Sord      | 0.34  | .029577563       | 4.088055 | Sorbitol dehydrogenase (Sord)  |
| Ugcg      | 0.34  | .005934095       | 7.607998 | UDP-glucose ceramide glucosyltransferase (Ugcg)                                      |
| Rab10     | 0.34  | .00353918        | 8.154457 | RAB10, member RAS oncogene family (Rab10)  |
| Mamld1    | 0.34  | .013147262       | 5.604974 | Mastermind-like domain containing 1 (Mamld1)   |
| Nop58     | 0.34  | .00233082        | 6.121293 | NOP58 ribonucleoprotein (Nop58)  |
| Med14     | 0.33  | .00112575        | 7.147221 | Mediator complex subunit 14 (Med14)  |
| Cbx4      | 0.33  | .011660119       | 5.369991 | Chromobox 4 (Cbx4)   |
| Kctd6     | 0.33  | .023496131       | 4.900962 | Potassium channel tetramerisation domain containing 6 (Kctd6)                        |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Cntn1     | 0.33  | .00017015        | 9.192182 | Contactin 1 (Cntn1)   |
| Fam193a   | 0.33  | .004910651       | 6.678828 | Family with sequence similarity 193, member A (Fam193a)   |
| Lrrc4     | 0.33  | .025019331       | 5.037492 | Leucine-rich repeat containing 4 (Lrrc4)  |
| Hltf      | 0.33  | .01045281        | 5.725832 | Helicase-like transcription factor (Hltf)   |
| Wipi2     | 0.33  | .005595738       | 6.447216 | WD repeat domain, phosphoinositide interacting 2 (Wipi2)  |
| Ddx6      | 0.33  | .000322361       | 7.896737 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 6 (Ddx6)   |
| Trnt1     | 0.33  | .003830189       | 5.825732 | tRNA nucleotidyl transferase, CCA-adding, 1 (Trnt1)   |
| Prkar2b   | 0.33  | .00483422        | 6.623862 | Protein kinase, cAMP dependent regulatory, type II beta (Prkar2b)                                     |
| Zfp87     | 0.33  | .026828586       | 4.838732 | Zinc finger protein 87 (Zfp87)  |
| Hsp90aa1  | 0.33  | .000156221       | 9.275057 | Heat shock protein 90, alpha (cytosolic), class A member 1 (Hsp90aa1)                                 |
| Prmt1     | 0.33  | .016243093       | 6.019318 | Protein arginine N-methyltransferase 1 (Prmt1)  |
| Grina     | 0.33  | .008200963       | 8.245842 | Glutamate receptor, ionotropic, N-methyl D-aspartate-associated protein 1 (glutamate binding) (Grina) |
| Coro7     | 0.33  | .00348391        | 5.690426 | Coronin 7 (Coro7)   |
| Galnt17   | 0.33  | .01578007        | 6.610709 | Polypeptide N-Acetylgalactosaminyltransferase 17 (Galnt17)  |
| Sec23b    | 0.33  | .019353076       | 5.280737 | SEC23 homolog B, COPII coat complex component (Sec23b)  |
| Myl12b    | 0.33  | .001676411       | 9.04496  | Myosin, light chain 12B, regulatory (Myl12b)  |
| Flii      | 0.33  | .006552514       | 6.030941 | Flightless I actin binding protein (Flii)   |
| Kdm2a     | 0.33  | .004985644       | 7.330772 | Lysine (K)-specific demethylase 2A (Kdm2a)  |
| Pcdhgc3   | 0.33  | .015642118       | 5.179142 | Protocadherin gamma subfamily C, 3 (Pcdhgc3)  |
| Brinp2    | 0.33  | .024170506       | 5.977563 | Bone morphogenic protein/retinoic acid inducible neural-specific 2 (Brinp2)                           |
| Rtn1      | 0.33  | .00026507        | 10.98937 | Reticulon 1 (Rtn1)  |
| Mfsd6     | 0.33  | .000439239       | 8.081668 | Major facilitator superfamily domain containing 6 (Mfsd6)   |
| Tspyl4    | 0.33  | .010235626       | 8.733701 | TSPY-like 4 (Tspyl4)  |
| Ehd3      | 0.33  | .006728709       | 6.840027 | EH-domain containing 3 (Ehd3)   |
| Esf1      | 0.33  | .007630661       | 6.057988 | ESF1 nucleolar pre-rRNA processing protein homolog (Esf1)   |
| Socs6     | 0.33  | .014278487       | 5.36968  | Suppressor of cytokine signaling 6 (Socs6)  |
| Snrpd3    | 0.33  | .006661183       | 5.515214 | Small nuclear ribonucleoprotein D3 (Snrpd3)   |
| Usp1      | 0.33  | .006212613       | 5.611587 | Ubiquitin-specific peptidase like 1 (Usp1)  |
| Sucla2    | 0.33  | .004765486       | 6.942959 | Succinate-Coenzyme A ligase, ADP-forming, beta subunit (Sucla2)                                       |
| Epc1      | 0.33  | .015648949       | 6.171797 | Enhancer of polycomb homolog 1 (Epc1)   |
| Zfp518b   | 0.33  | .031580102       | 5.032912 | Zinc finger protein 518B (Zfp518b)  |
| Epn1      | 0.33  | .008889292       | 6.13718  | Epsin 1 (Epn1)  |
| Kcnq2     | 0.33  | .000741401       | 8.180647 | Potassium voltage-gated channel, subfamily Q, member 2 (Kcnq2)  |
| Pde4dip   | 0.33  | .000587231       | 7.709251 | Phosphodiesterase 4D interacting protein (myomegalin) (Pde4dip)                                       |
| Nemf      | 0.33  | .000566443       | 7.084243 | Nuclear export mediator factor (Nemf)   |
| Rfesd     | 0.33  | .02365158        | 4.431779 | Rieske (Fe-S) domain containing (Rfesd)   |
| Ctr9      | 0.33  | .016267212       | 5.360286 | CTR9 homolog, Paf1/RNA polymerase II complex component (Ctr9)   |
| Erich3    | 0.33  | .010059756       | 6.186032 | Glutamate rich 3 (Erich3)   |
| Nol11     | 0.33  | .039601095       | 4.470355 | Nucleolar protein 11 (Nol11)  |
| Luc7l     | 0.33  | .003598651       | 6.611896 | Luc7-like (Luc7l)   |
| Ikbkap    | 0.33  | .008137022       | 5.910105 | Inhibitor of kappa light polypeptide enhancer in B cells, kinase complex-associated protein (Ikbkap)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Pomgnt2   | 0.33  | .008701524       | 5.764593 | Protein O-linked mannose beta 1,4-N-acetylglucosaminyltransferase 2 (Pomgnt2)                               |
| Ttll7     | 0.33  | .000351859       | 8.940802 | Tubulin tyrosine ligase-like family, member 7 (Ttll7)   |
| Bhlhb9    | 0.33  | .009885437       | 5.921434 | Basic helix-loop-helix domain containing, class B9 (Bhlhb9)   |
| Hdac11    | 0.33  | .001738021       | 6.903218 | Histone deacetylase 11 (Hdac11)   |
| Timp3     | 0.33  | .001733317       | 8.771546 | Tissue inhibitor of metalloproteinase 3 (Timp3)   |
| Arf1      | 0.33  | .000802733       | 9.032354 | ADP-ribosylation factor 1 (Arf1)  |
| Zdhhc5    | 0.33  | .005988349       | 6.36382  | Zinc finger, DHHC domain containing 5 (Zdhhc5)  |
| Gm12258   | 0.33  | .033098326       | 4.746801 | Predicted gene 12258 (Gm12258)  |
| Shroom2   | 0.33  | .008807928       | 5.608925 | Shroom family member 2 (Shroom2)  |
| Dnajb4    | 0.33  | .001375265       | 7.110212 | DnaJ heat shock protein family (Hsp40) member B4 (Dnajb4)   |
| Foxo3     | 0.33  | .002351931       | 7.01565  | Forkhead box O3 (Foxo3)   |
| Calb1     | 0.33  | .042574984       | 7.81752  | Calbindin 1 (Calb1)   |
| Arl6ip5   | 0.33  | .035189543       | 4.611752 | ADP-ribosylation factor-like 6 interacting protein 5 (Arl6ip5)  |
| Rnf6      | 0.33  | .001796092       | 6.469322 | Ring finger protein (C3H2C3 type) 6 (Rnf6)  |
| Phf10     | 0.33  | .006902625       | 6.114015 | PHD finger protein 10 (Phf10)   |
| Cggbp1    | 0.33  | .003998385       | 6.59638  | CGG triplet repeat binding protein 1 (Cggbp1)   |
| Ilf3      | 0.33  | .001568776       | 6.371511 | Interleukin enhancer binding factor 3 (Ilf3)  |
| Rspry1    | 0.33  | .016708794       | 5.278227 | Ring finger and SPRY domain containing 1 (Rspry1)   |
| Supt16    | 0.33  | .006758474       | 6.546343 | Suppressor of Ty 16 (Supt16)  |
| Smarcd1   | 0.33  | .014907092       | 6.704273 | SWI/SNF-related, matrix-associated, actin-dependent regulator of chromatin, subfamily d, member 1 (Smarcd1) |
| Pnck      | 0.33  | .023023329       | 6.194498 | Pregnancy upregulated nonubiquitously expressed CaM kinase (Pnck)   |
| Dgcr2     | 0.33  | .01946328        | 5.476247 | DiGeorge syndrome critical region gene 2 (Dgcr2)  |
| Dgcr14    | 0.33  | .037421706       | 4.155779 | DiGeorge syndrome critical region gene 14 (Dgcr14)  |
| Jmjd1c    | 0.33  | .002622684       | 7.624735 | Jumonji domain containing 1C (Jmjd1c)   |
| Mgrn1     | 0.33  | .00354282        | 7.099806 | Mahogunin, ring finger 1 (Mgrn1)  |
| Ndr4      | 0.33  | .000922193       | 11.09989 | N-myc downstream-regulated gene 4 (Ndr4)  |
| Cfap97    | 0.33  | .026998457       | 6.056315 | Cilia and flagella-associated protein 97 (Cfap97)   |
| Mapre2    | 0.33  | .00020497        | 9.287042 | Microtubule-associated protein, RP/EB family, member 2 (Mapre2)   |
| Tubb2b    | 0.33  | .022470818       | 4.424611 | Tubulin, beta 2B class IIB (Tubb2b)   |
| Trappc11  | 0.33  | .006032777       | 6.164346 | Trafficking protein particle complex 11 (Trappc11)  |
| Agfg1     | 0.33  | .00108783        | 7.991137 | ArfGAP with FG repeats 1 (Agfg1)  |
| Sdha      | 0.33  | .000377936       | 8.865626 | Succinate dehydrogenase complex, subunit A, flavoprotein (Fp) (Sdha)  |
| Inpp5a    | 0.33  | .034494563       | 6.081011 | Inositol polyphosphate-5-phosphatase A (Inpp5a)   |
| Ppp2r2c   | 0.33  | .000385061       | 8.515515 | Protein phosphatase 2, regulatory subunit B, gamma (Ppp2r2c)  |
| Polr2m    | 0.33  | .001098437       | 8.137719 | Polymerase (RNA) II (DNA directed) polypeptide M (Polr2m)   |
| Phf12     | 0.33  | .008427111       | 6.221092 | PHD finger protein 12 (Phf12)   |
| Rfx7      | 0.33  | .00738221        | 7.382932 | regulatory factor X, 7 (Rfx7)   |
| Lmbrd2    | 0.32  | .00130007        | 7.685183 | LMBR1 domain containing 2 (Lmbrd2)  |
| Hivep1    | 0.32  | .000941412       | 8.252872 | Human immunodeficiency virus type I enhancer binding protein 1 (Hivep1)                                     |
| Mcp1      | 0.32  | .018497358       | 5.327229 | Microcephaly, primary autosomal recessive 1 (Mcp1)  |
| Ice1      | 0.32  | .001811992       | 6.869076 | Interactor of little elongation complex ELL subunit 1 (Ice1)  |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Pum1          | 0.32  | .001006636               | 7.046814 | Pumilio RNA-binding family member 1 (Pum1)                                  |
| Plaa          | 0.32  | .008016303               | 6.449628 | Phospholipase A2, activating protein (Plaa)                                 |
| Zbtb7a        | 0.32  | .007137521               | 7.55393  | Zinc finger and BTB domain containing 7a (Zbtb7a)                           |
| Kifap3        | 0.32  | .00460339                | 8.275121 | Kinesin-associated protein 3 (Kifap3)                                       |
| Ddost         | 0.32  | .035061841               | 5.636319 | Dolichyl-di-phosphooligosaccharide-protein glycotransferase (Ddost)         |
| Trim37        | 0.32  | .000268967               | 8.749207 | Tripartite motif-containing 37 (Trim37)                                     |
| Tmtc3         | 0.32  | .012432278               | 5.414971 | Transmembrane and tetratricopeptide repeat containing 3 (Tmtc3)             |
| Slc6a15       | 0.32  | .019962109               | 5.215938 | Solute carrier family 6 (neurotransmitter transporter), member 15 (Slc6a15) |
| Fh1           | 0.32  | .007892335               | 5.960936 | Fumarate hydratase 1 (Fh1)  |
| Ap3b2         | 0.32  | .003747685               | 6.379705 | Adaptor-related protein complex 3, beta 2 subunit (Ap3b2)                   |
| Rab2a         | 0.32  | .000220801               | 8.692405 | RAB2A, member RAS oncogene family (Rab2a)                                   |
| Zmym2         | 0.32  | .000781794               | 7.389059 | Zinc finger, MYM-type 2 (Zmym2)   |
| Mettl6        | 0.32  | .028282045               | 4.397911 | Methyltransferase like 6 (Mettl6)   |
| Cyld          | 0.32  | .002588103               | 8.136469 | CYLD lysine 63 deubiquitinase (Cyld)  |
| Vps39         | 0.32  | .006070659               | 6.397156 | VPS39 HOPS complex subunit (Vps39)  |
| Letm1         | 0.32  | .002099845               | 6.313361 | Leucine zipper-EF-hand containing transmembrane protein 1 (Letm1)           |
| Vps41         | 0.32  | .002305515               | 7.47014  | VPS41 HOPS complex subunit (Vps41)  |
| Syt1          | 0.32  | .000233037               | 10.46581 | Synaptotagmin I (Syt1)  |
| Helz          | 0.32  | .002424083               | 7.806308 | Helicase with zinc finger domain (Helz)                                     |
| Grik1         | 0.32  | .039635346               | 4.347494 | Glutamate receptor, ionotropic, kainate 1 (Grik1)                           |
| Calb2         | 0.32  | .020979514               | 7.711593 | Calbindin 2 (Calb2)   |
| Mob4          | 0.32  | .005884773               | 6.920589 | MOB family member 4, phocein (Mob4)   |
| Kat2a         | 0.32  | .005806285               | 6.168165 | K (lysine) acetyltransferase 2A (Kat2a)                                     |
| Abraxas2      | 0.32  | .028772191               | 4.868722 | Abraxas 2, BRISC Complex Subunit (Abraxas2)                                 |
| Wdr37         | 0.32  | .003271495               | 7.170859 | WD repeat domain 37 (Wdr37)   |
| Cacna1c       | 0.32  | .002438264               | 7.566329 | Calcium channel, voltage-dependent, L type, alpha 1C subunit (Cacna1c)      |
| Gorasp2       | 0.32  | .008345638               | 6.585518 | Golgi reassembly stacking protein 2 (Gorasp2)                               |
| Gm9899        | 0.32  | .026732262               | 4.246155 | Predicted gene 9899 (Gm9899)  |
| Slc25a46      | 0.32  | .002309226               | 7.633286 | Solute carrier family 25, member 46 (Slc25a46)                              |
| Kcnk9         | 0.32  | .032213555               | 5.7127   | Potassium channel, subfamily K, member 9 (Kcnk9)                            |
| Zfp938        | 0.32  | .02409866                | 4.562629 | Zinc finger protein 938 (Zfp938)  |
| B230219D22Rik | 0.32  | .00264211                | 7.500595 | RIKEN cDNA B230219D22 gene (B230219D22Rik)                                  |
| Prps1         | 0.32  | .00613382                | 5.595308 | Phosphoribosyl pyrophosphate synthetase 1 (Prps1)                           |
| Msl2          | 0.32  | .004074863               | 6.103681 | Male-specific lethal 2 homolog (Msl2)                                       |
| Ccdc6         | 0.32  | .005849225               | 6.834713 | Coiled-coil domain containing 6 (Ccdc6)                                     |
| Pigt          | 0.32  | .003713324               | 6.847849 | Phosphatidylinositol glycan anchor biosynthesis, class T (Pigt)             |
| Mios          | 0.32  | .016126436               | 4.817988 | Missing oocyte, meiosis regulator, homolog (Mios)                           |
| Cdk5r1        | 0.32  | .004189595               | 7.388953 | Cyclin-dependent kinase 5, regulatory subunit 1 (p35) (Cdk5r1)              |
| Phf1          | 0.32  | .012419462               | 4.92529  | PHD finger protein 1 (Phf1)   |
| Kdm5a         | 0.32  | .007484069               | 6.878055 | Lysine (K)-specific demethylase 5A (Kdm5a)                                  |
| Ano5          | 0.32  | .031568417               | 5.225598 | Anoctamin 5 (Ano5)  |
| Tbc1d9        | 0.32  | .004961467               | 6.083663 | TBC1 domain family, member 9 (Tbc1d9)                                       |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Polr2a    | 0.32  | .001285887       | 6.858149 | Polymerase (RNA) II (DNA directed) polypeptide A (Polr2a)  |
| Mtch1     | 0.32  | .010792878       | 8.129323 | Mitochondrial carrier 1 (Mtch1)  |
| Stxbp5    | 0.32  | .005598656       | 7.089531 | Syntaxin binding protein 5 (tomosyn) (Stxbp5)  |
| Mta1      | 0.32  | .016658619       | 5.626356 | Metastasis associated 1 (Mta1)   |
| Fscn1     | 0.32  | .008412892       | 6.441701 | Fascin actin-bundling protein 1 (Fscn1)  |
| Tmem185a  | 0.32  | .013916409       | 5.548671 | Transmembrane protein 185A (Tmem185a)  |
| Lonp2     | 0.32  | .002585912       | 6.490415 | Lon peptidase 2, peroxisomal (Lonp2)   |
| Spats2l   | 0.32  | .023373455       | 4.698351 | Spermatogenesis-associated, serine-rich 2-like (Spats2l)   |
| Gm45884   | 0.32  | .035687983       | 5.585962 | Predicted gene (Gm45884)   |
| Ints6     | 0.32  | .02216801        | 5.225252 | Integrator complex subunit 6 (Ints6)   |
| Marchf5   | 0.32  | .026796231       | 6.037629 | Membrane-associated ring-CH-type finger 5 (Marchf5)  |
| Cdc42se2  | 0.32  | .003343593       | 6.869074 | CDC42 small effector 2 (Cdc42se2)  |
| Marchf7   | 0.32  | .016904859       | 5.28631  | Membrane-associated ring-CH-type finger 7 (Marchf7)  |
| Zbtb4     | 0.32  | .001664041       | 7.762387 | Zinc finger and BTB domain containing 4 (Zbtb4)  |
| Ppil4     | 0.32  | .03994192        | 5.416502 | Peptidylprolyl isomerase (cyclophilin)-like 4 (Ppil4)  |
| Tcaim     | 0.32  | .012509584       | 4.844963 | T cell activation inhibitor, mitochondrial (Tcaim)   |
| Zfp715    | 0.32  | .035189543       | 4.903394 | Zinc finger protein 715 (Zfp715)   |
| Slc45a1   | 0.31  | .029481696       | 5.392839 | Solute carrier family 45, member 1 (Slc45a1)   |
| Ctdspl2   | 0.31  | .011236249       | 5.344075 | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase like 2 (Ctdspl2) |
| Morc2a    | 0.31  | .004531884       | 5.964352 | Microrchidia 2A (Morc2a)   |
| Mtmr6     | 0.31  | .002432771       | 6.86766  | Myotubularin-related protein 6 (Mtmr6)   |
| Fchsd2    | 0.31  | .002446513       | 6.85829  | FCH and double SH3 domains 2 (Fchsd2)  |
| Gm10123   | 0.31  | .040252636       | 4.665038 | Peptidylprolyl isomerase A-like pseudogene (Gm10123)   |
| Atg13     | 0.31  | .005861533       | 6.686367 | Autophagy related 13 (Atg13)   |
| Camk2b    | 0.31  | .00186315        | 8.900206 | Calcium/calmodulin-dependent protein kinase II, beta (Camk2b)                                      |
| Nsd3      | 0.31  | .001306022       | 7.320374 | Nuclear receptor binding SET domain protein 3 (Nsd3)   |
| Terf2     | 0.31  | .006573428       | 6.239424 | Telomeric repeat binding factor 2 (Terf2)  |
| Hs6st2    | 0.31  | .018068654       | 5.488195 | Heparan sulfate 6-O-sulfotransferase 2 (Hs6st2)  |
| Zdhhc21   | 0.31  | .004754794       | 6.810664 | Zinc finger, DHHC domain containing 21 (Zdhhc21)   |
| Azin1     | 0.31  | .004681029       | 7.443452 | Antizyme inhibitor 1 (Azin1)   |
| Fat4      | 0.31  | .042577732       | 4.108048 | FAT atypical cadherin 4 (Fat4)   |
| Hif1a     | 0.31  | .003614196       | 6.506064 | Hypoxia inducible factor 1, alpha subunit (Hif1a)  |
| Edc4      | 0.31  | .037971866       | 4.261783 | Enhancer of mRNA decapping 4 (Edc4)  |
| Xpot      | 0.31  | .002550603       | 6.820754 | Exportin, tRNA (nuclear export receptor for tRNAs) (Xpot)  |
| Hspa12a   | 0.31  | .001556569       | 8.314541 | Heat shock protein 12A (Hspa12a)   |
| Stk24     | 0.31  | .002369586       | 6.349516 | Serine/threonine kinase 24 (Stk24)   |
| Zcchc14   | 0.31  | .002366772       | 6.450568 | Zinc finger, CCHC domain containing 14 (Zcchc14)   |
| Rps6kb1   | 0.31  | .009813086       | 5.978873 | Ribosomal protein S6 kinase, polypeptide 1 (Rps6kb1)   |
| Fbxo41    | 0.31  | .011963025       | 5.644764 | F-box protein 41 (Fbxo41)  |
| Arcn1     | 0.31  | .002195116       | 7.214013 | Archain 1 (Arcn1)  |
| Lztf1     | 0.31  | .011037004       | 6.176956 | Leucine zipper transcription factor-like 1 (Lztf1)   |
| Cldn12    | 0.31  | .010436237       | 6.715942 | Claudin 12 (Cldn12)  |
| Inpp5f    | 0.31  | .011583164       | 8.00787  | Inositol polyphosphate-5-phosphatase F (Inpp5f)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Synrg     | 0.31  | .002562882       | 7.223523 | Synergin, gamma (Synrg)   |
| Tcf25     | 0.31  | .000678736       | 9.466142 | Transcription factor 25 (basic helix-loop-helix) (Tcf25)                    |
| Prdm11    | 0.31  | .036363721       | 4.723243 | PR domain containing 11 (Prdm11)  |
| Senp6     | 0.31  | .011496571       | 7.598651 | SUMO/sentrin-specific peptidase 6 (Senp6)                                   |
| Lpcat4    | 0.31  | .033139201       | 6.572768 | Lysophosphatidylcholine acyltransferase 4 (Lpcat4)                          |
| Slc23a2   | 0.31  | .003391522       | 7.655895 | Solute carrier family 23 (nucleobase transporters), member 2 (Slc23a2)      |
| Jph3      | 0.31  | .009833735       | 6.364034 | Junctophilin 3 (Jph3)   |
| Inpp4a    | 0.31  | .001409669       | 7.790521 | Inositol polyphosphate-4-phosphatase, type I (Inpp4a)                       |
| Foxk2     | 0.31  | .002411011       | 6.765432 | Forkhead box K2 (Foxk2)   |
| Tunar     | 0.31  | .009725869       | 7.166781 | Tcl1 upstream neural differentiation-associated RNA (Tunar)                 |
| Ncdn      | 0.31  | .019977453       | 9.538642 | Neurochondrin (Ncdn)  |
| Emd       | 0.31  | .018784525       | 5.281802 | Emerin (Emd)  |
| Ttbk1     | 0.31  | .017973161       | 7.24211  | Tau tubulin kinase 1 (Ttbk1)  |
| Zfp871    | 0.31  | .031316414       | 7.774765 | Zinc finger protein 871 (Zfp871)  |
| Slc38a1   | 0.31  | .001581298       | 8.903581 | Solute carrier family 38, member 1 (Slc38a1)                                |
| Syt7      | 0.31  | .000890892       | 8.877422 | Synaptotagmin VII (Syt7)  |
| Trak2     | 0.31  | .003664544       | 6.994409 | Trafficking protein, kinesin binding 2 (Trak2)                              |
| Cdc42bpa  | 0.31  | .001672607       | 9.017793 | CDC42 binding protein kinase alpha (Cdc42bpa)                               |
| Mbnl1     | 0.31  | .004624647       | 7.850625 | Muscleblind-like 1 (Mbnl1)  |
| Syt11     | 0.31  | .000170212       | 9.412666 | Synaptotagmin XI (Syt11)  |
| Zbtb44    | 0.31  | .025748885       | 6.892859 | Zinc finger and BTB domain containing 44 (Zbtb44)                           |
| Ppm1f     | 0.31  | .041730143       | 5.221291 | Protein phosphatase 1F (PP2C domain containing) (Ppm1f)                     |
| Rnf11     | 0.31  | .002107953       | 7.184519 | Ring finger protein 11 (Rnf11)  |
| Slc22a17  | 0.31  | .004355691       | 8.133587 | Solute carrier family 22 (organic cation transporter), member 17 (Slc22a17) |
| Cacna1b   | 0.31  | .016569902       | 7.298883 | Calcium channel, voltage-dependent, N type, alpha 1B subunit (Cacna1b)      |
| Asic1     | 0.31  | .005347344       | 6.074872 | Acid-sensing (proton-gated) ion channel 1 (Asic1)                           |
| Mapre3    | 0.31  | .007698901       | 7.908402 | Microtubule-associated protein, RP/EB family, member 3 (Mapre3)             |
| Fam84a    | 0.31  | .049871193       | 4.380544 | Family with sequence similarity 84, member A (Fam84a)                       |
| Plxnc1    | 0.31  | .001670639       | 8.075548 | Plexin C1 (Plxnc1)  |
| Trim44    | 0.31  | .000508478       | 10.18059 | Tripartite motif-containing 44 (Trim44)                                     |
| Rabgap1   | 0.31  | .002426589       | 7.429103 | RAB GTPase activating protein 1 (Rabgap1)                                   |
| Nsd1      | 0.31  | .001824674       | 8.416994 | Nuclear receptor-binding SET-domain protein 1 (Nsd1)                        |
| Rragb     | 0.31  | .012607818       | 5.65292  | Ras-related GTP binding B (Rragb)   |
| EII2      | 0.31  | .005283976       | 5.624983 | Elongation factor RNA polymerase II 2 (EII2)                                |
| Hecw2     | 0.31  | .004895996       | 6.438744 | HECT, C2 and WW domain containing E3 ubiquitin protein ligase 2 (Hecw2)     |
| Senp2     | 0.31  | .002516156       | 6.799879 | SUMO/sentrin-specific peptidase 2 (Senp2)                                   |
| Bmt2      | 0.31  | .011472492       | 6.291756 | Base methyltransferase of 25S rRNA 2 (Bmt2)                                 |
| Bcas3     | 0.31  | .02311958        | 5.103432 | Breast carcinoma amplified sequence 3 (Bcas3)                               |
| Ddx24     | 0.31  | .00176941        | 6.905864 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 24 (Ddx24)                           |
| Zfp462    | 0.31  | .003803185       | 7.10365  | Zinc finger protein 462 (Zfp462)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tbck          | 0.31  | .00495254                | 6.056224 | TBC1 domain containing kinase (Tbck)  |
| Nap1l2        | 0.31  | .004138323               | 6.668799 | Nucleosome assembly protein 1-like 2 (Nap1l2)                                 |
| Tollip        | 0.31  | .001140999               | 7.410743 | Toll interacting protein (Tollip)   |
| Gpm6a         | 0.31  | .000242589               | 9.699009 | Glycoprotein m6a (Gpm6a)  |
| B4galt5       | 0.31  | .020679041               | 6.482451 | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 5 (B4galt5)    |
| Sec23ip       | 0.31  | .014707099               | 5.2833   | Sec23 interacting protein (Sec23ip)   |
| Srcin1        | 0.31  | .006815255               | 6.975277 | SRC kinase signaling inhibitor 1 (Srcin1)                                     |
| Slc43a2       | 0.31  | .014711343               | 6.225303 | Solute carrier family 43, member 2 (Slc43a2)                                  |
| Arl8a         | 0.31  | .001622761               | 7.814492 | ADP-ribosylation factor-like 8A (Arl8a)                                       |
| Hmbox1        | 0.31  | .014774937               | 6.413729 | Homeobox containing 1 (Hmbox1)  |
| Kcna6         | 0.30  | .006704587               | 5.959028 | Potassium voltage-gated channel, shaker-related, subfamily, member 6 (Kcna6)  |
| Srxn1         | 0.30  | .007364826               | 6.458998 | Sulfiredoxin 1 homolog ( <i>S. cerevisiae</i> ) (Srxn1)                       |
| Rbm12         | 0.30  | .046175209               | 4.23747  | RNA binding motif protein 12 (Rbm12)  |
| 9930021J03Rik | 0.30  | .004976948               | 8.048787 | RIKEN cDNA 9930021J03 gene (9930021J03Rik)                                    |
| Slc9a6        | 0.30  | .004555812               | 7.140333 | Solute carrier family 9 (sodium/hydrogen exchanger), member 6 (Slc9a6)        |
| Cbl           | 0.30  | .002555745               | 7.456415 | Casitas B-lineage lymphoma (Cbl)  |
| B230354K17Rik | 0.30  | .037538198               | 4.651618 | RIKEN cDNA B230354K17 gene (B230354K17Rik)                                    |
| Abhd13        | 0.30  | .006840464               | 5.843592 | Abhydrolase domain containing 13 (Abhd13)                                     |
| Rb1cc1        | 0.30  | .002032666               | 7.423043 | RB1-inducible coiled-coil 1 (Rb1cc1)  |
| Zfp275        | 0.30  | .012557752               | 5.703578 | Zinc finger protein 275 (Zfp275)  |
| Csnk1a1       | 0.30  | .000800046               | 8.160204 | Casein kinase 1, alpha 1 (Csnk1a1)  |
| Rlf           | 0.30  | .012967738               | 5.919536 | Rearranged L-myc fusion sequence (Rlf)  |
| Cnot2         | 0.30  | .010401047               | 6.065388 | CCR4-NOT transcription complex, subunit 2 (Cnot2)                             |
| 2310057M21Rik | 0.30  | .031437245               | 5.396433 | RIKEN cDNA 2310057M21 gene (2310057M21Rik)                                    |
| Ppm1k         | 0.30  | .002070587               | 6.915927 | Protein phosphatase 1K (PP2C domain containing) (Ppm1k)                       |
| Parp6         | 0.30  | .002183471               | 6.808903 | Poly(ADP-ribose) polymerase family, member 6 (Parp6)                          |
| Zmynd19       | 0.30  | .037665414               | 4.002888 | Zinc finger, MYND domain containing 19 (Zmynd19)                              |
| Sept11        | 0.30  | .004866842               | 7.063208 | Septin 11 (Sept11)  |
| Tipr1         | 0.30  | .002856573               | 6.284998 | TIP41, TOR signalling pathway regulator-like ( <i>S. cerevisiae</i> ) (Tipr1) |
| Mon1b         | 0.30  | .015563128               | 6.049116 | MON1 homolog B, secretory trafficking associated (Mon1b)                      |
| Ciapin1       | 0.30  | .028354648               | 5.027411 | Cytokine-induced apoptosis inhibitor 1 (Ciapin1)                              |
| Depdc5        | 0.30  | .007008639               | 6.158592 | DEP domain containing 5 (Depdc5)  |
| Timm29        | 0.30  | .033594309               | 6.179825 | Translocase Of Inner Mitochondrial Membrane 29 (Timm29)                       |
| Mfap3l        | 0.30  | .005401632               | 6.21341  | Microfibrillar-associated protein 3-like (Mfap3l)                             |
| Cenpc1        | 0.30  | .022975836               | 5.59561  | Centromere protein C1 (Cenpc1)  |
| Gap43         | 0.30  | .006425957               | 8.655053 | Growth-associated protein 43 (Gap43)  |
| Ptpn3         | 0.30  | .007698901               | 7.506339 | Protein tyrosine phosphatase, non-receptor type 3 (Ptpn3)                     |
| Nipal2        | 0.30  | .048324369               | 4.657557 | NIPA-like domain containing 2 (Nipal2)  |
| Exoc2         | 0.30  | .003992505               | 6.161269 | Exocyst complex component 2 (Exoc2)   |
| Ttbk2         | 0.30  | .00924387                | 8.011298 | Tau tubulin kinase 2 (Ttbk2)  |
| H13           | 0.30  | .008621433               | 6.027599 | Histocompatibility 13 (H13)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Dubr      | 0.30  | .036010297       | 4.368191 | Dppa2 upstream binding RNA (Dubr)   |
| Ankrd52   | 0.30  | .007140692       | 6.294721 | Ankyrin repeat domain 52 (Ankrd52)  |
| Pdp2      | 0.30  | .031930563       | 4.991922 | Pyruvate dehydrogenase phosphatase catalytic subunit 2 (Pdp2)   |
| Snrpn     | 0.30  | .001274061       | 9.023082 | Small nuclear ribonucleoprotein N (Snrpn)   |
| Gnao1     | 0.30  | .000272909       | 10.26961 | Guanine nucleotide binding protein, alpha O (Gnao1)   |
| Csmd1     | 0.30  | .018773501       | 5.460553 | CUB and Sushi multiple domains 1 (Csmd1)  |
| Bicd1     | 0.30  | .009227363       | 6.949075 | Bicaudal D homolog 1 (Bicd1)  |
| Tdrkh     | 0.30  | .014135912       | 5.772278 | Tudor and KH domain containing protein (Tdrkh)  |
| Ppip5k2   | 0.30  | .037485705       | 5.025493 | Diphosphoinositol pentakisphosphate kinase 2 (Ppip5k2)  |
| Dnajc27   | 0.30  | .001237432       | 7.203911 | DnaJ heat shock protein family (Hsp40) member C27 (Dnajc27)   |
| Nampt     | 0.30  | .01608854        | 6.729077 | Nicotinamide phosphoribosyltransferase (Nampt)  |
| Dscam     | 0.30  | .002131015       | 7.088152 | Down syndrome cell adhesion molecule (Dscam)  |
| Sf3b3     | 0.30  | .014655424       | 5.654957 | Splicing factor 3b, subunit 3 (Sf3b3)   |
| Pdzd4     | 0.30  | .027677806       | 5.061484 | PDZ domain containing 4 (Pdzd4)   |
| Snap25    | 0.30  | .001140235       | 12.44855 | Synaptosomal-associated protein 25 (Snap25)   |
| Pde7a     | 0.30  | .044604394       | 4.308021 | Phosphodiesterase 7A (Pde7a)  |
| Pign      | 0.30  | .035687983       | 5.112911 | Phosphatidylinositol glycan anchor biosynthesis, class N (Pign)   |
| Mtmr9     | 0.30  | .011559559       | 6.230916 | Myotubularin-related protein 9 (Mtmr9)  |
| Eno2      | 0.30  | .002253804       | 8.87194  | Enolase 2, gamma neuronal (Eno2)  |
| Atp6ap2   | 0.30  | .004964581       | 7.064367 | ATPase, H+ transporting, lysosomal accessory protein 2 (Atp6ap2)  |
| Mbnl2     | 0.30  | .001175527       | 8.403007 | Muscleblind-like 2 (Mbnl2)  |
| Ywhaz     | 0.30  | .00080519        | 11.54371 | Tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, zeta polypeptide (Ywhaz)                          |
| Impad1    | 0.30  | .002866568       | 8.228553 | Inositol monophosphatase domain containing 1 (Impad1)   |
| Plcb4     | 0.30  | .00100186        | 8.829629 | Phospholipase C, beta 4 (Plcb4)   |
| Sema4a    | 0.30  | .016926657       | 4.932598 | Sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytoplasmic domain, (semaphorin) 4A (Sema4a) |
| Rnf111    | 0.30  | .010674757       | 6.29004  | Ring finger 111 (Rnf111)  |
| Efhd2     | 0.30  | .01199216        | 7.294006 | EF hand domain containing 2 (Efhd2)   |
| Hdac2     | 0.30  | .006932158       | 6.413361 | Histone deacetylase 2 (Hdac2)   |
| Aprt      | 0.30  | .044457841       | 4.733443 | Adenine phosphoribosyl transferase (Aprt)   |
| Ube2j1    | 0.30  | .001482053       | 7.436077 | Ubiquitin-conjugating enzyme E2J 1 (Ube2j1)   |
| Mlec      | 0.30  | .00489464        | 7.529491 | Malectin (Mlec)   |
| Btrc      | 0.30  | .007178446       | 6.243904 | Beta-transducin repeat containing protein (Btrc)  |
| Vamp4     | 0.30  | .022789834       | 6.587331 | Vesicle-associated membrane protein 4 (Vamp4)   |
| Tnrc6a    | 0.30  | .007183707       | 6.627867 | Trinucleotide repeat containing 6a (Tnrc6a)   |
| Svop      | 0.30  | .010886261       | 5.77462  | SV2-related protein (Svop)  |
| Cdc42bpb  | 0.30  | .001254789       | 7.182722 | CDC42 binding protein kinase beta (Cdc42bpb)  |
| Lnpep     | 0.30  | .00472261        | 7.61621  | Leucyl/cystinyl aminopeptidase (Lnpep)  |
| Sh3kbp1   | 0.30  | .001401147       | 7.520692 | SH3-domain kinase binding protein 1 (Sh3kbp1)   |
| Srr       | 0.30  | .035191952       | 6.007721 | Serine racemase (Srr)   |
| Pacsin1   | 0.30  | .005465658       | 8.034317 | Protein kinase C and casein kinase substrate in neurons 1 (Pacsin1)   |
| Cacna2d1  | 0.30  | .003035618       | 7.269986 | Calcium channel, voltage-dependent, alpha2/delta subunit 1 (Cacna2d1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Ago3          | 0.29  | .027804757               | 7.051293 | Argonaute RISC catalytic subunit 3 (Ago3)                                   |
| Tmem50b       | 0.29  | .002601527               | 7.71822  | Transmembrane protein 50B (Tmem50b)   |
| Pcgf3         | 0.29  | .040366427               | 5.931799 | Polycomb group ring finger 3 (Pcgf3)  |
| Chchd4        | 0.29  | .011136689               | 5.802158 | Coiled-coil-helix-coiled-coil-helix domain containing 4 (Chchd4)            |
| Snx4          | 0.29  | .018159619               | 5.737659 | Sorting nexin 4 (Snx4)  |
| Cluh          | 0.29  | .009056085               | 6.187234 | Clustered mitochondria (cluA/CLU1) homolog (Cluh)                           |
| Zcchc18       | 0.29  | .002477076               | 7.833199 | Zinc finger, CCHC domain containing 18 (Zcchc18)                            |
| Ranbp9        | 0.29  | .004659662               | 6.987642 | RAN binding protein 9 (Ranbp9)  |
| Wdcp          | 0.29  | .045109819               | 4.119301 | WD repeat and coiled coil containing (Wdcp)                                 |
| Phf8          | 0.29  | .027197609               | 5.560488 | PHD finger protein 8 (Phf8)   |
| Copg1         | 0.29  | .002176579               | 7.741808 | Coatmer protein complex, subunit gamma 1 (Copg1)                            |
| Sptlc2        | 0.29  | .004897516               | 6.453922 | Serine palmitoyltransferase, long chain base subunit 2 (Sptlc2)             |
| Ddx25         | 0.29  | .003456314               | 6.374034 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 25 (Ddx25)                           |
| Phka2         | 0.29  | .019507754               | 4.86431  | Phosphorylase kinase alpha 2 (Phka2)  |
| Gabrg1        | 0.29  | .033632826               | 6.434823 | Gamma-aminobutyric acid (GABA) A receptor, subunit gamma 1 (Gabrg1)         |
| BC030336      | 0.29  | .012863723               | 6.643517 | cDNA sequence BC030336 (BC030336)   |
| Dpp6          | 0.29  | .001364163               | 8.174877 | Dipeptidylpeptidase 6 (Dpp6)  |
| Diras1        | 0.29  | .013137268               | 7.198799 | DIRAS family, GTP-binding RAS-like 1 (Diras1)                               |
| Atg2b         | 0.29  | .020091326               | 5.916504 | Autophagy related 2B (Atg2b)  |
| Cd99l2        | 0.29  | .00521277                | 7.38619  | CD99 antigen-like 2 (Cd99l2)  |
| B230209E15Rik | 0.29  | .043080673               | 5.304688 | RIKEN cDNA B230209E15 gene (B230209E15Rik)                                  |
| Itfg1         | 0.29  | .001418482               | 8.433981 | Integrin alpha FG-GAP repeat containing 1 (Itfg1)                           |
| Nin           | 0.29  | .019438147               | 6.252582 | Ninein (Nin)  |
| Plpp6         | 0.29  | .008997858               | 6.339292 | Phospholipid phosphatase 6 (Plpp6)  |
| Gtf3c4        | 0.29  | .010004425               | 5.78943  | General transcription factor IIIC, polypeptide 4 (Gtf3c4)                   |
| Prpf6         | 0.29  | .048835482               | 5.689386 | Pre-mRNA splicing factor 6 (Prpf6)  |
| Nufip2        | 0.29  | .005168133               | 6.832126 | Nuclear fragile X mental retardation protein interacting protein 2 (Nufip2) |
| Gak           | 0.29  | .003825128               | 6.969948 | Cyclin G-associated kinase (Gak)  |
| Tmem181a      | 0.29  | .022725455               | 5.066094 | Transmembrane protein 181A (Tmem181a)                                       |
| Clstn1        | 0.29  | .0009845                 | 9.278522 | Calsyntenin 1 (Clstn1)  |
| Cit           | 0.29  | .004411582               | 9.7881   | Citron (Cit)  |
| Nefh          | 0.29  | .013158873               | 5.713411 | Neurofilament, heavy polypeptide (Nefh)                                     |
| Dennd1b       | 0.29  | .032048904               | 5.275373 | DENN/MADD domain containing 1B (Dennd1b)                                    |
| Ppp1r15b      | 0.29  | .012340264               | 6.278374 | Protein phosphatase 1, regulatory (inhibitor) subunit 15b (Ppp1r15b)        |
| Odf2          | 0.29  | .030685551               | 5.194938 | Outer dense fiber of sperm tails 2 (Odf2)                                   |
| Napg          | 0.29  | .004756242               | 7.560103 | N-ethylmaleimide sensitive fusion protein attachment protein gamma (Napg)   |
| Poldip3       | 0.29  | .018616322               | 6.535524 | Polymerase (DNA-directed), delta interacting protein 3 (Poldip3)            |
| Hprt          | 0.29  | .003719834               | 7.502317 | Hypoxanthine guanine phosphoribosyl transferase (Hprt)                      |
| Eps8          | 0.29  | .007026658               | 6.681189 | Epidermal growth factor receptor pathway substrate 8 (Eps8)                 |
| Arhgef28      | 0.29  | .039602496               | 5.022086 | Rho guanine nucleotide exchange factor (GEF) 28 (Arhgef28)                  |
| Tnrc6b        | 0.29  | .004467218               | 8.094193 | Trinucleotide repeat containing 6b (Tnrc6b)                                 |
| Rhobtb2       | 0.29  | .019058437               | 5.808716 | Rho-related BTB domain containing 2 (Rhobtb2)                               |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Mysm1         | 0.29  | .016318799               | 6.244191 | Myb-like, SWIRM and MPN domains 1 (Mysm1)                                   |
| Rexo1         | 0.29  | .026714238               | 5.369836 | REX1, RNA exonuclease 1 (Rexo1)   |
| Kcna2         | 0.29  | .005584173               | 9.231444 | Potassium voltage-gated channel, shaker-related subfamily, member 2 (Kcna2) |
| Gpatch11      | 0.29  | .04012435                | 5.248353 | G patch domain containing 11 (Gpatch11)                                     |
| Ppp1r13b      | 0.29  | .017206437               | 6.757528 | Protein phosphatase 1, regulatory (inhibitor) subunit 13B (Ppp1r13b)        |
| Xiap          | 0.29  | .02947797                | 7.793085 | X-linked inhibitor of apoptosis (Xiap)                                      |
| Zfp62         | 0.29  | .01508435                | 5.769161 | Zinc finger protein 62 (Zfp62)  |
| Rsl1d1        | 0.29  | .007148906               | 6.562097 | Ribosomal L1 domain containing 1 (Rsl1d1)                                   |
| Scrt2         | 0.29  | .043168071               | 4.507479 | Scratch family zinc finger 2 (Scrt2)  |
| Ino80d        | 0.29  | .029832798               | 6.976664 | INO80 complex subunit D (Ino80d)  |
| Tnik          | 0.29  | .003821315               | 7.287748 | TRAF2 and NCK interacting kinase (Tnik)                                     |
| Uggt1         | 0.29  | .013058982               | 6.256806 | UDP-glucose glycoprotein glucosyltransferase 1 (Uggt1)                      |
| Tmem43        | 0.29  | .038260321               | 5.090363 | Transmembrane protein 43 (Tmem43)   |
| Trappc9       | 0.29  | .011276503               | 5.753603 | Trafficking protein particle complex 9 (Trappc9)                            |
| Dmx1          | 0.29  | .008601807               | 7.464723 | Dmx-like 1 (Dmx1)   |
| Prpf19        | 0.29  | .024329128               | 5.757284 | Pre-mRNA processing factor 19 (Prpf19)                                      |
| Apbb2         | 0.29  | .001590425               | 7.721342 | Amyloid beta (A4) precursor protein-binding, family B, member 2 (Apbb2)     |
| Caly          | 0.29  | .016466035               | 7.1097   | Calcyon neuron-specific vesicular protein (Caly)                            |
| Txnr1         | 0.29  | .041416102               | 5.712579 | Thioredoxin reductase 1 (Txnr1)   |
| Casc4         | 0.29  | .002536134               | 8.701304 | Cancer susceptibility candidate 4 (Casc4)                                   |
| Ncs1          | 0.29  | .004006759               | 8.041783 | Neuronal calcium sensor 1 (Ncs1)  |
| Fut8          | 0.29  | .007012116               | 5.877394 | Fucosyltransferase 8 (Fut8)   |
| Senp5         | 0.29  | .026675912               | 5.008522 | SUMO/sentrin-specific peptidase 5 (Senp5)                                   |
| 1700020I14Rik | 0.29  | .004103231               | 9.731026 | RIKEN cDNA 1700020I14 gene (1700020I14Rik)                                  |
| Rnmt          | 0.29  | .004993153               | 6.670023 | RNA (guanine-7-) methyltransferase (Rnmt)                                   |
| Ap2b1         | 0.29  | .00127953                | 8.255721 | Adaptor-related protein complex 2, beta 1 subunit (Ap2b1)                   |
| Capn7         | 0.29  | .006186201               | 6.036135 | Calpain 7 (Capn7)   |
| Dhx30         | 0.29  | .037016584               | 5.802387 | DEAH (Asp-Glu-Ala-His) box polypeptide 30 (Dhx30)                           |
| Nup133        | 0.29  | .043363172               | 4.879493 | Nucleoporin 133 (Nup133)  |
| Neb1          | 0.28  | .003407224               | 7.049783 | Nebulette (Neb1)  |
| Tomm40        | 0.28  | .018773501               | 5.150366 | Translocase of outer mitochondrial membrane 40 homolog (yeast) (Tomm40)     |
| Dld           | 0.28  | .004661051               | 7.426299 | Dihydroipoamide dehydrogenase (Dld)   |
| Upf1          | 0.28  | .037918718               | 4.705645 | UPF1 regulator of nonsense transcripts homolog (yeast) (Upf1)               |
| Slc25a44      | 0.28  | .004840969               | 6.649834 | Solute carrier family 25, member 44 (Slc25a44)                              |
| Slc38a9       | 0.28  | .036184439               | 5.200136 | Solute carrier family 38, member 9 (Slc38a9)                                |
| Ttc3          | 0.28  | .000182452               | 10.81009 | Tetratricopeptide repeat domain 3 (Ttc3)                                    |
| Srrt          | 0.28  | .011195774               | 6.233719 | Serrate RNA effector molecule homolog (Arabidopsis) (Srrt)                  |
| Zfp346        | 0.28  | .029600607               | 4.88929  | Zinc finger protein 346 (Zfp346)  |
| Vdac3         | 0.28  | .011265071               | 6.001346 | Voltage-dependent anion channel 3 (Vdac3)                                   |
| Zdhhc3        | 0.28  | .016672002               | 6.248905 | Zinc finger, DHHC domain containing 3 (Zdhhc3)                              |
| Gpcpd1        | 0.28  | .013346028               | 6.609606 | Glycerophosphocholine phosphodiesterase 1 (Gpcpd1)                          |
| Ciz1          | 0.28  | .047239578               | 4.980273 | CDKN1A interacting zinc finger protein 1 (Ciz1)                             |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Arel1     | 0.28  | .010993944       | 6.356425 | Apoptosis resistant E3 ubiquitin protein ligase 1 (Arel1)   |
| Fbrs      | 0.28  | .027103371       | 5.895547 | Fibrosin (Fbrs)   |
| Zfp329    | 0.28  | .029964756       | 6.195842 | Zinc finger protein 329 (Zfp329)  |
| Mapk6     | 0.28  | .018635944       | 6.656309 | Mitogen-activated protein kinase 6 (Mapk6)  |
| Rnf123    | 0.28  | .03201848        | 4.687283 | Ring finger protein 123 (Rnf123)  |
| Acbd3     | 0.28  | .020120246       | 6.303122 | Acyl-Coenzyme A binding domain containing 3 (Acbd3)   |
| Sacm1l    | 0.28  | .039883798       | 4.754358 | SAC1 suppressor of actin mutations 1-like (yeast) (Sacm1l)  |
| Tmie      | 0.28  | .020824676       | 5.415788 | Transmembrane inner ear (Tmie)  |
| Thnsl1    | 0.28  | .03144677        | 4.666539 | Threonine synthase-like 1 (bacterial) (Thnsl1)  |
| Fam171a1  | 0.28  | .041528396       | 5.761059 | Family with sequence similarity 171, member A1 (Fam171a1)   |
| Wrb       | 0.28  | .002276371       | 7.091132 | Tryptophan-rich basic protein (Wrb)   |
| Rbbp6     | 0.28  | .006620727       | 7.487087 | Retinoblastoma binding protein 6 (Rbbp6)  |
| Nova2     | 0.28  | .002644938       | 6.921313 | Neuro-oncological ventral antigen 2 (Nova2)   |
| Nek7      | 0.28  | .000975552       | 8.64502  | NIMA (never in mitosis gene a)-related expressed kinase 7 (Nek7)  |
| Camk2d    | 0.28  | .006988592       | 8.021251 | Calcium/calmodulin-dependent protein kinase II, delta (Camk2d)  |
| Kidins220 | 0.28  | .003853323       | 9.211366 | Kinase D-interacting substrate 220 (Kidins220)  |
| Wdr48     | 0.28  | .022705971       | 5.532367 | WD repeat domain 48 (Wdr48)   |
| Rps6kc1   | 0.28  | .013666321       | 5.541928 | Ribosomal protein S6 kinase polypeptide 1 (Rps6kc1)   |
| Mfsd14a   | 0.28  | .019919356       | 6.128688 | Major facilitator superfamily domain containing 14A (Mfsd14a)   |
| Smarcc1   | 0.28  | .011118138       | 6.548027 | SWI/SNF-related, matrix-associated, actin-dependent regulator of chromatin, subfamily c, member 1 (Smarcc1) |
| Scrn1     | 0.28  | .009647234       | 8.416075 | Secernin 1 (Scrn1)  |
| Nub1      | 0.28  | .029506175       | 5.291981 | Negative regulator of ubiquitin-like proteins 1 (Nub1)  |
| Dixdc1    | 0.28  | .003557218       | 7.61096  | DIX domain containing 1 (Dixdc1)  |
| Gramd1b   | 0.28  | .003199855       | 7.980444 | GRAM domain containing 1B (Gramd1b)   |
| Sarm1     | 0.28  | .022871278       | 5.131807 | Sterile alpha and HEAT/Armadillo motif containing 1 (Sarm1)   |
| Chd5      | 0.28  | .007324446       | 7.410324 | Chromodomain helicase DNA binding protein 5 (Chd5)  |
| Lrrc40    | 0.28  | .048006728       | 4.828818 | Leucine-rich repeat containing 40 (Lrrc40)  |
| Dhx32     | 0.28  | .025081808       | 4.859393 | DEAH (Asp-Glu-Ala-His) box polypeptide 32 (Dhx32)   |
| Zfp106    | 0.28  | .002549789       | 8.823319 | Zinc finger protein 106 (Zfp106)  |
| Slc30a1   | 0.28  | .037752699       | 5.657351 | Solute carrier family 30 (zinc transporter), member 1 (Slc30a1)   |
| Dner      | 0.28  | .002333045       | 7.730689 | Delta/notch-like EGF repeat containing (Dner)   |
| Plekhm1   | 0.28  | .011171292       | 5.608369 | Pleckstrin homology domain containing, family M (with RUN domain) member 1 (Plekhm1)                        |
| Snopc1    | 0.28  | .037630179       | 6.092211 | Small nuclear RNA activating complex, polypeptide 1 (Snopc1)  |
| Zfp148    | 0.28  | .006249724       | 7.467128 | Zinc finger protein 148 (Zfp148)  |
| Nipsnap2  | 0.28  | .014666795       | 6.397607 | Nipsnap Homolog 2 (Nipsnap2)  |
| Foxk1     | 0.28  | .005503706       | 6.319636 | Forkhead box K1 (Foxk1)   |
| Vti1a     | 0.28  | .008711502       | 7.112551 | Vesicle transport through interaction with t-SNAREs 1A (Vti1a)  |
| Rnf180    | 0.28  | .036278612       | 4.7386   | Ring finger protein 180 (Rnf180)  |
| Vps26a    | 0.28  | .013177194       | 6.988825 | VPS26 retromer complex component A (Vps26a)   |
| Rhot1     | 0.28  | .007332104       | 6.283881 | Ras homolog family member T1 (Rhot1)  |
| Tmem263   | 0.28  | .019306982       | 6.830252 | Transmembrane protein 263 (Tmem263)   |
| Atp9a     | 0.28  | .027112538       | 7.151991 | ATPase, class II, type 9A (Atp9a)   |



TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Aco2      | 0.28  | .001371504       | 8.424316 | Aconitase 2, mitochondrial (Aco2)                                      |
| Ctnnb1    | 0.28  | .002475998       | 8.407129 | Catenin (cadherin-associated protein), beta 1 (Ctnnb1)                 |
| Brd4      | 0.28  | .002418826       | 7.597624 | Bromodomain containing 4 (Brd4)  |
| Stradb    | 0.28  | .018876847       | 5.171677 | STE20-related kinase adaptor beta (Stradb)                             |
| Bri3bp    | 0.28  | .006370693       | 7.355458 | Bri3 binding protein (Bri3bp)  |
| Necap1    | 0.28  | .008035154       | 7.592931 | NECAP endocytosis associated 1 (Necap1)                                |
| Kdm5c     | 0.28  | .015474813       | 5.466005 | Lysine(K)-specific demethylase 5C (Kdm5c)                              |
| Ttc17     | 0.28  | .014313741       | 5.752314 | Tetratricopeptide repeat domain 17 (Ttc17)                             |
| Nisch     | 0.28  | .001290161       | 8.869673 | Nischarin (Nisch)  |
| Gng3      | 0.28  | .003011943       | 9.34266  | Guanine nucleotide binding protein (G protein), gamma 3 (Gng3)         |
| Jak1      | 0.28  | .005117976       | 7.24925  | Janus kinase 1 (Jak1)  |
| Gdi1      | 0.28  | .003366733       | 10.20332 | Guanosine diphosphate (GDP) dissociation inhibitor 1 (Gdi1)            |
| Dgkb      | 0.28  | .01143571        | 7.002562 | Diacylglycerol kinase, beta (Dgkb)                                     |
| Nfasc     | 0.28  | .005105436       | 8.639035 | Neurofascin (Nfasc)  |
| Polr1a    | 0.28  | .02947797        | 5.228718 | Polymerase (RNA) I polypeptide A (Polr1a)                              |
| Chst1     | 0.28  | .006620727       | 7.197954 | Carbohydrate (keratan sulfate Gal-6) sulfotransferase 1 (Chst1)        |
| Dhdds     | 0.28  | .018663017       | 5.476029 | Dehydrodolichyl diphosphate synthase (Dhdds)                           |
| Ankrd13c  | 0.28  | .004119142       | 6.810589 | Ankyrin repeat domain 13c (Ankrd13c)                                   |
| Gls       | 0.28  | .000852943       | 8.905604 | Glutaminase (Gls)  |
| Slc27a4   | 0.28  | .033848056       | 5.475829 | Solute carrier family 27 (fatty acid transporter), member 4 (Slc27a4)  |
| Zfp941    | 0.28  | .027431768       | 5.622759 | Zinc finger protein 941 (Zfp941)                                       |
| Rfng      | 0.28  | .035189543       | 5.3683   | RFNG O-fucosylpeptide 3-beta-N-acetylglucosaminyltransferase (Rfng)    |
| Pnpla8    | 0.28  | .012800934       | 7.205701 | Patatin-like phospholipase domain containing 8 (Pnpla8)                |
| Mfn2      | 0.28  | .003935793       | 7.304283 | Mitofusin 2 (Mfn2)   |
| Ccng1     | 0.28  | .042915129       | 8.044842 | Cyclin G1 (Ccng1)  |
| Gria3     | 0.28  | .010401047       | 6.999915 | Glutamate receptor, ionotropic, AMPA3 (alpha 3) (Gria3)                |
| Sec24b    | 0.28  | .006998773       | 6.660531 | Sec24-related gene family, member B (S. cerevisiae) (Sec24b)           |
| Synm      | 0.27  | .038916137       | 5.060104 | Synemin, intermediate filament protein (Synm)                          |
| Mapk8     | 0.27  | .011892902       | 7.565035 | Mitogen-activated protein kinase 8 (Mapk8)                             |
| Cramp1l   | 0.27  | .017619173       | 5.807321 | Crm, cramped-like (Cramp1l)  |
| Dennd4b   | 0.27  | .040255746       | 5.204414 | DENN/MADD domain containing 4B (Dennd4b)                               |
| Ssh2      | 0.27  | .006699296       | 6.563733 | Slingshot homolog 2 (Ssh2)   |
| Ric8b     | 0.27  | .014623263       | 6.24985  | RIC8 guanine nucleotide exchange factor B (Ric8b)                      |
| Fam217b   | 0.27  | .005273757       | 6.720992 | Family with sequence similarity 217, member B (Fam217b)                |
| Tiam1     | 0.27  | .032296766       | 6.579118 | T cell lymphoma invasion and metastasis 1 (Tiam1)                      |
| Efr3a     | 0.27  | .008518349       | 7.147258 | EFR3 homolog A (Efr3a)   |
| Adgrb3    | 0.27  | .005606181       | 6.921635 | Adhesion G protein-coupled receptor B3 (Adgrb3)                        |
| Btbd8     | 0.27  | .00597139        | 7.686081 | BTB (POZ) domain containing 8 (Btbd8)                                  |
| Elfn2     | 0.27  | .00793369        | 7.291967 | Leucine-rich repeat and fibronectin type III, extracellular 2 (Elfn2)  |
| Sppl3     | 0.27  | .048952288       | 5.325795 | Signal peptide peptidase 3 (Sppl3)                                     |
| Mast4     | 0.27  | .002536136       | 7.549238 | Microtubule-associated serine/threonine kinase family member 4 (Mast4) |
| Atxn7l3b  | 0.27  | .002479883       | 7.940815 | Ataxin 7-like 3B (Atxn7l3b)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Mrps2     | 0.27  | .028434323       | 5.432287 | Mitochondrial ribosomal protein S2 (Mrps2)                                    |
| Sez6l2    | 0.27  | .004104083       | 7.926525 | Seizure-related 6 homolog like 2 (Sez6l2)                                     |
| Ppp2r5e   | 0.27  | .008597578       | 6.871027 | Protein phosphatase 2, regulatory subunit B', epsilon (Ppp2r5e)               |
| Gspt1     | 0.27  | .006958315       | 6.415081 | G1 to S phase transition 1 (Gspt1)  |
| Wasf3     | 0.27  | .012615294       | 7.879823 | WAS protein family, member 3 (Wasf3)  |
| Extl3     | 0.27  | .002807727       | 7.803068 | Exostoses (multiple)-like 3 (Extl3)   |
| Wbp4      | 0.27  | .017248951       | 6.166412 | WW domain binding protein 4 (Wbp4)  |
| Fbxl20    | 0.27  | .014066408       | 6.449564 | F-box and leucine-rich repeat protein 20 (Fbxl20)                             |
| Cacna1a   | 0.27  | .014964932       | 5.999306 | Calcium channel, voltage-dependent, P/Q type, alpha 1A subunit (Cacna1a)      |
| Synj2     | 0.27  | .014696318       | 6.22205  | Synaptojanin 2 (Synj2)  |
| Zfp322a   | 0.27  | .009275571       | 5.927877 | Zinc finger protein 322A (Zfp322a)  |
| Tmem246   | 0.27  | .034308347       | 5.491578 | Transmembrane protein 246 (Tmem246)   |
| Utp3      | 0.27  | .017040002       | 5.980936 | UTP3 small subunit processome component (Utp3)                                |
| Dcp1a     | 0.27  | .042143098       | 5.341226 | Decapping mRNA 1A (Dcp1a)   |
| Dmxl2     | 0.27  | .002023891       | 8.337735 | Dmx-like 2 (Dmxl2)  |
| Gdap1l1   | 0.27  | .015980695       | 6.207562 | Ganglioside-induced differentiation-associated protein 1-like 1 (Gdap1l1)     |
| Zfp809    | 0.27  | .045630469       | 4.969866 | Zinc finger protein 809 (Zfp809)  |
| Smyd3     | 0.27  | .020026873       | 6.126087 | SET and MYND domain containing 3 (Smyd3)                                      |
| Efna3     | 0.27  | .043486496       | 4.472326 | Ephrin A3 (Efna3)   |
| Ncor1     | 0.27  | .000937444       | 8.557155 | Nuclear receptor co-repressor 1 (Ncor1)                                       |
| Plekhb2   | 0.27  | .009016154       | 7.831677 | Pleckstrin homology domain containing, family B (evectins) member 2 (Plekhb2) |
| Klhdc2    | 0.27  | .002585912       | 7.935284 | Kelch domain containing 2 (Klhdc2)  |
| Akt1      | 0.27  | .009816851       | 6.078466 | Thymoma viral proto-oncogene 1 (Akt1)   |
| Nrd1      | 0.27  | .005056229       | 7.807282 | Nardilysin, N-arginine dibasic convertase, NRD convertase 1 (Nrd1)            |
| Kdm5b     | 0.27  | .024457348       | 5.933054 | Lysine (K)-specific demethylase 5B (Kdm5b)                                    |
| Tmx3      | 0.27  | .013086607       | 5.879169 | Thioredoxin-related transmembrane protein 3 (Tmx3)                            |
| Chst8     | 0.27  | .044309093       | 5.16268  | Carbohydrate (N-acetylgalactosamine 4-O) sulfotransferase 8 (Chst8)           |
| Rab18     | 0.27  | .005271689       | 6.598716 | RAB18, member RAS oncogene family (Rab18)                                     |
| Ctbp1     | 0.27  | .042934367       | 6.443711 | C-terminal binding protein 1 (Ctbp1)  |
| N4bp1     | 0.27  | .00753234        | 7.831815 | NEDD4 binding protein 1 (N4bp1)   |
| Grm1      | 0.27  | .023914227       | 8.04685  | Glutamate receptor, metabotropic 1 (Grm1)                                     |
| Morf4l2   | 0.27  | .015797858       | 7.60517  | Mortality factor 4 like 2 (Morf4l2)   |
| Gclm      | 0.27  | .016928308       | 6.543524 | Glutamate-cysteine ligase, modifier subunit (Gclm)                            |
| Cstf2t    | 0.27  | .01048809        | 6.178532 | Cleavage stimulation factor, 3' pre-RNA subunit 2, tau (Cstf2t)               |
| Grid1     | 0.27  | .031517996       | 5.569667 | Glutamate receptor, ionotropic, delta 1 (Grid1)                               |
| Ik        | 0.27  | .00420581        | 7.944608 | IK cytokine (Ik)  |
| Ago1      | 0.27  | .021029319       | 6.039978 | Argonaute RISC catalytic subunit 1 (Ago1)                                     |
| Kdm7a     | 0.27  | .03994192        | 6.245133 | Lysine (K)-specific demethylase 7A (Kdm7a)                                    |
| Rab3gap2  | 0.27  | .022344908       | 5.827958 | RAB3 GTPase activating protein subunit 2 (Rab3gap2)                           |
| U2surp    | 0.27  | .007276141       | 6.895448 | U2 snRNP-associated SURP domain containing (U2surp)                           |
| Agap2     | 0.27  | .011698584       | 7.129894 | ArfGAP with GTPase domain, ankyrin repeat and PH domain 2 (Agap2)             |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Kcnc2     | 0.27  | .015859249       | 7.885483 | potassium voltage gated channel, Shaw-related subfamily, member 2 (Kcnc2)                     |
| Galnt11   | 0.27  | .030566665       | 5.115867 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 11 (Galnt11) |
| Eno1      | 0.27  | .018002481       | 8.527112 | Enolase 1, alpha non-neuron (Eno1)  |
| Fastk     | 0.27  | .041943112       | 5.355419 | Fas-activated serine/threonine kinase (Fastk)   |
| Cmas      | 0.27  | .005169528       | 7.395057 | Cytidine monophospho-N-acetylneuraminic acid synthetase (Cmas)                                |
| Slc35b4   | 0.27  | .009757436       | 6.319573 | Solute carrier family 35, member B4 (Slc35b4)   |
| Elavl1    | 0.27  | .038686965       | 6.716569 | ELAV (embryonic lethal, abnormal vision)-like 1 (Hu antigen R) (Elavl1)                       |
| Mlf2      | 0.26  | .006634018       | 7.99617  | Myeloid leukemia factor 2 (Mlf2)  |
| Cds1      | 0.26  | .008725194       | 6.551476 | CDP-diacylglycerol synthase 1 (Cds1)  |
| Mkl1      | 0.26  | .041286439       | 5.037545 | MKL (megakaryoblastic leukemia)/myocardin-like 1 (Mkl1)                                       |
| Eif1a     | 0.26  | .02596658        | 6.90807  | Eukaryotic translation initiation factor 1A (Eif1a)   |
| Mtmt1     | 0.26  | .023347531       | 5.282048 | Myotubularin-related protein 1 (Mtmt1)  |
| Adgrl1    | 0.26  | .002118505       | 8.506811 | Adhesion G protein-coupled receptor L1 (Adgrl1)   |
| Rragc     | 0.26  | .021937357       | 6.374251 | Ras-related GTP binding C (Rragc)   |
| Slc35e3   | 0.26  | .035687983       | 4.904488 | Solute carrier family 35, member E3 (Slc35e3)   |
| Mapt      | 0.26  | .008483427       | 8.376632 | Microtubule-associated protein tau (Mapt)   |
| Med1      | 0.26  | .02601574        | 6.868114 | Mediator complex subunit 1 (Med1)   |
| Gtpbp4    | 0.26  | .008981087       | 6.112213 | GTP binding protein 4 (Gtpbp4)  |
| Etf1      | 0.26  | .008784142       | 6.753486 | Eukaryotic translation termination factor 1 (Etf1)  |
| Cdk5r2    | 0.26  | .008588632       | 7.214605 | Cyclin-dependent kinase 5, regulatory subunit 2 (p39) (Cdk5r2)                                |
| Rab1      | 0.26  | .003398289       | 9.100399 | RAB1, Member RAS Oncogene Family (Rab1)   |
| Wapl      | 0.26  | .0041259         | 7.151871 | WAPL cohesin release factor (Wapl)  |
| Gfm1      | 0.26  | .037538198       | 5.687408 | G elongation factor, mitochondrial 1 (Gfm1)   |
| Abcg4     | 0.26  | .043531672       | 6.313969 | ATP-binding cassette, sub-family G (WHITE), member 4 (Abcg4)                                  |
| Tmcc1     | 0.26  | .00943859        | 7.39022  | Transmembrane and coiled coil domains 1 (Tmcc1)   |
| Gmfb      | 0.26  | .011970613       | 7.982291 | Glia maturation factor, beta (Gmfb)   |
| Ubqln2    | 0.26  | .013183398       | 7.841759 | Ubiquilin 2 (Ubqln2)  |
| Zdhhc17   | 0.26  | .010144508       | 7.018991 | Zinc finger, DHHC domain containing 17 (Zdhhc17)  |
| Ganab     | 0.26  | .012449667       | 6.432821 | Alpha glucosidase 2 alpha neutral subunit (Ganab)   |
| Arih1     | 0.26  | .00188698        | 7.688688 | Ariadne RBR E3 ubiquitin protein ligase 1 (Arih1)   |
| Fuca2     | 0.26  | .013600704       | 6.545753 | Fucosidase, alpha-L- 2, plasma (Fuca2)  |
| Bcat1     | 0.26  | .032071688       | 6.799144 | Branched chain aminotransferase 1, cytosolic (Bcat1)  |
| Rogdi     | 0.26  | .02220035        | 6.717655 | Rogdi homolog (Rogdi)   |
| Ttc19     | 0.26  | .006780863       | 7.304505 | Tetratricopeptide repeat domain 19 (Ttc19)  |
| Dynlt3    | 0.26  | .001355949       | 8.348117 | Dynein light chain Tctex-type 3 (Dynlt3)  |
| Ccar1     | 0.26  | .013183398       | 6.05194  | Cell division cycle and apoptosis regulator 1 (Ccar1)   |
| Mdm4      | 0.26  | .019120111       | 7.352569 | Transformed mouse 3T3 cell double minute 4 (Mdm4)   |
| Zhx1      | 0.26  | .004233749       | 7.310457 | Zinc fingers and homeoboxes 1 (Zhx1)  |
| Rbm25     | 0.26  | .020549481       | 6.2242   | RNA binding motif protein 25 (Rbm25)  |
| Plch1     | 0.26  | .037273334       | 5.536838 | Phospholipase C, eta 1 (Plch1)  |
| Mfsd4a    | 0.26  | .036567968       | 5.358221 | Major facilitator superfamily domain containing 4A (Mfsd4a)                                   |
| Atp1b1    | 0.26  | .003221607       | 10.12033 | ATPase, Na <sup>+</sup> /K <sup>+</sup> transporting, beta 1 polypeptide (Atp1b1)             |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Nrip1     | 0.26  | .030121409       | 6.015453 | Nuclear receptor interacting protein 1 (Nrip1)                                  |
| Tmem183a  | 0.26  | .01664335        | 6.649414 | Transmembrane protein 183A (Tmem183a)   |
| Fgf14     | 0.26  | .037539866       | 6.365664 | Fibroblast growth factor 14 (Fgf14)   |
| Eif4g1    | 0.26  | .006613234       | 6.999683 | Eukaryotic translation initiation factor 4, gamma 1 (Eif4g1)                    |
| Ube2h     | 0.26  | .012775352       | 6.954516 | Ubiquitin-conjugating enzyme E2H (Ube2h)  |
| Usp2      | 0.26  | .025090416       | 6.143011 | Ubiquitin-specific peptidase 2 (Usp2)   |
| Ndn       | 0.26  | .037538198       | 7.181255 | Necdin (Ndn)  |
| Zmiz2     | 0.26  | .006425957       | 7.458939 | Zinc finger, MIZ-type containing 2 (Zmiz2)                                      |
| Clmn      | 0.26  | .003550056       | 8.458508 | Calmin (Clmn)   |
| Prkar1a   | 0.26  | .002426589       | 9.697189 | Protein kinase, cAMP dependent regulatory, type I, alpha (Prkar1a)              |
| Zbtb21    | 0.26  | .037989591       | 4.890952 | Zinc finger and BTB domain containing 21 (Zbtb21)                               |
| Car10     | 0.26  | .026732262       | 7.754017 | Carbonic anhydrase 10 (Car10)   |
| Prdm2     | 0.26  | .027429947       | 6.460729 | PR domain containing 2, with ZNF domain (Prdm2)                                 |
| Dnajb6    | 0.26  | .019446411       | 5.582239 | DnaJ heat shock protein family (Hsp40) member B6 (Dnajb6)                       |
| Nptn      | 0.26  | .024777285       | 8.511305 | Neuroplastin (Nptn)   |
| Armc1     | 0.26  | .017384127       | 7.070633 | Armadillo repeat containing 1 (Armc1)   |
| Trim2     | 0.26  | .002547353       | 8.710248 | Tripartite motif-containing 2 (Trim2)   |
| Mkln1     | 0.26  | .006115011       | 7.385871 | Muskelin 1, intracellular mediator containing kelch motifs (Mkln1)              |
| Cyfp2     | 0.25  | .006556626       | 9.65834  | Cytoplasmic FMR1 interacting protein 2 (Cyfp2)                                  |
| Ctxn1     | 0.25  | .015502855       | 7.145987 | Cortecin 1 (Ctxn1)  |
| Cpeb1     | 0.25  | .033383797       | 5.328657 | Cytoplasmic polyadenylation element binding protein 1 (Cpeb1)                   |
| Arhgap32  | 0.25  | .004303565       | 8.77535  | Rho GTPase activating protein 32 (Arhgap32)                                     |
| Brd3      | 0.25  | .021115842       | 6.494486 | Bromodomain containing 3 (Brd3)   |
| Prkcb     | 0.25  | .010674757       | 7.377941 | Protein kinase C, beta (Prkcb)  |
| Cbx6      | 0.25  | .010913863       | 7.099465 | Chromobox 6 (Cbx6)  |
| Eif4enif1 | 0.25  | .049424979       | 6.381699 | Eukaryotic translation initiation factor 4E nuclear import factor 1 (Eif4enif1) |
| Rab8b     | 0.25  | .023591412       | 6.281451 | RAB8B, member RAS oncogene family (Rab8b)                                       |
| Grk2      | 0.25  | .011121976       | 6.817634 | G protein-coupled receptor kinase 2 (Grk2)                                      |
| Mafg      | 0.25  | .019987601       | 5.761778 | V-maf musculoaponeurotic fibrosarcoma oncogene family, protein G (avian) (Mafg) |
| Pxk       | 0.25  | .049871193       | 5.32972  | PX domain containing serine/threonine kinase (Pxk)                              |
| Ahctf1    | 0.25  | .032339039       | 5.974468 | AT hook containing transcription factor 1 (Ahctf1)                              |
| Zswim8    | 0.25  | .041207114       | 6.520703 | Zinc finger SWIM-type containing 8 (Zswim8)                                     |
| Gsk3a     | 0.25  | .044531571       | 6.568453 | Glycogen synthase kinase 3 alpha (Gsk3a)  |
| Polr2b    | 0.25  | .008765324       | 6.861404 | Polymerase (RNA) II (DNA directed) polypeptide B (Polr2b)                       |
| Gatad2b   | 0.25  | .00225318        | 8.306623 | GATA zinc finger domain containing 2B (Gatad2b)                                 |
| Tle3      | 0.25  | .034709348       | 5.256824 | Transducin-like enhancer of split 3 (Tle3)                                      |
| Ppa2      | 0.25  | .038742784       | 5.481607 | Pyrophosphatase (inorganic) 2 (Ppa2)  |
| Zrsr1     | 0.25  | .040252636       | 5.358349 | Zinc finger (CCCH type), RNA binding motif and serine/arginine rich 1 (Zrsr1)   |
| Gnl2      | 0.25  | .048542635       | 5.229231 | Guanine nucleotide binding protein-like 2 (nucleolar) (Gnl2)                    |
| Dlg2      | 0.25  | .010085425       | 8.510236 | Discs, large homolog 2 (Dlg2)   |
| Gpi1      | 0.25  | .012981106       | 8.550952 | Glucose phosphate isomerase 1 (Gpi1)  |
| Tppp      | 0.25  | .001217446       | 9.084994 | Tubulin polymerization promoting protein (Tppp)                                 |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Eif4g3    | 0.25  | .002213452       | 8.309797 | Eukaryotic translation initiation factor 4 gamma, 3 (Eif4g3)                      |
| Snx25     | 0.25  | .02296658        | 6.373403 | Sorting nexin 25 (Snx25)  |
| Bcl2l1    | 0.25  | .024494742       | 5.808804 | BCL2-like 1 (Bcl2l1)  |
| Hsd17b7   | 0.25  | .019391095       | 6.15484  | Hydroxysteroid (17-beta) dehydrogenase 7 (Hsd17b7)                                |
| Dpy19l3   | 0.25  | .014550835       | 6.745629 | dpy-19-like 3 (C. elegans) (Dpy19l3)  |
| Zc3h4     | 0.25  | .025588008       | 5.885946 | Zinc finger CCCH-type containing 4 (Zc3h4)  |
| Tox4      | 0.25  | .018784525       | 6.172471 | TOX high-mobility group box family member 4 (Tox4)                                |
| Rtn3      | 0.25  | .005263697       | 10.68972 | Reticulon 3 (Rtn3)  |
| Zfp318    | 0.25  | .028186533       | 6.253536 | Zinc finger protein 318 (Zfp318)  |
| Ric3      | 0.25  | .008419765       | 7.159328 | RIC3 acetylcholine receptor chaperone (Ric3)                                      |
| Hars      | 0.25  | .04679661        | 6.033038 | Histidyl-tRNA synthetase (Hars)   |
| Rictor    | 0.25  | .009896459       | 6.606077 | RPTOR independent companion of MTOR, complex 2 (Rictor)                           |
| Kcnab2    | 0.25  | .034951024       | 6.646441 | Potassium voltage-gated channel, shaker-related subfamily, beta member 2 (Kcnab2) |
| Kif1b     | 0.25  | .000918952       | 10.2399  | Kinesin family member 1B (Kif1b)  |
| Dnmt1     | 0.25  | .045603846       | 5.362349 | DNA methyltransferase (cytosine-5) 1 (Dnmt1)                                      |
| Dkc1      | 0.25  | .030357657       | 5.517805 | Dyskeratosis congenita 1, dyskerin (Dkc1)   |
| Tnfrsf21  | 0.25  | .017335584       | 6.787653 | Tumor necrosis factor receptor superfamily, member 21 (Tnfrsf21)                  |
| Tcf20     | 0.25  | .006554422       | 8.850207 | Transcription factor 20 (Tcf20)   |
| Tuba1b    | 0.25  | .017513457       | 8.113302 | Tubulin, alpha 1B (Tuba1b)  |
| Add1      | 0.25  | .006551052       | 7.73364  | Adducin 1 (alpha) (Add1)  |
| Mapk8ip3  | 0.25  | .002650302       | 7.907594 | Mitogen-activated protein kinase 8 interacting protein 3 (Mapk8ip3)               |
| Chn1      | 0.25  | .007728443       | 8.016187 | Chimerin 1 (Chn1)   |
| Srpk2     | 0.25  | .002131015       | 8.320705 | Serine/arginine-rich protein-specific kinase 2 (Srpk2)                            |
| Fam32a    | 0.25  | .030225363       | 6.452244 | Family with sequence similarity 32, member A (Fam32a)                             |
| Me2       | 0.25  | .046883031       | 5.564346 | Malic enzyme 2, NAD (+)-dependent, mitochondrial (Me2)                            |
| Nudcd3    | 0.25  | .024792245       | 6.990762 | NudC domain containing 3 (Nudcd3)   |
| Sept8     | 0.25  | .017778556       | 7.230033 | Septin 8 (Sept8)  |
| Scaper    | 0.25  | .018412516       | 6.805533 | S phase cyclin A-associated protein in the ER (Scaper)                            |
| Gopc      | 0.25  | .020478126       | 5.897352 | Golgi-associated PDZ and coiled-coil motif containing (Gopc)                      |
| Uhrf2     | 0.25  | .0270711         | 5.70033  | Ubiquitin-like, containing PHD and RING finger domains 2 (Uhrf2)                  |
| Abr       | 0.25  | .005105436       | 9.073203 | Active BCR-related gene (Abr)   |
| Nsg2      | 0.25  | .004056965       | 9.753347 | Neuron-specific gene family member 2 (Nsg2)                                       |
| Dcaf5     | 0.25  | .006972324       | 7.446307 | DDB1 and CUL4-associated factor 5 (Dcaf5)   |
| Tnrc6c    | 0.25  | .033517407       | 6.518989 | Trinucleotide repeat containing 6C (Tnrc6c)                                       |
| Suz12     | 0.25  | .029100629       | 6.147761 | Suppressor of zeste 12 homolog (Suz12)  |
| Chd6      | 0.25  | .007012116       | 7.179272 | Chromodomain helicase DNA binding protein 6 (Chd6)                                |
| Kantr     | 0.25  | .027476306       | 7.107519 | Kdm5c adjacent non-coding transcript (Kantr)                                      |
| Tnpo3     | 0.25  | .039248562       | 6.161886 | Transportin 3 (Tnpo3)   |
| Gnal      | 0.25  | .020292867       | 9.496616 | Guanine nucleotide binding protein, alpha stimulating, olfactory type (Gnal)      |
| Bscl2     | 0.25  | .03535563        | 5.854313 | Berardinelli-Seip congenital lipodystrophy 2 (seipin) (Bscl2)                     |
| Pcyt1b    | 0.24  | .036428621       | 5.69344  | Phosphate cytidylyltransferase 1, choline, beta isoform (Pcyt1b)                  |
| Kpna4     | 0.24  | .008599471       | 7.319111 | Karyopherin (importin) alpha 4 (Kpna4)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Tmem151a  | 0.24  | .046172933       | 6.720247 | Transmembrane protein 151A (Tmem151a)                                       |
| Crk       | 0.24  | .006545879       | 7.405028 | V-crk avian sarcoma virus CT10 oncogene homolog (Crk)                       |
| Plekha6   | 0.24  | .03236134        | 7.295051 | Pleckstrin homology domain containing, family A member 6 (Plekha6)          |
| Dnal1     | 0.24  | .007758999       | 7.330454 | Dynein, axonemal, light chain 1 (Dnal1)                                     |
| Btbd10    | 0.24  | .042727863       | 5.313358 | BTB (POZ) domain containing 10 (Btbd10)                                     |
| Fdft1     | 0.24  | .014112988       | 7.343004 | Farnesyl diphosphate farnesyl transferase 1 (Fdft1)                         |
| Ank       | 0.24  | .023195254       | 7.008378 | Progressive ankylosis (Ank)   |
| Dhx15     | 0.24  | .041329746       | 6.463917 | DEAH (Asp-Glu-Ala-His) box polypeptide 15 (Dhx15)                           |
| Rnft2     | 0.24  | .045862511       | 5.862266 | Ring finger protein, transmembrane 2 (Rnft2)                                |
| Tmem63b   | 0.24  | .028507804       | 6.652321 | Transmembrane protein 63b (Tmem63b)   |
| Cdkl2     | 0.24  | .017382173       | 5.902465 | Cyclin-dependent kinase-like 2 (CDC2-related kinase) (Cdkl2)                |
| Zfp334    | 0.24  | .039055913       | 5.637022 | Zinc finger protein 334 (Zfp334)  |
| Hsp90b1   | 0.24  | .010059756       | 9.137121 | Heat shock protein 90, beta (Grp94), member 1 (Hsp90b1)                     |
| Strip1    | 0.24  | .030883398       | 5.861158 | Striatin interacting protein 1 (Strip1)                                     |
| Pkia      | 0.24  | .04706864        | 7.844332 | Protein kinase inhibitor, alpha (Pkia)                                      |
| Creb1     | 0.24  | .036999146       | 6.575222 | cAMP responsive element binding protein 1 (Creb1)                           |
| Stk4      | 0.24  | .030123955       | 6.091511 | Serine/threonine kinase 4 (Stk4)  |
| Rc3h2     | 0.24  | .012241839       | 7.502372 | Ring finger and CCCH-type zinc finger domains 2 (Rc3h2)                     |
| Kndc1     | 0.24  | .045987994       | 7.643667 | Kinase noncatalytic C-lobe domain (KIND) containing 1 (Kndc1)               |
| Adcy5     | 0.24  | .016467427       | 6.945322 | Adenylate cyclase 5 (Adcy5)   |
| Bptf      | 0.24  | .019950533       | 7.853825 | Bromodomain PHD finger transcription factor (Bptf)                          |
| Cul5      | 0.24  | .018047502       | 6.614429 | Cullin 5 (Cul5)   |
| Rab11a    | 0.24  | .01229741        | 6.536686 | RAB11A, member RAS oncogene family (Rab11a)                                 |
| Gdi2      | 0.24  | .003074155       | 8.372964 | Guanosine diphosphate (GDP) dissociation inhibitor 2 (Gdi2)                 |
| Abca5     | 0.24  | .033073279       | 6.202761 | ATP-binding cassette, sub-family A (ABC1), member 5 (Abca5)                 |
| Vapb      | 0.24  | .013580507       | 7.092663 | Vesicle-associated membrane protein, associated protein B and C (Vapb)      |
| Taok2     | 0.24  | .015190111       | 6.465679 | TAO kinase 2 (Taok2)  |
| Mbtps1    | 0.24  | .032437521       | 5.979646 | Membrane-bound transcription factor peptidase, site 1 (Mbtps1)              |
| Rrn3      | 0.24  | .041142492       | 6.603308 | RRN3 RNA polymerase I transcription factor homolog (yeast) (Rrn3)           |
| Arid4b    | 0.24  | .02296604        | 6.188233 | AT-rich interactive domain 4B (RBP1-like) (Arid4b)                          |
| Prmt5     | 0.24  | .045645557       | 5.838054 | Protein arginine N-methyltransferase 5 (Prmt5)                              |
| Prpf8     | 0.24  | .005595738       | 8.014264 | Pre-mRNA processing factor 8 (Prpf8)  |
| Sgtb      | 0.24  | .010199583       | 7.17704  | Small glutamine-rich tetratricopeptide repeat (TPR)-containing, beta (Sgtb) |
| Manea     | 0.24  | .01810091        | 5.86709  | Mannosidase, endo-alpha (Manea)   |
| Ulk2      | 0.24  | .012607818       | 7.322568 | Unc-51 like kinase 2 (Ulk2)   |
| Mrpl39    | 0.24  | .040743171       | 5.060474 | Mitochondrial ribosomal protein L39 (Mrpl39)                                |
| Rcc2      | 0.24  | .014323411       | 6.670595 | Regulator of chromosome condensation 2 (Rcc2)                               |
| Setbp1    | 0.24  | .040056873       | 5.508508 | SET binding protein 1 (Setbp1)  |
| Macro2    | 0.24  | .042931647       | 6.329326 | MACRO domain containing 2 (Macro2)  |
| Taf2      | 0.24  | .033036522       | 6.274409 | TATA-box binding protein-associated factor 2 (Taf2)                         |
| Ppp4r2    | 0.24  | .020994392       | 6.406066 | Protein phosphatase 4, regulatory subunit 2 (Ppp4r2)                        |
| Pdcd6ip   | 0.24  | .026812881       | 6.862055 | Programmed cell death 6 interacting protein (Pdcd6ip)                       |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Clptm1        | 0.24  | .010674757               | 7.477241 | Cleft lip and palate-associated transmembrane protein 1 (Clptm1)              |
| Trps1         | 0.24  | .030443375               | 6.827773 | Trichorhinophalangeal syndrome I (human) (Trps1)                              |
| Khdrbs1       | 0.24  | .021576939               | 6.671807 | KH domain containing, RNA binding, signal transduction associated 1 (Khdrbs1) |
| Elp2          | 0.24  | .038766709               | 5.968091 | Elongator acetyltransferase complex subunit 2 (Elp2)                          |
| Adgrb2        | 0.24  | .038173009               | 6.594675 | Adhesion G protein-coupled receptor B2 (Adgrb2)                               |
| Tbc1d24       | 0.24  | .024814573               | 6.406851 | TBC1 domain family, member 24 (Tbc1d24)                                       |
| Xpr1          | 0.24  | .017591619               | 9.187294 | Xenotropic and polytropic retrovirus receptor 1 (Xpr1)                        |
| Ascc3         | 0.24  | .020486611               | 5.894079 | Activating signal cointegrator 1 complex subunit 3 (Ascc3)                    |
| Synj2bp       | 0.24  | .041075165               | 6.285633 | Synaptojanin 2 binding protein (Synj2bp)                                      |
| B930095G15Rik | 0.23  | .022829429               | 6.251638 | RIKEN cDNA B930095G15 gene (B930095G15Rik)                                    |
| Cdc27         | 0.23  | .012137354               | 7.095631 | Cell division cycle 27 (Cdc27)  |
| Synpo2        | 0.23  | .037056061               | 7.898035 | Synaptopodin 2 (Synpo2)   |
| Casd1         | 0.23  | .017970109               | 7.021037 | CAS1 domain containing 1 (Casd1)  |
| Prrt1         | 0.23  | .045898899               | 6.588541 | Proline-rich transmembrane protein 1 (Prrt1)                                  |
| Afap1         | 0.23  | .034479972               | 5.701328 | Actin filament-associated protein 1 (Afap1)                                   |
| Fasn          | 0.23  | .010781429               | 7.875931 | Fatty acid synthase (Fasn)  |
| Thoc1         | 0.23  | .037213395               | 5.629454 | THO complex 1 (Thoc1)   |
| Clcn3         | 0.23  | .019386897               | 7.808005 | Chloride channel, voltage-sensitive 3 (Clcn3)                                 |
| Ppp2r5d       | 0.23  | .030906742               | 6.600648 | Protein phosphatase 2, regulatory subunit B', delta (Ppp2r5d)                 |
| Thra          | 0.23  | .010197793               | 7.778314 | Thyroid hormone receptor alpha (Thra)   |
| Lgalsl        | 0.23  | .024771474               | 6.288153 | Lectin, galactoside binding-like (Lgalsl)                                     |
| Lrch1         | 0.23  | .048954948               | 5.236242 | Leucine-rich repeats and calponin homology (CH) domain containing 1 (Lrch1)   |
| G6pc3         | 0.23  | .020958841               | 6.090829 | Glucose 6 phosphatase, catalytic, 3 (G6pc3)                                   |
| Tmem184c      | 0.23  | .036194616               | 6.366835 | Transmembrane protein 184C (Tmem184c)   |
| Iars          | 0.23  | .027119805               | 6.374181 | Isoleucine-tRNA synthetase (Iars)   |
| Pitpna        | 0.23  | .004117539               | 9.032461 | Phosphatidylinositol transfer protein, alpha (Pitpna)                         |
| Pik3ca        | 0.23  | .016904859               | 6.874957 | Phosphatidylinositol 3-kinase, catalytic, alpha polypeptide (Pik3ca)          |
| Pcsk1n        | 0.23  | .01533009                | 8.013988 | Proprotein convertase subtilisin/kexin type 1 inhibitor (Pcsk1n)              |
| Chd3os        | 0.23  | .008933403               | 7.316628 | Chromodomain helicase DNA binding protein 3, opposite strand (Chd3os)         |
| Drosha        | 0.23  | .0102172                 | 6.867096 | Drosha, ribonuclease type III (Drosha)  |
| Jakmip2       | 0.23  | .042148973               | 6.768761 | Janus kinase and microtubule interacting protein 2 (Jakmip2)                  |
| Grin2b        | 0.23  | .004690257               | 9.977914 | Glutamate receptor, ionotropic, NMDA2B (epsilon 2) (Grin2b)                   |
| Cpeb2         | 0.23  | .024537408               | 6.907478 | Cytoplasmic polyadenylation element binding protein 2 (Cpeb2)                 |
| Edem3         | 0.23  | .01936051                | 6.610494 | ER degradation enhancer, mannosidase alpha-like 3 (Edem3)                     |
| Atrx          | 0.23  | .00357055                | 8.255195 | Alpha thalassemia/mental retardation syndrome X-linked (Atrx)                 |
| Tom1l2        | 0.23  | .005639071               | 8.678078 | Target of myb1-like 2 (chicken) (Tom1l2)                                      |
| Cbx5          | 0.23  | .00417953                | 9.319247 | Chromobox 5 (Cbx5)  |
| Copb2         | 0.23  | .013314006               | 6.888134 | Coatomer protein complex, subunit beta 2 (beta prime) (Copb2)                 |
| Aldoa         | 0.23  | .02921891                | 9.780481 | Aldolase A, fructose-bisphosphate (Aldoa)                                     |
| Arhgdia       | 0.23  | .011112733               | 8.369957 | Rho GDP dissociation inhibitor (GDI) alpha (Arhgdia)                          |
| Rock2         | 0.23  | .004247972               | 8.580233 | Rho-associated coiled-coil containing protein kinase 2 (Rock2)                |
| Sept6         | 0.23  | .017555223               | 6.535214 | Septin 6 (Sept6)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Kazn      | 0.23  | .024202783       | 6.908172 | Kazrin, periplakin interacting protein (Kazn)                    |
| Stau2     | 0.23  | .005383984       | 8.255218 | Staufen (RNA binding protein) homolog 2 (Stau2)                  |
| Pds5b     | 0.23  | .008679751       | 7.998538 | PDS5 cohesin-associated factor B (Pds5b)                         |
| Vps37a    | 0.23  | .012411112       | 7.512598 | Vacuolar protein sorting 37A (Vps37a)                            |
| Dctn1     | 0.23  | .045685692       | 6.927864 | Dynactin 1 (Dctn1)   |
| Dnajc18   | 0.23  | .009088717       | 7.62907  | DnaJ heat shock protein family (Hsp40) member C18 (Dnajc18)      |
| Fam91a1   | 0.23  | .014242206       | 6.905897 | Family with sequence similarity 91, member A1 (Fam91a1)          |
| Terf2ip   | 0.23  | .015523404       | 6.368839 | Telomeric repeat binding factor 2, interacting protein (Terf2ip) |
| Dek       | 0.23  | .048577372       | 6.400542 | DEK oncogene (DNA binding) (Dek)                                 |
| Cdc37l1   | 0.23  | .017116236       | 7.603095 | Cell division cycle 37-like 1 (Cdc37l1)                          |
| Clcn6     | 0.23  | .019893244       | 7.532963 | Chloride channel, voltage-sensitive 6 (Clcn6)                    |
| Usp47     | 0.23  | .009725869       | 7.14803  | Ubiquitin-specific peptidase 47 (Usp47)                          |
| Tbl1xr1   | 0.23  | .022264941       | 7.167374 | Transducin (beta)-like 1X-linked receptor 1 (Tbl1xr1)            |
| Eif3i     | 0.23  | .029478024       | 7.064884 | Eukaryotic translation initiation factor 3, subunit I (Eif3i)    |
| Bcl7a     | 0.22  | .038742784       | 5.845352 | B cell CLL/lymphoma 7A (Bcl7a)                                   |
| Hspa8     | 0.22  | .018106183       | 9.218006 | Heat shock protein 8 (Hspa8)                                     |
| Azi2      | 0.22  | .033580361       | 6.503647 | 5-Azacytidine-induced gene 2 (Azi2)                              |
| Pitpnc1   | 0.22  | .03256127        | 7.709743 | Phosphatidylinositol transfer protein, cytoplasmic 1 (Pitpnc1)   |
| Csnk2a2   | 0.22  | .038403562       | 6.086306 | Casein kinase 2, alpha prime polypeptide (Csnk2a2)               |
| Asap1     | 0.22  | .0241556         | 7.280941 | ArfGAP with SH3 domain, ankyrin repeat and PH domain1 (Asap1)    |
| Selenoi   | 0.22  | .044206887       | 6.186981 | Selenoprotein I (Selenoi)  |
| Srpk1     | 0.22  | .031541489       | 6.425031 | Serine/arginine-rich protein-specific kinase 1 (Srpk1)           |
| Crebrf    | 0.22  | .034005247       | 7.967018 | CREB3 regulatory factor (Crebrf)                                 |
| Tmem57    | 0.22  | .029741268       | 6.263453 | Transmembrane protein 57 (Tmem57)                                |
| Iqsec3    | 0.22  | .018168344       | 8.050706 | IQ motif and Sec7 domain 3 (Iqsec3)                              |
| Large1    | 0.22  | .039883798       | 5.948991 | LARGE xylosyl- and glucuronyltransferase 1 (Large1)              |
| Rabif     | 0.22  | .029431927       | 5.902428 | RAB interacting factor (Rabif)                                   |
| Ubp2l     | 0.22  | .006784378       | 7.770741 | Ubiquitin-associated protein 2-like (Ubp2l)                      |
| Mcfd2     | 0.22  | .023310887       | 6.360756 | Multiple coagulation factor deficiency 2 (Mcfd2)                 |
| Vps53     | 0.22  | .033260188       | 6.270787 | VPS53 GARP complex subunit (Vps53)                               |
| Phc3      | 0.22  | .040459768       | 7.704432 | Polyhomeotic-like 3 (Phc3)                                       |
| Suco      | 0.22  | .026858117       | 7.15394  | SUN domain containing ossification factor (Suco)                 |
| Errf1     | 0.22  | .038742784       | 5.789123 | ERBB receptor feedback inhibitor 1 (Errf1)                       |
| Eif4g2    | 0.22  | .002685008       | 10.42965 | Eukaryotic translation initiation factor 4, gamma 2 (Eif4g2)     |
| Omg       | 0.22  | .010711707       | 8.141917 | Oligodendrocyte myelin glycoprotein (Omg)                        |
| Acox1     | 0.22  | .012543035       | 7.605381 | Acyl-Coenzyme A oxidase 1, palmitoyl (Acox1)                     |
| Dido1     | 0.22  | .038708577       | 6.714423 | Death inducer-obliterator 1 (Dido1)                              |
| Rad21     | 0.22  | .018168344       | 7.502774 | RAD21 cohesin complex component (Rad21)                          |
| Ndfip1    | 0.22  | .009717673       | 8.867982 | Nedd4 family interacting protein 1 (Ndfip1)                      |
| Cap2      | 0.22  | .017738926       | 7.765202 | CAP, adenylate cyclase-associated protein, 2 (yeast) (Cap2)      |
| Abce1     | 0.22  | .036399601       | 6.590981 | ATP-binding cassette, sub-family E (OABP), member 1 (Abce1)      |
| Atrn      | 0.22  | .010061854       | 8.392604 | Attractin (Atrn)   |
| Zfp369    | 0.22  | .048683336       | 5.752277 | Zinc finger protein 369 (Zfp369)                                 |
| Leprotl1  | 0.22  | .037366063       | 6.712683 | Leptin receptor overlapping transcript-like 1 (Leprotl1)         |



TABLE A1 Continued

| Gene name   | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|-------------|-------|--------------------------|----------|---|
| D5Erttd579e | 0.21  | .021282694               | 7.421499 | DNA segment, Chr 5, ERATO Doi 579, expressed (D5Erttd579e)                |
| Arl8b       | 0.21  | .006886961               | 8.191092 | ADP-ribosylation factor-like 8B (Arl8b)                                   |
| Prrc2c      | 0.21  | .005078156               | 8.985612 | Proline-rich coiled-coil 2C (Prrc2c)                                      |
| Map7d2      | 0.21  | .026275616               | 7.251992 | MAP7 domain containing 2 (Map7d2)   |
| Txn1l       | 0.21  | .017907964               | 6.938467 | Thioredoxin-like 1 (Txn1l)  |
| Fkrp        | 0.21  | .044699789               | 5.979782 | Fukutin-related protein (Fkrp)  |
| Phrf1       | 0.21  | .044693678               | 5.464877 | PHD and ring finger domains 1 (Phrf1)                                     |
| Trappc10    | 0.21  | .033011839               | 6.408274 | Trafficking protein particle complex 10 (Trappc10)                        |
| R3hdm1      | 0.21  | .012152036               | 7.863841 | R3H domain containing 1 (R3hdm1)  |
| Mta3        | 0.21  | .036169268               | 6.149123 | Metastasis associated 3 (Mta3)  |
| Syngap1     | 0.21  | .023560786               | 7.569885 | Synaptic Ras GTPase activating protein 1 homolog (rat) (Syngap1)          |
| Dtd1        | 0.21  | .034044459               | 7.077657 | D-tyrosyl-tRNA deacylase 1 (Dtd1)   |
| Ube2n       | 0.21  | .025866771               | 7.243544 | Ubiquitin-conjugating enzyme E2N (Ube2n)                                  |
| Unc80       | 0.21  | .004056965               | 9.577441 | Unc-80, NALCN activator (Unc80)   |
| Nat8l       | 0.21  | .016352893               | 7.033942 | N-acetyltransferase 8-like (Nat8l)  |
| Spag9       | 0.21  | .011143937               | 9.07335  | Sperm-associated antigen 9 (Spag9)  |
| Gtf3c1      | 0.21  | .022270126               | 6.500793 | General transcription factor III C 1 (Gtf3c1)                             |
| Mgea5       | 0.21  | .006469373               | 8.392484 | Meningioma expressed antigen 5 (hyaluronidase) (Mgea5)                    |
| Uqcrc2      | 0.21  | .028720561               | 7.035127 | Ubiquinol cytochrome c reductase core protein 2 (Uqcrc2)                  |
| Trim3       | 0.21  | .03186925                | 6.065105 | Tripartite motif-containing 3 (Trim3)                                     |
| Nup50       | 0.21  | .032541327               | 6.253364 | Nucleoporin 50 (Nup50)  |
| Snrk        | 0.21  | .048207709               | 6.811954 | SNF-related kinase (Snrk)   |
| Strap       | 0.21  | .014694164               | 7.290549 | Serine/threonine kinase receptor-associated protein (Strap)               |
| Clip1       | 0.21  | .039060407               | 7.444099 | CAP-GLY domain containing linker protein 1 (Clip1)                        |
| Fat1        | 0.21  | .016156971               | 7.702461 | FAT atypical cadherin 1 (Fat1)  |
| Fam102a     | 0.21  | .025954131               | 7.139414 | Family with sequence similarity 102, member A (Fam102a)                   |
| Glyr1       | 0.21  | .032942506               | 6.343444 | Glyoxylate reductase 1 homolog (Arabidopsis) (Glyr1)                      |
| Atp6v0d1    | 0.21  | .045685535               | 7.900166 | ATPase, H+ transporting, lysosomal VO subunit D1 (Atp6v0d1)               |
| Arhgef17    | 0.21  | .019362505               | 7.500893 | Rho guanine nucleotide exchange factor (GEF) 17 (Arhgef17)                |
| Npm1        | 0.21  | .013058982               | 7.651072 | Nucleophosmin 1 (Npm1)  |
| Ndst1       | 0.21  | .023872569               | 7.527521 | N-deacetylase/N-sulfotransferase (heparan glucosaminyl) 1 (Ndst1)         |
| Fyn         | 0.21  | .035282357               | 6.954519 | Fyn proto-oncogene (Fyn)  |
| Ppid        | 0.21  | .047036448               | 6.592722 | Peptidylprolyl isomerase D (cyclophilin D) (Ppid)                         |
| Smap2       | 0.21  | .021282694               | 7.021789 | Small ArfGAP 2 (Smap2)  |
| Rbm27       | 0.21  | .019447739               | 6.737948 | RNA binding motif protein 27 (Rbm27)                                      |
| Megf11      | 0.21  | .031688737               | 6.920557 | Multiple EGF-like-domains 11 (Megf11)                                     |
| Bbs1        | 0.21  | .034308347               | 6.075153 | Bardet-Biedl syndrome 1 (human) (Bbs1)                                    |
| Ankrd17     | 0.20  | .005272877               | 8.604074 | Ankyrin repeat domain 17 (Ankrd17)  |
| Psip1       | 0.20  | .016926657               | 7.887736 | PC4 and SFRS1 interacting protein 1 (Psip1)                               |
| Hspd1       | 0.20  | .022972473               | 7.851378 | Heat shock protein 1 (chaperonin) (Hspd1)                                 |
| Msantd4     | 0.20  | .032313642               | 6.870624 | Myb/SANT-like DNA-binding domain containing 4 with coiled-coils (Msantd4) |
| Ncoa2       | 0.20  | .010774339               | 7.639831 | Nuclear receptor coactivator 2 (Ncoa2)                                    |
| Pfkip       | 0.20  | .03169816                | 6.784532 | Phosphofructokinase, platelet (Pfkip)                                     |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Armc8         | 0.20  | .038206676               | 6.974349 | Armadillo repeat containing 8 (Armc8)                                |
| Capzb         | 0.20  | .026590519               | 7.682041 | Capping protein (actin filament) muscle Z-line, beta (Capzb)         |
| Pfn2          | 0.20  | .012650969               | 7.980521 | Profilin 2 (Pfn2)  |
| Sub1          | 0.20  | .024511176               | 8.617964 | SUB1 homolog (S. cerevisiae) (Sub1)                                  |
| Zwint         | 0.20  | .009821897               | 9.575665 | ZW10 interactor (Zwint)  |
| Eif2s1        | 0.20  | .048683336               | 6.205005 | Eukaryotic translation initiation factor 2, subunit 1 alpha (Eif2s1) |
| Usp7          | 0.20  | .030298047               | 7.371317 | Ubiquitin-specific peptidase 7 (Usp7)                                |
| Exoc6b        | 0.20  | .014237722               | 7.298128 | Exocyst complex component 6B (Exoc6b)                                |
| Tsyp1         | 0.20  | .036037976               | 7.667227 | Testis-specific protein, Y-encoded-like 1 (Tsyp1)                    |
| Cdip1         | 0.20  | .049496716               | 7.380801 | Cell death inducing Trp53 target 1 (Cdip1)                           |
| 1500004A13Rik | 0.20  | .02035408                | 6.813499 | RIKEN cDNA 1500004A13 gene (1500004A13Rik)                           |
| Slc35e1       | 0.20  | .04543885                | 5.77335  | Solute carrier family 35, member E1 (Slc35e1)                        |
| Spire1        | 0.20  | .039883798               | 8.14859  | Spire homolog 1 (Spire1)   |
| Aida          | 0.20  | .037918718               | 6.387968 | Axin interactor, dorsalization associated (Aida)                     |
| Zfhx3         | 0.20  | .033140031               | 8.904693 | Zinc finger homeobox 3 (Zfhx3)                                       |
| Scamp5        | 0.20  | .021862153               | 8.218513 | Secretory carrier membrane protein 5 (Scamp5)                        |
| Zfp423        | 0.20  | .047493724               | 7.796412 | Zinc finger protein 423 (Zfp423)                                     |
| Bub3          | 0.20  | .036051448               | 6.142762 | BUB3 mitotic checkpoint protein (Bub3)                               |
| 2310035C23Rik | 0.20  | .032288886               | 6.45985  | RIKEN cDNA 2310035C23 gene (2310035C23Rik)                           |
| Trak1         | 0.19  | .019118752               | 7.711733 | Trafficking protein, kinesin binding 1 (Trak1)                       |
| Ccdc85a       | 0.19  | .037916588               | 6.256121 | Coiled-coil domain containing 85A (Ccdc85a)                          |
| Sept7         | 0.19  | .021556437               | 7.534803 | Septin 7 (Sept7)   |
| Otud6b        | 0.19  | .04543885                | 6.286238 | OTU domain containing 6B (Otud6b)                                    |
| Kpnb1         | 0.19  | .026285895               | 7.662213 | Karyopherin (importin) beta 1 (Kpnb1)                                |
| Ipmk          | 0.19  | .039022702               | 6.445374 | Inositol polyphosphate multikinase (Ipmk)                            |
| Smc1a         | 0.19  | .032573303               | 6.696561 | Structural maintenance of chromosomes 1A (Smc1a)                     |
| Spred1        | 0.19  | .049261866               | 7.451375 | Sprouty protein with EVH-1 domain 1, related sequence (Spred1)       |
| Snrnp200      | 0.19  | .028914258               | 6.980469 | Small nuclear ribonucleoprotein 200 (U5) (Snrnp200)                  |
| Sort1         | 0.19  | .028743818               | 7.937391 | Sortilin 1 (Sort1)   |
| Map4          | 0.19  | .005612815               | 9.895507 | Microtubule-associated protein 4 (Map4)                              |
| Gbf1          | 0.19  | .040257526               | 6.992578 | Golgi-specific brefeldin A-resistance factor 1 (Gbf1)                |
| Hnrnpk        | 0.19  | .02218019                | 7.911042 | Heterogeneous nuclear ribonucleoprotein K (Hnrnpk)                   |
| Sestd1        | 0.19  | .048334791               | 6.538606 | SEC14 and spectrin domains 1 (Sestd1)                                |
| Eif3c         | 0.19  | .041234666               | 7.586635 | Eukaryotic translation initiation factor 3, subunit C (Eif3c)        |
| Atxn10        | 0.19  | .049619707               | 7.843968 | Ataxin 10 (Atxn10)   |
| Celf1         | 0.19  | .02794052                | 7.598323 | CUGBP, Elav-like family member 1 (Celf1)                             |
| Ubr3          | 0.19  | .021180627               | 8.054207 | Ubiquitin protein ligase E3 component n-recognin 3 (Ubr3)            |
| Itsn1         | 0.19  | .029614858               | 8.73734  | Intersectin 1 (SH3 domain protein 1A) (Itsn1)                        |
| Celsr2        | 0.19  | .033744533               | 7.667407 | Cadherin, EGF LAG seven-pass G-type receptor 2 (Celsr2)              |
| Bnip3l        | 0.19  | .014327052               | 7.815339 | BCL2/adenovirus E1B interacting protein 3-like (Bnip3l)              |
| Copa          | 0.18  | .025336187               | 7.963883 | Coatomer protein complex subunit alpha (Copa)                        |
| Sms           | 0.18  | .049266826               | 6.607688 | Spermine synthase (Sms)  |
| Ankrd11       | 0.18  | .024248549               | 7.591252 | Ankyrin repeat domain 11 (Ankrd11)                                   |
| Zfyve9        | 0.18  | .048277082               | 6.584251 | Zinc finger, FYVE domain containing 9 (Zfyve9)                       |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Atp6v1g2      | 0.18  | .022623953               | 8.952172 | ATPase, H+ transporting, lysosomal V1 subunit G2 (Atp6v1g2)                                     |
| Smg7          | 0.18  | .031688737               | 7.673229 | Smg-7 homolog, nonsense mediated mRNA decay factor ( <i>C. elegans</i> ) (Smg7)                 |
| Trip12        | 0.17  | .023634137               | 8.276152 | Thyroid hormone receptor interactor 12 (Trip12)   |
| Top2b         | 0.17  | .048638299               | 7.07136  | Topoisomerase (DNA) II beta (Top2b)   |
| Cend1         | 0.17  | .031032057               | 9.045587 | Cell cycle exit and neuronal differentiation 1 (Cend1)  |
| Appl1         | 0.17  | .038916137               | 6.92413  | Adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 1 (Appl1) |
| Ggnbp2        | 0.17  | .041155115               | 7.23954  | Gametogenetin binding protein 2 (Ggnbp2)  |
| Srgap3        | 0.17  | .034807889               | 8.609683 | SLIT-ROBO Rho GTPase activating protein 3 (Srgap3)  |
| Bclaf1        | 0.16  | .046461052               | 7.931701 | BCL2-associated transcription factor 1 (Bclaf1)   |
| Aff4          | 0.16  | .044118355               | 8.509122 | AF4/FMR2 family, member 4 (Aff4)  |
| Clasp2        | 0.16  | .025284743               | 8.918275 | CLIP associating protein 2 (Clasp2)   |
| Tgoln1        | 0.16  | .037254426               | 8.093881 | Trans-golgi network protein (Tgoln1)  |
| Ralgapb       | 0.16  | .038812289               | 7.786821 | Ral GTPase activating protein, beta subunit (non-catalytic) (Ralgapb)                           |
| Rabep1        | 0.16  | .045426572               | 7.691113 | Rabaptin, RAB GTPase binding effector protein 1 (Rabep1)  |
| Ube2b         | 0.15  | .037492468               | 7.726242 | Ubiquitin-conjugating enzyme E2B (Ube2b)  |
| Cyb5b         | 0.15  | .047404683               | 7.678542 | Cytochrome b5 type B (Cyb5b)  |
| Hsp90ab1      | 0.15  | .032185692               | 10.72416 | Heat shock protein 90 alpha (cytosolic), class B member 1 (Hsp90ab1)                            |
| Serbp1        | 0.14  | .042604347               | 8.528189 | Serpine1 mRNA binding protein 1 (Serbp1)  |
| Reep5         | 0.14  | .035818368               | 9.583036 | Receptor accessory protein 5 (Reep5)  |
| Mat2a         | -0.18 | .029404518               | 7.582335 | Methionine adenosyltransferase II, alpha (Mat2a)  |
| Phyhipl       | -0.19 | .022680986               | 7.433778 | Phytoenyl-CoA hydroxylase interacting protein-like (Phyhipl)                                    |
| Calm3         | -0.19 | .028420636               | 8.65292  | Calmodulin 3 (Calm3)  |
| Psme3         | -0.20 | .029511489               | 6.679222 | Proteasome (prosome, macropain) activator subunit 3 (PA28 gamma, Ki) (Psme3)                    |
| 9530068E07Rik | -0.20 | .027380706               | 6.96003  | RIKEN cDNA 9530068E07 gene (9530068E07Rik)  |
| Ckap5         | -0.20 | .02474113                | 7.681142 | Cytoskeleton-associated protein 5 (Ckap5)   |
| Dtna          | -0.20 | .048540176               | 7.608819 | Dystrobrevin alpha (Dtna)   |
| Tnks2         | -0.20 | .038960893               | 7.368871 | Tankyrase, TRF1-interacting ankyrin-related ADP-ribose polymerase 2 (Tnks2)                     |
| Dag1          | -0.20 | .019824798               | 7.131407 | Dystroglycan 1 (Dag1)   |
| Chtop         | -0.20 | .015123266               | 7.463196 | Chromatin target of PRMT1 (Chtop)   |
| Map2          | -0.20 | .004795535               | 9.983491 | Microtubule-associated protein 2 (Map2)   |
| Capns1        | -0.21 | .021141437               | 7.702451 | Calpain, small subunit 1 (Capns1)   |
| Ewsr1         | -0.21 | .034904516               | 6.072625 | EWING sarcoma breakpoint region 1 (Ewsr1)   |
| Wnk2          | -0.21 | .029084936               | 7.039452 | WNK lysine deficient protein kinase 2 (Wnk2)  |
| Ppm1b         | -0.21 | .032876379               | 7.139224 | Protein phosphatase 1B, magnesium dependent, beta isoform (Ppm1b)                               |
| Mark3         | -0.21 | .047725201               | 5.69677  | MAP/microtubule affinity regulating kinase 3 (Mark3)  |
| Pacs2         | -0.21 | .049261866               | 7.922781 | Phosphofurin acidic cluster sorting protein 2 (Pacs2)   |
| Lamp2         | -0.22 | .020902731               | 7.129216 | Lysosomal-associated membrane protein 2 (Lamp2)   |
| Eef1a1        | -0.22 | .002386636               | 10.01755 | Eukaryotic translation elongation factor 1 alpha 1 (Eef1a1)                                     |
| Tagln3        | -0.22 | .045645557               | 7.037695 | Transgelin 3 (Tagln3)   |
| Tjp1          | -0.22 | .037366063               | 7.078721 | Tight junction protein 1 (Tjp1)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name  |
|-----------|-------|------------------|----------|---|
| Fez1      | -0.22 | .019133946       | 6.586395 | Fasciculation and elongation protein zeta 1 (zygin I) (Fez1)  |
| Zfyve27   | -0.22 | .04840043        | 5.356501 | Zinc finger, FYVE domain containing 27 (Zfyve27)  |
| Usp24     | -0.22 | .015743725       | 6.845824 | Ubiquitin-specific peptidase 24 (Usp24)   |
| Sptbn1    | -0.22 | .033918619       | 9.649821 | Spectrin beta, non-erythrocytic 1 (Sptbn1)  |
| Higd1a    | -0.22 | .048098188       | 6.351253 | HIG1 domain family, member 1A (Higd1a)  |
| Fundc1    | -0.22 | .033222174       | 6.078343 | FUN14 domain containing 1 (Fundc1)  |
| Dnajc8    | -0.22 | .048026004       | 5.994237 | DnaJ heat shock protein family (Hsp40) member C8 (Dnajc8)   |
| Cpped1    | -0.22 | .04315154        | 5.674905 | Calcineurin-like phosphoesterase domain containing 1 (Cpped1)   |
| Hnrnpa2b1 | -0.23 | .032288886       | 8.339669 | Heterogeneous nuclear ribonucleoprotein A2/B1 (Hnrnpa2b1)   |
| Ipo11     | -0.23 | .02794052        | 5.869566 | Importin 11 (Ipo11)   |
| Tmcc2     | -0.23 | .042701165       | 6.955315 | Transmembrane and coiled-coil domains 2 (Tmcc2)   |
| Ccni      | -0.23 | .031624232       | 8.073274 | Cyclin I (Ccni)   |
| St13      | -0.23 | .024270826       | 6.637612 | Suppression of tumorigenicity 13 (St13)   |
| Fam103a1  | -0.23 | .044699789       | 6.13996  | Family with sequence similarity 103, member A1 (Fam103a1)   |
| Edf1      | -0.23 | .047602141       | 7.219681 | Endothelial differentiation-related factor 1 (Edf1)   |
| Sall2     | -0.23 | .021380885       | 6.406947 | Sal-like 2 (Sall2)  |
| Slc25a4   | -0.23 | .014205371       | 9.314009 | Solute carrier family 25 (mitochondrial carrier, adenine nucleotide translocator), member 4 (Slc25a4) |
| Serinc3   | -0.23 | .010268109       | 8.211402 | Serine incorporator 3 (Serinc3)   |
| Chmp2b    | -0.23 | .031387276       | 5.341422 | Charged multivesicular body protein 2B (Chmp2b)   |
| Pls3      | -0.23 | .018779257       | 6.951053 | Plastin 3 (T-isoform) (Pls3)  |
| Odc1      | -0.23 | .034180961       | 5.955828 | Ornithine decarboxylase, structural 1 (Odc1)  |
| Ugp2      | -0.23 | .019094095       | 6.421912 | UDP-glucose pyrophosphorylase 2 (Ugp2)  |
| Stt3b     | -0.24 | .037953708       | 6.384695 | STT3, subunit of the oligosaccharyltransferase complex, homolog B ( <i>S. cerevisiae</i> ) (Stt3b)    |
| Nf1       | -0.24 | .003894461       | 8.325326 | Neurofibromatosis 1 (Nf1)   |
| Nbr1      | -0.24 | .016135328       | 6.657396 | Neighbor of Brca1 gene 1 (Nbr1)   |
| Sod2      | -0.24 | .020239088       | 7.314313 | Superoxide dismutase 2, mitochondrial (Sod2)  |
| Epn2      | -0.24 | .019401615       | 6.345149 | Epsin 2 (Epn2)  |
| Zfp330    | -0.24 | .042604347       | 4.865023 | Zinc finger protein 330 (Zfp330)  |
| Hdgf      | -0.24 | .034308347       | 6.773475 | Hepatoma-derived growth factor (Hdgf)   |
| Atf7ip    | -0.24 | .007354928       | 6.895615 | Activating transcription factor 7 interacting protein (Atf7ip)  |
| Cat       | -0.24 | .022261006       | 6.349767 | Catalase (Cat)  |
| Fbxo18    | -0.24 | .029856638       | 5.325475 | F-box protein 18 (Fbxo18)   |
| Rbmx      | -0.24 | .031316414       | 5.785527 | RNA binding motif protein, X chromosome (Rbmx)  |
| Dynll2    | -0.24 | .008739203       | 7.108816 | Dynein light chain LC8-type 2 (Dynll2)  |
| Amfr      | -0.24 | .011650588       | 7.325955 | Autocrine motility factor receptor (Amfr)   |
| Acbd5     | -0.24 | .026300658       | 7.227923 | Acyl-Coenzyme A binding domain containing 5 (Acbd5)   |
| Dnttip2   | -0.24 | .037893608       | 5.073691 | Deoxynucleotidyltransferase, terminal, interacting protein 2 (Dnttip2)                                |
| Calcoco1  | -0.24 | .021656056       | 5.499136 | Calcium binding and coiled coil domain 1 (Calcoco1)   |
| Pex19     | -0.24 | .040565049       | 5.906631 | Peroxisomal biogenesis factor 19 (Pex19)  |
| Sgpp1     | -0.25 | .022383684       | 6.333106 | Sphingosine-1-phosphate phosphatase 1 (Sgpp1)   |
| Smim7     | -0.25 | .029856638       | 6.244041 | Small integral membrane protein 7 (Smim7)   |
| Osbpl9    | -0.25 | .022861183       | 5.891799 | Oxysterol binding protein-like 9 (Osblp9)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Slc25a23      | -0.25 | .027621271               | 8.756569 | Solute carrier family 25 (mitochondrial carrier; phosphate carrier), member 23 (Slc25a23)           |
| Kcnk1         | -0.25 | .037129423               | 6.110503 | Potassium channel, subfamily K, member 1 (Kcnk1)  |
| Rasgef1b      | -0.25 | .022676509               | 5.982417 | RasGEF domain family, member 1B (Rasgef1b)  |
| Bbip1         | -0.25 | .048703145               | 5.34488  | BBSome interacting protein 1 (Bbip1)  |
| Phactr3       | -0.25 | .030123955               | 6.30021  | Phosphatase and actin regulator 3 (Phactr3)   |
| Oxsr1         | -0.25 | .027664989               | 5.572511 | Oxidative-stress responsive 1 (Oxsr1)   |
| Kat6a         | -0.25 | .033139201               | 6.610582 | K (lysine) acetyltransferase 6A (Kat6a)   |
| Hnrnpm        | -0.25 | .043869314               | 5.443259 | Heterogeneous nuclear ribonucleoprotein M (Hnrnpm)  |
| 2810403A07Rik | -0.25 | .018929779               | 5.636397 | RIKEN cDNA 2810403A07 gene (2810403A07Rik)  |
| Arid1b        | -0.25 | .03932386                | 5.455294 | AT-rich interactive domain 1B (SWI-like) (Arid1b)   |
| Rpl4          | -0.25 | .001129865               | 9.115343 | Ribosomal protein L4 (Rpl4)   |
| Cog3          | -0.25 | .043869775               | 4.982244 | Component of oligomeric golgi complex 3 (Cog3)  |
| Btaf1         | -0.25 | .048980131               | 5.230846 | B-TFIID TATA-box binding protein-associated factor 1 (Btaf1)  |
| Fus           | -0.25 | .026567644               | 6.534785 | Fused in sarcoma (Fus)  |
| Slc3a2        | -0.26 | .03138491                | 6.435586 | Solute carrier family 3 (activators of dibasic and neutral amino acid transport), member 2 (Slc3a2) |
| Tspan13       | -0.26 | .044048868               | 8.569765 | Tetraspanin 13 (Tspan13)  |
| Gnai3         | -0.26 | .042090453               | 5.639429 | Guanine nucleotide binding protein (G protein), alpha inhibiting 3 (Gnai3)                          |
| Arxes2        | -0.26 | .037646782               | 4.983505 | Adipocyte-related X-chromosome expressed sequence 2 (Arxes2)  |
| Phlpp1        | -0.26 | .006308037               | 6.748707 | PH domain and leucine-rich repeat protein phosphatase 1 (Phlpp1)                                    |
| Ankhd1        | -0.26 | .015576916               | 6.296844 | Ankyrin repeat and KH domain containing 1 (Ankhd1)  |
| Psme4         | -0.26 | .042061361               | 5.440159 | Proteasome (prosome, macropain) activator subunit 4 (Psme4)   |
| Snn           | -0.26 | .023955501               | 6.117338 | Stannin (Snn)   |
| BC005624      | -0.26 | .010994407               | 6.164256 | cDNA sequence BC005624 (BC005624)   |
| Mapre1        | -0.26 | .0077379                 | 6.934596 | Microtubule-associated protein, RP/EB family, member 1 (Mapre1)                                     |
| Rnh1          | -0.26 | .049266826               | 5.053477 | Ribonuclease/angiogenin inhibitor 1 (Rnh1)  |
| Necab2        | -0.26 | .013488601               | 7.788454 | N-terminal EF-hand calcium binding protein 2 (Necab2)   |
| Mterf3        | -0.26 | .046031584               | 4.501799 | Mitochondrial transcription termination factor 3 (Mterf3)   |
| Phc1          | -0.26 | .02813615                | 5.631294 | Polyhomeotic-like 1 (Phc1)  |
| Fam98a        | -0.26 | .049227284               | 4.88658  | Family with sequence similarity 98, member A (Fam98a)   |
| Rgma          | -0.26 | .0115973                 | 6.693934 | Repulsive guidance molecule family member A (Rgma)  |
| Pdzd11        | -0.26 | .01508435                | 5.766269 | PDZ domain containing 11 (Pdzd11)   |
| Eps15l1       | -0.26 | .024649476               | 6.087765 | Epidermal growth factor receptor pathway substrate 15-like 1 (Eps15l1)                              |
| Sltm          | -0.26 | .0296414                 | 5.923339 | SAFB-like, transcription modulator (Sltm)   |
| Akap13        | -0.26 | .049198755               | 6.012378 | A kinase (PRKA) anchor protein 13 (Akap13)  |
| Snx3          | -0.26 | .021127669               | 6.289998 | Sorting nexin 3 (Snx3)  |
| Arl3          | -0.27 | .017852891               | 6.135617 | ADP-ribosylation factor-like 3 (Arl3)   |
| Nudt9         | -0.27 | .032750747               | 5.122026 | Nudix (nucleoside diphosphate linked moiety X)-type motif 9 (Nudt9)                                 |
| Sri           | -0.27 | .031541549               | 5.671224 | Sorcin (Sri)  |
| Sin3a         | -0.27 | .029170877               | 5.394434 | Transcriptional regulator, SIN3A (yeast) (Sin3a)  |
| Add3          | -0.27 | .00359095                | 6.715724 | Adducin 3 (gamma) (Add3)  |
| Lrba          | -0.27 | .019058437               | 6.005154 | LPS-responsive beige-like anchor (Lrba)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Agpat3        | -0.27 | .011822831               | 7.742568 | 1-Acylglycerol-3-phosphate O-acyltransferase 3 (Agpat3)                          |
| Bod1l         | -0.27 | .01103335                | 7.14806  | Biorientation of chromosomes in cell division 1-like (Bod1l)                     |
| Ddx50         | -0.27 | .014794905               | 5.628299 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 50 (Ddx50)                                |
| Gabpa         | -0.27 | .038408411               | 5.396862 | GA repeat binding protein, alpha (Gabpa)   |
| Tspan9        | -0.27 | .045818635               | 5.035527 | Tetraspanin 9 (Tspan9)   |
| Shisa4        | -0.27 | .021282694               | 6.101481 | Shisa family member 4 (Shisa4)   |
| Ndutfaf1      | -0.27 | .045685535               | 4.531153 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, assembly factor 1 (Ndutfaf1) |
| Bcas2         | -0.27 | .048334791               | 5.403565 | Breast carcinoma amplified sequence 2 (Bcas2)                                    |
| Hnrnp3        | -0.27 | .029169184               | 5.359504 | Heterogeneous nuclear ribonucleoprotein H3 (Hnrnp3)                              |
| Anp32b        | -0.27 | .021943429               | 6.302753 | Acidic (leucine-rich) nuclear phosphoprotein 32 family, member B (Anp32b)        |
| Stx6          | -0.28 | .025574347               | 4.776296 | Syntaxin 6 (Stx6)  |
| Pcyt1a        | -0.28 | .023347531               | 5.685035 | Phosphate cytidylyltransferase 1, choline, alpha isoform (Pcyt1a)                |
| Psm4          | -0.28 | .02794052                | 5.420277 | Proteasome (prosome, macropain) subunit, alpha type 4 (Psm4)                     |
| Vti1b         | -0.28 | .01425755                | 6.755367 | Vesicle transport through interaction with t-SNAREs 1B (Vti1b)                   |
| Myo10         | -0.28 | .02455505                | 5.713401 | Myosin X (Myo10)   |
| Dpy19l1       | -0.28 | .006968579               | 6.225319 | Dpy-19-like 1 (C. elegans) (Dpy19l1)   |
| Prdx5         | -0.28 | .048902398               | 6.832908 | Peroxiredoxin 5 (Prdx5)  |
| Rnf130        | -0.28 | .008599471               | 5.934991 | Ring finger protein 130 (Rnf130)   |
| Tm7sf3        | -0.28 | .014849369               | 5.751446 | Transmembrane 7 superfamily member 3 (Tm7sf3)                                    |
| Map4k2        | -0.28 | .019324903               | 5.559858 | Mitogen-activated protein kinase kinase kinase kinase 2 (Map4k2)                 |
| Mrpl42        | -0.28 | .026998457               | 5.232647 | Mitochondrial ribosomal protein L42 (Mrpl42)                                     |
| Sfr1          | -0.28 | .017749768               | 6.518097 | SWI5 dependent recombination repair 1 (Sfr1)                                     |
| Ptptra        | -0.28 | .004076185               | 6.506519 | Protein tyrosine phosphatase, receptor type, A (Ptptra)                          |
| Dst           | -0.29 | .033073279               | 9.041516 | Dystonin (Dst)   |
| Coq2          | -0.29 | .038847529               | 5.300119 | Coenzyme Q2 4-hydroxybenzoate polyprenyltransferase (Coq2)                       |
| Phtf2         | -0.29 | .034892025               | 4.6744   | Putative homeodomain transcription factor 2 (Phtf2)                              |
| O610009B22Rik | -0.29 | .020551259               | 5.592015 | RIKEN cDNA O610009B22 gene (O610009B22Rik)                                       |
| Btf3l4        | -0.29 | .025161849               | 4.874957 | Basic transcription factor 3-like 4 (Btf3l4)                                     |
| Sdhb          | -0.29 | .012079109               | 6.47757  | Succinate dehydrogenase complex, subunit D, integral membrane protein (Sdhb)     |
| Acsl6         | -0.29 | .003485907               | 7.3734   | Acyl-CoA synthetase long-chain family member 6 (Acsl6)                           |
| Mrps15        | -0.29 | .024643437               | 4.82709  | Mitochondrial ribosomal protein S15 (Mrps15)                                     |
| Srp19         | -0.29 | .031184791               | 5.450445 | Signal recognition particle 19 (Srp19)   |
| Gpx1          | -0.29 | .007027757               | 6.226432 | Glutathione peroxidase 1 (Gpx1)  |
| Cyb5r3        | -0.29 | .008963428               | 6.817103 | Cytochrome b5 reductase 3 (Cyb5r3)   |
| Rtl8c         | -0.29 | .00336804                | 6.884815 | Retrotransposon Gag Like 8C (Rtl8c)  |
| Bod1          | -0.29 | .029856638               | 5.79444  | Biorientation of chromosomes in cell division 1 (Bod1)                           |
| Hmgn2         | -0.29 | .036545246               | 4.46665  | High-mobility group nucleosomal binding domain 2 (Hmgn2)                         |
| Mrpl34        | -0.29 | .019086888               | 4.915868 | Mitochondrial ribosomal protein L34 (Mrpl34)                                     |
| Tmem229a      | -0.29 | .037129093               | 7.89179  | Transmembrane protein 229A (Tmem229a)  |
| Eea1          | -0.29 | .005423168               | 6.426653 | Early endosome antigen 1 (Eea1)  |
| Herc2         | -0.30 | .008304718               | 7.716338 | HECT and RLD domain containing E3 ubiquitin protein ligase 2 (Herc2)             |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Rdh14         | -0.30 | .033011839               | 4.511187 | Retinol dehydrogenase 14 (all-trans and 9-cis) (Rdh14)                                |
| Smim19        | -0.30 | .035402795               | 4.66994  | Small integral membrane protein 19 (Smim19)   |
| Igfbp1        | -0.30 | .044827788               | 5.314464 | Immunoglobulin (CD79A) binding protein 1 (Igfbp1)                                     |
| Sympk         | -0.30 | .01226005                | 5.58604  | Symplekin (Sympk)   |
| Suds3         | -0.30 | .038158638               | 5.614964 | Suppressor of defective silencing 3 homolog ( <i>S. cerevisiae</i> ) (Suds3)          |
| Gnai2         | -0.30 | .003963796               | 7.476246 | Guanine nucleotide binding protein (G protein), alpha inhibiting 2 (Gnai2)            |
| Soat1         | -0.30 | .027828131               | 5.723837 | Sterol O-acyltransferase 1 (Soat1)  |
| Efcab14       | -0.30 | .011960822               | 7.110829 | EF-hand calcium binding domain 14 (Efcab14)   |
| Rps15a        | -0.30 | .001348066               | 7.714283 | Ribosomal protein S15A (Rps15a)   |
| Dtnbp1        | -0.30 | .04757055                | 5.344555 | Dystrobrevin binding protein 1 (Dtnbp1)   |
| Pdia4         | -0.30 | .028502651               | 5.26666  | Protein disulfide isomerase associated 4 (Pdia4)                                      |
| Eef1g         | -0.30 | .00213617                | 6.942786 | Eukaryotic translation elongation factor 1 gamma (Eef1g)                              |
| Pnrc2         | -0.30 | .020227553               | 5.847061 | Proline-rich nuclear receptor coactivator 2 (Pnrc2)                                   |
| Ndufb5        | -0.30 | .045540796               | 6.505275 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 5 (Ndufb5)                         |
| Ctsl          | -0.30 | .004323134               | 6.861777 | Cathepsin L (Ctsl)  |
| Itm2b         | -0.30 | .002436013               | 8.858788 | Integral membrane protein 2B (Itm2b)  |
| Dnajc19       | -0.30 | .033260188               | 4.55625  | DnaJ heat shock protein family (Hsp40) member C19 (Dnajc19)                           |
| Porcn         | -0.30 | .043835047               | 5.01051  | Porcupine homolog (Porcn)   |
| Mpp6          | -0.30 | .02185883                | 7.652036 | Membrane protein, palmitoylated 6 (MAGUK p55 subfamily member 6) (Mpp6)               |
| Snx1          | -0.30 | .007757178               | 5.87988  | Sorting nexin 1 (Snx1)  |
| Chmp5         | -0.30 | .014984772               | 5.940911 | Charged multivesicular body protein 5 (Chmp5)   |
| B230118H07Rik | -0.30 | .027788875               | 5.032722 | RIKEN cDNA B230118H07 gene (B230118H07Rik)  |
| Rgs2          | -0.31 | .034857114               | 5.694138 | Regulator of G-protein signaling 2 (Rgs2)   |
| Nek9          | -0.31 | .020366297               | 5.409532 | NIMA (never in mitosis gene a)-related expressed kinase 9 (Nek9)                      |
| Zfand5        | -0.31 | .001632556               | 7.427132 | Zinc finger, AN1-type domain 5 (Zfand5)   |
| Slc1a4        | -0.31 | .004323047               | 5.890215 | Solute carrier family 1 (glutamate/neutral amino acid transporter), member 4 (Slc1a4) |
| Ndr1          | -0.31 | .008394268               | 5.878064 | N-myc downstream-regulated gene 1 (Ndr1)  |
| Tex261        | -0.31 | .014849369               | 4.9824   | Testis expressed gene 261 (Tex261)  |
| Mia3          | -0.31 | .003317225               | 6.39833  | Melanoma inhibitory activity 3 (Mia3)   |
| Gm14597       | -0.31 | .017907964               | 5.520588 | Predicted gene (Gm14597)  |
| Atad2b        | -0.31 | .048579946               | 5.161203 | ATPase family, AAA domain containing 2B (Atad2b)                                      |
| Rpl6          | -0.31 | .006857215               | 6.385921 | Ribosomal protein L6 (Rpl6)   |
| Hnrnpa1       | -0.31 | .008494552               | 5.65413  | Heterogeneous nuclear ribonucleoprotein A1 (Hnrnpa1)                                  |
| Coro1b        | -0.31 | .018424083               | 5.050853 | Coronin, actin binding protein 1B (Coro1b)  |
| Map1lc3b      | -0.31 | .004922193               | 7.269997 | Microtubule-associated protein 1 light chain 3 beta (Map1lc3b)                        |
| Cript         | -0.31 | .002137321               | 6.904906 | Cysteine-rich PDZ-binding protein (Cript)   |
| Hsd17b12      | -0.31 | .021305324               | 5.441834 | Hydroxysteroid (17-beta) dehydrogenase 12 (Hsd17b12)                                  |
| Arhgef10l     | -0.31 | .044110955               | 3.913622 | Rho guanine nucleotide exchange factor (GEF) 10-like (Arhgef10l)                      |
| Psm1          | -0.31 | .007008639               | 6.292132 | Proteasome (prosome, macropain) 26S subunit, non-ATPase, 7 (Psm1)                     |
| Lamtor1       | -0.31 | .030117081               | 5.270539 | Late endosomal/lysosomal adaptor, MAPK and MTOR activator 1 (Lamtor1)                 |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tmem14c       | -0.31 | .040243883               | 4.806698 | Transmembrane protein 14C (Tmem14c)   |
| Med23         | -0.31 | .040901862               | 4.163135 | Mediator complex subunit 23 (Med23)   |
| Plxnb2        | -0.31 | .01013132                | 5.776563 | Plexin B2 (Plxnb2)  |
| 5031439G07Rik | -0.32 | .028092203               | 6.825154 | RIKEN cDNA 5031439G07 gene (5031439G07Rik)  |
| Mrps16        | -0.32 | .0413193                 | 3.987191 | Mitochondrial ribosomal protein S16 (Mrps16)  |
| Pcnt          | -0.32 | .023529659               | 4.885882 | Pericentrin (kendrin) (Pcnt)  |
| Gpr108        | -0.32 | .016056938               | 4.902229 | G protein-coupled receptor 108 (Gpr108)   |
| Gcsh          | -0.32 | .003495536               | 6.435538 | Glycine cleavage system protein H (aminomethyl carrier) (Gcsh)  |
| Usf2          | -0.32 | .02836186                | 4.557085 | Upstream transcription factor 2 (Usf2)  |
| Sec61a1       | -0.32 | .042966543               | 4.465689 | Sec61 alpha 1 subunit ( <i>S. cerevisiae</i> ) (Sec61a1)  |
| Prdx1         | -0.32 | .017646208               | 7.110693 | Peroxiredoxin 1 (Prdx1)   |
| Spg11         | -0.32 | .024534225               | 4.480576 | Spastic paraplegia 11 (Spg11)   |
| Atp5c1        | -0.32 | .026615422               | 7.849047 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F1 complex, gamma polypeptide 1 (Atp5c1)                         |
| Fbxo8         | -0.32 | .029667625               | 4.38742  | F-box protein 8 (Fbxo8)   |
| Cyth1         | -0.32 | .043127425               | 4.084181 | Cytohesin 1 (Cyth1)   |
| Fnta          | -0.32 | .014070832               | 6.002893 | Farnesyltransferase, CAAX box, alpha (Fnta)   |
| Gabbr1        | -0.32 | .000947021               | 10.13781 | Gamma-aminobutyric acid (GABA) B receptor, 1 (Gabbr1)   |
| Unc50         | -0.32 | .027261907               | 5.516906 | Unc-50 homolog ( <i>C. elegans</i> ) (Unc50)  |
| Srsf11        | -0.32 | .002452406               | 6.377959 | Serine/arginine-rich splicing factor 11 (Srsf11)  |
| 1110004F10Rik | -0.32 | .007162596               | 6.628161 | RIKEN cDNA 1110004F10 gene (1110004F10Rik)  |
| Ppp4r1        | -0.32 | .023664878               | 4.316199 | Protein phosphatase 4, regulatory subunit 1 (Ppp4r1)  |
| Cacng5        | -0.32 | .002994166               | 6.237949 | Calcium channel, voltage-dependent, gamma subunit 5 (Cacng5)  |
| Mpdz          | -0.32 | .005031819               | 5.725429 | Multiple PDZ domain protein (Mpdz)  |
| St6galnac4    | -0.32 | .020675368               | 4.314121 | ST6 (alpha-N-acetyl-neuraminy-2,3-beta-galactosyl-1,3)-N-acetylgalactosaminide alpha-2,6-sialyltransferase 4 (St6galnac4) |
| Ndufb10       | -0.32 | .039714871               | 6.002438 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 10 (Ndufb10)   |
| Unc79         | -0.32 | .002761284               | 6.302647 | Unc-79 homolog ( <i>C. elegans</i> ) (Unc79)  |
| Rsu1          | -0.32 | .013584672               | 4.998013 | Ras suppressor protein 1 (Rsu1)   |
| Skp1a         | -0.32 | .010054031               | 7.672254 | S-phase kinase-associated protein 1A (Skp1a)  |
| Ptpn23        | -0.33 | .007698901               | 5.441743 | Protein tyrosine phosphatase, non-receptor type 23 (Ptpn23)   |
| Eif4a3        | -0.33 | .027247753               | 5.173418 | Eukaryotic translation initiation factor 4A3 (Eif4a3)   |
| Fbxw2         | -0.33 | .021265545               | 5.093464 | F-box and WD-40 domain protein 2 (Fbxw2)  |
| Btf3          | -0.33 | .02161036                | 5.421679 | Basic transcription factor 3 (Btf3)   |
| Rbm17         | -0.33 | .041302514               | 5.327054 | RNA binding motif protein 17 (Rbm17)  |
| Utp20         | -0.33 | .028592899               | 4.178725 | UTP20 small subunit processome component (Utp20)  |
| Tra2b         | -0.33 | .025845262               | 5.094612 | Transformer 2 beta homolog (Tra2b)  |
| Adamts20      | -0.33 | .045333472               | 3.498477 | A disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 20 (Adamts20)                 |
| Bicdl1        | -0.33 | .039090601               | 4.598759 | BICD Family Like Cargo Adaptor 1 (Bicdl1)   |
| Tspan6        | -0.33 | .031437245               | 5.12991  | Tetraspanin 6 (Tspan6)  |
| Sod1          | -0.33 | .011599886               | 8.686631 | Superoxide dismutase 1, soluble (Sod1)  |
| Eif3k         | -0.33 | .041166308               | 6.415439 | Eukaryotic translation initiation factor 3, subunit K (Eif3k)   |
| Vps13d        | -0.33 | .010629564               | 7.310236 | Vacuolar protein sorting 13D (Vps13d)   |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Trappc6b      | -0.33 | .009971872               | 6.711676 | Trafficking protein particle complex 6B (Trappc6b)                                  |
| Siah1a        | -0.33 | .023276584               | 4.635733 | Seven in absentia 1A (Siah1a)   |
| Gtf2h5        | -0.33 | .015576268               | 5.463452 | General transcription factor IIH, polypeptide 5 (Gtf2h5)                            |
| Chmp3         | -0.33 | .002485981               | 6.156804 | Charged multivesicular body protein 3 (Chmp3)                                       |
| Slc25a37      | -0.33 | .039256318               | 5.250203 | Solute carrier family 25, member 37 (Slc25a37)                                      |
| Surf4         | -0.33 | .013746434               | 5.581993 | Surfeit gene 4 (Surf4)  |
| Bcar1         | -0.33 | .02601574                | 4.546247 | Breast cancer anti-estrogen resistance 1 (Bcar1)                                    |
| Dhrs1         | -0.33 | .002406327               | 6.293994 | Dehydrogenase/reductase (SDR family) member 1 (Dhrs1)                               |
| Cirbp         | -0.33 | .030826326               | 4.672219 | Cold inducible RNA binding protein (Cirbp)  |
| Otud7b        | -0.33 | .013955006               | 6.636387 | OTU domain containing 7B (Otud7b)   |
| Knop1         | -0.33 | .020947676               | 4.540222 | Lysine-rich nucleolar protein 1 (Knop1)   |
| Timm44        | -0.33 | .028703373               | 4.245006 | Translocase of inner mitochondrial membrane 44 (Timm44)                             |
| Cdc42se1      | -0.33 | .02047175                | 5.071714 | CDC42 small effector 1 (Cdc42se1)   |
| Dars          | -0.33 | .010476027               | 5.114956 | Aspartyl-tRNA synthetase (Dars)   |
| Slc6a8        | -0.33 | .028112304               | 6.419921 | Solute carrier family 6 (neurotransmitter transporter, creatine), member 8 (Slc6a8) |
| Strn3         | -0.33 | .006649473               | 6.810383 | Striatin, calmodulin binding protein 3 (Strn3)                                      |
| Actr3b        | -0.33 | .048109505               | 4.928606 | ARP3 actin-related protein 3B (Actr3b)  |
| Adipor2       | -0.34 | .009671181               | 5.088752 | Adiponectin receptor 2 (Adipor2)  |
| Ep400         | -0.34 | .004524504               | 6.607341 | E1A binding protein p400 (Ep400)  |
| Pdcl3         | -0.34 | .022289688               | 4.628409 | phosducin-like 3 (Pdcl3)  |
| Gle1          | -0.34 | .030829968               | 4.408031 | GLE1 RNA export mediator (yeast) (Gle1)   |
| Papss1        | -0.34 | .00348391                | 5.640647 | 3'-Phosphoadenosine 5'-phosphosulfate synthase 1 (Papss1)                           |
| Suclg1        | -0.34 | .027205934               | 5.889638 | Succinate-CoA ligase, GDP-forming, alpha subunit (Suclg1)                           |
| Marchf8       | -0.34 | .029564941               | 5.818224 | Membrane-associated ring-CH-type finger 8 (Marchf8)                                 |
| Stard10       | -0.34 | .021265545               | 4.156027 | START domain containing 10 (Stard10)  |
| Trp53bp1      | -0.34 | .003914961               | 6.612606 | Transformation-related protein 53 binding protein 1 (Trp53bp1)                      |
| Cers5         | -0.34 | .010811946               | 5.109968 | Ceramide synthase 5 (Cers5)   |
| Sft2d2        | -0.34 | .027788875               | 5.164481 | SFT2 domain containing 2 (Sft2d2)   |
| Fam104a       | -0.34 | .042574984               | 3.963271 | Family with sequence similarity 104, member A (Fam104a)                             |
| Gcc2          | -0.34 | .000848083               | 7.047509 | GRIP and coiled-coil domain containing 2 (Gcc2)                                     |
| P4hb          | -0.34 | .00186315                | 6.262339 | Prolyl 4-hydroxylase, beta polypeptide (P4hb)                                       |
| Sorbs1        | -0.34 | .008775483               | 6.360295 | Sorbin and SH3 domain containing 1 (Sorbs1)   |
| 1600012H06Rik | -0.34 | .028531277               | 4.001906 | RIKEN cDNA 1600012H06 gene (1600012H06Rik)  |
| Med9          | -0.34 | .041270088               | 5.259304 | Mediator complex subunit 9 (Med9)   |
| Ei24          | -0.34 | .002896849               | 5.94467  | Etoposide-induced 2.4 mRNA (Ei24)   |
| Rap1a         | -0.34 | .02794052                | 5.66673  | RAS-related protein-1a (Rap1a)  |
| Luc7l2        | -0.34 | .00414404                | 6.313962 | LUC7-like 2 ( <i>S. cerevisiae</i> ) (Luc7l2)                                       |
| Banf1         | -0.34 | .039212306               | 4.775062 | Barrier to autointegration factor 1 (Banf1)   |
| Tead1         | -0.34 | .032054003               | 5.666116 | TEA domain family member 1 (Tead1)  |
| Map1a         | -0.34 | .000874691               | 10.06103 | Microtubule-associated protein 1 A (Map1a)  |
| 4933434E20Rik | -0.35 | .00187235                | 6.501247 | RIKEN cDNA 4933434E20 gene (4933434E20Rik)  |
| Bicd2         | -0.35 | .007362769               | 5.950658 | Bicaudal D homolog 2 (Bicd2)  |
| Crcp          | -0.35 | .024649476               | 4.497548 | Calcitonin gene-related peptide-receptor component protein (Crcp)                   |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Pigp          | -0.35 | .029404518               | 4.357308 | Phosphatidylinositol glycan anchor biosynthesis, class P (Pigp)                                      |
| Atp5g3        | -0.35 | .019406446               | 7.887496 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F0 complex, subunit C3 (subunit 9) (Atp5g3) |
| Ccdc43        | -0.35 | .041439052               | 4.209402 | Coiled-coil domain containing 43 (Ccdc43)  |
| Gpr155        | -0.35 | .012676302               | 5.385064 | G protein-coupled receptor 155 (Gpr155)  |
| Nop53         | -0.35 | .01419492                | 5.421592 | NOP53 Ribosome Biogenesis Factor (Nop53)   |
| Tmem108       | -0.35 | .044600709               | 4.697958 | Transmembrane protein 108 (Tmem108)  |
| Ccl27a        | -0.35 | .011230986               | 4.586288 | Chemokine (C-C motif) ligand 27A (Ccl27a)  |
| Ttc21b        | -0.35 | .035896904               | 4.059452 | Tetratricopeptide repeat domain 21B (Ttc21b)   |
| Sdf2          | -0.35 | .031989287               | 5.105139 | Stromal cell derived factor 2 (Sdf2)   |
| Manf          | -0.35 | .029448594               | 4.526091 | Mesencephalic astrocyte-derived neurotrophic factor (Manf)   |
| Cnppd1        | -0.35 | .045987994               | 4.040715 | Cyclin Pas1/PHO80 domain containing 1 (Cnppd1)   |
| Fryl          | -0.35 | .000519009               | 6.990492 | FRY like transcription coactivator (Fryl)  |
| Notch2        | -0.35 | .030400738               | 4.670483 | Notch 2 (Notch2)   |
| Golga1        | -0.35 | .005095247               | 5.307623 | Golgi autoantigen, golgin subfamily a, 1 (Golga1)  |
| Ier3ip1       | -0.35 | .014319962               | 5.238897 | Immediate early response 3 interacting protein 1 (Ier3ip1)   |
| 1110032A03Rik | -0.35 | .014712542               | 5.609509 | RIKEN cDNA 1110032A03 gene (1110032A03Rik)   |
| A830082K12Rik | -0.35 | .011783889               | 4.938299 | RIKEN cDNA A830082K12 gene (A830082K12Rik)   |
| Rnf181        | -0.35 | .005731889               | 5.71086  | Ring finger protein 181 (Rnf181)   |
| Trib2         | -0.35 | .04588652                | 5.220302 | Tribbles pseudokinase 2 (Trib2)  |
| Mocs2         | -0.35 | .004316871               | 6.203041 | Molybdenum cofactor synthesis 2 (Mocs2)  |
| Fgfr1         | -0.35 | .029600607               | 5.016118 | Fibroblast growth factor receptor 1 (Fgfr1)  |
| Ahcyl2        | -0.35 | .003566774               | 7.338844 | S-adenosylhomocysteine hydrolase-like 2 (Ahcyl2)   |
| Pomt2         | -0.35 | .039883798               | 4.419317 | Protein-O-mannosyltransferase 2 (Pomt2)  |
| Thap11        | -0.35 | .027150003               | 3.701867 | THAP domain containing 11 (Thap11)   |
| Tspan12       | -0.35 | .024777285               | 5.337946 | Tetraspanin 12 (Tspan12)   |
| Cnbp          | -0.35 | .000456916               | 8.561758 | Cellular nucleic acid binding protein (Cnbp)   |
| Atg3          | -0.36 | .003322881               | 5.691353 | Autophagy related 3 (Atg3)   |
| Blvra         | -0.36 | .049187748               | 3.422634 | Biliverdin reductase A (Blvra)   |
| Smad3         | -0.36 | .015444153               | 4.343757 | SMAD family member 3 (Smad3)   |
| Arhgap42      | -0.36 | .015376064               | 4.531345 | Rho GTPase activating protein 42 (Arhgap42)  |
| Pdpf          | -0.36 | .007540637               | 5.164225 | Pancreatic progenitor cell differentiation and proliferation factor (Pdpf)                           |
| Rpl19         | -0.36 | .021865615               | 5.538451 | Ribosomal protein L19 (Rpl19)  |
| Prelid3b      | -0.36 | .005584173               | 6.077624 | PRELI Domain Containing 3B (Prelid3b)  |
| Smndc1        | -0.36 | .021033398               | 4.699628 | Survival motor neuron domain containing 1 (Smndc1)   |
| Ccm2          | -0.36 | .012746058               | 5.692786 | Cerebral cavernous malformation 2 (Ccm2)   |
| Txn1          | -0.36 | .023338067               | 6.687713 | Thioredoxin 1 (Txn1)   |
| Adam11        | -0.36 | .002352264               | 6.116481 | A disintegrin and metallopeptidase domain 11 (Adam11)  |
| Rasa3         | -0.36 | .026272451               | 4.940832 | RAS p21 protein activator 3 (Rasa3)  |
| Asah1         | -0.36 | .006031062               | 5.248269 | N-acylsphingosine amidohydrolase 1 (Asah1)   |
| Tnpo1         | -0.36 | .02660083                | 6.104989 | Transportin 1 (Tnpo1)  |
| Gpt2          | -0.36 | .023872569               | 4.980208 | Glutamic pyruvate transaminase (alanine aminotransferase) 2 (Gpt2)                                   |
| Rps7          | -0.36 | .020962203               | 4.349939 | Ribosomal protein S7 (Rps7)  |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| 1500009C09Rik | -0.36 | .007306183               | 6.161677 | RIKEN cDNA 1500009C09 gene (1500009C09Rik)  |
| Sirt3         | -0.36 | .019216825               | 3.894719 | Sirtuin 3 (Sirt3)   |
| Gemin7        | -0.36 | .034317847               | 4.179991 | Gem (nuclear organelle)-associated protein 7 (Gemin7)                               |
| Isca2         | -0.36 | .020709771               | 5.730503 | Iron-sulfur cluster assembly 2 (Isca2)  |
| Slc35a1       | -0.36 | .016755359               | 4.649356 | Solute carrier family 35 (CMP-sialic acid transporter), member 1 (Slc35a1)          |
| Rer1          | -0.36 | .006545879               | 5.915649 | Retention in endoplasmic reticulum sorting receptor 1 (Rer1)                        |
| Fmn2          | -0.36 | .002314967               | 7.301916 | Formin 2 (Fmn2)   |
| Map6d1        | -0.36 | .003061616               | 5.466221 | MAP6 domain containing 1 (Map6d1)   |
| Zfp950        | -0.36 | .017907964               | 4.392611 | Zinc finger protein 950 (Zfp950)  |
| Fam133b       | -0.36 | .019326279               | 4.280278 | Family with sequence similarity 133, member B (Fam133b)                             |
| Sf3b6         | -0.36 | .027718749               | 4.791618 | Splicing factor 3B, subunit 6 (Sf3b6)   |
| Zswim6        | -0.36 | .031902171               | 4.891964 | Zinc finger SWIM-type containing 6 (Zswim6)   |
| Pnn           | -0.36 | .010199583               | 5.524106 | Pinin (Pnn)   |
| Sptb          | -0.36 | .015088367               | 6.027025 | Spectrin beta, erythrocytic (Sptb)  |
| Selenom       | -0.36 | .013686345               | 6.145625 | Selenoprotein M (Selenom)   |
| Cyb561d1      | -0.37 | .030800714               | 3.894296 | Cytochrome b-561 domain containing 1 (Cyb561d1)                                     |
| Commd4        | -0.37 | .015896224               | 4.730431 | COMM domain containing 4 (Commd4)   |
| Klhl21        | -0.37 | .017918086               | 4.541181 | Kelch-like 21 (Klhl21)  |
| Cetn2         | -0.37 | .036974195               | 5.102604 | Centrin 2 (Cetn2)   |
| Chfr          | -0.37 | .04773477                | 3.847429 | Checkpoint with forkhead and ring finger domains (Chfr)                             |
| Dph7          | -0.37 | .023338067               | 4.090044 | Diphthamine biosynthesis 7 (Dph7)   |
| Ss18l2        | -0.37 | .028202678               | 5.279502 | SS18 Like 2 (Ss18l2)  |
| Emc2          | -0.37 | .001926553               | 5.769606 | ER membrane protein complex subunit 2 (Emc2)  |
| Yes1          | -0.37 | .017564034               | 4.592648 | YES proto-oncogene 1, Src family tyrosine kinase (Yes1)                             |
| Trim39        | -0.37 | .010335023               | 4.280451 | Tripartite motif-containing 39 (Trim39)   |
| Hdac1         | -0.37 | .020824676               | 4.174361 | Histone deacetylase 1 (Hdac1)   |
| Spcs2         | -0.37 | .012536351               | 6.099474 | Signal peptidase complex subunit 2 homolog ( <i>S. cerevisiae</i> ) (Spcs2)         |
| Rnf13         | -0.37 | .000576592               | 7.201238 | Ring finger protein 13 (Rnf13)  |
| Hnrnpdl       | -0.37 | .002817175               | 6.956162 | Heterogeneous nuclear ribonucleoprotein D-like (Hnrnpdl)                            |
| Mpnd          | -0.37 | .027319849               | 5.6926   | MPN domain containing (Mpnd)  |
| Golph3l       | -0.37 | .003043264               | 5.147593 | Golgi phosphoprotein 3-like (Golph3l)   |
| Sp1           | -0.37 | .043696803               | 5.635839 | Trans-acting transcription factor 1 (Sp1)   |
| Pdlim5        | -0.37 | .002406327               | 5.82551  | PDZ and LIM domain 5 (Pdlim5)   |
| Ndubf1        | -0.37 | .023149087               | 5.072944 | NADH dehydrogenase (ubiquinone) 1, alpha/beta subcomplex, 1 (Ndubf1)                |
| Farp1         | -0.37 | .015701214               | 5.51445  | FERM, RhoGEF (Arhgef) and pleckstrin domain protein 1 (chondrocyte-derived) (Farp1) |
| Rbl2          | -0.37 | .007688337               | 5.946285 | Retinoblastoma-like 2 (Rbl2)  |
| Parvb         | -0.37 | .002022362               | 5.643923 | Parvin, beta (Parvb)  |
| Upf3a         | -0.37 | .029143626               | 4.115451 | UPF3 regulator of nonsense transcripts homolog A (yeast) (Upf3a)                    |
| Mllt6         | -0.37 | .007909745               | 6.434454 | Myeloid/lymphoid or mixed-lineage leukemia; translocated to, 6 (Mllt6)              |
| Sec14l1       | -0.37 | .003637939               | 6.308805 | SEC14-like lipid binding 1 (Sec14l1)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Leng8     | -0.37 | .02471236        | 4.96617  | Leukocyte receptor cluster (LRC) member 8 (Leng8)  |
| Ppp1r9a   | -0.37 | .004867721       | 7.55654  | Protein phosphatase 1, regulatory (inhibitor) subunit 9A (Ppp1r9a)                       |
| Bzw2      | -0.37 | .038158638       | 3.741907 | Basic leucine zipper and W2 domains 2 (Bzw2)   |
| Nubp2     | -0.37 | .045315976       | 3.735065 | Nucleotide binding protein 2 (Nubp2)   |
| Pcna      | -0.37 | .024826104       | 4.433702 | Proliferating cell nuclear antigen (Pcna)  |
| Gnptg     | -0.37 | .003393207       | 5.492882 | N-acetylglucosamine-1-phosphotransferase, gamma subunit (Gnptg)                          |
| Rilpl1    | -0.37 | .014625427       | 4.427741 | Rab interacting lysosomal protein-like 1 (Rilpl1)  |
| Pdcl      | -0.37 | .032589349       | 3.845604 | Phosducin-like (Pdcl)  |
| Akap9     | -0.37 | .021631681       | 8.247787 | A kinase (PRKA) anchor protein (yotiao) 9 (Akap9)  |
| Camk2g    | -0.37 | .000912075       | 6.569967 | Calcium/calmodulin-dependent protein kinase II gamma (Camk2g)                            |
| Map4k4    | -0.37 | .00742593        | 6.484895 | Mitogen-activated protein kinase kinase kinase kinase 4 (Map4k4)                         |
| Elof1     | -0.37 | .005734008       | 5.705256 | ELF1 homolog, elongation factor 1 (Elof1)  |
| Uhrf1bp1  | -0.38 | .02699407        | 4.750968 | UHRF1 (ICBP90) binding protein 1 (Uhrf1bp1)  |
| Mtus1     | -0.38 | .017206437       | 6.197123 | Mitochondrial tumor suppressor 1 (Mtus1)   |
| Txndc9    | -0.38 | .01226005        | 5.376709 | Thioredoxin domain containing 9 (Txndc9)   |
| Focad     | -0.38 | .017646946       | 4.681616 | Focadhesin (Focad)   |
| Paxx      | -0.38 | .010098291       | 5.193032 | PAXX Non-Homologous End Joining Factor (Paxx)  |
| Macf1     | -0.38 | .019796206       | 8.720209 | Microtubule-actin crosslinking factor 1 (Macf1)  |
| Fopnl     | -0.38 | .004455196       | 5.122131 | Fgfr1op N-terminal like (Fopnl)  |
| Ehmt1     | -0.38 | .016199251       | 4.206255 | Euchromatic histone methyltransferase 1 (Ehmt1)  |
| Sppl2a    | -0.38 | .010389925       | 5.665058 | Signal peptide peptidase like 2A (Sppl2a)  |
| Ndufv3    | -0.38 | .01096809        | 5.983784 | NADH dehydrogenase (ubiquinone) flavoprotein 3 (Ndufv3)                                  |
| Coq10a    | -0.38 | .011470903       | 4.96198  | Coenzyme Q10A (Coq10a)   |
| Ddit4     | -0.38 | .035389075       | 3.676984 | DNA-damage-inducible transcript 4 (Ddit4)  |
| Lrrc1     | -0.38 | .021326175       | 3.734517 | Leucine-rich repeat containing 1 (Lrrc1)   |
| Stx8      | -0.38 | .016904859       | 4.336883 | Syntaxin 8 (Stx8)  |
| Sec61b    | -0.38 | .02210521        | 4.163164 | Sec61 beta subunit (Sec61b)  |
| Sema6a    | -0.38 | .002203446       | 6.792381 | Sema domain, transmembrane domain (TM), and cytoplasmic domain, (semaphorin) 6A (Sema6a) |
| Sun2      | -0.38 | .029143626       | 4.407153 | Sad1 and UNC84 domain containing 2 (Sun2)  |
| Cyb5d2    | -0.38 | .023023329       | 4.077094 | Cytochrome b5 domain containing 2 (Cyb5d2)   |
| Rpl7      | -0.38 | .01061723        | 6.632378 | Ribosomal protein L7 (Rpl7)  |
| Desi1     | -0.38 | .002960631       | 6.469185 | Desumoylating isopeptidase 1 (Desi1)   |
| Txndc12   | -0.38 | .043938488       | 4.646076 | Thioredoxin domain containing 12 (endoplasmic reticulum) (Txndc12)                       |
| Mcrs1     | -0.38 | .041730143       | 3.713408 | Microspherule protein 1 (Mcrs1)  |
| Tpm4      | -0.38 | .015279601       | 5.239195 | Tropomyosin 4 (Tpm4)   |
| Slc20a1   | -0.38 | .002536116       | 5.443567 | Solute carrier family 20, member 1 (Slc20a1)   |
| Mrpl32    | -0.38 | .016430801       | 3.932454 | Mitochondrial ribosomal protein L32 (Mrpl32)   |
| Pdcd6     | -0.38 | .008930446       | 5.432322 | Programmed cell death 6 (Pdcd6)  |
| Rexo4     | -0.38 | .013084293       | 4.657192 | REX4, 3'-5' exonuclease (Rexo4)  |
| Cnih4     | -0.38 | .007750305       | 5.473925 | Cornichon family AMPA receptor auxiliary protein 4 (Cnih4)                               |
| Zdhhc1    | -0.38 | .022523673       | 4.048519 | Zinc finger, DHHC domain containing 1 (Zdhhc1)   |
| Ndufb11   | -0.39 | .003485907       | 5.957946 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 11 (Ndufb11)                          |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|-----------|-------|------------------|----------|--|
| Ctsa      | -0.39 | .002812314       | 6.46464  | Cathepsin A (Ctsa)   |
| Camk1     | -0.39 | .026463697       | 4.039013 | Calcium/calmodulin-dependent protein kinase I (Camk1)  |
| Jam2      | -0.39 | .001109752       | 6.643172 | Junction adhesion molecule 2 (Jam2)  |
| Ankrd40   | -0.39 | .000293487       | 7.263537 | Ankyrin repeat domain 40 (Ankrd40)   |
| Specc1    | -0.39 | .032381058       | 5.767666 | Sperm antigen with calponin homology and coiled-coil domains 1-like (Specc1)                   |
| Mrpl18    | -0.39 | .00405561        | 5.318986 | Mitochondrial ribosomal protein L18 (Mrpl18)   |
| Hey1      | -0.39 | .0143615         | 5.927487 | Hairy/enhancer-of-split related with YRPW motif 1 (Hey1)                                       |
| Degs1     | -0.39 | .000941595       | 6.436363 | Delta (4)-desaturase, sphingolipid 1 (Degs1)   |
| Zdhhc24   | -0.39 | .005734008       | 5.616937 | Zinc finger, DHHC domain containing 24 (Zdhhc24)   |
| Rpl28     | -0.39 | .01937184        | 4.185653 | Ribosomal protein L28 (Rpl28)  |
| Msmo1     | -0.39 | .003532042       | 6.385531 | Methylsterol monooxygenase 1 (Msmo1)   |
| Tpp1      | -0.39 | .001142609       | 6.754548 | Tripeptidyl peptidase I (Tpp1)   |
| Orai3     | -0.39 | .015583382       | 4.541553 | ORAI calcium release-activated calcium modulator 3 (Orai3)                                     |
| Apip      | -0.39 | .031612138       | 3.894771 | APAF1 interacting protein (Apip)   |
| Cep83     | -0.39 | .012458118       | 4.868491 | Centrosomal protein 83 (Cep83)   |
| Ssfa2     | -0.39 | .005465658       | 5.274424 | Sperm-specific antigen 2 (Ssfa2)   |
| Snrpb2    | -0.39 | .041485457       | 4.544808 | U2 small nuclear ribonucleoprotein B (Snrpb2)  |
| Qars      | -0.39 | .01013132        | 4.70361  | Glutamyl-tRNA synthetase (Qars)  |
| Pdcd10    | -0.39 | .002093131       | 5.296319 | Programmed cell death 10 (Pdcd10)  |
| Rabac1    | -0.39 | .003095396       | 6.618743 | Rab acceptor 1 (prenylated) (Rabac1)   |
| Pcsk6     | -0.39 | .013501345       | 4.184831 | Proprotein convertase subtilisin/kexin type 6 (Pcsk6)  |
| Phf23     | -0.39 | .016924453       | 4.464982 | PHD finger protein 23 (Phf23)  |
| Cox6b1    | -0.39 | .009766661       | 6.620112 | Cytochrome c oxidase, subunit VIb polypeptide 1 (Cox6b1)                                       |
| Pdk2      | -0.39 | .000970233       | 6.572492 | Pyruvate dehydrogenase kinase, isoenzyme 2 (Pdk2)  |
| Smim15    | -0.39 | .030278518       | 4.724098 | Small integral membrane protein 15 (Smim15)  |
| Aldh9a1   | -0.39 | .002459873       | 5.179273 | Aldehyde dehydrogenase 9, subfamily A1 (Aldh9a1)   |
| St6gal1   | -0.39 | .012453171       | 4.509486 | Beta galactoside alpha 2,6 sialyltransferase 1 (St6gal1)                                       |
| Tmeff2    | -0.40 | .003482828       | 6.858251 | Transmembrane protein with EGF-like and two follistatin-like domains 2 (Tmeff2)                |
| Rdx       | -0.40 | .002382967       | 6.442893 | Radixin (Rdx)  |
| Naa16     | -0.40 | .035375302       | 3.629829 | N (alpha)-acetyltransferase 16, NatA auxiliary subunit (Naa16)                                 |
| Chchd5    | -0.40 | .015678367       | 3.626452 | Coiled-coil-helix-coiled-coil-helix domain containing 5 (Chchd5)                               |
| Slc25a33  | -0.40 | .01533009        | 4.168083 | Solute carrier family 25, member 33 (Slc25a33)   |
| Rcbtb2    | -0.40 | .011769985       | 4.214699 | Regulator of chromosome condensation (RCC1) and BTB (POZ) domain containing protein 2 (Rcbtb2) |
| Tbcel     | -0.40 | .008250138       | 5.427753 | Tubulin folding cofactor E-like (Tbcel)  |
| Gdpd5     | -0.40 | .007686435       | 5.576238 | Glycerophosphodiester phosphodiesterase domain containing 5 (Gdpd5)                            |
| Nsa2      | -0.40 | .029322323       | 3.584271 | NSA2 ribosome biogenesis homolog (Nsa2)  |
| Rcsd1     | -0.40 | .038866642       | 3.352806 | RCSD domain containing 1 (Rcsd1)   |
| Zc3h7a    | -0.40 | .025997015       | 4.485623 | Zinc finger CCCH type containing 7 A (Zc3h7a)  |
| Unc119b   | -0.40 | .033579875       | 4.044553 | Unc-119 lipid binding chaperone B (Unc119b)  |
| Ufc1      | -0.40 | .012572791       | 5.182179 | Ubiquitin-fold modifier conjugating enzyme 1 (Ufc1)  |
| Efcab2    | -0.40 | .006639468       | 5.597234 | EF-hand calcium binding domain 2 (Efcab2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Mcur1         | -0.40 | .01508435                | 4.4308   | Mitochondrial calcium uniporter regulator 1 (Mcur1)                         |
| Adcy2         | -0.40 | .006257954               | 5.062578 | Adenylate cyclase 2 (Adcy2)   |
| Pex5l         | -0.40 | .015319252               | 6.100358 | Peroxisomal biogenesis factor 5-like (Pex5l)                                |
| Acin1         | -0.40 | .001931456               | 5.489797 | Apoptotic chromatin condensation inducer 1 (Acin1)                          |
| Sypl          | -0.40 | .012300838               | 5.513002 | Synaptophysin-like protein (Sypl)   |
| Cplx2         | -0.40 | .027804757               | 6.816912 | Complexin 2 (Cplx2)   |
| Cox7a2        | -0.40 | .019194704               | 6.955438 | Cytochrome c oxidase subunit VIIa 2 (Cox7a2)                                |
| Fmn1          | -0.40 | .040583036               | 4.752557 | Formin 1 (Fmn1)   |
| Psmc3         | -0.40 | .008609779               | 5.667568 | Proteasome (prosome, macropain) 26S subunit, ATPase 3 (Psmc3)               |
| 1700021F05Rik | -0.40 | .018956485               | 4.041475 | RIKEN cDNA 1700021F05 gene (1700021F05Rik)                                  |
| Ccdc117       | -0.40 | .007193457               | 4.626625 | Coiled-coil domain containing 117 (Ccdc117)                                 |
| Zfp516        | -0.40 | .024977903               | 4.518407 | Zinc finger protein 516 (Zfp516)  |
| H1f0          | -0.40 | .000860327               | 6.050358 | H1 histone family, member 0 (H1f0)  |
| Ak3           | -0.41 | .001318461               | 6.309927 | Adenylate kinase 3 (Ak3)  |
| Med8          | -0.41 | .027247753               | 3.755468 | Mediator complex subunit 8 (Med8)   |
| Nacc2         | -0.41 | .00158207                | 7.198835 | Nucleus accumbens-associated 2, BEN and BTB (POZ) domain containing (Nacc2) |
| Tppp3         | -0.41 | .002860213               | 6.019368 | Tubulin polymerization-promoting protein family member 3 (Tppp3)            |
| Fbln5         | -0.41 | .019162381               | 4.248527 | Fibulin 5 (Fbln5)   |
| Chka          | -0.41 | .009767034               | 5.14187  | Choline kinase alpha (Chka)   |
| Faim          | -0.41 | .03490335                | 5.148838 | Fas apoptotic inhibitory molecule (Faim)                                    |
| Acot13        | -0.41 | .007021954               | 6.051956 | Acyl-CoA thioesterase 13 (Acot13)   |
| Gtf2e2        | -0.41 | .026864152               | 3.908014 | General transcription factor II E, polypeptide 2 (beta subunit) (Gtf2e2)    |
| Myo7a         | -0.41 | .02365158                | 3.611898 | Myosin VIIA (Myo7a)   |
| Dynll1        | -0.41 | .004126485               | 7.122626 | Dynein light chain LC8-type 1 (Dynll1)                                      |
| Cdyl          | -0.41 | .014454136               | 3.679257 | Chromodomain protein, Y chromosome-like (Cdyl)                              |
| Rplp0         | -0.41 | .000828213               | 6.08716  | Ribosomal protein, large, P0 (Rplp0)  |
| Atp6v1g1      | -0.41 | .002850508               | 5.860596 | ATPase, H+ transporting, lysosomal V1 subunit G1 (Atp6v1g1)                 |
| B4galt4       | -0.41 | .008337123               | 4.220181 | UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 4 (B4galt4)  |
| Rnf114        | -0.41 | .005503396               | 6.42017  | Ring finger protein 114 (Rnf114)  |
| Nxt2          | -0.41 | .002572666               | 6.028015 | Nuclear transport factor 2-like export factor 2 (Nxt2)                      |
| Rtf2          | -0.41 | .003672551               | 5.246635 | Replication Termination Factor 2 (Rtf2)                                     |
| Prpsap1       | -0.41 | .020104078               | 4.786538 | Phosphoribosyl pyrophosphate synthetase-associated protein 1 (Prpsap1)      |
| Bad           | -0.41 | .011915112               | 4.270577 | BCL2-associated agonist of cell death (Bad)                                 |
| Gabarap       | -0.41 | .000583159               | 6.537115 | Gamma-aminobutyric acid receptor-associated protein (Gabarap)               |
| Trim11        | -0.41 | .030357657               | 3.466939 | Tripartite motif-containing 11 (Trim11)                                     |
| Parl          | -0.41 | .02541718                | 4.982809 | Presenilin-associated, rhomboid-like (Parl)                                 |
| Rpl22l1       | -0.41 | .048542635               | 4.250184 | Ribosomal protein L22 like 1 (Rpl22l1)                                      |
| Tcof1         | -0.41 | .023373455               | 3.80479  | Treacle ribosome biogenesis factor 1 (Tcof1)                                |
| Mdp1          | -0.41 | .009073335               | 3.906135 | Magnesium-dependent phosphatase 1 (Mdp1)                                    |
| Cox7b         | -0.41 | .003354847               | 7.233903 | Cytochrome c oxidase subunit VIIb (Cox7b)                                   |
| Ndufa8        | -0.41 | .004610134               | 5.261944 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 8 (Ndufa8)              |
| Grb14         | -0.41 | .008500124               | 4.769801 | Growth factor receptor bound protein 14 (Grb14)                             |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted p-value | AveExpr  | Gene full name   |
|---------------|-------|------------------|----------|--|
| Vta1          | -0.41 | .00359095        | 5.088706 | Vesicle (multivesicular body) trafficking 1 (Vta1)   |
| Mia2          | -0.41 | .001632556       | 5.951979 | Melanoma inhibitory activity 2 (Mia2)  |
| Trpm3         | -0.41 | .007375649       | 6.892197 | Transient receptor potential cation channel, subfamily M, member 3 (Trpm3)                   |
| Tmem161a      | -0.41 | .03325665        | 3.620343 | Transmembrane protein 161A (Tmem161a)  |
| Ctdsp2        | -0.41 | .000605447       | 5.823337 | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase 2 (Ctdsp2) |
| Zfp740        | -0.41 | .004772053       | 4.822581 | Zinc finger protein 740 (Zfp740)   |
| Lsm4          | -0.42 | .018412516       | 3.881901 | LSM4 homolog, U6 small nuclear RNA and mRNA degradation-associated (Lsm4)                    |
| Ndufs4        | -0.42 | .008910629       | 5.857538 | NADH dehydrogenase (ubiquinone) Fe-S protein 4 (Ndufs4)                                      |
| Cadps2        | -0.42 | .007112601       | 7.096508 | Ca <sup>2+</sup> -dependent activator protein for secretion 2 (Cadps2)                       |
| Cacfd1        | -0.42 | .015159819       | 5.886646 | Calcium channel flower domain containing 1 (Cacfd1)  |
| Mrps33        | -0.42 | .010820006       | 4.578723 | Mitochondrial ribosomal protein S33 (Mrps33)   |
| Slc20a2       | -0.42 | .003131139       | 6.206066 | Solute carrier family 20, member 2 (Slc20a2)   |
| Fam204a       | -0.42 | .019874699       | 3.804719 | Family with sequence similarity 204, member A (Fam204a)                                      |
| Adi1          | -0.42 | .002061103       | 6.321408 | Acireductone dioxygenase 1 (Adi1)  |
| Safb2         | -0.42 | .003301053       | 5.003817 | Scaffold attachment factor B2 (Safb2)  |
| Itpkb         | -0.42 | .001865287       | 6.32844  | Inositol 1,4,5-trisphosphate 3-kinase B (Itpkb)  |
| Tmco1         | -0.42 | .009031661       | 5.093259 | Transmembrane and coiled-coil domains 1 (Tmco1)  |
| Minos1        | -0.42 | .002982715       | 6.250402 | Mitochondrial inner membrane organizing system 1 (Minos1)                                    |
| Dand5         | -0.42 | .029966511       | 3.423705 | DAN domain family member 5, BMP antagonist (Dand5)   |
| Lrrc8a        | -0.42 | .001430721       | 5.684724 | Leucine-rich repeat containing 8A (Lrrc8a)   |
| Dctn6         | -0.42 | .021020224       | 5.622318 | Dynactin 6 (Dctn6)   |
| Ccdc90b       | -0.42 | .009223793       | 4.205238 | Coiled-coil domain containing 90B (Ccdc90b)  |
| Oaz1          | -0.42 | .001758502       | 6.464603 | Ornithine decarboxylase antizyme 1 (Oaz1)  |
| Ccdc30        | -0.42 | .030732249       | 3.595489 | Coiled-coil domain containing 30 (Ccdc30)  |
| Mrps28        | -0.42 | .046867769       | 3.88398  | Mitochondrial ribosomal protein S28 (Mrps28)   |
| Cep135        | -0.42 | .039883798       | 3.362123 | Centrosomal protein 135 (Cep135)   |
| Trappc3       | -0.42 | .000815174       | 6.671699 | Trafficking protein particle complex 3 (Trappc3)   |
| Mpc2          | -0.42 | .017476286       | 6.52468  | Mitochondrial pyruvate carrier 2 (Mpc2)  |
| Ubl5          | -0.42 | .007558033       | 6.137327 | Ubiquitin-like 5 (Ubl5)  |
| Kmt2d         | -0.42 | .001184058       | 7.741809 | Lysine (K)-specific methyltransferase 2D (Kmt2d)   |
| 2410015M20Rik | -0.42 | .013105516       | 4.64786  | RIKEN cDNA 2410015M20 gene (2410015M20Rik)   |
| Cox6a1        | -0.42 | .007686435       | 8.185404 | Cytochrome c oxidase subunit VIa polypeptide 1 (Cox6a1)                                      |
| Ccdc157       | -0.42 | .036722293       | 4.231007 | Coiled-coil domain containing 157 (Ccdc157)  |
| Bcap31        | -0.42 | .002951731       | 5.766616 | B cell receptor-associated protein 31 (Bcap31)   |
| Cadm4         | -0.42 | .004868494       | 5.572911 | Cell adhesion molecule 4 (Cadm4)   |
| H2afz         | -0.42 | .022217564       | 4.34632  | H2A histone family, member Z (H2afz)   |
| Lamtor3       | -0.42 | .004684401       | 4.982196 | Late endosomal/lysosomal adaptor, MAPK and MTOR activator 3 (Lamtor3)                        |
| Mettl3        | -0.42 | .026667285       | 3.228261 | Methyltransferase like 3 (Mettl3)  |
| CT010467.1    | -0.42 | .027220301       | 3.79783  | 18s RNA, related sequence 5 (Rn18s-rs5)  |
| Hmgn3         | -0.42 | .032589349       | 3.559541 | High-mobility group nucleosomal binding domain 3 (Hmgn3)                                     |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Rack1         | -0.43 | .000660096               | 6.920318 | Receptor for activated C kinase 1 (Rack1)   |
| Pitpnb        | -0.43 | .001904998               | 5.630274 | Phosphatidylinositol transfer protein, beta (Pitpnb)  |
| Emc3          | -0.43 | .001099459               | 6.195085 | ER membrane protein complex subunit 3 (Emc3)  |
| Timm9         | -0.43 | .002994166               | 4.980975 | Translocase of inner mitochondrial membrane 9 (Timm9)   |
| Chmp1b        | -0.43 | .010432832               | 4.187301 | Charged multivesicular body protein 1B (Chmp1b)   |
| Zmpste24      | -0.43 | .004002513               | 5.2161   | Zinc metalloproteinase, STE24 (Zmpste24)  |
| Hist1h1e      | -0.43 | .015743725               | 4.151375 | Histone cluster 1, H1e (Hist1h1e)   |
| Etfdh         | -0.43 | .003981479               | 4.709052 | Electron transferring flavoprotein, dehydrogenase (Etfdh)                                       |
| Cmss1         | -0.43 | .045634291               | 3.56466  | Cms small ribosomal subunit 1 (Cmss1)   |
| Hint1         | -0.43 | .00578877                | 6.687905 | Histidine triad nucleotide binding protein 1 (Hint1)  |
| Rara          | -0.43 | .048084305               | 3.556643 | Retinoic acid receptor, alpha (Rara)  |
| Paqr4         | -0.43 | .00367203                | 4.919297 | Progesterin and adipoQ receptor family member IV (Paqr4)  |
| Scg5          | -0.43 | .000569585               | 6.698831 | Secretogranin V (Scg5)  |
| Parp2         | -0.43 | .006114634               | 4.472915 | Poly(ADP-ribose) polymerase family, member 2 (Parp2)  |
| Man2b1        | -0.43 | .002971651               | 5.518745 | Mannosidase 2, alpha B1 (Man2b1)  |
| Txlna         | -0.43 | .032944447               | 4.639165 | Taxilin alpha (Txlna)   |
| Anapc16       | -0.43 | .000486801               | 5.703237 | Anaphase promoting complex subunit 16 (Anapc16)   |
| Dpm2          | -0.43 | .004207634               | 5.097606 | Dolichol-phosphate (beta-D) mannosyltransferase 2 (Dpm2)  |
| Snta1         | -0.43 | .04598509                | 3.066313 | Syntrophin, acidic 1 (Snta1)  |
| Mars          | -0.43 | .002418826               | 4.991893 | Methionine-tRNA synthetase (Mars)   |
| Trmt10b       | -0.43 | .00765485                | 4.205443 | tRNA methyltransferase 10B (Trmt10b)  |
| Coprs         | -0.43 | .04677459                | 5.242261 | Coordinator of PRMT5, differentiation stimulator (Coprs)  |
| Eif2b2        | -0.43 | .005779452               | 4.644576 | Eukaryotic translation initiation factor 2B, subunit 2 beta (Eif2b2)                            |
| Ahcy1         | -0.43 | .000143414               | 9.011066 | S-adenosylhomocysteine hydrolase-like 1 (Ahcy1)   |
| Cox5b         | -0.43 | .021115842               | 6.176991 | Cytochrome c oxidase subunit Vb (Cox5b)   |
| 3110082117Rik | -0.44 | .035540624               | 2.940827 | RIKEN cDNA 3110082117 gene (3110082117Rik)  |
| Gtf2b         | -0.44 | .00455525                | 4.85966  | General transcription factor IIB (Gtf2b)  |
| Elmod3        | -0.44 | .018047502               | 3.964494 | ELMO/CED-12 domain containing 3 (Elmod3)  |
| Eif2s3y       | -0.44 | .015076188               | 4.305951 | Eukaryotic translation initiation factor 2, subunit 3, structural gene Y-linked (Eif2s3y)       |
| Sdf2l1        | -0.44 | .044993679               | 2.922869 | Stromal cell-derived factor 2-like 1 (Sdf2l1)   |
| Plec          | -0.44 | .001520434               | 5.521983 | Plectin (Plec)  |
| Ift20         | -0.44 | .000280195               | 6.380937 | Intraflagellar transport 20 (Ift20)   |
| Fau           | -0.44 | .011750251               | 5.281708 | Finkel-Biskis-Reilly murine sarcoma virus (FBR-MuSV) ubiquitously expressed (fox derived) (Fau) |
| Hist3h2a      | -0.44 | .019003802               | 4.514681 | Histone cluster 3, H2a (Hist3h2a)   |
| Tmf1          | -0.44 | .000161929               | 6.442435 | TATA element modulatory factor 1 (Tmf1)   |
| Commd6        | -0.44 | .000699718               | 6.032527 | COMM domain containing 6 (Commd6)   |
| Pigv          | -0.44 | .033359548               | 2.776678 | Phosphatidylinositol glycan anchor biosynthesis, class V (Pigv)                                 |
| Cnm2          | -0.44 | .015159819               | 5.845062 | Cyclin M2 (Cnm2)  |
| Tti1          | -0.44 | .007918353               | 3.76309  | TELO2 interacting protein 1 (Tti1)  |
| 1110004E09Rik | -0.44 | .003792173               | 5.334904 | RIKEN cDNA 1110004E09 gene (1110004E09Rik)  |
| Kat2b         | -0.44 | .005571812               | 4.578222 | K (lysine) acetyltransferase 2B (Kat2b)   |
| Gtf2a2        | -0.44 | .001814296               | 5.085631 | General transcription factor II A, 2 (Gtf2a2)   |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Ap4s1         | -0.44 | .005383984               | 5.072882 | Adaptor-related protein complex AP-4, sigma 1 (Ap4s1)  |
| Ncan          | -0.44 | .000139914               | 7.899611 | Neurocan (Ncan)  |
| Elmo2         | -0.44 | .002712291               | 6.22453  | Engulfment and cell motility 2 (Elmo2)   |
| Ift80         | -0.44 | .017169007               | 4.868394 | Intraflagellar transport 80 (Ift80)  |
| Psmd9         | -0.44 | .024341637               | 3.935734 | Proteasome (prosome, macropain) 26S subunit, non-ATPase, 9 (Psmd9)                                     |
| Acyp2         | -0.44 | .003482272               | 5.429165 | Acylphosphatase 2, muscle type (Acyp2)   |
| Ap3b1         | -0.44 | .014769482               | 5.337996 | Adaptor-related protein complex 3, beta 1 subunit (Ap3b1)  |
| Tmc7          | -0.44 | .006603736               | 5.350307 | Transmembrane channel-like gene family 7 (Tmc7)  |
| Emc6          | -0.44 | .009221934               | 4.730617 | ER membrane protein complex subunit 6 (Emc6)   |
| Kyat1         | -0.44 | .043835047               | 2.698969 | Kynurenine aminotransferase 1 (Kyat1)  |
| Taf4          | -0.44 | .010617797               | 3.936144 | TATA-box binding protein-associated factor 4 (Taf4)  |
| Il1rap        | -0.44 | .015980695               | 4.681825 | Interleukin 1 receptor accessory protein (Il1rap)  |
| Nadk2         | -0.44 | .033892951               | 5.120271 | NAD kinase 2, mitochondrial (Nadk2)  |
| Dio2          | -0.44 | .005398225               | 4.803148 | Deiodinase, iodothyronine, type II (Dio2)  |
| Abtb1         | -0.44 | .048409154               | 3.283191 | Ankyrin repeat and BTB (POZ) domain containing 1 (Abtb1)   |
| Xpa           | -0.44 | .031545058               | 3.270251 | Xeroderma pigmentosum, complementation group A (Xpa)   |
| Atr           | -0.44 | .045404494               | 3.963495 | Ataxia telangiectasia and Rad3 related (Atr)   |
| Cd151         | -0.44 | .036084322               | 3.934619 | CD151 antigen (Cd151)  |
| Ints13        | -0.44 | .026490141               | 3.992241 | Integrator Complex Subunit 13 (Ints13)   |
| Serf2         | -0.44 | .022953895               | 3.184858 | Small EDRK-rich factor 2 (Serf2)   |
| Gria1         | -0.44 | .000273778               | 8.497389 | Glutamate receptor, ionotropic, AMPA1 (alpha 1) (Gria1)  |
| Marchf2       | -0.45 | .003856333               | 5.44614  | Membrane-associated ring-CH-type finger 2 (Marchf2)  |
| Lamtor4       | -0.45 | .008386012               | 4.427357 | Late endosomal/lysosomal adaptor, MAPK and MTOR activator 4 (Lamtor4)                                  |
| Tbca          | -0.45 | .007290095               | 6.105938 | Tubulin cofactor A (Tbca)  |
| Dad1          | -0.45 | .000729261               | 5.775609 | Defender against cell death 1 (Dad1)   |
| Smim26        | -0.45 | .008056938               | 4.383132 | Small Integral Membrane Protein 26 (Smim26)  |
| Rpl29         | -0.45 | .012125738               | 4.474077 | Ribosomal protein L29 (Rpl29)  |
| Cpne9         | -0.45 | .001197943               | 6.911288 | Copine family member IX (Cpne9)  |
| Eif1ad        | -0.45 | .032966326               | 4.051912 | Eukaryotic translation initiation factor 1A domain containing (Eif1ad)                                 |
| Mrpl54        | -0.45 | .047097802               | 3.169198 | Mitochondrial ribosomal protein L54 (Mrpl54)   |
| Uqcrb         | -0.45 | .022239401               | 4.310601 | Ubiquinol-cytochrome c reductase binding protein (Uqcrb)   |
| Nudt19        | -0.45 | .005078156               | 4.786934 | Nudix (nucleoside diphosphate linked moiety X)-type motif 19 (Nudt19)                                  |
| O610030E20Rik | -0.45 | .014964932               | 3.933243 | RIKEN cDNA O610030E20 gene (O610030E20Rik)   |
| Tmem242       | -0.45 | .00877788                | 4.092959 | Transmembrane protein 242 (Tmem242)  |
| Ptpdc1        | -0.45 | .014624429               | 5.754945 | Protein tyrosine phosphatase domain containing 1 (Ptpdc1)  |
| Clcc1         | -0.45 | .019253209               | 4.429356 | Chloride channel CLIC-like 1 (Clcc1)   |
| P4ha1         | -0.45 | .006350481               | 4.266142 | Procollagen-proline, 2-oxoglutarate 4-dioxygenase (proline 4-hydroxylase), alpha 1 polypeptide (P4ha1) |
| Fam50a        | -0.45 | .049871193               | 3.475657 | Family with sequence similarity 50, member A (Fam50a)  |
| Tmem216       | -0.45 | .048109505               | 3.228648 | Transmembrane protein 216 (Tmem216)  |
| Hspe1         | -0.45 | .005033126               | 6.226898 | Heat shock protein 1 (chaperonin 10) (Hspe1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Ryr3          | -0.45 | .013032013               | 5.277667 | Ryanodine receptor 3 (Ryr3)  |
| Nudc          | -0.45 | .003789289               | 5.192679 | nudC nuclear distribution protein (Nudc)   |
| Golga4        | -0.45 | .002304271               | 6.946693 | Golgi autoantigen, golgin subfamily a, 4 (Golga4)  |
| Snf8          | -0.45 | .011952121               | 4.954754 | SNF8, ESCRT-II complex subunit, homolog ( <i>S. cerevisiae</i> ) (Snf8)                  |
| Ndufa6        | -0.45 | .018209114               | 5.053535 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 6 (B14) (Ndufa6)                     |
| Zfp408        | -0.45 | .004396876               | 3.891377 | Zinc finger protein 408 (Zfp408)   |
| Atp5j2        | -0.45 | .031852455               | 4.997522 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F0 complex, subunit F2 (Atp5j2) |
| R3hdm4        | -0.45 | .000655883               | 5.586559 | R3H domain containing 4 (R3hdm4)   |
| Gpr4          | -0.45 | .006149778               | 4.388827 | G protein-coupled receptor 4 (Gpr4)  |
| Snrpd2        | -0.45 | .010643184               | 5.043409 | Small nuclear ribonucleoprotein D2 (Snrpd2)  |
| Dip2a         | -0.45 | .000830682               | 5.714678 | Disco interacting protein 2 homolog A (Dip2a)  |
| Rassf2        | -0.45 | .012360533               | 6.240017 | Ras association (RalGDS/AF-6) domain family member 2 (Rassf2)                            |
| Ryk           | -0.45 | .023328894               | 4.165696 | Receptor-like tyrosine kinase (Ryk)  |
| Rela          | -0.45 | .030881255               | 3.337454 | V-rel reticuloendotheliosis viral oncogene homolog A (avian) (Rela)                      |
| Ndufc1        | -0.45 | .006620727               | 5.766976 | NADH dehydrogenase (ubiquinone) 1, subcomplex unknown, 1 (Ndufc1)                        |
| Abcd2         | -0.45 | .002573216               | 5.010059 | ATP-binding cassette, sub-family D (ALD), member 2 (Abcd2)                               |
| Zfp651        | -0.45 | .006250277               | 4.546392 | Zinc finger protein 651 (Zfp651)   |
| Eef1akmt2     | -0.45 | .011428984               | 4.280509 | EEF1A Lysine Methyltransferase 2 (Eef1akmt2)   |
| Acad11        | -0.45 | .012526707               | 3.872331 | Acyl-Coenzyme A dehydrogenase family, member 11 (Acad11)                                 |
| Cobll1        | -0.45 | .011495141               | 3.936041 | Cobl-like 1 (Cobll1)   |
| Ldhb          | -0.45 | $6.78 \times 10^{-5}$    | 8.562448 | Lactate dehydrogenase B (Ldhb)   |
| Ppp1r16b      | -0.45 | .035612447               | 6.195026 | Protein phosphatase 1, regulatory (inhibitor) subunit 16B (Ppp1r16b)                     |
| Nrsn1         | -0.46 | .000194968               | 8.20317  | Neurensin 1 (Nrsn1)  |
| Gng12         | -0.46 | .00102596                | 6.425015 | Guanine nucleotide binding protein (G protein), gamma 12 (Gng12)                         |
| O610037L13Rik | -0.46 | .000508478               | 5.338903 | RIKEN cDNA O610037L13 gene (O610037L13Rik)   |
| Rock1         | -0.46 | .006609834               | 4.781342 | Rho-associated coiled-coil containing protein kinase 1 (Rock1)                           |
| Ptpmt1        | -0.46 | .0225033                 | 3.466663 | Protein tyrosine phosphatase, mitochondrial 1 (Ptpmt1)                                   |
| Vamp1         | -0.46 | .00785917                | 6.087557 | Vesicle-associated membrane protein 1 (Vamp1)  |
| Fam19a4       | -0.46 | .028703373               | 3.545306 | Family with sequence similarity 19, member A4 (Fam19a4)                                  |
| Tbc1d10a      | -0.46 | .026440925               | 3.093425 | TBC1 domain family, member 10a (Tbc1d10a)  |
| Prdx4         | -0.46 | .020566146               | 3.945309 | Peroxiredoxin 4 (Prdx4)  |
| Szrd1         | -0.46 | .003898525               | 4.60083  | SUZ RNA binding domain containing 1 (Szrd1)  |
| Sdhc          | -0.46 | .000441905               | 6.350884 | Succinate dehydrogenase complex, subunit C, integral membrane protein (Sdhc)             |
| Abca2         | -0.46 | .00024636                | 7.630009 | ATP-binding cassette, sub-family A (ABC1), member 2 (Abca2)                              |
| Rpap1         | -0.46 | .022530216               | 3.289161 | RNA polymerase II-associated protein 1 (Rpap1)   |
| Wnk1          | -0.46 | .00026372                | 8.986791 | WNK lysine deficient protein kinase 1 (Wnk1)   |
| Abhd14a       | -0.46 | .017242956               | 3.307686 | Abhydrolase domain containing 14A (Abhd14a)  |
| Nrgn          | -0.46 | .00500445                | 5.458358 | Neurogranin (Nrgn)   |
| Timm13        | -0.46 | .035345668               | 4.617238 | Translocase of inner mitochondrial membrane 13 (Timm13)                                  |
| Slc30a10      | -0.46 | .013253751               | 5.137112 | Solute carrier family 30, member 10 (Slc30a10)   |
| Krtcap2       | -0.46 | .005030185               | 4.820873 | Keratinocyte-associated protein 2 (Krtcap2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Scrt1         | -0.46 | .002694103               | 6.558491 | Scratch family zinc finger 1 (Scrt1)   |
| Pde1a         | -0.46 | .011495141               | 6.734232 | Phosphodiesterase 1A, calmodulin-dependent (Pde1a)   |
| Iqgap1        | -0.46 | .022356736               | 3.678007 | IQ motif containing GTPase activating protein 1 (Iqgap1)   |
| Fam173a       | -0.46 | .004464385               | 4.798495 | Family with sequence similarity 173, member A (Fam173a)  |
| Pigc          | -0.46 | .035322628               | 3.882049 | Phosphatidylinositol glycan anchor biosynthesis, class C (Pigc)  |
| Sac3d1        | -0.47 | .026796231               | 3.16932  | SAC3 domain containing 1 (Sac3d1)  |
| Hadhb         | -0.47 | .003830629               | 4.304094 | Hydroxyacyl-Coenzyme A dehydrogenase/3-ketoacyl-Coenzyme A thiolase/enoyl-Coenzyme A hydratase (trifunctional protein), beta subunit (Hadhb) |
| Tom111        | -0.47 | .009720775               | 4.9057   | Target of myb1-like 1 (chicken) (Tom111)   |
| Map7          | -0.47 | .002501728               | 4.362957 | Microtubule-associated protein 7 (Map7)  |
| Mindy1        | -0.47 | .012012463               | 3.528454 | MINDY Lysine 48 Deubiquitinase 1 (Mindy1)  |
| Zfand1        | -0.47 | .023966523               | 3.992524 | Zinc finger, AN1-type domain 1 (Zfand1)  |
| Diaph2        | -0.47 | .000756176               | 5.132277 | Diaphanous-related formin 2 (Diaph2)   |
| Kif16b        | -0.47 | .038699906               | 3.448732 | Kinesin family member 16B (Kif16b)   |
| Cntln         | -0.47 | .002298286               | 4.778481 | Centlein, centrosomal protein (Cntln)  |
| Lrrc10b       | -0.47 | .007450764               | 4.829905 | Leucine-rich repeat containing 10B (Lrrc10b)   |
| Tra2a         | -0.47 | .002222194               | 5.447715 | Transformer 2 alpha homolog (Tra2a)  |
| Rbm28         | -0.47 | .004618014               | 4.729767 | RNA binding motif protein 28 (Rbm28)   |
| Gcdh          | -0.47 | .0305352                 | 3.741276 | Glutaryl-Coenzyme A dehydrogenase (Gcdh)   |
| Gstz1         | -0.47 | .001088356               | 4.791127 | Glutathione transferase zeta 1 (maleylacetoacetate isomerase) (Gstz1)  |
| Tmem189       | -0.47 | .00521277                | 4.165724 | Transmembrane protein 189 (Tmem189)  |
| Cep63         | -0.47 | .00432711                | 4.581367 | Centrosomal protein 63 (Cep63)   |
| Gpr137b-ps    | -0.47 | .034308347               | 3.113276 | G protein-coupled receptor 137B, pseudogene (Gpr137b-ps)   |
| Cycs          | -0.47 | .028802536               | 3.194359 | Cytochrome c, somatic (Cycs)   |
| Arap2         | -0.47 | .004315947               | 6.3222   | ArfGAP with RhoGAP domain, ankyrin repeat and PH domain 2 (Arap2)  |
| Dlg1          | -0.47 | .00061393                | 6.286192 | Discs, large homolog 1 (Dlg1)  |
| Oat           | -0.47 | .000538534               | 5.650633 | Ornithine aminotransferase (Oat)   |
| Prkdc         | -0.47 | .00432711                | 5.157711 | Protein kinase, DNA activated, catalytic polypeptide (Prkdc)   |
| Trim62        | -0.47 | .048780331               | 4.538335 | Tripartite motif-containing 62 (Trim62)  |
| Zfp839        | -0.47 | .006453177               | 4.258793 | Zinc finger protein 839 (Zfp839)   |
| Ubr4          | -0.47 | .000706477               | 7.820195 | Ubiquitin protein ligase E3 component n-recognin 4 (Ubr4)  |
| Cacnb3        | -0.47 | .008030563               | 8.035226 | Calcium channel, voltage-dependent, beta 3 subunit (Cacnb3)  |
| Zfp362        | -0.47 | .003831909               | 4.519507 | Zinc finger protein 362 (Zfp362)   |
| Cald1         | -0.47 | .011730843               | 5.178264 | Caldesmon 1 (Cald1)  |
| Tpd52l2       | -0.47 | .001879225               | 5.669304 | Tumor protein D52-like 2 (Tpd52l2)   |
| Timm10        | -0.47 | .012371974               | 4.066029 | Translocase of inner mitochondrial membrane 10 (Timm10)  |
| Tspan3        | -0.47 | 5.01 × 10 <sup>-5</sup>  | 8.179475 | Tetraspanin 3 (Tspan3)   |
| Amt           | -0.47 | .005496422               | 4.281956 | Aminomethyltransferase (Amt)   |
| Ank2          | -0.48 | .001585343               | 8.968535 | Ankyrin 2, brain (Ank2)  |
| Gemin8        | -0.48 | .028793942               | 2.9229   | Gem (nuclear organelle)-associated protein 8 (Gemin8)  |
| Oma1          | -0.48 | .038158638               | 3.391501 | OMA1 zinc metalloproteinase (Oma1)   |
| 2810001G20Rik | -0.48 | .010468306               | 4.199036 | RIKEN cDNA 2810001G20 gene (2810001G20Rik)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Mdc1          | -0.48 | .01508435                | 4.233727 | Mediator of DNA damage checkpoint 1 (Mdc1)                                      |
| Lhfp          | -0.48 | .004507432               | 4.194927 | Lipoma HMGIC fusion partner (Lhfp)  |
| Ranbp17       | -0.48 | .027188626               | 3.808555 | RAN binding protein 17 (Ranbp17)  |
| Itga9         | -0.48 | .022651024               | 3.908348 | Integrin alpha 9 (Itga9)  |
| Hyi           | -0.48 | .013627975               | 3.258372 | Hydroxypyruvate isomerase (putative) (Hyi)                                      |
| Elk3          | -0.48 | .040882725               | 2.934018 | ELK3, member of ETS oncogene family (Elk3)                                      |
| Tmem168       | -0.48 | .018785478               | 3.340635 | Transmembrane protein 168 (Tmem168)   |
| Aimp1         | -0.48 | .001944648               | 5.070269 | Aminoacyl tRNA synthetase complex-interacting multifunctional protein 1 (Aimp1) |
| Plekhj1       | -0.48 | .047440422               | 3.000487 | Pleckstrin homology domain containing, family J member 1 (Plekhj1)              |
| Gkap1         | -0.48 | .011171292               | 3.549386 | G kinase anchoring protein 1 (Gkap1)  |
| Tmbim6        | -0.48 | .000150079               | 8.13391  | Transmembrane BAX inhibitor motif containing 6 (Tmbim6)                         |
| AC121965.1    | -0.48 | .022360633               | 4.498964 | Predicted gene (Gm2695)   |
| Nck2          | -0.48 | .005781317               | 3.892291 | Noncatalytic region of tyrosine kinase adaptor protein 2 (Nck2)                 |
| Ska2          | -0.48 | .01207791                | 3.635161 | Spindle and kinetochore-associated complex subunit 2 (Ska2)                     |
| Sbds          | -0.48 | .000888982               | 5.551983 | Shwachman-Bodian-Diamond syndrome homolog (human) (Sbds)                        |
| Dnajb2        | -0.48 | .002100534               | 5.365543 | DnaJ heat shock protein family (Hsp40) member B2 (Dnajb2)                       |
| P2rx4         | -0.48 | .005734719               | 3.71719  | Purinergic receptor P2X, ligand-gated ion channel 4 (P2rx4)                     |
| Hsd12         | -0.48 | .00237989                | 5.619354 | Hydroxysteroid dehydrogenase like 2 (Hsd12)                                     |
| Spg20         | -0.48 | .001055265               | 5.070014 | Spastic paraplegia 20, spartin (Troyer syndrome) homolog (human) (Spg20)        |
| Abca7         | -0.48 | .025155748               | 3.178336 | ATP-binding cassette, sub-family A (ABC1), member 7 (Abca7)                     |
| Pip4k2a       | -0.48 | .004220257               | 7.473879 | Phosphatidylinositol-5-phosphate 4-kinase, type II, alpha (Pip4k2a)             |
| Kctd18        | -0.48 | .046743784               | 3.834231 | Potassium channel tetramerisation domain containing 18 (Kctd18)                 |
| Atf4          | -0.48 | .000799215               | 6.910545 | Activating transcription factor 4 (Atf4)  |
| Ly6e          | -0.48 | .037464203               | 7.105477 | Lymphocyte antigen 6 complex, locus E (Ly6e)                                    |
| Ggcx          | -0.48 | .041104788               | 2.873299 | Gamma-glutamyl carboxylase (Ggcx)   |
| Tgfbr1        | -0.48 | .0021464                 | 5.027863 | Transforming growth factor, beta receptor I (Tgfbr1)                            |
| Shmt2         | -0.49 | .027363574               | 3.458721 | Serine hydroxymethyltransferase 2 (mitochondrial) (Shmt2)                       |
| Nudt16l1      | -0.49 | .023200975               | 4.154098 | Nudix (nucleoside diphosphate linked moiety X)-type motif 16-like 1 (Nudt16l1)  |
| Lrwd1         | -0.49 | .046870412               | 2.246506 | Leucine-rich repeats and WD repeat domain containing 1 (Lrwd1)                  |
| Wdr83         | -0.49 | .033493545               | 2.580416 | WD repeat domain containing 83 (Wdr83)  |
| Rpl3          | -0.49 | .000604982               | 6.106839 | Ribosomal protein L3 (Rpl3)   |
| Slc48a1       | -0.49 | .000148066               | 6.391251 | Solute carrier family 48 (heme transporter), member 1 (Slc48a1)                 |
| Zfp219        | -0.49 | .033710186               | 2.841035 | Zinc finger protein 219 (Zfp219)  |
| Ctsd          | -0.49 | .000511823               | 7.041001 | Cathepsin D (Ctsd)  |
| Mfsd1         | -0.49 | .004169398               | 5.26991  | Major facilitator superfamily domain containing 1 (Mfsd1)                       |
| 9930104L06Rik | -0.49 | .027278437               | 3.662379 | RIKEN cDNA 9930104L06 gene (9930104L06Rik)                                      |
| Dguok         | -0.49 | .044907598               | 2.910376 | Deoxyguanosine kinase (Dguok)   |
| Dtymk         | -0.49 | .021380885               | 3.978147 | Deoxythymidylate kinase (Dtymk)   |
| Mterf4        | -0.49 | .039687564               | 3.18262  | Mitochondrial transcription termination factor 4 (Mterf4)                       |
| Irf2          | -0.49 | .011352328               | 4.269511 | Interferon regulatory factor 2 (Irf2)   |
| Vrk3          | -0.49 | .008636137               | 3.441625 | Vaccinia-related kinase 3 (Vrk3)  |
| Pgpep1        | -0.49 | .013757923               | 3.398452 | Pyroglutamyl-peptidase I (Pgpep1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Lamp1         | -0.49 | $2.83 \times 10^{-5}$    | 8.3874   | Lysosomal-associated membrane protein 1 (Lamp1)                                   |
| Nup93         | -0.49 | .009887858               | 3.656256 | Nucleoporin 93 (Nup93)  |
| Trrap         | -0.49 | .000244925               | 6.748986 | Transformation/transcription domain-associated protein (Trrap)                    |
| Galk1         | -0.49 | .049088262               | 2.533341 | Galactokinase 1 (Galk1)   |
| Zbtb8os       | -0.49 | .019278772               | 3.003606 | Zinc finger and BTB domain containing 8 opposite strand (Zbtb8os)                 |
| Tmem218       | -0.49 | .022106398               | 3.413889 | Transmembrane protein 218 (Tmem218)   |
| Emg1          | -0.49 | .019824921               | 4.40964  | EMG1 N1-specific pseudouridine methyltransferase (Emg1)                           |
| Maml2         | -0.49 | .003986814               | 4.524363 | Mastermind like 2 (Maml2)   |
| Mipol1        | -0.49 | .035061841               | 3.08693  | Mirror-image polydactyly 1 (Mipol1)   |
| Naga          | -0.49 | .006793904               | 4.312178 | N-acetyl galactosaminidase, alpha (Naga)  |
| Dpp3          | -0.49 | .007092454               | 4.15024  | Dipeptidylpeptidase 3 (Dpp3)  |
| Heg1          | -0.49 | .001245768               | 5.732508 | Heart development protein with EGF-like domains 1 (Heg1)                          |
| Lrp4          | -0.49 | .010416343               | 4.662759 | Low-density lipoprotein receptor-related protein 4 (Lrp4)                         |
| Lrrc8c        | -0.49 | .006592016               | 4.904482 | Leucine-rich repeat containing 8 family, member C (Lrrc8c)                        |
| Rpl7a         | -0.49 | .000109047               | 6.832328 | Ribosomal protein L7A (Rpl7a)   |
| 2700097O09Rik | -0.50 | .030695066               | 3.017129 | RIKEN cDNA 2700097O09 gene (2700097O09Rik)  |
| Tspan14       | -0.50 | .008250138               | 4.205027 | Tetraspanin 14 (Tspan14)  |
| Fbxl5         | -0.50 | .000901523               | 5.514143 | F-box and leucine-rich repeat protein 5 (Fbxl5)                                   |
| Atp1b3        | -0.50 | $8.74 \times 10^{-5}$    | 7.012412 | ATPase, Na <sup>+</sup> /K <sup>+</sup> transporting, beta 3 polypeptide (Atp1b3) |
| Ccdc59        | -0.50 | .002860462               | 4.180228 | Coiled-coil domain containing 59 (Ccdc59)   |
| Zscan21       | -0.50 | .01642792                | 3.611398 | Zinc finger and SCAN domain containing 21 (Zscan21)                               |
| Lrp1          | -0.50 | .000286586               | 7.914638 | Low density lipoprotein receptor-related protein 1 (Lrp1)                         |
| Zfp438        | -0.50 | .028639296               | 3.226506 | Zinc finger protein 438 (Zfp438)  |
| Idh2          | -0.50 | .005839545               | 4.603244 | Isocitrate dehydrogenase 2 (NADP <sup>+</sup> ), mitochondrial (Idh2)             |
| Prpf38b       | -0.50 | .000752914               | 5.335866 | PRP38 pre-mRNA processing factor 38 (yeast) domain containing B (Prpf38b)         |
| Akt2          | -0.50 | .03244257                | 4.507185 | Thymoma viral proto-oncogene 2 (Akt2)   |
| Tysnd1        | -0.50 | .026675912               | 2.757061 | Trypsin domain containing 1 (Tysnd1)  |
| Agbl3         | -0.50 | .010518187               | 3.133018 | ATP/GTP binding protein-like 3 (Agbl3)  |
| Ddx39         | -0.50 | .026732262               | 3.007384 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 39 (Ddx39)                                 |
| Traf7         | -0.50 | .017180772               | 3.732924 | TNF receptor-associated factor 7 (Traf7)  |
| Sbf2          | -0.50 | .001135483               | 5.882387 | SET binding factor 2 (Sbf2)   |
| Cfap74        | -0.50 | .007153697               | 3.523    | Cilia and flagella-associated protein 74 (Cfap74)                                 |
| Arhgef40      | -0.50 | .01439739                | 3.840156 | Rho guanine nucleotide exchange factor (GEF) 40 (Arhgef40)                        |
| Faap20        | -0.50 | .018896934               | 4.216039 | Fanconi anemia core complex-associated protein 20 (Faap20)                        |
| Tsta3         | -0.50 | .031032057               | 2.746685 | Tissue-specific transplantation antigen P35B (Tsta3)                              |
| Myl6          | -0.50 | .002378098               | 6.092635 | Myosin, light polypeptide 6, alkali, smooth muscle and non-muscle (Myl6)          |
| Nmral1        | -0.50 | .012996689               | 3.40016  | NmrA-like family domain containing 1 (Nmral1)                                     |
| Flvcr1        | -0.50 | .01498988                | 3.629885 | FLVCR Heme Transporter 1 (Flvcr1)   |
| Rab10os       | -0.50 | .033047577               | 3.645877 | RAB10, member RAS oncogene family, opposite strand (Rab10os)                      |
| Vegfb         | -0.50 | .002539964               | 5.395321 | Vascular endothelial growth factor B (Vegfb)                                      |
| Adsl          | -0.50 | .023504725               | 3.020195 | Adenylosuccinate lyase (Adsl)   |
| Slc39a1       | -0.50 | .004566718               | 4.48284  | Solute carrier family 39 (zinc transporter), member 1 (Slc39a1)                   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Caml          | -0.51 | .016424095               | 3.678952 | Calcium modulating ligand (Caml)   |
| Mydgf         | -0.51 | .00614242                | 4.898177 | Myeloid derived growth factor (Mydgf)  |
| Cox4i1        | -0.51 | .002104514               | 8.13906  | Cytochrome c oxidase subunit IV isoform 1 (Cox4i1)   |
| Sem1          | -0.51 | .020734559               | 4.41879  | SEM1 26S Proteasome Subunit (Sem1)   |
| Ipp           | -0.51 | .01819853                | 2.821681 | IAP promoted placental gene (Ipp)  |
| Scg3          | -0.51 | $1.56 \times 10^{-5}$    | 7.739821 | Secretogranin III (Scg3)   |
| Dnah7a        | -0.51 | .030336419               | 3.630869 | Dynein, axonemal, heavy chain 7A (Dnah7a)  |
| Crtc2         | -0.51 | .005851189               | 3.700006 | CREB-regulated transcription coactivator 2 (Crtc2)   |
| Pno1          | -0.51 | .016744673               | 3.707357 | Partner of NOB1 homolog (Pno1)   |
| Npc1          | -0.51 | .000223604               | 6.448484 | Niemann-Pick type C1 (Npc1)  |
| Rfc2          | -0.51 | .016012892               | 3.739075 | Replication factor C (activator 1) 2 (Rfc2)  |
| Rhobtb3       | -0.51 | .003622651               | 5.322215 | Rho-related BTB domain containing 3 (Rhobtb3)  |
| Anks1         | -0.51 | .009912262               | 3.970306 | Ankyrin repeat and SAM domain containing 1 (Anks1)   |
| Bcl10         | -0.51 | .00467955                | 3.586532 | B cell leukemia/lymphoma 10 (Bcl10)  |
| Arglu1        | -0.51 | .003995261               | 5.984937 | Arginine and glutamate rich 1 (Arglu1)   |
| Nme5          | -0.51 | .006032777               | 4.354851 | NME/NM23 family member 5 (Nme5)  |
| Pskh1         | -0.51 | .023882343               | 2.96767  | Protein serine kinase H1 (Pskh1)   |
| Ube2d-ps      | -0.51 | .005660147               | 4.065762 | Ubiquitin-conjugating enzyme E2D, pseudogene (Ube2d-ps)  |
| Gm17018       | -0.51 | .001877449               | 5.003502 | Predicted gene (Gm17018)   |
| Pcp4l1        | -0.51 | .000774269               | 7.288132 | PURKINJE cell protein 4-like 1 (Pcp4l1)  |
| Rpl18         | -0.51 | .002225846               | 5.538417 | Ribosomal protein L18 (Rpl18)  |
| Bphl          | -0.51 | .001709309               | 4.239973 | Biphenyl hydrolase-like (serine hydrolase, breast epithelial mucin-associated antigen) (Bphl)          |
| Acss2         | -0.51 | .003284931               | 4.745502 | Acyl-CoA synthetase short-chain family member 2 (Acss2)  |
| Agpat4        | -0.51 | .005728789               | 4.636549 | 1-Acylglycerol-3-phosphate O-acyltransferase 4 (lysophosphatidic acid acyltransferase, delta) (Agpat4) |
| Tspan2        | -0.51 | .000518239               | 8.10443  | Tetraspanin 2 (Tspan2)   |
| Arhgef26      | -0.51 | .001884219               | 4.801547 | Rho guanine nucleotide exchange factor (GEF) 26 (Arhgef26)   |
| Zfp775        | -0.52 | .036572551               | 2.979028 | Zinc finger protein 775 (Zfp775)   |
| Mphosph6      | -0.52 | .01943874                | 3.623721 | M phase phosphoprotein 6 (Mphosph6)  |
| Prpf31        | -0.52 | .003042744               | 4.652804 | Pre-mRNA processing factor 31 (Prpf31)   |
| Ndufa3        | -0.52 | .009049555               | 5.522135 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 3 (Ndufa3)   |
| Psd2          | -0.52 | $9.26 \times 10^{-5}$    | 6.733639 | Pleckstrin and Sec7 domain containing 2 (Psd2)   |
| 9330151L19Rik | -0.52 | .004302431               | 4.080096 | RIKEN cDNA 9330151L19 gene (9330151L19Rik)   |
| Ccdc107       | -0.52 | .009896459               | 3.67451  | Coiled-coil domain containing 107 (Ccdc107)  |
| Myopop        | -0.52 | .036456992               | 2.488579 | Myb-related transcription factor, partner of profilin (Myopop)   |
| Cluap1        | -0.52 | .013571034               | 3.870673 | Clusterin-associated protein 1 (Cluap1)  |
| Eci2          | -0.52 | .001530817               | 4.750868 | Enoyl-Coenzyme A delta isomerase 2 (Eci2)  |
| Tomm5         | -0.52 | .001856778               | 5.058181 | Translocase of outer mitochondrial membrane 5 homolog (yeast) (Tomm5)                                  |
| Wls           | -0.52 | .000960391               | 5.466917 | Wntless homolog (Wls)  |
| Ano6          | -0.52 | .014715837               | 4.698516 | Anoctamin 6 (Ano6)   |
| Tipin         | -0.52 | .026187218               | 3.20156  | Timeless interacting protein (Tipin)   |
| Ndufa7        | -0.52 | .001935342               | 5.577888 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 7 (B14.5a) (Ndufa7)                                |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| 4931406C07Rik | -0.52 | .001209419               | 4.751471 | RIKEN cDNA 4931406C07 gene (4931406C07Rik)  |
| Fuom          | -0.52 | .005423168               | 4.077103 | Fucose mutarotase (Fuom)  |
| Creld2        | -0.52 | .047995695               | 3.622911 | Cysteine-rich with EGF-like domains 2 (Creld2)  |
| Cd320         | -0.52 | .004563875               | 3.708609 | CD320 antigen (Cd320)   |
| Dbn1          | -0.52 | .00082779                | 4.981159 | Drebrin 1 (Dbn1)  |
| Fam174a       | -0.52 | .001164473               | 5.141668 | Family with sequence similarity 174, member A (Fam174a)   |
| Nol7          | -0.52 | .000276441               | 4.985802 | Nucleolar protein 7 (Nol7)  |
| Ppt2          | -0.52 | .024451232               | 2.814197 | Palmitoyl-protein thioesterase 2 (Ppt2)   |
| Bicra         | -0.52 | .002622684               | 4.758494 | BRD4 interacting chromatin remodeling complex-associated protein (Bicra)                              |
| Nmnat1        | -0.52 | .045603846               | 2.42555  | Nicotinamide nucleotide adenylyltransferase 1 (Nmnat1)  |
| Dnaja4        | -0.52 | .027344088               | 2.91643  | DnaJ heat shock protein family (Hsp40) member A4 (Dnaja4)   |
| Tctex1d2      | -0.52 | .005380427               | 4.257158 | Tctex1 domain containing 2 (Tctex1d2)   |
| Kif9          | -0.52 | .025308866               | 2.998886 | Kinesin family member 9 (Kif9)  |
| 1810058I24Rik | -0.52 | .008562762               | 3.953452 | RIKEN cDNA 1810058I24 gene (1810058I24Rik)  |
| Uqcr10        | -0.53 | .000947358               | 6.713035 | Ubiquinol-cytochrome c reductase, complex III subunit X (Uqcr10)                                      |
| Npr2          | -0.53 | .006032777               | 4.231798 | Natriuretic peptide receptor 2 (Npr2)   |
| Bri3          | -0.53 | .031457872               | 2.765699 | Brain protein I3 (Bri3)   |
| Lzts2         | -0.53 | .01938535                | 3.430145 | Leucine zipper, putative tumor suppressor 2 (Lzts2)   |
| Nphp1         | -0.53 | .004225136               | 3.975885 | Nephronophthisis 1 (juvenile) homolog (human) (Nphp1)   |
| Zdhhc18       | -0.53 | .000331812               | 6.075579 | Zinc finger, DHHC domain containing 18 (Zdhhc18)  |
| Idua          | -0.53 | .003003186               | 3.998116 | Iduronidase, alpha-L- (Idua)  |
| Sclt1         | -0.53 | .009740423               | 3.427917 | Sodium channel and clathrin linker 1 (Sclt1)  |
| Fmnl2         | -0.53 | .002070685               | 6.297394 | Formin-like 2 (Fmnl2)   |
| Naxd          | -0.53 | .008588632               | 4.177942 | NAD (P)HX dehydratase (Naxd)  |
| Gm3693        | -0.53 | .03244257                | 3.054183 | Predicted gene 3693 (Gm3693)  |
| Med12         | -0.53 | .014622213               | 3.965326 | Mediator complex subunit 12 (Med12)   |
| Raver2        | -0.53 | .006407767               | 3.888472 | Ribonucleoprotein, PTB-binding 2 (Raver2)   |
| Decr1         | -0.53 | .001472216               | 4.15866  | 2,4-Dienoyl CoA reductase 1, mitochondrial (Decr1)  |
| Zfand3        | -0.53 | .000224403               | 5.549279 | Zinc finger, AN1-type domain 3 (Zfand3)   |
| Gtf2h3        | -0.53 | .017609553               | 2.894053 | General transcription factor IIH, polypeptide 3 (Gtf2h3)  |
| Polr2f        | -0.53 | .031624232               | 3.669594 | Polymerase (RNA) II (DNA directed) polypeptide F (Polr2f)   |
| Chchd2        | -0.53 | .001899198               | 7.0977   | Coiled-coil-helix-coiled-coil-helix domain containing 2 (Chchd2)                                      |
| Bak1          | -0.53 | .018003087               | 3.175554 | BCL2-antagonist/killer 1 (Bak1)   |
| Igdcc4        | -0.53 | .000155178               | 5.298658 | Immunoglobulin superfamily, DCC subclass, member 4 (Igdcc4)   |
| Kmt5a         | -0.53 | .006182374               | 5.665997 | Lysine methyltransferase 5A (Kmt5a)   |
| Slc25a5       | -0.54 | .000101514               | 7.214417 | Solute carrier family 25 (mitochondrial carrier, adenine nucleotide translocator), member 5 (Slc25a5) |
| Patj          | -0.54 | .000387429               | 5.942844 | PATJ, crumbs cell polarity complex component (Patj)   |
| Tmem208       | -0.54 | .021380885               | 4.37907  | Transmembrane protein 208 (Tmem208)   |
| Fabp5         | -0.54 | .003001558               | 5.054629 | Fatty acid binding protein 5, epidermal (Fabp5)   |
| Uqcrq         | -0.54 | .003894461               | 6.419031 | Ubiquinol-cytochrome c reductase, complex III subunit VII (Uqcrq)                                     |
| Pop4          | -0.54 | .018688446               | 4.229356 | Processing of precursor 4, ribonuclease P/MRP family, ( <i>S. cerevisiae</i> ) (Pop4)                 |
| Washc2        | -0.54 | .00026507                | 5.33914  | WASH Complex Subunit 2C (Washc2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Lamtor5       | -0.54 | .002457495               | 4.542659 | Late endosomal/lysosomal adaptor, MAPK and MTOR activator 5 (Lamtor5)                |
| Ttc5          | -0.54 | .002099845               | 4.54102  | Tetratricopeptide repeat domain 5 (Ttc5)   |
| Cln3          | -0.54 | .019353076               | 3.343761 | Ceroid lipofuscinosis, neuronal 3, juvenile (Batten, Spielmeyer-Vogt disease) (Cln3) |
| Tac1          | -0.54 | .002203446               | 5.172512 | Tachykinin 1 (Tac1)  |
| Rps23         | -0.54 | .004189595               | 4.28015  | Ribosomal protein S23 (Rps23)  |
| Gas8          | -0.54 | .007758927               | 3.823829 | Growth arrest specific 8 (Gas8)  |
| Slain1        | -0.54 | .00034433                | 5.758278 | SLAIN motif family, member 1 (Slain1)  |
| Adrb1         | -0.54 | .021743299               | 3.465158 | Adrenergic receptor, beta 1 (Adrb1)  |
| Rps5          | -0.54 | .00012459                | 7.473633 | Ribosomal protein S5 (Rps5)  |
| Uqcr11        | -0.54 | .010674757               | 6.136805 | Ubiquinol-cytochrome c reductase, complex III subunit XI (Uqcr11)                    |
| Bmp6          | -0.54 | .037538198               | 2.903527 | Bone morphogenetic protein 6 (Bmp6)  |
| 2510002D24Rik | -0.54 | .018896934               | 2.797231 | RIKEN cDNA 2510002D24 gene (2510002D24Rik)   |
| Gcnt1         | -0.54 | .026836993               | 2.878342 | Glucosaminyl (N-acetyl) transferase 1, core 2 (Gcnt1)                                |
| Chchd3        | -0.54 | .001105372               | 5.078891 | Coiled-coil-helix-coiled-coil-helix domain containing 3 (Chchd3)                     |
| Mboat2        | -0.54 | .000650437               | 6.333473 | Membrane bound O-acyltransferase domain containing 2 (Mboat2)                        |
| Phf5a         | -0.54 | .009412668               | 4.822311 | PHD finger protein 5A (Phf5a)  |
| Hsd17b4       | -0.54 | .000269626               | 5.371034 | Hydroxysteroid (17-beta) dehydrogenase 4 (Hsd17b4)                                   |
| Pgls          | -0.54 | .003794321               | 3.494269 | 6-Phosphogluconolactonase (Pgls)   |
| Nasp          | -0.54 | .006122743               | 3.872067 | Nuclear autoantigenic sperm protein (histone-binding) (Nasp)                         |
| Yif1a         | -0.54 | .010302806               | 3.310781 | Yip1 interacting factor homolog A ( <i>S. cerevisiae</i> ) (Yif1a)                   |
| Usmg5         | -0.54 | .012739351               | 4.130213 | Upregulated during skeletal muscle growth 5 (Usmg5)                                  |
| Lmo3          | -0.54 | .03519008                | 5.743879 | LIM domain only 3 (Lmo3)   |
| Cpne3         | -0.54 | .000646891               | 5.195198 | Copine III (Cpne3)   |
| Pfdn2         | -0.54 | $5.43 \times 10^{-5}$    | 5.725978 | Prefoldin 2 (Pfdn2)  |
| Trabd         | -0.54 | .017791333               | 3.194985 | TraB domain containing (Trabd)   |
| Mtor          | -0.55 | $2.36 \times 10^{-5}$    | 6.730726 | Mechanistic target of rapamycin (serine/threonine kinase) (Mtor)                     |
| Cfap54        | -0.55 | .003368354               | 4.544157 | Cilia and flagella-associated protein 54 (Cfap54)                                    |
| Gins4         | -0.55 | .00187235                | 4.13463  | GINS complex subunit 4 (Sld5 homolog) (Gins4)  |
| Cwc15         | -0.55 | .000423654               | 5.839721 | CWC15 spliceosome-associated protein (Cwc15)   |
| Slc44a2       | -0.55 | .001361155               | 4.737299 | Solute carrier family 44, member 2 (Slc44a2)   |
| Tor1aip1      | -0.55 | .002601527               | 5.994064 | Torsin A interacting protein 1 (Tor1aip1)  |
| Odf2l         | -0.55 | .01013132                | 3.408248 | Outer dense fiber of sperm tails 2-like (Odf2l)                                      |
| Hexa          | -0.55 | .000947358               | 4.824397 | Hexosaminidase A (Hexa)  |
| Irak2         | -0.55 | .006676307               | 3.512588 | Interleukin-1 receptor-associated kinase 2 (Irak2)                                   |
| Hspb11        | -0.55 | .044895395               | 2.857482 | Heat shock protein family B (small), member 11 (Hspb11)                              |
| Rpl8          | -0.55 | .000441285               | 7.049748 | Ribosomal protein L8 (Rpl8)  |
| Hscb          | -0.55 | .01824737                | 3.635238 | HscB iron-sulfur cluster co-chaperone (Hscb)   |
| Thoc7         | -0.55 | .000620506               | 4.608745 | THO complex 7 (Thoc7)  |
| Mapkapk2      | -0.55 | .004813324               | 4.301589 | MAP kinase-activated protein kinase 2 (Mapkapk2)                                     |
| Tedc2         | -0.55 | .042310303               | 2.678162 | Tubulin Epsilon And Delta Complex 2 (Tedc2)  |
| 5930412G12Rik | -0.55 | .024624252               | 2.585928 | RIKEN cDNA 5930412G12 gene (5930412G12Rik)   |
| Mir9-3hg      | -0.55 | .02388003                | 2.598739 | Mir9-3 host gene (Mir9-3hg)  |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value        | AveExpr  | Gene full name   |
|---------------|-------|-------------------------|----------|--|
| Pnp           | -0.55 | .032203827              | 4.084198 | Purine-nucleoside phosphorylase (Pnp)  |
| Slc9a3r2      | -0.56 | .000826189              | 4.773769 | Solute carrier family 9 (sodium/hydrogen exchanger), member 3 regulator 2 (Slc9a3r2)     |
| Tcea2         | -0.56 | .016437857              | 3.442116 | Transcription elongation factor A (SII), 2 (Tcea2)                                       |
| 2610306M01Rik | -0.56 | .027298452              | 2.504893 | RIKEN cDNA 2610306M01 gene (2610306M01Rik)   |
| Lsm10         | -0.56 | .033594878              | 2.761455 | U7 snRNP-specific Sm-like protein LSM10 (Lsm10)  |
| Gm6483        | -0.56 | .018932095              | 2.621391 | Cadherin 11 pseudogene (Gm6483)  |
| Atp5k         | -0.56 | .004720456              | 5.587479 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F1FO complex, subunit E (Atp5k) |
| Cdk2ap1       | -0.56 | .003007248              | 3.31918  | CDK2 (cyclin-dependent kinase 2)-associated protein 1 (Cdk2ap1)                          |
| Cpne8         | -0.56 | .010793472              | 3.334861 | Copine VIII (Cpne8)  |
| Ntrk2         | -0.56 | 2.38 × 10 <sup>-5</sup> | 9.939266 | Neurotrophic tyrosine kinase, receptor, type 2 (Ntrk2)                                   |
| Slc16a1       | -0.56 | .008910629              | 4.41073  | Solute carrier family 16 (monocarboxylic acid transporters), member 1 (Slc16a1)          |
| Polr2i        | -0.56 | .003920074              | 3.751273 | Polymerase (RNA) II (DNA directed) polypeptide I (Polr2i)                                |
| Snapi         | -0.56 | .000442261              | 6.728626 | SNAP-associated protein (Snapi)  |
| Fam162a       | -0.56 | .005580394              | 4.342906 | Family with sequence similarity 162, member A (Fam162a)                                  |
| Atf5          | -0.56 | .027708733              | 2.894045 | Activating transcription factor 5 (Atf5)   |
| Ccnyl1        | -0.56 | .010539556              | 3.042705 | Cyclin Y-like 1 (Ccnyl1)   |
| Btg1          | -0.56 | .006249326              | 3.982653 | B cell translocation gene 1, anti-proliferative (Btg1)                                   |
| Atp6v0a2      | -0.56 | .0003803                | 5.676502 | ATPase, H <sup>+</sup> transporting, lysosomal VO subunit A2 (Atp6v0a2)                  |
| Rps11         | -0.56 | .000728873              | 5.485933 | Ribosomal protein S11 (Rps11)  |
| Prkab1        | -0.56 | .0116519                | 3.605022 | Protein kinase, AMP-activated, beta 1 non-catalytic subunit (Prkab1)                     |
| Lamtor2       | -0.56 | .01647194               | 4.898764 | Late endosomal/lysosomal adaptor, MAPK and MTOR activator 2 (Lamtor2)                    |
| Natd1         | -0.56 | .00197176               | 4.920486 | N-acetyltransferase domain containing 1 (Natd1)  |
| Uqcrh         | -0.56 | .000504797              | 7.424672 | Ubiquinol-cytochrome c reductase hinge protein (Uqcrh)                                   |
| Lair1         | -0.56 | .018831068              | 3.912171 | Leukocyte-associated Ig-like receptor 1 (Lair1)  |
| Psmg1         | -0.56 | .028335252              | 3.801052 | Proteasome (prosome, macropain) assembly chaperone 1 (Psmg1)                             |
| Retsat        | -0.56 | .013171265              | 3.157733 | Retinol saturase (all trans retinol 13,14 reductase) (Retsat)                            |
| Cox7a2l       | -0.57 | 7.54 × 10 <sup>-5</sup> | 6.118126 | Cytochrome c oxidase subunit VIIa polypeptide 2-like (Cox7a2l)                           |
| Traf4         | -0.57 | .036535714              | 2.202446 | TNF receptor-associated factor 4 (Traf4)   |
| Hars2         | -0.57 | .01757566               | 3.790111 | Histidyl-tRNA synthetase 2 (Hars2)   |
| Cyb5a         | -0.57 | .000859819              | 5.213275 | Cytochrome b5 type A (microsomal) (Cyb5a)  |
| Washc3        | -0.57 | .00432711               | 4.239677 | WASH Complex Subunit 3 (Washc3)  |
| Syt9          | -0.57 | .019362505              | 8.004679 | Synaptotagmin IX (Syt9)  |
| Nup188        | -0.57 | .006768763              | 3.773964 | Nucleoporin 188 (Nup188)   |
| Bag3          | -0.57 | .01682695               | 3.2843   | BCL2-associated athanogene 3 (Bag3)  |
| Mvb12a        | -0.57 | .042781575              | 3.035934 | Multivesicular body subunit 12A (Mvb12a)   |
| Dbnnd2        | -0.57 | .00019206               | 5.313127 | Dysbindin (dystrobrevin binding protein 1) domain containing 2 (Dbnnd2)                  |
| Fank1         | -0.57 | .045826652              | 2.227904 | Fibronectin type 3 and ankyrin repeat domains 1 (Fank1)                                  |
| Cnih1         | -0.57 | .000266989              | 5.308213 | Cornichon family AMPA receptor auxiliary protein 1 (Cnih1)                               |
| Mbd3          | -0.57 | .003087065              | 4.820509 | Methyl-CpG binding domain protein 3 (Mbd3)   |

TABLE A1 Continued

| Gene name      | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|----------------|-------|--------------------------|----------|---|
| Lhpp           | -0.57 | .005862289               | 3.730477 | Phospholysine phosphohistidine inorganic pyrophosphate phosphatase (Lhpp)                     |
| Plch2          | -0.57 | .002152467               | 5.80422  | Phospholipase C, eta 2 (Plch2)  |
| Tdp1           | -0.57 | .010464107               | 3.242318 | Tyrosyl-DNA phosphodiesterase 1 (Tdp1)  |
| Sat2           | -0.57 | .015703885               | 3.096439 | Spermidine/spermine N1-acetyl transferase 2 (Sat2)  |
| Fnbp1          | -0.57 | $2.90 \times 10^{-5}$    | 7.049361 | Formin binding protein 1 (Fnbp1)  |
| Ccnd1          | -0.57 | .012256727               | 3.775621 | Cyclin D1 (Ccnd1)   |
| Cygb           | -0.57 | .014499583               | 6.166839 | Cytoglobin (Cygb)   |
| Saxo2          | -0.57 | .045469338               | 2.761986 | Stablizer of axonemal microtubules 2 (Saxo2)  |
| Mlip           | -0.58 | $9.08 \times 10^{-5}$    | 5.979582 | Muscular LMNA-interacting protein (Mlip)  |
| Ndufb3         | -0.58 | .001142609               | 5.299792 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex 3 (Ndufb3)                                  |
| Sec11a         | -0.58 | .00085491                | 4.364588 | SEC11 homolog A, signal peptidase complex subunit (Sec11a)                                    |
| Wasf2          | -0.58 | .013174575               | 4.575831 | WAS protein family, member 2 (Wasf2)  |
| Hspa2          | -0.58 | .003910116               | 4.225001 | Heat shock protein 2 (Hspa2)  |
| Mettl9         | -0.58 | .000348155               | 5.156757 | Methyltransferase like 9 (Mettl9)   |
| Rhbdd3         | -0.58 | .038932386               | 2.259323 | Rhomboid domain containing 3 (Rhbdd3)   |
| Atraid         | -0.58 | .005185826               | 5.203488 | All-trans retinoic acid-induced differentiation factor (Atraid)                               |
| Tcta           | -0.58 | .000295715               | 4.566442 | T cell leukemia translocation altered gene (Tcta)   |
| Ddt            | -0.58 | .017732069               | 3.437489 | D-dopachrome tautomerase (Ddt)  |
| Gpr62          | -0.58 | .019711536               | 2.97008  | G protein-coupled receptor 62 (Gpr62)   |
| Cc2d2a         | -0.58 | .011907533               | 4.430492 | Coiled-coil and C2 domain containing 2A (Cc2d2a)  |
| Nexn           | -0.58 | .014155293               | 3.334773 | Nexilin (Nexn)  |
| Hnmt           | -0.58 | .003995261               | 4.006748 | Histamine N-methyltransferase (Hnmt)  |
| Fdx1           | -0.58 | .011196831               | 3.490623 | Ferredoxin 1 (Fdx1)   |
| Bcl7b          | -0.58 | .000561752               | 4.401215 | B cell CLL/lymphoma 7B (Bcl7b)  |
| Mrps24         | -0.58 | .011299528               | 3.330482 | Mitochondrial ribosomal protein S24 (Mrps24)  |
| Naca           | -0.58 | .000183049               | 6.122107 | Nascent polypeptide-associated complex alpha polypeptide (Naca)                               |
| Gt (ROSA)26Sor | -0.58 | .02526197                | 2.487516 | Gene trap ROSA 26, Philippe Soriano (Gt (ROSA)26Sor)  |
| Abcd3          | -0.58 | .000111228               | 5.957834 | ATP-binding cassette, sub-family D (ALD), member 3 (Abcd3)                                    |
| Bpgm           | -0.58 | $4.91 \times 10^{-5}$    | 6.115788 | 2,3-Bisphosphoglycerate mutase (Bpgm)   |
| Tifa           | -0.58 | .023914227               | 2.881693 | TRAF-interacting protein with forkhead-associated domain (Tifa)                               |
| Mad2l2         | -0.58 | .004134027               | 3.289126 | MAD2 mitotic arrest deficient-like 2 (Mad2l2)   |
| Rgs6           | -0.58 | .00713061                | 5.436332 | Regulator of G-protein signaling 6 (Rgs6)   |
| Rex1bd         | -0.58 | .001979919               | 4.47241  | Required For Excision 1-B Domain Containing (Rex1bd)  |
| Taz            | -0.58 | .005869825               | 4.248677 | Tafazzin (Taz)  |
| Ech1           | -0.58 | .00124239                | 4.49546  | Enoyl coenzyme A hydratase 1, peroxisomal (Ech1)  |
| Polb           | -0.58 | .023020417               | 4.28136  | Polymerase (DNA directed), beta (Polb)  |
| Tssc4          | -0.58 | .005892229               | 3.851934 | Tumor-suppressing subchromosomal transferable fragment 4 (Tssc4)                              |
| Cdh20          | -0.59 | .006903285               | 5.085429 | Cadherin 20 (Cdh20)   |
| Net1           | -0.59 | .003222646               | 3.58252  | Neuroepithelial cell transforming gene 1 (Net1)   |
| Ercc1          | -0.59 | .030650385               | 2.941334 | Excision repair cross-complementing rodent repair deficiency, complementation group 1 (Ercc1) |
| Cldnd1         | -0.59 | .001559853               | 6.012929 | Claudin domain containing 1 (Cldnd1)  |
| Crlf3          | -0.59 | .011121976               | 2.792021 | Cytokine receptor-like factor 3 (Crlf3)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Snx5          | -0.59 | $1.36 \times 10^{-5}$    | 6.84492  | Sorting nexin 5 (Snx5)   |
| Kiz           | -0.59 | .002831529               | 4.425713 | Kizuna centrosomal protein (Kiz)   |
| Fgf1          | -0.59 | .017180772               | 7.714394 | Fibroblast growth factor 1 (Fgf1)  |
| Scnm1         | -0.59 | .007750305               | 3.751657 | Sodium channel modifier 1 (Scnm1)  |
| Iqcg          | -0.59 | .004392997               | 3.717438 | IQ motif containing G (Iqcg)   |
| Msantd2       | -0.59 | .04236311                | 2.836545 | Myb/SANT-like DNA-binding domain containing 2 (Msantd2)  |
| Cspp1         | -0.59 | .005247622               | 4.041482 | Centrosome and spindle pole-associated protein 1 (Cspp1)                                       |
| Ndufa13       | -0.59 | .000216584               | 7.296876 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 13 (Ndufa13)                               |
| Eef1d         | -0.59 | .002180198               | 5.32275  | Eukaryotic translation elongation factor 1 delta (guanine nucleotide exchange protein) (Eef1d) |
| Adh5          | -0.59 | .000120594               | 5.044918 | Alcohol dehydrogenase 5 (class III), chi polypeptide (Adh5)                                    |
| Rps26         | -0.59 | .000414656               | 5.768732 | Ribosomal protein S26 (Rps26)  |
| Efcab5        | -0.59 | .03623292                | 2.193047 | EF-hand calcium binding domain 5 (Efcab5)  |
| Taf6l         | -0.59 | .008905361               | 3.457957 | TATA-box binding protein-associated factor 6 like (Taf6l)                                      |
| Chd1l         | -0.59 | .024649476               | 2.372125 | Chromodomain helicase DNA binding protein 1-like (Chd1l)                                       |
| 4732491K20Rik | -0.59 | .03459078                | 2.757013 | RIKEN cDNA 4732491K20 gene (4732491K20Rik)   |
| Nt5c3b        | -0.59 | .012276984               | 3.832221 | 5'-Nucleotidase, cytosolic IIIB (Nt5c3b)   |
| Pigh          | -0.59 | .030371322               | 2.316364 | Phosphatidylinositol glycan anchor biosynthesis, class H (Pigh)                                |
| Map4k5        | -0.59 | .00358462                | 4.386346 | Mitogen-activated protein kinase kinase kinase kinase 5 (Map4k5)                               |
| Cdk10         | -0.59 | .004053265               | 4.160992 | Cyclin-dependent kinase 10 (Cdk10)   |
| Hs3st1        | -0.60 | .002448758               | 4.003497 | Heparan sulfate (glucosamine) 3-O-sulfotransferase 1 (Hs3st1)                                  |
| D8Ertd738e    | -0.60 | .007193457               | 4.5806   | DNA segment, Chr 8, ERATO Doi 738, expressed (D8Ertd738e)                                      |
| Cdc42ep2      | -0.60 | .025845262               | 3.503264 | CDC42 effector protein (Rho GTPase binding) 2 (Cdc42ep2)                                       |
| Dhx34         | -0.60 | .028879506               | 2.285649 | DEAH (Asp-Glu-Ala-His) box polypeptide 34 (Dhx34)  |
| Slc41a1       | -0.60 | $4.30 \times 10^{-5}$    | 6.34502  | Solute carrier family 41, member 1 (Slc41a1)   |
| Gm16701       | -0.60 | .003719834               | 4.053003 | Predicted gene, 16701 (Gm16701)  |
| Xylb          | -0.60 | .016007569               | 3.21511  | Xylulokinase homolog (H. influenzae) (Xylb)  |
| Taldo1        | -0.60 | .001518428               | 4.935919 | Transaldolase 1 (Taldo1)   |
| Atp5h         | -0.60 | .000595023               | 6.864817 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F0 complex, subunit D (Atp5h)         |
| Gm13889       | -0.60 | .010571268               | 3.456098 | Predicted gene 13889 (Gm13889)   |
| Cnpy4         | -0.60 | .001931456               | 3.519628 | Canopy FGF signaling regulator 4 (Cnpy4)   |
| Adk           | -0.60 | .000688589               | 4.276751 | Adenosine kinase (Adk)   |
| Cdk4          | -0.60 | .00018605                | 4.570517 | Cyclin-dependent kinase 4 (Cdk4)   |
| Ehd2          | -0.60 | .049786123               | 2.198543 | EH-domain containing 2 (Ehd2)  |
| S100a10       | -0.60 | .007896907               | 3.529441 | S100 calcium binding protein A10 (calpactin) (S100a10)   |
| Ldlrad3       | -0.60 | .002538556               | 4.168246 | Low-density lipoprotein receptor class A domain containing 3 (Ldlrad3)                         |
| Rpl10         | -0.60 | .000118896               | 5.325176 | Ribosomal protein L10 (Rpl10)  |
| E2f1          | -0.60 | .028518037               | 2.601794 | E2F transcription factor 1 (E2f1)  |
| Galc          | -0.60 | .003394541               | 4.384328 | Galactosylceramidase (Galc)  |
| Egfr          | -0.60 | .001261944               | 4.448216 | Epidermal growth factor receptor (Egfr)  |
| Ndufa5        | -0.60 | .01425755                | 4.674703 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 5 (Ndufa5)                                 |
| Ndufa1        | -0.60 | .005401632               | 4.763444 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 1 (Ndufa1)                                 |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Chmp2a        | -0.60 | .000304313               | 4.902212 | Charged multivesicular body protein 2A (Chmp2a)  |
| Hist1h4d      | -0.60 | .003634809               | 3.828203 | Histone cluster 1, H4d (Hist1h4d)  |
| Casz1         | -0.60 | .025471005               | 3.610645 | Castor zinc finger 1 (Casz1)   |
| Rnf7          | -0.60 | $7.00 \times 10^{-5}$    | 6.255796 | Ring finger protein 7 (Rnf7)   |
| Rita1         | -0.60 | .004283383               | 3.231795 | RBPJ interacting and tubulin associated 1 (Rita1)  |
| Ppard         | -0.61 | .0071564                 | 4.857274 | Peroxisome proliferator activator receptor delta (Ppard)   |
| Slc35d1       | -0.61 | .003604952               | 4.499334 | Solute carrier family 35 (UDP-glucuronic acid/UDP-N-acetylgalactosamine dual transporter), member D1 (Slc35d1) |
| Rest          | -0.61 | .004240178               | 3.972448 | RE1-silencing transcription factor (Rest)  |
| D330023K18Rik | -0.61 | .01985075                | 2.190993 | RIKEN cDNA D330023K18 gene (D330023K18Rik)   |
| Myh9          | -0.61 | .000681594               | 4.222169 | Myosin, heavy polypeptide 9, non-muscle (Myh9)   |
| Usp16         | -0.61 | .000529106               | 5.157597 | Ubiquitin-specific peptidase 16 (Usp16)  |
| Ctns          | -0.61 | .005864587               | 2.934692 | Cystinosis, nephropathic (Ctns)  |
| Mrto4         | -0.61 | .005551783               | 3.333951 | mRNA turnover 4, ribosome maturation factor (Mrto4)  |
| Mrps6         | -0.61 | .000946959               | 4.012046 | Mitochondrial ribosomal protein S6 (Mrps6)   |
| Aasdh         | -0.61 | .012203041               | 2.791253 | Amino adipate-semialdehyde dehydrogenase (Aasdh)   |
| Agtrap        | -0.61 | .018963115               | 3.350529 | Angiotensin II, type I receptor-associated protein (Agtrap)  |
| Mthfd2l       | -0.61 | .036775109               | 3.016261 | Methylenetetrahydrofolate dehydrogenase (NADP+ dependent) 2-like (Mthfd2l)                                     |
| Cdkl4         | -0.61 | .037732591               | 2.156503 | Cyclin-dependent kinase-like 4 (Cdkl4)   |
| Rpl27a        | -0.61 | $5.95 \times 10^{-5}$    | 5.516825 | Ribosomal protein L27A (Rpl27a)  |
| Pygb          | -0.61 | $7.72 \times 10^{-5}$    | 6.783398 | Brain glycogen phosphorylase (Pygb)  |
| Msi1          | -0.61 | .001863748               | 4.938594 | Musashi RNA-binding protein 1 (Msi1)   |
| Ndufs6        | -0.61 | .011444352               | 5.580973 | NADH dehydrogenase (ubiquinone) Fe-S protein 6 (Ndufs6)  |
| Ptn           | -0.61 | $3.44 \times 10^{-6}$    | 7.985841 | Pleiotrophin (Ptn)   |
| Sorbs3        | -0.61 | .002960631               | 5.452567 | Sorbin and SH3 domain containing 3 (Sorbs3)  |
| Ak6           | -0.61 | .011763857               | 2.875372 | Adenylate kinase 6 (Ak6)   |
| Reep3         | -0.61 | .002533143               | 5.670771 | Receptor accessory protein 3 (Reep3)   |
| Rnls          | -0.61 | .031169002               | 1.816941 | Renalase, FAD-dependent amine oxidase (Rnls)   |
| Atox1         | -0.61 | .00190298                | 4.43523  | Antioxidant 1 copper chaperone (Atox1)   |
| Pkd2          | -0.61 | .000520794               | 5.111793 | Polycystic kidney disease 2 (Pkd2)   |
| Sft2d3        | -0.61 | .015297926               | 2.902532 | SFT2 domain containing 3 (Sft2d3)  |
| Paqr8         | -0.61 | .001051922               | 8.326806 | Progesterin and adipoQ receptor family member VIII (Paqr8)   |
| Uckl1         | -0.61 | .002712291               | 3.393746 | Uridine-cytidine kinase 1-like 1 (Uckl1)   |
| Speg          | -0.61 | .000756471               | 4.317412 | SPEG complex locus (Speg)  |
| Mprip         | -0.61 | $1.04 \times 10^{-5}$    | 7.840381 | Myosin phosphatase Rho interacting protein (Mprip)   |
| Neurod1       | -0.61 | .015768263               | 3.991788 | Neurogenic differentiation 1 (Neurod1)   |
| Usp3          | -0.61 | .000684523               | 4.241772 | Ubiquitin-specific peptidase 3 (Usp3)  |
| Kif26a        | -0.62 | .036141721               | 1.890234 | Kinesin family member 26A (Kif26a)   |
| Ktn1          | -0.62 | $1.43 \times 10^{-5}$    | 6.635628 | Kinectin 1 (Ktn1)  |
| Fam129b       | -0.62 | .011251923               | 2.866118 | Family with sequence similarity 129, member B (Fam129b)  |
| H3f3b         | -0.62 | $1.83 \times 10^{-5}$    | 6.641063 | H3 histone, family 3B (H3f3b)  |
| Dazap2        | -0.62 | $5.27 \times 10^{-5}$    | 7.624097 | DAZ-associated protein 2 (Dazap2)  |
| Scd2          | -0.62 | $3.96 \times 10^{-6}$    | 10.35496 | Stearoyl-Coenzyme A desaturase 2 (Scd2)  |

**TABLE A1** Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Tmem86a   | -0.62 | .012708036            | 3.494719 | Transmembrane protein 86A (Tmem86a)   |
| Osgep     | -0.62 | .004104083            | 3.637412 | O-sialoglycoprotein endopeptidase (Osgep)   |
| Cox8a     | -0.62 | .000120305            | 7.147469 | Cytochrome c oxidase subunit VIIIa (Cox8a)  |
| Zw10      | -0.62 | .036792516            | 2.832055 | zw10 kinetochore protein (Zw10)   |
| Nfkbia    | -0.62 | .042310303            | 2.099284 | Nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, alpha (Nfkbia)      |
| Slc18b1   | -0.62 | .001586914            | 4.046394 | Solute carrier family 18, subfamily B, member 1 (Slc18b1)   |
| Ndufc2    | -0.62 | .000823742            | 6.281541 | NADH dehydrogenase (ubiquinone) 1, subcomplex unknown, 2 (Ndufc2)                                 |
| Sptssa    | -0.62 | .005186413            | 3.591965 | Serine palmitoyltransferase, small subunit A (Sptssa)   |
| Serp1     | -0.62 | .000212536            | 5.550364 | Stress-associated endoplasmic reticulum protein 1 (Serp1)   |
| Dgat1     | -0.62 | .007122829            | 3.063424 | Diacylglycerol O-acyltransferase 1 (Dgat1)  |
| Rnd2      | -0.62 | $2.81 \times 10^{-5}$ | 6.508868 | Rho family GTPase 2 (Rnd2)  |
| Selenos   | -0.62 | .000190462            | 4.810874 | Selenoprotein S (Selenos)   |
| BC031181  | -0.62 | $4.50 \times 10^{-5}$ | 6.691533 | cDNA sequence BC031181 (BC031181)   |
| B9d1      | -0.62 | .008436695            | 3.3404   | B9 protein domain 1 (B9d1)  |
| Grtp1     | -0.62 | .012627234            | 2.552823 | GH-regulated TBC protein 1 (Grtp1)  |
| Mcee      | -0.62 | .00124002             | 4.152572 | Methylmalonyl CoA epimerase (Mcee)  |
| Rbm3      | -0.62 | .000495879            | 4.278432 | RNA binding motif protein 3 (Rbm3)  |
| Polr3g    | -0.63 | .043149729            | 2.228887 | Polymerase (RNA) III (DNA directed) polypeptide G (Polr3g)  |
| Ppp1r15a  | -0.63 | .012587058            | 2.77325  | Protein phosphatase 1, regulatory (inhibitor) subunit 15A (Ppp1r15a)                              |
| Elfn1     | -0.63 | .047008119            | 6.243181 | Leucine-rich repeat and fibronectin type III, extracellular 1 (Elfn1)                             |
| Elovl7    | -0.63 | .014218724            | 4.497898 | ELOVL family member 7, elongation of long chain fatty acids (yeast) (Elovl7)                      |
| Col18a1   | -0.63 | .015558377            | 2.671624 | Collagen, type XVIII, alpha 1 (Col18a1)   |
| Rnpepl1   | -0.63 | .015179962            | 3.928203 | Arginyl aminopeptidase (aminopeptidase B)-like 1 (Rnpepl1)  |
| Cytip     | -0.63 | .044874908            | 2.92107  | Cytohesin 1 interacting protein (Cytip)   |
| Gm13375   | -0.63 | .007227594            | 2.878242 | Predicted gene 13375 (Gm13375)  |
| Rps27a    | -0.63 | .002669903            | 4.794661 | Ribosomal protein S27A (Rps27a)   |
| Capn3     | -0.63 | .014715837            | 2.96471  | Calpain 3 (Capn3)   |
| Trmu      | -0.63 | .00930154             | 2.604666 | tRNA 5-methylaminomethyl-2-thiouridylate methyltransferase (Trmu)                                 |
| Rnpc3     | -0.63 | .003257939            | 3.294593 | RNA-binding region (RNP1, RRM) containing 3 (Rnpc3)   |
| Lrp10     | -0.63 | .000127616            | 4.824147 | Low-density lipoprotein receptor-related protein 10 (Lrp10)                                       |
| Dusp15    | -0.63 | .018350619            | 2.656935 | Dual-specificity phosphatase-like 15 (Dusp15)   |
| Kcnn2     | -0.63 | .004315947            | 4.390654 | potassium intermediate/small conductance calcium-activated channel, subfamily N, member 2 (Kcnn2) |
| Ifngr1    | -0.63 | .002839606            | 3.767764 | Interferon gamma receptor 1 (Ifngr1)  |
| Sbk1      | -0.63 | .004922193            | 4.250637 | SH3-binding kinase 1 (Sbk1)   |
| Llg1      | -0.63 | .001453455            | 4.256972 | Lethal giant larvae homolog 1 (Llg1)  |
| Rpl22     | -0.63 | .000266171            | 6.339041 | Ribosomal protein L22 (Rpl22)   |
| Cep128    | -0.63 | .029655474            | 3.280109 | Centrosomal protein 128 (Cep128)  |
| Ddr1      | -0.63 | .000126347            | 5.132665 | Discoidin domain receptor family, member 1 (Ddr1)   |
| Atp1b2    | -0.63 | $4.81 \times 10^{-6}$ | 9.836582 | ATPase, Na <sup>+</sup> /K <sup>+</sup> transporting, beta 2 polypeptide (Atp1b2)                 |
| Fkbp2     | -0.63 | .001701475            | 5.330724 | FK506 binding protein 2 (Fkbp2)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Rfxank        | -0.63 | .020904931            | 2.346    | Regulatory factor X-associated ankyrin-containing protein (Rfxank)          |
| Sar1b         | -0.64 | $5.89 \times 10^{-5}$ | 5.687738 | Secretion-associated Ras-related GTPase 1B (Sar1b)                          |
| Bola1         | -0.64 | .007431416            | 2.764271 | bolA-like 1 (E. coli) (Bola1)   |
| Slc25a28      | -0.64 | .001548544            | 3.844212 | Solute carrier family 25, member 28 (Slc25a28)                              |
| Cox14         | -0.64 | .000466782            | 5.08454  | Cytochrome c oxidase assembly protein 14 (Cox14)                            |
| Tmem141       | -0.64 | .010659455            | 3.032708 | Transmembrane protein 141 (Tmem141)   |
| Slc15a4       | -0.64 | .00277358             | 3.627289 | Solute carrier family 15, member 4 (Slc15a4)                                |
| Pet100        | -0.64 | .049424979            | 2.133192 | PET100 homolog (Pet100)   |
| Lsm8          | -0.64 | .002195693            | 3.655856 | LSM8 homolog, U6 small nuclear RNA associated (Lsm8)                        |
| Gfra1         | -0.64 | .022286212            | 6.543331 | Glial cell line derived neurotrophic factor family receptor alpha 1 (Gfra1) |
| Il15ra        | -0.64 | .045862511            | 1.591228 | Interleukin 15 receptor, alpha chain (Il15ra)                               |
| Sall1         | -0.64 | .000514043            | 4.329751 | Sal-like 1 (Sall1)  |
| Grm3          | -0.64 | .001364121            | 5.488486 | Glutamate receptor, metabotropic 3 (Grm3)                                   |
| Utp11         | -0.64 | .000969843            | 4.492416 | UTP11 Small Subunit Processome Component (Utp11)                            |
| Btd           | -0.64 | .002308912            | 3.226788 | Biotinidase (Btd)   |
| Tgfa          | -0.64 | .009637513            | 4.944005 | Transforming growth factor alpha (Tgfa)                                     |
| 1700003M07Rik | -0.64 | .015710461            | 3.243855 | RIKEN cDNA 1700003M07 gene (1700003M07Rik)                                  |
| Ehhadh        | -0.64 | .033684125            | 1.968019 | Enoyl-Coenzyme A, hydratase/3-hydroxyacyl Coenzyme A dehydrogenase (Ehhadh) |
| Acbd4         | -0.64 | .006119006            | 3.129769 | Acyl-Coenzyme A binding domain containing 4 (Acbd4)                         |
| Arsk          | -0.64 | .002622684            | 3.404615 | Arylsulfatase K (Arsk)  |
| Rpl11         | -0.64 | .000238358            | 4.496203 | Ribosomal protein L11 (Rpl11)   |
| Nlrp5-ps      | -0.64 | .013823016            | 3.716091 | NLR family, pyrin domain containing 5, pseudogene (Nlrp5-ps)                |
| Adgrg1        | -0.64 | .000892557            | 6.519775 | Adhesion G protein-coupled receptor G1 (Adgrg1)                             |
| Crybg3        | -0.65 | .017365805            | 2.062718 | Beta-gamma crystallin domain containing 3 (Crybg3)                          |
| Prkcd         | -0.65 | .000464785            | 7.360998 | Protein kinase C, delta (Prkcd)   |
| Mpv17l2       | -0.65 | .016512284            | 3.821126 | MPV17 mitochondrial membrane protein-like 2 (Mpv17l2)                       |
| Dusp11        | -0.65 | .000666953            | 5.234913 | Dual-specificity phosphatase 11 (RNA/RNP complex 1-interacting) (Dusp11)    |
| Zfp787        | -0.65 | .020880402            | 2.552673 | Zinc finger protein 787 (Zfp787)  |
| Imp1          | -0.65 | .001626569            | 3.859403 | IMP1 inner mitochondrial membrane peptidase-like (S. cerevisiae) (Imp1)     |
| Malt1         | -0.65 | .042163663            | 2.235643 | MALT1 paracaspase (Malt1)   |
| Eepd1         | -0.65 | .040366284            | 1.902663 | Endonuclease/exonuclease/phosphatase family domain containing 1 (Eepd1)     |
| Gm16432       | -0.65 | .026675912            | 2.68436  | Predicted gene 16432 (Gm16432)  |
| Slc31a2       | -0.65 | .015995906            | 3.86975  | Solute carrier family 31, member 2 (Slc31a2)                                |
| Rsph4a        | -0.65 | .003358959            | 4.554405 | Radial spoke head 4 homolog A (Chlamydomonas) (Rsph4a)                      |
| Egfl7         | -0.65 | .019386897            | 2.434919 | EGF-like domain 7 (Egfl7)   |
| Rpsa          | -0.65 | $5.78 \times 10^{-6}$ | 6.800309 | Ribosomal protein SA (Rpsa)   |
| Etfa          | -0.65 | .000320883            | 5.461131 | Electron transferring flavoprotein, alpha polypeptide (Etfa)                |
| Stk33         | -0.65 | .032509218            | 2.852379 | Serine/threonine kinase 33 (Stk33)  |
| Aqp4          | -0.65 | .014701608            | 8.35426  | Aquaporin 4 (Aqp4)  |
| Rnf5          | -0.65 | .002841706            | 5.430422 | Ring finger protein 5 (Rnf5)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Rpl17         | -0.65 | 4.41 × 10 <sup>-5</sup>  | 5.393224 | Ribosomal protein L17 (Rpl17)  |
| Rpl14         | -0.65 | 3.04 × 10 <sup>-5</sup>  | 5.558006 | Ribosomal protein L14 (Rpl14)  |
| Rin2          | -0.65 | .000854386               | 4.806051 | RAS and Rab interactor 2 (Rin2)  |
| Mrpl33        | -0.65 | .006243377               | 3.273027 | Mitochondrial ribosomal protein L33 (Mrpl33)   |
| Atp5j         | -0.65 | .000348155               | 6.996285 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F0 complex, subunit F (Atp5j) |
| Hsd17b10      | -0.65 | .000504797               | 4.244624 | Hydroxysteroid (17-beta) dehydrogenase 10 (Hsd17b10)                                   |
| Tceal8        | -0.65 | .000244377               | 5.502409 | Transcription elongation factor A (SII)-like 8 (Tceal8)                                |
| Selenof       | -0.65 | 6.66 × 10 <sup>-6</sup>  | 7.142503 | Selenoprotein F (Selenof)  |
| Gpx4          | -0.66 | .00127953                | 3.755899 | Glutathione peroxidase 4 (Gpx4)  |
| Kif6          | -0.66 | .039925457               | 1.990967 | Kinesin family member 6 (Kif6)   |
| Fzd4          | -0.66 | .020981595               | 2.946199 | Frizzled class receptor 4 (Fzd4)   |
| Tex9          | -0.66 | .003031257               | 3.811824 | Testis expressed gene 9 (Tex9)   |
| Ntn1          | -0.66 | .008818444               | 2.831446 | Netrin 1 (Ntn1)  |
| Dhrs7         | -0.66 | .006646127               | 3.782121 | Dehydrogenase/reductase (SDR family) member 7 (Dhrs7)                                  |
| Otulin        | -0.66 | .00490459                | 3.18073  | OTU deubiquitinase with linear linkage specificity (Otulin)                            |
| Snhg17        | -0.66 | .020339082               | 1.816337 | Small nucleolar RNA host gene 17 (Snhg17)  |
| Etv5          | -0.66 | .000257266               | 4.821753 | ets variant 5 (Etv5)   |
| Ilkap         | -0.66 | .000523549               | 4.755555 | Integrin-linked kinase-associated serine/threonine phosphatase 2C (Ilkap)              |
| Gm45605       | -0.66 | .024729319               | 2.041045 | Predicted gene (Gm45605)   |
| Zfand2b       | -0.66 | .045138748               | 2.287668 | Zinc finger, AN1 type domain 2B (Zfand2b)  |
| Arhgap29      | -0.66 | .007354928               | 3.819825 | Rho GTPase activating protein 29 (Arhgap29)  |
| Mtmr10        | -0.66 | .005330084               | 4.437537 | Myotubularin-related protein 10 (Mtmr10)   |
| Bax           | -0.66 | .005598384               | 3.481316 | BCL2-associated X protein (Bax)  |
| Mien1         | -0.66 | .001652512               | 4.175419 | Migration and invasion enhancer 1 (Mien1)  |
| 1500011K16Rik | -0.66 | .000515894               | 4.76452  | RIKEN cDNA 1500011K16 gene (1500011K16Rik)   |
| Ctu2          | -0.66 | .016681558               | 2.277446 | Cytosolic thiouridylase subunit 2 (Ctu2)   |
| 2310009A05Rik | -0.66 | .011850319               | 2.717225 | RIKEN cDNA 2310009A05 gene (2310009A05Rik)   |
| 3110056K07Rik | -0.66 | .018426073               | 2.592994 | RIKEN cDNA 3110056K07 gene (3110056K07Rik)   |
| Rps6ka1       | -0.66 | .001105372               | 3.474464 | Ribosomal protein S6 kinase polypeptide 1 (Rps6ka1)                                    |
| Hip1r         | -0.66 | .000699718               | 4.082384 | Huntingtin interacting protein 1-related (Hip1r)                                       |
| Adgra3        | -0.66 | .000924156               | 3.69905  | Adhesion G protein-coupled receptor A3 (Adgra3)  |
| Ssbp1         | -0.66 | .001338799               | 4.263046 | Single-stranded DNA binding protein 1 (Ssbp1)  |
| Pxylp1        | -0.66 | .024977903               | 3.214745 | 2-Phosphoxylose phosphatase 1 (Pxylp1)   |
| Card19        | -0.66 | .005128564               | 2.937447 | Caspase recruitment domain family, member 19 (Card19)                                  |
| Cgnl1         | -0.66 | .043059615               | 2.109093 | Cingulin-like 1 (Cgnl1)  |
| Ccdc58        | -0.66 | .016655958               | 2.458506 | Coiled-coil domain containing 58 (Ccdc58)  |
| Caprin2       | -0.66 | .012736767               | 2.554031 | Caprin family member 2 (Caprin2)   |
| Fcf1          | -0.67 | .003140864               | 3.610489 | FCF1 rRNA processing protein (Fcf1)  |
| Chd7          | -0.67 | .016146763               | 5.134733 | Chromodomain helicase DNA binding protein 7 (Chd7)                                     |
| Rpl32         | -0.67 | .000111999               | 7.617208 | Ribosomal protein L32 (Rpl32)  |
| Cmc4          | -0.67 | .031919077               | 1.727233 | C-x (9)-C motif containing 4 (Cmc4)  |
| Fyco1         | -0.67 | .00080519                | 5.588259 | FYVE and coiled-coil domain containing 1 (Fyco1)                                       |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Fgd6          | -0.67 | .000855313               | 5.114489 | FYVE, RhoGEF and PH domain containing 6 (Fgd6)   |
| Spsb1         | -0.67 | .009475074               | 3.438327 | splA/ryanodine receptor domain and SOCS box containing 1 (Spsb1)                           |
| Snrpc         | -0.67 | .045805901               | 1.785356 | U1 small nuclear ribonucleoprotein C (Snrpc)   |
| Pard3b        | -0.67 | .030278518               | 2.978152 | Par-3 family cell polarity regulator beta (Pard3b)   |
| Synpr         | -0.67 | .01226005                | 6.371494 | Synaptoporin (Synpr)   |
| Flywch2       | -0.67 | .035937283               | 2.678039 | FLYWCH family member 2 (Flywch2)   |
| Sulf2         | -0.67 | .001357801               | 6.516621 | Sulfatase 2 (Sulf2)  |
| Slc16a2       | -0.67 | .00132835                | 3.771513 | Solute carrier family 16 (monocarboxylic acid transporters), member 2 (Slc16a2)            |
| Mcc           | -0.67 | .000591057               | 5.755009 | Mutated in colorectal cancers (Mcc)  |
| Bmp1          | -0.67 | .026285895               | 2.074876 | Bone morphogenetic protein 1 (Bmp1)  |
| Tmod3         | -0.67 | .000729819               | 4.55708  | Tropomodulin 3 (Tmod3)   |
| 1110046J04Rik | -0.67 | .018412516               | 2.18246  | RIKEN cDNA 1110046J04 gene (1110046J04Rik)   |
| Zc3h8         | -0.67 | .013505748               | 2.405338 | Zinc finger CCCH type containing 8 (Zc3h8)   |
| Rpp38         | -0.67 | .022072384               | 2.678805 | Ribonuclease P/MRP 38 subunit (Rpp38)  |
| Zfand6        | -0.67 | .001856778               | 4.71923  | Zinc finger, AN1-type domain 6 (Zfand6)  |
| Plcl1         | -0.67 | .003419757               | 5.456141 | Phospholipase C-like 1 (Plcl1)   |
| Ctnnbl1       | -0.67 | .002505762               | 3.10508  | Catenin, beta like 1 (Ctnnbl1)   |
| Nptx1         | -0.67 | .047700502               | 5.83422  | Neuronal pentraxin 1 (Nptx1)   |
| Fstl1         | -0.67 | .000672644               | 5.158487 | Follistatin-like 1 (Fstl1)   |
| Zeb2          | -0.67 | .002400684               | 6.775996 | Zinc finger E-box binding homeobox 2 (Zeb2)  |
| Smim20        | -0.67 | .000500932               | 4.365446 | Small integral membrane protein 20 (Smim20)  |
| Pld5          | -0.67 | .042041569               | 5.676102 | Phospholipase D family, member 5 (Pld5)  |
| Rps16         | -0.67 | .00041712                | 5.122946 | Ribosomal protein S16 (Rps16)  |
| Rps25         | -0.67 | $3.42 \times 10^{-5}$    | 7.237472 | Ribosomal protein S25 (Rps25)  |
| Pnpla2        | -0.67 | .001945325               | 4.256841 | Patatin-like phospholipase domain containing 2 (Pnpla2)                                    |
| Alkbh3        | -0.67 | .021161885               | 2.213075 | alkB homolog 3, alpha-ketoglutarate-dependent dioxygenase (Alkbh3)                         |
| Cavin3        | -0.67 | .004002513               | 3.314798 | Caveolae-associated protein 3 (Cavin3)   |
| Cdpf1         | -0.67 | .002096016               | 3.519073 | Cysteine-rich, DPF motif domain containing 1 (Cdpf1)                                       |
| Rps8          | -0.68 | .000168046               | 4.665951 | Ribosomal protein S8 (Rps8)  |
| Pwwp2a        | -0.68 | .001334561               | 4.986938 | PWWP domain containing 2A (Pwwp2a)   |
| Sema7a        | -0.68 | $8.71 \times 10^{-5}$    | 4.646144 | Sema domain, immunoglobulin domain (Ig), and GPI membrane anchor, (semaphorin) 7A (Sema7a) |
| Sys1          | -0.68 | .000224073               | 4.063646 | SYS1 Golgi-localized integral membrane protein homolog ( <i>S. cerevisiae</i> ) (Sys1)     |
| Gm16794       | -0.68 | .039631738               | 1.505798 | Predicted gene, 16794 (Gm16794)  |
| Slc35b2       | -0.68 | .004134027               | 3.596397 | Solute carrier family 35, member B2 (Slc35b2)  |
| Josd2         | -0.68 | .004778098               | 3.581197 | Josephin domain containing 2 (Josd2)   |
| Snrpa1        | -0.68 | .002645101               | 3.643475 | Small nuclear ribonucleoprotein polypeptide A' (Snrpa1)                                    |
| Smdt1         | -0.68 | .001109435               | 5.621242 | Single-pass membrane protein with aspartate-rich tail 1 (Smdt1)                            |
| Eno4          | -0.68 | .029498843               | 2.06391  | Enolase 4 (Eno4)   |
| Tmem144       | -0.68 | .002354346               | 3.729227 | Transmembrane protein 144 (Tmem144)  |
| Enpp6         | -0.68 | .027304739               | 4.202956 | Ectonucleotide pyrophosphatase/phosphodiesterase 6 (Enpp6)                                 |
| Shc4          | -0.68 | .007069555               | 2.825835 | SHC (Src homology 2 domain containing) family, member 4 (Shc4)                             |
| Iqck          | -0.68 | .003003186               | 3.349128 | IQ motif containing K (Iqck)   |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Wdr60         | -0.68 | .00676544             | 3.126138 | WD repeat domain 60 (Wdr60)   |
| Kif1c         | -0.68 | .002055791            | 5.648548 | Kinesin family member 1C (Kif1c)                                      |
| 1110038F14Rik | -0.68 | .011435696            | 3.003711 | RIKEN cDNA 1110038F14 gene (1110038F14Rik)                            |
| Gm1976        | -0.68 | .014236399            | 2.637521 | Predicted gene 1976 (Gm1976)  |
| Ttyh1         | -0.68 | $4.13 \times 10^{-6}$ | 8.696656 | Tweety family member 1 (Ttyh1)  |
| Lix1l         | -0.68 | .00091824             | 4.927738 | Lix1-like (Lix1l)   |
| Tmem39a       | -0.68 | .006533561            | 3.336655 | Transmembrane protein 39a (Tmem39a)                                   |
| Anxa5         | -0.68 | .001119261            | 5.575959 | Annexin A5 (Anxa5)  |
| Dgcr6         | -0.68 | .001246157            | 3.791271 | DiGeorge syndrome critical region gene 6 (Dgcr6)                      |
| Slc4a2        | -0.68 | .000513786            | 4.040131 | Solute carrier family 4 (anion exchanger), member 2 (Slc4a2)          |
| Nudt1         | -0.68 | .039631738            | 1.841279 | Nudix (nucleoside diphosphate linked moiety X)-type motif 1 (Nudt1)   |
| Tmem232       | -0.68 | .012241839            | 2.697146 | Transmembrane protein 232 (Tmem232)                                   |
| Ccp1os        | -0.68 | .003899723            | 3.293575 | Cell cycle progression 1, opposite strand (Ccp1os)                    |
| Itgb1         | -0.68 | .000240911            | 5.494356 | Integrin beta 1 (fibronectin receptor beta) (Itgb1)                   |
| Ptbp1         | -0.68 | .0001962              | 4.54997  | Polypyrimidine tract binding protein 1 (Ptbp1)                        |
| Ccdc88c       | -0.69 | .005480721            | 3.612535 | Coiled-coil domain containing 88C (Ccdc88c)                           |
| Fadd          | -0.69 | .026789876            | 2.190976 | Fas (TNFRSF6)-associated via death domain (Fadd)                      |
| Akr1b10       | -0.69 | .000825749            | 3.429434 | aldo-keto reductase family 1, member B10 (aldose reductase) (Akr1b10) |
| Bola3         | -0.69 | .016566769            | 2.510886 | boLA-like 3 (E. coli) (Bola3)   |
| Mri1          | -0.69 | .009075324            | 2.442271 | Methylthioribose-1-phosphate isomerase 1 (Mri1)                       |
| Pts           | -0.69 | .000119713            | 5.000387 | 6-Pyruvoyl-tetrahydropterin synthase (Pts)                            |
| 2010320M18Rik | -0.69 | .017646208            | 2.039388 | RIKEN cDNA 2010320M18 gene (2010320M18Rik)                            |
| 2310011J03Rik | -0.69 | .004330184            | 3.172291 | RIKEN cDNA 2310011J03 gene (2310011J03Rik)                            |
| Gpm6b         | -0.69 | .000127369            | 8.864788 | Glycoprotein m6b (Gpm6b)  |
| Zkscan3       | -0.69 | .007410085            | 3.569379 | Zinc finger with KRAB and SCAN domains 3 (Zkscan3)                    |
| Echdc1        | -0.69 | .035913115            | 1.626138 | Enoyl Coenzyme A hydratase domain containing 1 (Echdc1)               |
| Helq          | -0.69 | .018672717            | 2.427183 | Helicase, POLQ-like (Helq)  |
| Sox1ot        | -0.69 | .000353493            | 4.772023 | SOX1 Overlapping Transcript (Sox1ot)                                  |
| Susd5         | -0.69 | .016801987            | 2.902972 | Sushi domain containing 5 (Susd5)                                     |
| Dnaaf5        | -0.69 | .012583825            | 3.203969 | Dynein, axonemal assembly factor 5 (Dnaaf5)                           |
| Ndufa2        | -0.69 | .004637548            | 5.281471 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 2 (Ndufa2)        |
| Mrpl52        | -0.69 | .001177158            | 4.191429 | Mitochondrial ribosomal protein L52 (Mrpl52)                          |
| Pls1          | -0.69 | .005067183            | 3.651407 | Plastin 1 (I-isoform) (Pls1)  |
| Cystm1        | -0.69 | .000742407            | 3.757867 | Cysteine-rich transmembrane module containing 1 (Cystm1)              |
| Commd10       | -0.69 | .008678584            | 3.445984 | COMM domain containing 10 (Commd10)                                   |
| Zfp703        | -0.69 | .008458822            | 2.840441 | Zinc finger protein 703 (Zfp703)                                      |
| Spop          | -0.69 | $3.14 \times 10^{-5}$ | 8.405848 | Speckle-type POZ protein (Spop)                                       |
| Nfam1         | -0.70 | .013209915            | 4.778527 | Nfat activating molecule with ITAM motif 1 (Nfam1)                    |
| Rreb1         | -0.70 | .000371674            | 5.42952  | Ras responsive element binding protein 1 (Rreb1)                      |
| Pkig          | -0.70 | .004593673            | 2.82839  | Protein kinase inhibitor, gamma (Pkig)                                |
| Rps6          | -0.70 | .044704187            | 1.109345 | Ribosomal protein S6 (Rps6)   |
| Itm2c         | -0.70 | $6.00 \times 10^{-6}$ | 7.903863 | Integral membrane protein 2C (Itm2c)                                  |
| Hacd2         | -0.70 | $4.12 \times 10^{-5}$ | 5.504852 | 3-Hydroxyacyl-CoA dehydratase 2 (Hacd2)                               |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Tsc22d3   | -0.70 | .00101211             | 4.957683 | TSC22 domain family, member 3 (Tsc22d3)   |
| Ptma      | -0.70 | .003125493            | 3.293406 | Prothymosin alpha (Ptma)  |
| Pum3      | -0.70 | .001533596            | 4.586104 | Pumilio RNA-binding family member 3 (Pum3)  |
| Crocc     | -0.70 | .019870615            | 2.150926 | Ciliary rootlet coiled-coil, rootletin (Crocc)  |
| Mrps21    | -0.70 | .000678875            | 4.456485 | Mitochondrial ribosomal protein S21 (Mrps21)  |
| Tmem38b   | -0.70 | .013158873            | 2.782299 | Transmembrane protein 38B (Tmem38b)   |
| Tyro3     | -0.70 | .000256536            | 3.947445 | TYRO3 protein tyrosine kinase 3 (Tyro3)   |
| Snrpg     | -0.70 | .005532843            | 3.323614 | Small nuclear ribonucleoprotein polypeptide G (Snrpg)   |
| Itgav     | -0.70 | .000115082            | 5.833847 | Integrin alpha V (Itgav)  |
| H3f3a     | -0.70 | .00017438             | 4.244121 | H3 histone, family 3A (H3f3a)   |
| Pqlc2     | -0.70 | .02307615             | 2.403743 | PQ loop repeat containing 2 (Pqlc2)   |
| Ttc39aos1 | -0.70 | .005292505            | 3.666678 | Ttc39a opposite strand RNA 1 (Ttc39aos1)  |
| Rad9b     | -0.70 | .040901862            | 1.684189 | RAD9 checkpoint clamp component B (Rad9b)   |
| Selenok   | -0.71 | .000464785            | 5.925493 | Selenoprotein K (Selenok)   |
| Lsm6      | -0.71 | $6.24 \times 10^{-5}$ | 5.204966 | LSM6 homolog, U6 small nuclear RNA and mRNA degradation associated (Lsm6)                     |
| S100a11   | -0.71 | .045483238            | 1.481447 | S100 calcium binding protein A11 (S100a11)  |
| Fmnl3     | -0.71 | .005394472            | 2.936182 | Formin-like 3 (Fmnl3)   |
| Gab1      | -0.71 | .000623531            | 6.031924 | Growth factor receptor bound protein 2-associated protein 1 (Gab1)                            |
| Ndufb9    | -0.71 | .000111734            | 5.914792 | NADH dehydrogenase (ubiquinone) 1 beta subcomplex, 9 (Ndufb9)                                 |
| Fam107b   | -0.71 | .008016303            | 3.864478 | Family with sequence similarity 107, member B (Fam107b)                                       |
| Coq8b     | -0.71 | .031118406            | 1.82094  | Coenzyme Q8B (Coq8b)  |
| Zdhhc4    | -0.71 | .00068304             | 3.762525 | Zinc finger, DHHC domain containing 4 (Zdhhc4)  |
| Apbb1ip   | -0.71 | .014794905            | 2.159698 | Amyloid beta (A4) precursor protein-binding, family B, member 1 interacting protein (Apbb1ip) |
| Tmem134   | -0.71 | .00158207             | 3.188746 | Transmembrane protein 134 (Tmem134)   |
| Aamdc     | -0.71 | .000311646            | 3.594922 | Adipogenesis-associated Mth938 domain containing (Aamdc)                                      |
| Mir670hg  | -0.71 | .031688737            | 1.484986 | MIR670 host gene (non-protein coding) (Mir670hg)  |
| Nsmce1    | -0.71 | .017677103            | 2.709915 | NSE1 homolog, SMC5-SMC6 complex component (Nsmce1)  |
| Pfdn5     | -0.71 | $2.05 \times 10^{-5}$ | 7.099518 | Prefoldin 5 (Pfdn5)   |
| Elovl2    | -0.71 | .001863981            | 4.434404 | Elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)-like 2 (Elovl2)       |
| P3h4      | -0.71 | .004922131            | 3.401554 | Prolyl 3-hydroxylase family member 4 (non-enzymatic) (P3h4)                                   |
| Thap3     | -0.71 | .006032777            | 2.90214  | THAP domain containing, apoptosis-associated protein 3 (Thap3)                                |
| Cox6c     | -0.71 | .00040773             | 6.063557 | Cytochrome c oxidase subunit VIc (Cox6c)  |
| Usp40     | -0.71 | .001119261            | 4.185605 | Ubiquitin-specific peptidase 40 (Usp40)   |
| Elovl5    | -0.71 | $7.75 \times 10^{-6}$ | 6.674783 | ELOVL family member 5, elongation of long chain fatty acids (yeast) (Elovl5)                  |
| Tomm7     | -0.71 | .002559336            | 4.401669 | Translocase of outer mitochondrial membrane 7 homolog (yeast) (Tomm7)                         |
| Ctbs      | -0.71 | .001511183            | 3.238649 | Chitinase, di-N-acetyl- (Ctbs)  |
| Zfp488    | -0.71 | .012811148            | 2.955644 | Zinc finger protein 488 (Zfp488)  |
| Zswim7    | -0.71 | .03051504             | 1.961373 | Zinc finger SWIM-type containing 7 (Zswim7)   |
| Tprkb     | -0.72 | $3.22 \times 10^{-5}$ | 6.654363 | Tp53rk binding protein (Tprkb)  |
| Rps16-ps2 | -0.72 | .038877403            | 1.495869 | Ribosomal protein S16, pseudogene 2 (Rps16-ps2)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Naaa          | -0.72 | .002516188               | 3.484266 | N-acylethanolamine acid amidase (Naaa)   |
| Abca8b        | -0.72 | .027804757               | 2.559968 | ATP-binding cassette, sub-family A (ABC1), member 8b (Abca8b)  |
| Arhgef1       | -0.72 | .001327334               | 3.638156 | Rho guanine nucleotide exchange factor (GEF) 1 (Arhgef1)   |
| Shank3        | -0.72 | $5.89 \times 10^{-5}$    | 7.002377 | SH3/ankyrin domain gene 3 (Shank3)   |
| Sirt2         | -0.72 | $6.14 \times 10^{-6}$    | 7.504511 | Sirtuin 2 (Sirt2)  |
| Cep152        | -0.72 | .049687686               | 1.136366 | Centrosomal protein 152 (Cep152)   |
| Actl6a        | -0.72 | .045645557               | 1.627291 | Actin-like 6A (Actl6a)   |
| Slc7a2        | -0.72 | .00091401                | 4.507206 | Solute carrier family 7 (cationic amino acid transporter, y+ system), member 2 (Slc7a2)                              |
| Nwd2          | -0.72 | .027783112               | 8.134979 | NACHT and WD repeat domain containing 2 (Nwd2)   |
| Ccdc190       | -0.72 | .012360533               | 2.304146 | Coiled-coil domain containing 190 (Ccdc190)  |
| Ebp           | -0.72 | .004872538               | 2.793891 | Phenylalkylamine Ca <sup>2+</sup> antagonist (emopamil) binding protein (Ebp)  |
| Rpl18a        | -0.72 | $1.82 \times 10^{-6}$    | 6.885522 | Ribosomal protein L18A (Rpl18a)  |
| Smim1         | -0.72 | .022261006               | 1.740654 | Small integral membrane protein 1 (Smim1)  |
| Ptch1         | -0.72 | .000111085               | 7.990192 | Patched 1 (Ptch1)  |
| Gna12         | -0.72 | .001573558               | 5.741384 | Guanine nucleotide binding protein, alpha 12 (Gna12)   |
| Atp5e         | -0.72 | .002539964               | 6.076804 | ATP synthase, H <sup>+</sup> transporting, mitochondrial F1 complex, epsilon subunit (Atp5e)                         |
| Rian          | -0.72 | .000565417               | 7.549145 | RNA imprinted and accumulated in nucleus (Rian)  |
| Myo1d         | -0.72 | .002783266               | 4.026959 | Myosin ID (Myo1d)  |
| Fam229b       | -0.73 | .001669081               | 3.229115 | Family with sequence similarity 229, member B (Fam229b)  |
| 4930570G19Rik | -0.73 | .005721739               | 2.968658 | RIKEN cDNA 4930570G19 gene (4930570G19Rik)   |
| Esyt1         | -0.73 | .036722293               | 2.175348 | Extended synaptotagmin-like protein 1 (Esyt1)  |
| St5           | -0.73 | .002261836               | 4.469716 | Suppression of tumorigenicity 5 (St5)  |
| Il17rd        | -0.73 | .003019827               | 3.121452 | Interleukin 17 receptor D (Il17rd)   |
| Map3k19       | -0.73 | .022210779               | 3.079196 | Mitogen-activated protein kinase kinase kinase 19 (Map3k19)  |
| Kctd12b       | -0.73 | .037964848               | 4.245385 | Potassium channel tetramerisation domain containing 12b (Kctd12b)  |
| Dnm2          | -0.73 | .000171211               | 4.595825 | Dynamin 2 (Dnm2)   |
| Cftr          | -0.73 | .035891523               | 2.585149 | Cystic fibrosis transmembrane conductance regulator (Cftr)   |
| Hemk1         | -0.73 | .005660147               | 2.474465 | HemK methyltransferase family member 1 (Hemk1)   |
| 2010107E04Rik | -0.73 | .001053757               | 6.258876 | RIKEN cDNA 2010107E04 gene (2010107E04Rik)   |
| Abcg2         | -0.73 | .001207838               | 3.145087 | ATP-binding cassette, sub-family G (WHITE), member 2 (Abcg2)   |
| Podxl         | -0.73 | .002302996               | 3.454779 | Podocalyxin-like (Podxl)   |
| Pax6          | -0.73 | .025595829               | 2.689857 | Paired box 6 (Pax6)  |
| Fam213b       | -0.73 | .000573279               | 4.798306 | Family with sequence similarity 213, member B (Fam213b)  |
| Rpl21         | -0.73 | $2.93 \times 10^{-6}$    | 6.467392 | Ribosomal protein L21 (Rpl21)  |
| Ndufaf2       | -0.73 | .001967122               | 3.280904 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, assembly factor 2 (Ndufaf2)                                      |
| Hpgds         | -0.73 | .025015837               | 2.021919 | Hematopoietic prostaglandin D synthase (Hpgds)   |
| Arhgap18      | -0.73 | .001154156               | 3.403752 | Rho GTPase activating protein 18 (Arhgap18)  |
| Gpr37         | -0.73 | .000343901               | 5.703181 | G protein-coupled receptor 37 (Gpr37)  |
| Gal3st1       | -0.73 | .007688337               | 2.195836 | Galactose-3-O-sulfotransferase 1 (Gal3st1)   |
| Pcbd2         | -0.73 | .012896208               | 2.323069 | Pterin 4 alpha carbinolamine dehydratase/dimerization cofactor of hepatocyte nuclear factor 1 alpha (TCF1) 2 (Pcbd2) |
| Phf21b        | -0.73 | .019049477               | 2.253954 | PHD finger protein 21B (Phf21b)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Bet1          | -0.73 | .00269514                | 3.74725  | Bet1 golgi vesicular membrane trafficking protein (Bet1)       |
| Garem2        | -0.74 | .003693994               | 3.697976 | GRB2-associated regulator of MAPK1 subtype 2 (Garem2)          |
| Ccdc96        | -0.74 | .00738221                | 2.817301 | Coiled-coil domain containing 96 (Ccdc96)                      |
| Bmf           | -0.74 | .043236941               | 1.924173 | BCL2 modifying factor (Bmf)                                    |
| Gm9385        | -0.74 | .019351633               | 1.825544 | Predicted pseudogene 9385 (Gm9385)                             |
| Gm43843       | -0.74 | .02947797                | 1.945163 | Predicted gene (Gm9385)  |
| Drc3          | -0.74 | .001849439               | 3.17162  | Dynein Regulatory Complex Subunit 3 (Drc3)                     |
| 1300002E11Rik | -0.74 | .002502714               | 3.636221 | RIKEN cDNA 1300002E11 gene (1300002E11Rik)                     |
| A230057D06Rik | -0.74 | .040035138               | 2.127123 | RIKEN cDNA A230057D06 gene (A230057D06Rik)                     |
| Sarnp         | -0.74 | .001803852               | 3.005652 | SAP domain containing ribonucleoprotein (Sarnp)                |
| Sft2d1        | -0.74 | .006551052               | 2.667601 | SFT2 domain containing 1 (Sft2d1)                              |
| Trnau1ap      | -0.74 | .025860482               | 2.436853 | tRNA selenocysteine 1-associated protein 1 (Trnau1ap)          |
| Haus1         | -0.74 | .002061146               | 3.471392 | HAUS augmin-like complex, subunit 1 (Haus1)                    |
| Trp53bp2      | -0.74 | $7.59 \times 10^{-5}$    | 5.636781 | Transformation-related protein 53 binding protein 2 (Trp53bp2) |
| Cfap44        | -0.74 | .004100844               | 3.34182  | Cilia and flagella-associated protein 44 (Cfap44)              |
| Enho          | -0.74 | .001514895               | 4.922877 | Energy homeostasis associated (Enho)                           |
| Pou3f3        | -0.74 | .007892013               | 4.81611  | POU domain, class 3, transcription factor 3 (Pou3f3)           |
| Rnft1         | -0.74 | .0043798                 | 3.259997 | Ring finger protein, transmembrane 1 (Rnft1)                   |
| Fam160b2      | -0.74 | .000699718               | 3.779263 | Family with sequence similarity 160, member B2 (Fam160b2)      |
| Sostdc1       | -0.74 | .041158603               | 3.352082 | Sclerostin domain containing 1 (Sostdc1)                       |
| Gm2000        | -0.75 | .038801677               | 1.011046 | Ribosomal protein L35 pseudogene (Gm2000)                      |
| Plin2         | -0.75 | .008099173               | 2.894854 | Perilipin 2 (Plin2)  |
| Pfkfb4        | -0.75 | .0273616                 | 1.605476 | 6-Phosphofructo-2-kinase/fructose-2,6-biphosphatase 4 (Pfkfb4) |
| Gm15417       | -0.75 | .014155293               | 2.080683 | Predicted gene 15417 (Gm15417)                                 |
| Entpd1        | -0.75 | .003319018               | 3.579577 | Ectonucleoside triphosphate diphosphohydrolase 1 (Entpd1)      |
| Rps3          | -0.75 | $1.68 \times 10^{-5}$    | 6.857745 | Ribosomal protein S3 (Rps3)                                    |
| Bok           | -0.75 | .000201806               | 5.339799 | BCL2-related ovarian killer (Bok)                              |
| Qtrt2         | -0.75 | .031707255               | 2.436997 | Queuine tRNA-Ribosyltransferase Accessory Subunit 2 (Qtrt2)    |
| Rab13         | -0.75 | .00933314                | 2.028074 | RAB13, member RAS oncogene family (Rab13)                      |
| Itga6         | -0.75 | .000984101               | 4.856695 | Integrin alpha 6 (Itga6)                                       |
| Ccdc74a       | -0.75 | .001724166               | 3.396714 | Coiled-coil domain containing 74A (Ccdc74a)                    |
| Ikzf1         | -0.75 | .032655229               | 2.661964 | IKAROS family zinc finger 1 (Ikzf1)                            |
| Cables1       | -0.75 | .000231785               | 4.437089 | CDK5 and Abl enzyme substrate 1 (Cables1)                      |
| Cecr6         | -0.75 | .045702512               | 2.321249 | Cat eye syndrome chromosome region, candidate 6 (Cecr6)        |
| Hacd1         | -0.75 | .011616227               | 1.952287 | 3-Hydroxyacyl-CoA dehydratase 1 (Hacd1)                        |
| Asb2          | -0.75 | .019800604               | 2.797241 | Ankyrin repeat and SOCS box-containing 2 (Asb2)                |
| Dnah12        | -0.75 | .011575722               | 2.917351 | Dynein, axonemal, heavy chain 12 (Dnah12)                      |
| Spata18       | -0.75 | .011439076               | 2.799041 | Spermatogenesis associated 18 (Spata18)                        |
| Rps13         | -0.75 | .000171227               | 5.204694 | Ribosomal protein S13 (Rps13)                                  |
| Tmem178       | -0.75 | .006218273               | 2.564378 | Transmembrane protein 178 (Tmem178)                            |
| Magt1         | -0.75 | .003249929               | 4.835108 | Magnesium transporter 1 (Magt1)                                |
| Taf13         | -0.75 | $3.22 \times 10^{-5}$    | 5.571771 | TATA-box binding protein-associated factor 13 (Taf13)          |
| Ephb1         | -0.75 | .009031661               | 4.405649 | Eph receptor B1 (Ephb1)  |
| Myo9b         | -0.75 | .000815215               | 3.964934 | Myosin IXb (Myo9b)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Sec14l5       | -0.75 | .036791623               | 2.81168  | SEC14-like lipid binding 5 (Sec14l5)   |
| Ttc34         | -0.75 | .046870412               | 1.341178 | Tetratricopeptide repeat domain 34 (Ttc34)                                       |
| Rpl31-ps8     | -0.76 | .016067384               | 1.835762 | Ribosomal protein L31, pseudogene 8 (Rpl31-ps8)                                  |
| Rps19         | -0.76 | $3.14 \times 10^{-5}$    | 4.721972 | Ribosomal protein S19 (Rps19)  |
| Rfx1          | -0.76 | .012360533               | 2.876197 | Regulatory factor X, 1 (influences HLA class II expression) (Rfx1)               |
| Rps9          | -0.76 | $1.84 \times 10^{-5}$    | 6.347229 | Ribosomal protein S9 (Rps9)  |
| Ccdc171       | -0.76 | .041366209               | 2.385024 | Coiled-coil domain containing 171 (Ccdc171)                                      |
| Snopc5        | -0.76 | .000749397               | 3.585373 | Small nuclear RNA activating complex, polypeptide 5 (Snopc5)                     |
| Heatr5a       | -0.76 | .000801375               | 3.922107 | HEAT repeat containing 5A (Heatr5a)  |
| Col4a1        | -0.76 | .006340613               | 2.628715 | Collagen, type IV, alpha 1 (Col4a1)  |
| Drap1         | -0.76 | $4.26 \times 10^{-5}$    | 4.995156 | Dr1-associated protein 1 (negative cofactor 2 alpha) (Drap1)                     |
| 1500015A07Rik | -0.76 | .019527927               | 2.026303 | RIKEN cDNA 1500015A07 gene (1500015A07Rik)                                       |
| Sstr2         | -0.76 | .013209915               | 4.011479 | Somatostatin receptor 2 (Sstr2)  |
| Elf1          | -0.76 | .007401504               | 2.934874 | E74-like factor 1 (Elf1)   |
| Prex2         | -0.76 | .000266989               | 6.795311 | Phosphatidylinositol-3,4,5-trisphosphate-dependent Rac exchange factor 2 (Prex2) |
| Zc3hav1       | -0.76 | .017464486               | 3.50779  | Zinc finger CCCH type, antiviral 1 (Zc3hav1)                                     |
| Selenoh       | -0.76 | .000329398               | 3.880633 | Selenoprotein H (Selenoh)  |
| Fmo1          | -0.76 | .014738407               | 2.841318 | Flavin containing monooxygenase 1 (Fmo1)   |
| Dnajc1        | -0.76 | .001036855               | 3.99184  | DnaJ heat shock protein family (Hsp40) member C1 (Dnajc1)                        |
| Plgrkt        | -0.76 | .000958584               | 3.325198 | Plasminogen receptor, C-terminal lysine transmembrane protein (Plgrkt)           |
| Sash1         | -0.76 | $1.67 \times 10^{-5}$    | 6.883325 | SAM and SH3 domain containing 1 (Sash1)  |
| Laptm4b       | -0.76 | $3.83 \times 10^{-5}$    | 4.941842 | Lysosomal-associated protein transmembrane 4B (Laptm4b)                          |
| Rpl35         | -0.76 | .001169567               | 4.276143 | Ribosomal protein L35 (Rpl35)  |
| Syt6          | -0.76 | .03919844                | 7.26392  | Synaptotagmin VI (Syt6)  |
| Eef2kmt       | -0.76 | .031172433               | 1.929338 | Eukaryotic elongation factor 2 lysine methyltransferase (Eef2kmt)                |
| Ginm1         | -0.76 | .000184611               | 4.567676 | Glycoprotein integral membrane 1 (Ginm1)   |
| Numa1         | -0.76 | $1.21 \times 10^{-5}$    | 5.255655 | Nuclear mitotic apparatus protein 1 (Numa1)                                      |
| Grin2c        | -0.76 | .000879683               | 3.107485 | Glutamate receptor, ionotropic, NMDA2C (epsilon 3) (Grin2c)                      |
| Grcc10        | -0.76 | .010387319               | 2.261392 | Gene-rich cluster, C10 gene (Grcc10)   |
| Sox2ot        | -0.76 | .000374036               | 5.455071 | SOX2 overlapping transcript (non-protein coding) (Sox2ot)                        |
| Acaa1a        | -0.76 | .000266989               | 3.563541 | Acetyl-Coenzyme A acyltransferase 1A (Acaa1a)                                    |
| Rpl13         | -0.76 | $5.43 \times 10^{-5}$    | 5.208199 | Ribosomal protein L13 (Rpl13)  |
| Abcd4         | -0.77 | .009569385               | 2.292422 | ATP-binding cassette, sub-family D (ALD), member 4 (Abcd4)                       |
| Rel1          | -0.77 | .000855313               | 3.451694 | RELT-like 1 (Rel1)   |
| St18          | -0.77 | .001624083               | 3.602387 | Suppression of tumorigenicity 18 (St18)  |
| Tmed1         | -0.77 | .012079109               | 2.718479 | Transmembrane p24 trafficking protein 1 (Tmed1)                                  |
| Bnip2         | -0.77 | .000262604               | 4.650029 | BCL2/adenovirus E1B interacting protein 2 (Bnip2)                                |
| Gm32699       | -0.77 | .026440925               | 1.572241 | Predicted gene, 32699 (Gm32699)  |
| Tprn          | -0.77 | .001606425               | 3.370969 | Taperin (Tprn)   |
| Rab31         | -0.77 | $4.21 \times 10^{-5}$    | 6.125961 | RAB31, member RAS oncogene family (Rab31)  |
| Wnt7b         | -0.77 | .007698901               | 2.977884 | Wingless-type MMTV integration site family, member 7B (Wnt7b)                    |
| Pola1         | -0.77 | .046345738               | 2.203394 | Polymerase (DNA directed), alpha 1 (Pola1)                                       |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Mccc1         | -0.77 | .002861667               | 3.02085  | Methylcrotonoyl-Coenzyme A carboxylase 1 (alpha) (Mccc1)                          |
| Rps10         | -0.77 | .000172234               | 5.520483 | Ribosomal protein S10 (Rps10)   |
| Nphp3         | -0.77 | .011439076               | 1.923862 | Nephronophthisis 3 (adolescent) (Nphp3)   |
| Slc22a4       | -0.77 | .004103231               | 2.69211  | Solute carrier family 22 (organic cation transporter), member 4 (Slc22a4)         |
| Antxr1        | -0.77 | .000474338               | 4.553788 | Anthrax toxin receptor 1 (Antxr1)   |
| Ngf           | -0.77 | .036714265               | 1.07354  | Nerve growth factor (Ngf)   |
| Mid1ip1       | -0.77 | 4.20 × 10 <sup>-5</sup>  | 5.857974 | Mid1 interacting protein 1 (gastrulation-specific G12-like (zebrafish)) (Mid1ip1) |
| 9530059O14Rik | -0.78 | .043149729               | 1.629187 | RIKEN cDNA 9530059O14 gene (9530059O14Rik)  |
| Adam17        | -0.78 | .002514103               | 3.977304 | A disintegrin and metallopeptidase domain 17 (Adam17)                             |
| 3110035E14Rik | -0.78 | .001548895               | 3.369268 | RIKEN cDNA 3110035E14 gene (3110035E14Rik)  |
| Ubxn1         | -0.78 | .000245498               | 4.723982 | UBX domain protein 1 (Ubxn1)  |
| Fam96b        | -0.78 | .000378492               | 4.421252 | Family with sequence similarity 96, member B (Fam96b)                             |
| Cdk5rap2      | -0.78 | .002405035               | 4.351515 | CDK5 regulatory subunit-associated protein 2 (Cdk5rap2)                           |
| Sppl2b        | -0.78 | .006704587               | 2.843513 | Signal peptide peptidase like 2B (Sppl2b)   |
| Uimc1         | -0.78 | .001245615               | 3.380125 | Ubiquitin interaction motif containing 1 (Uimc1)                                  |
| Cox17         | -0.78 | .017924356               | 2.285259 | Cytochrome c oxidase assembly protein 17 (Cox17)                                  |
| Snhg18        | -0.78 | .035969357               | 1.730083 | Small nucleolar RNA host gene 18 (Snhg18)   |
| B4galt1       | -0.78 | .015710461               | 2.461907 | UDP-Gal:betaGlcNAc beta 1,4- galactosyltransferase, polypeptide 1 (B4galt1)       |
| Zfp691        | -0.78 | .006225374               | 2.179373 | Zinc finger protein 691 (Zfp691)  |
| Cenpx         | -0.78 | .001565671               | 2.711687 | Centromere Protein X (Cenpx)  |
| Efcab10       | -0.78 | .017169007               | 2.644979 | EF-hand calcium binding domain 10 (Efcab10)                                       |
| 2610203C20Rik | -0.78 | .006665097               | 3.283851 | RIKEN cDNA 2610203C20Rik gene (2610203C20Rik)                                     |
| Irf3          | -0.78 | .002062208               | 2.765632 | Interferon regulatory factor 3 (Irf3)   |
| Lipe          | -0.78 | .007300472               | 2.210418 | Lipase, hormone sensitive (Lipe)  |
| Rps4x         | -0.78 | 4.16 × 10 <sup>-6</sup>  | 7.647839 | Ribosomal protein S4, X-linked (Rps4x)  |
| Jtb           | -0.78 | .000280269               | 3.932704 | Jumping translocation breakpoint (Jtb)  |
| Ccdc187       | -0.78 | .029741268               | 2.703059 | Coiled-coil domain containing 187 (Ccdc187)                                       |
| Adgrf5        | -0.78 | .001744018               | 4.669262 | Adhesion G protein-coupled receptor F5 (Adgrf5)                                   |
| Col9a2        | -0.79 | .049688389               | 0.661908 | Collagen, type IX, alpha 2 (Col9a2)   |
| 2310015A10Rik | -0.79 | .001365476               | 2.908139 | RIKEN cDNA 2310015A10 gene (2310015A10Rik)  |
| Mknk1         | -0.79 | .001088356               | 2.950945 | MAP kinase-interacting serine/threonine kinase 1 (Mknk1)                          |
| Fmc1          | -0.79 | .000362864               | 4.425565 | Formation of mitochondrial complex V assembly factor 1 (Fmc1)                     |
| 3632451O06Rik | -0.79 | .001113333               | 5.910194 | RIKEN cDNA 3632451O06 gene (3632451O06Rik)  |
| Rps17         | -0.79 | 4.37 × 10 <sup>-5</sup>  | 5.763021 | Ribosomal protein S17 (Rps17)   |
| Zcrb1         | -0.79 | 5.26 × 10 <sup>-5</sup>  | 5.202176 | Zinc finger CCHC-type and RNA binding motif 1 (Zcrb1)                             |
| S1pr3         | -0.79 | .010098291               | 2.641788 | Sphingosine-1-phosphate receptor 3 (S1pr3)  |
| Gar1          | -0.79 | .001244955               | 2.981348 | GAR1 ribonucleoprotein (Gar1)   |
| Snrpe         | -0.79 | .004181674               | 3.658523 | Small nuclear ribonucleoprotein E (Snrpe)   |
| Stx4a         | -0.79 | 1.77 × 10 <sup>-5</sup>  | 5.940899 | Syntaxin 4A (placental) (Stx4a)   |
| Cox6b2        | -0.79 | .024206628               | 1.52685  | Cytochrome c oxidase subunit VIb polypeptide 2 (Cox6b2)                           |
| Marveld1      | -0.79 | .005002434               | 2.150035 | MARVEL (membrane-associating) domain containing 1 (Marveld1)                      |
| Dchs1         | -0.79 | .000535846               | 3.976417 | Dachsous 1 (Dchs1)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Ccdc57        | -0.79 | .042781575               | 1.50558  | Coiled-coil domain containing 57 (Ccdc57)  |
| Cyp7b1        | -0.79 | .001189468               | 3.079682 | Cytochrome P450, family 7, subfamily b, polypeptide 1 (Cyp7b1)   |
| Smim4         | -0.79 | .007688337               | 2.307316 | Small integral membrane protein 4 (Smim4)  |
| Ptprb         | -0.79 | .00012349                | 4.950459 | Protein tyrosine phosphatase, receptor type, B (Ptprb)   |
| 6230400D17Rik | -0.79 | .019405595               | 1.94552  | RIKEN cDNA 6230400D17 gene (6230400D17Rik)   |
| Golga7        | -0.79 | $3.25 \times 10^{-5}$    | 6.529813 | Golgi autoantigen, golgin subfamily a, 7 (Golga7)  |
| Sgk3          | -0.79 | .00429636                | 3.084093 | Serum/glucocorticoid-regulated kinase 3 (Sgk3)   |
| Aldh7a1       | -0.79 | $6.08 \times 10^{-5}$    | 5.000689 | Aldehyde dehydrogenase family 7, member A1 (Aldh7a1)   |
| Tnfrsf19      | -0.80 | .000546262               | 4.820842 | Tumor necrosis factor receptor superfamily, member 19 (Tnfrsf19)                                       |
| Vcan          | -0.80 | .003614196               | 4.294649 | Versican (Vcan)  |
| Mmgt2         | -0.80 | .000777717               | 3.032753 | Membrane magnesium transporter 2 (Mmgt2)   |
| Slco2a1       | -0.80 | .02947797                | 1.982608 | Solute carrier organic anion transporter family, member 2a1 (Slco2a1)                                  |
| Ccdc173       | -0.80 | .033047577               | 1.217093 | Coiled-coil domain containing 173 (Ccdc173)  |
| Abhd14b       | -0.80 | .026201164               | 2.369062 | Abhydrolase domain containing 14b (Abhd14b)  |
| Edem2         | -0.80 | .003672551               | 2.465962 | ER degradation enhancer, mannosidase alpha-like 2 (Edem2)  |
| Scn4b         | -0.80 | .001559853               | 3.00474  | Sodium channel, type IV, beta (Scn4b)  |
| Slc25a1       | -0.80 | .000136976               | 4.282414 | Solute carrier family 25 (mitochondrial carrier, citrate transporter), member 1 (Slc25a1)              |
| 1110038B12Rik | -0.80 | .003003186               | 2.749611 | RIKEN cDNA 1110038B12 gene (1110038B12Rik)   |
| Hint2         | -0.80 | .003679484               | 3.749721 | Histidine triad nucleotide binding protein 2 (Hint2)   |
| Akain1        | -0.80 | .014040644               | 3.484438 | A kinase (PRKA) anchor inhibitor 1 (Akain1)  |
| 1700008J07Rik | -0.80 | .021044519               | 2.082983 | RIKEN cDNA 1700008J07 gene (1700008J07Rik)   |
| Nadsyn1       | -0.80 | .023523029               | 1.379723 | NAD synthetase 1 (Nadsyn1)   |
| Lrp5          | -0.80 | .004602407               | 2.702982 | Low-density lipoprotein receptor-related protein 5 (Lrp5)  |
| Wbp1          | -0.80 | $5.27 \times 10^{-5}$    | 5.084007 | WW domain binding protein 1 (Wbp1)   |
| Rplp2         | -0.80 | $8.21 \times 10^{-5}$    | 6.624557 | Ribosomal protein, large P2 (Rplp2)  |
| Pigyl         | -0.80 | .002588355               | 3.758849 | Phosphatidylinositol glycan anchor biosynthesis, class Y-like (Pigyl)                                  |
| Rpp25l        | -0.80 | .003224801               | 3.158995 | Ribonuclease P/MRP 25 subunit-like (Rpp25l)  |
| Osmr          | -0.80 | .024206628               | 2.196056 | Oncostatin M receptor (Osmr)   |
| Rps2          | -0.80 | .000122038               | 5.336532 | Ribosomal protein S2 (Rps2)  |
| Slc4a4        | -0.80 | $4.97 \times 10^{-5}$    | 8.737147 | Solute carrier family 4 (anion exchanger), member 4 (Slc4a4)   |
| Tpmt          | -0.81 | .005924864               | 2.958091 | Thiopurine methyltransferase (Tpmt)  |
| Cotl1         | -0.81 | .003452337               | 3.476215 | Coactosin-like 1 (Dictyostelium) (Cotl1)   |
| Cd248         | -0.81 | .046504656               | 1.019186 | CD248 antigen, endosialin (Cd248)  |
| Ackr3         | -0.81 | .023223447               | 2.230249 | Atypical chemokine receptor 3 (Ackr3)  |
| Tatdn3        | -0.81 | .000823742               | 3.487695 | TatD DNase domain containing 3 (Tatdn3)  |
| Gpr146        | -0.81 | .000384483               | 4.018847 | G protein-coupled receptor 146 (Gpr146)  |
| Ogfod3        | -0.81 | .001769063               | 2.649005 | 2-Oxoglutarate and iron-dependent oxygenase domain containing 3 (Ogfod3)                               |
| Pld2          | -0.81 | .009816926               | 2.573401 | Phospholipase D2 (Pld2)  |
| Cacng7        | -0.81 | $5.88 \times 10^{-5}$    | 6.738999 | Calcium channel, voltage-dependent, gamma subunit 7 (Cacng7)   |
| Plpp3         | -0.81 | $3.57 \times 10^{-5}$    | 7.484772 | Phospholipid phosphatase 3 (Plpp3)   |
| Cmb1          | -0.81 | .005465412               | 3.350448 | Carboxymethylenebutenolidase-like (Pseudomonas) (Cmb1)   |
| Adamts4       | -0.81 | .00448815                | 4.370519 | A disintegrin-like and metallopeptidase (repolysin type) with thrombospondin type 1 motif, 4 (Adamts4) |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Dnajc25   | -0.81 | .016446335            | 1.945793 | DnaJ heat shock protein family (Hsp40) member C25 (Dnajc25)        |
| Pttg1     | -0.81 | $8.21 \times 10^{-5}$ | 4.558176 | Pituitary tumor-transforming gene 1 (Pttg1)                        |
| Cyfp1     | -0.81 | .000113642            | 5.152916 | Cytoplasmic FMR1 interacting protein 1 (Cyfp1)                     |
| Rps20     | -0.81 | $3.00 \times 10^{-5}$ | 5.894894 | Ribosomal protein S20 (Rps20)                                      |
| Wwtr1     | -0.81 | .000391252            | 4.071175 | WW domain containing transcription regulator 1 (Wwtr1)             |
| Snrnp70   | -0.81 | .00040773             | 4.87771  | Small nuclear ribonucleoprotein 70 (U1) (Snrnp70)                  |
| Tia1      | -0.81 | .005284204            | 4.668968 | Cytotoxic granule-associated RNA binding protein 1 (Tia1)          |
| Lgr6      | -0.81 | $7.17 \times 10^{-5}$ | 4.305998 | Leucine-rich repeat-containing G protein-coupled receptor 6 (Lgr6) |
| Gm14586   | -0.81 | .036003893            | 0.640953 | Predicted gene 14586 (Gm14586)                                     |
| Pxmp4     | -0.81 | .000353493            | 4.221599 | Peroxisomal membrane protein 4 (Pxmp4)                             |
| Mfn1      | -0.81 | $3.22 \times 10^{-5}$ | 5.820155 | Mitofusin 1 (Mfn1)   |
| Tmem258   | -0.81 | .002885699            | 2.9699   | Transmembrane protein 258 (Tmem258)                                |
| Rab37     | -0.81 | .000123895            | 4.435012 | RAB37, member RAS oncogene family (Rab37)                          |
| Eef1b2    | -0.82 | $5.78 \times 10^{-6}$ | 6.648046 | Eukaryotic translation elongation factor 1 beta 2 (Eef1b2)         |
| Ttc21a    | -0.82 | .017335584            | 1.819283 | Tetratricopeptide repeat domain 21A (Ttc21a)                       |
| C78859    | -0.82 | .043347921            | 2.544428 | Expressed sequence C78859 (C78859)                                 |
| Plod2     | -0.82 | .011107237            | 2.861977 | Procollagen lysine, 2-oxoglutarate 5-dioxygenase 2 (Plod2)         |
| Epas1     | -0.82 | .000106707            | 7.64891  | Endothelial PAS domain protein 1 (Epas1)                           |
| Heyl      | -0.82 | .001647973            | 4.102298 | Hairy/enhancer-of-split related with YRPW motif-like (Heyl)        |
| Pou3f4    | -0.82 | .0293272              | 2.682454 | POU domain, class 3, transcription factor 4 (Pou3f4)               |
| Lix1      | -0.82 | .006932158            | 4.052236 | Limb and CNS expressed 1 (Lix1)                                    |
| Notch1    | -0.82 | .000626123            | 4.190655 | Notch 1 (Notch1)   |
| Hbegf     | -0.82 | .006235333            | 2.416888 | Heparin-binding EGF-like growth factor (Hbegf)                     |
| Ost4      | -0.82 | $7.00 \times 10^{-5}$ | 3.966531 | Oligosaccharyltransferase complex subunit 4 (non-catalytic) (Ost4) |
| Gm15500   | -0.82 | .007630386            | 1.786832 | Ribosomal protein L5 pseudogene (Gm15500)                          |
| Pmm2      | -0.82 | .004532551            | 2.707303 | Phosphomannomutase 2 (Pmm2)  |
| Kctd5     | -0.82 | .00105832             | 3.145356 | Potassium channel tetramerisation domain containing 5 (Kctd5)      |
| Stx2      | -0.82 | .005052072            | 2.463495 | Syntaxin 2 (Stx2)  |
| Casp6     | -0.82 | .029866889            | 1.118286 | Caspase 6 (Casp6)  |
| Bmpr1b    | -0.82 | .0002187              | 4.907829 | Bone morphogenetic protein receptor, type 1B (Bmpr1b)              |
| Rpl9      | -0.82 | $2.23 \times 10^{-6}$ | 6.586888 | Ribosomal protein L9 (Rpl9)  |
| Reck      | -0.82 | .002791214            | 3.059455 | Reversion-inducing-cysteine-rich protein with kazal motifs (Reck)  |
| Megf10    | -0.82 | .001574308            | 4.96861  | Multiple EGF-like-domains 10 (Megf10)                              |
| Rps3a1    | -0.82 | $7.21 \times 10^{-6}$ | 7.460305 | Ribosomal protein S3A1 (Rps3a1)                                    |
| Oard1     | -0.82 | .000660544            | 3.78778  | O-acyl-ADP-ribose deacylase 1 (Oard1)                              |
| Chchd7    | -0.82 | .00139219             | 3.255894 | Coiled-coil-helix-coiled-coil-helix domain containing 7 (Chchd7)   |
| Smim8     | -0.82 | .000518855            | 2.889099 | Small integral membrane protein 8 (Smim8)                          |
| Ddo       | -0.82 | .000699718            | 4.254757 | D-aspartate oxidase (Ddo)  |
| Trim12a   | -0.82 | .013328605            | 2.065856 | Tripartite motif-containing 12A (Trim12a)                          |
| Piezo2    | -0.82 | .040560227            | 2.071866 | Piezo-type mechanosensitive ion channel component 2 (Piezo2)       |
| Mbd6      | -0.82 | .000341614            | 3.445955 | Methyl-CpG binding domain protein 6 (Mbd6)                         |
| Gpr182    | -0.83 | .041440401            | 1.421411 | G protein-coupled receptor 182 (Gpr182)                            |
| Serinc5   | -0.83 | .000711556            | 5.740015 | Serine incorporator 5 (Serinc5)                                    |



TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Cdc14a    | -0.83 | .00663037             | 3.635522 | CDC14 cell division cycle 14A (Cdc14a)                                    |
| Acot11    | -0.83 | .0007287              | 4.715474 | Acyl-CoA thioesterase 11 (Acot11)   |
| Gstt1     | -0.83 | .005104163            | 3.310823 | Glutathione S-transferase, theta 1 (Gstt1)                                |
| Gm7429    | -0.83 | .037163002            | 0.670379 | Predicted pseudogene 7429 (Gm7429)  |
| Cetn3     | -0.83 | $2.10 \times 10^{-5}$ | 5.319196 | Centrin 3 (Cetn3)   |
| Gm11966   | -0.83 | .049097186            | 0.660266 | Predicted gene (Gm11966)  |
| Nfix      | -0.83 | .00012102             | 6.402135 | Nuclear factor I/X (Nfix)   |
| Tns1      | -0.83 | .002496348            | 4.891983 | Tensin 1 (Tns1)   |
| Cstb      | -0.83 | .000136201            | 4.969699 | Cystatin B (Cstb)   |
| Hmgn1     | -0.83 | $2.59 \times 10^{-5}$ | 5.620666 | High-mobility group nucleosomal binding domain 1 (Hmgn1)                  |
| Rps15     | -0.83 | $4.23 \times 10^{-6}$ | 7.671732 | Ribosomal protein S15 (Rps15)   |
| Prkd3     | -0.83 | .001053757            | 4.492791 | Protein kinase D3 (Prkd3)   |
| Sat1      | -0.83 | $5.64 \times 10^{-5}$ | 4.606973 | Spermidine/spermine N1-acetyl transferase 1 (Sat1)                        |
| Ttc30b    | -0.83 | .003477372            | 3.001648 | Tetratricopeptide repeat domain 30B (Ttc30b)                              |
| Pak4      | -0.83 | .003849133            | 3.168903 | p21 protein (Cdc42/Rac)-activated kinase 4 (Pak4)                         |
| Mtarc2    | -0.83 | .000535846            | 4.051263 | Mitochondrial amidoxime reducing component 2 (Mtarc2)                     |
| Ttc12     | -0.84 | .012444578            | 2.493621 | Tetratricopeptide repeat domain 12 (Ttc12)                                |
| Bola2     | -0.84 | .005492777            | 3.543962 | bolA-like 2 (E. coli) (Bola2)   |
| Cdh19     | -0.84 | .005056229            | 2.971989 | Cadherin 19, type 2 (Cdh19)   |
| Scube1    | -0.84 | .014300374            | 7.330372 | Signal peptide, CUB domain, EGF-like 1 (Scube1)                           |
| Shank1    | -0.84 | $2.08 \times 10^{-5}$ | 9.296366 | SH3/ankyrin domain gene 1 (Shank1)  |
| Col4a2    | -0.84 | .001369036            | 3.249733 | Collagen, type IV, alpha 2 (Col4a2)                                       |
| Laptm4a   | -0.84 | $9.02 \times 10^{-6}$ | 6.348179 | Lysosomal-associated protein transmembrane 4A (Laptm4a)                   |
| Slc12a2   | -0.84 | $5.90 \times 10^{-5}$ | 6.00735  | Solute carrier family 12, member 2 (Slc12a2)                              |
| Rpl36     | -0.84 | .000187289            | 5.755248 | Ribosomal protein L36 (Rpl36)   |
| Dlec1     | -0.84 | .025095211            | 1.121147 | Deleted in lung and esophageal cancer 1 (Dlec1)                           |
| Ybx3      | -0.84 | .000481987            | 4.316367 | Y box protein 3 (Ybx3)  |
| Fam96a    | -0.84 | .000103342            | 4.56326  | Family with sequence similarity 96, member A (Fam96a)                     |
| Tcf3      | -0.84 | .00186405             | 3.426863 | Transcription factor 3 (Tcf3)   |
| Tns2      | -0.84 | .002062208            | 2.897174 | Tensin 2 (Tns2)   |
| Rpl36a    | -0.84 | .000515683            | 3.59509  | Ribosomal protein L36A (Rpl36a)   |
| Cenpb     | -0.84 | .000180848            | 4.952051 | Centromere protein B (Cenpb)  |
| Cox7c     | -0.84 | .001320437            | 2.840237 | Cytochrome c oxidase subunit VIIc (Cox7c)                                 |
| Ak2       | -0.84 | .000125541            | 3.973568 | Adenylate kinase 2 (Ak2)  |
| Ube2cbp   | -0.85 | .029534889            | 1.339345 | Ubiquitin-conjugating enzyme E2C binding protein (Ube2cbp)                |
| Nelfe     | -0.85 | .000488423            | 3.267102 | Negative elongation factor complex member E, Rdbp (Nelfe)                 |
| Snhg6     | -0.85 | .034539983            | 0.788071 | Small nucleolar RNA host gene 6 (Snhg6)                                   |
| Itpril1   | -0.85 | .029829246            | 1.266547 | Inositol 1,4,5-triphosphate receptor interacting protein-like 1 (Itpril1) |
| Rhbdd1    | -0.85 | .000409208            | 3.765076 | Rhomboid domain containing 1 (Rhbdd1)                                     |
| Irx2      | -0.85 | .024777285            | 4.63275  | Iroquois-related homeobox 2 (Irx2)  |
| Sox21     | -0.85 | .011626798            | 2.041729 | SRY (sex determining region Y)-box 21 (Sox21)                             |
| Epb41l2   | -0.85 | $3.86 \times 10^{-5}$ | 6.012639 | Erythrocyte membrane protein band 4.1 like 2 (Epb41l2)                    |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Slc17a7   | -0.85 | .004311803            | 6.565319 | Solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter), member 7 (Slc17a7) |
| Prrg1     | -0.85 | .00146253             | 2.565835 | Proline-rich Gla (G-carboxyglutamic acid) 1 (Prrg1)   |
| Acyp1     | -0.85 | $3.51 \times 10^{-5}$ | 4.894596 | Acylphosphatase 1, erythrocyte (common) type (Acyp1)  |
| Akip1     | -0.85 | .043222547            | 0.97787  | A kinase (PRKA) interacting protein 1 (Akip1)   |
| Pigz      | -0.85 | .001453455            | 3.180712 | Phosphatidylinositol glycan anchor biosynthesis, class Z (Pigz)                                   |
| Ctnna1    | -0.85 | $7.98 \times 10^{-6}$ | 5.750588 | Catenin (cadherin-associated protein), alpha 1 (Ctnna1)   |
| Ints6l    | -0.85 | .000974465            | 3.95998  | Integrator complex subunit 6 like (Ints6l)  |
| Saysd1    | -0.85 | .004496161            | 2.426683 | SAYSVFN motif domain containing 1 (Saysd1)  |
| Lrrc2     | -0.85 | .04593376             | 3.035478 | Leucine-rich repeat containing 2 (Lrrc2)  |
| Cpe       | -0.86 | $1.61 \times 10^{-7}$ | 10.55444 | Carboxypeptidase E (Cpe)  |
| AI413582  | -0.86 | .000441199            | 3.900899 | Expressed sequence AI413582 (AI413582)  |
| Zcchc24   | -0.86 | $2.06 \times 10^{-5}$ | 6.520137 | Zinc finger, CCHC domain containing 24 (Zcchc24)  |
| Carmil1   | -0.86 | .000336364            | 4.884337 | Capping protein regulator and myosin 1 linker 1 (Carmil1)   |
| Pecam1    | -0.86 | .00348391             | 2.957813 | Platelet/endothelial cell adhesion molecule 1 (Pecam1)  |
| Rab29     | -0.86 | .042915129            | 1.375417 | RAB29, member RAS oncogene family (Rab29)   |
| Fancc     | -0.86 | .006087716            | 2.462592 | Fanconi anemia, complementation group C (Fancc)   |
| Syf2      | -0.86 | .000181464            | 4.881794 | SYF2 homolog, RNA splicing factor ( <i>S. cerevisiae</i> ) (Syf2)                                 |
| Gm19461   | -0.86 | .031387276            | 1.001853 | Predicted gene, 19461 (Gm19461)   |
| Cth       | -0.86 | .03868898             | 1.12676  | Cystathionase (cystathionine gamma-lyase) (Cth)   |
| Scube3    | -0.86 | .001674524            | 4.36148  | Signal peptide, CUB domain, EGF-like 3 (Scube3)   |
| Rasgrp3   | -0.86 | .000391252            | 4.593859 | RAS, guanyl releasing protein 3 (Rasgrp3)   |
| Otx1      | -0.86 | .002572666            | 3.452916 | Orthodenticle homeobox 1 (Otx1)   |
| Hspg2     | -0.86 | .007543628            | 1.826743 | Perlecan (heparan sulfate proteoglycan 2) (Hspg2)   |
| Kcnab3    | -0.86 | .008207798            | 2.700308 | Potassium voltage-gated channel, shaker-related subfamily, beta member 3 (Kcnab3)                 |
| Rpl39     | -0.86 | $7.59 \times 10^{-5}$ | 5.844992 | Ribosomal protein L39 (Rpl39)   |
| Ddit3     | -0.86 | .000868541            | 2.693326 | DNA-damage inducible transcript 3 (Ddit3)   |
| Ccdc12    | -0.86 | .004625503            | 3.565958 | Coiled-coil domain containing 12 (Ccdc12)   |
| Atf7      | -0.86 | $2.45 \times 10^{-5}$ | 5.657754 | Activating transcription factor 7 (Atf7)  |
| Fam193b   | -0.86 | .000466302            | 3.814972 | Family with sequence similarity 193, member B (Fam193b)   |
| Plce1     | -0.86 | .001624083            | 4.95537  | Phospholipase C, epsilon 1 (Plce1)  |
| Col15a1   | -0.87 | .033288695            | 0.578448 | Collagen, type XV, alpha 1 (Col15a1)  |
| Galm      | -0.87 | .02914928             | 1.952762 | Galactose mutarotase (Galm)   |
| Hdhd5     | -0.87 | .005853752            | 2.120375 | Haloacid Dehalogenase Like Hydrolase Domain Containing 5 (Hdhd5)                                  |
| Gm34583   | -0.87 | .02090924             | 1.231197 | Predicted gene, 34583 (Gm34583)   |
| Dnajc24   | -0.87 | .001545747            | 2.945447 | DnaJ heat shock protein family (Hsp40) member C24 (Dnajc24)                                       |
| Tyk2      | -0.87 | .038699906            | 2.130587 | Tyrosine kinase 2 (Tyk2)  |
| Klhl5     | -0.87 | .000317428            | 5.282945 | Kelch-like 5 (Klhl5)  |
| Aldh6a1   | -0.87 | $7.54 \times 10^{-6}$ | 5.285687 | Aldehyde dehydrogenase family 6, subfamily A1 (Aldh6a1)   |
| Gprc5b    | -0.87 | $5.27 \times 10^{-5}$ | 6.473193 | G protein-coupled receptor, family C, group 5, member B (Gprc5b)                                  |
| Ppp1r14b  | -0.87 | .001407815            | 2.558379 | Protein phosphatase 1, regulatory (inhibitor) subunit 14B (Ppp1r14b)                              |
| Matn2     | -0.87 | .028111721            | 1.788787 | Matrilin 2 (Matn2)  |
| Rpl38-ps2 | -0.87 | .027510951            | 0.847332 | Ribosomal protein L38, pseudogene 2 (Rpl38-ps2)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Gm42549       | -0.87 | .046883031               | 0.943836 | Predicted gene (Gm42549)   |
| Stard8        | -0.87 | .010410972               | 2.54415  | START domain containing 8 (Stard8)   |
| Sptan1        | -0.87 | $1.83 \times 10^{-6}$    | 8.269392 | Spectrin alpha, non-erythrocytic 1 (Sptan1)  |
| Gstt2         | -0.87 | .014642207               | 1.415209 | Glutathione S-transferase, theta 2 (Gstt2)   |
| Leprot        | -0.87 | $9.20 \times 10^{-5}$    | 4.174056 | Leptin receptor overlapping transcript (Leprot)  |
| Use1          | -0.87 | $3.37 \times 10^{-5}$    | 5.027971 | Unconventional SNARE in the ER 1 homolog ( <i>S. cerevisiae</i> ) (Use1)               |
| Slc50a1       | -0.87 | .00243646                | 3.363631 | Solute carrier family 50 (sugar transporter), member 1 (Slc50a1)                       |
| Plekhh1       | -0.88 | .000546007               | 4.864274 | Pleckstrin homology domain containing, family H (with MyTH4 domain) member 1 (Plekhh1) |
| Hspb6         | -0.88 | .001584324               | 4.471351 | Heat shock protein, alpha-crystallin-related, B6 (Hspb6)                               |
| Ppp2r5a       | -0.88 | $8.71 \times 10^{-5}$    | 4.894486 | Protein phosphatase 2, regulatory subunit B', alpha (Ppp2r5a)                          |
| Rps18         | -0.88 | $1.96 \times 10^{-5}$    | 5.251159 | Ribosomal protein S18 (Rps18)  |
| Spag6         | -0.88 | .002084127               | 3.152525 | Sperm-associated antigen 6 (Spag6)   |
| Scd1          | -0.88 | $4.95 \times 10^{-6}$    | 8.35724  | Stearoyl-Coenzyme A desaturase 1 (Scd1)  |
| 6030443J06Rik | -0.88 | .046883031               | 0.882499 | RIKEN cDNA 6030443J06 gene (6030443J06Rik)   |
| Phka1         | -0.88 | $1.24 \times 10^{-5}$    | 4.650416 | Phosphorylase kinase alpha 1 (Phka1)   |
| Gm10516       | -0.88 | .004006469               | 2.536555 | Predicted gene 10516 (Gm10516)   |
| Fbxo4         | -0.88 | .018358096               | 1.634842 | F-box protein 4 (Fbxo4)  |
| Clic4         | -0.88 | $1.04 \times 10^{-5}$    | 6.905322 | Chloride intracellular channel 4 (mitochondrial) (Clic4)                               |
| Flnb          | -0.88 | .000275022               | 4.880671 | Filamin, beta (Flnb)   |
| Sp3os         | -0.88 | .033768276               | 0.698985 | Trans-acting transcription factor 3, opposite strand (Sp3os)                           |
| Sdhaf1        | -0.88 | .015746895               | 1.400524 | Succinate dehydrogenase complex assembly factor 1 (Sdhaf1)                             |
| 4930523C07Rik | -0.88 | .033241896               | 0.8275   | RIKEN cDNA 4930523C07 gene (4930523C07Rik)   |
| Cpsf4         | -0.88 | .002424083               | 2.640389 | Cleavage and polyadenylation-specific factor 4 (Cpsf4)                                 |
| Gjc1          | -0.88 | .004460761               | 2.882686 | Gap junction protein, gamma 1 (Gjc1)   |
| Rilpl2        | -0.89 | .011225384               | 2.333193 | Rab interacting lysosomal protein-like 2 (Rilpl2)                                      |
| Pycard        | -0.89 | .009558675               | 2.369973 | PYD and CARD domain containing (Pycard)  |
| Gm17251       | -0.89 | .03838928                | 0.940431 | Predicted gene, 17251 (Gm17251)  |
| Arhgap17      | -0.89 | .000666827               | 3.325606 | Rho GTPase activating protein 17 (Arhgap17)  |
| Dhx16         | -0.89 | .011863812               | 3.045479 | DEAH (Asp-Glu-Ala-His) box polypeptide 16 (Dhx16)                                      |
| Ccdc191       | -0.89 | .004189595               | 2.283631 | Coiled-coil domain containing 191 (Ccdc191)  |
| Wipf1         | -0.89 | .002686226               | 3.700005 | WAS/WASL interacting protein family, member 1 (Wipf1)                                  |
| Gamt          | -0.89 | .006670722               | 2.273565 | Guanidinoacetate methyltransferase (Gamt)  |
| Tlr2          | -0.89 | .020550025               | 1.482156 | Toll-like receptor 2 (Tlr2)  |
| Cfap221       | -0.89 | .007104882               | 1.988202 | Cilia and flagella-associated protein 221 (Cfap221)                                    |
| Arsg          | -0.89 | .000720589               | 3.974855 | Arylsulfatase G (Arsg)   |
| Gas1          | -0.89 | .010889392               | 1.758437 | Growth arrest specific 1 (Gas1)  |
| Rps27l        | -0.89 | .001545653               | 3.466398 | Ribosomal protein S27-like (Rps27l)  |
| Snhg20        | -0.89 | .017742239               | 1.495503 | Small nucleolar RNA host gene 20 (Snhg20)  |
| Gm3355        | -0.89 | .048967797               | 0.349209 | Predicted gene 3355 (Gm3355)   |
| Abcc4         | -0.89 | .007335508               | 2.474674 | ATP-binding cassette, sub-family C (CFTR/MRP), member 4 (Abcc4)                        |
| Sh3bp2        | -0.89 | .048098188               | 0.896831 | SH3-domain binding protein 2 (Sh3bp2)  |
| Rps27         | -0.89 | .000356221               | 3.553654 | Ribosomal protein S27 (Rps27)  |
| D130020L05Rik | -0.89 | .008720223               | 2.009334 | RIKEN cDNA D130020L05 gene (D130020L05Rik)   |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Gm10736   | -0.89 | .000531272            | 3.450477 | Predicted gene 10736 (Gm10736)   |
| Gpr151    | -0.89 | .002401108            | 6.869296 | G protein-coupled receptor 151 (Gpr151)  |
| Eml3      | -0.89 | .009622699            | 2.205678 | Echinoderm microtubule-associated protein like 3 (Eml3)                                      |
| Fam213a   | -0.89 | $4.23 \times 10^{-7}$ | 7.969016 | Family with sequence similarity 213, member A (Fam213a)                                      |
| Tsen15    | -0.90 | .000299452            | 3.383719 | tRNA splicing endonuclease subunit 15 (Tsen15)   |
| Leng1     | -0.90 | .005328268            | 2.742513 | Leukocyte receptor cluster (LRC) member 1 (Leng1)  |
| Rgs5      | -0.90 | .000959283            | 5.920073 | Regulator of G-protein signaling 5 (Rgs5)  |
| Fkbp9     | -0.90 | $2.19 \times 10^{-5}$ | 4.816369 | FK506 binding protein 9 (Fkbp9)  |
| Frmd4b    | -0.90 | .000246074            | 3.968158 | FERM domain containing 4B (Frmd4b)   |
| Lpar6     | -0.90 | .015048245            | 1.600827 | Lysophosphatidic acid receptor 6 (Lpar6)   |
| Mtm1      | -0.90 | .004185043            | 2.220156 | X-linked myotubular myopathy gene 1 (Mtm1)   |
| Rab11fip1 | -0.90 | .018616322            | 1.785404 | RAB11 family interacting protein 1 (class I) (Rab11fip1)                                     |
| Slc12a9   | -0.90 | .000614688            | 3.261885 | Solute carrier family 12 (potassium/chloride transporters), member 9 (Slc12a9)               |
| Hps5      | -0.90 | .003784621            | 2.709618 | Hermansky-Pudlak syndrome 5 (Hps5)   |
| Rdh12     | -0.90 | .043249947            | 1.136116 | Retinol dehydrogenase 12 (Rdh12)   |
| Ccdc28b   | -0.91 | .000699718            | 2.848931 | Coiled coil domain containing 28B (Ccdc28b)  |
| Cdc42ep4  | -0.91 | .000163613            | 5.090688 | CDC42 effector protein (Rho GTPase binding) 4 (Cdc42ep4)                                     |
| Ocln      | -0.91 | .002410333            | 2.670958 | Occludin (Ocln)  |
| Gm42067   | -0.91 | .004308805            | 2.204556 | Predicted gene, 42067 (Gm42067)  |
| Smpd2     | -0.91 | .000346704            | 3.167267 | Sphingomyelin phosphodiesterase 2, neutral (Smpd2)   |
| Fis1      | -0.91 | $4.26 \times 10^{-5}$ | 5.78885  | Fission, mitochondrial 1 (Fis1)  |
| Abca1     | -0.91 | $5.45 \times 10^{-5}$ | 5.293057 | ATP-binding cassette, sub-family A (ABC1), member 1 (Abca1)                                  |
| Ctdsp1    | -0.91 | .000373022            | 3.668514 | CTD (carboxy-terminal domain, RNA polymerase II, polypeptide A) small phosphatase 1 (Ctdsp1) |
| Sspn      | -0.91 | .000661433            | 3.26683  | Sarcospan (Sspn)   |
| Miip      | -0.91 | .017861809            | 1.351737 | Migration and invasion inhibitory protein (Miip)   |
| Cyp20a1   | -0.91 | .000224403            | 3.379148 | Cytochrome P450, family 20, subfamily a, polypeptide 1 (Cyp20a1)                             |
| Ebf4      | -0.91 | .008495499            | 2.327185 | Early B cell factor 4 (Ebf4)   |
| Stxbp2    | -0.91 | .021819153            | 2.370636 | Syntaxin binding protein 2 (Stxbp2)  |
| Vcl       | -0.91 | .000311074            | 3.095304 | Vinculin (Vcl)   |
| Ccnd3     | -0.91 | .001298386            | 3.102406 | Cyclin D3 (Ccnd3)  |
| Cntrl     | -0.91 | .002280926            | 3.520487 | Centriolin (Cntrl)   |
| Colgalt2  | -0.91 | .009135578            | 2.953097 | Collagen beta (1-O)galactosyltransferase 2 (Colgalt2)  |
| Rpl31     | -0.91 | .000514043            | 2.60902  | Ribosomal protein L31 (Rpl31)  |
| Rpl34     | -0.91 | $2.23 \times 10^{-5}$ | 4.878733 | Ribosomal protein L34 (Rpl34)  |
| Dleu2     | -0.91 | .007135169            | 1.853385 | Deleted in lymphocytic leukemia, 2 (Dleu2)   |
| Il10rb    | -0.91 | .021264452            | 1.11441  | Interleukin 10 receptor, beta (Il10rb)   |
| Thbs3     | -0.91 | .017669152            | 1.163103 | Thrombospondin 3 (Thbs3)   |
| Nwd1      | -0.91 | .000101885            | 6.529115 | NACHT and WD repeat domain containing 1 (Nwd1)   |
| Jag1      | -0.91 | .030958631            | 2.197259 | Jagged 1 (Jag1)  |
| Mycbpap   | -0.91 | .017852891            | 2.283751 | MYCBP-associated protein (Mycbpap)   |
| Pgf       | -0.92 | .011012004            | 1.551239 | Placental growth factor (Pgf)  |
| Kdm1b     | -0.92 | .002555125            | 2.43241  | Lysine (K)-specific demethylase 1B (Kdm1b)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Gpam          | -0.92 | $7.56 \times 10^{-5}$    | 4.013024 | Glycerol-3-phosphate acyltransferase, mitochondrial (Gpam)          |
| Tldc1         | -0.92 | .011393152               | 1.740521 | TBC/LysM-associated domain containing 1 (Tldc1)                     |
| Ccdc113       | -0.92 | .006802264               | 1.880966 | Coiled-coil domain containing 113 (Ccdc113)                         |
| Ftx           | -0.92 | .006202262               | 2.551892 | Ftx transcript, Xist regulator (non-protein coding) (Ftx)           |
| Gm16499       | -0.92 | .015671334               | 1.612639 | Predicted gene 16499 (Gm16499)                                      |
| Smpdl3a       | -0.92 | $4.45 \times 10^{-5}$    | 4.298341 | Sphingomyelin phosphodiesterase, acid-like 3A (Smpdl3a)             |
| Frmpd1        | -0.92 | .000108867               | 3.996831 | FERM and PDZ domain containing 1 (Frmpd1)                           |
| Etfb          | -0.92 | .011602428               | 1.685077 | Electron transferring flavoprotein, beta polypeptide (Etfb)         |
| Rpl23         | -0.92 | $3.95 \times 10^{-6}$    | 6.309536 | Ribosomal protein L23 (Rpl23)                                       |
| Gdpd2         | -0.92 | .007375649               | 2.101511 | Glycerophosphodiester phosphodiesterase domain containing 2 (Gdpd2) |
| Tmem238       | -0.92 | .034857114               | 0.95475  | Transmembrane protein 238 (Tmem238)                                 |
| Nid1          | -0.92 | .009183618               | 3.470011 | Nidogen 1 (Nid1)  |
| Gm7854        | -0.92 | .025157365               | 0.888233 | Predicted gene 7854 (Gm7854)  |
| D7Ertd443e    | -0.93 | .009341476               | 1.861897 | DNA segment, Chr 7, ERATO Doi 443, expressed (D7Ertd443e)           |
| Rrbp1         | -0.93 | $1.40 \times 10^{-6}$    | 5.589034 | Ribosome binding protein 1 (Rrbp1)                                  |
| H2afv         | -0.93 | $3.63 \times 10^{-5}$    | 4.65479  | H2A histone family, member V (H2afv)                                |
| Tpbgl         | -0.93 | .008735517               | 2.947913 | Trophoblast glycoprotein-like (Tpbgl)                               |
| Fam181b       | -0.93 | .001500162               | 2.744614 | Family with sequence similarity 181, member B (Fam181b)             |
| Hspb1         | -0.93 | .013183398               | 1.73901  | Heat shock protein 1 (Hspb1)  |
| Dpm3          | -0.93 | .000848083               | 2.943445 | Dolichyl-phosphate mannosyltransferase polypeptide 3 (Dpm3)         |
| Tram2         | -0.93 | .030371322               | 1.687303 | Translocating chain-associating membrane protein 2 (Tram2)          |
| Tmem123       | -0.93 | .000135734               | 4.328127 | Transmembrane protein 123 (Tmem123)                                 |
| 2900093K20Rik | -0.93 | .030360006               | 0.815139 | RIKEN cDNA 2900093K20 gene (2900093K20Rik)                          |
| Rgs22         | -0.93 | .004673112               | 2.830308 | Regulator of G-protein signalling 22 (Rgs22)                        |
| Rorc          | -0.93 | .021240871               | 1.243383 | RAR-related orphan receptor gamma (Rorc)                            |
| Rpl13a        | -0.93 | .000576649               | 2.933243 | Ribosomal protein L13A (Rpl13a)                                     |
| Rpl30         | -0.93 | $2.82 \times 10^{-6}$    | 5.709143 | Ribosomal protein L30 (Rpl30)                                       |
| Nrarp         | -0.93 | .049434346               | 0.327919 | Notch-regulated ankyrin repeat protein (Nrarp)                      |
| Ttc16         | -0.93 | .040459768               | 0.512763 | Tetratricopeptide repeat domain 16 (Ttc16)                          |
| Gm11696       | -0.93 | .014327052               | 1.51839  | Predicted gene 11696 (Gm11696)                                      |
| Ppib          | -0.93 | .00359095                | 3.401022 | Peptidylprolyl isomerase B (Ppib)                                   |
| Ccdc141       | -0.93 | .000373628               | 5.143556 | Coiled-coil domain containing 141 (Ccdc141)                         |
| Apcdd1        | -0.93 | .002813298               | 2.713266 | Adenomatosis polyposis coli down-regulated 1 (Apcdd1)               |
| Lca5l         | -0.94 | .002937886               | 1.985161 | Leber congenital amaurosis 5-like (Lca5l)                           |
| Hpgd          | -0.94 | .011682413               | 2.23781  | Hydroxyprostaglandin dehydrogenase 15 (NAD) (Hpgd)                  |
| Zfp36l2       | -0.94 | .000382039               | 3.314321 | Zinc finger protein 36, C3H type-like 2 (Zfp36l2)                   |
| Lrrc56        | -0.94 | .010335023               | 1.537141 | Leucine-rich repeat containing 56 (Lrrc56)                          |
| Gprc5c        | -0.94 | .044118023               | 1.236449 | G protein-coupled receptor, family C, group 5, member C (Gprc5c)    |
| Rpl26         | -0.94 | $1.21 \times 10^{-5}$    | 6.036162 | Ribosomal protein L26 (Rpl26)                                       |
| Carhsp1       | -0.94 | $2.57 \times 10^{-5}$    | 4.973809 | Calcium-regulated heat-stable protein 1 (Carhsp1)                   |
| Prom2         | -0.94 | .049631771               | 0.873394 | Prominin 2 (Prom2)  |
| Dock8         | -0.94 | .007377613               | 2.290841 | Dedicator of cytokinesis 8 (Dock8)                                  |
| Fam46c        | -0.94 | .004659662               | 2.441896 | Family with sequence similarity 46, member C (Fam46c)               |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tacc3         | -0.94 | .020742982               | 1.320972 | Transforming, acidic coiled-coil containing protein 3 (Tacc3)                                 |
| Gpld1         | -0.94 | $1.95 \times 10^{-5}$    | 4.654528 | Glycosylphosphatidylinositol-specific phospholipase D1 (Gpld1)                                |
| Igsf11        | -0.94 | .000136152               | 5.815958 | Immunoglobulin superfamily, member 11 (Igsf11)  |
| Sec11c        | -0.94 | .000170788               | 4.856154 | SEC11 homolog C, signal peptidase complex subunit (Sec11c)                                    |
| Srsf9         | -0.94 | .000732723               | 3.560618 | Serine/arginine-rich splicing factor 9 (Srsf9)  |
| Hmcn1         | -0.95 | .018996948               | 1.489871 | Hemicentin 1 (Hmcn1)  |
| Kcnp3         | -0.95 | $6.14 \times 10^{-6}$    | 7.092064 | Kv channel interacting protein 3, calsenilin (Kcnp3)  |
| Nectin2       | -0.95 | .020457072               | 2.791576 | Nectin cell adhesion molecule 2 (Nectin2)   |
| Bbox1         | -0.95 | .006987628               | 3.224529 | Butyrobetaine (gamma), 2-oxoglutarate dioxygenase 1 (gamma-butyrobetaine hydroxylase) (Bbox1) |
| Zbbx          | -0.95 | .015712901               | 1.141362 | Zinc finger, B-box domain containing (Zbbx)   |
| Tmem243       | -0.95 | .000617691               | 3.712374 | Transmembrane protein 243, mitochondrial (Tmem243)  |
| Slc1a5        | -0.95 | .047344403               | 0.075399 | Solute carrier family 1 (neutral amino acid transporter), member 5 (Slc1a5)                   |
| Gm9843        | -0.95 | .006131418               | 1.723602 | Predicted gene 9843 (Gm9843)  |
| Rpa3          | -0.95 | .004956771               | 2.377453 | Replication protein A3 (Rpa3)   |
| Lrrc34        | -0.95 | .039925457               | 1.469465 | Leucine-rich repeat containing 34 (Lrrc34)  |
| Dnph1         | -0.95 | .013754677               | 1.460417 | 2'-Deoxynucleoside 5'-phosphate N-hydrolase 1 (Dnph1)   |
| Apln          | -0.95 | .00060515                | 4.238171 | Apelin (Apln)   |
| Ndufaf8       | -0.95 | .000851916               | 2.598805 | NADH dehydrogenase (ubiquinone) 1 alpha subcomplex assembly factor 8 (Ndufaf8)                |
| Nat8f4        | -0.95 | .000757973               | 2.762291 | N-acetyltransferase 8 (GCN5-related) family member 4 (Nat8f4)                                 |
| AA465934      | -0.95 | .016904859               | 1.070392 | Expressed sequence AA465934 (AA465934)  |
| Fzd6          | -0.95 | .002299405               | 2.735509 | Frizzled class receptor 6 (Fzd6)  |
| Zfp36l1       | -0.95 | $6.29 \times 10^{-5}$    | 5.448167 | Zinc finger protein 36, C3H type-like 1 (Zfp36l1)   |
| 1810059H22Rik | -0.95 | .040890765               | 0.932584 | RIKEN cDNA 1810059H22 gene (1810059H22Rik)  |
| Tor3a         | -0.95 | .001414651               | 3.323664 | Torsin family 3, member A (Tor3a)   |
| Edn3          | -0.95 | .011512885               | 1.560349 | Endothelin 3 (Edn3)   |
| Acy1          | -0.95 | .022974663               | 1.012129 | Aminoacylase 1 (Acy1)   |
| Atg4a         | -0.95 | .011925428               | 1.574637 | Autophagy-related 4A, cysteine peptidase (Atg4a)  |
| Gm37090       | -0.96 | .039022702               | 1.896429 | Predicted gene (Gm37090)  |
| Galnt10       | -0.96 | .000448204               | 3.283323 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 10 (Galnt10) |
| Gm17597       | -0.96 | .033779628               | 0.403378 | Predicted gene, 17597 (Gm17597)   |
| Ush1g         | -0.96 | .023835431               | 0.791154 | Usher syndrome 1G (Ush1g)   |
| Gm45250       | -0.96 | .001958274               | 3.182017 | Predicted gene (Gm45250)  |
| Gm6145        | -0.96 | .000472827               | 3.517427 | Predicted gene 6145 (Gm6145)  |
| Dennd2a       | -0.96 | .002713051               | 3.883716 | DENN/MADD domain containing 2A (Dennd2a)  |
| Trim12c       | -0.96 | .020742982               | 1.230752 | Tripartite motif-containing 12C (Trim12c)   |
| Ddc           | -0.96 | .005756481               | 2.604593 | Dopa decarboxylase (Ddc)  |
| Cfh           | -0.96 | .001055265               | 3.750533 | Complement component factor h (Cfh)   |
| A830036E02Rik | -0.96 | .002559986               | 2.067928 | RIKEN cDNA A830036E02 gene (A830036E02Rik)  |
| Itih5         | -0.96 | $2.03 \times 10^{-5}$    | 4.875766 | Inter-alpha (globulin) inhibitor H5 (Itih5)   |
| Gm9794        | -0.96 | .006636564               | 1.667364 | Predicted pseudogene 9794 (Gm9794)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Rpl35a    | -0.96 | $1.60 \times 10^{-6}$ | 5.466421 | Ribosomal protein L35A (Rpl35a)   |
| Pik3cg    | -0.96 | .041779457            | 1.7165   | Phosphoinositide-3-kinase, catalytic, gamma polypeptide (Pik3cg)                        |
| Spag1     | -0.96 | .003061616            | 2.993456 | Sperm-associated antigen 1 (Spag1)  |
| Ogg1      | -0.96 | .030681695            | 1.455673 | 8-Oxoguanine DNA-glycosylase 1 (Ogg1)   |
| Rhpn2     | -0.96 | .000971098            | 2.792279 | Rhopilin, Rho GTPase binding protein 2 (Rhpn2)  |
| Gm10762   | -0.96 | .041657709            | 1.080895 | Predicted gene (Gm10762)  |
| Hif3a     | -0.96 | .014233758            | 2.049942 | Hypoxia inducible factor 3, alpha subunit (Hif3a)                                       |
| Golgb1    | -0.97 | $7.86 \times 10^{-7}$ | 7.077972 | Golgi autoantigen, golgin subfamily b, macrogolgin 1 (Golgb1)                           |
| Slc29a3   | -0.97 | $6.29 \times 10^{-5}$ | 5.346097 | Solute carrier family 29 (nucleoside transporters), member 3 (Slc29a3)                  |
| Pgm1      | -0.97 | .019974478            | 1.807861 | Phosphoglucomutase 1 (Pgm1)   |
| Cdca7l    | -0.97 | .044463496            | 1.071982 | Cell division cycle-associated 7 like (Cdca7l)  |
| Foxo4     | -0.97 | .016588753            | 1.653677 | Forkhead box O4 (Foxo4)   |
| Akna      | -0.97 | .001133361            | 3.092456 | AT-hook transcription factor (Akna)   |
| Ptpn13    | -0.97 | .000139503            | 4.199572 | Protein tyrosine phosphatase, non-receptor type 13 (Ptpn13)                             |
| Ubxn11    | -0.97 | .001702614            | 2.717686 | UBX domain protein 11 (Ubxn11)  |
| Plekhf2   | -0.97 | .000299954            | 2.879884 | Pleckstrin homology domain containing, family F (with FYVE domain) member 2 (Plekhf2)   |
| Car4      | -0.97 | .001689054            | 3.198022 | Carbonic anhydrase 4 (Car4)   |
| Tulp3     | -0.97 | $4.12 \times 10^{-5}$ | 3.769663 | Tubby-like protein 3 (Tulp3)  |
| Pold4     | -0.97 | .000296703            | 3.325193 | Polymerase (DNA-directed), delta 4 (Pold4)  |
| Map3k6    | -0.97 | .013871901            | 3.325042 | Mitogen-activated protein kinase kinase kinase 6 (Map3k6)                               |
| Ccl25     | -0.97 | .007669672            | 2.260765 | Chemokine (C-C motif) ligand 25 (Ccl25)   |
| Cplx1     | -0.98 | $1.31 \times 10^{-5}$ | 7.957424 | Complexin 1 (Cplx1)   |
| Itpr2     | -0.98 | .000909931            | 4.365185 | Inositol 1,4,5-triphosphate receptor 2 (Itpr2)  |
| Cd81      | -0.98 | $6.12 \times 10^{-8}$ | 8.964185 | CD81 antigen (Cd81)   |
| Mks1      | -0.98 | .017215924            | 0.899816 | Meckel syndrome, type 1 (Mks1)  |
| Sox12     | -0.98 | .001949677            | 3.111846 | SRY (sex determining region Y)-box 12 (Sox12)   |
| Gm26721   | -0.98 | .030364024            | 0.817416 | Predicted gene, 26721 (Gm26721)   |
| Ddrgk1    | -0.98 | $5.45 \times 10^{-5}$ | 4.389542 | DDRKG domain containing 1 (Ddrgk1)  |
| Plekhg2   | -0.98 | .040668023            | 1.241028 | Pleckstrin homology domain containing, family G (with RhoGef domain) member 2 (Plekhg2) |
| Gpc5      | -0.98 | $1.57 \times 10^{-5}$ | 4.388827 | Glypican 5 (Gpc5)   |
| Ccdc103   | -0.98 | .048683336            | 0.12984  | Coiled-coil domain containing 103 (Ccdc103)   |
| Rpl41     | -0.98 | $1.41 \times 10^{-5}$ | 7.607891 | Ribosomal protein L41 (Rpl41)   |
| Fzd7      | -0.98 | .001502261            | 4.015327 | Frizzled class receptor 7 (Fzd7)  |
| Trim56    | -0.98 | .00126785             | 3.780847 | Tripartite motif-containing 56 (Trim56)   |
| Rpl12     | -0.98 | $1.10 \times 10^{-5}$ | 5.298674 | Ribosomal protein L12 (Rpl12)   |
| Myo19     | -0.98 | .017245303            | 1.644958 | Myosin XIX (Myo19)  |
| Lama5     | -0.98 | .021108805            | 1.091282 | Laminin, alpha 5 (Lama5)  |
| Tesk2     | -0.98 | .007133786            | 1.49454  | Testis-specific kinase 2 (Tesk2)  |
| Chuk      | -0.98 | .000188021            | 4.177061 | Conserved helix-loop-helix ubiquitous kinase (Chuk)                                     |
| Fam189a2  | -0.98 | .00458852             | 2.567309 | Family with sequence similarity 189, member A2 (Fam189a2)                               |
| Tmem44    | -0.99 | .001294124            | 2.879033 | Transmembrane protein 44 (Tmem44)   |
| Hip1      | -0.99 | $3.57 \times 10^{-5}$ | 4.443614 | Huntingtin interacting protein 1 (Hip1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Wtip          | -0.99 | .040246967               | 0.423633 | WT1-interacting protein (Wtip)   |
| Gm29595       | -0.99 | .039723343               | 0.655604 | Predicted gene 29595 (Gm29595)   |
| Hyal1         | -0.99 | .037291672               | 0.554396 | Hyaluronoglucosaminidase 1 (Hyal1)   |
| Itga7         | -0.99 | .018773501               | 0.99965  | Integrin alpha 7 (Itga7)   |
| 4932443119Rik | -0.99 | .018226696               | 1.024815 | RIKEN cDNA 4932443119 gene (4932443119Rik)   |
| Katna1        | -0.99 | .000643438               | 2.635619 | Katanin p60 (ATPase-containing) subunit A1 (Katna1)  |
| Tmem150a      | -0.99 | .009542327               | 1.629905 | Transmembrane protein 150A (Tmem150a)  |
| Cwh43         | -0.99 | .03455745                | 0.741204 | Cell wall biogenesis 43 C-terminal homolog (Cwh43)   |
| Cubn          | -0.99 | .007688337               | 2.388458 | Cubilin (intrinsic factor-cobalamin receptor) (Cubn)   |
| Rhbdf1        | -0.99 | .039986994               | 0.501294 | Rhomboid 5 homolog 1 (Rhbdf1)  |
| Ednrb         | -0.99 | .000111734               | 5.853344 | Endothelin receptor type B (Ednrb)   |
| Hspb8         | -0.99 | .000282765               | 3.232952 | Heat shock protein 8 (Hspb8)   |
| Rps15a-ps6    | -0.99 | .022639486               | 1.147411 | Ribosomal protein S15A, pseudogene 6 (Rps15a-ps6)  |
| Adamts19      | -0.99 | .032966326               | 0.315111 | A disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 19 (Adamts19)                  |
| Nrm           | -0.99 | .049871193               | 0.597828 | Nurim (nuclear envelope membrane protein) (Nrm)  |
| Gm13111       | -0.99 | .000785148               | 2.539682 | Predicted gene 13111 (Gm13111)   |
| Lpar1         | -0.99 | .000785135               | 4.952834 | Lysophosphatidic acid receptor 1 (Lpar1)   |
| Pmp22         | -0.99 | $4.37 \times 10^{-5}$    | 5.523078 | Peripheral myelin protein 22 (Pmp22)   |
| Phactr4       | -0.99 | .000212867               | 4.330217 | Phosphatase and actin regulator 4 (Phactr4)  |
| Klf4          | -0.99 | .008233751               | 1.425383 | Kruppel-like factor 4 (gut) (Klf4)   |
| Ucp3          | -0.99 | .015279601               | 1.455499 | Uncoupling protein 3 (mitochondrial, proton carrier) (Ucp3)  |
| St6galnac2    | -0.99 | .026969346               | 0.831719 | ST6 (alpha-N-acetyl-neuraminyl-2,3-beta-galactosyl-1,3)-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2 (St6galnac2) |
| Kcnj10        | -1.00 | $2.49 \times 10^{-6}$    | 9.696994 | Potassium inwardly-rectifying channel, subfamily J, member 10 (Kcnj10)   |
| Syde1         | -1.00 | .003935793               | 3.020643 | Synapse defective 1, Rho GTPase, homolog 1 ( <i>C. elegans</i> ) (Syde1)   |
| Chaf1a        | -1.00 | .040056873               | 1.141897 | Chromatin assembly factor 1, subunit A (p150) (Chaf1a)   |
| Prkcq         | -1.00 | .016701369               | 6.078658 | Protein kinase C, theta (Prkcq)  |
| Tspan18       | -1.00 | .007462928               | 6.202997 | Tetraspanin 18 (Tspan18)   |
| Pde11a        | -1.00 | .025977553               | 1.224132 | Phosphodiesterase 11A (Pde11a)   |
| Kcng4         | -1.00 | .001235299               | 5.539409 | Potassium voltage-gated channel, subfamily G, member 4 (Kcng4)   |
| Rrp15         | -1.00 | .020868149               | 1.509673 | Ribosomal RNA processing 15 homolog ( <i>S. cerevisiae</i> ) (Rrp15)   |
| Ss18          | -1.00 | .000139609               | 3.793651 | Synovial sarcoma translocation, Chromosome 18 (Ss18)   |
| K230010J24Rik | -1.00 | .025158345               | 0.614887 | RIKEN cDNA K230010J24 gene (K230010J24Rik)   |
| Vps37b        | -1.00 | .031541489               | 0.446809 | Vacuolar protein sorting 37B (Vps37b)  |
| Prr18         | -1.00 | .000153842               | 4.63153  | Proline rich 18 (Prr18)  |
| Gm17396       | -1.00 | .014605219               | 3.210163 | Predicted gene, 17396 (Gm17396)  |
| Trim68        | -1.00 | .031978552               | 0.719003 | Tripartite motif-containing 68 (Trim68)  |
| Tmod1         | -1.00 | .002505183               | 2.789531 | Tropomodulin 1 (Tmod1)   |
| Cybrd1        | -1.01 | .008028386               | 2.190312 | Cytochrome b reductase 1 (Cybrd1)  |
| 2310009B15Rik | -1.01 | $2.67 \times 10^{-5}$    | 3.527399 | RIKEN cDNA 2310009B15 gene (2310009B15Rik)   |
| Fermt2        | -1.01 | $3.99 \times 10^{-6}$    | 5.742724 | Fermitin family member 2 (Fermt2)  |
| Eno3          | -1.01 | .001265523               | 3.286181 | Enolase 3, beta muscle (Eno3)  |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| 1110034G24Rik | -1.01 | .011323396               | 1.363119 | RIKEN cDNA 1110034G24 gene (1110034G24Rik)  |
| Vwa3a         | -1.01 | .002302996               | 2.673957 | Von Willebrand factor A domain containing 3A (Vwa3a)                                    |
| AC174678.1    | -1.01 | .01937184                | 1.413821 | Novel transcript, antisense to Tm9sf1   |
| Hey2          | -1.01 | .006794571               | 1.974444 | Hairy/enhancer-of-split related with YRPW motif 2 (Hey2)                                |
| P3h3          | -1.01 | .045645557               | 0.771302 | Prolyl 3-hydroxylase 3 (P3h3)   |
| Prdm5         | -1.01 | .002093131               | 1.834587 | PR domain containing 5 (Prdm5)  |
| Ezh2          | -1.01 | .001322749               | 2.406659 | Enhancer of zeste 2 polycomb repressive complex 2 subunit (Ezh2)                        |
| Btbd17        | -1.01 | .016636591               | 1.86766  | BTB (POZ) domain containing 17 (Btbd17)   |
| Morn2         | -1.01 | .002442363               | 2.914989 | MORN repeat containing 2 (Morn2)  |
| Plod1         | -1.01 | $5.99 \times 10^{-5}$    | 3.741833 | Procollagen-lysine, 2-oxoglutarate 5-dioxygenase 1 (Plod1)                              |
| Dhrs4         | -1.01 | .000161515               | 2.875716 | Dehydrogenase/reductase (SDR family) member 4 (Dhrs4)                                   |
| Ppp1r18       | -1.01 | .006459495               | 1.83672  | Protein phosphatase 1, regulatory subunit 18 (Ppp1r18)                                  |
| Tesc          | -1.01 | $7.07 \times 10^{-5}$    | 4.079589 | Tescalcin (Tesc)  |
| Jam3          | -1.01 | $4.82 \times 10^{-5}$    | 4.193844 | Junction adhesion molecule 3 (Jam3)   |
| Sept4         | -1.01 | $3.93 \times 10^{-7}$    | 6.72624  | Septin 4 (Sept4)  |
| Sox1          | -1.01 | .000563108               | 4.868068 | SRY (sex determining region Y)-box 1 (Sox1)   |
| 4930481A15Rik | -1.01 | .011230492               | 1.435105 | RIKEN cDNA 4930481A15 gene (4930481A15Rik)  |
| Tmem176a      | -1.02 | $1.25 \times 10^{-5}$    | 4.751907 | Transmembrane protein 176A (Tmem176a)   |
| Rhoj          | -1.02 | .026691941               | 1.992444 | Ras homolog family member J (Rhoj)  |
| Vav2          | -1.02 | .015279601               | 3.956667 | Vav 2 oncogene (Vav2)   |
| Ttc32         | -1.02 | .018106183               | 1.241441 | Tetratricopeptide repeat domain 32 (Ttc32)  |
| Gsta4         | -1.02 | $1.82 \times 10^{-5}$    | 4.584553 | Glutathione S-transferase, alpha 4 (Gsta4)  |
| Gm2a          | -1.02 | $2.79 \times 10^{-6}$    | 6.003268 | GM2 ganglioside activator protein (Gm2a)  |
| Snhg12        | -1.02 | .00013334                | 4.335032 | Small nucleolar RNA host gene 12 (Snhg12)   |
| Ddx59         | -1.02 | .006128507               | 2.069652 | DEAD (Asp-Glu-Ala-Asp) box polypeptide 59 (Ddx59)                                       |
| Rpl38         | -1.02 | $6.26 \times 10^{-5}$    | 4.87255  | Ribosomal protein L38 (Rpl38)   |
| Mapkapk3      | -1.02 | .00993712                | 1.812349 | Mitogen-activated protein kinase-activated protein kinase 3 (Mapkapk3)                  |
| Mtss1l        | -1.03 | $7.86 \times 10^{-7}$    | 8.37211  | Metastasis suppressor 1-like (Mtss1l)   |
| Plekhh3       | -1.03 | .003007248               | 2.721827 | Pleckstrin homology domain containing, family G (with RhoGef domain) member 3 (Plekhh3) |
| Mr1           | -1.03 | $1.74 \times 10^{-5}$    | 4.043897 | Major histocompatibility complex, class I-related (Mr1)                                 |
| Otx2          | -1.03 | .000484519               | 4.454805 | Orthodenticle homeobox 2 (Otx2)   |
| Anxa4         | -1.03 | .010856796               | 1.744356 | Annexin A4 (Anxa4)  |
| Dap           | -1.03 | .000545422               | 3.778962 | Death-associated protein (Dap)  |
| Mns1          | -1.03 | .002165084               | 2.210108 | Meiosis-specific nuclear structural protein 1 (Mns1)                                    |
| Pdpn          | -1.03 | .00208589                | 2.586479 | Podoplanin (Pdpn)   |
| Gm10073       | -1.03 | .004260752               | 1.640832 | Ribosomal protein, large, P1 pseudogene (Gm10073)                                       |
| Rom1          | -1.03 | .006288902               | 1.26705  | Rod outer segment membrane protein 1 (Rom1)   |
| Prob1         | -1.03 | .005675655               | 2.684955 | Proline-rich basic protein 1 (Prob1)  |
| Six5          | -1.03 | .04143023                | 0.247005 | sine oculis-related homeobox 5 (Six5)   |
| Vit           | -1.03 | .000155643               | 3.209151 | Vitrin (Vit)  |
| Cttnal1       | -1.03 | $6.92 \times 10^{-5}$    | 3.476178 | Catenin (cadherin-associated protein), alpha-like 1 (Cttnal1)                           |
| Gm21781       | -1.03 | .000314173               | 3.841796 | Predicted gene (Gm21781)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|---------------|-------|-----------------------|----------|--|
| Syt15         | -1.03 | .008005735            | 4.609842 | Synaptotagmin XV (Syt15)   |
| Spata24       | -1.03 | .004221449            | 1.612839 | Spermatogenesis-associated 24 (Spata24)  |
| Gm10076       | -1.03 | $8.48 \times 10^{-5}$ | 4.244379 | Ribosomal protein L41 pseudogene (Gm10076)   |
| E230016M11Rik | -1.03 | .044048868            | 0.675591 | RIKEN cDNA E230016M11 gene (E230016M11Rik)   |
| Cdc42ep1      | -1.03 | .000483412            | 3.568535 | CDC42 effector protein (Rho GTPase binding) 1 (Cdc42ep1)                                       |
| 6330418K02Rik | -1.03 | .022896091            | 0.270596 | RIKEN cDNA 6330418K02 gene (6330418K02Rik)   |
| Timm21        | -1.03 | .000238358            | 2.855592 | Tranlocase of inner mitochondrial membrane 21 (Timm21)   |
| Catsper2      | -1.03 | .016029415            | 1.183808 | Cation channel, sperm associated 2 (Catsper2)  |
| Slc2a10       | -1.04 | .042427394            | 0.144964 | Solute carrier family 2 (facilitated glucose transporter), member 10 (Slc2a10)                 |
| Sfxn5         | -1.04 | $5.06 \times 10^{-8}$ | 7.359857 | Sideroflexin 5 (Sfxn5)   |
| Nfkbie        | -1.04 | .047008119            | 0.617041 | Nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, epsilon (Nfkbie) |
| 1110019D14Rik | -1.04 | .029832798            | 0.915383 | RIKEN cDNA 1110019D14 gene (1110019D14Rik)   |
| Cd180         | -1.04 | .036997623            | 3.750463 | CD180 antigen (Cd180)  |
| Catip         | -1.04 | .031184791            | 0.880728 | Ciliogenesis-associated TTC17 interacting protein (Catip)                                      |
| Cfap45        | -1.04 | .005076222            | 2.274819 | Cilia and flagella-associated protein 45 (Cfap45)  |
| Chrm1         | -1.04 | .008189079            | 1.823646 | Cholinergic receptor, muscarinic 1, CNS (Chrm1)  |
| Cops9         | -1.04 | .000213184            | 4.397896 | COP9 Signalosome Subunit 9 (Cops9)   |
| Bmp7          | -1.04 | .001133361            | 4.810091 | Bone morphogenetic protein 7 (Bmp7)  |
| Gm19196       | -1.04 | .005137957            | 1.610969 | TATA box binding protein (Tbp)-associated factor, RNA polymerase I, B pseudogene (Gm19196)     |
| Irx1          | -1.04 | .00856864             | 3.412898 | Iroquois-related homeobox 1 (Irx1)   |
| Glul          | -1.04 | $3.78 \times 10^{-6}$ | 9.010339 | Glutamate-ammonia ligase (glutamine synthetase) (Glul)   |
| Mpzl1         | -1.04 | $5.01 \times 10^{-5}$ | 3.963352 | Myelin protein zero-like 1 (Mpzl1)   |
| Sox9          | -1.04 | $1.74 \times 10^{-5}$ | 5.498845 | SRY (sex determining region Y)-box 9 (Sox9)  |
| Lgi4          | -1.04 | .003914519            | 1.875343 | Leucine-rich repeat LGI family, member 4 (Lgi4)  |
| Slc6a9        | -1.05 | $5.64 \times 10^{-6}$ | 4.649541 | Solute carrier family 6 (neurotransmitter transporter, glycine), member 9 (Slc6a9)             |
| Ccdc62        | -1.05 | .036998497            | 0.57538  | Coiled-coil domain containing 62 (Ccdc62)  |
| Slc2a1        | -1.05 | $9.66 \times 10^{-7}$ | 6.024924 | Solute carrier family 2 (facilitated glucose transporter), member 1 (Slc2a1)                   |
| Asrgl1        | -1.05 | $9.78 \times 10^{-7}$ | 7.456191 | Asparaginase like 1 (Asrgl1)   |
| Cd302         | -1.05 | .000247182            | 2.765785 | CD302 antigen (Cd302)  |
| Hist1h2be     | -1.05 | .00124002             | 2.551123 | Histone cluster 1, H2be (Hist1h2be)  |
| Ttpa          | -1.05 | .004573104            | 1.845821 | Tocopherol (alpha) transfer protein (Ttpa)   |
| Arhgap31      | -1.05 | $1.70 \times 10^{-5}$ | 4.007033 | Rho GTPase activating protein 31 (Arhgap31)  |
| Rspo3         | -1.05 | .000373022            | 4.188401 | R-spondin 3 (Rspo3)  |
| Pou3f1        | -1.05 | .006601117            | 2.102268 | POU domain, class 3, transcription factor 1 (Pou3f1)   |
| Tspan15       | -1.05 | $8.19 \times 10^{-5}$ | 3.667246 | Tetraspanin 15 (Tspan15)   |
| Krcc1         | -1.05 | $4.82 \times 10^{-5}$ | 3.881183 | Lysine-rich coiled-coil 1 (Krcc1)  |
| Fubp3         | -1.05 | $1.91 \times 10^{-5}$ | 4.189816 | Far upstream element (FUSE) binding protein 3 (Fubp3)  |
| Pi4k2b        | -1.05 | .042409274            | 1.144028 | Phosphatidylinositol 4-kinase type 2 beta (Pi4k2b)   |
| Dnah3         | -1.05 | .018234003            | 1.919365 | Dynein, axonemal, heavy chain 3 (Dnah3)  |
| Robo4         | -1.05 | .029832798            | 0.894701 | Roundabout guidance receptor 4 (Robo4)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Kctd11        | -1.05 | .038613499               | 1.14862  | Potassium channel tetramerisation domain containing 11 (Kctd11)  |
| Layn          | -1.05 | .024475939               | 1.264241 | Layilin (Layn)   |
| Hps1          | -1.06 | .037482567               | 0.701494 | Hermansky-Pudlak syndrome 1 (Hps1)   |
| A330023F24Rik | -1.06 | .005171393               | 2.900362 | RIKEN cDNA A330023F24 gene (A330023F24Rik)   |
| Lxn           | -1.06 | .000247675               | 3.809813 | Latexin (Lxn)  |
| Efs           | -1.06 | .005779452               | 1.702913 | Embryonal Fyn-associated substrate (Efs)   |
| Syt11         | -1.06 | .048334791               | -0.09553 | Synaptotagmin-like 1 (Syt11)   |
| Stk38         | -1.06 | $4.66 \times 10^{-5}$    | 3.649656 | Serine/threonine kinase 38 (Stk38)   |
| Ephx2         | -1.06 | .005030185               | 2.098436 | Epoxide hydrolase 2, cytoplasmic (Ephx2)   |
| Dapp1         | -1.06 | .011620722               | 2.056056 | Dual adaptor for phosphotyrosine and 3-phosphoinositides 1 (Dapp1)                                       |
| Lpcat3        | -1.06 | .000202558               | 3.466025 | Lysophosphatidylcholine acyltransferase 3 (Lpcat3)   |
| Ankrd16       | -1.06 | .000168046               | 3.182764 | Ankyrin repeat domain 16 (Ankrd16)   |
| Dock2         | -1.06 | .013914945               | 2.173776 | Dedicator of cyto-kinesis 2 (Dock2)  |
| Pou4f1        | -1.06 | .012746058               | 5.399256 | POU domain, class 4, transcription factor 1 (Pou4f1)   |
| Lama4         | -1.06 | .021320228               | 1.326939 | Laminin, alpha 4 (Lama4)   |
| Lpar4         | -1.07 | .018672471               | 0.984859 | Lysophosphatidic acid receptor 4 (Lpar4)   |
| 9930014A18Rik | -1.07 | .018981597               | 1.076936 | RIKEN cDNA 9930014A18 gene (9930014A18Rik)   |
| Fam228b       | -1.07 | .020208202               | 0.799233 | Family with sequence similarity 228, member B (Fam228b)  |
| Sdsl          | -1.07 | .026926928               | 0.44355  | Serine dehydratase-like (Sdsl)   |
| Acot1         | -1.07 | .000142607               | 3.21134  | Acyl-CoA thioesterase 1 (Acot1)  |
| Kank2         | -1.07 | $4.55 \times 10^{-5}$    | 3.066684 | KN motif and ankyrin repeat domains 2 (Kank2)  |
| Fmo5          | -1.07 | .002194178               | 2.207253 | Flavin containing monooxygenase 5 (Fmo5)   |
| Anapc13       | -1.07 | $8.20 \times 10^{-5}$    | 3.722231 | Anaphase promoting complex subunit 13 (Anapc13)  |
| Selenow       | -1.07 | $8.06 \times 10^{-7}$    | 7.626596 | Selenoprotein W (Selenow)  |
| Cmtm3         | -1.07 | .001931456               | 2.566073 | CKLF-like MARVEL transmembrane domain containing 3 (Cmtm3)   |
| Nfe2l2        | -1.07 | .000413421               | 4.230263 | Nuclear factor, erythroid derived 2, like 2 (Nfe2l2)   |
| 5031425E22Rik | -1.07 | .000497612               | 2.984237 | RIKEN cDNA 5031425E22 gene (5031425E22Rik)   |
| Snap23        | -1.07 | $2.99 \times 10^{-5}$    | 3.640914 | Synaptosomal-associated protein 23 (Snap23)  |
| Slc27a1       | -1.07 | $3.18 \times 10^{-6}$    | 5.486464 | Solute carrier family 27 (fatty acid transporter), member 1 (Slc27a1)                                    |
| Fam120aos     | -1.07 | .003238703               | 2.35456  | Family with sequence similarity 120A, opposite strand (Fam120aos)  |
| Vamp3         | -1.07 | $3.19 \times 10^{-5}$    | 5.185294 | Vesicle-associated membrane protein 3 (Vamp3)  |
| P4ha3         | -1.07 | .000140484               | 3.429348 | Procollagen-proline, 2-oxoglutarate 4-dioxygenase (proline 4-hydroxylase), alpha polypeptide III (P4ha3) |
| Stpg1         | -1.07 | .004866842               | 2.198324 | Sperm tail PG-rich repeat containing 1 (Stpg1)   |
| Trac          | -1.07 | .005138686               | 1.840936 | T cell receptor alpha constant (Trac)  |
| Rftn2         | -1.07 | $8.22 \times 10^{-5}$    | 5.051637 | Raftlin family member 2 (Rftn2)  |
| Myh14         | -1.07 | $2.98 \times 10^{-5}$    | 3.293594 | Myosin, heavy polypeptide 14 (Myh14)   |
| Fads1         | -1.07 | $6.49 \times 10^{-8}$    | 8.074893 | Fatty acid desaturase 1 (Fads1)  |
| Tmem80        | -1.08 | $8.79 \times 10^{-5}$    | 3.061762 | Transmembrane protein 80 (Tmem80)  |
| Boc           | -1.08 | .002448758               | 2.086176 | Biregional cell adhesion molecule-related/down-regulated by oncogenes (Cdon) binding protein (Boc)       |
| Vwa1          | -1.08 | .00348391                | 3.169003 | Von Willebrand factor A domain containing 1 (Vwa1)   |
| Efemp1        | -1.08 | .009371592               | 2.003588 | Epidermal growth factor-containing fibulin-like extracellular matrix protein 1 (Efemp1)                  |
| Col8a2        | -1.08 | .017803646               | 1.016824 | Collagen, type VIII, alpha 2 (Col8a2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Fbxl8         | -1.08 | .017353641               | 0.584954 | F-box and leucine-rich repeat protein 8 (Fbxl8)   |
| 1810026B05Rik | -1.08 | .023198428               | 2.467091 | RIKEN cDNA 1810026B05 gene (1810026B05Rik)  |
| Lyn           | -1.08 | .001900465               | 2.790056 | LYN proto-oncogene, Src family tyrosine kinase (Lyn)                                      |
| Sept10        | -1.08 | .00348391                | 1.724381 | Septin 10 (Sept10)  |
| Hk2           | -1.08 | .017206437               | 1.245931 | Hexokinase 2 (Hk2)  |
| Rplp1         | -1.09 | $1.10 \times 10^{-6}$    | 7.566551 | Ribosomal protein, large, P1 (Rplp1)  |
| Necab3        | -1.09 | .000122038               | 7.209698 | N-terminal EF-hand calcium binding protein 3 (Necab3)                                     |
| Fbxo36        | -1.09 | .002193605               | 2.495713 | F-box protein 36 (Fbxo36)   |
| Ugt8a         | -1.09 | .000353493               | 6.19542  | UDP galactosyltransferase 8A (Ugt8a)  |
| Aldh1a2       | -1.09 | .035582118               | 1.952453 | Aldehyde dehydrogenase family 1, subfamily A2 (Aldh1a2)                                   |
| Gm33680       | -1.09 | .037023513               | 0.025029 | Predicted gene, 33680 (Gm33680)   |
| Tpcn1         | -1.09 | $4.97 \times 10^{-6}$    | 5.512309 | Two pore channel 1 (Tpcn1)  |
| Tlr3          | -1.09 | .000535578               | 4.03953  | Toll-like receptor 3 (Tlr3)   |
| Lrig3         | -1.09 | .009401514               | 1.359981 | Leucine-rich repeats and immunoglobulin-like domains 3 (Lrig3)                            |
| Acaa2         | -1.09 | $3.41 \times 10^{-5}$    | 3.241949 | Acetyl-Coenzyme A acyltransferase 2 (mitochondrial 3-oxoacyl-Coenzyme A thiolase) (Acaa2) |
| She           | -1.09 | .021396078               | 0.978163 | Src homology 2 domain-containing transforming protein E (She)                             |
| Cep112        | -1.09 | $2.69 \times 10^{-5}$    | 3.848475 | Centrosomal protein 112 (Cep112)  |
| Daam2         | -1.09 | $2.93 \times 10^{-6}$    | 5.212464 | Dishevelled-associated activator of morphogenesis 2 (Daam2)                               |
| Rpl10-ps6     | -1.09 | .012543218               | 1.30449  | Ribosomal protein L10, pseudogene 6 (Rpl10-ps6)   |
| Bloc1s1       | -1.09 | .002250829               | 1.684672 | Biogenesis of lysosomal organelles complex-1, subunit 1 (Bloc1s1)                         |
| Rps24         | -1.09 | $9.73 \times 10^{-7}$    | 6.991988 | Ribosomal protein S24 (Rps24)   |
| Prelp         | -1.09 | .000973217               | 4.831111 | Proline arginine-rich end leucine-rich repeat (Prelp)                                     |
| Nxt1          | -1.09 | .004636224               | 1.974019 | NTF2-related export protein 1 (Nxt1)  |
| Kif13b        | -1.10 | $5.57 \times 10^{-5}$    | 4.468318 | Kinesin family member 13B (Kif13b)  |
| Gm45708       | -1.10 | .030906742               | -0.08747 | Predicted gene (Gm45708)  |
| Mb21d1        | -1.10 | .048028786               | 0.750674 | Mab-21 domain containing 1 (Mb21d1)   |
| Dynlt1f       | -1.10 | .016146763               | 0.325965 | Dynein light chain Tctex-type 1F (Dynlt1f)  |
| Ubxn10        | -1.10 | .003025684               | 2.92694  | UBX domain protein 10 (Ubxn10)  |
| Gm37238       | -1.10 | .01983704                | 1.209398 | Predicted gene (Gm37238)  |
| Gpsm1         | -1.10 | $4.93 \times 10^{-5}$    | 3.671139 | G-protein signalling modulator 1 (AGS3-like, <i>C. elegans</i> ) (Gpsm1)                  |
| Chrn3         | -1.10 | .001344315               | 5.48669  | Cholinergic receptor, nicotinic, beta polypeptide 3 (Chrn3)                               |
| Thsd1         | -1.10 | .014279993               | 0.773359 | Thrombospondin, type I, domain 1 (Thsd1)  |
| Irx5          | -1.10 | .026477297               | 2.272937 | IROQUOIS-related homeobox 5 (Irx5)  |
| P2ry14        | -1.10 | .012953398               | 1.325854 | Purinergic receptor P2Y, G-protein coupled, 14 (P2ry14)                                   |
| Exosc3        | -1.10 | .001270369               | 3.004655 | Exosome component 3 (Exosc3)  |
| Hmox1         | -1.10 | .001503166               | 2.084193 | Heme oxygenase 1 (Hmox1)  |
| Slfn5         | -1.10 | .018234003               | 2.196344 | Schlafen 5 (Slfn5)  |
| Ctsc          | -1.10 | .029022449               | 3.178739 | Cathepsin C (Ctsc)  |
| Ifrd1         | -1.10 | $5.52 \times 10^{-5}$    | 4.217696 | Interferon-related developmental regulator 1 (Ifrd1)                                      |
| Il18          | -1.10 | $7.15 \times 10^{-5}$    | 2.862566 | Interleukin 18 (Il18)   |
| Lima1         | -1.10 | $6.18 \times 10^{-5}$    | 3.454519 | LIM domain and actin binding 1 (Lima1)  |
| Pde8a         | -1.10 | .000270051               | 3.769577 | Phosphodiesterase 8A (Pde8a)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Pon3          | -1.10 | .024573321               | 0.705249 | Paraoxonase 3 (Pon3)  |
| Mpeg1         | -1.11 | .004205821               | 4.793875 | Macrophage expressed gene 1 (Mpeg1)   |
| Rps14         | -1.11 | $7.58 \times 10^{-6}$    | 5.221231 | Ribosomal protein S14 (Rps14)   |
| Aifm3         | -1.11 | .000108463               | 4.597911 | Apoptosis-inducing factor, mitochondrion-associated 3 (Aifm3)                               |
| Ccdc114       | -1.11 | .020938965               | 0.849293 | Coiled-coil domain containing 114 (Ccdc114)   |
| Lbr           | -1.11 | .000824747               | 2.060907 | Lamin B receptor (Lbr)  |
| Aga           | -1.11 | .000295207               | 2.480546 | Aspartylglucosaminidase (Aga)   |
| Smim3         | -1.11 | .00887688                | 1.048962 | Small integral membrane protein 3 (Smim3)   |
| Kcnmb1        | -1.11 | .004551291               | 2.8786   | Potassium large conductance calcium-activated channel, subfamily M, beta member 1 (Kcnmb1)  |
| Smo           | -1.11 | $6.61 \times 10^{-5}$    | 4.100241 | Smoothed, frizzled class receptor (Smo)   |
| Rbm38         | -1.11 | .02175209                | 0.485657 | RNA binding motif protein 38 (Rbm38)  |
| Alox5ap       | -1.11 | .029515857               | 0.767398 | Arachidonate 5-lipoxygenase activating protein (Alox5ap)                                    |
| Pacrg         | -1.11 | .000159027               | 3.898794 | PARK2 co-regulated (Pacrg)  |
| St3gal6       | -1.11 | .000149436               | 3.680103 | ST3 beta-galactoside alpha-2,3-sialyltransferase 6 (St3gal6)                                |
| Nfkbiz        | -1.11 | .005044978               | 1.604071 | Nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, zeta (Nfkbiz) |
| Aox1          | -1.11 | .020117724               | 0.525351 | Aldehyde oxidase 1 (Aox1)   |
| Rpl37a        | -1.11 | $3.18 \times 10^{-6}$    | 6.393297 | Ribosomal protein L37a (Rpl37a)   |
| Nos3          | -1.11 | .039925457               | 0.342762 | Nitric oxide synthase 3, endothelial cell (Nos3)  |
| 4932438H23Rik | -1.11 | .036194616               | 1.079526 | RIKEN cDNA 4932438H23 gene (4932438H23Rik)  |
| 4732416N19Rik | -1.12 | .003664544               | 1.2333   | RIKEN cDNA 4732416N19 gene (4732416N19Rik)  |
| 1810037117Rik | -1.12 | $4.34 \times 10^{-5}$    | 4.438177 | RIKEN cDNA 1810037117 gene (1810037117Rik)  |
| Abrac1        | -1.12 | .005156073               | 1.681769 | ABRA C-terminal like (Abrac1)   |
| Cd24a         | -1.12 | .000172134               | 5.272342 | CD24a antigen (Cd24a)   |
| Rps12         | -1.12 | .00020497                | 3.107199 | Ribosomal protein S12 (Rps12)   |
| Padi2         | -1.12 | .000533592               | 4.173653 | Peptidyl arginine deiminase, type II (Padi2)  |
| S1pr2         | -1.12 | .038801677               | 0.349446 | Sphingosine-1-phosphate receptor 2 (S1pr2)  |
| Plat          | -1.12 | .001071094               | 4.032358 | Plasminogen activator, tissue (Plat)  |
| Nat8f1        | -1.12 | .005229145               | 1.402616 | N-acetyltransferase 8 (GCN5-related) family member 1 (Nat8f1)                               |
| Tfpi          | -1.12 | .007088739               | 1.775694 | Tissue factor pathway inhibitor (Tfpi)  |
| Gm20342       | -1.12 | .034164838               | 2.015582 | Predicted gene, 20342 (Gm20342)   |
| Nes           | -1.13 | .008073829               | 0.898532 | Nestin (Nes)  |
| Snhg1         | -1.13 | $1.74 \times 10^{-5}$    | 4.158464 | Small nucleolar RNA host gene 1 (Snhg1)   |
| Wnk4          | -1.13 | .041357409               | -0.02167 | WNK lysine deficient protein kinase 4 (Wnk4)  |
| Pla2r1        | -1.13 | .047097802               | 0.35419  | Phospholipase A2 receptor 1 (Pla2r1)  |
| Emp2          | -1.13 | .00021166                | 3.355918 | Epithelial membrane protein 2 (Emp2)  |
| 1500035N22Rik | -1.13 | .023338067               | 0.997441 | RIKEN cDNA 1500035N22 gene (1500035N22Rik)  |
| Parp9         | -1.13 | .044531516               | 1.66239  | Poly(ADP-ribose) polymerase family, member 9 (Parp9)  |
| Cmtm6         | -1.13 | $7.22 \times 10^{-6}$    | 4.016724 | CKLF-like MARVEL transmembrane domain containing 6 (Cmtm6)                                  |
| Smim11        | -1.13 | .000257199               | 2.465743 | Small integral membrane protein 11 (Smim11)   |
| Plxnb1        | -1.13 | $2.03 \times 10^{-6}$    | 5.289573 | Plexin B1 (Plxnb1)  |
| Gatm          | -1.13 | $1.91 \times 10^{-5}$    | 6.478355 | Glycine amidinotransferase (L-arginine:glycine amidinotransferase) (Gatm)                   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Obscn         | -1.13 | .043393264               | 0.750041 | Obscurin, cytoskeletal calmodulin and titin-interacting RhoGEF (Obscn)      |
| 4930447F24Rik | -1.13 | .024325218               | 0.747207 | RIKEN cDNA 4930447F24 gene (4930447F24Rik)                                  |
| Gm27003       | -1.13 | .025155748               | -0.08161 | Predicted gene, 27003 (Gm27003)   |
| Myo6          | -1.13 | $1.61 \times 10^{-5}$    | 6.275704 | Myosin VI (Myo6)  |
| Tns3          | -1.13 | $1.34 \times 10^{-5}$    | 6.000206 | Tensin 3 (Tns3)   |
| Tril          | -1.13 | $3.36 \times 10^{-6}$    | 5.531253 | TLR4 interactor with leucine-rich repeats (Tril)                            |
| Rfx4          | -1.14 | .000113285               | 4.725023 | Regulatory factor X, 4 (influences HLA class II expression) (Rfx4)          |
| Prr5l         | -1.14 | .000952419               | 3.47516  | Proline rich 5 like (Prr5l)   |
| Pros1         | -1.14 | .000102301               | 3.426973 | Protein S (alpha) (Pros1)   |
| Lrrc51        | -1.14 | .00472261                | 2.065139 | Leucine-rich repeat containing 51 (Lrrc51)                                  |
| Ptprz1        | -1.14 | $2.12 \times 10^{-7}$    | 8.015394 | Protein tyrosine phosphatase, receptor type Z, polypeptide 1 (Ptprz1)       |
| C3ar1         | -1.14 | .004754794               | 2.260126 | Complement component 3a receptor 1 (C3ar1)                                  |
| Slc5a11       | -1.14 | .028695831               | 0.207292 | Solute carrier family 5 (sodium/glucose cotransporter), member 11 (Slc5a11) |
| Myb           | -1.14 | .006117957               | 1.51947  | Myeloblastosis oncogene (Myb)   |
| Fsip1         | -1.14 | .036567968               | -0.06486 | Fibrous sheath-interacting protein 1 (Fsip1)                                |
| Mettl23       | -1.14 | .000419938               | 2.211524 | Methyltransferase like 23 (Mettl23)   |
| Rpl37         | -1.14 | $2.93 \times 10^{-6}$    | 6.017693 | Ribosomal protein L37 (Rpl37)   |
| 4930431P19Rik | -1.15 | .003429155               | 2.10157  | RIKEN cDNA 4930431P19 gene (4930431P19Rik)                                  |
| C030037D09Rik | -1.15 | .000750569               | 2.993472 | RIKEN cDNA C030037D09 gene (C030037D09Rik)                                  |
| Npc2          | -1.15 | $2.24 \times 10^{-6}$    | 5.42618  | Niemann-Pick type C2 (Npc2)   |
| Atp7b         | -1.15 | .003894268               | 1.349234 | ATPase, Cu <sup>++</sup> transporting, beta polypeptide (Atp7b)             |
| Nt5dc2        | -1.15 | .003522517               | 1.26268  | 5'-Nucleotidase domain containing 2 (Nt5dc2)                                |
| Fam129a       | -1.15 | .023338067               | 0.376994 | Family with sequence similarity 129, member A (Fam129a)                     |
| Scp2          | -1.15 | $2.94 \times 10^{-6}$    | 4.53868  | Sterol carrier protein 2, liver (Scp2)                                      |
| lfrd2         | -1.15 | .016218299               | 1.393107 | Interferon-related developmental regulator 2 (lfrd2)                        |
| Adgrl4        | -1.15 | .000691243               | 3.165261 | Adhesion G protein-coupled receptor L4 (Adgrl4)                             |
| Uxt           | -1.15 | .008590702               | 0.662938 | Ubiquitously expressed transcript (Uxt)                                     |
| Cd33          | -1.15 | .000920938               | 2.949039 | CD33 antigen (Cd33)   |
| Slc44a1       | -1.15 | $1.12 \times 10^{-6}$    | 6.422691 | Solute carrier family 44, member 1 (Slc44a1)                                |
| Yap1          | -1.15 | .000140484               | 3.139538 | Yes-associated protein 1 (Yap1)   |
| Notch3        | -1.15 | .001059508               | 3.001284 | Notch 3 (Notch3)  |
| Tmsb4x        | -1.15 | $1.34 \times 10^{-5}$    | 7.408202 | Thymosin, beta 4, X chromosome (Tmsb4x)                                     |
| E2f5          | -1.16 | .000731656               | 2.698102 | E2F transcription factor 5 (E2f5)   |
| Als2cl        | -1.16 | .025765291               | 1.110174 | ALS2 C-terminal like (Als2cl)   |
| 4933413G19Rik | -1.16 | .040027641               | 0.240535 | RIKEN cDNA 4933413G19 gene (4933413G19Rik)                                  |
| Klhdc7a       | -1.16 | .002337753               | 2.892523 | Kelch domain containing 7A (Klhdc7a)  |
| Nr2e1         | -1.16 | .001709309               | 2.717297 | Nuclear receptor subfamily 2, group E, member 1 (Nr2e1)                     |
| Rabep2        | -1.16 | .000513935               | 1.96385  | Rabaptin, RAB GTPase binding effector protein 2 (Rabep2)                    |
| Il11ra1       | -1.16 | .002425254               | 2.141388 | Interleukin 11 receptor, alpha chain 1 (Il11ra1)                            |
| Tmem35b       | -1.16 | .002536116               | 1.980574 | Transmembrane protein 35B (Tmem35b)   |
| Crybg2        | -1.16 | .028793942               | 0.675262 | Crystallin Beta-Gamma Domain Containing 2 (Crybg2)                          |
| 2700046A07Rik | -1.16 | .029826632               | 0.029924 | RIKEN cDNA 2700046A07 gene (2700046A07Rik)                                  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Ccna2         | -1.16 | .049561915            | 0.320962 | Cyclin A2 (Ccna2)   |
| Ggh           | -1.16 | .000157484            | 2.861872 | Gamma-glutamyl hydrolase (Ggh)  |
| Trim25        | -1.16 | .000140232            | 3.304243 | Tripartite motif-containing 25 (Trim25)   |
| Kmt5c         | -1.17 | .002681468            | 1.589277 | Lysine methyltransferase 5C (Kmt5c)   |
| Fam117a       | -1.17 | .001833285            | 1.40422  | Family with sequence similarity 117, member A (Fam117a)                                 |
| Wfikkn2       | -1.17 | .0004311              | 3.030509 | WAP, follistatin/kazal, immunoglobulin, kunitz and netrin domain containing 2 (Wfikkn2) |
| 3110070M22Rik | -1.17 | .009711278            | 0.78267  | RIKEN cDNA 3110070M22 gene (3110070M22Rik)  |
| Fgfr2         | -1.17 | $4.97 \times 10^{-5}$ | 5.631052 | Fibroblast growth factor receptor 2 (Fgfr2)   |
| Bgn           | -1.17 | .008073829            | 2.87013  | Biglycan (Bgn)  |
| Ulk4          | -1.17 | .008784142            | 1.81416  | Unc-51-like kinase 4 (Ulk4)   |
| Hes1          | -1.17 | .001945942            | 1.313793 | Hairy and enhancer of split 1 (Hes1)  |
| Papss2        | -1.17 | .000981542            | 3.096375 | 3'-Phosphoadenosine 5'-phosphosulfate synthase 2 (Papss2)                               |
| Gltp          | -1.18 | $6.99 \times 10^{-5}$ | 4.899758 | Glycolipid transfer protein (Gltp)  |
| Itgb3         | -1.18 | .009444664            | 1.366371 | Integrin beta 3 (Itgb3)   |
| BC030343      | -1.18 | .002847448            | 1.656515 | cDNA sequence BC030343 (BC030343)   |
| 1700120C14Rik | -1.18 | .049261866            | 0.175745 | RIKEN cDNA 1700120C14 gene (1700120C14Rik)  |
| Rnase4        | -1.18 | $4.56 \times 10^{-5}$ | 3.59023  | Ribonuclease, RNase A family 4 (Rnase4)   |
| Rps28         | -1.18 | $8.53 \times 10^{-5}$ | 3.417645 | Ribosomal protein S28 (Rps28)   |
| 0610043K17Rik | -1.18 | .008294123            | 1.079591 | RIKEN cDNA 0610043K17 gene (0610043K17Rik)  |
| Chrn4         | -1.18 | .002127168            | 6.848111 | Cholinergic receptor, nicotinic, beta polypeptide 4 (Chrn4)                             |
| Qdpr          | -1.18 | $1.25 \times 10^{-6}$ | 5.30414  | Quinoid dihydropteridine reductase (Qdpr)   |
| Scnn1a        | -1.18 | .017169007            | 1.972245 | Sodium channel, nonvoltage-gated 1 alpha (Scnn1a)                                       |
| 2900052N01Rik | -1.18 | $8.86 \times 10^{-5}$ | 4.057103 | RIKEN cDNA 2900052N01 gene (2900052N01Rik)  |
| Tnfrsf1b      | -1.18 | .045782065            | 1.11812  | Tumor necrosis factor receptor superfamily, member 1b (Tnfrsf1b)                        |
| Neu4          | -1.18 | .000275022            | 2.692901 | Sialidase 4 (Neu4)  |
| Gm10561       | -1.18 | .002801426            | 1.544058 | Predicted gene 10561 (Gm10561)  |
| Evc2          | -1.18 | .032066734            | 0.558719 | Ellis van Creveld syndrome 2 (Evc2)   |
| H2-D1         | -1.18 | .027298452            | 5.445131 | Histocompatibility 2, D region locus 1 (H2-D1)  |
| Ascl4         | -1.18 | .00582942             | 1.854344 | Achaete-scute family bHLH transcription factor 4 (Ascl4)                                |
| Ccdc84        | -1.18 | .014232243            | 0.941049 | Coiled-coil domain containing 84 (Ccdc84)   |
| Hexb          | -1.18 | $2.79 \times 10^{-6}$ | 4.717284 | Hexosaminidase B (Hexb)   |
| Rps21         | -1.18 | $1.10 \times 10^{-5}$ | 5.19166  | Ribosomal protein S21 (Rps21)   |
| Acss3         | -1.18 | .014289176            | 1.072955 | Acyl-CoA synthetase short-chain family member 3 (Acss3)                                 |
| Pxdc1         | -1.18 | .015098246            | 1.672496 | PX domain containing 1 (Pxdc1)  |
| Prcd          | -1.19 | .022344908            | 0.513325 | Photoreceptor Disc Component (Prcd)   |
| Lrrk1         | -1.19 | .012371974            | 0.836502 | Leucine-rich repeat kinase 1 (Lrrk1)  |
| Nod1          | -1.19 | .007070722            | 1.788212 | Nucleotide-binding oligomerization domain containing 1 (Nod1)                           |
| B230323A14Rik | -1.19 | .000909697            | 1.806089 | RIKEN cDNA B230323A14 gene (B230323A14Rik)  |
| Zfp474        | -1.19 | .003224519            | 1.10621  | Zinc finger protein 474 (Zfp474)  |
| 1700028P14Rik | -1.19 | .019667026            | 1.021961 | RIKEN cDNA 1700028P14 gene (1700028P14Rik)  |
| Tnnt1         | -1.19 | .000348091            | 4.245126 | Troponin T1, skeletal, slow (Tnnt1)   |
| Fam107a       | -1.19 | $5.36 \times 10^{-6}$ | 8.044484 | Family with sequence similarity 107, member A (Fam107a)                                 |
| Fth1          | -1.19 | $4.73 \times 10^{-8}$ | 9.706873 | Ferritin heavy polypeptide 1 (Fth1)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|---------------|-------|-----------------------|----------|---|
| Vmac          | -1.19 | .000968787            | 2.56346  | Vimentin-type intermediate filament-associated coiled-coil protein (Vmac)       |
| Atp2a3        | -1.19 | .014202937            | 0.994436 | ATPase, Ca++ transporting, ubiquitous (Atp2a3)                                  |
| Cebpa         | -1.20 | .042604347            | 0.186336 | CCAAT/enhancer binding protein (C/EBP), alpha (Cebpa)                           |
| Colec12       | -1.20 | $9.38 \times 10^{-5}$ | 2.879462 | Collectin sub-family member 12 (Colec12)  |
| Hsd17b11      | -1.20 | $2.18 \times 10^{-5}$ | 3.59739  | Hydroxysteroid (17-beta) dehydrogenase 11 (Hsd17b11)                            |
| Ano1          | -1.20 | .001339309            | 4.054515 | Anoctamin 1, calcium activated chloride channel (Ano1)                          |
| Gm15893       | -1.20 | .021141437            | 0.073855 | Predicted gene (Gm15893)  |
| Gm27032       | -1.20 | .001687297            | 1.306945 | Predicted gene (Gm27032)  |
| Ybx1          | -1.20 | $4.14 \times 10^{-7}$ | 5.865673 | Y box protein 1 (Ybx1)  |
| Tmem181b-ps   | -1.20 | $1.99 \times 10^{-5}$ | 3.713917 | Transmembrane protein 181B, pseudogene (Tmem181b-ps)                            |
| Ctnna3        | -1.20 | .021380885            | 1.194521 | Catenin (cadherin-associated protein), alpha 3 (Ctnna3)                         |
| Spef2         | -1.20 | .00174136             | 2.163183 | Sperm flagellar 2 (Spef2)   |
| Sqor          | -1.20 | .000929719            | 2.494005 | Sulfide Quinone Oxidoreductase (Sqor)   |
| Plekho2       | -1.20 | $1.25 \times 10^{-5}$ | 3.730697 | pleckstrin homology domain containing, family O member 2 (Plekho2)              |
| Kank1         | -1.20 | .000113408            | 4.21666  | KN motif and ankyrin repeat domains 1 (Kank1)                                   |
| Sall3         | -1.20 | .001150534            | 2.707474 | Sal-like 3 (Sall3)  |
| Pdgfd         | -1.20 | .01425755             | 1.066187 | Platelet-derived growth factor, D polypeptide (Pdgfd)                           |
| Pik3r5        | -1.20 | .031874957            | 1.350876 | Phosphoinositide-3-kinase, regulatory subunit 5, p101 (Pik3r5)                  |
| Snhg5         | -1.20 | .000413421            | 2.155522 | Small nucleolar RNA host gene 5 (Snhg5)   |
| Cpq           | -1.20 | .000307293            | 2.745175 | Carboxypeptidase Q (Cpq)  |
| Mafb          | -1.20 | .006958315            | 2.401036 | V-maf musculoaponeurotic fibrosarcoma oncogene family, protein B (avian) (Mafb) |
| Ttll3         | -1.20 | .000111734            | 2.924717 | Tubulin tyrosine ligase-like family, member 3 (Ttll3)                           |
| Gramd3        | -1.21 | $2.87 \times 10^{-5}$ | 3.536419 | GRAM domain containing 3 (Gramd3)   |
| Rspo4         | -1.21 | .01261748             | 1.466589 | R-spondin 4 (Rspo4)   |
| Zfp524        | -1.21 | .014499583            | 0.231873 | Zinc finger protein 524 (Zfp524)  |
| Limch1        | -1.21 | $2.23 \times 10^{-5}$ | 5.113421 | LIM and calponin homology domains 1 (Limch1)                                    |
| Stom          | -1.21 | .000175375            | 2.649156 | Stomatin (Stom)   |
| Nr2c2ap       | -1.21 | .015534765            | 0.193693 | Nuclear receptor 2C2-associated protein (Nr2c2ap)                               |
| Pdk4          | -1.21 | .000273645            | 2.288155 | Pyruvate dehydrogenase kinase, isoenzyme 4 (Pdk4)                               |
| Cped1         | -1.21 | .033579098            | 1.404764 | Cadherin-like and PC-esterase domain containing 1 (Cped1)                       |
| Tmem176b      | -1.21 | $1.59 \times 10^{-5}$ | 5.682541 | Transmembrane protein 176B (Tmem176b)   |
| Fam234a       | -1.21 | $7.58 \times 10^{-5}$ | 2.625972 | Family with sequence similarity 234, member A (Fam234a)                         |
| Frdm8         | -1.21 | .000274702            | 3.280708 | FERM domain containing 8 (Frdm8)  |
| Abtb2         | -1.21 | .000113285            | 3.061535 | Ankyrin repeat and BTB (POZ) domain containing 2 (Abtb2)                        |
| Plscr4        | -1.21 | .004704001            | 1.059285 | Phospholipid scramblase 4 (Plscr4)  |
| Rtn4rl2       | -1.21 | .022857561            | 1.009697 | Reticulon 4 receptor-like 2 (Rtn4rl2)   |
| 2810459M11Rik | -1.21 | .000298204            | 2.443126 | RIKEN cDNA 2810459M11 gene (2810459M11Rik)                                      |
| Lamc3         | -1.21 | .016767275            | 1.651479 | Laminin gamma 3 (Lamc3)   |
| Trp73         | -1.21 | .019278772            | 1.088466 | Transformation-related protein 73 (Trp73)                                       |
| Abca9         | -1.21 | $9.92 \times 10^{-5}$ | 2.792147 | ATP-binding cassette, sub-family A (ABC1), member 9 (Abca9)                     |
| Tor4a         | -1.21 | .037421706            | 0.328779 | Torsin family 4, member A (Tor4a)   |
| Tnfsf12       | -1.21 | .006533561            | 0.580528 | Tumor necrosis factor (ligand) superfamily, member 12 (Tnfsf12)                 |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tgfb2         | -1.21 | $6.20 \times 10^{-5}$    | 4.201933 | Transforming growth factor, beta receptor II (Tgfb2)  |
| Galnt4        | -1.22 | .001453455               | 1.957865 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 4 (Galnt4) |
| Tsc22d4       | -1.22 | $2.23 \times 10^{-6}$    | 4.326679 | TSC22 domain family, member 4 (Tsc22d4)   |
| Vsig10        | -1.22 | .022971426               | 0.391938 | V-set and immunoglobulin domain containing 10 (Vsig10)                                      |
| Mettl7a1      | -1.22 | $3.96 \times 10^{-6}$    | 4.402014 | Methyltransferase like 7A1 (Mettl7a1)   |
| Ang           | -1.22 | .026732262               | 0.760579 | Angiogenin, ribonuclease, RNase A family, 5 (Ang)   |
| Il17ra        | -1.22 | .000161732               | 3.116952 | Interleukin 17 receptor A (Il17ra)  |
| Erg           | -1.22 | .015159819               | 1.58783  | Avian erythroblastosis virus E-26 (v-ets) oncogene related (Erg)                            |
| 4930519K11Rik | -1.22 | .007956524               | 0.795241 | RIKEN cDNA 4930519K11 gene (4930519K11Rik)  |
| Rpl9-ps6      | -1.22 | .002457495               | 1.235462 | Ribosomal protein L9, pseudogene 6 (Rpl9-ps6)   |
| Cpt1a         | -1.22 | $2.75 \times 10^{-5}$    | 3.794592 | Carnitine palmitoyltransferase 1a, liver (Cpt1a)  |
| Gm12940       | -1.22 | .012084874               | 1.362936 | Predicted gene (Gm12940)  |
| Vcam1         | -1.22 | .000351859               | 4.600288 | Vascular cell adhesion molecule 1 (Vcam1)   |
| C230072F16Rik | -1.22 | .007074567               | 1.988352 | RIKEN cDNA C230072F16 gene (C230072F16Rik)  |
| Amy1          | -1.23 | .003125048               | 3.124295 | Amylase 1, salivary (Amy1)  |
| Spag17        | -1.23 | .010228757               | 1.073302 | Sperm-associated antigen 17 (Spag17)  |
| Syt14         | -1.23 | .03201848                | 1.760065 | Synaptotagmin-like 4 (Syt14)  |
| Slc16a4       | -1.23 | .011411404               | 0.693355 | Solute carrier family 16 (monocarboxylic acid transporters), member 4 (Slc16a4)             |
| Msn           | -1.23 | .000334057               | 4.791074 | Moesin (Msn)  |
| Lsm5          | -1.23 | .025330932               | 1.178313 | LSM5 homolog, U6 small nuclear RNA and mRNA degradation associated (Lsm5)                   |
| Msr2          | -1.23 | .000646891               | 1.840277 | Methionine sulfoxide reductase B2 (Msr2)  |
| Scamp2        | -1.23 | .000149502               | 2.97905  | Secretory carrier membrane protein 2 (Scamp2)   |
| Tfeb          | -1.23 | .005222906               | 1.694663 | Transcription factor EB (Tfeb)  |
| Mvp           | -1.23 | .001599223               | 2.0596   | Major vault protein (Mvp)   |
| Gm973         | -1.23 | .000106457               | 3.078131 | Predicted gene 973 (Gm973)  |
| Cdh3          | -1.23 | .004556736               | 2.374557 | Cadherin 3 (Cdh3)   |
| Gsap          | -1.23 | .025748885               | 1.650245 | Gamma-secretase activating protein (Gsap)   |
| Cbs           | -1.23 | $1.71 \times 10^{-5}$    | 3.741092 | Cystathionine beta-synthase (Cbs)   |
| Gm44250       | -1.23 | .005309158               | 1.243933 | Predicted gene (Gm44250)  |
| C1ql1         | -1.23 | .001369036               | 1.903386 | Complement component 1, q subcomponent-like 1 (C1ql1)                                       |
| Mertk         | -1.24 | $1.59 \times 10^{-5}$    | 4.173314 | C-mer proto-oncogene tyrosine kinase (Mertk)  |
| Arhgef19      | -1.24 | .002302996               | 1.80534  | Rho guanine nucleotide exchange factor (GEF) 19 (Arhgef19)                                  |
| Serpine2      | -1.24 | $1.44 \times 10^{-8}$    | 7.699841 | Serine (or cysteine) peptidase inhibitor, clade E, member 2 (Serpine2)                      |
| Arpc1b        | -1.24 | .000361722               | 3.536518 | Actin-related protein 2/3 complex, subunit 1B (Arpc1b)                                      |
| 5430402O13Rik | -1.24 | .010061854               | 0.149713 | RIKEN cDNA 5430402O13 gene (5430402O13Rik)  |
| Dab2          | -1.24 | $1.18 \times 10^{-6}$    | 4.299648 | Disabled 2, mitogen-responsive phosphoprotein (Dab2)  |
| Il12rb2       | -1.24 | .00781795                | 1.076085 | Interleukin 12 receptor, beta 2 (Il12rb2)   |
| Gpr17         | -1.24 | $4.43 \times 10^{-6}$    | 5.345105 | G protein-coupled receptor 17 (Gpr17)   |
| Kyat3         | -1.24 | .00248065                | 1.326724 | Kynurenine aminotransferase 3 (Kyat3)   |
| Golim4        | -1.25 | $1.66 \times 10^{-5}$    | 4.141702 | Golgi integral membrane protein 4 (Golim4)  |
| Slc13a4       | -1.25 | .032869475               | 1.871927 | Solute carrier family 13 (sodium/sulfate symporters), member 4 (Slc13a4)                    |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Prom1         | -1.25 | .000478356               | 2.236378 | Prominin 1 (Prom1)  |
| Blvrb         | -1.25 | .000246074               | 2.336584 | Biliverdin reductase B (flavin reductase (NADPH)) (Blvrb)                                 |
| Fli1          | -1.25 | .002176919               | 1.691115 | Friend leukemia integration 1 (Fli1)  |
| Chrna3        | -1.25 | .001565671               | 6.702268 | Cholinergic receptor, nicotinic, alpha polypeptide 3 (Chrna3)                             |
| Ddah2         | -1.25 | .000240897               | 2.218008 | Dimethylarginine dimethylaminohydrolase 2 (Ddah2)   |
| Fuz           | -1.25 | .016335254               | 0.851709 | Fuzzy planar cell polarity protein (Fuz)  |
| Cfap57        | -1.25 | .007012116               | 1.237086 | Cilia and flagella-associated protein 57 (Cfap57)   |
| Fads2         | -1.25 | $1.22 \times 10^{-7}$    | 6.141946 | Fatty acid desaturase 2 (Fads2)   |
| Mmel1         | -1.25 | .020973542               | 0.166616 | Membrane metallo-endopeptidase-like 1 (Mmel1)   |
| Aass          | -1.25 | .007541978               | 0.920775 | Aminoadipate-semialdehyde synthase (Aass)   |
| Cers2         | -1.25 | $7.84 \times 10^{-7}$    | 5.357083 | Ceramide synthase 2 (Cers2)   |
| Cabp1         | -1.25 | .00161309                | 2.020935 | Calcium binding protein 1 (Cabp1)   |
| Tlr7          | -1.25 | .014564453               | 1.703322 | Toll-like receptor 7 (Tlr7)   |
| Gm42692       | -1.25 | .029964932               | 0.095187 | Predicted gene (Gm42692)  |
| Rsph10b       | -1.26 | .006744795               | 1.692022 | Radial spoke head 10 homolog B (Chlamydomonas) (Rsph10b)                                  |
| Slc6a1        | -1.26 | $3.93 \times 10^{-7}$    | 7.697146 | Solute carrier family 6 (neurotransmitter transporter, GABA), member 1 (Slc6a1)           |
| Gm26703       | -1.26 | .004350776               | 1.697319 | Predicted gene, 26703 (Gm26703)   |
| C030029H02Rik | -1.26 | .00267094                | 1.906417 | RIKEN cDNA C030029H02 gene (C030029H02Rik)  |
| Chst3         | -1.26 | .008250138               | 1.844138 | Carbohydrate (chondroitin 6/keratan) sulfotransferase 3 (Chst3)                           |
| Tln1          | -1.26 | $6.92 \times 10^{-7}$    | 4.484675 | Talin 1 (Tln1)  |
| Tec           | -1.26 | .004303565               | 0.761994 | Tec protein tyrosine kinase (Tec)   |
| Flt1          | -1.26 | $4.06 \times 10^{-5}$    | 4.772082 | FMS-like tyrosine kinase 1 (Flt1)   |
| Ephx1         | -1.27 | .001008685               | 2.789296 | Epoxide hydrolase 1, microsomal (Ephx1)   |
| Tbx18         | -1.27 | .023523029               | -0.13114 | T-box18 (Tbx18)   |
| Slc13a3       | -1.27 | $1.62 \times 10^{-5}$    | 3.996678 | Solute carrier family 13 (sodium-dependent dicarboxylate transporter), member 3 (Slc13a3) |
| 2410006H16Rik | -1.27 | $1.74 \times 10^{-5}$    | 4.074663 | RIKEN cDNA 2410006H16 gene (2410006H16Rik)  |
| Ctso          | -1.27 | $2.62 \times 10^{-6}$    | 5.036704 | Cathepsin O (Ctso)  |
| G0s2          | -1.27 | .002195116               | 1.168191 | G0/G1 switch gene 2 (G0s2)  |
| Slc40a1       | -1.27 | .004191592               | 1.637292 | Solute carrier family 40 (iron-regulated transporter), member 1 (Slc40a1)                 |
| Pxn           | -1.27 | .000104976               | 3.752536 | Paxillin (Pxn)  |
| Ermn          | -1.27 | .000150079               | 6.275225 | Ermin, ERM-like protein (Ermn)  |
| Tgm2          | -1.27 | .032610588               | 1.591611 | Transglutaminase 2, C polypeptide (Tgm2)  |
| Arhgef10      | -1.27 | $4.18 \times 10^{-5}$    | 5.14484  | Rho guanine nucleotide exchange factor (GEF) 10 (Arhgef10)                                |
| Pdgfra        | -1.27 | $6.36 \times 10^{-6}$    | 5.295795 | Platelet derived growth factor receptor, alpha polypeptide (Pdgfra)                       |
| Gm16365       | -1.27 | .013177697               | 1.190078 | Predicted gene 16365 (Gm16365)  |
| Rdm1          | -1.27 | .001288605               | 1.466372 | RAD52 motif 1 (Rdm1)  |
| Tmem107       | -1.27 | .000234253               | 3.224221 | Transmembrane protein 107 (Tmem107)   |
| Fam81b        | -1.28 | .008901412               | 0.796243 | Family with sequence similarity 81, member B (Fam81b)                                     |
| AI464131      | -1.28 | $4.05 \times 10^{-5}$    | 3.953476 | Expressed sequence AI464131 (AI464131)  |
| Plcb3         | -1.28 | .000176486               | 2.557937 | Phospholipase C, beta 3 (Plcb3)   |
| Lag3          | -1.28 | .002892783               | 0.945963 | Lymphocyte-activation gene 3 (Lag3)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| 1110018N20Rik | -1.28 | .033748296               | -0.03408 | RIKEN cDNA 1110018N20 gene (1110018N20Rik)  |
| Agmo          | -1.28 | .005066877               | 1.574874 | Alkylglycerol monooxygenase (Agmo)  |
| Cdh23         | -1.28 | .007688337               | 0.342461 | Cadherin 23 (otocadherin) (Cdh23)   |
| Slc9a9        | -1.28 | .000309926               | 2.600591 | Solute carrier family 9 (sodium/hydrogen exchanger), member 9 (Slc9a9)                      |
| Aldh1a1       | -1.28 | $2.60 \times 10^{-6}$    | 6.018856 | Aldehyde dehydrogenase family 1, subfamily A1 (Aldh1a1)                                     |
| Prdx6         | -1.28 | $1.75 \times 10^{-7}$    | 6.777654 | Peroxiredoxin 6 (Prdx6)   |
| Pcp4          | -1.28 | $5.63 \times 10^{-8}$    | 6.545404 | Purkinje cell protein 4 (Pcp4)  |
| Gm45716       | -1.28 | .01697989                | 0.125651 | Predicted gene (Gm45716)  |
| S1pr5         | -1.28 | .002953969               | 2.776386 | Sphingosine-1-phosphate receptor 5 (S1pr5)  |
| Nckap1l       | -1.28 | .000749397               | 2.466474 | NCK-associated protein 1 like (Nckap1l)   |
| 1700113A16Rik | -1.28 | .045449888               | -0.23194 | RIKEN cDNA 1700113A16 gene (1700113A16Rik)  |
| Pnpla7        | -1.29 | .004522025               | 2.263436 | Patatin-like phospholipase domain containing 7 (Pnpla7)                                     |
| Gm20257       | -1.29 | .003278337               | 1.187467 | Caspase 8 pseudogene (Gm20257)  |
| A930005H10Rik | -1.29 | .000741401               | 2.10605  | RIKEN cDNA A930005H10 gene (A930005H10Rik)  |
| Fam72a        | -1.29 | .011173289               | 0.068406 | Family with sequence similarity 72, member A (Fam72a)                                       |
| Ccdc162       | -1.29 | .000303517               | 2.167377 | Coiled-coil domain containing 162 (Ccdc162)   |
| Mill2         | -1.29 | .04411911                | 0.672528 | MHC I like leukocyte 2 (Mill2)  |
| Kcnj16        | -1.29 | $1.28 \times 10^{-6}$    | 5.619336 | Potassium inwardly-rectifying channel, subfamily J, member 16 (Kcnj16)                      |
| Stamos        | -1.29 | .016703382               | 0.486983 | Signal transducing adaptor molecule (SH3 domain and ITAM motif) 1, opposite strand (Stamos) |
| As3mt         | -1.29 | .000143123               | 2.647238 | Arsenic (+3 oxidation state) methyltransferase (As3mt)                                      |
| Gm2238        | -1.29 | .028416049               | 0.13995  | Predicted gene 2238 (Gm2238)  |
| Lsm7          | -1.29 | .026105371               | 0.416061 | LSM7 homolog, U6 small nuclear RNA and mRNA degradation associated (Lsm7)                   |
| BC065397      | -1.29 | .024815617               | -0.00065 | cDNA sequence BC065397 (BC065397)   |
| Tcf7          | -1.29 | .001125414               | 2.679247 | Transcription factor 7, T cell specific (Tcf7)  |
| Gm37069       | -1.29 | .009061486               | 0.33677  | Predicted gene (Gm37069)  |
| Nqo1          | -1.29 | .001624859               | 1.127912 | NAD (P)H dehydrogenase, quinone 1 (Nqo1)  |
| Pcolce        | -1.30 | .01544803                | 0.779588 | Procollagen C-endopeptidase enhancer protein (Pcolce)                                       |
| Metap1d       | -1.30 | .000532269               | 2.72722  | Methionyl aminopeptidase type 1D (mitochondrial) (Metap1d)                                  |
| Cavin2        | -1.30 | .000659238               | 2.303618 | Caveolae-associated protein 2 (Cavin2)  |
| Stk10         | -1.30 | .001356037               | 2.367117 | Serine/threonine kinase 10 (Stk10)  |
| Mcm3          | -1.30 | .028752989               | -0.15957 | Minichromosome maintenance complex component 3 (Mcm3)                                       |
| Gm29508       | -1.30 | .000104414               | 3.027245 | Predicted gene 29508 (Gm29508)  |
| Stab1         | -1.30 | .00735235                | 1.391579 | Stabilin 1 (Stab1)  |
| Cxcl11        | -1.30 | .049149593               | 0.243646 | Chemokine (C-X-C motif) ligand 11 (Cxcl11)  |
| Ptprc         | -1.30 | .012321532               | 1.962355 | Protein tyrosine phosphatase, receptor type, C (Ptprc)                                      |
| F11r          | -1.30 | .000727234               | 3.060361 | F11 receptor (F11r)   |
| Adgre5        | -1.30 | .003995261               | 2.345504 | Adhesion G protein-coupled receptor E5 (Adgre5)   |
| Spaca6        | -1.30 | .000345572               | 2.847876 | Sperm acrosome associated 6 (Spaca6)  |
| 1700007K13Rik | -1.30 | .000769424               | 2.498656 | RIKEN cDNA 1700007K13 gene (1700007K13Rik)  |
| Tmem88b       | -1.31 | $2.71 \times 10^{-5}$    | 6.491674 | Transmembrane protein 88B (Tmem88b)   |
| Phldb1        | -1.31 | $4.48 \times 10^{-5}$    | 4.518581 | Pleckstrin homology like domain, family B, member 1 (Phldb1)                                |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Slc25a34      | -1.31 | .009527422               | 0.589197 | Solute carrier family 25, member 34 (Slc25a34)  |
| Nrros         | -1.31 | .017677103               | 1.397366 | Negative regulator of reactive oxygen species (Nrros)                                   |
| Evc           | -1.31 | .018500934               | 0.901212 | Ellis van Creveld gene syndrome (Evc)   |
| Map2k3os      | -1.31 | .045630469               | 0.485121 | Mitogen-activated protein kinase kinase 3, opposite strand (Map2k3os)                   |
| Ppp1r3c       | -1.31 | $1.70 \times 10^{-5}$    | 5.094986 | Protein phosphatase 1, regulatory (inhibitor) subunit 3C (Ppp1r3c)                      |
| Tmem256       | -1.31 | $4.25 \times 10^{-5}$    | 3.239443 | Transmembrane protein 256 (Tmem256)   |
| Ppil6         | -1.31 | .000802708               | 1.994358 | Peptidylprolyl isomerase (cyclophilin)-like 6 (Ppil6)                                   |
| A730094K22Rik | -1.31 | .037664816               | 0.442847 | RIKEN cDNA A730094K22 gene (A730094K22Rik)  |
| Ezr           | -1.31 | $2.04 \times 10^{-5}$    | 3.89966  | Ezrin (Ezr)   |
| Ednra         | -1.31 | .001197488               | 2.12313  | Endothelin receptor type A (Ednra)  |
| Cyp27a1       | -1.31 | .01103335                | 0.971878 | Cytochrome P450, family 27, subfamily a, polypeptide 1 (Cyp27a1)                        |
| 4732440D04Rik | -1.31 | .001093325               | 1.865407 | RIKEN cDNA 4732440D04 gene (4732440D04Rik)  |
| Etnppl        | -1.31 | $1.63 \times 10^{-6}$    | 6.121327 | Ethanolamine phosphate phosphorylase (Etnppl)   |
| Rnf135        | -1.31 | .00348391                | 0.874615 | Ring finger protein 135 (Rnf135)  |
| Cd84          | -1.31 | .00373572                | 1.375136 | CD84 antigen (Cd84)   |
| Slco1a4       | -1.31 | $7.74 \times 10^{-6}$    | 3.906069 | Solute carrier organic anion transporter family, member 1a4 (Slco1a4)                   |
| Gadd45g       | -1.32 | $5.75 \times 10^{-5}$    | 3.240926 | Growth arrest and DNA-damage-inducible 45 gamma (Gadd45g)                               |
| Olfml1        | -1.32 | .00011805                | 3.400022 | Olfactomedin-like 1 (Olfml1)  |
| 4930579K19Rik | -1.32 | .033735273               | -0.06073 | RIKEN cDNA 4930579K19 gene (4930579K19Rik)  |
| P2ry13        | -1.32 | .000181543               | 2.924089 | Purinergic receptor P2Y, G-protein coupled 13 (P2ry13)                                  |
| Fam92b        | -1.32 | .026796231               | -0.08404 | Family with sequence similarity 92, member B (Fam92b)                                   |
| Myrf          | -1.32 | $8.01 \times 10^{-5}$    | 5.526492 | Myelin regulatory factor (Myrf)   |
| Malat1        | -1.32 | $1.25 \times 10^{-5}$    | 11.27975 | Metastasis-associated lung adenocarcinoma transcript 1 (non-coding RNA) (Malat1)        |
| Fyb           | -1.33 | .00064147                | 2.625658 | FYN binding protein (Fyb)   |
| Palmd         | -1.33 | .000459606               | 1.57698  | Palmdelphin (Palmd)   |
| Cnp           | -1.33 | $1.06 \times 10^{-5}$    | 7.288601 | 2',3'-Cyclic nucleotide 3' phosphodiesterase (Cnp)                                      |
| Golm1         | -1.33 | .000187498               | 2.18171  | Golgi membrane protein 1 (Golm1)  |
| Ptgs1         | -1.33 | .000282475               | 2.614793 | Prostaglandin-endoperoxide synthase 1 (Ptgs1)   |
| Efemp2        | -1.33 | .000766188               | 2.238571 | Epidermal growth factor-containing fibulin-like extracellular matrix protein 2 (Efemp2) |
| Ccdc155       | -1.33 | .003436977               | 1.880302 | Coiled-coil domain containing 155 (Ccdc155)   |
| Necap2        | -1.33 | $5.78 \times 10^{-5}$    | 3.463441 | NECAP endocytosis associated 2 (Necap2)   |
| 4930447C04Rik | -1.33 | $3.50 \times 10^{-5}$    | 3.386535 | RIKEN cDNA 4930447C04 gene (4930447C04Rik)  |
| Gm2990        | -1.33 | .009741717               | 1.185481 | Predicted gene 2990 (Gm2990)  |
| Ankub1        | -1.33 | .000281243               | 2.029349 | Ankrin repeat and ubiquitin domain containing 1 (Ankub1)                                |
| Hmgn5         | -1.33 | .000458147               | 2.084144 | High-mobility group nucleosome binding domain 5 (Hmgn5)                                 |
| Rab32         | -1.34 | .024617533               | 0.646476 | RAB32, member RAS oncogene family (Rab32)   |
| Siglech       | -1.34 | .001310629               | 2.794549 | Sialic acid binding Ig-like lectin H (Siglech)  |
| Acss1         | -1.34 | $8.62 \times 10^{-6}$    | 4.531243 | Acyl-CoA synthetase short-chain family member 1 (Acss1)                                 |
| Gpnmb         | -1.34 | .001119119               | 2.765881 | Glycoprotein (transmembrane) nmb (Gpnmb)  |
| Dusp23        | -1.34 | .003714873               | 1.481088 | Dual-specificity phosphatase 23 (Dusp23)  |
| Stxbp3        | -1.34 | $1.19 \times 10^{-5}$    | 3.584292 | Syntaxin binding protein 3 (Stxbp3)   |
| Arhgef37      | -1.34 | .003398746               | 0.827707 | Rho guanine nucleotide exchange factor (GEF) 37 (Arhgef37)                              |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Stat6         | -1.34 | .00222539                | 1.887735 | Signal transducer and activator of transcription 6 (Stat6)                       |
| Folh1         | -1.34 | .000439546               | 3.072827 | Folate hydrolase 1 (Folh1)   |
| Tcf7l1        | -1.34 | .001688666               | 1.71563  | Transcription factor 7 like 1 (T cell-specific, HMG box) (Tcf7l1)                |
| Lage3         | -1.34 | $3.19 \times 10^{-5}$    | 3.314088 | L antigen family, member 3 (Lage3)   |
| Ldlrap1       | -1.34 | .017206437               | 0.650118 | Low-density lipoprotein receptor adaptor protein 1 (Ldlrap1)                     |
| Dapk2         | -1.34 | .027812722               | 0.653834 | Death-associated protein kinase 2 (Dapk2)  |
| Ptafr         | -1.35 | .00742593                | 1.02125  | Platelet-activating factor receptor (Ptafr)                                      |
| Mif4gd        | -1.35 | .000264674               | 2.247288 | MIF4G domain containing (Mif4gd)   |
| Dnajb13       | -1.35 | .00438234                | 0.987655 | DnaJ heat shock protein family (Hsp40) member B13 (Dnajb13)                      |
| Abhd4         | -1.35 | $1.70 \times 10^{-6}$    | 5.322264 | Abhydrolase domain containing 4 (Abhd4)  |
| Prex1         | -1.35 | $2.19 \times 10^{-7}$    | 5.62714  | Phosphatidylinositol-3,4,5-trisphosphate-dependent Rac exchange factor 1 (Prex1) |
| Tgfb1         | -1.35 | .018990524               | 0.444288 | Transforming growth factor, beta 1 (Tgfb1)                                       |
| Meig1         | -1.35 | .005503396               | 1.204329 | Meiosis expressed gene 1 (Meig1)   |
| Ttf2          | -1.35 | .012513063               | 0.747548 | Transcription termination factor, RNA polymerase II (Ttf2)                       |
| Mmp2          | -1.35 | .004303565               | 1.38306  | Matrix metalloproteinase 2 (Mmp2)  |
| Gm28941       | -1.35 | .018680283               | 0.020033 | Predicted gene (Gm28941)   |
| Zfas1         | -1.35 | $1.55 \times 10^{-6}$    | 4.210731 | Zinc finger, NFX1-type containing 1, antisense RNA 1 (Zfas1)                     |
| Acsf2         | -1.35 | .000296909               | 2.716402 | Acyl-CoA synthetase family member 2 (Acsf2)                                      |
| Sgpl1         | -1.35 | $4.91 \times 10^{-6}$    | 3.770929 | Sphingosine phosphate lyase 1 (Sgpl1)  |
| Pdgfrb        | -1.36 | .000101885               | 2.91282  | Platelet derived growth factor receptor, beta polypeptide (Pdgfrb)               |
| Anln          | -1.36 | .000146383               | 5.033587 | Anillin, actin binding protein (Anln)  |
| Lmntd1        | -1.36 | .043964816               | -0.25349 | Lamin tail domain containing 1 (Lmntd1)  |
| Slc43a3       | -1.36 | .000518855               | 2.398469 | Solute carrier family 43, member 3 (Slc43a3)                                     |
| Pld1          | -1.36 | .000148712               | 3.057431 | Phospholipase D1 (Pld1)  |
| Casp8         | -1.36 | .044874908               | 1.248788 | Caspase 8 (Casp8)  |
| Cib1          | -1.36 | $9.08 \times 10^{-5}$    | 2.583014 | Calcium and integrin binding 1 (calmyrin) (Cib1)                                 |
| Rhog          | -1.36 | $7.09 \times 10^{-6}$    | 4.314896 | Ras homolog family member G (Rhog)   |
| Lhfp1         | -1.36 | .008005735               | 1.836067 | Lipoma HMGIC fusion partner-like 1 (Lhfp1)                                       |
| 2310022B05Rik | -1.36 | $2.94 \times 10^{-7}$    | 6.71281  | RIKEN cDNA 2310022B05 gene (2310022B05Rik)                                       |
| Lgals9        | -1.36 | .015972351               | 2.072865 | Lectin, galactose binding, soluble 9 (Lgals9)                                    |
| Acadl         | -1.37 | $6.80 \times 10^{-6}$    | 3.771726 | Acyl-Coenzyme A dehydrogenase, long-chain (Acadl)                                |
| Pttg1ip       | -1.37 | $5.83 \times 10^{-7}$    | 5.348897 | Pituitary tumor-transforming 1 interacting protein (Pttg1ip)                     |
| Sod3          | -1.37 | .001591042               | 2.556318 | Superoxide dismutase 3, extracellular (Sod3)                                     |
| Ift43         | -1.37 | $3.28 \times 10^{-5}$    | 2.83452  | Intraflagellar transport 43 (Ift43)  |
| Gstm1         | -1.37 | $8.73 \times 10^{-7}$    | 7.554045 | Glutathione S-transferase, mu 1 (Gstm1)  |
| P2rx7         | -1.37 | .000143643               | 2.562472 | Purinergic receptor P2X, ligand-gated ion channel, 7 (P2rx7)                     |
| Ncf1          | -1.37 | .00483422                | 1.600633 | Neutrophil cytosolic factor 1 (Ncf1)   |
| Gjc3          | -1.37 | $3.15 \times 10^{-5}$    | 6.305602 | Gap junction protein, gamma 3 (Gjc3)   |
| Trim34a       | -1.37 | .013292882               | 0.479568 | Tripartite motif-containing 34A (Trim34a)  |
| Il10ra        | -1.37 | .03519008                | 1.175011 | Interleukin 10 receptor, alpha (Il10ra)  |
| Parp4         | -1.37 | $7.23 \times 10^{-5}$    | 2.944981 | Poly(ADP-ribose) polymerase family, member 4 (Parp4)                             |
| Gm45552       | -1.38 | .006932158               | 0.367417 | Predicted gene (Gm45552)   |
| Lap3          | -1.38 | $7.58 \times 10^{-7}$    | 4.888293 | Leucine aminopeptidase 3 (Lap3)  |

TABLE A1 Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name  |
|-----------|-------|-----------------------|----------|---|
| Tjp2      | -1.38 | $2.09 \times 10^{-6}$ | 3.967861 | Tight junction protein 2 (Tjp2)   |
| Chil1     | -1.38 | $5.22 \times 10^{-5}$ | 2.650764 | Chitinase-like 1 (Chil1)  |
| Galnt6    | -1.38 | .000413421            | 3.597886 | UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 6 (Galnt6) |
| Gm40578   | -1.38 | .011685617            | 0.368828 | Predicted gene, 40578 (Gm40578)   |
| Lrig1     | -1.38 | $9.28 \times 10^{-7}$ | 5.086225 | Leucine-rich repeats and immunoglobulin-like domains 1 (Lrig1)                              |
| Dhrs3     | -1.39 | $5.79 \times 10^{-5}$ | 3.43863  | Dehydrogenase/reductase (SDR family) member 3 (Dhrs3)                                       |
| Tinagl1   | -1.39 | .023592968            | -0.22512 | Tubulointerstitial nephritis antigen-like 1 (Tinagl1)                                       |
| Eci1      | -1.39 | $9.54 \times 10^{-6}$ | 3.02314  | Enoyl-Coenzyme A delta isomerase 1 (Eci1)   |
| Hmg20b    | -1.39 | .000800046            | 1.438421 | High-mobility group 20B (Hmg20b)  |
| Smyd1     | -1.39 | .000848083            | 1.999803 | SET and MYND domain containing 1 (Smyd1)  |
| Eya4      | -1.39 | .034545704            | 0.267291 | EYA transcriptional coactivator and phosphatase 4 (Eya4)                                    |
| Prkd1     | -1.39 | .000103447            | 2.702669 | Protein kinase D1 (Prkd1)   |
| Scml2     | -1.39 | .039883798            | 0.311357 | Sex comb on midleg-like 2 (Scml2)   |
| Slc7a7    | -1.39 | .005829219            | 1.13158  | Solute carrier family 7 (cationic amino acid transporter, y+ system), member 7 (Slc7a7)     |
| Pbxip1    | -1.39 | $9.39 \times 10^{-6}$ | 5.012332 | Pre B cell leukemia transcription factor interacting protein 1 (Pbxip1)                     |
| Gm30238   | -1.39 | .000766422            | 1.581527 | Predicted gene, 30238 (Gm30238)   |
| Dock5     | -1.39 | .000262604            | 3.805104 | Dedicator of cytokinesis 5 (Dock5)  |
| Tst       | -1.39 | $1.97 \times 10^{-5}$ | 4.636992 | Thiosulfate sulfurtransferase, mitochondrial (Tst)  |
| Gm8451    | -1.40 | .006768763            | 0.024791 | Predicted gene 8451 (Gm8451)  |
| Tek       | -1.40 | .000183049            | 2.423851 | Endothelial-specific receptor tyrosine kinase (Tek)   |
| Axl       | -1.40 | $3.54 \times 10^{-7}$ | 4.789533 | AXL receptor tyrosine kinase (Axl)  |
| Adhfe1    | -1.40 | $2.14 \times 10^{-5}$ | 3.83685  | Alcohol dehydrogenase, iron containing, 1 (Adhfe1)  |
| Slc9a3r1  | -1.40 | $6.69 \times 10^{-6}$ | 4.518047 | Solute carrier family 9 (sodium/hydrogen exchanger), member 3 regulator 1 (Slc9a3r1)        |
| F3        | -1.40 | $1.53 \times 10^{-6}$ | 4.066322 | Coagulation factor III (F3)   |
| Riad1     | -1.40 | .000135596            | 1.995268 | Regulatory subunit of type II PKA R-subunit (Riia) domain containing 1 (Riad1)              |
| Capn6     | -1.40 | .001693978            | 1.009957 | Calpain 6 (Capn6)   |
| Mro       | -1.40 | $6.64 \times 10^{-6}$ | 3.809738 | Maestro (Mro)   |
| Skap2     | -1.40 | $1.77 \times 10^{-5}$ | 3.077299 | Src family-associated phosphoprotein 2 (Skap2)  |
| Fermt3    | -1.41 | .01561507             | 0.444051 | Fermitin family member 3 (Fermt3)   |
| Abhd12b   | -1.41 | .007500187            | 1.464549 | Abhydrolase domain containing 12B (Abhd12b)   |
| Dnaic1    | -1.41 | $4.91 \times 10^{-5}$ | 2.688396 | Dynein, axonemal, intermediate chain 1 (Dnaic1)   |
| Adgb      | -1.41 | .002308912            | 1.323123 | Androglobin (Adgb)  |
| Enpp2     | -1.41 | $6.69 \times 10^{-6}$ | 6.989574 | Ectonucleotide pyrophosphatase/phosphodiesterase 2 (Enpp2)                                  |
| Tlr4      | -1.41 | .021115842            | 0.256607 | Toll-like receptor 4 (Tlr4)   |
| Ccdc60    | -1.41 | .014696318            | 0.778206 | Coiled-coil domain containing 60 (Ccdc60)   |
| Lama2     | -1.42 | .000281864            | 3.290524 | Laminin, alpha 2 (Lama2)  |
| Gm38534   | -1.42 | .004199058            | 1.966138 | Predicted gene, 38534 (Gm38534)   |
| Mlf1      | -1.42 | .002741921            | 1.647759 | Myeloid leukemia factor 1 (Mlf1)  |
| Swap70    | -1.42 | .003712311            | 1.387202 | SWA-70 protein (Swap70)   |
| Pla2g16   | -1.42 | $7.38 \times 10^{-6}$ | 5.53983  | Phospholipase A2, group XVI (Pla2g16)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Cyth4         | -1.42 | .000541966               | 1.59539  | Cytohesin 4 (Cyth4)   |
| Mcrip2        | -1.43 | .002761074               | 1.147967 | MAPK-regulated corepressor interacting protein 2 (Mcrip2)             |
| Ccdc180       | -1.43 | .002939966               | 1.113061 | Coiled-coil domain containing 180 (Ccdc180)                           |
| Cmklr1        | -1.43 | .018672717               | 1.355092 | Chemokine-like receptor 1 (Cmklr1)                                    |
| Fam114a1      | -1.43 | $9.26 \times 10^{-5}$    | 2.463574 | Family with sequence similarity 114, member A1 (Fam114a1)             |
| Nipal4        | -1.43 | .003540995               | 1.366539 | NIPA-like domain containing 4 (Nipal4)                                |
| Gm28729       | -1.43 | .014409252               | 1.034236 | Predicted gene 28729 (Gm28729)  |
| 9330160F10Rik | -1.43 | .035457326               | -0.20198 | RIKEN cDNA 9330160F10 gene (9330160F10Rik)                            |
| Xdh           | -1.43 | .037256005               | -0.01444 | Xanthine dehydrogenase (Xdh)  |
| Ctsz          | -1.43 | .00130488                | 3.409261 | Cathepsin Z (Ctsz)  |
| AC160637.1    | -1.44 | .013258903               | -0.01741 | -   |
| Pacsin3       | -1.44 | $3.10 \times 10^{-5}$    | 2.700949 | Protein kinase C and casein kinase substrate in neurons 3 (Pacsin3)   |
| Ncf2          | -1.44 | .008270476               | 0.382622 | Neutrophil cytosolic factor 2 (Ncf2)                                  |
| Mmd2          | -1.44 | $1.64 \times 10^{-7}$    | 6.160072 | Monocyte to macrophage differentiation-associated 2 (Mmd2)            |
| 2810468N07Rik | -1.44 | $2.03 \times 10^{-6}$    | 3.780046 | RIKEN cDNA 2810468N07 gene (2810468N07Rik)                            |
| Aif1l         | -1.44 | .000908224               | 2.379813 | Allograft inflammatory factor 1-like (Aif1l)                          |
| Hepacam       | -1.44 | $1.60 \times 10^{-6}$    | 6.158098 | Hepatocyte cell adhesion molecule (Hepacam)                           |
| Spa17         | -1.44 | .000161219               | 1.906076 | Sperm autoantigenic protein 17 (Spa17)                                |
| Clec7a        | -1.44 | .039950816               | 0.419504 | C-type lectin domain family 7, member a (Clec7a)                      |
| Selenbp1      | -1.44 | .000353493               | 1.833442 | Selenium binding protein 1 (Selenbp1)                                 |
| Uaca          | -1.44 | .000163926               | 2.797253 | Uveal autoantigen with coiled-coil domains and ankyrin repeats (Uaca) |
| P3h2          | -1.44 | .001408207               | 0.972894 | Prolyl 3-hydroxylase 2 (P3h2)   |
| Drc7          | -1.44 | .000190641               | 1.894718 | Dynein regulatory complex subunit 7 (Drc7)                            |
| Id2           | -1.44 | $2.05 \times 10^{-7}$    | 5.299077 | Inhibitor of DNA binding 2 (Id2)                                      |
| Gm5617        | -1.44 | $4.91 \times 10^{-5}$    | 2.539737 | Predicted gene 5617 (Gm5617)  |
| Smox          | -1.45 | $2.25 \times 10^{-5}$    | 4.147057 | Spermine oxidase (Smox)   |
| Cyp4f16       | -1.45 | .00643057                | 1.269148 | Cytochrome P450, family 4, subfamily f, polypeptide 16 (Cyp4f16)      |
| Bin2          | -1.45 | .023336107               | 1.211277 | Bridging integrator 2 (Bin2)  |
| 4930593C16Rik | -1.45 | .01926779                | 0.165292 | RIKEN cDNA 4930593C16 gene (4930593C16Rik)                            |
| Psph          | -1.45 | $1.51 \times 10^{-5}$    | 3.164797 | Phosphoserine phosphatase (Psph)                                      |
| Lcp1          | -1.46 | .000396982               | 3.090569 | Lymphocyte cytosolic protein 1 (Lcp1)                                 |
| AC121997.2    | -1.46 | .041082914               | 0.981212 | -   |
| Fbxo2         | -1.46 | $5.68 \times 10^{-7}$    | 4.527276 | F-box protein 2 (Fbxo2)   |
| Gm20501       | -1.46 | .006565451               | 0.345826 | Predicted gene 20501 (Gm20501)  |
| Dnah6         | -1.46 | .000739731               | 3.382093 | Dynein, axonemal, heavy chain 6 (Dnah6)                               |
| Nuf2          | -1.46 | $9.64 \times 10^{-5}$    | 1.992284 | NUF2, NDC80 kinetochore complex component (Nuf2)                      |
| Firre         | -1.46 | .000145092               | 2.997797 | Functional intergenic repeating RNA element (Firre)                   |
| Mmp14         | -1.46 | .000110599               | 3.390641 | Matrix metalloproteinase 14 (membrane-inserted) (Mmp14)               |
| Rps27rt       | -1.46 | .00907303                | 0.051268 | Ribosomal protein S27, retrogene (Rps27rt)                            |
| Ly96          | -1.46 | .036867611               | 0.498798 | Lymphocyte antigen 96 (Ly96)  |
| Adgre1        | -1.46 | .000754786               | 1.51594  | Adhesion G protein-coupled receptor E1 (Adgre1)                       |
| Gjb2          | -1.47 | .000538534               | 2.920153 | Gap junction protein, beta 2 (Gjb2)                                   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Tcn2          | -1.47 | $1.43 \times 10^{-5}$    | 3.350372 | Transcobalamin 2 (Tcn2)   |
| Rida          | -1.47 | $1.68 \times 10^{-5}$    | 4.438917 | Reactive intermediate imine deaminase A homolog (Rida)  |
| Rsrp1         | -1.47 | $2.12 \times 10^{-7}$    | 6.302967 | Arginine/serine-rich protein 1 (Rsrp1)  |
| Gm30731       | -1.47 | .006575911               | 0.863418 | Predicted gene, 30731 (Gm30731)   |
| Ak7           | -1.47 | $9.08 \times 10^{-5}$    | 3.55344  | Adenylate kinase 7 (Ak7)  |
| Gm11478       | -1.47 | .002118505               | 0.607903 | 60S ribosomal protein L13a-like (Gm11478)   |
| Lrrc23        | -1.47 | $4.82 \times 10^{-5}$    | 3.345398 | Leucine-rich repeat containing 23 (Lrrc23)  |
| Ccnb2         | -1.48 | .04218358                | -0.35428 | Cyclin B2 (Ccnb2)   |
| Myl12a        | -1.48 | $4.56 \times 10^{-6}$    | 3.549985 | Myosin, light chain 12A, regulatory, non-sarcomeric (Myl12a)                                    |
| Gjb6          | -1.48 | $1.10 \times 10^{-6}$    | 6.184784 | Gap junction protein, beta 6 (Gjb6)   |
| Hadh          | -1.48 | $4.65 \times 10^{-5}$    | 3.373386 | Hydroxyacyl-Coenzyme A dehydrogenase (Hadh)   |
| C4b           | -1.48 | .009637513               | 3.441925 | Complement component 4B (Chido blood group) (C4b)   |
| Cyp4v3        | -1.48 | .000429552               | 2.421433 | Cytochrome P450, family 4, subfamily v, polypeptide 3 (Cyp4v3)                                  |
| Col27a1       | -1.48 | .019800604               | 0.611019 | Collagen, type XXVII, alpha 1 (Col27a1)   |
| Vav1          | -1.48 | .021295143               | 0.363808 | Vav 1 oncogene (Vav1)   |
| Slc14a1       | -1.48 | $1.25 \times 10^{-5}$    | 4.781116 | Solute carrier family 14 (urea transporter), member 1 (Slc14a1)                                 |
| Pm20d1        | -1.48 | .005280728               | 1.133294 | Peptidase M20 domain containing 1 (Pm20d1)  |
| Il33          | -1.48 | $3.15 \times 10^{-5}$    | 5.093789 | Interleukin 33 (Il33)   |
| Htr5b         | -1.48 | .002680017               | 5.118576 | 5-Hydroxytryptamine (serotonin) receptor 5B (Htr5b)   |
| Gm10941       | -1.48 | .017669152               | -0.23422 | Predicted gene 10941 (Gm10941)  |
| 1700063D05Rik | -1.49 | .015269086               | 0.136951 | RIKEN cDNA 1700063D05 gene (1700063D05Rik)  |
| Fkbp7         | -1.49 | .018724562               | 0.303922 | FK506 binding protein 7 (Fkbp7)   |
| H2-DMb1       | -1.49 | .036779758               | 0.011736 | Histocompatibility 2, class II, locus Mb1 (H2-DMb1)   |
| Tnfaip6       | -1.49 | .000266171               | 2.757342 | Tumor necrosis factor alpha-induced protein 6 (Tnfaip6)   |
| Ccdc146       | -1.49 | $7.72 \times 10^{-5}$    | 2.65406  | Coiled-coil domain containing 146 (Ccdc146)   |
| Jchain        | -1.49 | .034266137               | 0.009426 | Immunoglobulin joining chain (Jchain)   |
| Sla           | -1.49 | .001063084               | 0.848306 | Src-like adaptor (Sla)  |
| Hist2h2be     | -1.49 | $1.46 \times 10^{-5}$    | 3.652584 | Histone cluster 2, H2be (Hist2h2be)   |
| Rtl1          | -1.49 | .001371626               | 1.778547 | Retrotransposon-like 1 (Rtl1)   |
| Cdh5          | -1.50 | .000228378               | 2.532748 | Cadherin 5 (Cdh5)   |
| Col9a3        | -1.50 | .000684523               | 1.563886 | Collagen, type IX, alpha 3 (Col9a3)   |
| 4930563E22Rik | -1.50 | .006857215               | 0.775329 | RIKEN cDNA 4930563E22 gene (4930563E22Rik)  |
| Rras          | -1.50 | .000273634               | 2.064715 | Related RAS viral (r-ras) oncogene (Rras)   |
| Gadd45b       | -1.50 | .001543526               | 1.911254 | Growth arrest and DNA-damage-inducible 45 beta (Gadd45b)  |
| Vstm4         | -1.50 | .000506278               | 1.573794 | V-set and transmembrane domain containing 4 (Vstm4)   |
| Srebf1        | -1.50 | $6.21 \times 10^{-7}$    | 4.959446 | Sterol regulatory element binding transcription factor 1 (Srebf1)                               |
| Tnfrsf18      | -1.50 | .001380989               | 1.290474 | Tumor necrosis factor receptor superfamily, member 18 (Tnfrsf18)                                |
| Snhg15        | -1.50 | .007065505               | 0.287088 | Small nucleolar RNA host gene 15 (Snhg15)   |
| Ccdc189       | -1.50 | .003557218               | 1.157862 | Coiled-coil domain containing 189 (Ccdc189)   |
| Appl2         | -1.50 | $2.72 \times 10^{-6}$    | 4.828377 | Adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 2 (Appl2) |
| Cp            | -1.50 | $2.92 \times 10^{-6}$    | 3.336484 | Ceruloplasmin (Cp)  |
| Rab34         | -1.51 | .000246073               | 1.769783 | RAB34, member RAS oncogene family (Rab34)   |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Calhm2        | -1.51 | .008016303               | 0.67204  | Calcium homeostasis modulator 2 (Calhm2)                              |
| Slco2b1       | -1.51 | $7.68 \times 10^{-5}$    | 3.081781 | Solute carrier organic anion transporter family, member 2b1 (Slco2b1) |
| Steap3        | -1.51 | .001016838               | 1.433418 | STEAP family member 3 (Steap3)  |
| Gja1          | -1.51 | $2.07 \times 10^{-6}$    | 6.701451 | Gap junction protein, alpha 1 (Gja1)                                  |
| Mobp          | -1.51 | $1.27 \times 10^{-5}$    | 7.956908 | Myelin-associated oligodendrocytic basic protein (Mobp)               |
| Ak9           | -1.51 | .002642234               | 1.029734 | Adenylate kinase 9 (Ak9)  |
| Lrrc18        | -1.51 | .013868542               | 0.589247 | Leucine-rich repeat containing 18 (Lrrc18)                            |
| Rxfp2         | -1.51 | .007483776               | 0.479428 | Relaxin/insulin-like family peptide receptor 2 (Rxfp2)                |
| Ccdc78        | -1.51 | .009417996               | 0.619623 | Coiled-coil domain containing 78 (Ccdc78)                             |
| Gm27202       | -1.52 | .017429344               | 0.624421 | Predicted gene (Gm27202)  |
| Cdh26         | -1.52 | .021141437               | 0.875714 | Cadherin-like 26 (Cdh26)  |
| Hapln2        | -1.52 | .000393804               | 2.235915 | Hyaluronan and proteoglycan link protein 2 (Hapln2)                   |
| Spag5         | -1.52 | .000732723               | 1.308572 | Sperm-associated antigen 5 (Spag5)                                    |
| Parp12        | -1.52 | .006785903               | 2.428606 | Poly(ADP-ribose) polymerase family, member 12 (Parp12)                |
| Foxj1         | -1.52 | $8.61 \times 10^{-5}$    | 3.972678 | Forkhead box J1 (Foxj1)   |
| Pygm          | -1.52 | $3.07 \times 10^{-6}$    | 4.166787 | Muscle glycogen phosphorylase (Pygm)                                  |
| Mcam          | -1.52 | .001579887               | 2.427458 | Melanoma cell adhesion molecule (Mcam)                                |
| 1700055D18Rik | -1.52 | .023297901               | 0.135207 | RIKEN cDNA 1700055D18 gene (1700055D18Rik)                            |
| Atp13a5       | -1.52 | .000455215               | 1.918432 | ATPase type 13A5 (Atp13a5)  |
| Tmem220       | -1.52 | .014696318               | 0.238238 | Transmembrane protein 220 (Tmem220)                                   |
| Tnfaip2       | -1.52 | .000333777               | 1.775152 | Tumor necrosis factor, alpha-induced protein 2 (Tnfaip2)              |
| Fam183b       | -1.52 | .000196935               | 2.471199 | Family with sequence similarity 183, member B (Fam183b)               |
| Enpp1         | -1.52 | .000302481               | 2.539444 | Ectonucleotide pyrophosphatase/phosphodiesterase 1 (Enpp1)            |
| Slc15a2       | -1.53 | .000165258               | 3.091365 | Solute carrier family 15 (H+/peptide transporter), member 2 (Slc15a2) |
| Snhg11        | -1.53 | .000353493               | 7.8282   | Small nucleolar RNA host gene 11 (Snhg11)                             |
| Emp3          | -1.53 | .006676307               | 0.442789 | Epithelial membrane protein 3 (Emp3)                                  |
| Dock1         | -1.53 | $1.17 \times 10^{-5}$    | 4.448128 | Dedicator of cytokinesis 1 (Dock1)                                    |
| Gatsl3        | -1.53 | .026781494               | -0.22813 | GATS protein-like 3 (Gatsl3)  |
| Tlr13         | -1.53 | .014915092               | 1.236129 | Toll-like receptor 13 (Tlr13)   |
| Dhx58         | -1.53 | .04016627                | -0.18403 | DEXH (Asp-Glu-X-His) box polypeptide 58 (Dhx58)                       |
| Tlcd1         | -1.54 | $8.35 \times 10^{-6}$    | 3.587868 | TLC domain containing 1 (Tlcd1)                                       |
| Gli1          | -1.54 | .000661433               | 1.69155  | GLI-Kruppel family member GLI1 (Gli1)                                 |
| ErbB3         | -1.54 | $6.57 \times 10^{-5}$    | 2.959266 | Erb-b2 receptor tyrosine kinase 3 (ErbB3)                             |
| Tekt1         | -1.54 | .00029787                | 1.572178 | Tektin 1 (Tekt1)  |
| Gm28424       | -1.54 | .002783625               | 2.035219 | Predicted gene (Gm28424)  |
| Foxb1         | -1.54 | .000756176               | 1.255901 | Forkhead box B1 (Foxb1)   |
| Fblim1        | -1.54 | .013013877               | 1.070207 | Filamin binding LIM protein 1 (Fblim1)                                |
| 1810032O08Rik | -1.54 | .005931612               | -0.17641 | RIKEN cDNA 1810032O08 gene (1810032O08Rik)                            |
| Cav1          | -1.54 | $1.20 \times 10^{-5}$    | 2.878065 | Caveolin 1, caveolae protein (Cav1)                                   |
| AI480526      | -1.54 | .008241829               | 0.230991 | Expressed sequence AI480526 (AI480526)                                |
| Robo3         | -1.54 | $5.01 \times 10^{-5}$    | 2.90627  | Roundabout guidance receptor 3 (Robo3)                                |
| Sardh         | -1.55 | .000353493               | 1.632956 | Sarcosine dehydrogenase (Sardh)                                       |
| Bcas1         | -1.55 | $2.26 \times 10^{-5}$    | 5.957158 | Breast carcinoma amplified sequence 1 (Bcas1)                         |
| Cyp2j6        | -1.55 | $4.89 \times 10^{-7}$    | 4.183969 | Cytochrome P450, family 2, subfamily j, polypeptide 6 (Cyp2j6)        |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Car5b         | -1.55 | .012860151               | 0.544803 | Carbonic anhydrase 5b, mitochondrial (Car5b)                               |
| Mrc1          | -1.55 | .000932051               | 1.307069 | Mannose receptor, C type 1 (Mrc1)  |
| Kdr           | -1.55 | .00017657                | 2.326149 | Kinase insert domain protein receptor (Kdr)                                |
| Ppp1r32       | -1.55 | .000115088               | 1.928675 | Protein phosphatase 1, regulatory subunit 32 (Ppp1r32)                     |
| Armc4         | -1.55 | .021394404               | 0.445196 | Armadillo repeat containing 4 (Armc4)                                      |
| Arap3         | -1.55 | .005868129               | 0.288531 | ArfGAP with RhoGAP domain, ankyrin repeat and PH domain 3 (Arap3)          |
| Wsb1          | -1.55 | $2.91 \times 10^{-6}$    | 4.048311 | WD repeat and SOCS box-containing 1 (Wsb1)                                 |
| Gpr55         | -1.55 | .048280254               | 0.003131 | G protein-coupled receptor 55 (Gpr55)                                      |
| Car14         | -1.56 | .00124336                | 1.928691 | Carbonic anhydrase 14 (Car14)  |
| Gm35618       | -1.56 | .009758625               | 0.103519 | Predicted gene, 35618 (Gm35618)  |
| Cfp           | -1.56 | .005423168               | 0.544829 | Complement factor properdin (Cfp)  |
| Rbpm52        | -1.56 | .00053975                | 1.624301 | RNA binding protein with multiple splicing 2 (Rbpm52)                      |
| Cfap52        | -1.57 | .000433349               | 1.431713 | Cilia and flagella-associated protein 52 (Cfap52)                          |
| Gm26588       | -1.57 | .001364163               | 1.344046 | Predicted gene, 26588 (Gm26588)  |
| Itgb4         | -1.57 | .000504797               | 2.50243  | Integrin beta 4 (Itgb4)  |
| Naip2         | -1.57 | .044273397               | 0.327049 | NLR family, apoptosis inhibitory protein 2 (Naip2)                         |
| A930004J17Rik | -1.57 | .045820918               | 0.790915 | RIKEN cDNA A930004J17 gene (A930004J17Rik)                                 |
| Crnde         | -1.57 | .011444163               | 1.311599 | Colorectal neoplasia differentially expressed (non-protein coding) (Crnde) |
| 6820408C15Rik | -1.57 | .008910629               | 0.799644 | RIKEN cDNA 6820408C15 gene (6820408C15Rik)                                 |
| Csf3r         | -1.57 | .000833749               | 1.972606 | Colony stimulating factor 3 receptor (granulocyte) (Csf3r)                 |
| Sucg2         | -1.57 | $2.85 \times 10^{-5}$    | 3.309374 | Succinate-Coenzyme A ligase, GDP-forming, beta subunit (Sucg2)             |
| Arhgap25      | -1.58 | .0183383                 | 0.265037 | Rho GTPase activating protein 25 (Arhgap25)                                |
| Dnaic2        | -1.58 | .000813886               | 1.595223 | Dynein, axonemal, intermediate chain 2 (Dnaic2)                            |
| Scara3        | -1.58 | .000314173               | 2.084317 | Scavenger receptor class A, member 3 (Scara3)                              |
| Cfap65        | -1.58 | .000935174               | 2.714349 | Cilia and flagella-associated protein 65 (Cfap65)                          |
| Adam32        | -1.58 | .01013132                | -0.08731 | A disintegrin and metallopeptidase domain 32 (Adam32)                      |
| Cfap161       | -1.58 | $2.83 \times 10^{-5}$    | 3.557184 | Cilia and flagella-associated protein 161 (Cfap161)                        |
| Gm20554       | -1.58 | .007914675               | 0.614431 | Predicted gene, 20554 (Gm20554)  |
| Npepl1        | -1.58 | .000188244               | 2.413656 | Aminopeptidase-like 1 (Npepl1)   |
| 9830144P21Rik | -1.58 | .00768963                | 0.34146  | RIKEN cDNA 9830144P21 gene (9830144P21Rik)                                 |
| Rpl37rt       | -1.59 | .000870602               | 0.777031 | Ribosomal protein L37, retrotransposed (Rpl37rt)                           |
| Cnn3          | -1.59 | $1.33 \times 10^{-6}$    | 4.502764 | Calponin 3, acidic (Cnn3)  |
| Gm13293       | -1.59 | .012691403               | 0.975319 | Predicted gene 13293 (Gm13293)   |
| Ccdc80        | -1.59 | .011978622               | 1.045757 | Coiled-coil domain containing 80 (Ccdc80)                                  |
| Mbp           | -1.59 | $2.79 \times 10^{-6}$    | 9.470224 | Myelin basic protein (Mbp)   |
| Nkx2-2        | -1.59 | .000508478               | 1.700561 | NK2 homeobox 2 (Nkx2-2)  |
| Tie1          | -1.59 | .008756877               | 0.385531 | Tyrosine kinase with immunoglobulin-like and EGF-like domains 1 (Tie1)     |
| Rac2          | -1.59 | .030298047               | 1.067113 | RAS-related C3 botulinum substrate 2 (Rac2)                                |
| Gm42664       | -1.59 | .020486611               | 0.186614 | Predicted gene (Gm42664)   |
| Prodh         | -1.59 | .000212799               | 2.218763 | Proline dehydrogenase (Prodh)  |
| Ly75          | -1.59 | .027258788               | 1.009157 | Lymphocyte antigen 75 (Ly75)   |
| Scrg1         | -1.59 | .00073809                | 2.814208 | Scrapie responsive gene 1 (Scrg1)  |

**TABLE A1** Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Fcor          | -1.60 | .001787266               | 0.642191 | Foxo1 corepressor (Fcor)   |
| Dthd1         | -1.60 | .005901502               | 1.94602  | Death domain containing 1 (Dthd1)  |
| Timp4         | -1.60 | $7.39 \times 10^{-6}$    | 4.384132 | Tissue inhibitor of metalloproteinase 4 (Timp4)                            |
| Gm16861       | -1.60 | .007698901               | 0.173874 | Predicted gene, 16861 (Gm16861)  |
| Cd86          | -1.60 | .015676676               | 0.80163  | CD86 antigen (Cd86)  |
| Inpp1         | -1.60 | .000150122               | 3.15293  | Inositol polyphosphate phosphatase-like 1 (Inpp1)                          |
| Gng8          | -1.60 | $3.01 \times 10^{-6}$    | 4.802463 | Guanine nucleotide binding protein (G protein), gamma 8 (Gng8)             |
| Heph          | -1.60 | .000188077               | 2.5001   | Hephaestin (Heph)  |
| Gm44800       | -1.61 | .046712854               | -0.05125 | Predicted gene (Gm44800)   |
| Rhoc          | -1.61 | .000547863               | 1.422704 | Ras homolog family member C (Rhoc)   |
| Arap1         | -1.61 | $2.68 \times 10^{-5}$    | 2.467002 | ArfGAP with RhoGAP domain, ankyrin repeat and PH domain 1 (Arap1)          |
| A930017K11Rik | -1.61 | .028359066               | -0.18249 | RIKEN cDNA A930017K11 gene (A930017K11Rik)                                 |
| Serpind1      | -1.61 | .006060872               | 0.460962 | Serine (or cysteine) peptidase inhibitor, clade D, member 1 (Serpind1)     |
| Isoc2a        | -1.61 | .003740326               | 0.639465 | Isochorismatase domain containing 2a (Isoc2a)                              |
| Aqp6          | -1.61 | .00296832                | 1.02764  | Aquaporin 6 (Aqp6)   |
| Emcn          | -1.61 | .000493717               | 1.295156 | Endomucin (Emcn)   |
| Lacc1         | -1.61 | .003513053               | 1.531364 | Laccase (multicopper oxidoreductase) domain containing 1 (Lacc1)           |
| 1600020E01Rik | -1.61 | .000441905               | 0.934824 | RIKEN cDNA 1600020E01 gene (1600020E01Rik)                                 |
| Pomc          | -1.61 | .007688337               | -0.06049 | Pro-opiomelanocortin-alpha (Pomc)  |
| Flna          | -1.61 | $4.46 \times 10^{-5}$    | 2.518728 | Filamin, alpha (Flna)  |
| AC154683.1    | -1.62 | .000573743               | 2.202428 | -  |
| Efcab12       | -1.62 | .000693756               | 1.018516 | EF-hand calcium binding domain 12 (Efcab12)                                |
| Ecm2          | -1.62 | $6.12 \times 10^{-5}$    | 2.388481 | Extracellular matrix protein 2, female organ and adipocyte specific (Ecm2) |
| Aebp1         | -1.62 | $7.66 \times 10^{-5}$    | 3.253992 | AE binding protein 1 (Aebp1)   |
| Nxn           | -1.62 | $2.69 \times 10^{-5}$    | 2.530431 | Nucleoredoxin (Nxn)  |
| Meg3          | -1.62 | $3.61 \times 10^{-5}$    | 8.232292 | Maternally expressed 3 (Meg3)  |
| Tnfrsf13b     | -1.62 | .010962329               | 0.295921 | Tumor necrosis factor receptor superfamily, member 13b (Tnfrsf13b)         |
| Zfyve21       | -1.62 | $1.53 \times 10^{-5}$    | 2.533566 | Zinc finger, FYVE domain containing 21 (Zfyve21)                           |
| Wnt11         | -1.62 | .012384396               | 0.074183 | Wingless-type MMTV integration site family, member 11 (Wnt11)              |
| Gm10421       | -1.62 | .000336151               | 2.356391 | Predicted gene 10421 (Gm10421)   |
| Enkur         | -1.62 | $7.44 \times 10^{-5}$    | 2.337315 | Enkurin, TRPC channel interacting protein (Enkur)                          |
| Mir124a-1hg   | -1.62 | $5.34 \times 10^{-5}$    | 5.188186 | Mir124-1 host gene (non-protein coding) (Mir124a-1hg)                      |
| Copz2         | -1.63 | .00040773                | 2.246581 | Coatomer protein complex, subunit zeta 2 (Copz2)                           |
| Psat1         | -1.63 | $4.18 \times 10^{-7}$    | 5.681399 | Phosphoserine aminotransferase 1 (Psat1)                                   |
| Hp            | -1.63 | .047425746               | -0.14851 | Haptoglobin (Hp)   |
| Adamtsl4      | -1.63 | $1.77 \times 10^{-5}$    | 2.229865 | ADAMTS-like 4 (Adamtsl4)   |
| Miat          | -1.63 | $1.70 \times 10^{-5}$    | 4.315439 | Myocardial infarction-associated transcript (non-protein coding) (Miat)    |
| Gm36908       | -1.63 | .012195178               | 1.58531  | Predicted gene, 36908 (Gm36908)  |
| Car2          | -1.63 | $9.40 \times 10^{-7}$    | 6.557535 | Carbonic anhydrase 2 (Car2)  |
| Rlbp1         | -1.63 | .002885699               | 1.462093 | Retinaldehyde binding protein 1 (Rlbp1)                                    |
| Serping1      | -1.63 | .023764968               | 2.609958 | Serine (or cysteine) peptidase inhibitor, clade G, member 1 (Serping1)     |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Sypl2         | -1.64 | .014910313               | -0.25976 | Synaptophysin-like 2 (Sypl2)   |
| Tpm2          | -1.64 | .000426979               | 1.506816 | Tropomyosin 2, beta (Tpm2)   |
| Ccr5          | -1.64 | .000192636               | 2.068851 | Chemokine (C-C motif) receptor 5 (Ccr5)  |
| Csrp2         | -1.64 | .002029242               | 1.01531  | Cysteine and glycine-rich protein 2 (Csrp2)  |
| Gm47260       | -1.64 | .014794905               | -0.24866 | Predicted gene (Gm47260)   |
| Zfp36         | -1.64 | .000758739               | 1.828875 | Zinc finger protein 36 (Zfp36)   |
| Mag           | -1.64 | 2.68 × 10 <sup>-6</sup>  | 5.049395 | Myelin-associated glycoprotein (Mag)   |
| Gpt           | -1.64 | .000361722               | 1.018836 | Glutamic pyruvic transaminase, soluble (Gpt)   |
| Caskin2       | -1.65 | 4.76 × 10 <sup>-5</sup>  | 2.871049 | CASK-interacting protein 2 (Caskin2)   |
| Nr1h3         | -1.65 | .002709218               | 0.279177 | Nuclear receptor subfamily 1, group H, member 3 (Nr1h3)                              |
| Rd3           | -1.65 | .029832798               | 0.700243 | Retinal degeneration 3 (Rd3)   |
| Gm9958        | -1.65 | .000879683               | 0.803511 | Predicted gene 9958 (Gm9958)   |
| Art3          | -1.65 | .0008613                 | 0.756292 | ADP-ribosyltransferase 3 (Art3)  |
| Mapk15        | -1.65 | .009966245               | 0.170722 | Mitogen-activated protein kinase 15 (Mapk15)   |
| Cxcr4         | -1.65 | .01091675                | 0.172224 | Chemokine (C-X-C motif) receptor 4 (Cxcr4)   |
| Ppfibp2       | -1.65 | 6.41 × 10 <sup>-5</sup>  | 2.426437 | PTPRF interacting protein, binding protein 2 (liprin beta 2) (Ppfibp2)               |
| Itgam         | -1.66 | 8.37 × 10 <sup>-5</sup>  | 3.32242  | Integrin alpha M (Itgam)   |
| B2m           | -1.66 | .006362253               | 7.486583 | Beta-2 microglobulin (B2m)   |
| Blnk          | -1.66 | .005754685               | 0.503826 | B cell linker (Blnk)   |
| Tnfaip8       | -1.66 | 7.21 × 10 <sup>-6</sup>  | 2.7278   | Tumor necrosis factor, alpha-induced protein 8 (Tnfaip8)                             |
| Nek8          | -1.66 | .016071684               | -0.13259 | NIMA (never in mitosis gene a)-related expressed kinase 8 (Nek8)                     |
| Inpp5d        | -1.66 | .001783142               | 1.900644 | Inositol polyphosphate-5-phosphatase D (Inpp5d)                                      |
| Tifab         | -1.66 | .0077379                 | 0.442907 | TRAF-interacting protein with forkhead-associated domain, family member B (Tifab)    |
| Gm43980       | -1.67 | .046743784               | -0.23207 | Predicted gene (Gm43980)   |
| Plxnb3        | -1.67 | 1.72 × 10 <sup>-5</sup>  | 3.195993 | Plexin B3 (Plxnb3)   |
| A330076C08Rik | -1.67 | .004129757               | 1.714381 | RIKEN cDNA A330076C08 gene (A330076C08Rik)   |
| Psmc3ip       | -1.67 | .001053204               | 0.810739 | Proteasome (prosome, macropain) 26S subunit, ATPase 3, interacting protein (Psmc3ip) |
| Fgfr3         | -1.67 | 8.50 × 10 <sup>-7</sup>  | 5.165772 | Fibroblast growth factor receptor 3 (Fgfr3)  |
| Traf1         | -1.67 | .002814285               | 0.786171 | TNF receptor-associated factor 1 (Traf1)   |
| Efhb          | -1.67 | .006250277               | 0.290435 | EF hand domain family, member B (Efhb)   |
| Gldc          | -1.67 | .004684401               | 1.149229 | Glycine decarboxylase (Gldc)   |
| Lsp1          | -1.67 | .000353493               | 1.743835 | Lymphocyte specific 1 (Lsp1)   |
| Snx22         | -1.68 | .00521794                | 0.925216 | Sorting nexin 22 (Snx22)   |
| Gm37829       | -1.68 | .001147291               | 0.381735 | Predicted gene (Gm37829)   |
| Gm20045       | -1.68 | .001427513               | 1.871184 | Predicted gene, 20045 (Gm20045)  |
| Nme9          | -1.68 | .004360612               | 0.126143 | NME/NM23 family member 9 (Nme9)  |
| Gpd1          | -1.68 | 9.10 × 10 <sup>-5</sup>  | 4.515189 | Glycerol-3-phosphate dehydrogenase 1 (soluble) (Gpd1)                                |
| Spag8         | -1.68 | .00171823                | 0.742979 | Sperm-associated antigen 8 (Spag8)   |
| Ttyh2         | -1.68 | 6.30 × 10 <sup>-7</sup>  | 5.205867 | Tweety family member 2 (Ttyh2)   |
| Gm16487       | -1.68 | .006396682               | -0.08828 | Predicted gene 16487 (Gm16487)   |
| Dnali1        | -1.69 | 1.48 × 10 <sup>-5</sup>  | 2.699567 | Dynein, axonemal, light intermediate polypeptide 1 (Dnali1)                          |
| Dusp10        | -1.69 | .000361722               | 1.912183 | Dual-specificity phosphatase 10 (Dusp10)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Avil          | -1.69 | .009816926               | 0.484871 | Advillin (Avil)  |
| Pdzph1        | -1.69 | .001033535               | 0.957542 | PDZ and pleckstrin homology domains 1 (Pdzph1)   |
| 1700016K19Rik | -1.69 | .000169557               | 2.742134 | RIKEN cDNA 1700016K19 gene (1700016K19Rik)   |
| AC154640.4    | -1.69 | .003869026               | 0.2316   | -  |
| Inf2          | -1.69 | $4.33 \times 10^{-5}$    | 3.371086 | Inverted formin, FH2 and WH2 domain containing (Inf2)                                      |
| Lamb2         | -1.69 | .000231785               | 2.610556 | Laminin, beta 2 (Lamb2)  |
| Col11a2       | -1.69 | .013508814               | -0.27006 | Collagen, type XI, alpha 2 (Col11a2)   |
| Serinc2       | -1.69 | .001369036               | 0.303092 | Serine incorporator 2 (Serinc2)  |
| Pih1d2        | -1.69 | .001355794               | 0.801559 | PIH1 domain containing 2 (Pih1d2)  |
| Itgb5         | -1.70 | $4.01 \times 10^{-6}$    | 3.679778 | Integrin beta 5 (Itgb5)  |
| Gpr34         | -1.70 | .002759123               | 0.942269 | G protein-coupled receptor 34 (Gpr34)  |
| Ucp2          | -1.70 | $1.86 \times 10^{-6}$    | 5.177163 | Uncoupling protein 2 (mitochondrial, proton carrier) (Ucp2)                                |
| Hist1h2ac     | -1.70 | .006863392               | -0.07226 | Histone cluster 1, H2ac (Hist1h2ac)  |
| Csf2rb        | -1.70 | .049261866               | 0.890797 | Colony stimulating factor 2 receptor, beta, low-affinity (granulocyte-macrophage) (Csf2rb) |
| Efcab11       | -1.70 | .007689731               | -0.09218 | EF-hand calcium binding domain 11 (Efcab11)  |
| Fcrls         | -1.70 | $2.26 \times 10^{-6}$    | 3.045985 | Fc receptor-like S, scavenger receptor (Fcrls)   |
| Tmem51        | -1.70 | .0010881                 | 0.956865 | Transmembrane protein 51 (Tmem51)  |
| Spidr         | -1.70 | .002343991               | 0.63471  | Scaffolding protein involved in DNA repair (Spidr)   |
| Fcgr2b        | -1.70 | .001929587               | 2.363301 | Fc receptor, IgG, low affinity IIb (Fcgr2b)  |
| Marchf10      | -1.71 | .021759875               | -0.38729 | Membrane-associated ring-CH-type finger 10 (Marchf10)                                      |
| Rin3          | -1.71 | .006113228               | 0.153509 | Ras and Rab interactor 3 (Rin3)  |
| Itga11        | -1.71 | .006520867               | 0.032602 | Integrin alpha 11 (Itga11)   |
| O610040J01Rik | -1.71 | .015385824               | -0.22102 | RIKEN cDNA O610040J01 gene (O610040J01Rik)   |
| Ephb4         | -1.71 | .030357657               | 0.258712 | Eph receptor B4 (Ephb4)  |
| Fgfr1         | -1.72 | $3.93 \times 10^{-5}$    | 2.519421 | Fibroblast growth factor receptor-like 1 (Fgfr1)   |
| S1pr1         | -1.72 | $2.06 \times 10^{-7}$    | 5.542674 | Sphingosine-1-phosphate receptor 1 (S1pr1)   |
| Best3         | -1.72 | .000848545               | 0.879045 | Bestrophin 3 (Best3)   |
| Ccdc170       | -1.72 | .002151061               | 1.853048 | Coiled-coil domain containing 170 (Ccdc170)  |
| Baz1a         | -1.72 | .032046772               | 0.594979 | Bromodomain adjacent to zinc finger domain 1A (Baz1a)                                      |
| Hist1h1c      | -1.72 | $4.01 \times 10^{-5}$    | 2.941175 | Histone cluster 1, H1c (Hist1h1c)  |
| Gpc4          | -1.72 | .004221097               | 0.655829 | Glypican 4 (Gpc4)  |
| Tcp11         | -1.72 | .037789522               | -0.09929 | T-complex protein 11 (Tcp11)   |
| AW047730      | -1.73 | $4.80 \times 10^{-5}$    | 1.636783 | Expressed sequence AW047730 (AW047730)   |
| Cyr61         | -1.73 | .014417094               | 0.51186  | Cysteine-rich protein 61 (Cyr61)   |
| Slc6a20a      | -1.73 | .001367435               | 0.90829  | Solute carrier family 6 (neurotransmitter transporter), member 20A (Slc6a20a)              |
| Hfe           | -1.73 | .000622189               | 1.552588 | Hemochromatosis (Hfe)  |
| Cfap43        | -1.73 | $8.51 \times 10^{-5}$    | 2.525039 | Cilia and flagella-associated protein 43 (Cfap43)  |
| Slc6a11       | -1.73 | $1.94 \times 10^{-7}$    | 8.876865 | Solute carrier family 6 (neurotransmitter transporter, GABA), member 11 (Slc6a11)          |
| Gimap1        | -1.73 | .012104473               | -0.16657 | GTPase, IMAP family member 1 (Gimap1)  |
| Abcb1a        | -1.73 | $1.57 \times 10^{-5}$    | 2.586089 | ATP-binding cassette, sub-family B (MDR/TAP), member 1A (Abcb1a)                           |
| Slc39a8       | -1.73 | $8.76 \times 10^{-5}$    | 1.506431 | Solute carrier family 39 (metal ion transporter), member 8 (Slc39a8)                       |
| Gjc2          | -1.73 | .000176584               | 2.009373 | Gap junction protein, gamma 2 (Gjc2)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Tyrp1         | -1.74 | .000888982               | 2.277092 | Tyrosinase-related protein 1 (Tyrp1)   |
| Olf287        | -1.74 | .000196935               | 1.77929  | Olfactory receptor 287 (Olf287)  |
| Sult1a1       | -1.74 | .009095038               | 0.662955 | Sulfotransferase family 1A, phenol-preferring, member 1 (Sult1a1)                      |
| Sox8          | -1.74 | $2.19 \times 10^{-6}$    | 4.643643 | SRY (sex determining region Y)-box 8 (Sox8)  |
| Metrn         | -1.74 | .002547353               | 0.106074 | Meteorin, glial cell differentiation regulator (Metrn)                                 |
| Slc18a3       | -1.74 | .000437718               | 3.357415 | Solute carrier family 18 (vesicular monoamine), member 3 (Slc18a3)                     |
| Hc            | -1.74 | .000295715               | 1.212564 | Hemolytic complement (Hc)  |
| Ccdc13        | -1.74 | .000922193               | 0.975706 | Coiled-coil domain containing 13 (Ccdc13)  |
| Mal           | -1.74 | $1.91 \times 10^{-6}$    | 7.246285 | Myelin and lymphocyte protein, T cell differentiation protein (Mal)                    |
| 2810405F17Rik | -1.74 | $3.28 \times 10^{-5}$    | 1.966444 | RIKEN cDNA 2810405F17 gene (2810405F17Rik)   |
| Islr          | -1.74 | .00633143                | 1.093069 | Immunoglobulin superfamily containing leucine-rich repeat (Islr)                       |
| Abhd11os      | -1.74 | .003944624               | 0.222163 | Abhydrolase domain containing 11, opposite strand (Abhd11os)                           |
| Dbx2          | -1.74 | $1.17 \times 10^{-5}$    | 2.894525 | Developing brain homeobox 2 (Dbx2)   |
| Tmbim1        | -1.75 | $1.09 \times 10^{-6}$    | 5.214548 | Transmembrane BAX inhibitor motif containing 1 (Tmbim1)                                |
| 5330413P13Rik | -1.75 | .000757667               | 0.786697 | RIKEN cDNA 5330413P13 gene (5330413P13Rik)   |
| Rsph1         | -1.75 | $7.14 \times 10^{-6}$    | 3.911349 | Radial spoke head 1 homolog (Chlamydomonas) (Rsph1)                                    |
| I830077J02Rik | -1.75 | .007273724               | 0.547545 | RIKEN cDNA I830077J02 gene (I830077J02Rik)   |
| Cavin1        | -1.75 | .000101856               | 2.037385 | Caveolae-associated protein 1 (Calvin1)  |
| Fcgrt         | -1.75 | .000676472               | 1.513949 | Fc receptor, IgG, alpha chain transporter (Fcgrt)                                      |
| Slc1a3        | -1.75 | $9.51 \times 10^{-8}$    | 7.783251 | Solute carrier family 1 (glial high affinity glutamate transporter), member 3 (Slc1a3) |
| Cd164l2       | -1.75 | .000920406               | 1.404084 | CD164 sialomucin-like 2 (Cd164l2)  |
| Hmgcs2        | -1.76 | .002252377               | 1.157443 | 3-Hydroxy-3-methylglutaryl-Coenzyme A synthase 2 (Hmgcs2)                              |
| Htra3         | -1.76 | .001513104               | 0.706217 | Htra serine peptidase 3 (Htra3)  |
| Col16a1       | -1.76 | .021949716               | -0.19597 | Collagen, type XVI, alpha 1 (Col16a1)  |
| Cfap206       | -1.76 | .000554563               | 1.613459 | Cilia and flagella-associated protein 206 (Cfap206)                                    |
| Smim5         | -1.76 | .003935037               | 0.149767 | Small integral membrane protein 5 (Smim5)  |
| Fa2h          | -1.76 | $8.53 \times 10^{-6}$    | 5.714753 | Fatty acid 2-hydroxylase (Fa2h)  |
| Wdr49         | -1.76 | .006494042               | 0.503643 | WD repeat domain 49 (Wdr49)  |
| Dmpk          | -1.76 | .004478339               | 0.473583 | Dystrophia myotonica-protein kinase (Dmpk)   |
| Rpl30-ps1     | -1.76 | .007290272               | -0.29296 | Ribosomal protein L30, pseudogene 1 (Rpl30-ps1)  |
| Pyroxd2       | -1.77 | .005641798               | 0.129902 | Pyridine nucleotide-disulphide oxidoreductase domain 2 (Pyroxd2)                       |
| Uox           | -1.77 | .000308983               | 1.238275 | Urate oxidase (Uox)  |
| Cyp2d22       | -1.77 | $1.32 \times 10^{-5}$    | 3.472993 | Cytochrome P450, family 2, subfamily d, polypeptide 22 (Cyp2d22)                       |
| Havcr2        | -1.77 | .000109206               | 2.138031 | Hepatitis A virus cellular receptor 2 (Havcr2)   |
| Gm11992       | -1.77 | .000282767               | 1.510296 | Predicted gene 11992 (Gm11992)   |
| Cryzl2        | -1.77 | .000520635               | 1.941624 | Crystallin Zeta Like 2, Pseudogene (Cryzl2)  |
| Mfge8         | -1.78 | $2.79 \times 10^{-6}$    | 3.622042 | Milk fat globule-EGF factor 8 protein (Mfge8)  |
| Eng           | -1.78 | .000109385               | 2.408912 | Endoglin (Eng)   |
| Naprt         | -1.78 | .002541825               | 0.329836 | Nicotinate phosphoribosyltransferase (Naprt)   |
| Eva1a         | -1.78 | .00017897                | 1.923803 | Eva-1 homolog A ( <i>C. elegans</i> ) (Eva1a)  |
| Glipr2        | -1.78 | $7.23 \times 10^{-5}$    | 1.807791 | GLI pathogenesis-related 2 (Glipr2)  |
| Cyp4f13       | -1.78 | .00012238                | 1.466176 | cytochrome P450, family 4, subfamily f, polypeptide 13 (Cyp4f13)                       |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Pabpn1        | -1.79 | .006450368               | -0.20154 | Poly(A) binding protein, nuclear 1 (Pabpn1)  |
| Sfrp5         | -1.79 | .000274845               | 1.467786 | Secreted frizzled-related sequence protein 5 (Sfrp5)                                 |
| Bcan          | -1.79 | $1.33 \times 10^{-6}$    | 5.233517 | Brevican (Bcan)  |
| Atp6v0e       | -1.79 | $9.14 \times 10^{-6}$    | 3.095946 | ATPase, H <sup>+</sup> transporting, lysosomal VO subunit E (Atp6v0e)                |
| Lims2         | -1.80 | $4.40 \times 10^{-6}$    | 2.9375   | LIM and senescent cell antigen like domains 2 (Lims2)                                |
| Pantr1        | -1.80 | .0003803                 | 1.382462 | POU domain, class 3, transcription factor 3 adjacent noncoding transcript 1 (Pantr1) |
| Selenop       | -1.80 | $1.45 \times 10^{-7}$    | 7.517814 | Selenoprotein P (Selenop)  |
| 2410004P03Rik | -1.80 | $7.44 \times 10^{-5}$    | 3.756506 | RIKEN cDNA 2410004P03 gene (2410004P03Rik)   |
| Vim           | -1.80 | $5.25 \times 10^{-6}$    | 4.320862 | Vimentin (Vim)   |
| Lrrc74b       | -1.80 | .000168578               | 2.256361 | Leucine-rich repeat containing 74B (Lrrc74b)   |
| Nnat          | -1.80 | $7.40 \times 10^{-8}$    | 8.493392 | Neuronatin (Nnat)  |
| Fkbp10        | -1.80 | .000802855               | 1.544891 | FK506 binding protein 10 (Fkbp10)  |
| Rdh5          | -1.80 | .000163613               | 1.447545 | Retinol dehydrogenase 5 (Rdh5)   |
| Cd14          | -1.81 | .003285454               | 0.515404 | CD14 antigen (Cd14)  |
| Txnip         | -1.81 | $3.63 \times 10^{-5}$    | 2.771196 | Thioredoxin interacting protein (Txnip)  |
| Slc8b1        | -1.81 | .002736414               | 0.868784 | Solute carrier family 8 (sodium/lithium/calcium exchanger), member B1 (Slc8b1)       |
| 4833427G06Rik | -1.81 | .018679935               | -0.15925 | RIKEN cDNA 4833427G06 gene (4833427G06Rik)   |
| Ceacam1       | -1.82 | .004846565               | 0.885231 | Carcinoembryonic antigen-related cell adhesion molecule 1 (Ceacam1)                  |
| 1110017D15Rik | -1.82 | $2.30 \times 10^{-5}$    | 1.98939  | RIKEN cDNA 1110017D15 gene (1110017D15Rik)   |
| Prss23        | -1.83 | .025260259               | -0.14147 | Protease, serine 23 (Prss23)   |
| Syngn2        | -1.83 | $6.18 \times 10^{-5}$    | 1.995379 | Synaptogyrin 2 (Syngn2)  |
| Tmem119       | -1.83 | .000138809               | 3.284763 | Transmembrane protein 119 (Tmem119)  |
| Spag16        | -1.83 | .000107991               | 1.90364  | Sperm-associated antigen 16 (Spag16)   |
| Ttc25         | -1.83 | .004053896               | 0.244375 | Tetratricopeptide repeat domain 25 (Ttc25)   |
| Serpina3n     | -1.83 | .000184233               | 5.081741 | Serine (or cysteine) peptidase inhibitor, clade A, member 3N (Serpina3n)             |
| Gm14303       | -1.83 | $1.21 \times 10^{-5}$    | 2.459829 | Ribosomal protein S29 pseudogene (Gm14303)   |
| Cfap126       | -1.83 | $6.87 \times 10^{-5}$    | 2.570458 | Cilia and flagella-associated protein 126 (Cfap126)                                  |
| Cldn19        | -1.84 | .0001508                 | 1.622941 | Claudin 19 (Cldn19)  |
| mt-Co1        | -1.84 | $1.78 \times 10^{-6}$    | 14.19352 | Mitochondrially encoded cytochrome C oxidase I (mt-Co1)                              |
| 6720427I07Rik | -1.84 | .00037591                | 1.559681 | RIKEN cDNA 6720427I07 gene (6720427I07Rik)   |
| Cd53          | -1.84 | $6.73 \times 10^{-5}$    | 2.986068 | CD53 antigen (Cd53)  |
| Cd68          | -1.84 | $5.32 \times 10^{-6}$    | 2.865541 | CD68 antigen (Cd68)  |
| Vsir          | -1.84 | $6.14 \times 10^{-6}$    | 2.701666 | V-set immunoregulatory receptor (Vsir)   |
| Slc22a8       | -1.84 | $3.32 \times 10^{-5}$    | 2.789401 | Solute carrier family 22 (organic anion transporter), member 8 (Slc22a8)             |
| Rgcc          | -1.85 | .000532111               | 1.713011 | Regulator of cell cycle (Rgcc)   |
| C130023A14Rik | -1.85 | .006264438               | 0.686219 | RIKEN cDNA C130023A14 gene (C130023A14Rik)   |
| Tmem204       | -1.85 | .000330226               | 1.219531 | Transmembrane protein 204 (Tmem204)  |
| Ptpn6         | -1.85 | .004104083               | 0.409271 | Protein tyrosine phosphatase, non-receptor type 6 (Ptpn6)                            |
| Plp1          | -1.85 | $2.69 \times 10^{-6}$    | 9.24293  | Proteolipid protein (myelin) 1 (Plp1)  |
| Togaram2      | -1.85 | .007998548               | 0.342621 | TOG Array Regulator Of Axonemal Microtubules 2 (Togaram2)                            |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Aldoc         | -1.85 | $6.46 \times 10^{-9}$    | 8.630132 | Aldolase C, fructose-bisphosphate (Aldoc)   |
| Ltbr          | -1.85 | .000634378               | 1.093577 | Lymphotoxin B receptor (Ltbr)   |
| Cnmd          | -1.85 | .002779435               | 1.634655 | Chondromodulin (Cnmd)   |
| Mog           | -1.85 | $3.82 \times 10^{-6}$    | 4.4984   | Myelin oligodendrocyte glycoprotein (Mog)   |
| Ms4a6b        | -1.86 | .049045741               | -0.27241 | Membrane-spanning 4-domains, subfamily A, member 6B (Ms4a6b)                        |
| Paqr5         | -1.86 | .000322361               | 1.164568 | Progesterone and adipoQ receptor family member V (Paqr5)                            |
| P2ry12        | -1.86 | $3.93 \times 10^{-7}$    | 3.672857 | Purinergic receptor P2Y, G-protein coupled 12 (P2ry12)                              |
| Csf1r         | -1.87 | $1.75 \times 10^{-6}$    | 4.836905 | Colony stimulating factor 1 receptor (Csf1r)  |
| Sgk2          | -1.87 | .008773744               | -0.12086 | Serum/glucocorticoid-regulated kinase 2 (Sgk2)                                      |
| Ect2l         | -1.87 | .006279018               | -0.16173 | Epithelial cell transforming sequence 2 oncogene-like (Ect2l)                       |
| Apobec3       | -1.87 | .021264452               | 1.088735 | Apolipoprotein B mRNA editing enzyme, catalytic polypeptide 3 (Apobec3)             |
| Esam          | -1.87 | .00067822                | 1.238903 | Endothelial cell-specific adhesion molecule (Esam)                                  |
| 4930506C21Rik | -1.87 | .002771411               | -0.11277 | RIKEN cDNA 4930506C21 gene (4930506C21Rik)  |
| Fam166b       | -1.87 | .001027956               | 0.856944 | Family with sequence similarity 166, member B (Fam166b)                             |
| A2m           | -1.88 | $1.06 \times 10^{-6}$    | 3.769972 | Alpha-2-macroglobulin (A2m)   |
| Olig2         | -1.88 | $8.18 \times 10^{-6}$    | 3.891852 | Oligodendrocyte transcription factor 2 (Olig2)                                      |
| Bst2          | -1.88 | .048542635               | 1.903151 | Bone marrow stromal cell antigen 2 (Bst2)   |
| Abhd3         | -1.88 | $1.59 \times 10^{-8}$    | 5.079703 | Abhydrolase domain containing 3 (Abhd3)   |
| A230009B12Rik | -1.88 | .004302431               | -0.03696 | RIKEN cDNA A230009B12 gene (A230009B12Rik)  |
| Npl           | -1.88 | .000219923               | 1.250911 | N-acetylneuraminidase pyruvate lyase (Npl)  |
| Col11a1       | -1.88 | .012607818               | -0.11904 | Collagen, type XI, alpha 1 (Col11a1)  |
| Odf3b         | -1.88 | $6.76 \times 10^{-6}$    | 2.20151  | Outer dense fiber of sperm tails 3B (Odf3b)   |
| Wdr63         | -1.89 | .000383762               | 0.900809 | WD repeat domain 63 (Wdr63)   |
| D730003I15Rik | -1.89 | .000929322               | 1.277536 | RIKEN cDNA D730003I15 gene (D730003I15Rik)  |
| Car13         | -1.89 | .00098461                | -0.05841 | Carbonic anhydrase 13 (Car13)   |
| Atp1a2        | -1.89 | $1.03 \times 10^{-8}$    | 8.944492 | ATPase, Na <sup>+</sup> /K <sup>+</sup> transporting, alpha 2 polypeptide (Atp1a2)  |
| Myo1f         | -1.90 | .001315762               | 0.935222 | Myosin IF (Myo1f)   |
| Hhatl         | -1.90 | .000100835               | 1.532608 | Hedgehog acyltransferase-like (Hhatl)   |
| Parvg         | -1.90 | .000433349               | 0.729999 | Parvin, gamma (Parvg)   |
| Msx1          | -1.90 | .001273663               | 0.602755 | Msh homeobox 1 (Msx1)   |
| 5730559C18Rik | -1.90 | .016787428               | 0.779935 | RIKEN cDNA 5730559C18 gene (5730559C18Rik)  |
| Plekha1       | -1.90 | $3.12 \times 10^{-7}$    | 7.428643 | Pleckstrin homology domain containing, family B (evectins) member 1 (Plekha1)       |
| Slc13a5       | -1.90 | $1.33 \times 10^{-5}$    | 2.883403 | Solute carrier family 13 (sodium-dependent citrate transporter), member 5 (Slc13a5) |
| Cd300a        | -1.91 | .002391643               | 0.038774 | CD300A molecule (Cd300a)  |
| Slc25a18      | -1.91 | $5.39 \times 10^{-7}$    | 5.092737 | Solute carrier family 25 (mitochondrial carrier), member 18 (Slc25a18)              |
| Pltp          | -1.91 | $2.03 \times 10^{-6}$    | 4.574219 | Phospholipid transfer protein (Pltp)  |
| Cxcl14        | -1.91 | $6.92 \times 10^{-7}$    | 3.402367 | Chemokine (C-X-C motif) ligand 14 (Cxcl14)  |
| Stra6         | -1.91 | .005130027               | 0.562037 | Stimulated by retinoic acid gene 6 (Stra6)  |
| Car9          | -1.91 | .001145146               | 0.769785 | Carbonic anhydrase 9 (Car9)   |
| 2010001K21Rik | -1.92 | .00046524                | 0.91636  | RIKEN cDNA 2010001K21 gene (2010001K21Rik)  |



TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Arhgap30      | -1.92 | .013220354               | 0.616513 | Rho GTPase activating protein 30 (Arhgap30)                            |
| Lfng          | -1.92 | $3.16 \times 10^{-5}$    | 2.541206 | LFNG O-fucosylpeptide 3-beta-N-acetylglucosaminyltransferase (Lfng)    |
| Ndrg2         | -1.92 | $2.93 \times 10^{-10}$   | 9.398886 | N-myc downstream-regulated gene 2 (Ndrg2)                              |
| Chat          | -1.92 | .000127616               | 2.727393 | Choline acetyltransferase (Chat)                                       |
| Neat1         | -1.92 | $6.44 \times 10^{-7}$    | 5.320716 | Nuclear paraspeckle assembly transcript 1 (non-protein coding) (Neat1) |
| Litaf         | -1.92 | $1.36 \times 10^{-5}$    | 3.726957 | LPS-induced TN factor (Litaf)  |
| Gm17750       | -1.92 | .00044139                | 0.567423 | Predicted gene, 17750 (Gm17750)  |
| A330041J22Rik | -1.92 | .015558377               | -0.02695 | RIKEN cDNA A330041J22 gene (A330041J22Rik)                             |
| 4930550C14Rik | -1.93 | .006660268               | -0.04719 | RIKEN cDNA 4930550C14 gene (4930550C14Rik)                             |
| Cx3cr1        | -1.93 | $9.66 \times 10^{-7}$    | 3.649944 | Chemokine (C-X3-C motif) receptor 1 (Cx3cr1)                           |
| Sox10         | -1.93 | $7.14 \times 10^{-6}$    | 4.213018 | SRY (sex determining region Y)-box 10 (Sox10)                          |
| Sncg          | -1.93 | $8.71 \times 10^{-5}$    | 3.151988 | Synuclein, gamma (Sncg)  |
| Aspa          | -1.94 | $3.85 \times 10^{-6}$    | 4.440446 | Aspartoacylase (Aspa)  |
| Gm44430       | -1.94 | .006070659               | -0.27533 | Predicted gene (Gm44430)   |
| Cabcoco1      | -1.94 | .000163008               | 1.009936 | Ciliary-associated calcium binding coiled-coil 1 (Cabcoco1)            |
| Dnase111      | -1.94 | .005675655               | 0.370842 | Deoxyribonuclease 1-like 1 (Dnase111)                                  |
| H2-Aa         | -1.95 | .040196696               | 3.5945   | Histocompatibility 2, class II antigen A, alpha (H2-Aa)                |
| Pvalb         | -1.95 | .000175375               | 1.430208 | Parvalbumin (Pvalb)  |
| Clic6         | -1.95 | $4.29 \times 10^{-5}$    | 2.641829 | Chloride intracellular channel 6 (Clic6)                               |
| Ppp1r1b       | -1.95 | $3.20 \times 10^{-5}$    | 3.882371 | Protein phosphatase 1, regulatory (inhibitor) subunit 1B (Ppp1r1b)     |
| Itgb2         | -1.95 | .000300134               | 1.618245 | Integrin beta 2 (Itgb2)  |
| H2-K1         | -1.95 | .021173316               | 4.5691   | Histocompatibility 2, K1, K region (H2-K1)                             |
| Celsr1        | -1.96 | .001189468               | 1.400365 | Cadherin, EGF LAG seven-pass G-type receptor 1 (Celsr1)                |
| Afap1l2       | -1.96 | $5.99 \times 10^{-5}$    | 2.072917 | Actin filament-associated protein 1-like 2 (Afap1l2)                   |
| Itih3         | -1.96 | $1.11 \times 10^{-7}$    | 5.731097 | Inter-alpha trypsin inhibitor, heavy chain 3 (Itih3)                   |
| Ttll8         | -1.96 | .004838896               | -0.3194  | Tubulin tyrosine ligase-like family, member 8 (Ttll8)                  |
| 4930519F16Rik | -1.96 | .007795216               | -0.29348 | RIKEN cDNA 4930519F16 gene (4930519F16Rik)                             |
| Slc35f2       | -1.96 | .007477728               | 0.390166 | Solute carrier family 35, member F2 (Slc35f2)                          |
| Cd38          | -1.97 | $6.83 \times 10^{-5}$    | 2.686635 | CD38 antigen (Cd38)  |
| Sparcl1       | -1.97 | $2.93 \times 10^{-10}$   | 9.580819 | SPARC-like 1 (Sparcl1)   |
| Laptm5        | -1.97 | $3.07 \times 10^{-6}$    | 4.657288 | Lysosomal-associated protein transmembrane 5 (Laptm5)                  |
| 1700029J07Rik | -1.97 | .002680338               | 1.465959 | RIKEN cDNA 1700029J07 gene (1700029J07Rik)                             |
| Tmem100       | -1.97 | $1.24 \times 10^{-5}$    | 2.279007 | Transmembrane protein 100 (Tmem100)                                    |
| Lpcat2        | -1.97 | .000270658               | 2.731381 | Lysophosphatidylcholine acyltransferase 2 (Lpcat2)                     |
| Cyp2j12       | -1.97 | .000797947               | 0.426562 | Cytochrome P450, family 2, subfamily j, polypeptide 12 (Cyp2j12)       |
| Slc39a12      | -1.98 | $6.57 \times 10^{-7}$    | 4.353183 | Solute carrier family 39 (zinc transporter), member 12 (Slc39a12)      |
| Zmynd12       | -1.98 | .041288677               | -0.49462 | Zinc finger, MYND domain containing 12 (Zmynd12)                       |
| Gm3764        | -1.98 | $1.28 \times 10^{-5}$    | 3.120007 | Predicted gene 3764 (Gm3764)   |
| Myoc          | -1.98 | .000358244               | 1.254251 | Myocilin (Myoc)  |
| Tekt4         | -1.98 | .008219937               | 0.613013 | Tektin 4 (Tekt4)   |
| Ccdc121       | -1.98 | .001179527               | 1.261191 | Coiled-coil domain containing 121 (Ccdc121)                            |
| Atoh8         | -1.98 | .011654393               | -0.40334 | Atonal bHLH transcription factor 8 (Atoh8)                             |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Atp13a4       | -1.98 | $9.18 \times 10^{-6}$    | 3.282583 | ATPase type 13A4 (Atp13a4)  |
| Elovl1        | -1.98 | .000153918               | 2.487994 | Elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)-like 1 (Elovl1) |
| Tagln2        | -1.99 | .000131066               | 3.785068 | Transgelin 2 (Tagln2)   |
| Clu           | -1.99 | $5.05 \times 10^{-9}$    | 8.148085 | Clusterin (Clu)   |
| Wnt7a         | -1.99 | $5.13 \times 10^{-6}$    | 2.387486 | Wingless-type MMTV integration site family, member 7A (Wnt7a)                           |
| Dcn           | -1.99 | .000201425               | 2.766588 | Decorin (Dcn)   |
| Mt2           | -1.99 | .000107512               | 1.376331 | Metallothionein 2 (Mt2)   |
| Efhd1         | -2.01 | $9.51 \times 10^{-8}$    | 4.464602 | EF hand domain containing 1 (Efhd1)   |
| Plekhf1       | -2.01 | .006786698               | 0.655115 | Pleckstrin homology domain containing, family F (with FYVE domain) member 1 (Plekhf1)   |
| Tnfrsf1a      | -2.01 | $3.37 \times 10^{-5}$    | 2.704296 | Tumor necrosis factor receptor superfamily, member 1a (Tnfrsf1a)                        |
| Sugct         | -2.01 | $3.10 \times 10^{-5}$    | 2.199478 | Succinyl-CoA glutarate-CoA transferase (Sugct)  |
| 4933407L21Rik | -2.01 | $4.08 \times 10^{-5}$    | 1.532556 | RIKEN cDNA 4933407L21 gene (4933407L21Rik)  |
| Gm2830        | -2.01 | $3.67 \times 10^{-5}$    | 1.700907 | Predicted gene 2830 (Gm2830)  |
| Ramp2         | -2.01 | .000547863               | 1.379686 | Receptor (calcitonin) activity modifying protein 2 (Ramp2)                              |
| Crybg3        | -2.01 | .006177271               | -0.22485 | Beta-gamma crystallin domain containing 3 (Crybg3)                                      |
| Cyp2j9        | -2.02 | $5.37 \times 10^{-7}$    | 4.392277 | Cytochrome P450, family 2, subfamily j, polypeptide 9 (Cyp2j9)                          |
| Vwf           | -2.02 | .003961198               | 1.276605 | Von Willebrand factor (Vwf)   |
| Evi2a         | -2.02 | $2.14 \times 10^{-5}$    | 3.517947 | Ecotropic viral integration site 2a (Evi2a)   |
| Sparc         | -2.02 | $1.85 \times 10^{-9}$    | 9.612044 | Secreted acidic cysteine-rich glycoprotein (Sparc)                                      |
| Nkain4        | -2.02 | $1.18 \times 10^{-6}$    | 3.663312 | Na <sup>+</sup> /K <sup>+</sup> transporting ATPase interacting 4 (Nkain4)              |
| Nek5          | -2.03 | .002536116               | -0.06157 | NIMA (never in mitosis gene a)-related expressed kinase 5 (Nek5)                        |
| Gpsm2         | -2.03 | .000129292               | 1.406032 | G-protein signalling modulator 2 (AGS3-like, <i>C. elegans</i> ) (Gpsm2)                |
| Stoml3        | -2.03 | $2.74 \times 10^{-5}$    | 2.954767 | Stomatin (Epb7.2)-like 3 (Stoml3)   |
| Cdhr3         | -2.03 | $2.45 \times 10^{-5}$    | 2.934715 | Cadherin-related family member 3 (Cdhr3)  |
| Gm19439       | -2.03 | .001246759               | 1.032023 | Predicted gene, 19439 (Gm19439)   |
| Abcc3         | -2.03 | .004859573               | -0.23008 | ATP-binding cassette, sub-family C (CFTR/MRP), member 3 (Abcc3)                         |
| Aldh1l1       | -2.03 | $1.10 \times 10^{-6}$    | 3.334472 | Aldehyde dehydrogenase 1 family, member L1 (Aldh1l1)                                    |
| Bmp4          | -2.04 | .004713383               | 1.370513 | Bone morphogenetic protein 4 (Bmp4)   |
| Mt1           | -2.04 | $2.08 \times 10^{-8}$    | 4.843165 | Metallothionein 1 (Mt1)   |
| Pglyrp1       | -2.05 | .000229161               | 1.360246 | Peptidoglycan recognition protein 1 (Pglyrp1)   |
| Phkg1         | -2.05 | $2.87 \times 10^{-5}$    | 1.555353 | Phosphorylase kinase gamma 1 (Phkg1)  |
| Gm11423       | -2.05 | .002029242               | 0.375497 | Predicted gene 11423 (Gm11423)  |
| Gm11266       | -2.05 | .002457495               | -0.26048 | Predicted gene 11266 (Gm11266)  |
| 4933406C10Rik | -2.05 | .04411911                | -0.35264 | RIKEN cDNA 4933406C10 gene (4933406C10Rik)  |
| Gjb1          | -2.05 | $1.25 \times 10^{-5}$    | 3.002231 | Gap junction protein, beta 1 (Gjb1)   |
| Tmem63a       | -2.06 | $1.51 \times 10^{-6}$    | 3.782223 | Transmembrane protein 63a (Tmem63a)   |
| Fhl3          | -2.06 | .009994296               | -0.12466 | Four and a half LIM domains 3 (Fhl3)  |
| Igsf1         | -2.06 | $1.10 \times 10^{-6}$    | 3.786173 | Immunoglobulin superfamily, member 1 (Igsf1)  |
| Cd300c2       | -2.06 | .000221469               | 1.232229 | CD300C molecule 2 (Cd300c2)   |
| Acsbg1        | -2.06 | $4.23 \times 10^{-7}$    | 5.185581 | Acyl-CoA synthetase bubblegum family member 1 (Acsbg1)                                  |
| Gm47794       | -2.06 | .0287879                 | -0.35252 | Predicted gene (Gm47794)  |
| Slco1c1       | -2.06 | $2.39 \times 10^{-6}$    | 3.103453 | Solute carrier organic anion transporter family, member 1c1 (Slco1c1)                   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| C130074G19Rik | -2.07 | $7.93 \times 10^{-5}$    | 1.551419 | RIKEN cDNA C130074G19 gene (C130074G19Rik)  |
| Casq2         | -2.07 | .00077846                | 1.124322 | Calsequestrin 2 (Casq2)   |
| Sntn          | -2.07 | .000320214               | 1.183331 | Sentan, cilia apical structure protein (Sntn)   |
| Wdr66         | -2.07 | $7.25 \times 10^{-5}$    | 1.731774 | WD repeat domain 66 (Wdr66)   |
| Nkx6-2        | -2.07 | $2.36 \times 10^{-5}$    | 1.707178 | NK6 homeobox 2 (Nkx6-2)   |
| Tmem253       | -2.07 | .017619173               | -0.27098 | Transmembrane protein 253 (Tmem253)   |
| Cd34          | -2.08 | $7.54 \times 10^{-5}$    | 1.783674 | CD34 antigen (Cd34)   |
| Csrp1         | -2.08 | $6.46 \times 10^{-9}$    | 6.466519 | Cysteine and glycine-rich protein 1 (Csrp1)   |
| Abca6         | -2.08 | .002475828               | 0.298072 | ATP-binding cassette, sub-family A (ABC1), member 6 (Abca6)                                       |
| Morn5         | -2.08 | .003316556               | 0.077987 | MORN repeat containing 5 (Morn5)  |
| Iqca          | -2.09 | .001088356               | 1.126013 | IQ motif containing with AAA domain (Iqca)  |
| Itm2a         | -2.09 | $5.62 \times 10^{-7}$    | 3.031832 | Integral membrane protein 2A (Itm2a)  |
| C1qtnf1       | -2.09 | .000912075               | 0.993324 | C1q and tumor necrosis factor-related protein 1 (C1qtnf1)   |
| Pla2g7        | -2.09 | $2.05 \times 10^{-7}$    | 5.65692  | Phospholipase A2, group VII (platelet-activating factor acetylhydrolase, plasma) (Pla2g7)         |
| Phgdh         | -2.10 | $1.21 \times 10^{-6}$    | 3.112993 | 3-Phosphoglycerate dehydrogenase (Phgdh)  |
| Fbln7         | -2.10 | .000927369               | 1.181143 | Fibulin 7 (Fbln7)   |
| Irak4         | -2.10 | .002601527               | 0.345948 | Interleukin-1 receptor-associated kinase 4 (Irak4)  |
| Olfml3        | -2.10 | $3.95 \times 10^{-6}$    | 2.987583 | Olfactomedin-like 3 (Olfml3)  |
| Clec18a       | -2.11 | $2.53 \times 10^{-5}$    | 1.713095 | C-type lectin domain family 18, member A (Clec18a)  |
| Tmem125       | -2.11 | $2.13 \times 10^{-5}$    | 2.014312 | Transmembrane protein 125 (Tmem125)   |
| Snhg8         | -2.11 | $2.43 \times 10^{-5}$    | 1.741734 | Small nucleolar RNA host gene 8 (Snhg8)   |
| Ifi27         | -2.11 | $5.61 \times 10^{-5}$    | 2.559219 | Interferon, alpha-inducible protein 27 (Ifi27)  |
| Slc6a13       | -2.11 | .001784309               | 0.541982 | Solute carrier family 6 (neurotransmitter transporter, GABA), member 13 (Slc6a13)                 |
| 3300002A11Rik | -2.11 | .002076296               | 0.550618 | RIKEN cDNA 3300002A11 gene (3300002A11Rik)  |
| Fgd2          | -2.12 | .007222668               | 0.253991 | FYVE, RhoGEF and PH domain containing 2 (Fgd2)  |
| Dmp1          | -2.12 | .00995495                | -0.39557 | Dentin matrix protein 1 (Dmp1)  |
| Adora2b       | -2.12 | .000120466               | 1.324014 | Adenosine A2b receptor (Adora2b)  |
| Slc7a10       | -2.13 | $1.57 \times 10^{-5}$    | 2.230329 | Solute carrier family 7 (cationic amino acid transporter, $\gamma$ + system), member 10 (Slc7a10) |
| Hhex          | -2.13 | .010209566               | -0.13954 | Hematopoietically expressed homeobox (Hhex)   |
| Plip          | -2.13 | $7.66 \times 10^{-6}$    | 2.48025  | Plasma membrane proteolipid (Plip)  |
| Pon2          | -2.13 | $2.08 \times 10^{-8}$    | 4.850478 | Paraoxonase 2 (Pon2)  |
| Sdc4          | -2.14 | $4.40 \times 10^{-8}$    | 5.928974 | Syndecan 4 (Sdc4)   |
| Icam1         | -2.14 | .03944603                | -0.43555 | Intercellular adhesion molecule 1 (Icam1)   |
| Fzd2          | -2.14 | .003930125               | 0.105722 | Frizzled class receptor 2 (Fzd2)  |
| Abca8a        | -2.14 | .003161027               | 0.751855 | ATP-binding cassette, sub-family A (ABC1), member 8a (Abca8a)                                     |
| Ly86          | -2.14 | .00021166                | 3.754637 | Lymphocyte antigen 86 (Ly86)  |
| Olig1         | -2.15 | $1.31 \times 10^{-8}$    | 5.974647 | Oligodendrocyte transcription factor 1 (Olig1)  |
| Epb41l4aos    | -2.15 | .001542855               | 0.393748 | Erythrocyte membrane protein band 4.1 like 4a, opposite strand (Epb41l4aos)                       |
| Casc1         | -2.15 | .002171616               | 0.950031 | Cancer susceptibility candidate 1 (Casc1)   |
| Wdfy4         | -2.15 | .002746533               | 0.161471 | WD repeat and FYVE domain containing 4 (Wdfy4)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| Gstt3         | -2.17 | $6.47 \times 10^{-5}$    | 1.709241 | Glutathione S-transferase, theta 3 (Gstt3)   |
| Pld4          | -2.17 | $8.66 \times 10^{-5}$    | 1.857009 | Phospholipase D family, member 4 (Pld4)  |
| AC152827.1    | -2.17 | .001866268               | 0.239561 | -  |
| Armc3         | -2.17 | .006786698               | -0.13561 | Armadillo repeat containing 3 (Armc3)  |
| Parp3         | -2.17 | .00528782                | 1.026615 | Poly(ADP-ribose) polymerase family, member 3 (Parp3)                                     |
| Sox18         | -2.17 | .000117213               | 0.857294 | SRY (sex determining region Y)-box 18 (Sox18)  |
| Ppp1r36       | -2.18 | .001096483               | 1.456112 | Protein phosphatase 1, regulatory subunit 36 (Ppp1r36)                                   |
| Aoah          | -2.18 | .005533253               | 0.418155 | Acyloxyacyl hydrolase (Aoah)   |
| Fcgr1         | -2.18 | .010496936               | 1.214554 | Fc receptor, IgG, high affinity I (Fcgr1)  |
| Lbp           | -2.19 | $3.13 \times 10^{-6}$    | 2.798288 | Lipopolysaccharide binding protein (Lbp)   |
| Tmem98        | -2.19 | $8.03 \times 10^{-6}$    | 2.644016 | Transmembrane protein 98 (Tmem98)  |
| Col1a1        | -2.20 | .00069679                | 0.969096 | Collagen, type I, alpha 1 (Col1a1)   |
| Chp2          | -2.20 | .002746189               | 0.093954 | Calcineurin-like EF hand protein 2 (Chp2)  |
| Insc          | -2.20 | $8.17 \times 10^{-5}$    | 1.232903 | Inscuteable homolog (Insc)   |
| B230311B06Rik | -2.21 | .000695798               | 0.253428 | RIKEN cDNA B230311B06 gene (B230311B06Rik)   |
| Loxl3         | -2.21 | .003095396               | 0.709268 | Lysyl oxidase-like 3 (Loxl3)   |
| Mfsd2a        | -2.22 | $1.36 \times 10^{-5}$    | 2.429199 | Major facilitator superfamily domain containing 2A (Mfsd2a)                              |
| Cmtm5         | -2.22 | $2.56 \times 10^{-7}$    | 4.64494  | CKLF-like MARVEL transmembrane domain containing 5 (Cmtm5)                               |
| Lppos         | -2.22 | .00060225                | -0.17136 | LIM domain containing preferred translocation partner in lipoma, opposite strand (Lppos) |
| Mlc1          | -2.23 | $9.11 \times 10^{-9}$    | 5.751964 | Megalencephalic leukoencephalopathy with subcortical cysts 1 homolog (human) (Mlc1)      |
| Tgif1         | -2.23 | .000361722               | 0.987667 | TGFB-induced factor homeobox 1 (Tgif1)   |
| Unc93b1       | -2.23 | .000255566               | 1.996307 | Unc-93 homolog B1 ( <i>C. elegans</i> ) (Unc93b1)  |
| Serpinh1a     | -2.23 | $1.36 \times 10^{-5}$    | 2.315338 | Serine (or cysteine) peptidase inhibitor, clade B, member 1a (Serpinh1a)                 |
| Pifo          | -2.24 | $5.24 \times 10^{-5}$    | 1.932162 | Primary cilia formation (Pifo)   |
| Gm16845       | -2.24 | .001105372               | -0.27274 | Predicted gene, 16845 (Gm16845)  |
| Cdhr4         | -2.24 | .001407815               | 0.340489 | Cadherin-related family member 4 (Cdhr4)   |
| Gm43267       | -2.25 | .000280269               | 0.990718 | Predicted gene (Gm43267)   |
| Tm4sf1        | -2.25 | $4.94 \times 10^{-6}$    | 3.40215  | Transmembrane 4 superfamily member 1 (Tm4sf1)  |
| Gm266         | -2.25 | .000111678               | 0.51183  | Predicted gene 266 (Gm266)   |
| Lrrc36        | -2.25 | $5.89 \times 10^{-5}$    | 1.762477 | Leucine-rich repeat containing 36 (Lrrc36)   |
| Serpinh1      | -2.25 | .000201734               | 2.474281 | Serine (or cysteine) peptidase inhibitor, clade H, member 1 (Serpinh1)                   |
| Nde1          | -2.25 | $6.76 \times 10^{-6}$    | 2.341013 | nudE neurodevelopment protein 1 (Nde1)   |
| Gm26881       | -2.26 | .001818518               | -0.31595 | Predicted gene, 26881 (Gm26881)  |
| Itih2         | -2.26 | .001708089               | -0.22004 | Inter-alpha trypsin inhibitor, heavy chain 2 (Itih2)                                     |
| Ntsr2         | -2.26 | $2.08 \times 10^{-8}$    | 6.007592 | Neurotensin receptor 2 (Ntsr2)   |
| Mlxipl        | -2.26 | .002042396               | 0.017298 | MLX interacting protein-like (Mlxipl)  |
| Cldn11        | -2.26 | $3.93 \times 10^{-7}$    | 5.016633 | Claudin 11 (Cldn11)  |
| Lcat          | -2.26 | $4.48 \times 10^{-8}$    | 4.45636  | Lecithin cholesterol acyltransferase (Lcat)  |
| Slc15a3       | -2.26 | .004258089               | -0.15162 | Solute carrier family 15, member 3 (Slc15a3)   |
| Cfap77        | -2.27 | .000172653               | 0.956349 | Cilia and flagella-associated protein 77 (Cfap77)  |
| Cst3          | -2.27 | $2.93 \times 10^{-10}$   | 9.000216 | Cystatin C (Cst3)  |
| Gm13340       | -2.27 | $1.72 \times 10^{-5}$    | 1.846743 | Predicted gene (Gm13340)   |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| Slc14a2       | -2.28 | $1.66 \times 10^{-5}$    | 1.757931 | Solute carrier family 14 (urea transporter), member 2 (Slc14a2)                         |
| Gm38414       | -2.29 | .004129518               | -0.13771 | Predicted gene, 38414 (Gm38414)   |
| Gfap          | -2.29 | $3.72 \times 10^{-6}$    | 5.579701 | Glial fibrillary acidic protein (Gfap)  |
| Selplg        | -2.30 | $5.68 \times 10^{-6}$    | 3.011718 | Selectin, platelet (p-selectin) ligand (Selplg)   |
| P2ry6         | -2.30 | .000517932               | 0.685384 | Pyrimidinergic receptor P2Y, G-protein coupled, 6 (P2ry6)                               |
| Tmem173       | -2.30 | .008082068               | 0.563428 | Transmembrane protein 173 (Tmem173)   |
| Gas5          | -2.31 | $3.68 \times 10^{-8}$    | 5.095377 | Growth arrest specific 5 (Gas5)   |
| Angptl4       | -2.31 | .000189638               | 1.228769 | Angiopoietin-like 4 (Angptl4)   |
| Agt           | -2.31 | $2.19 \times 10^{-7}$    | 5.673454 | Angiotensinogen (serpin peptidase inhibitor, clade A, member 8) (Agt)                   |
| Pdlim4        | -2.31 | $5.59 \times 10^{-6}$    | 1.981126 | PDZ and LIM domain 4 (Pdlim4)   |
| Ifitm2        | -2.31 | .000480185               | 0.04934  | Interferon-induced transmembrane protein 2 (Ifitm2)                                     |
| Gpx8          | -2.31 | $9.08 \times 10^{-5}$    | 1.606885 | Glutathione peroxidase 8 (putative) (Gpx8)  |
| S100b         | -2.31 | $6.66 \times 10^{-8}$    | 6.211467 | S100 protein, beta polypeptide, neural (S100b)  |
| Gm16160       | -2.31 | .002899795               | -0.02699 | Predicted gene 16160 (Gm16160)  |
| Cd48          | -2.32 | .007101319               | -0.58943 | CD48 antigen (Cd48)   |
| Gm38190       | -2.33 | .001066802               | 1.363964 | Predicted gene (Gm38190)  |
| Slc38a3       | -2.33 | $1.51 \times 10^{-6}$    | 3.563537 | Solute carrier family 38, member 3 (Slc38a3)  |
| Alpl          | -2.33 | $5.20 \times 10^{-5}$    | 1.556545 | Alkaline phosphatase, liver/bone/kidney (Alpl)  |
| Proca1        | -2.33 | $5.99 \times 10^{-5}$    | 1.303081 | Protein interacting with cyclin A1 (Proca1)   |
| Col1a2        | -2.34 | $4.18 \times 10^{-5}$    | 2.122734 | Collagen, type I, alpha 2 (Col1a2)  |
| Gm20515       | -2.35 | .002916822               | 0.109405 | Predicted gene (Gm20515)  |
| Arhgap45      | -2.35 | .001001352               | 0.133302 | Rho GTPase Activating Protein 45 (Arhgap45)   |
| F5            | -2.36 | .001113673               | -0.14645 | Coagulation factor V (F5)   |
| Myl9          | -2.36 | $7.59 \times 10^{-5}$    | 1.585387 | Myosin, light polypeptide 9, regulatory (Myl9)  |
| Kcne1l        | -2.36 | $2.48 \times 10^{-5}$    | 1.525034 | Potassium voltage-gated channel, Isk-related family, member 1-like, pseudogene (Kcne1l) |
| Hsd11b1       | -2.36 | $1.40 \times 10^{-6}$    | 2.456478 | Hydroxysteroid 11-beta dehydrogenase 1 (Hsd11b1)  |
| 6430503K07Rik | -2.36 | .001537478               | -0.14294 | RIKEN cDNA 6430503K07 gene (6430503K07Rik)  |
| BC064078      | -2.37 | .002037062               | 0.845363 | cDNA sequence BC064078 (BC064078)   |
| Lmcd1         | -2.37 | .000158317               | 0.406117 | LIM and cysteine-rich domains 1 (Lmcd1)   |
| Slc12a4       | -2.37 | $4.99 \times 10^{-5}$    | 1.944246 | Solute carrier family 12, member 4 (Slc12a4)  |
| Dnah14        | -2.37 | .000411774               | 0.176602 | Dynein, axonemal, heavy chain 14 (Dnah14)   |
| 1700012B09Rik | -2.38 | $3.74 \times 10^{-5}$    | 1.56264  | RIKEN cDNA 1700012B09 gene (1700012B09Rik)  |
| Gstk1         | -2.38 | $4.08 \times 10^{-6}$    | 2.324627 | Glutathione S-transferase kappa 1 (Gstk1)   |
| Aldh3b1       | -2.40 | .001407815               | -0.2842  | Aldehyde dehydrogenase 3 family, member B1 (Aldh3b1)                                    |
| C1qa          | -2.40 | $6.44 \times 10^{-6}$    | 3.293363 | Complement component 1, q subcomponent, alpha polypeptide (C1qa)                        |
| Cryab         | -2.40 | $2.05 \times 10^{-7}$    | 5.885784 | Crystallin, alpha B (Cryab)   |
| Cst7          | -2.41 | .007688337               | 0.168082 | Cystatin F (leukocystatin) (Cst7)   |
| Crybb1        | -2.41 | .000304516               | -0.04279 | Crystallin, beta B1 (Crybb1)  |
| Tspo          | -2.41 | .001685832               | -0.003   | Translocator protein (Tspo)   |
| Bfsp2         | -2.42 | .000947121               | -0.3145  | Beaded filament structural protein 2, phakinin (Bfsp2)                                  |
| E130114P18Rik | -2.42 | .000132558               | 1.697918 | RIKEN cDNA E130114P18 gene (E130114P18Rik)  |
| Hes5          | -2.42 | $9.02 \times 10^{-6}$    | 1.266088 | Hairy and enhancer of split 5 (Hes5)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name   |
|---------------|-------|--------------------------|----------|--|
| S100a16       | -2.42 | $4.18 \times 10^{-7}$    | 3.969094 | S100 calcium binding protein A16 (S100a16)                       |
| Paqr6         | -2.42 | .000188921               | 0.897268 | Progesterin and adipoQ receptor family member VI (Paqr6)         |
| Echdc2        | -2.43 | .000293797               | 0.770259 | Enoyl Coenzyme A hydratase domain containing 2 (Echdc2)          |
| Cldn10        | -2.44 | $3.59 \times 10^{-7}$    | 3.556722 | Claudin 10 (Cldn10)  |
| Id1           | -2.45 | $2.14 \times 10^{-5}$    | 1.551946 | Inhibitor of DNA binding 1 (Id1)                                 |
| Wfdc1         | -2.45 | $2.78 \times 10^{-5}$    | 1.450255 | WAP four-disulfide core domain 1 (Wfdc1)                         |
| C1qc          | -2.46 | $9.02 \times 10^{-6}$    | 4.120528 | Complement component 1, q subcomponent, C chain (C1qc)           |
| Spata17       | -2.46 | .001150661               | -0.08735 | Spermatogenesis associated 17 (Spata17)                          |
| Fcgr3         | -2.47 | $5.20 \times 10^{-5}$    | 2.150881 | Fc receptor, IgG, low affinity III (Fcgr3)                       |
| Gm16201       | -2.47 | .003163212               | -0.24507 | Predicted gene 16201 (Gm16201)                                   |
| Sept1         | -2.47 | .000592268               | -0.25843 | Septin 1 (Sept1)   |
| Anxa3         | -2.47 | .000101668               | 0.84268  | Annexin A3 (Anxa3)   |
| Cldn5         | -2.48 | $2.87 \times 10^{-5}$    | 2.326624 | Claudin 5 (Cldn5)  |
| Gm19935       | -2.48 | $3.79 \times 10^{-5}$    | 2.436985 | Predicted gene, 19935 (Gm19935)                                  |
| Gng5          | -2.49 | $7.97 \times 10^{-7}$    | 2.953626 | Guanine nucleotide binding protein (G protein), gamma 5 (Gng5)   |
| Daw1          | -2.49 | .008807928               | -0.29478 | Dynein assembly factor with WDR repeat domains 1 (Daw1)          |
| Gpr3711       | -2.50 | $1.97 \times 10^{-9}$    | 6.201916 | G protein-coupled receptor 37-like 1 (Gpr3711)                   |
| Rbp1          | -2.50 | $1.28 \times 10^{-6}$    | 2.492214 | Retinol binding protein 1, cellular (Rbp1)                       |
| Arhgdib       | -2.50 | .000182452               | 0.848466 | Rho, GDP dissociation inhibitor (GDI) beta (Arhgdib)             |
| Cpn1          | -2.51 | .012654915               | -0.4999  | Carboxypeptidase N, polypeptide 1 (Cpn1)                         |
| Vamp8         | -2.51 | $3.95 \times 10^{-5}$    | 1.416741 | Vesicle-associated membrane protein 8 (Vamp8)                    |
| 1700007G11Rik | -2.51 | .001654961               | 0.440218 | RIKEN cDNA 1700007G11 gene (1700007G11Rik)                       |
| Trim47        | -2.51 | .000399912               | -0.25107 | Tripartite motif-containing 47 (Trim47)                          |
| Anpep         | -2.51 | .000398563               | 1.15475  | Alanyl (membrane) aminopeptidase (Anpep)                         |
| Lyz2          | -2.51 | $6.15 \times 10^{-6}$    | 5.20813  | Lysozyme 2 (Lyz2)  |
| Gsn           | -2.52 | $1.60 \times 10^{-6}$    | 2.937683 | Gelsolin (Gsn)   |
| Xaf1          | -2.53 | .006616552               | 1.614131 | XIAP-associated factor 1 (Xaf1)                                  |
| Id3           | -2.53 | $1.26 \times 10^{-6}$    | 3.316696 | Inhibitor of DNA binding 3 (Id3)                                 |
| BC028528      | -2.54 | .006631642               | -0.48747 | cDNA sequence BC028528 (BC028528)                                |
| Cd82          | -2.54 | $5.08 \times 10^{-5}$    | 1.188462 | CD82 antigen (Cd82)  |
| Ccdc153       | -2.54 | $7.13 \times 10^{-7}$    | 3.028542 | Coiled-coil domain containing 153 (Ccdc153)                      |
| Ttll6         | -2.54 | .000259286               | 1.132604 | Tubulin tyrosine ligase-like family, member 6 (Ttll6)            |
| Nat8          | -2.55 | .004188428               | -0.30007 | N-acetyltransferase 8 (GCN5-related) (Nat8)                      |
| Rcn3          | -2.55 | .000245184               | -0.12209 | Reticulocalbin 3, EF-hand calcium binding domain (Rcn3)          |
| Ramp1         | -2.56 | $4.38 \times 10^{-8}$    | 3.708342 | Receptor (calcitonin) activity modifying protein 1 (Ramp1)       |
| Clic1         | -2.56 | $4.38 \times 10^{-5}$    | 1.528673 | Chloride intracellular channel 1 (Clic1)                         |
| Cyp4f15       | -2.57 | $5.64 \times 10^{-6}$    | 2.236492 | Cytochrome P450, family 4, subfamily f, polypeptide 15 (Cyp4f15) |
| Thrsp         | -2.58 | $6.92 \times 10^{-7}$    | 2.685035 | Thyroid hormone responsive (Thrsp)                               |
| Fbxl13        | -2.58 | .001204844               | -0.51251 | F-box and leucine-rich repeat protein 13 (Fbxl13)                |
| Dnaaf1        | -2.58 | $4.78 \times 10^{-5}$    | 0.457686 | Dynein, axonemal assembly factor 1 (Dnaaf1)                      |
| Ifi207        | -2.60 | .031485849               | -0.09011 | Interferon activated gene 207 (Ifi207)                           |
| Cnn2          | -2.60 | .001294124               | 0.489047 | Calponin 2 (Cnn2)  |
| 1700047M11Rik | -2.60 | .000257172               | 1.356029 | RIKEN cDNA 1700047M11 gene (1700047M11Rik)                       |
| Tac2          | -2.60 | $1.74 \times 10^{-5}$    | 6.663872 | Tachykinin 2 (Tac2)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted p-value       | AveExpr  | Gene full name   |
|---------------|-------|------------------------|----------|--|
| Got1l1        | -2.61 | .004622814             | -0.67916 | Glutamic-oxaloacetic transaminase 1-like 1 (Got1l1)                                  |
| Opalin        | -2.61 | $2.12 \times 10^{-7}$  | 3.570829 | Oligodendrocytic myelin paranodal and inner loop protein (Opalin)                    |
| Rarres2       | -2.61 | $3.12 \times 10^{-6}$  | 2.458739 | Retinoic acid receptor responder (tazarotene induced) 2 (Rarres2)                    |
| S100a6        | -2.62 | .000118658             | 2.196294 | S100 calcium binding protein A6 (calcylin) (S100a6)                                  |
| Cdr1          | -2.63 | $1.62 \times 10^{-7}$  | 5.308522 | Cerebellar degeneration-related antigen 1 (Cdr1)                                     |
| Vtn           | -2.63 | $1.45 \times 10^{-7}$  | 3.695122 | Vitronectin (Vtn)  |
| Acta2         | -2.63 | .000922069             | 0.181487 | Actin, alpha 2, smooth muscle, aorta (Acta2)   |
| Nppa          | -2.65 | .004866842             | -0.66823 | Natriuretic peptide type A (Nppa)  |
| 1700001C02Rik | -2.66 | .000132254             | 0.475533 | RIKEN cDNA 1700001C02 gene (1700001C02Rik)   |
| Kcnj8         | -2.66 | .000266171             | 0.596436 | Potassium inwardly rectifying channel, subfamily J, member 8 (Kcnj8)                 |
| Ccl9          | -2.67 | .001472797             | -0.10814 | Chemokine (C-C motif) ligand 9 (Ccl9)  |
| Tnni1         | -2.67 | .000174129             | 0.596632 | Troponin I, skeletal, slow 1 (Tnni1)   |
| Entpd2        | -2.68 | $2.50 \times 10^{-6}$  | 2.138821 | Ectonucleoside triphosphate diphosphohydrolase 2 (Entpd2)                            |
| Cd37          | -2.68 | .00048829              | 0.695952 | CD37 antigen (Cd37)  |
| Ankrd66       | -2.68 | .00023528              | 0.434094 | Ankyrin repeat domain 66 (Ankrd66)   |
| Cd63          | -2.69 | $1.22 \times 10^{-7}$  | 4.833184 | CD63 antigen (Cd63)  |
| Trf           | -2.69 | $1.09 \times 10^{-5}$  | 1.932546 | Transferrin (Trf)  |
| Htra1         | -2.70 | $7.84 \times 10^{-7}$  | 3.859458 | HtrA serine peptidase 1 (Htra1)  |
| Tsnaxip1      | -2.70 | .000101547             | 0.374081 | Translin-associated factor X (Tsnax) interacting protein 1 (Tsnaxip1)                |
| Erich2        | -2.71 | .000488344             | 0.0994   | Glutamate rich 2 (Erich2)  |
| Hist1h2bc     | -2.71 | $1.11 \times 10^{-7}$  | 3.094263 | Histone cluster 1, H2bc (Hist1h2bc)  |
| Fcer1g        | -2.71 | $3.03 \times 10^{-5}$  | 3.558796 | Fc receptor, IgE, high affinity I, gamma polypeptide (Fcer1g)                        |
| Renbp         | -2.73 | .000274029             | 0.001057 | Renin binding protein (Renbp)  |
| Pdlim2        | -2.73 | $6.41 \times 10^{-5}$  | 1.187617 | PDZ and LIM domain 2 (Pdlim2)  |
| Ttr           | -2.74 | $2.21 \times 10^{-5}$  | 4.510489 | Transthyretin (Ttr)  |
| Ctss          | -2.74 | $2.33 \times 10^{-6}$  | 5.114436 | Cathepsin S (Ctss)   |
| Dbi           | -2.75 | $2.93 \times 10^{-10}$ | 7.573272 | Diazepam binding inhibitor (Dbi)   |
| Cd9           | -2.75 | $1.03 \times 10^{-6}$  | 3.598137 | CD9 antigen (Cd9)  |
| Hba-a2        | -2.78 | .000508037             | -0.63245 | Hemoglobin alpha, adult chain 2 (Hba-a2)   |
| Ly6a          | -2.79 | $6.77 \times 10^{-5}$  | 3.424054 | Lymphocyte antigen 6 complex, locus A (Ly6a)   |
| Pdlim1        | -2.80 | .000131379             | 0.293776 | PDZ and LIM domain 1 (elfin) (Pdlim1)  |
| Pkd2l1        | -2.80 | .00130007              | -0.45888 | Polycystic kidney disease 2-like 1 (Pkd2l1)  |
| Apod          | -2.82 | $6.97 \times 10^{-8}$  | 6.35764  | Apolipoprotein D (Apod)  |
| Cyp4f14       | -2.83 | $2.23 \times 10^{-5}$  | 2.021949 | Cytochrome P450, family 4, subfamily f, polypeptide 14 (Cyp4f14)                     |
| Ctsh          | -2.83 | $2.87 \times 10^{-5}$  | 2.986981 | Cathepsin H (Ctsh)   |
| Klk6          | -2.83 | $9.71 \times 10^{-5}$  | 1.19974  | Kallikrein-related peptidase 6 (Klk6)  |
| Degs2         | -2.84 | .000349994             | -0.63263 | Delta(4)-desaturase, sphingolipid 2 (Degs2)  |
| Hba-a1        | -2.85 | $9.28 \times 10^{-5}$  | -0.34694 | Hemoglobin alpha, adult chain 1 (Hba-a1)   |
| Ly6c1         | -2.87 | $1.33 \times 10^{-6}$  | 2.157419 | Lymphocyte antigen 6 complex, locus C1 (Ly6c1)                                       |
| Ptgds         | -2.87 | $5.25 \times 10^{-6}$  | 7.923294 | Prostaglandin D2 synthase (brain) (Ptgds)  |
| Pantr2        | -2.88 | .000529487             | 0.122094 | POU domain, class 3, transcription factor 3 adjacent noncoding transcript 2 (Pantr2) |
| Igfbp2        | -2.88 | $1.28 \times 10^{-5}$  | 1.792515 | Insulin-like growth factor binding protein 2 (Igfbp2)                                |
| Hdc           | -2.91 | $8.57 \times 10^{-6}$  | 1.980861 | Histidine decarboxylase (Hdc)  |

TABLE A1 Continued

| Gene name     | LogFC | Adjusted <i>p</i> -value | AveExpr  | Gene full name  |
|---------------|-------|--------------------------|----------|---|
| mt-Nd5        | -2.92 | $6.14 \times 10^{-8}$    | 11.71883 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 5 (mt-Nd5)                |
| Emid1         | -2.96 | .000101196               | 0.237697 | EMI domain containing 1 (Emid1)   |
| Mdk           | -2.96 | $1.11 \times 10^{-6}$    | 2.248316 | Midkine (Mdk)   |
| Tbxas1        | -2.97 | .00045447                | -0.61678 | Thromboxane A synthase 1, platelet (Tbxas1)   |
| Mgst1         | -2.97 | $4.33 \times 10^{-7}$    | 3.207941 | Microsomal glutathione S-transferase 1 (Mgst1)  |
| Tmem212       | -2.97 | $1.33 \times 10^{-6}$    | 2.830554 | Transmembrane protein 212 (Tmem212)   |
| 1700024G13Rik | -2.98 | $8.07 \times 10^{-5}$    | 1.778458 | RIKEN cDNA 1700024G13 gene (1700024G13Rik)  |
| Gm5741        | -2.98 | $5.59 \times 10^{-6}$    | 4.110074 | Predicted gene 5741 (Gm5741)  |
| C1qb          | -2.99 | $2.26 \times 10^{-6}$    | 4.422786 | Complement component 1, q subcomponent, beta polypeptide (C1qb)                               |
| Slfn2         | -2.99 | .015188017               | -0.79462 | Schlafen 2 (Slfn2)  |
| Calml4        | -3.02 | $1.14 \times 10^{-5}$    | 1.445258 | Calmodulin-like 4 (Calml4)  |
| AW112010      | -3.03 | .045530751               | -0.34903 | Expressed sequence AW112010 (AW112010)  |
| Fxyd5         | -3.03 | $9.47 \times 10^{-6}$    | 1.694469 | FXYP domain-containing ion transport regulator 5 (Fxyd5)                                      |
| 1500015O10Rik | -3.03 | $5.13 \times 10^{-6}$    | 2.855535 | RIKEN cDNA 1500015O10 gene (1500015O10Rik)  |
| Lrrc71        | -3.04 | .000402096               | -0.58253 | Leucine-rich repeat containing 71 (Lrrc71)  |
| mt-Nd1        | -3.04 | $1.31 \times 10^{-8}$    | 11.60777 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 1 (mt-Nd1)                |
| Clec2d        | -3.05 | .001746984               | 0.07291  | C-type lectin domain family 2, member d (Clec2d)  |
| Slc39a4       | -3.05 | .003283469               | -0.77095 | Solute carrier family 39 (zinc transporter), member 4 (Slc39a4)                               |
| Plin3         | -3.05 | $3.22 \times 10^{-5}$    | 0.797856 | Perilipin 3 (Plin3)   |
| Fabp7         | -3.06 | $7.75 \times 10^{-7}$    | 5.082211 | Fatty acid binding protein 7, brain (Fabp7)   |
| Capsl         | -3.06 | $8.17 \times 10^{-5}$    | 1.08282  | Calcyphosine-like (Capsl)   |
| Ifi27l2a      | -3.11 | .039116732               | -1.36053 | Interferon, alpha-inducible protein 27 like 2A (Ifi27l2a)                                     |
| Lcn2          | -3.13 | $8.21 \times 10^{-5}$    | 0.12928  | Lipocalin 2 (Lcn2)  |
| Ifitm3        | -3.13 | .000153918               | 3.445999 | Interferon-induced transmembrane protein 3 (Ifitm3)   |
| Fxyd1         | -3.13 | $3.23 \times 10^{-8}$    | 3.407838 | FXYP domain-containing ion transport regulator 1 (Fxyd1)                                      |
| Trem2         | -3.16 | $5.85 \times 10^{-6}$    | 1.680444 | Triggering receptor expressed on myeloid cells 2 (Trem2)                                      |
| mt-Rnr1       | -3.16 | $2.79 \times 10^{-6}$    | 1.726454 | Mitochondrially encoded 12S rRNA (mt-Rnr1)  |
| Ninj2         | -3.17 | .000197296               | 0.426492 | Ninjurin 2 (Ninj2)  |
| Gm10714       | -3.20 | .000608097               | -0.65802 | Predicted gene 10714 (Gm10714)  |
| Gm12326       | -3.21 | .003736674               | -0.91246 | Predicted gene 12326 (Gm12326)  |
| Slc11a1       | -3.24 | .001355949               | -0.57597 | Solute carrier family 11 (proton-coupled divalent metal ion transporters), member 1 (Slc11a1) |
| Dmkn          | -3.26 | $5.99 \times 10^{-5}$    | 0.427697 | Dermokine (Dmkn)  |
| mt-Tp         | -3.30 | $6.66 \times 10^{-8}$    | 4.35983  | Mitochondrially encoded TRNA-Pro (CCN) (mt-Tp)  |
| mt-Nd4        | -3.33 | $8.43 \times 10^{-9}$    | 10.46327 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 4 (mt-Nd4)                |
| S100a1        | -3.35 | $5.11 \times 10^{-8}$    | 3.8086   | S100 calcium binding protein A1 (S100a1)  |
| S100a13       | -3.36 | $3.22 \times 10^{-5}$    | 1.523038 | S100 calcium binding protein A13 (S100a13)  |
| Aif1          | -3.37 | .000281666               | 0.708752 | Allograft inflammatory factor 1 (Aif1)  |
| Apoe          | -3.38 | $1.02 \times 10^{-9}$    | 7.923024 | Apolipoprotein E (Apoe)   |
| Dynlrb2       | -3.44 | $1.84 \times 10^{-6}$    | 1.787046 | Dynein light chain roadblock-type 2 (Dynlrb2)   |
| Cd52          | -3.50 | .002433684               | 0.43572  | CD52 antigen (Cd52)   |
| Hbb-bs        | -3.51 | $4.10 \times 10^{-5}$    | -0.03216 | Hemoglobin, beta adult s chain (Hbb-bs)   |



**TABLE A1** Continued

| Gene name | LogFC | Adjusted p-value      | AveExpr  | Gene full name   |
|-----------|-------|-----------------------|----------|--|
| Tyrobp    | -3.52 | $1.03 \times 10^{-6}$ | 2.750794 | TYRO protein tyrosine kinase binding protein (Tyrobp)                          |
| Ccl12     | -3.53 | .030906742            | 0.333625 | Chemokine (C-C motif) ligand 12 (Ccl12)  |
| Srgn      | -3.56 | $2.21 \times 10^{-5}$ | 0.662524 | Serglycin (Srgn)   |
| Capg      | -3.57 | .003792173            | -0.718   | Capping protein (actin filament), gelsolin-like (Capg)                         |
| Cyba      | -3.57 | .000197296            | -0.15772 | Cytochrome b-245, alpha polypeptide (Cyba)                                     |
| Apoc1     | -3.66 | .00012238             | 0.40079  | Apolipoprotein C-I (Apoc1)   |
| mt-Cytb   | -3.67 | $1.22 \times 10^{-8}$ | 11.63159 | Mitochondrially encoded cytochrome b (mt-Cytb)                                 |
| Gng11     | -3.68 | $6.76 \times 10^{-6}$ | 1.804819 | Guanine nucleotide binding protein (G protein), gamma 11 (Gng11)               |
| Crip1     | -3.69 | $2.69 \times 10^{-5}$ | 0.658334 | Cysteine-rich protein 1 (intestinal) (Crip1)                                   |
| Ppp1r14a  | -3.74 | $3.00 \times 10^{-5}$ | -0.18616 | Protein phosphatase 1, regulatory (inhibitor) subunit 14A (Ppp1r14a)           |
| mt-Nd2    | -3.77 | $5.60 \times 10^{-8}$ | 8.255642 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 2 (mt-Nd2) |
| mt-Rnr2   | -3.78 | $8.79 \times 10^{-9}$ | 4.324646 | Mitochondrially encoded 16S rRNA (mt-Rnr2)                                     |
| mt-Nd3    | -3.81 | $3.74 \times 10^{-5}$ | -0.42245 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 3 (mt-Nd3) |
| mt-Nd6    | -3.93 | $4.21 \times 10^{-8}$ | 6.055903 | Mitochondrially encoded NADH:ubiquinone oxidoreductase core subunit 6 (mt-Nd6) |
| Mgp       | -3.97 | .002551098            | -0.00964 | Matrix Gla protein (Mgp)   |
| Samsn1    | -4.03 | .002536116            | -1.39578 | SAM domain, SH3 domain, and nuclear localization signals, 1 (Samsn1)           |
| Ccdc33    | -4.08 | $1.48 \times 10^{-5}$ | -0.14491 | Coiled-coil domain containing 33 (Ccdc33)                                      |
| Tctex1d4  | -4.18 | .000519009            | -1.00281 | Tctex1 domain containing 4 (Tctex1d4)  |
| Avp       | -4.21 | .014279993            | -0.33205 | Arginine vasopressin (Avp)   |
| Hcls1     | -4.31 | .00113449             | -1.15454 | Hematopoietic cell-specific Lyn substrate 1 (Hcls1)                            |
| Rn7sk     | -4.69 | $1.85 \times 10^{-6}$ | 0.297819 | RNA, 7SK, nuclear (Rn7sk)  |