

2022  
ANNUAL  
REPORT

SEARCH, FIND, CURE

## CONTENTS

Message from the President	3
Message from the Secretary General	4
Interview with Prof. Alexis Brice, Executive Director	5
2022 in review	7
2022 achievements	11
Paris Brain Institute in 2022	12
<b>RESEARCH</b>	<b>13</b>
24 research teams	15
Clinical and translational research	27
Core facilities	31
International	35
<b>INNOVATION</b>	<b>39</b>
Commercializing research discoveries	41
Driving the development of products and services for patients	41
Supporting new startups	43
<b>TRAINING AND OUTREACH</b>	<b>45</b>
Teaching and training	47
Sharing and transferring information to the public	49
<b>GOVERNANCE</b>	<b>51</b>
Board of Directors	53
Board Committees	54
Management Committee (CODIR)	55
CODIR Committees	56
Staff representative bodies	56
<b>SUPPORTING RESEARCH</b>	<b>57</b>
Upholding scientific integrity	59
Human resources	60
Finance	61
Public support	67
Tribute to Lily Safra	71
Thank you	72

**Coordination:** Communication and Development Department

**Design and realization:** Armelle&lesCrayons

© **Photos:** Nicolas Anetson, Paolo Bartoloméo, Franck Bielle, Martin Carbo-Tano, Simon Cassanas, Jimmy Delpire, Vincent Desailly, Mathieu Génon, Inria, Institut du Cerveau, Laurent Jacob, neuroClues (photo Delaprod), Jean-Philippe Pariente, Thibault Rolland, Siemens Healthineers, Bernard Simoni ; rawpixel.com (Freepik), Adobe Stock.

**Printing:** DYNAPRINT

The brain is fascinating. It is the most complex organ in the human body; it manages our social behavior, our actions and emotions, our movement and coordination. It is the brain that makes us aware of the world around us, of ourselves and others. Yet the brain still holds many mysteries. Understanding how it works and treating brain disorders is a major challenge for human health.

Paris Brain Institute has devised a multidisciplinary model in which scientists, clinicians, engineers and technicians, patients, students and business leaders work side by side.

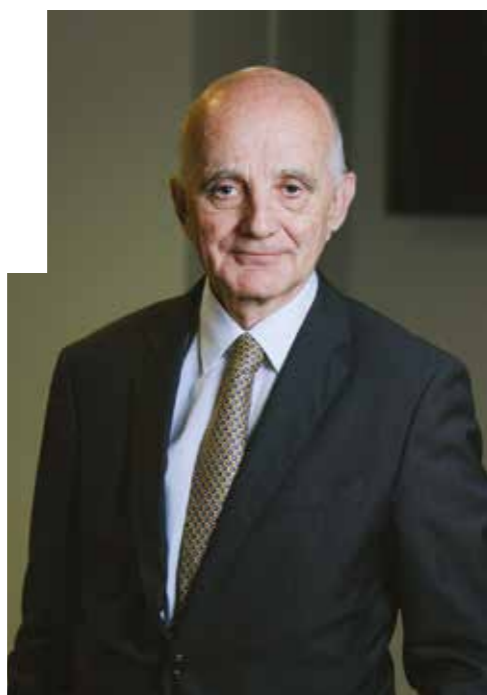
The aim is to facilitate the rapid development of treatments for nervous system diseases so that they can be brought to patients at the earliest opportunity. This environment breeds innovation and groundbreaking discoveries, yielding remarkable results and positioning the Institute as a leading research center in Europe.

The future is now. With drive and ambition, the Institute's teams are working tirelessly to make sure it fulfills its promise.

# OUR MISSION

# “ AUDACITY + AMBITION = INNOVATION ”

**PROF. GÉRARD SAILLANT**  
President  
of Paris Brain  
Institute



■ Audacity and ambition are good words to sum up 2022. Audacity describes our model, which has proven itself time and again and is inspiring others to follow our lead, as we can see with University-Hospital Institutes (IHUs) – an ecosystem that combines the best of the public and private sectors – the world of teaching and research hospitals and the world of entrepreneurship – for the benefit of health, freedom of movement and freedom of thought for all.

Ambition is the cornerstone of our 2023-2030 Development Plan, which took shape in 2022 – growth in investment will position Paris Brain Institute at the forefront of technology and innovation with the acquisition of new equipment and expertise. We are already planning to purchase a 7 Tesla MRI scanner, a quantum leap in our ability to study and understand the brain.

The support we receive from both the IHU and Carnot programs gives us the freedom to aim ever higher in our mission to serve research, innovation and patients.

Finally, and perhaps most importantly, audacity and ambition are the hallmarks of our scientists, our clinicians, and all the experts working in our core facilities and in support roles. The 846 people that constitute the Paris Brain Institute team live out these qualities on a daily basis, driving medical and scientific innovation for the benefit of patients. They have the ambition to tackle complex neurological challenges and the audacity to respond by thinking outside the box. And their approach generates results, as you will see in this report!

We will reach a number of milestones in 2023: assessment by our Scientific Advisory Board with a view to a future inspection by the French High Council for Evaluation of Research and Higher Education; initiatives to strengthen clinical research; and a dynamic innovation policy, with the new Brain & Mind biocluster coordinated jointly with the Institut de la Vision and the FondaMental Foundation.

Our ambition for development drives us, inspiring us to give our research teams the best resources and the best possible chance to advance our knowledge of the nervous system and develop new therapeutic solutions. To all those who read this report and are part of this effort on a daily basis – partners, donors, collaborators, volunteers – I want you to know that your contribution is vital. It gives us the momentum to go further, faster, for patients and society, and I would like to extend my sincere thanks to you all. ■



■ In keeping with our strategy of working to better support scientific and medical ambition, in 2022 we pursued our Resource Development Plan. We also restructured our increasingly advanced levels of expertise. Year after year, we want to keep offering the Institute’s scientists, clinicians and startups the best possible ecosystem in which to identify and develop pioneering therapeutic solutions.

In 2022, we also implemented a new fiscal calendar, with a cycle running from 1<sup>st</sup> October to 30<sup>th</sup> September, to offer better financial visibility and gain flexibility and agility in our investments.

Our strategy of supporting scientific and medical ambition is borne out in our work to provide the Institute’s core facilities



**CORINNE FORTIN**  
Secretary General  
of Paris Brain Institute

with state-of-the-art equipment and experts in increasingly advanced technologies – like the 7T MRI scanner that will be installed in summer 2024. This cutting-edge technology, and the expertise to use it, will in turn give our scientists the resources they need to implement “high-risk, high-reward” research, whether that’s supported by our annual funding to each research team or by partnership funding through our Big Brain Theory program. We are also stepping up our support for research-driven clinical trials.

The Institute is also strengthening and restructuring its support services to meet the needs of the new research landscape. Data is growing exponentially, the regulatory research environment is increasingly complex and demanding, and scientific integrity is more crucial than ever. In 2022, the Institute established a Regulatory and Technical Support Unit (CART). This unit works with scientists to analyze their projects and ensure regulatory compliance, while also taking account of potential future technical or regulatory implications from the very start of the authorization and design process.

This saves valuable time for the research process. The Institute has also appointed a Scientific Integrity Advisor, strengthened the role of the Animal Welfare Unit and developed a Data Governance Policy. All of these measures contribute to scientific integrity, which is at the foundation of the Institute’s commitment to scientific excellence. Finally, after adopting a Gender Equality Charter, in early 2022 Paris Brain Institute developed and implemented a Gender Equality Action Plan.

In 2022, with its University-Hospital Institute (IHU) accreditation set to be renewed in 2023 and a new call for applications to develop the third series of IHUs coming up, Paris Brain Institute also reasserted its commitment to excellence alongside the other IHUs in the IHU France Alliance, with the publication of a White Paper highlighting the benefits and achievements of a unique French model that draws on interdisciplinarity to drive innovation in health.

Bolstered by our progress in these key areas, Paris Brain Institute is approaching 2023 and the years ahead with confidence as a key player in scientific and medical research, committed to shaping the future of medicine for the benefit of patients. ■



## HOW WOULD YOU SUM UP 2022?

Success and strategic vision! It was a year for strategic reflection. Our scientists stepped up to the task with enthusiasm ahead of the visit from our Scientific Advisory Board. The Board's role is to assess our scientific activities and issue an opinion that will inform the assessment by the French High Council for Evaluation of Research and Higher Education (Hcéres), with a view to the renewal of our mandate. In 2022, we also launched our 2023-2030 Development Plan, which sets ambitious goals for research, innovation and our organizational structure.

2022 was also a year of scientific success. Research from our laboratories led to more than 560 publications in 2022, 41.1% in journals with an impact factor higher than 7 (compared with 33.6% in 2021). We also won our 18<sup>th</sup> European Research Council (ERC) grant and achieved a record success rate of nearly 40% in the French National Research Agency's generic call for proposals. Finally, it was a successful year in terms of awards and recruitment of scientists and clinicians - we were delighted to welcome four new research associates and five hospital-university associates.

## WHAT ACTION HAS BEEN TAKEN TO SUPPORT THE INSTITUTE'S SCIENTIFIC STRATEGY?

Our international call for applications for new teams led to the recruitment of two outstanding early career scientists from Europe, who will bring brand new techniques, questions and scientific approaches to the Institute. In 2022 we also strengthened our research on Alzheimer's Disease and neurodegenerative diseases, with the recruitment of Prof. Kaj Blennow from the University of Gothenburg, an internationally renowned Visiting Professor and pioneer in the field of biomarkers. We launched ambitious initiatives to position Paris Brain Institute at the forefront

of technology and innovation through the acquisition of new equipment and expertise. In 2022 the Institute purchased two state-of-the-art imaging facilities: a high-field MRI scanner (7T MRI), due to arrive in summer 2024, and a 3T MRI scanner. I firmly believe that these structural developments will serve as a driver and lead to major advances in neuroscience.

## CAN YOU OUTLINE THE INSTITUTE'S BROAD STRATEGY ON INNOVATION?

Our 2030 Innovation Plan gives us new tools to guarantee the future industrial value of projects developed at the Institute. We have introduced two new initiatives: Technological Innovation and Development Units (TIDUs), to bring specific therapeutic solutions to market more quickly, and the NeurAL launch pad, to de-risk promising startup projects and support them from the outset. The first TIDU, GENOV (established in late 2022), specializes in gene therapy.

In 2023, we also hope to renew our Carnot status, which is crucial for technological development and the maturation of innovations from our laboratories. In 2022 it enabled us to dedicate €1.63 million to research partnerships with economic stakeholders.

The recent acceptance of our proposal to establish the Brain & Mind biocluster alongside partners including the Fondamental Foundation and the Institut de la Vision also paves the way for the potential creation of a neuroscience innovation hub in the coming years, along the lines of the Boston cluster. We are very excited about this huge project, which involves the entire neuroscience community in Île-de-France region and which I firmly believe will lead to major progress in the field of neurological, psychiatric and sensory organ disorders.

## HOW HAS CLINICAL RESEARCH CONTINUED TO DEVELOP?

The Institute has always put patients at the center of its strategy, striving for dynamic clinical research that will rapidly lead to novel therapeutic solutions. Two initiatives will further strengthen this strategy. The first is partnership contracts, which release clinicians from some of their clinical activities so that they can invest at least 50% of their time in research projects. We will also launch a new call for tenders in 2023-24 to widen the scope of topics covered by clinical research infrastructures (iCRINs). The aim of iCRINs is to structure and develop research in hospital departments, especially Pitié-Salpêtrière Hospital's Neuroscience Medical-University Department (DMU), involving both patients and the Institute's research teams. iCRINs have already proven to be highly effective.

## CAN YOU TELL US MORE ABOUT THE PARTNERSHIPS DEVELOPED IN 2022?

In 2022, we developed and consolidated our partnerships policy in France, Europe and worldwide. Paris Brain Institute has become an associate member of the European Digital Brain Research Infrastructure, EBRAINS. In connection with our involvement in the C-BRAINS academic and industrial neuroscience network, a Major Research and Innovation Field (DIM) funded by Île-de-France region, we have launched an international PhD program to attract new talent, with five PhD students to be recruited in 2023.

# PROF. ALEXIS BRICE

Executive Director of Paris Brain Institute



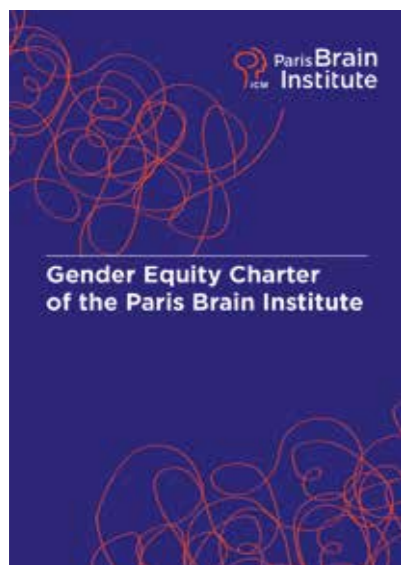
**PROF. ALEXIS BRICE**  
Executive Director of Paris Brain Institute

## A NEW CHALLENGE FOR 2023?

The Institute is going global! We are planning to establish a fundraising foundation in the United States to boost the visibility of our work and attract new donors and partners. Their support is crucial to give our scientists the resources they need to advance knowledge and treatment of brain disorders.

In 2023 we will also be launching joint research projects with our major institutional partners in Europe and North America, and we will embark on ambitious interdisciplinary projects to tackle major scientific and medical challenges.

JANUARY



■ A GENDER EQUALITY ACTION PLAN

After adopting a Gender Equality Charter, in January Paris Brain Institute introduced a Gender Equality Action Plan, which it implemented throughout the year.  
**See p. 60**

FEBRUARY



■ STARTUPS

In 2022, the iPEPS incubator celebrated its tenth anniversary and selected nine new startups to join this unique support facility at Paris Brain Institute.  
**See p. 43**



■ BRAIN AND ADDICTION

Scientists identified brain imaging markers associated with a risk of developing addictive behaviors involving psychoactive substances, gambling or food.  
**See p. 22**

MARCH

■ TRACING THE PROGRESSION OF SPINOCEREBELLAR ATAXIA

A therapeutic trial coordinated by scientists and clinicians at Paris Brain Institute revealed an association of clinical and radiological signs characteristic of different stages of the disease.  
**See p. 23**



■ GETTING INTO OUR HEADS!

For 2022 Brain Awareness Week, the Institute released the first season of its podcast "Getting into our heads!", which answers children's questions.  
**See p. 50**



Copyright @Nicolas Anetson

■ EXTENSION OF THE CHEVALERET SITE

Paris Brain Institute acquired an additional 1,400m<sup>2</sup> space in the iPEPS building on rue du Chevaleret with a view to extending its education and training activities and core facilities.

APRIL



■ CONVERSATIONS BETWEEN BRAIN AND GUT

Working with a team from the Institut Pasteur, scientists demonstrated that some brain cells directly detect variations in bacterial activity in the gut and adapt appetite and body temperature accordingly.  
**See p. 17**

MAY



■ HOSTING DMU PARAMEDICS

In May, the Institute hosted a discussion day with representatives of paramedical staff in the Neuroscience Medical-University Department (DMU) at Pitié-Salpêtrière Hospital.  
**See p. 48**

JUNE



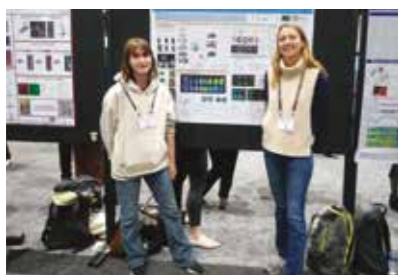
■ CLAIRE WYART RECEIVES THE 2022 RICHARD LOUNSBERY AWARD

The 2022 Richard Lounsbery Award was given by the French Academy of Sciences and the US National Academy of Sciences to Claire Wyart (Inserm), head of the Sensory Spinal Signaling team at Paris Brain Institute, for her research on the sensory interface between the central nervous system and cerebrospinal fluid, which controls posture and movement.  
**See p. 11**



■ RETREAT FOR SCIENTISTS

A highlight of the year and a milestone in the scientific life of the Institute was the two-day retreat for scientists. This was a time to reflect on the future of the Institute ahead of the 2023 assessment of the Joint Research Unit and its renewal on January 1, 2025. Wide-ranging discussions on the configuration of teams and synergy between scientists resulted in original, ambitious proposals and an exciting transformation drive to build a bright future for the Institute.



**■ FENS FORUM**

Early career scientists from Paris Brain Institute attended two lectures and several poster sessions at the largest neuroscience symposium ever held in Europe, organized by the Federation of European Neuroscience Societies (FENS).



**■ INTERNATIONAL BRAIN BEE**

The Institute co-hosted the International Brain Bee for high school students, which aims to raise awareness among younger generations to encourage them to consider a career in neuroscience.  
**See p. 47**

JULY

AUGUST

**■ BRAIN & MIND™ BIOCLUSTER PROPOSAL**

Paris Brain Institute, the Fonda-Mental Foundation and the Institut de la Vision submitted a proposal for the Brain & Mind project in response to the biocluster call under the “France 2030” plan.

The aim is to establish global clusters of excellence involving companies, the healthcare sector and groundbreaking research and innovation, to transform France’s biomedical research landscape. Involving more than 50 scientific, medical and industry partners, the Brain & Mind project will create an internationally renowned ecosystem in the Paris region to drive innovation in neuroscience and mental health. In 2023, French President Emmanuel Macron announced that the Brain & Mind proposal had been selected.

**See p. 42**



**■ REMEMBERING FEAR**

A research team identified new glutamate receptors in the brain involved in behavior and remembering fear.

**See p. 20**



**■ MODELING THE BRAIN’S COMPLEXITY**

Using MRI technology, scientists developed a novel mathematical model to elucidate brain organization and function in time and space. One of the key challenges in neuroscience is to link the anatomy of connectivity networks with brain activity.

**See p. 26**



SEPTEMBER

**■ VIVRE FM COMES TO THE INSTITUTE**

On September 21, for World Alzheimer’s Day, radio station Vivre FM presented a live broadcast about Alzheimer’s from the Edmond & Lily Safra auditorium. The Institute’s research teams are committed to the cause.  
**See p. 49**



**■ SUMMER SCHOOL: 8<sup>TH</sup> EDITION ON EPILEPSY**

The Institute’s Summer School is an intensive five-day program offering a hands-on introduction to key skills in health entrepreneurship. The projects developed by the 40 participants were presented to a panel of scientific and business experts. The winning project, a mechanism that detects potential epileptic fits by analyzing volatile organic compounds emitted by patients, will be examined by the Institute’s Living Lab to see whether it can be developed.  
**See p. 48**

**■ PARIS BRAIN INSTITUTE BECOMES AN ASSOCIATE EBRAINS MEMBER**

Paris Brain Institute announced that it was joining EBRAINS AISBL, a new EU-funded digital research infrastructure created by the Human Brain Project to advance brain research by transposing the latest scientific discoveries into innovations in medicine and industry.  
**See p. 38**

**■ PARIS BRAIN INSTITUTE AND ARTE EDUCATION RENEW THEIR PARTNERSHIP**

ARTE Education and the Open Brain School, the Institute’s training organization, renewed their partnership for the 2022-2023 academic year to continue creating and distributing neuroscience reference material to the French-speaking teaching community.  
**See p. 47**

OCTOBER



**■ OUTSTANDING SUPPORT FOR ALS RESEARCH AT PARIS+ PAR ART BASEL**

In partnership with the inaugural “Paris+ par Art Basel” contemporary art fair, the founding members, the Friends Committee of Paris Brain Institute and the “Invincible été” support committee met for an “Art-Science Breakfast” on October 19, 2022 at the Café de l’Homme and raised €1.1 million for the Institute’s research projects.  
**See p. 68**

NOVEMBER



**■ INTERGLITCHES: A NEW EDITION OF THE CHARITY VIDEO GAME MARATHON**

More than €21,000 was raised for Paris Brain Institute at the third edition of the Interglitches video game marathon, after three intense days in a fun and friendly atmosphere.  
**See p. 69**

DECEMBER



**■ THE INSTITUTE’S FIRST TIDU**

The aim of TIDUs (Technological Innovation and Development Units), a key initiative in the Paris Brain Institute’s 2030 Innovation Plan, is to develop applied solutions in response to neuroscience-related health challenges. The first TIDU, GENOV, led by Françoise Piguet, was launched in 2022 to develop gene and cell therapy strategies for severe neurodegenerative diseases in adults and children.  
**See p. 42**



© Siemens Healthineers

**■ 7 TESLA MRI FOR THE INSTITUTE**

Paris Brain Institute has placed an order with Siemens Healthineers for a 7 Tesla MRI and a next-generation 3 Tesla MRI, among the most powerful technologies to date in magnetic resonance imaging for human use.  
**See p. 5**

**■ LAUNCH OF THE C-BRAINS INTERNATIONAL PHD PROGRAM**

In late 2022, in its ongoing drive to attract new talent, Paris Brain Institute launched its first call for applications for five three-year PhD grants, in association with the Greater Paris C-BRAINS consortium.  
**See p. 47**

# 2022 ACHIEVEMENTS

In 2022, the Paris Brain Institute's outstanding scientists were recognized with prestigious awards, grants, funding and successful proposals.

## HONORS AND AWARDS



**SÉVERINE BOILLÉE**  
(Inserm)  
Joint head of the "ALS: Causes and Mechanisms of Motor Neuron Degeneration" team  
**2022 Fabrice Le Mouhaër Award**



**OLGA CORTI**  
(Inserm)  
Joint head of the "Molecular Pathophysiology of Parkinson's Disease" team  
**2022 Scientific Grand Prize, Fondation NRJ**



**ALEXANDRA DURR**  
(AP-HP/Sorbonne University)  
Joint head of the "Basic to Translational Neurogenetics" team  
**2022 Allianz-Institut de France Foundation Research Award Eliane & Gérard Pauthier Award**



**NICOLAS RENIER**  
(Inserm)  
Head of the "Structural Dynamics of Networks" team  
**Schlumberger Foundation for Education and Research Prize**



**NICOLAS VILLAIN**  
(AP-HP/Sorbonne University)  
Associate researcher in the "Alzheimer's Disease and Prion Diseases" team  
**Claude Pompidou Award for research on Alzheimer's disease**



**YASMINE CANTAUT-BELARIF**  
(CNRS)  
Scientist in the "Sensory Spinal Signaling" team  
**2022 CNRS Bronze Medal**



**JEAN-CHRISTOPHE CORVOL**  
(AP-HP/Sorbonne University)  
Joint head of the "Molecular Pathophysiology of Parkinson's Disease" team  
**2022 Scientific Grand Prize, Fondation NRJ**



**CLAIRE WYART**  
(Inserm)  
Head of the "Sensory Spinal Signaling" team  
**Richard Lounsbery Award**

## GRANTS, FUNDING AND CALLS FOR PROPOSALS



**THOMAS ANDRILLON**  
(Inserm)  
Research fellow in the "Mov'it: Movement, Investigation, Therapeutics. Normal and Abnormal Motor Control: Movement Disorders and Experimental Therapeutics" team  
**City of Paris Emergence(s) Program**

**ANR early career funding**



**LAILA EL KHATTABI**  
(AP-HP)  
Scientist in the "Brain Development" team  
**ANR early career funding**



**MATTHIEU PEYRE**  
(AP-HP, Sorbonne University)  
Scientist in the "Genetics and Development of Nervous System Tumors" team  
**ANR early career funding**

**"GENETICS AND PATHOPHYSIOLOGY OF EPILEPSY" TEAM "BASIC TO TRANSLATIONAL NEUROGENETICS" TEAM**  
**French Foundation for Medical Research accreditation**



**FRÉDÉRIC DARIOS**  
(Inserm)  
Scientist in the "Basic to Translational Neurogenetics" team  
**Spastic Paraplegia Foundation grant**

# PARIS BRAIN INSTITUTE IN 2022

826

staff, including 71.5% scientific staff



46

nationalities



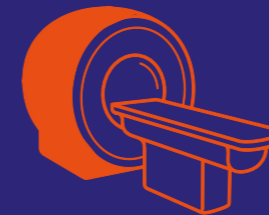
24

research teams selected by a Scientific Advisory Board



10

core facilities and biobank



564

publications in international scientific journals in 2022



502

patients included in Neuroscience CIC trials



83

ongoing CIC clinical trials



13

clinical research infrastructures (ICRINS)



16

training programs at the Open Brain School with over 200 participants (1,700 since it began)



170,422

active donors (past 36 months)



8

new patent requests filed



9

new startups selected to be hosted in the iPEPS incubator



The 24 research teams at Paris Brain Institute are organized into five fields, reflecting the multidisciplinary nature of their research and offering a high degree of flexibility – the cornerstone of the Institute’s scientific and medical success.

# RESEARCH



# RESEARCH TEAMS

## ■ CELLULAR PHYSIOLOGY OF CORTICAL MICROCIRCUITS

**Alberto Bacci** (Inserm)  
2 ANR-PRC

## ■ GENETICS AND PATHOPHYSIOLOGY OF EPILEPSY

**Stéphanie Baulac** (Inserm),  
**Eric Leguern** (AP-HP/Sorbonne University)  
FRM

## ■ ALS: CAUSES AND MECHANISMS OF MOTOR NEURON DEGENERATION

**Séverine Boillée** (Inserm)  
FRM

## ■ NEUROPHYSIOLOGY OF REPETITIVE BEHAVIORS

**Eric Burguière** (CNRS)  
Inserm, ANR-PRC, FRM

## ■ DYNAMICS OF EPILEPTIC NETWORKS AND NEURONAL EXCITABILITY

**Stéphane Charpier** (Sorbonne University), **Mario Chavez** (CNRS),  
**Vincent Navarro** (AP-HP/Sorbonne University)  
École de l'Inserm Liliane Bettencourt, Inserm, ANR-PRC

## ■ PICNIC - PHYSIOLOGICAL INVESTIGATION OF CLINICALLY NORMAL AND IMPAIRED COGNITION

**Laurent Cohen** (AP-HP/Sorbonne University), **Lionel Naccache** (AP-HP/Sorbonne University),  
**Paolo Bartolomeo** (Inserm)

## ■ ARAMIS: ALGORITHMS, MODELS AND METHODS FOR IMAGES AND SIGNALS OF THE HUMAN BRAIN

**Olivier Colliot** (CNRS), **Stanley Durrleman** (Inria)

## ■ MOLECULAR PATHOPHYSIOLOGY OF PARKINSON'S DISEASE

**Olga Corti** (Inserm), **Jean-Christophe Corvol** (AP-HP/Sorbonne University)  
FRM, ANR-PRC

## ■ MOLECULAR PHYSIOLOGY OF SYNAPTIC BIOENERGETICS (DIANE BARRIÈRE CHAIR)

**Jaime de Juan-Sanz** (CNRS)  
ANR-PRC

## ■ BASIC TO TRANSLATIONAL NEUROGENETICS

**Alexandra Durr** (AP-HP/Sorbonne University), **Giovanni Stevanin** (Inserm/EPHE)  
ANR-PRC, Fondation de France, Allianz-Institut de France Foundation, FRM

The scientific strategy of Paris Brain Institute encourages autonomy and productive synergy among the 24 teams. Neuroscientists, neurologists and psychiatrists work together to understand the healthy brain and elucidate the mechanisms underlying disease – from embryogenesis to adult neuron function, from the physiological origins of behaviors and emotions to the causes of diseases like Alzheimer's, Parkinson's and depression. This creates a positive feedback loop between knowledge and excellence, for the benefit of patients, families and society at large. In 2022, the "Gene Therapy" team was closed and the Institute's expertise in the field was transferred to the TIDU GENOV (see p. 42). The list below presents all the teams and the competitive funding obtained in 2022.

## ■ CIA: COGNITIVE CONTROL - INTERCEPTION - ATTENTION

**Philippe Fossati** (AP-HP/Sorbonne University), **Liane Schmidt** (Inserm)  
RIF

## ■ BRAIN DEVELOPMENT

**Bassem Hassan** (Inserm)  
ARSEP, Horizon Europe, ANR-JCJC, ANR-PRC

## ■ EXPERIMENTAL THERAPEUTICS OF PARKINSON'S DISEASE

**Etienne Hirsch** (CNRS), **Stéphane Hunot** (CNRS)  
France Parkinson, Campus France - COFECUB

## ■ GENETICS AND DEVELOPMENT OF NERVOUS SYSTEM TUMORS

**Emmanuelle Huillard** (CNRS), **Marc Sanson** (AP-HP/Sorbonne University)  
APHP, Ligue contre le cancer, ARTC, MSC-DN, ANR-JCJC

## ■ EXPERIMENTAL NEUROSURGERY

**Brian Lau** (CNRS), **Carine Karachi** (AP-HP/Sorbonne University)  
Fondation des Gueules Cassées, France Parkinson

## ■ FRONTLAB: FRONTAL FUNCTIONS AND PATHOLOGY

**Richard Lévy** (AP-HP/Sorbonne University)  
Fondation Claude Pompidou, FRM, ANR-PRC

## ■ REPAIR IN MULTIPLE SCLEROSIS: FROM BIOLOGY TO CLINICAL TRANSLATION

**Catherine Lubetzki** (AP-HP/Sorbonne University), **Bruno Stankoff** (AP-HP/Sorbonne University)

## ■ MYELIN PLASTICITY AND REGENERATION

**Brahim Nait Oumesmar** (Inserm), **Violetta Zujovic** (Inserm)  
FRC, ARSEP

## ■ MOTIVATION, BRAIN AND BEHAVIOR

**Mathias Pessiglione** (Inserm), **Sébastien Bouret** (CNRS), **Jean Daunizeau** (Inserm)  
FRM

## ■ ALZHEIMER'S DISEASE AND PRION DISEASES

**Marie-Claude Potier** (CNRS), **Stéphane Haïk** (Inserm, AP-HP)  
Santé publique France, Fondation pour la Recherche sur Alzheimer, AFM, Fondation Alzheimer, Horizon Europe

## ■ CELLULAR MECHANISMS OF SENSORY PROCESSING

**Nelson Rebola** (CNRS)

## ■ STRUCTURAL DYNAMICS OF NETWORKS

**Nicolas Renier** (Inserm)

## ■ MOV'IT: MOVEMENT, INVESTIGATION, THERAPEUTICS. NORMAL AND ABNORMAL MOTOR CONTROL: MOVEMENT DISORDERS AND EXPERIMENTAL THERAPEUTICS

**Marie Vidailhet** (AP-HP/Sorbonne University), **Stéphane Lehericy** (AP-HP/Sorbonne University)  
SFRMS, Sorbonne University, ANR-PRCE, ANR-ERA NET E-Rare, FRM, ANR-PRC, MSC-DN, ANR-JCJC

## ■ SENSORY SPINAL SIGNALING

**Claire Wyart** (Inserm)  
French Academy of Sciences/US National Academy of Sciences, École de l'Inserm Liliane Bettencourt, ANR-PRC

## GLOSSARY

**ANR-JCJC:** French National Research Agency (ANR) - Early Career Scientist

**ANR-ERA-NET E-Rare:** Transnational co-funding on rare diseases

**ANR-PRC:** ANR Collaborative Research Projects

**ANR-PRCE:** ANR Collaborative Research Projects - Business

**AFM:** French Muscular Dystrophy Association

**AP-HP:** Paris Public Hospital Network

**ARSEP:** French Association for Multiple Sclerosis Research

**ARTC:** French Association for Brain Tumor Research

**COFECUB:** French Committee for the Evaluation of Academic and Scientific Cooperation with Brazil

**FRC:** French Foundation for Brain Research

**FRM:** French Foundation for Medical Research

**MSC-DN:** Marie Skłodowska-Curie Actions - Doctoral Networks

**RIF:** Greater Paris Region

**Santé publique France:** French Institute for Public Health Surveillance

**SFRMS:** French Sleep Research and Medicine Society

# €11.5 M

total competitive, national and international funding obtained in 2022

# 18 ANR

grants won in 2022, including 3 Early Career Scientist grants

# 2

FRM accredited teams

# Cellular and molecular neurobiology

The main goal of the teams in this field is to shed light on the genetic, molecular and cellular bases of brain development, aging, function and diseases. Focus areas include brain cell diversity and interactions in the healthy and diseased brain, and identifying the genetic causes of neurological and psychiatric disorders, Alzheimer's, Parkinson's, multiple sclerosis, epilepsy and other conditions to develop novel therapeutic targets.

## DIRECT DIALOG BETWEEN THE GUT MICROBIOTA AND THE BRAIN

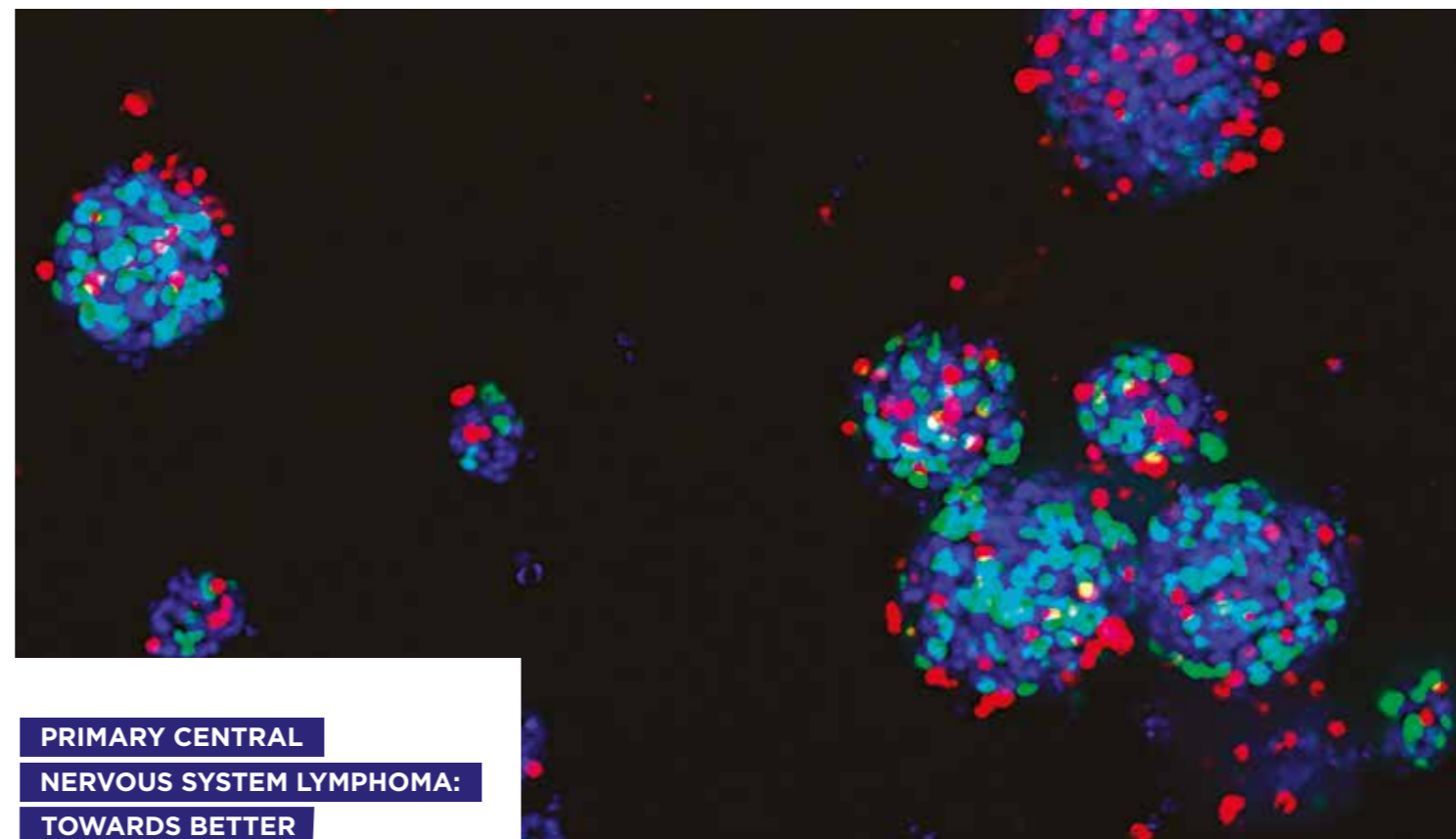
The gut microbiota is the largest reservoir of bacteria in the body, and some bacteria-derived molecules, such as muropeptides, can pass into the bloodstream. A research team from the Institut Pasteur, in collaboration with Paris Brain Institute, demonstrated that some neurons, especially those situated in the hypothalamus, have receptors for bacterial muropeptides similar to those found on immune cells. The research established a connection between the activity of these receptors and hypothalamic control of food intake and body temperature. The results show for the first time that gut bacteria populations are directly linked to food intake, paving the way for novel therapeutic avenues associating aging and metabolic deficiencies.

Gabanyi I, et al. *Science*. April 2022  
**Structural Dynamics of Networks team - N. Renier**

## NOVEL ANTI-INFLAMMATORY MECHANISM IDENTIFIED

The inflammation in lesions that occur in multiple sclerosis and other neurodegenerative diseases needs to be contained to slow down the pathological process. A 2022 study demonstrated that production of transcription factor Gcm2 by immune cells in the brain promotes their transition to an anti-inflammatory state conducive to lesion repair. These results represent a major contribution to our understanding of molecular mechanisms that control the inflammatory response, opening up new therapeutic avenues.

Pavlidaki A, et al. *Cell Rep*. October 2022  
**Myelin Plasticity and Regeneration team - B. Nait Oumesmar and V. Zujovic**



Malignant glioma cells in cell culture (spheroids)

## PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA: TOWARDS BETTER TREATMENT

Primary central nervous system lymphoma (PCNSL) is diagnosed based on histology obtained from a brain biopsy. But patients can have very different clinical and radiological presentations, making diagnosis difficult. For the first time, a team from Paris Brain Institute identified four molecular profiles of PCNSL that predict prognosis and relapse risk, so that patients can be offered more rapid and targeted treatment.

Hernández-Verdin I, et al. *Ann Oncol*. November 2022  
**Genetics and Development of Nervous System Tumors team - E. Huillard and M. Sanson**

## IMAGING MENINGEAL LYMPHATIC VESSELS TO EXPLORE BRAIN INFLAMMATION

The meningeal lymphatic system is a series of non-blood vessels involved in waste clearance and immune surveillance in the central nervous system. Scientists from Paris Brain Institute used magnetic resonance imaging (MRI) in humans to establish a three-dimensional map of this network. A pilot study in 11 patients affected by various neurological diseases also revealed that meningeal lymphatic volume varies from one individual to the next and is greater in men than in women. Lymphatic MRI can now be used to determine whether the morphology of the meningeal lymphatic system is a novel indicator of brain inflammation in neurological diseases like multiple sclerosis and Parkinson's disease.

Jacob L. et al. *Journal of Experimental Medicine*. 2022  
**Alzheimer's Disease and Prion Diseases team - MC. Potier and S. Haïk**

### ACHIEVEMENTS

**FRANCESCA BRANZOLI** was successful in the Inserm Research Associate competition. After a PhD in Physics, she is now a member of the Genetics and Development of Nervous System Tumors team. Her research uses magnetic resonance spectroscopy to identify genomic markers for gliomas.



**STÉPHANIE BAULAC**, Inserm Research Director and head of the Genetics and Pathophysiology of Epilepsy team, won highly selective competitive funding from the European Research Council (ERC) for her project on the role of cell degeneration in focal cortical dysplasia (FCD), a developmental malformation of the

brain that causes drug-resistant epilepsy in children.



# Integrative neurophysiology

The neurophysiology teams study the mechanisms and cellular interactions underlying sensory processing, cognition and motor control. Their aim is to characterize neuronal activity in synapses – areas between neurons where information is exchanged – microcircuits and whole-brain networks. They are also seeking to determine how and why the neuronal activity associated with visual perception, locomotion, habits and cognitive flexibility can be disrupted in conditions such as epilepsy and Parkinson’s disease.

## CAUSES OF EPILEPTIC SEIZURES IN AUTOIMMUNE ENCEPHALITIS

Autoimmune encephalitis can cause epileptic seizures when abnormal antibodies interact with brain cells. In this study, the scientists showed for the first time *in vivo* that seizures were linked to disruption in a known potassium-permeable neuronal channel. Using regional and local recordings of single neurons, they also proposed a scenario explaining the intermittent recruitment of neurons and the regular and frequent occurrence of seizures in patients. These findings may help identify novel therapeutic targets for this disease, which continues to cause multiple, frequent and severe sequelae in patients.

Baudin P, et al. *Prog Neurobiol.* 2022  
**Dynamics of Epileptic Networks and Neuronal Excitability team – S. Charpier, M. Chavez and V. Navarro**

## THE ROLE OF CANNABINOID RECEPTOR-EXPRESSING INTERNEURONS IN VISUAL PERCEPTION

Sensory information is integrated by cortical circuits formed of multiple neuronal subtypes that connect with each other based on a detailed blueprint. Inhibition of pyramidal neurons (PNs) coordinates cortical network activity during sensory processing. Sensory information is relayed (via the thalamus) to the primary sensory neocortical areas and then passed to other cortical layers before transmission to higher-order associative cortical areas, integration zones that play a major role in information processing and behavior. Scientists from the Institute demonstrated that cannabinoid receptor type 1-expressing interneurons control PN activity according to an alternative connectivity model in different cortical areas, especially the visual area.

Koukouli et al. *Cell Reports.* 2022  
**Cellular Physiology of Cortical Microcircuits team – A. Bacci**

## A COMPARATIVE STUDY OF NEURONAL MECHANISMS ASSOCIATED WITH BEHAVIOR

Little is known about the way in which closely related species with similar neuronal circuitry can evolve different locomotion and navigation strategies to explore their environment. Scientists from the Institute studied divergent swimming patterns in the larvae of a small fish, *Danio rerio* (DC), which swims for long continuous periods, and zebrafish (ZF), characterized by burst-and-glide swimming. They showed that two anatomically similar brains with conserved characteristics can produce different behavioral results and identified a particular neuronal type behind this divergence. The findings show the efficacy of comparative neuroethology in elucidating the evolution of behaviors and neuronal circuits in vertebrates.

Rajan et al. *Cell Reports.* 2022  
**Sensory Spinal Signaling team – C. Wyart**



Zebrafish larvae viewed using optogenetics

### SUCCESS STORIES

**NICOLAS CHENOUD** was successful in the Inserm Research Associate competition. His research in the Cellular Mechanisms of Sensory Processing team focuses on the development of algorithms for image and neural signal analysis.

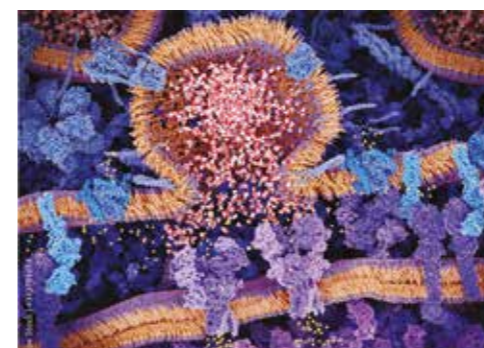


**DELPHINE OUDIETTE**, an Inserm scientist in the “Mov’It: Movement, Investigation, Therapeutics, Normal and Abnormal Motor Control: Movement Disorders and Experimental Therapeutics” team, was awarded a highly competitive European Research Council grant. The aim of her project CREDOZE is to identify a brain signature to improve sleep characterization using encephalography.



## RECEPTORS INVOLVED IN FEAR MEMORIES

In the brain, NMDA membrane receptors (NMDARs) specialize in the detection of glutamate, an excitatory neurotransmitter. NMDAR activation requires simultaneous binding of glutamate and glycine or D-ser-



ine. In 2022, scientists from Paris Brain Institute revealed the existence of receptors activated solely by glycine in the neocortex, in selective populations of inhibitory interneurons. They also discovered that these receptors are neuromodulated by the dopaminergic system and control the stability of fear memories in the basolateral amygdala. Their results show that NMDARs are plastic and represent a novel signaling system, widely present in multiple brain regions, by which extracellular glycine regulates neuronal activity, circuit function and behavior.

Bossi S, et al. *Neuron.* 2022  
**Cellular Mechanisms of Sensory Processing team – N. Rebola**

## Cognitive neuroscience

The aim of research in this field, which combines psychology and neuroscience, is to identify the neural circuits in the brain behind mental processes that are impaired by disease, treatment and rehabilitation. Using behavioral testing and mathematical models of behavior together with multimodal brain imaging and stimulation, the aim is to characterize cognitive, motivational, affective and attentional factors that shape behavior in mood disorders, apathy, dementia, impaired consciousness, aphasia, negligence and dysexecutive syndrome. The teams also study higher brain functions like language, attention, consciousness, motivation, decision-making, cognitive bias, goal-directed behavior, creativity, reasoning, emotional processing and social influence.

### IN THE BRAINS OF PROCRASTINATORS

A team from Paris Brain Institute elucidated how our brain behaves when we procrastinate. The study in humans, combining functional imaging and behavioral tests, revealed that the decision to procrastinate takes place in the anterior cingulate cortex. The team also developed an algorithm to predict participants' tendency to procrastinate. The research could contribute to the development of individual strategies to help us stop putting off tasks that are within our grasp, thereby preventing the adverse effects of procrastination in fields as varied as education, economics and health.

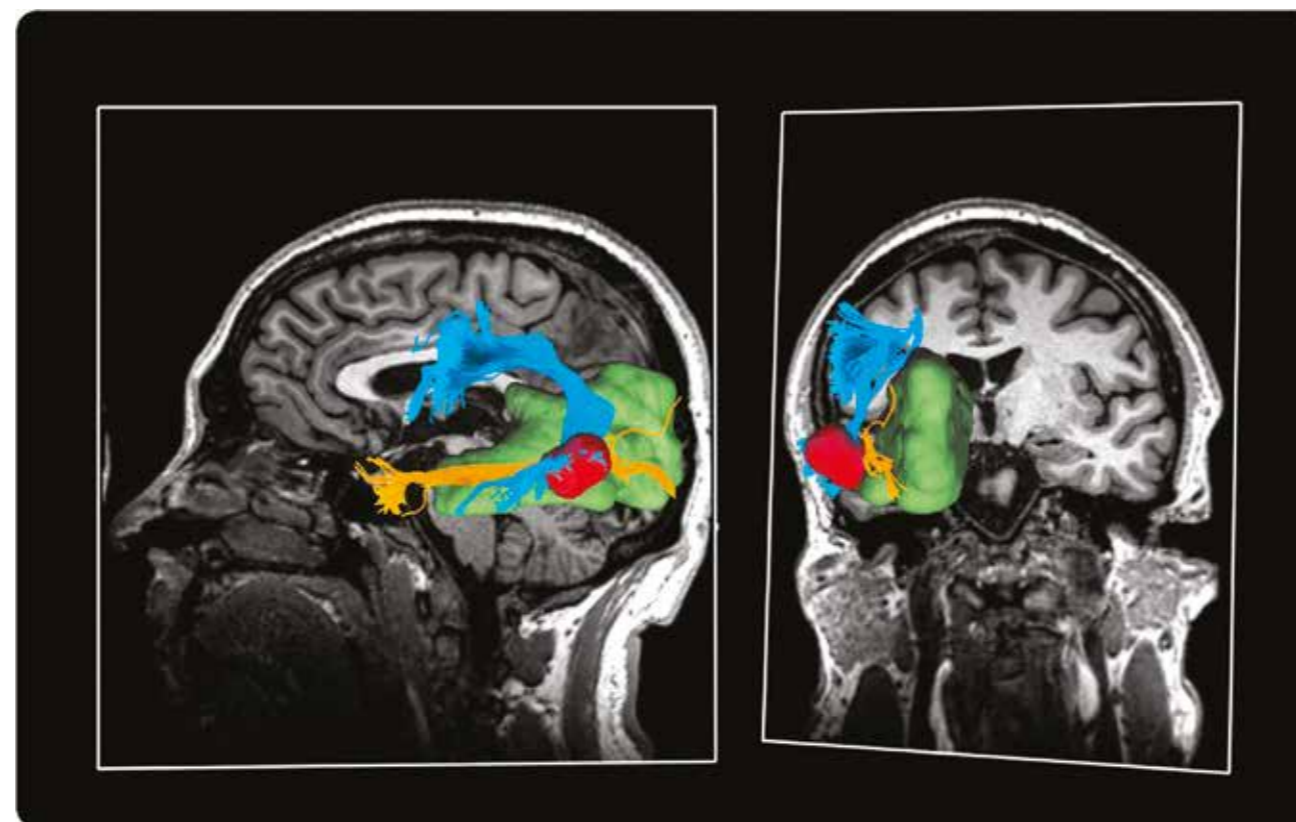
Le Bouc, et al. *Nature Communications*. 2022

**Motivation, Brain and Behavior team** - M. Pessiglione, J. Daunizeau and S. Boure

### BRAIN CONNECTIONS CONDUCIVE TO CREATIVITY

Creativity is a cognitive function that we use every day to solve problems, cope with change and innovate. In neuroscience, it is generally defined as the ability to produce something new and original that is suited to the context. In a study conducted in 2022, participants undergoing functional MRI evaluated semantic links between multiple pairs of words during acquisition. Their real-life creativity was measured with a questionnaire on creative activities and achievements in eight different areas including literature, creative cooking, music, sport, performing arts, and science and engineering. The results showed that creativity depends on individual semantic associations and that functional brain connectivity patterns are specific to the organization of semantic associations that encourage creativity.

Ovando-Tellez, et al. *Sci Adv*. 2022  
**Frontlab: Frontal Functions and Pathology team** - R. Levy



Using MRI tractography to visualize the brain of a post-stroke patient (see adjacent image). Lesion in green, mental imagery node at the fusiform gyrus in red, arcuate fasciculus in blue, and inferior longitudinal fasciculus in yellow

### A NOVEL BRAIN NETWORK BEHIND VISUAL MENTAL IMAGERY

Every day, we make use of one of our brain's unique abilities - visual mental imagery - to see images, objects or people "in our mind's eye." By studying a patient with a post-stroke brain lesion who was experiencing difficulties reading and naming colors but had good mental imagery in these areas, scientists from Paris Brain Institute identified a network that could play a key role in this process. Using MRI tractography to visualize neurons in the brain, the research revealed connections in a node that is crucial for mental imagery, located in the fusiform gyrus in the left temporal lobe. It showed that two white matter fascicles passed through this node: the arcuate fasciculus, associated with the language system, and the inferior longitudinal fasciculus, linked with the semantic system - our knowledge of the world, objects and concepts.

Hajhajate, et al. *Brain Struct Funct*. 2022  
**PICNIC - Physiological Investigation of Clinically Normal and Impaired Cognition team** - L. Cohen, L. Naccache and P. Bartolomeo

### A SPECIFIC BRAIN SIGNATURE FOR CRAVING

Craving is a key characteristic of psychoactive substance use disorders. It is a strong predictor of substance use and

relapse and is linked to overeating, gambling and other maladaptive behaviors. Scientists from Paris Brain Institute used machine learning to identify neuroimaging markers based on functional MRI evaluating the intensity of food cravings in drug users and non-users. These biomarkers pointed to target brain mechanisms that could be used to monitor the progression of cravings, identify individuals at risk of weight gain, predict responses to treatment or serve as drug targets.

Koban, et al. *Nature Neuroscience*. 2022  
**CIA: Control - Interoception - Attention team** - P. Fossati and L. Schmidt



## Clinical and translational neuroscience

From laboratory to patient bedside and back again, the main aim of the teams working in this field is to advance translational research on neurological and psychiatric disorders. Their scientific strategies aim to shed light on brain physiology and pathophysiology using human diseases as models. The ultimate goal is to provide innovative tools that can be used in clinical symptom evaluation and diagnosis, to identify progression biomarkers and design novel therapies. This research requires the development of patient cohorts that have been phenotyped and biologically characterized using molecular, neuroimaging or electrophysiological biomarkers, to study pathological processes, devise molecular screening and therapeutic strategies, and develop personalized medicine.

### COFFEE TO TREAT GENETIC DYSKINESIA

Genetic dyskinesia is an orphan disease characterized by sudden involuntary movements that can affect the whole body. In a recent collaborative study involving 30 dyskinesia patients with a mutation in the ADCY5 gene, scientists from the Institute confirmed the therapeutic effects of coffee. Their finding may be explained by the fact that caffeine binds to adenosine receptors that modify the function of the affected protein (ADCY5) at the striatum, a deep brain region that plays a key role in movement control. This research opens new therapeutic prospects for both dyskinesia and hyperkinetic movement disorders.

Méneret A, et al. *Mov Disord.* 2022  
**Mov'it: Movement, Investigation, Therapeutics. Normal and Abnormal Motor Control: Movement Disorders and Experimental Therapeutics team - S. Lehericy and M. Vidailhet**

### SPINOCEREBELLAR ATAXIA TYPE 2: NEW AVENUES AFTER A THERAPEUTIC TRIAL

Spinocerebellar ataxias are a group of clinically and genetically heterogeneous inherited neurodegenerative disorders for which there is no curative treatment. The main symptoms are coordination and balance difficulties, dysarthria and eye movement abnormalities. A team of scientists coordinated the ATRIL clinical trial involving 45 patients with moderate-stage disease. Although the results of the trial did not improve clinical or radiological outcomes in the patients treated with riluzole compared with the placebo group, monitoring clinical and MRI scores provided disease progression data that may lead to the identification of novel biomarkers, which are crucial in evaluating new treatments.

Coarelli G, et al. *Lancet Neurol.* 2022  
**Basic to Translational Neurogenetics team - A. Durr and G. Stevanin**

**COMPETITION** MARION ROUAULT was successful in the CNRS Research Associate competition. Her research in the Motivation, Brain and Behavior team focuses on the neural mechanisms underlying self-confidence and their role in learning and decision-making.



### KETAMINE AND DEPRESSION: MECHANISM OF ACTION REVEALED

Depression is the most commonly occurring psychiatric disorder: it is thought that 5 to 15% of the French population will experience an episode of clinical depression during their lifetime. It affects people of all ages and social backgrounds. In 2022, scientists from the Institute identified one of the mechanisms of action underlying the antidepressant effects of ketamine, usually used as an anesthetic. The team tested this low-dose treatment in patients with severe treatment-resistant depression. The patients demonstrated an increased ability to overcome their negative views of themselves and the world - one of the symptoms of the condition - when presented with positive information. These results open new therapeutic avenues for the treatment of antidepressant-resistant mood disorders.

Botteman H, et al. *JAMA Psychiatry.* 2022  
**CIA: Control - Interoception Attention team - P. Fossati and L. Schmidt**



### TREATING INSOMNIA ASSOCIATED WITH PARKINSON'S DISEASE

Sleep disorders are one of the most debilitating non-motor symptoms of Parkinson's disease - they have a major impact on the quality of life of patients and carers. 60 to 80% of advanced-stage patients suffer from insomnia. Scientists and clinicians from Paris Brain Institute coordinated a therapeutic trial on night-time infusion of apomorphine, a molecule that mimics the action of dopamine, the missing neurotransmitter in Parkinson's disease, in patients with moderate to severe insomnia. The treatment was found to reduce insomnia and improve sleep quality and motor skills on waking up. It therefore represents a potential therapeutic option for treating sleep disorders in Parkinson's disease.

De Cock VC, et al. *Lancet Neurol.* 2022  
**Mov'it: Movement, Investigation, Therapeutics. Normal and Abnormal Motor Control: Movement Disorders and Experimental Therapeutics team - S. Lehericy and M. Vidailhet**

Cryopreserved cells from a Parkinson's patient

## Computational modeling in neuroscience

Mathematical models, computer simulations and theoretical analyses can be used to investigate brain functions at multiple scales. Modeling teams develop computer techniques and exploration methods to characterize diseases based on multimodal brain data, offering new perspectives on behavioral analysis and our understanding of molecular and cellular processes. Their research may also be useful for electrophysiological signal processing and brain imaging. Integrated analysis of research data from other fields can help improve the diagnosis and prognosis of neurological and psychiatric diseases and identify early markers to prevent their development.



**RECRUITMENT** **MARIE CONSTANCE CORSI** was successful in the INRIA Research Associate competition. Her research in the "ARAMIS - Algorithms, Models and Methods for Images and Signals of the Human Brain" team focuses on developing multimodal approaches to identify clinical applications for human-machine interfaces.

### EARLY DETECTION OF PARKINSON'S DISEASE TO IMPROVE TREATMENT

Scientists from Paris Brain Institute developed an artificial intelligence algorithm for automatic, rapid and reliable analysis of neurodegenerative changes in the substantia nigra pars compacta (SNc), a structure involved in Parkinson's disease, using neuromelanin-sensitive MRI. They applied the technique in isolated rapid eye movement (REM) sleep behavior disorder (iRBD), a prodromal form of Parkinson's disease.

The algorithm is a valuable tool for directly evaluating neurodegenerative changes in the SNc. Research is ongoing to determine whether neuromelanin imaging could predict the conversion of iRBD to Parkinson's disease, with the aim of developing early treatment before the emergence of motor symptoms.

Gaurav, R, et al. *Movement Disorders*. 2022 **Mov'it: Movement, Investigation, Therapeutics. Normal and Abnormal Motor Control: Movement Disorders and Experimental Therapeutics team - S. Lehericy and M. Vidailhet**

### GENETIC PREDISPOSITION TO ALZHEIMER'S DISEASE

Although 99% of Alzheimer's cases are not inherited, genetic factors may increase the risk of developing the disease. In a study in elderly people without cognitive decline, scientists at Paris Brain Institute revealed a link between brain amyloid deposition, a hallmark of Alzheimer's disease, and a combination of 17 genetic variants. Assessing the genetic risks conferred by these predisposing variants before amyloid plaque can be detected in the brain or plasma could enable early identification of people most at risk and prevent the emergence of Alzheimer's through a more interventional approach.

Xicota L, et al. *Neurology*. 2022 **Alzheimer's Disease and Prion Diseases team - MC. Potier and S. Haïk**

### PREVENTING THE EMERGENCE OF IMPULSIVE BEHAVIORS IN PARKINSON'S DISEASE

Impulse control disorders (ICDs) are frequent non-motor symptoms that affect 50% of patients with Parkinson's disease after five years of disease duration. A team of scientists and clinicians from Paris Brain Institute has developed the first machine learning algorithm to predict the emergence of ICDs over the course of the disease. Although the predictive model was relatively accurate, it does not yet meet the level to be used in clinical routine. Improvements are under way and the algorithm will soon be tested in a clinical trial to validate its effectiveness in preventing ICDs in Parkinson's patients.

Faouzi, et al. *Engineering in Medicine and Biology*. 2022 **Molecular Pathophysiology of Parkinson's Disease team - O. Corti and JC. Corvol**



Using modeling to reconstruct brain networks

### ELUCIDATING BRAIN ORGANIZATION AND FUNCTION IN TIME AND SPACE

Brain function develops simultaneously in different dimensions, which can be considered at various scales. In the temporal dimension, aging occurs over a lifetime, learning over weeks or months, and behavior in milliseconds. The spatial dimension considers the brain as a whole or in terms of regions or even neurons. Using diffusion MRI, which can reconstruct connectivity networks, and functional MRI, which provides information about brain activity, scientists from Paris Brain Insti-

tute revealed new connectivity patterns between brain structure and activity by developing a new modeling approach that mathematically integrates anatomical and functional data.

Presigny, et al. *Rev. Mod. Phys.* 2022 **ARAMIS - Algorithms, Models and Methods for Images and Signals of the Human Brain team - O. Colliot and S. Durrleman**

# FUNDAMENTAL AND CLINICAL RESEARCH: KEY COMPLEMENTARITY



**Bassem Hassan, Scientific Director of the Paris Brain Institute, and Catherine Lubetzki, Medical Director and Head of the AP-HP-Sorbonne University Neuroscience DMU, share their thoughts on the complementarity between basic and translational research at the Institute.**

## THE INSTITUTE WAS FOUNDED ON THE CONCEPT OF SYNERGY BETWEEN CLINICAL AND RESEARCH TEAMS. HOW IS THIS RESEARCH CONTINUUM ORGANIZED ON A DAILY BASIS?

**BH:** The Institute has broken down the barriers between basic and clinical research. We run the full gamut of the research spectrum, with multiple areas of expertise sometimes even within a single team, and specialist services provided by our core

facilities. Over the past few years we have also introduced new initiatives to encourage collaboration between experts from different fields. One excellent example is the Big Brain Theory program, in which innovative, interdisciplinary, high-risk research projects are proposed by several teams.

**CL:** Our clinical research infrastructures (iCRINS), in which clinicians interact with scientists on a particular disease, facilitate the establishment of cohorts that are well characterized in clinical, genetic and imaging terms and encourage the inclusion of patients in therapeutic trials. Another practical example: in 2022, we launched the first partnership contracts with the Paris Public Hospital Network (AP-HP) and Sorbonne University to give clinicians dedicated research time.

## WHAT STILL NEEDS TO BE IMPROVED IF THIS RESEARCH IS TO REACH ITS FULL POTENTIAL?

**BH:** We must provide long-term support for ambitious research by giving teams stable funding via five-year grants. We are also constantly encouraging our core facilities to develop innovations so that they can offer scientists specific tools in addition to existing market solutions. Finally, we are committed to maintaining strong links between research and innovation at the Institute, in collaboration with industry, to facil-

At Paris Brain Institute, clinicians and scientists work together on a daily basis. This permanent interaction, from patient bedside to laboratory and back again, optimizes the work of scientists as they seek to understand the nervous system and neurological diseases and to develop innovative diagnostic and therapeutic solutions more quickly.

itate the emergence of discoveries that can be turned into pharmaceutical, technological or digital solutions. We are particularly working on this with the TIDUs and launchpads (see *Innovation chapter*).

**CL:** In terms of clinical research, we make every effort to optimize administrative deadlines, from the first idea for a trial to its implementation. This has been facilitated by the fast tracks we are continuing to develop between the Institute and the AP-HP.

## HOW WILL THE INSTITUTE STRUCTURE ITS RESEARCH STRATEGY TO RESPOND TO THESE CHALLENGES?

**BH:** Our challenge is to lead major multilevel interdisciplinary projects so that we can create a map of brain diseases, pooling our expertise in population analysis, from genetics and physiology to imaging.

**CL:** We also intend to step up our efforts on big data and artificial intelligence. Our cohorts provide vast quantities of data and represent a real asset – especially presymptomatic subjects, in other words those at risk of developing a nervous system disorder. We also hope that new imaging tools such as high-field MRI will improve the visualization of pathological processes, enhancing our understanding and facilitating the identification of new prognostic markers.

# Clinicians and scientists: synergy in action

The ecosystem at Paris Brain Institute encourages complementarity between clinical and research approaches. The success of this strategy is based on links with Pitié-Salpêtrière Hospital, constant dialog between patient bedside and laboratory, and access to unique patient cohorts. Here are two examples of this cross-cutting approach to research and clinical practice.

## THE ORIGINS OF HUNTINGTON'S DISEASE IN EMBRYOS

Clinician and geneticist **Alexandra Durr** is working with **Sandrine Humbert**, a specialist in brain development and neurodegenerative processes, on the origins of Huntington's disease. They have made a major discovery.

**AD:** Huntington's disease is a rare inherited neurological condition which leads in adulthood to progressive motor dysfunction, cognitive decline and psychiatric symptoms. We were aware of its genetic origins – a mutation in the gene that encodes the huntingtin protein –, but that did not tell us when we should intervene in the natural history of the disease to try to curb its pathological mechanisms. Although the symptoms generally begin in adulthood, we suspected the presence of early abnormalities in people with the genetic mutation.

**SH:** Research over the past decade has described the role of huntingtin in stem cell division and maturation during the development of the central nervous system: it regulates several stages of cerebral cortex development. The collaborative work with Alexandra has furthered our knowledge in this area. During human embryogenesis, the pathological huntingtin protein is abnormally localized in progenitor cells. This mislocalization is associated with decreased levels of junction proteins, disrupting the "division-differentiation" balance of progenitor cells. Our identification of a neurodevelopmental component may help improve understanding and treatment of Huntington's disease.

ALEXANDRA DURR & SANDRINE HUMBERT



SÉVERINE BOILLÉE & FRANÇOIS SALACHAS

## ALS: UNDERSTANDING THE IMMUNE COMPONENT OF THE DISEASE

**Séverine Boillée**, who leads the "ALS: Causes and Mechanisms of Motor Neuron Degeneration" team, is working in collaboration with neurologist **François Salachas** on amyotrophic lateral sclerosis (ALS).

**FS:** ALS is a neurodegenerative disease that affects motor neurons, nerve cells that control muscle contraction. The death of these neurons leads to muscle loss and progressive paralysis in patients. But other cell types can also be involved in the progression of the disease – including immune cells.

**SB:** We are researching a specific type of immune cell, macrophages, found in all tissues. They are known as microglial cells in the brain and as peripheral macrophages in the nerves. We have demonstrated that these cells are involved in motor neuron survival and can have a harmful effect in ALS. And when we modify peripheral macrophages to reduce their toxicity in mouse models of ALS, we can also modulate the responses of microglial cells in the central nervous system.

**FS:** So our hope is to use immune cells as an intermediary to act on the brain. It is very difficult to deliver drugs to the central nervous system as it is protected by the blood-brain barrier. Séverine's team has shown that this technique works in animals to slow the progression of the disease. We now want to see whether it has an impact in humans.

## Patients at the center of the Institute's scientific and medical strategy

With its on-site Clinical Investigation Center (CIC), clinical research infrastructures (iCRINs) in departments at Pitié-Salpêtrière Hospital, and multidisciplinary teams combining clinicians and scientists, Paris Brain Institute is ideally positioned to perform outstanding clinical research driven by wide-ranging expertise.

### COMPLEMENTARY AND COLLABORATIVE STRUCTURES FOR CLINICAL RESEARCH



The **Neuroscience Clinical Investigation Center** at Paris Brain Institute is a clinical research facility for the coordination and organization of clinical trials. It currently has around 50 staff members, and every day patients with neurological and psychiatric diseases come to take part in trials and receive innovative treatments in optimum quality and safety conditions governed by the highest ethical standards. The CIC provides services for hospital physicians, scientists at the Institute and drug manufacturers.

The Neuroscience CIC coordinates the **Paris Brain Institute's clinical research infrastructures (iCRINs)**. The 13 iCRINs are one of the clearest examples of the In-

stitute's philosophy that clinical research should be performed as close as possible to patients and that links between clinical and basic research need to be strengthened. The aim is facilitate expertise sharing between medical staff at Pitié-Salpêtrière Hospital and research teams at Paris Brain Institute. In 2022, the first patients were included in the SonoFirst trial based on use of the SonoCloud medical device as a first-line treatment for malignant brain tumors, which is soon set to be applied in pediatrics. In the neurovascular field, a routine treatment protocol to predict post-stroke upper limb motor recovery was introduced. Encouraging results were also observed in the PAS\_AVC trial, conducted in collaboration with the Neuroscience CIC to assess how neuromodulation affects upper limb function after a stroke.



Part of the **NeuroTrials** early clinical development team is based in the Support Unit for Research Involving Human Subjects (RIPH), so that scientists at Paris Brain Institute can carry out clinical trials sponsored by the Institute. In December 2022, the RIPH Support Unit was supporting 21 trials, three pending authorization.

### NETWORKS AND COHORTS TO ACCELERATE CLINICAL RESEARCH

The Neuroscience CIC is involved in national and international clinical research networks, facilitating the sharing of vast quantities of patient data that can improve our understanding of nervous system diseases. CIC physicians are among the coordinators of the NS-Park/FCRIN network for Parkinson's disease (70 trials from 2016 to 2022 involving over 5,000 patients), F-CRIN4MS for multiple sclerosis, and Act4ALS-MND for amyotrophic lateral sclerosis. More than 20,000 patients are monitored via these networks. Several large cohorts have also been established at the CIC to gather multiple data from patients with the same disease over a long period. One example is the ICEBERG cohort (170 Parkinson's patients, 70 individuals at risk of developing the disease and 60 healthy individuals).

### CLINICAL RESEARCH IN 2022

**1,827** patients included in clinical trials, **502** in the CIC and **1,325** in the **13** iCRINs

**175** trials under way, **83** at the CIC

**33** new trials launched in 2022, **20** at the CIC

**2 171** visits to the CIC

### CLINICAL TRIALS IN 2022

In 2022, the Neuroscience CIC's clinical trials yielded a number of significant results.

#### Understanding and stimulating remyelination in multiple sclerosis

The team led by Bruno Stankoff identified a novel marker of multiple sclerosis in patients, namely the variation in size of a brain structure known as the choroid plexus. Two trials are also ongoing to promote remyelination and neuroprotection in optic neuritis, a common consequence of MS: ON-STIM through electrical stimulation of the optic nerve, and ACUITY through drug therapy.

#### Antisense oligonucleotide therapeutic strategies

"Antisense" therapy involves modulating the expression of certain target proteins in the central nervous system by administering fragments of genetic material capable of specifically suppressing the expression of certain genes. In patients with ALS caused by a SOD1 gene mutation, the therapy showed promising results, slowing muscular and respiratory decline. Other trials are under way for Huntington's disease, amyotrophic lateral sclerosis (ALS), some forms of spinocerebellar ataxia, Alzheimer's disease and multiple system atrophy.

### PROGRAMS TO PROMOTE CLINICAL RESEARCH

STARE is an educational program that gives third-year medical students an introduction to neuroscience research. Since 2020, it has been offered as a teaching unit at the Sorbonne University Faculty of Medicine. In 2022, 20 new clinical students were hosted for a week by the Institute's teams and facilities.

Like STARE, the DÉCLIC immersion program, developed in collaboration with the Neuroscience DMU at Pitié-Salpêtrière Hospital, offers research staff an introduction to nervous system diseases. In late March 2022, six scientists completed internships in the Neuropathology and Neuro-oncology Departments. On May 11, 2022, 17 paramedical staff representatives from the DMU were given a

presentation and visited Paris Brain Institute as part of the new Paramed exchange program.

**+** See p. 48





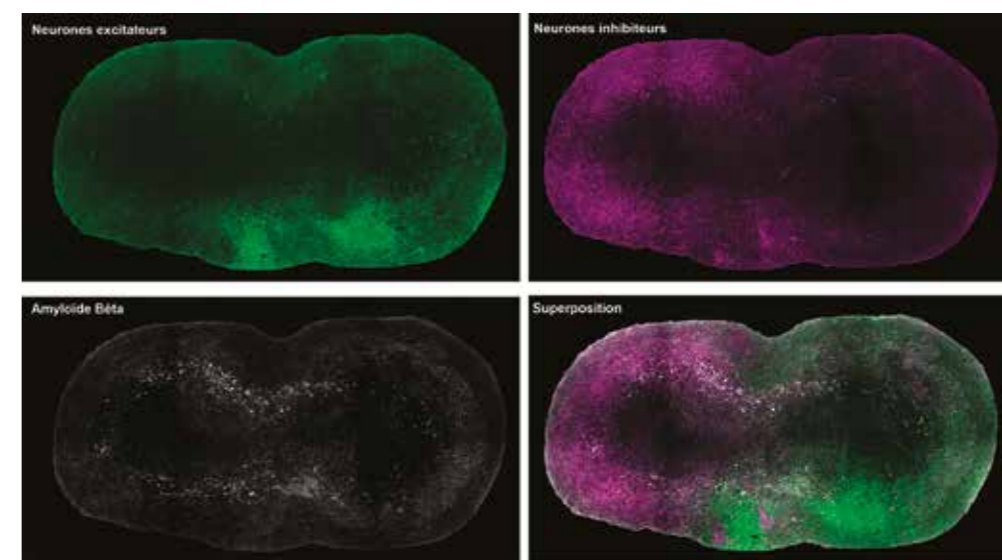
# RESEARCH AND TECHNOLOGY IN SYNERGY TO SERVE PATIENTS

The ten core facilities at the Institute give internal and external research teams access to state-of-the-art equipment and expertise in acquiring, interpreting and using data from specialists in these technologies. Scientists use the technical facilities to explore the brain and mechanisms of disease at every level, from DNA sequencing for genetic research to whole-brain MRI analysis to identify disease-related lesions.

	<p><b>iGenSeq</b>, the ISO 9001- and GIS IBISA-certified <b>genotyping and sequencing core facility</b>, specializes in genome analysis techniques (DNA and RNA) to detect mutations or variations in the expression of disease-associated genes.</p>	
	<p>The ISO 9001-certified <b>Cell Engineering and Vectorology core facility</b> cultures cells from experimental models and patients, produces human-induced pluripotent stem cells and develops molecular tools for gene transfer.</p>	
	<p><b>ePHYS</b> specializes in electrophysiology to record electrical activity between neurons and characterize cell function and dysfunction.</p>	
	<p><b>HISTOMICS</b> is a facility where scientific teams can analyze cells and tissues like the brain.</p>	
	<p><b>ICM-QUANT</b> offers access to multiple imaging techniques to observe cells and tissues using microscopy.</p>	
	<p><b>PhenoParc</b> specializes in the development of preclinical functional exploration protocols that are essential for effective, patient-friendly applied research.</p>	
	<p><b>CENIR neuroimaging</b> provides the Institute's research teams with equipment such as MRI, PET and electroencephalography that is vital for studying disease and understanding brain function.</p>	
	<p><b>PRISME</b> specializes in the study of brain function and normal and pathological human behavior. It develops new equipment and experimental therapeutic protocols for neuropsychiatric diseases.</p>	
	<p><b>Data Analysis Core</b> specializes in biomedical computing. It provides expertise in databases, genome analysis and biostatistics for the Institute's research teams.</p>	
	<p><b>DNA &amp; Cell Bank</b> is a Biological Resource Center (BRC) specializing in the conservation and provision of biological samples (DNA, RNA, cells, plasma, cerebrospinal fluid, etc.) from patients and controls. NF S96-900-certified.</p>	

## News from core facilities in 2022

In 2022, as well as the acquisition of the 7T MRI scanner, the Institute purchased three rare state-of-the-art machines that will help boost research, refine diagnosis and develop more effective treatments.



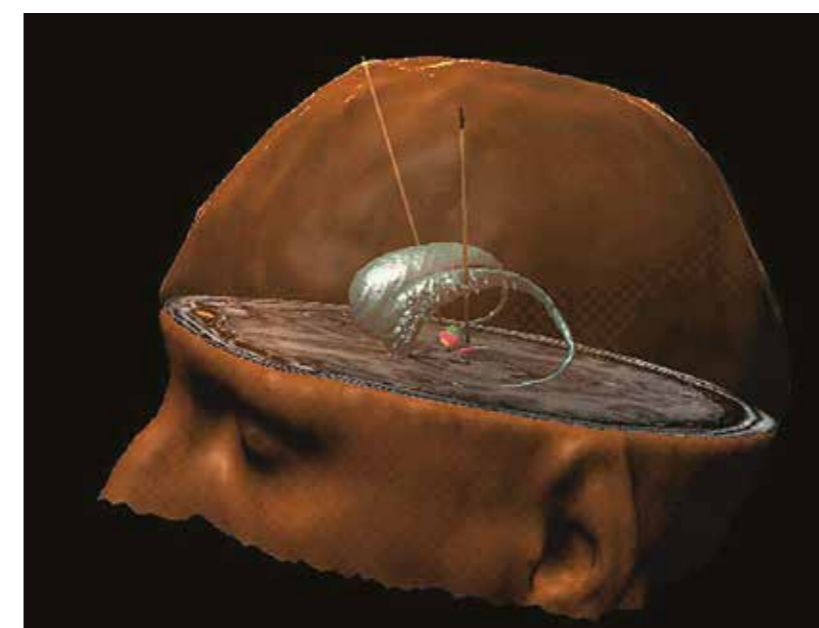
Organoids derived from patients with Alzheimer's disease

### 4,000 ELECTRODES TO RECORD CELLULAR ELECTRICAL SIGNALS

ePHYS has acquired a cutting-edge recorder with analytical capabilities 60 times more powerful than its predecessor. It can record electrical signals from neurons and identify new anomalies

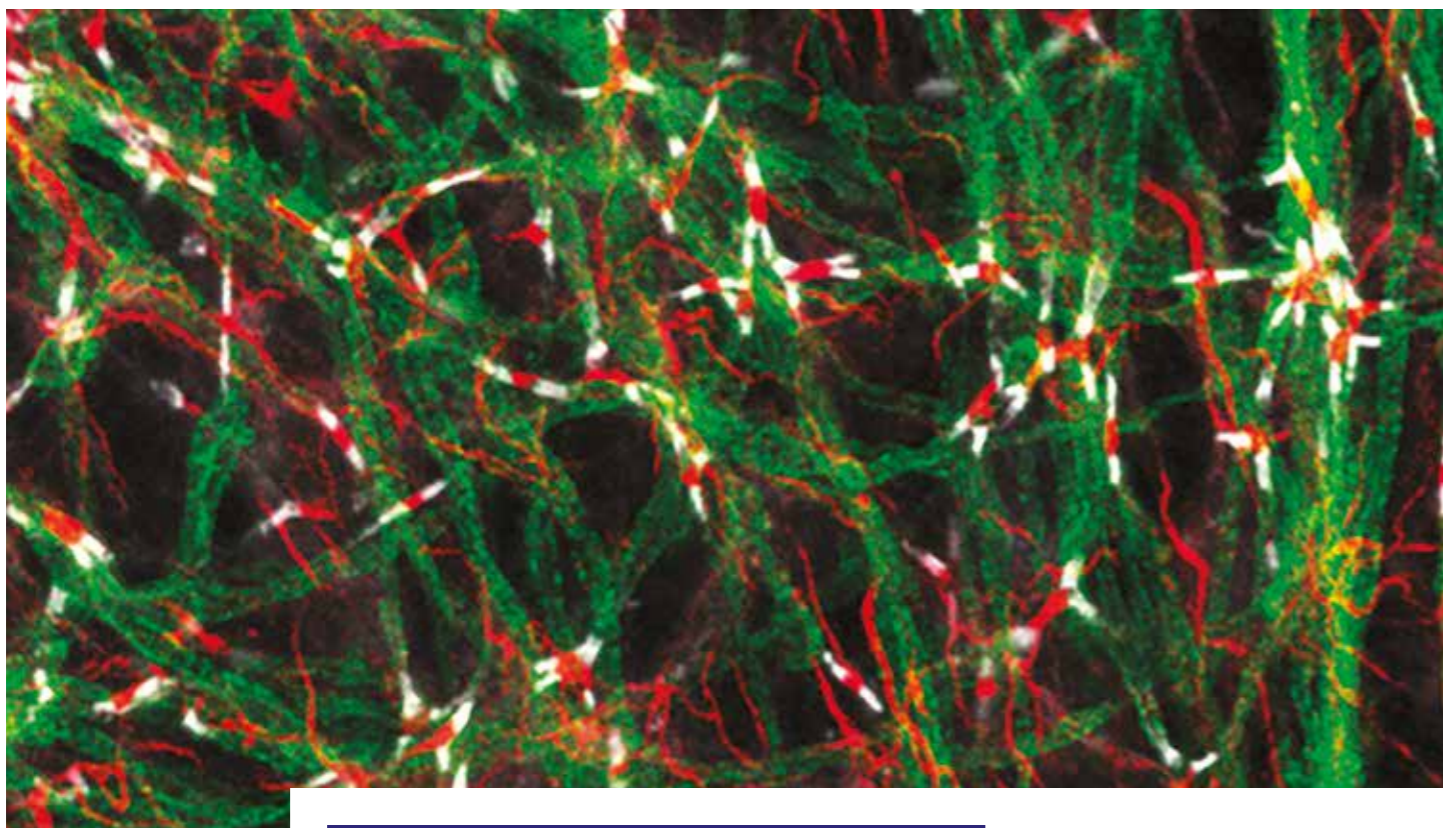
that were previously undetectable. It will help scientists understand neuron dysfunction and identify, test and validate novel therapies.

### MRI reconstruction of deep brain stimulation electrode implantation



### DEVELOPING A MORE PERSONALIZED THERAPEUTIC APPROACH

The Neuro-Omega system, installed in the CENIR facility in 2022, provides scientists with precise recordings of beta oscillations, neural electrical signals which if abnormal can indicate Parkinson's disease. The equipment will help optimize deep brain stimulation therapy for conditions such as Tourette's syndrome, dystonia and obsessive compulsive disorder.



**OBSERVING PREVIOUSLY UNSEEN DETAILS**

A new STED microscope with an adaptive optics system is available in the ICM-Quant facility and now offers four times higher resolution, enabling scientists to observe previously invisible regions of diseased brains and see details such as

abnormalities in protein localization and structure. Cutting-edge STED microscopy will benefit molecular and cellular research for all neurological and psychiatric diseases.

In 2022, Paris Brain Institute launched its first R&D call for tenders for interdisciplinary proposals involving several core facilities and scientists. Three proposals received funding:

- **A spatial transcriptomics facility** for research on the morphology and function of brain cells like neurons.
- **Development of a collaborative platform** for interpreting brain imaging data.
- **Recruitment of an engineer specializing** in kinetic analysis of MRI and PET brain images.

3 QUESTIONS FOR...

**YANNICK MARIE**  
Head of the iGenSeq core facility

**HOW HAVE YOU ORGANIZED THE IGENSEQ FACILITY?**

**Yannick Marie:** Launching the facility in 2010 was an ambitious undertaking – high-throughput sequencing was just taking off and we had to start from scratch. We immediately developed an extensive network of partners, such as the manufacturer Roche, who helped us install state-of-the-art technology. With the benefit of experience, I believed that the most effective strategy for iGenSeq was to let the scientists handle the research questions and to focus on the technological side – improving sequencing methods and processes to boost speed, quality and yield.

**WHAT WERE THE RESULTS OF THIS STRATEGY?**

**YM:** Our productivity went through the roof! We grew from a turnover of €100,000 and a deficit of 50% in 2010 to a turnover of more than €4 million and profits of over €700,000, with around 650 clients. IGenSeq is now one of France's top sequencing platforms, despite its small size. In 2022 we worked with the startup Ziwig, hosted at the Institute. Ziwig was initially developing a saliva diagnostic test for endometriosis, and it designed a hybrid process combining salivary RNA analysis and artificial intelligence. That method can now be applied to neuroscience research.

**WILL IGENSEQ BE ABLE TO MAINTAIN ITS COMPETITIVE POSITION?**

**YM:** High-throughput sequencing is evolving rapidly, so we need to make every effort to anticipate market developments and identify groundbreaking technologies. I am committed to this. The proportion of services provided by iGenSeq for industry has increased from 0% to 20% in ten years, and that figure could grow further with our acquisition of next-generation equipment and the fall in sequencing costs.



# INTERNATIONAL PARTNERSHIPS

Paris Brain Institute has developed an extensive French, European and international network for research and teaching, with more than 300 partnerships worldwide that serve as a basis to pursue joint research projects. Exchange programs also provide opportunities for novel training initiatives and knowledge transfer.

## 2022, new impetus for international events

After the COVID-19 pandemic, the desire for cooperation among the international community is stronger than ever. International exchange programs have gradually resumed their operations (especially with Stanford and Yale University in the US), as has participation in major scientific conferences, such as the Federation of European Neuroscience Societies (FENS) conference in Europe and the Society for Neuroscience (SFN) conference in the US. Paris Brain Institute was at the French Neuroscience Society booth for these two conferences to raise its profile and promote its new programs among the international community of early career scientists.



Society for Neuroscience booth in San Diego

## Global partnerships and collaborations

### CURE-ND (FRANCE, GERMANY, BELGIUM, UK)

CURE-ND (Catalyzing a United Response in Europe to Neurodegenerative Disease) is a network of excellence on neurodegenerative diseases composed of Paris Brain Institute, the UK Dementia Research Institute (UK DRI), DZNE in Germany and Mission Lucidity (VIB) in Belgium. The network's three main highlights in 2022 were:

**Workshop for early career scientists:** a retreat for PhD students and postdocs from the four partner institutes was held on May 25-27, 2022 in London.

**FENS networking event:** CURE-ND organized a social event on July 10, 2022

as part of the FENS Forum 2022 in Paris. The event, coordinated by Paris Brain Institute, was attended by over 130 participants from the French and European neuroscience community.

### Visit by a delegation from the Leuven Brain Institute (KU Leuven, Belgium):

The LBI steering committee visited Paris Brain Institute on October 12-13, 2022 to discuss strategic and organizational aspects to optimize LBI's development along the lines of Paris Brain Institute but tailored to the local ecosystem.



Early career scientist workshop in London, May 25-27, 2022

### COLUMBIA UNIVERSITY

#### (NEW YORK, US)

The new partnership with Columbia University involved two events:

**Hands-on Consciousness summer program:** Columbia University's Psychology Department and Center for Undergraduate Global Engagement invited Paris Brain Institute to take part in a new teaching program on consciousness, based on learning through research and including an internship in one of the Institute's laboratories and "Conversations on Consciousness" with the Institute's scientists. Twelve students were hosted between May 22 and July 3, 2022.

**Symposium on multiple sclerosis:** held on January 6, 2022 with Columbia University's Center for Translational and Computational Neuroimmunology, with nine experts and more than 70 participants.



Students from Columbia University visiting Paris Brain Institute

### YALE UNIVERSITY

#### (NEW HAVEN, US)

The permanent exchange program for clinicians established with Yale University in 2015 continued in 2022, with these events:

**Brain Vascular Imaging workshop (December 2022):** 15 brain imaging experts shared their latest scientific advances and discussed potential joint projects. A new collaborative research program was developed to investigate markers and mechanisms of neuroinflammation involved in neurodegenerative diseases, with a focus on multiple sclerosis and motor disorders. The program will be finalized in 2023 and a collaborative funding application will be submitted.

**Clinical exchange program:** scientists from the two institutes were given the opportunity to work in the partner team and learn about local approaches to diagnosis and treatment.



See inset, "Yale and Paris Brain Institute: a successful partnership," next page

**"Clinical Rounds" by video link:** presentations of clinical cases by resident clinicians from the two partner institutes. A joint session on multiple sclerosis with more than 70 participants was held in January 2022.

## ■ YALE AND PARIS BRAIN INSTITUTE: A SUCCESSFUL PARTNERSHIP

**JEAN-LÉON THOMAS, an Inserm Research Director at Paris Brain Institute, coordinates the Institute's partnership program with Yale University, where he is also a neurology professor.**



### HOW DID COLLABORATION WITH YALE UNIVERSITY BEGIN?

Since 2011 I have co-led a research team with Anna Eichmann on the origins of the nervous system in experimental models and growth factors involved in the vascular network. But our cooperation really took off in 2015, when an exchange program was launched between Yale and Paris Brain Institute for neurology interns. Around 20 placements have since been organized, funded by the Institute for French clinicians and now extended to neuropsychiatry and neurosurgery.

### HOW HAS THE COOPERATION DEVELOPED SINCE THEN?

Since 2018, we have also organized multi-annual meetings based on case studies. Exchanges between French and US clinicians often lead to further scientific collaboration, as was the case in 2022 on epilepsy. Since 2021, workshops have been held on either side of the Atlantic, with speakers from both institutes on topics including motor disorders, epilepsy, brain imaging, neuro-oncology and neurodevelopment. Our partnership has resulted in 29 joint publications!

### ANY NEW DEVELOPMENTS IN 2022?

We are very proud to have launched a new collaborative project on neuroimmunology, which will use the latest techniques to research brain inflammation. The aim is to set up a surveillance program for a wide range of neurological diseases, especially multiple sclerosis and motor disorders, involving patient cohorts and expertise from both institutions. Research protocols have been harmonized and patient cohorts meet the same clinical criteria. We are developing a five-year project that will involve four teams from Paris Brain Institute and four from Yale.



## ■ C-BRAINS: A MAJOR REGIONAL ALLIANCE

C-BRAINS, a neuroscience and cognitive sciences project in the Greater Paris region, involves teams from over 20 Paris-based neuroscience laboratories including Paris Brain Institute. It was selected as one of the region's nine Major Research and Innovation Fields (DIMs) in 2022.

The aim of C-BRAINS is to train a new generation of researchers in neuroscience and cognitive sciences while boosting the international impact and visibility of research in Greater Paris. In 2022, an international call for applications was launched for 13 PhD contracts, five at Paris Brain Institute. Two large-scale projects were also launched: on human stem cells and neuro-organoids, with the launch of a regional platform in coordination with the Institute's stem cell (iPS) core facility; and on behavior and cognition in animals and humans in environmental conditions.

## ■ PARIS BRAIN INSTITUTE BECOMES AN ASSOCIATE MEMBER OF EBRAINS AISBL



In August 2022, Paris Brain Institute joined EBRAINS AISBL, a new EU-funded digital research infrastructure established by the Human Brain Project to promote brain research. The Institute will be involved in governance of the program and will be well informed of any future innovations in computing and services developed by EBRAINS. The flagship EU project centralizes knowledge about data science, brain organization and artificial in-

telligence to help European researchers tackle major challenges in brain health, providing them with state-of-the-art brain atlases and tools for data sharing, modeling, simulation, high-performance computing and neurorobotics.

## MNI (MONTREAL NEUROLOGICAL INSTITUTE, CANADA)

Paris Brain Institute has developed tight scientific links with the Montreal Neurological Institute-Hospital (MNI) - The Neuro, a unique centre dedicated to accelerating discoveries to help patients with neurological disorders.

An extension of the cooperation agreement between the two institutes is set to be signed in 2023. The Directors of the MNI and Paris Brain Institute are exploring possibilities for future joint projects, including joint BBT projects, exchange of students, and opportunities for collaborations on Open Data.

## SAME-NEUROID (POLAND, FRANCE, GERMANY, NETHERLANDS)

SAME-NeuroID is a Horizon Europe Twinning project launched in October 2022 by Paris Brain Institute, Łukasiewicz PORT - Polish Center for Technology (Poland), the Erasmus Medical Center (Netherlands) and the Max Planck Institute of Psychiatry (Germany). The aim is to establish standardized protocols for modeling and researching neuropsychiatric disorders at Łukasiewicz PORT.

The SAME-NeuroID platform will involve two types of complementary assay covering key aspects of target validation: *in vivo* automated assays to evaluate social behavior deficits in rodents, and *in vitro* assays to examine cellular phenotypes associated with psychiatric diseases in human neural cells. Standard operating procedures (SOPs) will be employed and validated at Łukasiewicz PORT and across partner laboratories to guarantee reliability and facilitate large-scale transfer of the methods developed.

## INDIAN INSTITUTE OF TECHNOLOGY - DEHLI (NEW DEHLI, INDIA)

Paris Brain Institute is involved in the new French-Indian Campus between Sorbonne University (Paris) and the Indian Institute of Technology Delhi, selected in November 2022 following the French Embassy in India's call for proposals on life sciences for health. The program will develop courses and Master/PhD student exchanges between the two campuses, and training and research workshops based on existing capabilities, such as the Paris Brain Institute's iMIND international Master's program on neurodegenerative diseases.

The research conducted in the Paris Brain Institute's laboratories and core facilities and the multiple interactions with patients, associations and healthcare workers create a breeding ground for expertise, ideas and discoveries that can be turned into solutions, leading to the development of new treatments.

# INNOVATION

# THE INNOVATION CONTINUUM: FROM ORIGINAL IDEAS TO BUSINESS DEVELOPMENT

In 2022, Paris Brain Institute published its 2030 Innovation Plan. The Research Applications Directorate has now become the Innovation Directorate and has its first R&D unit in cell and gene therapy. It also has an “acceleration hub,” with new tools to boost the future industry value of projects developed at the Institute.



Humans Matter prototype

3 QUESTIONS FOR...

## Commercializing research discoveries

### COLLABORATIONS WITH INDUSTRY FOR NOVEL THERAPIES

In 2022, Paris Brain Institute signed 59 new industrial agreements with biotech, pharma and medtech companies. The Institute was involved in the collaborative development of antisense therapy for glioblastoma and launched a highly innovative gene therapy trial for Huntington’s disease.

### EIGHT NEW PATENT APPLICATIONS

The Institute filed eight new patent applications and protected four new software programs in 2022. The patents include two for novel gene therapy solutions; two for molecules to treat demyelinating disorders; and one for a molecule targeting neurodegenerative and neuroinflammatory diseases.

## INNOVATION IN 2022

**59** new industrial agreements

**61** active patents

**5** therapeutic molecules under development

**9** startups incubated

**2** new acceleration and startup programs in digital health

## Driving the development of products and services for patients

### “SLEEPING BEAUTIES” PROGRAM

The “Sleeping Beauties” program was launched in 2018 in collaboration with the best medicinal chemistry laboratories to test and develop potential therapeutic molecules. In 2022, new partnerships were developed with French chemists and five new projects were launched. A total of 207 molecules were analyzed us-



ing different models, with 11 selected as candidates for glioblastoma therapy. A further 80 molecules were tested for their ability to modulate mitochondrial import, a mechanism affected in many neurodegenerative diseases.

### SUCCESS FOR THE NEUROTRIALS EARLY CLINICAL DEVELOPMENT UNIT

Neurotrials conducts early phase clinical trials for industry. In 2022, it launched its third phase I/II clinical trial to determine the safety, tolerability and preliminary effectiveness of a gene therapy for early-stage Huntington’s disease. A first patient was included at the end of the year. Neurotrials also added new centers to its first trial, launched in 2021, and finalized inclusion of a multicenter study that began in 2022.

### PURSUING COLLABORATION ON STROKE RESEARCH

The technological, medical and research development team identified new projects to include in the Strokecare joint laboratory with the Humans Matter group. Several projects were transferred and an operating agreement was signed. Three new projects proposed by staff at Pitié-Salpêtrière AP-HP Hospital were selected for prototype development.

ALEXIS GÉNIN,  
Director of Innovation

## WHAT WERE THE INSTITUTE’S INNOVATION HIGHLIGHTS IN 2022?



The focus this year was the development of our “Innovation 2030” plan, with two flagship programs: first, our new Technological Innovation and Development Units (TIDUs), composed of teams of scientists and engineers working to develop solutions for urgent health challenges. The first TIDU, GENOV, was launched in late 2022 to develop next-generation cell and gene therapy tools. The second program is the NeurAL launchpad, which we believe is the first of its kind in Europe in the field of neuroscience. With the support of the Anne and Claude Berda Foundation and a panel of investors and industry experts, it will encourage promising projects and technological investment to facilitate new startups.

## IN 2022, IPEPS, THE PARIS BRAIN INSTITUTE’S INCUBATOR, ALSO CELEBRATED ITS TENTH ANNIVERSARY.

After ten years, nearly 100 startups have received support and €700 million has been raised. As well as three dedicated sites, the iPEPS incubator has a talented team of five experts to support startups, facilitate their technological development and help them raise capital. Startups launched over the past decade are now offering solutions to improve treatment and understanding of neurological diseases. In 2022, nine promising new companies joined the incubator and support was provided for seven other digital health companies, with two fast-track programs in collaboration with major corporations.

## WHAT IS THE GOAL OF THE BRAIN & MIND BIOCLUSTER?

With the FondaMental Foundation, the Institut de la Vision, leading research and healthcare institutions in the Greater Paris region and several private stakeholders, we responded to the France 2030 biocluster call. Our proposed “Brain & Mind” biocluster will mobilize the scientific, medical and technological communities specializing in neurology, psychiatry and sensory disability to develop new therapeutic and preventive approaches in adults and children.

## Supporting new startups

### NEW STARTUPS FOR 2022

Nine innovative startups were selected to join the iPEPS incubator in 2022.

■ **Cline Research** is developing a platform to facilitate candidate recruitment by proposing decentralized clinical trials.

■ **Emobot** is developing a solution to detect solitude and depression among elderly people and improve diagnosis.



Robot Emobot

■ **Ceres Brain Therapeutics** combines a drug administration device with a drug candidate for Parkinson's disease.



Drug candidate CBT101, developed by Ceres Brain Therapeutics

■ **HyperEdge Instruments** is developing a device to advance knowledge about taste loss and improve medical practice and treatment for patients with a variety of conditions.

■ **Imageens** provides carotid vascular imaging to monitor strokes.

■ **Kolibri** is developing a new generation of bioreactors, especially novel gene therapy vectors.

■ **Leal Therapeutics** is a US biotech working on the development of a pipeline of novel ultra-precise therapies for major central nervous system indications.

■ **Litdhospi** is a platform to facilitate contact between emergency services and hospital wards.

■ **neuroClues**, co-founded by a Paris Brain Institute scientist, is developing an eye tracking solution for early identification of neurological diseases like Parkinson's, multiple sclerosis and Alzheimer's.



NeuroClues eye tracking device

### CARNOT ACCREDITATION TO UNLOCK INNOVATION

Since 2011, Paris Brain Institute has been part of the Carnot "family" of expert research institutes working with and for companies. The Carnot network serves as an extraordinary talent pool, and Carnot institutes also receive state financial support for tools and resources earmarked for research with industry, as well as funding for innovation development through **Carnot Tools** (developing new research technologies) and **Carnot Maturation** (maturing projects derived from the Institute's basic research).



### TWO FAST-TRACK PROGRAMS FOR DIGITAL HEALTH

In 2022, the incubator also supported two fast-track programs for startups in collaboration with big pharma companies:

**Impact Santé Mentale**, for digital mental health solutions, involves Janssen, Eisai, Otsuka, Axa and France Biotech. The program is set to be extended in 2023 with the support of new partners.

**Realize**, in collaboration with AstraZeneca, to field test digital startup solutions for cancer research.

In total, seven digital health startups have received support from the incubator and benefited from the expertise of industry leaders in pharma and health insurance. **Litdhospi**, a startup supported by the "Impact Santé Mentale" program, has joined the iPEPS incubator.



### MEDTECH GENERATOR AND ACCELERATOR PROGRAM

The iPEPS incubator is leading the Medtech Generator and Accelerator program with funding from BPI France. The program was established in partnership with the Imagine Institute and the Institut de la Vision to encourage deeptech entrepreneurship and

meet the specific needs of startups developing medtech solutions for neuroscience and rare diseases. Scientists and startups are given collective and/or personalized support depending on the maturity of the project.



One of the Institute's key strategic priorities is to make neuroscience more accessible by training experts and sharing knowledge with the public.

# TRAINING AND OUTREACH



# TEACHING AND TRAINING

## NEUROSCIENCE & TECHNOLOGY

In 2022, to increase international visibility and attract talented individuals with high potential, Paris Brain Institute introduced a new international PhD program in collaboration with the C-BRAINS neuroscience consortium for Greater Paris. The Institute played a key part in devising the call for applications and will be closely involved in the selection process. The PhD students will join their laboratories in autumn 2023.

To diversify its teaching methods, the Institute produced immersive, interactive 360° teaching videos of its core facilities that offer an introduction to some of their techniques. Videos for the PRISME human behavior facility, ePHYS electrophysiology core facility and CENIR neuroimaging center were finalized in 2022.



Immersive training video in the CENIR core facility



Participants in the national Brain Bee

### FOCUS ON... INTERNATIONAL BRAIN BEE

In 2022, Paris Brain Institute was the official co-host of the International Brain Bee, an annual competition on neuroscience and neurological diseases for middle- and high school students who won their national Brain Bee. In collaboration with the International Brain Bee Committee, the Institute organized this high-level scientific challenge with the support of its scientists. Participants from 31 countries attended the event, which was a great success.

Through a partnership with Educ'ARTE, the educational platform of TV channel ARTE, the Institute also developed a neuroscience teaching program that was adopted by 20 institutions that take part each year.

In 2022, Paris Brain Institute pursued its commitment to training by developing new programs for early career scientists, hospital staff and the innovation ecosystem.

## CLINICAL NEUROSCIENCE

Paris Brain Institute is committed to fostering links between hospitals and its research teams. Two programs have been launched to host young clinicians in research laboratories (STARE) and scientists in hospital departments (DÉCLIC). Since 2020, STARE has been offered as a teaching unit in the Sorbonne University Faculty of Medicine. In 2022, 20 new clinical students joined the Institute's teams and core facilities for a week. DÉCLIC was launched in 2022, with six scientists hosted in the Neuropathology and Neuro-Oncology Departments at Pitié-Salpêtrière Hospital.

On May 11, 2022, the first "Paramed Day" introduced paramedical staff from the Neuroscience DMU to research at Paris Brain Institute. Seventeen paramedical staff attended the day, which is set to become a regular event. The aim is to provide training for these staff who work alongside patients and encourage them to develop research projects.

## NEUROSCIENCE & INNOVATION

The five-year Epica project was launched at the end of 2022 by Paris Brain Institute, the Imagine Institute, the Institut Pasteur and the startup Cameo, supported by the Banque des Territoires-Caisse des Dépôts. Epica will offer professional training for partnership projects between academia and the private sector. The idea is to train up pairs of participants from the public and private sectors. They will receive six months of theoretical training (in-person and e-learning) before completing work placements in startups and healthcare establishments.

### 3 QUESTIONS FOR...

**MARIE PIERRÉ**  
Instructional designer for the Teaching Center in the Department of Scientific and Medical Affairs



### WHAT IS YOUR BACKGROUND AND YOUR ROLE AS AN INSTRUCTIONAL DESIGNER AT PARIS BRAIN INSTITUTE?

I am an engineering graduate from Arts et Métiers ParisTech, with a Master's in Biomedicine. I started out in pharmaceutical consultancy, but I am passionate about learning, so I decided to become an instructional designer and then I joined the Institute. My role is to understand people's needs and to create programs with the most effective content and format to encourage their development.

### IN 2022, YOU DEVELOPED E-LEARNING COURSES FOR THE MEDTECH GLOBAL ACCELERATOR PROGRAM. WHAT ARE THEY AND WHO ARE THEY AIMED AT?

The two training programs meet different needs. One is a "survival kit" for project leaders looking to become health entrepreneurs. It covers key subjects like intellectual property, regulations and funding. The second program introduces scientists to entrepreneurship to pique their interest. It focuses on soft skills and lived experience and includes testimonials.

### YOU ARE ALSO INVOLVED IN DESIGNING OTHER TRAINING COURSES RUN BY PARIS BRAIN INSTITUTE. CAN YOU TELL US MORE?

I am constantly thinking about how to improve programs to make them as effective as possible for participants. In 2022, we completely redesigned the Creativity Masterclass in collaboration with experts from the Institute. We also revamped the Summer School, adding an online kick-off, clarifying learning outcomes, adding meaning and structure and including practical exercises.

# SHARING AND TRANSFERRING INFORMATION TO THE PUBLIC

## Outstanding conferences

### “LES MATINALES” LECTURES

Four times a year, Paris Brain Institute organizes a keynote lecture presenting its ongoing research and projects on various topics related to brain health. In 2022, as well as a special behind-the-scenes presentation of the Institute, the lecture cycle covered amyotrophic lateral sclerosis and brain lesions. The September session focused on Alzheimer’s disease, with a special radio broadcast on Vivre FM, live from Paris Brain Institute, to mark World Alzheimer’s Day.



### “SCIENCE, ART & CULTURE” LECTURES

At the “Science, Art & Culture” lectures, held once a month on Thursday evenings, prominent figures from art, culture, media or science speak about the issues and challenges surrounding neuroscience. The lectures are open in person to Paris Brain Institute donors, and as with all the Institute’s lectures, recordings are also posted on its YouTube channel. Speakers in 2022 included psychiatrist Roland Jouvent, actor Elsa Zylberstein, neurologist Martin Catala, philosopher Pascal

The goal of the Paris Brain Institute’s communication strategy is to share research advances with various target groups and to develop its image and appeal, both in France and abroad. Throughout the year the Institute runs events and publishes communication materials for the public.

Bruckner, and philosopher Roger-Pol Droit who spoke alongside neurologist Yves Agid. In December, the annual “history of science” lecture organized as part of the series explored the concept of brain dominance.



### OPEN BRAIN BAR

As part of its commitment to stimulating curiosity and debate among the public, Paris Brain Institute runs Open Brain Bar, an informal series of lectures held at relaxed venues in Paris to explore the role of neuroscience in society. In 2022, an Open Brain Bar on the neuroscience of food preferences was held with Hilke Plassmann, a decision neuroscience researcher at Insead, and Liane Schmidt, an Inserm cognitive neuroscience researcher and co-head of the CIA: Cognitive control - Interoception - Attention team at Paris Brain Institute.



## Committed to scientific outreach

### BRAIN AWARENESS WEEK

International Brain Awareness Week, held every year in March since 1999 to raise public awareness about the importance of brain research, is coordinated in France by the French Neuroscience Society. For the 24<sup>th</sup> edition, because of the COVID-19 pandemic, Paris Brain Institute organized a large-scale digital campaign exploring the functions of the human brain, with:

- A live-streamed lecture, “Seeing sounds, hearing letters,” presented by Prof. Laurent Cohen, a



neurologist and team leader at the Institute;

- A video series, “Scientists in their own words,” in partnership with S3Odéon, showcasing early career scientists;
- A new podcast for children, “Getting into our heads!” (see below).

### SCIENCE FESTIVAL

France’s annual Science Festival in October is an opportunity for the whole country to celebrate science, technology and innovation. To promote knowledge transfer between scientists and society, Paris Brain Institute held a public lecture on

brain-computer interfaces, presented by Fabrizio De Vico Fallani, an Inria scientist in the “ARAMIS - Algorithms, Models and Methods for Images and Signals of the Human Brain” team.

### RAISING AWARENESS ON WORLD MS DAY

To mark World Multiple Sclerosis Day in May 2022, actor Guillaume de Tonquédec, patron of Paris Brain Institute, made a special video in which he shared his personal story about being a carer. Guillaume de Tonquédec also agreed to take part in a press conference presenting the Institute’s research on MS. As well as his involvement in MS Day, Guillaume de Tonquédec is a dedicated patron of Paris Brain Institute (see p. 69, *Public fundraising*). We extend our heartfelt thanks to him!



## Spotlight on podcasts

### “GETTING INTO OUR HEADS!”, THE INSTITUTE’S SMART PODCAST

Why do we daydream? How do we learn to read? Why do we prefer pizza to courgettes? In “Dans le coin du ciboulot” (“Getting into our heads!”), the new podcast for neuro-curious listeners, the Institute’s scientists offer simple, entertaining explanations to these questions from children. A series of seven 3-4 minute episodes was released in March 2022 to mark Season 2 coming soon!



### BRAINCAST, THE PODCAST ALL ABOUT NEUROSCIENCE

The Paris Brain Institute’s podcasts also include Braincast, produced in partnership with the magazine *Cerveau & Psycho* and presented by the magazine’s editor, neuroscientist Sébastien Bohler. Three new episodes were produced in 2022:

- Braincast #10 - “Alzheimer’s: AI in diagnosis” with Ninon Burgos, a CNRS researcher in the ARAMIS - Algorithms, Models and Methods for Images and Signals of the Human Brain team
- Braincast #12 - “How do we make decisions?” with Mathias Pessiglione, joint head of the Motivation, Brain and Behavior team
- Braincast #11 - “What happens to the brain when we die?” with Stéphane Charpier, head of the Dynamics of Epileptic Networks and Neuronal Excitability team and a neuroscience professor at Sorbonne University.



Paris Brain Institute is based on a partnership between a public joint research unit (CNRS, Inserm and Sorbonne University) and a private foundation with recognized charitable status, Paris Brain Institute Foundation, working with the AP-HP Paris Public Hospital Network. The broad range of representation in the Institute's governing bodies – Board of Directors and management committees – is testament to this solid partnership.

# GOVERNANCE

# GOVERNING BODIES

## BOARD OF DIRECTORS

Board members are divided into four colleges. The Board regulates the affairs of the Institute through its deliberations. It decides on the strategic orientations presented by the Executive Director, votes on budgets and approves the accounts.

### COLLEGE OF FOUNDERS AND MEMBERS OF THE BOARD

**President – Gérard Saillant**, Professor of Orthopedic and Trauma Surgery

**Vice President – Jean Todt**, UN Secretary-General's Special Envoy for Road Safety

**Treasurer – Serge Weinberg**, President of Weinberg Capital Partners

**Jean Glavany**, Former minister

**Jean-Pierre Martel**, Attorney

### COLLEGE OF QUALIFIED PERSONS

**Richard Frackowiak**, Emeritus Professor at University College London

**Philippe Ménasché**, Professor of Thoracic and Cardiovascular Surgery

**Élisabeth Tournier-Lasserre**, Professor of Medical Genetics at Université Paris-Cité

### COLLEGE OF FULL MEMBERS

**André Le Bivic**, Director of the CNRS's National Institute of Biological Sciences (INSB)

**Didier Samuel**, Chairman and CEO of the French National Institute for Health and Medical Research (Inserm)

**Bruno Riou**, Dean of Sorbonne University's Faculty of Medicine

**Nicolas Revel**, CEO of Paris Hospital Administration (AP-HP)

### COLLEGE OF FRIENDS OF THE FOUNDATION

**Martine Assouline**, Assouline SAS

**Maurice Lévy**, Publicis SA

**Christian Schmidt de La Brélie**, Klesia SA

### PUBLIC COMMISSIONER

**Jean-Marie Paulot**

## BOARD COMMITTEES

### SCIENTIFIC ADVISORY BOARD

The mission of the Scientific Advisory Board (SAB) and its world-leading neuroscience experts is to advise Paris Brain Institute and provide the necessary support in overall strategy planning.

**President – Prof. Dimitri Kullmann**, Clinical & Experimental Epilepsy, UCL Queen Square Institute of Neurology, UK

**Prof. Adrienne Fairhall**, Department of Physiology and Biophysics, Department of Physics and Department of Applied Mathematics, Washington University, USA

**Prof. Tamas Gabor**, University of Szeged, Department of Physiology, Anatomy and Neuroscience, Hungary

**Prof. Magdalena Goetz**, LMU Department of Physiological Genomics, Helmholtz Center Munich, Institute Stem Cell Research, Germany

**Prof. Masud Husain**, Wellcome Trust Principal Fellow – Nuffield Dept Clinical Neuroscience – University of Oxford, UK

**Prof. Sabine Kastner**, Princeton Neuroscience Institute, USA

**Prof. Giovanna Malluci**, Department of Clinical Neurosciences, University of Cambridge, UK

**Prof. Eve Marder**, Victor and Gwendolyn Beinfeld, Brandeis University, USA

**Prof. Elizabeth Phelps**, Harvard University, USA

**Prof. Carmen Sandi**, Laboratory of Behavioral Genetics – Brain Mind Institute – EPFL Lausanne, Switzerland

**Prof. Erin Schuman**, Goethe University Frankfurt, Germany

**Prof. Mikael Simons**, Institute of Neuronal Cell Biology (TUM-NCB) Technical University Munich, German Center for Neurodegenerative Diseases (DZNE), Germany

### AUDIT COMMITTEE

**President – Serge Weinberg**, Treasurer of Paris Brain Institute Foundation

**Elli Chatzopoulou**, Representative for Inserm

**Jean Glavany**, Former minister

**Jean-Pierre Martel**, Attorney

### NOMINATIONS AND WAGES COMMITTEE

**President – Serge Weinberg**, Treasurer of Paris Brain Institute Foundation

**Elli Chatzopoulou**, Representative for Inserm

**Jean Glavany**, Former minister

**Jean-Pierre Martel**, Attorney

### COMMITTEE FOR COORDINATION OF PARIS BRAIN INSTITUTE PARTNERSHIPS

**President – Gérard Saillant**, President of Paris Brain Institute

**André Le Bivic**, Representative for CNRS  
**Didier Samuel**, Representative for Inserm

**Bruno Riou**, Representative for Sorbonne University

**Erik Domain**, Representative for AP-HP

### ETHICS AND DEONTOLOGY COMMITTEE

The mission of the Paris Brain Institute Ethics and Deontology Committee (COMETH) is to guide the reflection on ethical and deontological issues raised by our scientific and medical research programs, and help all those involved in research at the Paris Brain Institute to comply with ethical and deontological principles, by facilitating reflection on their own practices and contributing to general reflection based on pioneering experiences. In 2022, the COMETH organized two debates, one on the double bind scientists face when pressured to publish as many articles as possible yet guarantee perfect-

ly validated results, and the other on the COMETH's 2021 activity report. The committee was also consulted on the opportunity of having Paris Brain Institute sign the charter developed by the OECD for the responsible development of neuro-technologies, and updated the Paris Brain Institute's ethics and deontology charter (available to view on our website). The COMETH also hosts monthly ethics and deontology training sessions for new recruits.

## FOUNDING MEMBERS

■ **Gérard Saillant**, Professor of Orthopedic and Trauma Surgery, President of Paris Brain Institute

■ **Jean Todt**, UN Secretary-General's Special Envoy for Road Safety, Vice President of Paris Brain Institute

■ **Yves Agid**, Honorary Professor of Neurology and Neuroscience

■ **Luc Besson**, Film director

■ **Louis Camilleri**, Former CEO of Ferrari

■ **Jean Glavany**, Former minister

■ **Maurice Lévy**, Chairman of the Executive Board of Publicis Group, Co-Chair of Paris Brain Institute Friends Committee

■ **Olivier Lyon-Caen**, Professor of Neurology, former Director of the Nervous System Diseases Division at Pitié-Salpêtrière University Hospital

■ **Jean-Pierre Martel**, Attorney

■ **Lindsay Owen-Jones**, Honorary Chair of L'Oréal and of Paris Brain Institute Friends Committee

■ **David de Rothschild**, Honorary Chairman of the Rothschild & Co Supervisory Board

■ **Michael Schumacher**, Former Formula 1 Driver

■ **Serge Weinberg**, President of Weinberg Capital Partners, Treasurer of Paris Brain Institute

## MANAGEMENT COMMITTEE (CODIR)

The senior management team implements the policy developed by the Paris Brain Institute's Board of Directors. The Executive Director, appointed by the Board of Directors, leads the five-member management committee.



Executive Director of Paris Brain Institute and the Joint Research Unit (UMR)  
**Prof. Alexis Brice**



Medical Director  
**Prof. Catherine Lubetzki**



Scientific Director and Deputy Director of the UMR  
**Bassem Hassan**



Secretary General of Paris Brain Institute and the Joint Research Unit (UMR)  
**Corinne Fortin**



Director of Communications and Development  
**Jean-Louis Da Costa**

The Support function management Committee (CODIS) also leads institutional and cross-cutting projects. In addition to the CODIR members, the CODIS has the following members:

**Deputy Secretary General - Pierre Couraud**

**Director of the IT Department - Stéphane Chaillou**  
**Director of Innovation - Alexis Genin**  
**Director of Scientific and Medical Affairs - Géraldine Gouzer**  
**Director of Human Resources - Cécile Proust**

**CFO - Marc Thévenot**  
**RIPH unit manager - Pierre Georges-François**  
**Director of Legal Affairs - Mathilde Gibert**

**Director of IT Security - Lahcen Gourari**  
**Director of the Procurement, Equipment and Logistics Department - Sylvain Gugliermi**  
**Director of the Organization and Quality & Risk Management Division - Laurine Lenoir**  
**Data Protection Officer - Frédérique Lesaulnier**

## CODIR COMMITTEES

## ■ SCIENTIFIC AND MEDICAL STEERING COMMITTEE (COPIL)

The Scientific and Medical Steering Committee (COPIL) is a consultative body on all matters related to the scientific and medical strategy of the Institute. It provides opinions to the Management Committee (CODIR). Additionally, it has decision-making authority on funding allocation for internal project calls.

## ■ TEAMS COUNCIL

The Teams Council, comprising the senior management team and all the team leaders, meets once a month. It is consulted on the scientific policy, budgetary matters, and resources to be allocated for the UMR.

## ■ GENDER EQUITY COMMITTEE

The Gender Equity Committee (GEC) consults with the Paris Brain Institute's steering bodies, monitors relevant measures and takes action to promote gender equality. The work of the GEC is supported by the GEM (Gender Equity Movement) initiative, a collective of Paris Brain Institute staff who have come together to raise awareness of gender bias and inequities and propose measures to address them.

Following the adoption of a gender equality charter in 2021, the GEC developed an action plan and continued its efforts with awareness raising, monitoring statistics and indicators measuring gender distribution at all professional levels, communication campaigns and interventions. The Paris Brain Institute's workplace gender equality index progressed in recent years, achieving 75 in 2020, 91 in 2021 and 89 in 2022 out of a maximum score of 100.

In 2022, the GEM was divided into working groups to organize a biennial international workshop, and develop a website, journal club, scientist mentoring program and broader educational activities.

## STAFF

## REPRESENTATIVE BODIES

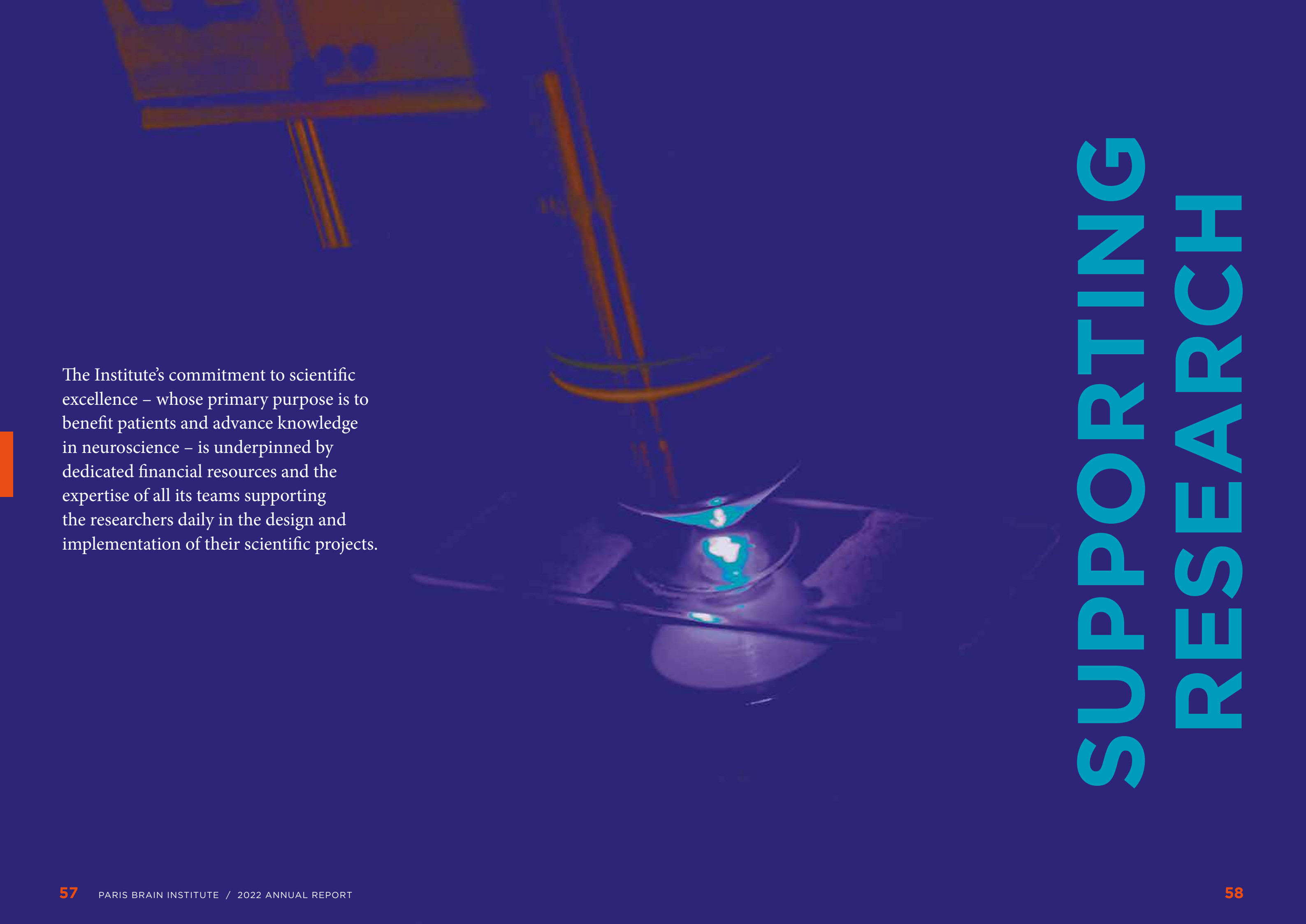
## ■ SOCIAL AND ECONOMIC COMMITTEE

The mission of the Social and Economic Committee (CSE) is to represent the Paris Brain Institute Foundation's staff in dealings with management and relay any individual or collective complaint raised concerning the application of labor regulations (Labor Code, pay, working hours, health and safety, etc.). The role of its Health, Safety and Working Conditions Committee (CSSCT) is to oversee compliance with legal and regulatory provisions, help protect the health and safety of staff and implement measures to improve their well-being, analyze occupational risks, be available for consultation by the employer and assist in analyzing working conditions.

## ■ LABORATORY COMMITTEE

The role of the Laboratory Committee is to advise the UMR's management on scientific, budgetary and human resources policy, and on all other matters related to UMR administration. Members are elected by their college (five colleges in 2022). The number of representatives is proportional to the number of members in the college.





The Institute's commitment to scientific excellence – whose primary purpose is to benefit patients and advance knowledge in neuroscience – is underpinned by dedicated financial resources and the expertise of all its teams supporting the researchers daily in the design and implementation of their scientific projects.

# SUPPORTING RESEARCH

# TECHNICAL AND REGULATORY SUPPORT TO UPHOLD SCIENTIFIC INTEGRITY

With the successful rollout of the Support Unit for Research Involving Human Subjects (RIPH), launched in 2019, and the Data Protection Office (GDPR DPO), brought in house in late 2021, in 2022 the Institute consolidated its technical and regulatory support infrastructure for scientists in a bid to uphold the scientific integrity of its research.

## REGULATORY AND TECHNICAL SUPPORT UNIT

The Regulatory and Technical Support Unit (CART) is a new support service launched in 2022, providing both regulatory capabilities (Data Protection Office, Legal affairs department, Support Unit for Research Involving Human Subjects (RIPH)) and technical capabilities (IT, Organization and Quality & Risk Management Division). The unit is tasked with analyzing projects with researchers in a bid to ensure regulatory compliance as well as include any future developments envisaged in authorization requests prior to project implementation.

All of these measures contribute to the Paris Brain Institute's principles of scientific integrity. To coordinate all efforts to best effect, Claire Lévy Marchal was appointed Scientific Integrity Advisor by the senior management team on November 1, 2022. Her primary role is to raise awareness and provide training in scientific integrity, as well as implement procedures for the prevention and detection of potential breaches of the Paris Brain Institute's Scientific Integrity Policy requirements, which are currently in the completion stage.



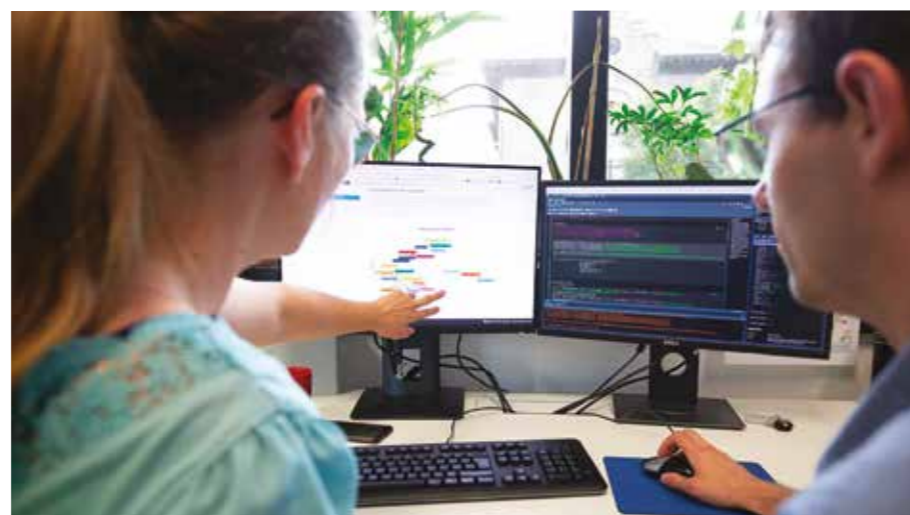
**CLAIRE LÉVY MARCHAL** was appointed Scientific Integrity Advisor in 2022. She is a physician (pediatric endocrinology and diabetology) and Inserm researcher and led Inserm's clinical research unit from 2009 to 2017. Since 2010 she has been an Executive Committee member of the French Clinical Research Infrastructure Network, F-CRIN.

## ANIMAL WELFARE

Paris Brain Institute has also strengthened the prerogatives of the Animal Welfare Unit (SBEA), laid down in a best practice charter on the use of animals for scientific purposes, drafted and circulated in 2022.

## DATA GOVERNANCE POLICY

In 2022, the Data Committee working group launched in late 2021, comprising researchers and experts in support roles (legal, DPO, IT) and led by operational and scientific managers from the Data Analysis Core (DAC), drafted the Paris Brain Institute Data Governance Policy, which was adopted by the Management Committee in early 2023.



# PROMOTING AN ATTRACTIVE AND RESPONSIBLE WORKING ENVIRONMENT

In 2022, Paris Brain Institute reaffirmed its commitment to providing a responsible working environment consistent with its values of integrity, fairness and inclusion for all staff.

## ROLLOUT OF THE GENDER EQUALITY CHARTER

Adopted by Paris Brain Institute in 2021, the Gender Equality Charter was implemented in a 2021-2025 action plan coordinated by the Institute's Gender Equity Movement (GEM). Through this plan, the Institute aims to measure progress towards gender equality in the workplace based on key figures and targeted actions.

The plan includes eight key objectives and some forty indicators or measures aimed at changing the Paris Brain Institute's culture and internal environment and embracing diversity and social equity. Objectives include Parity, Equal pay, Specific training in issues of equality and fighting gender bias, Recognition of women in research, Visibility of women in science and society, and Dissemination of scientific knowledge and raising public awareness.

## SCIENTIFIC MENTORING, EXPERIENCE OF SENIORS TO BENEFIT JUNIORS

Launched in 2021, the scientific mentoring program is being continued for junior research associates newly recruited in 2021 and 2022, focusing on several key components.

■ **Onboarding:** welcoming permanent junior researchers into the Institute's scientific and administrative community (including introduction at the Institute's seminar, announcements on the website and in the staff newsletter, meetings with the Paris Brain Institute Executive Direc-

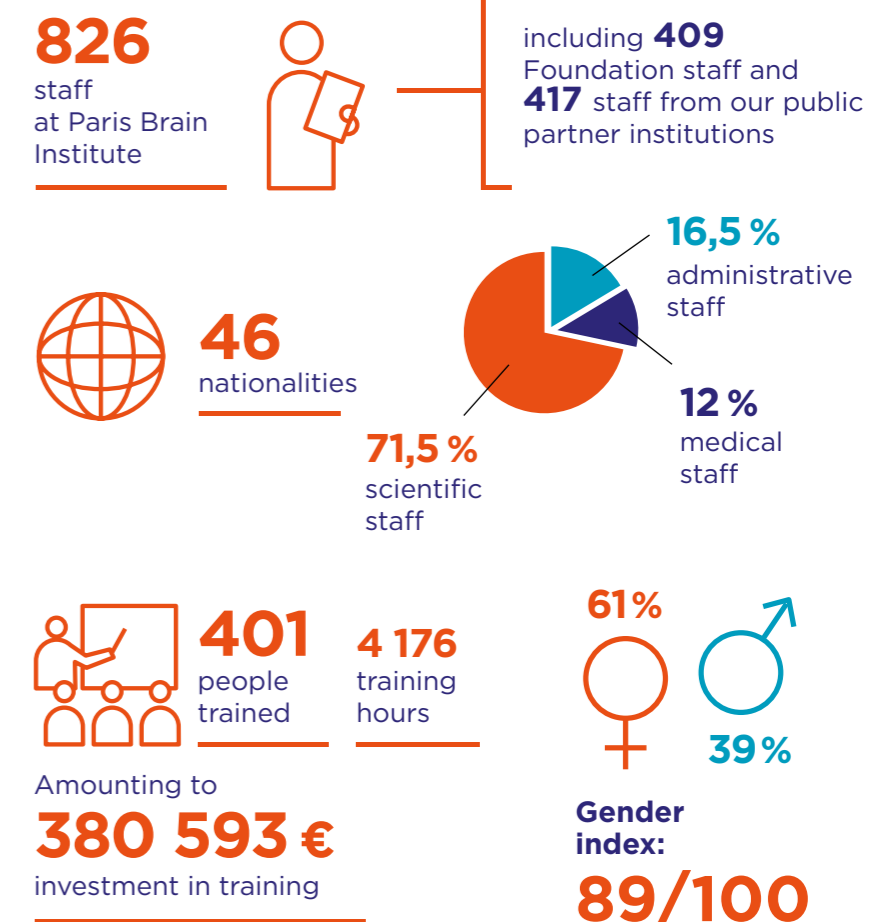
tor, Scientific and Medical Steering Committee and support department managers);

- **Training and coaching** of junior researchers via a program of training in team management, data management, animal/human research, with additional individual coaching (grant writing, etc.);
- **Mentoring** by a senior researcher from the Institute with informal scheduled meetings.



See p. 56  
The Gender Equity Committee

## GENDER OVERVIEW AT THE INSTITUTE ON 31/12/2022



# FINANCIAL REPORT: RIGOR AND TRANSPARENCY CENTRAL TO OUR ACTION

Funding for research projects came from multiple sources, with a resolute focus on the long-term prospect of gaining knowledge and achieving major breakthroughs within the field of neuroscience. All Institute operations are undertaken with due regard for transparency.

In November 2010 Paris Brain Institute Foundation was granted certification by the trusted donations facility “Don en confiance”, and renewal was granted in 2019 and subsequently in 2022.

3 QUESTIONS FOR...



MARC THÉVENOT,  
CFO

THE INSTITUTE WAS LAUNCHED 13 YEARS AGO AND HAS CONTINUED TO GROW EVER SINCE. HOW DOES THE FINANCE DEPARTMENT SUPPORT ITS GROWTH?

**Marc Thévenot** - The Finance Department's mission is twofold - to support all Paris Brain Institute research teams and units (including core facilities and departments) in their tasks, and to secure the Foundation's long-term financial future with a management policy that

ensures overall balance in terms of operational and investment requirements. We have a duty to support growth with the same rigor as when we launched our Institute, the only difference being that with the development of resources from public support and the success of our researchers in securing competitive funding we can now be bolder and more ambitious, which is so important in research. The Foundation's business model has proven sound and resilient and its fundamentals are robust. Since its inception in 2010, the Foundation has broken even six years running with investment of €54 M over 12 years.

FOR THE INSTITUTE 2022 WAS A YEAR OF PREPARATIONS FOR THE KEY MILESTONES ANNOUNCED FOR 2023. HOW DOES THIS SIT FROM A FINANCIAL PERSPECTIVE?

**MT** - The Institute has developed an ambitious medium-term plan in a bid to boost its scientific excellence and progress, in particular internationally, with the recruitment

of new international scientific talent and the instigation of bold collaborations, and to remain at the forefront of technology and innovation through the acquisition of state-of-the-art equipment and expertise. For instance, we are currently investing in a 7T MRI scanner and are developing expert capability in this technology. Through its scientific drive underpinned by cutting-edge technologies and expertise, Paris Brain Institute aims to develop innovative clinical research to help secure faster benefits for society. The challenge for the Finance Department, together with other Institute departments, is to identify the funding sources that best align with each given project undertaken. The Institute's reputation and attractiveness help to increase the contribution of sponsorship and charitable giving while securing a significant rise in competitive funding. The diversity of funding sources is a huge asset and strength to Paris Brain Institute.

IN 2022 THE INSTITUT CHANGED ITS FISCAL YEAR-END CLOSE DATE. WHY WAS THIS?

**MT** - Fundraising from the last quarter of each year accounts for over 50% of the annual amount raised owing to the fiscal calendar, and public support now accounts for 30% of Paris Brain Institute Foundation's resources. The Foundation's board is required to enact a balanced annual budget and the Finance Department must executive it and ultimately comply with this budget constraint. Consequently, with a fiscal year recording 50% of a major funding source in the first quarter, all funds raised can be distributed to researchers and their environment all the more quickly. The allocation of resources to research is therefore optimized and budget balance is achieved.

## Income statement by nature and function (ISNF) and expenditure statement (ES)

Primarily it should be noted that owing to a change in Paris Brain Institute Foundation's year-end close date, the 2022 fiscal year only concerns the first nine months of 2022.

### 2022 INCOME BY NATURE

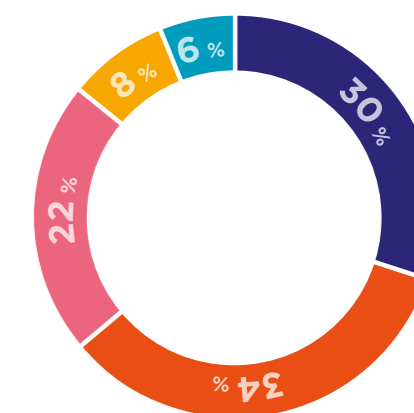
Income for 2022 amounted to **€52.9 M**, including **€39.6 M** in income for the fiscal year and **€13.3 M** in carryover of resources allocated and not used in previous years. Income for the fiscal year consisted of fundraising revenue (€12 M or 30%), which includes donations (€7.9 M or 66%), bequests and gifts (€2.6 M or 22%), and sponsorship (€1.5 M or 12%).

#### It also includes:

- Income from core facilities activities (€6.9 M) and research collaborations with industrial partners (€1.7 M)
- Public and private grants (€13.4 M)
- Funding of the “IHU program” (€3.2 M)
- Miscellaneous income (rental, re-invoicing of charges (€2.4 M)

#### Income breakdown

- Fundraising revenue
- Public and private competitive funding of research projects
- Revenue from core facilities activities and collaborations with industrial partners
- Funding of the “IHU program”
- Miscellaneous income (rental, re-invoicing of charges)





## 2022 ALLOCATION BY FUNCTION

Overall expenses for 2022 amounted to **€55.8 M**: **€39.9 M** used in 2022 and **€15.9 M** to be used subsequently from the allocated resources.

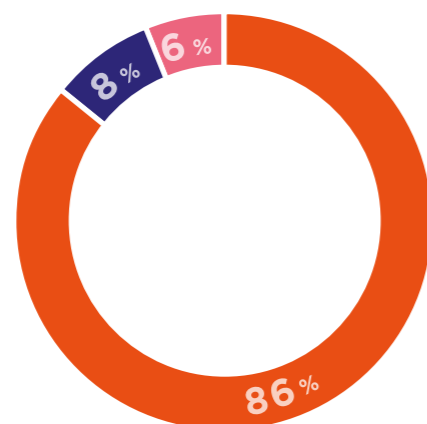
Of the 2022 allocations, €34.1 M was allocated to social missions, representing 86% of total ISNF allocations.

### Paris Brain Institute social missions include:

- Research programs
- Core facilities
- Scientific leadership and implementation of international alliances
- Incubation of innovative businesses

### Breakdown of allocations

- Social missions
- Fundraising and communication costs
- Operating costs



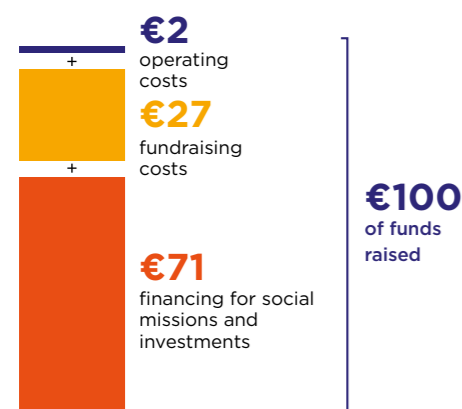
Funding for research projects is primarily dedicated to nervous system diseases and spinal cord injuries. Core facilities (neuro-imaging, vectorology, genotyping and sequencing, cell culture, histology and bio-informatics) support these projects.

Fundraising and communication costs are expenses incurred to collect funds from individuals (donations and bequests), companies and private foundations (patronage and sponsorship initiatives), as well as communication initiatives. They represent a total of €3.2 M, or 8% of total ISNF allocations.

Operating costs are expenses in support of research (general administration, finance, human resources, legal, IT and logistics) and represent 6% of total ISNF allocations, i.e. €2.4 M.

## ALLOCATION OF PUBLIC FUNDRAISING RESOURCES

Public fundraising resources used in 2022 amounted to **€12 M**. For every €100 raised from the public, €71 was used to finance social missions and investments, €27 was used to cover the costs of fundraising and communication and €2 to cover Paris Brain Institute operating costs. As indicated above, we draw your attention to the fact that these amounts are only calculated over the first 9 months of the 2022 fiscal year, not over the entire year.



## 2022 BALANCE SHEET

ASSETS (€M)	2021	2022
Net fixed assets	60	60
Realizable and available assets	93	86
<b>Total</b>	<b>153</b>	<b>146</b>

LIABILITIES (€M)	2021	2022
Association funds	53	53
Fiscal year profit/loss	1.7	-2.8
Dedicated funds	22	25
Debt	42	42
Deferred income	34	29
<b>Total</b>	<b>153</b>	<b>146</b>

Total investments made by Paris Brain Institute since inception amount to €54 M, allocated primarily to core facilities supporting research.

Investments for fiscal 2022 amount to **€2.8 M** (including variation in assets in progress) and include:

- Investments in scientific materials and equipment (€1.4 M including €0.7 M for two microscopes);
- Extension of the premises in rue du Chevaleret (purchase of the basement, €0.7 M).

Net fixed assets amount to €60.3 M. As of September 30, 2022, cash holdings amount to €43.9 M, including €19.2 M allocated to earmarked funding. Paris Brain Institute equity stands at €50.5 M (including the fiscal year loss of €2.8 M), with €30.9 M in net position supplemented by investment grants of €19.6 M. The non-expendable endowment of Paris Brain Institute totals €1.2 M. At fis-

cal year-end, dedicated funds (funds still to be invested in multi-year programs) amount to €22 M.

### Reserve policy

The reserve fund is designed to secure the sustainability of the Paris Brain Institute Foundation's activities and provide the resources to support and engage in ambitious multi-year research programs. Thanks to tight budget management, the Foundation has balanced its expenses and income for the past six years prior to 2022, thus avoiding drawing on its reserves. 2022 closed with a deficit owing to a 9-month year due to the deduction of the final calendar quarter, which generally accounts for 50% of annual public fundraising proceeds. Excluding available funds to finance operating expenses, the Paris Brain Institute's cash holdings are invested in marketable securities (capitalization contracts (taken out with leading banking institutions), which are 100% capital-guaranteed euro funds and capital-guaranteed term deposits).

## VOLUNTARY IN-KIND CONTRIBUTIONS

**Volunteering:** Paris Brain Institute benefited from volunteer hours during the 2022 fiscal year, primarily for communication initiatives. Total volume is evaluated at 0.8 FTE, or on the basis of an hourly minimum wage, a total amount of €24,000.

**In-kind patronage:** In 2022, Paris Brain Institute benefited from in-kind patronage and patronage in skills in connection with its communication and fundraising activities, namely:

- Media space: 366, Altice Média publicité, Amaury Média, Bayard Média, Bein Sport, Canal+, Groupe France TV, Groupe Barrière, JC Decaux, Klesia, NRJ Global, Orange, Radio France, Richard Mille and RTL.
- Donated products and services: IDEC, Orange, Orrick Rambaud Martel and Publicis Group.

## INCOME STATEMENT BY NATURE AND FUNCTION (IN EUROS)

Income and expenses by nature and function	2022 Fiscal year		2021 Fiscal year	
	Total	Including public support	Total	Including public support
<b>Income by nature</b>				
<b>1. Resources collected from the public</b>	<b>11,972,582</b>	<b>11,972,582</b>	<b>20,440,884</b>	<b>20,440,884</b>
1.1 Donations free of equivalent compensation				
1.2 Patronage, donations and bequests	11 971 595	11 971 595	20 436 071	20 436 071
<i>Personal donations</i>	7 924 735	7 924 735	13 086 411	13 086 411
<i>Bequests and life insurance policies</i>	2 618 415	2 618 415	2 747 569	2 747 569
<i>Patronage</i>	1 428 445	1 428 445	4 602 092	4 602 092
1.3 Other revenue from public support	987	987	4 812	4 812
<b>2. Resources unrelated to public support</b>	<b>14 297 338</b>		<b>18 801 515</b>	
2.1 Donations free of equivalent compensation				
2.2 Corporate patronage				
2.3 Financial contributions free of equiv. compensation	3 220 430		4 113 912	
2.4 Other revenue unrelated to public support	11 076 908		14 687 603	
<i>Services rendered</i>	6 944 785		8 356 741	
<i>Partnerships</i>	1 664 780		3 193 488	
<i>Other revenue</i>	2 467 343		3 137 374	
<b>3. Grants and other public funding</b>	<b>13 191 980</b>		<b>17 078 077</b>	
<b>4. Reversals of provisions and impairments</b>	<b>191 747</b>	<b>0</b>	<b>214 355</b>	<b>0</b>
<b>5. Use of allocated resources from previous fiscal yrs</b>	<b>13 265 253</b>	<b>1 604 165</b>	<b>18 603 493</b>	<b>1 887 894</b>
<b>Total</b>	<b>52 918 900</b>	<b>13 576 747</b>	<b>75 138 324</b>	<b>22 328 778</b>
<b>Expenses by function</b>				
<b>1. Social missions</b>	<b>34 072 853</b>	<b>8 223 025</b>	<b>44 290 851</b>	<b>15 128 888</b>
1.1 Carried out in France	34 072 853	8 223 025	44 290 851	15 128 888
<i>Actions directly carried out</i>	34 072 853	8 223 025	44 290 851	15 128 888
<i>Payments to an acting organization in France</i>	0	0	0	0
1.2 Carried out abroad				
<i>Actions directly carried out</i>				
<i>Payments to an acting organization in France</i>				
<b>2. Fundraising costs</b>	<b>3 175 637</b>	<b>3 175 637</b>	<b>4 720 344</b>	<b>4 720 344</b>
2.1 Cost of appeals to public generosity	2 778 309	2 778 309	4 305 412	4 305 412
2.2 Costs related to canvassing	397 328	397 328	414 932	414 932
<b>3. Operational costs</b>	<b>2 406 523</b>	<b>275 086</b>	<b>2 967 953</b>	<b>523 859</b>
<b>4. Provisions &amp; impairments</b>	<b>196 689</b>	<b>0</b>	<b>691 535</b>	<b>0</b>
<b>5. Income tax</b>				
<b>6. Carryover of fiscal year allocated resources</b>	<b>15 946 336</b>	<b>1 903 000</b>	<b>20 725 097</b>	<b>1 955 686</b>
<b>Total</b>	<b>55 798 037</b>	<b>13 576 747</b>	<b>73 395 780</b>	<b>22 328 778</b>
<b>Surplus or deficit</b>	<b>- 2 879 138</b>	<b>0</b>	<b>1 742 544</b>	<b>0</b>

Allocations by function	2022 Fiscal year	Resources by nature	2022 Fiscal year
Allocations for the fiscal year		Resources for the fiscal year	
<b>1. Social missions</b>	<b>8 223 025</b>	<b>1. Resources collected from the public</b>	<b>11 972 582</b>
1.1 Carried out in France	8 223 025	1.1 Donations free of equiv. compensation	
<i>Actions directly carried out</i>	8 223 025	1.2 Patronage, donations and bequests	11 971 595
<i>Payments to an acting organization in France</i>	0	<i>Personal donations</i>	7 924 735
		<i>Bequests and life insurance policies</i>	2 618 415
		<i>Patronage</i>	1 428 445
1.2 Carried out abroad	0		
<i>Actions directly carried out</i>	0	1.3 Other revenue from public support	987
<i>Payments to an acting organization in France</i>	0		
<b>2. Fundraising costs</b>	<b>3 175 637</b>		
2.1 Cost of appeals to public generosity	2 778 309		
2.2 Costs related to canvassing	397 328		
<b>3. Operational costs</b>			
<b>Total applications</b>	<b>11 673 748</b>	<b>Total resources</b>	<b>11 972 582</b>
<b>4. Provisions &amp; impairments</b>	<b>0</b>	<b>2. Reversals of provisions &amp; impairments</b>	<b>0</b>
<b>5. Carryover of fiscal yr allocated resources</b>	<b>1 903 000</b>	<b>3. Use of allocated resources from prev. fiscal yrs</b>	<b>1 604 165</b>
<b>Resource surplus for the year</b>		<b>Deficit of public fundraising for the year</b>	
<b>Total</b>	<b>13 576 747</b>	<b>Total</b>	<b>13 576 747</b>

To maintain its standards of excellence, Paris Brain Institute has internal and external control procedures in place to guarantee effective and efficient management. It holds Trusted Donations Charter Committee certification and uses independent auditors.

#### ■ TRUSTED DONATIONS

On November 3, 2010, Paris Brain Institute was granted certification by the Trusted Donations Charter Committee, which was renewed in October 2022. For over 20 years, this Committee has acted as a regulator: certified organizations must adhere to codes of ethics, implement a stringent policy towards donors, and accept ongoing monitoring of their commitments.



## Philanthropy

### Building a healthy future for all

The Circle of Friends is a recognition program for major donors, offering them a unique opportunity to learn about the work of the outstanding scientists at Paris Brain Institute. Individuals, companies and foundations who support the Institute can enjoy private laboratory tours, scientific lectures, and meetings with researchers. The Institute's scientific community would like to express their sincere gratitude to all the donors in our Circle of Friends for their incredible generosity.

#### AN EVER-GROWING COMMUNITY OF CORPORATE PARTNERS

The long-term commitment of donors, including our corporate partners, provides the Institute's teams with the resources they need to understand the brain and to treat neurological diseases and trauma. Our scientists and experts are immensely grateful for the continued support of Air France, Bolloré SE, Fondation Sucres et Denrées, Klésia Group and UNIM. Boston Scientific SA, Accuracy and Fonds Saint Michel also renewed their annual support in 2022.

In 2022, several new corporate partners pledged multi-year support to Paris Brain Institute's large-scale research projects, including Haltra, the Mutuelle du Médecin, and LOV Group.

Donations from long-standing partners continued to bring in key resources for the Institute. These include watchmaker F.P. Journe, the SCPI Pierval Santé sharing fund via Credit Mutuel Nord Europe, La Française and Euryale AM, who became a major donor in 2022 after making an extremely generous donation.

#### FIRST ANNIVERSARY OF THE RICHARD MILLE DONORS CLUBS

Watchmaker Richard Mille, a Paris Brain Institute partner since 2012, recently stepped up its involvement by establishing the Richard Mille Donors Club to rally support among its global community for the Institute and research into brain diseases. The aim is to offer long-term support and boost the visibility of the Institute's research teams. The Club is developing an international philanthropic community dedicated to improving the health of the billions of people affected by neurological and psychiatric diseases worldwide.

#### ■ BIG BRAIN THEORY (BBT) CAMPAIGN: MISSION ACCOMPLISHED

Audacity and interdisciplinarity are a key part of the Institute's scientific strategy, as epitomized by the "high-risk" projects in the BBT Program, which are revolutionizing treatment prospects for nervous system diseases. From November 2021 to December 2022, Paris Brain Institute called on its donors to provide seed capital for the ten selected BBT projects. More than 900 donors stepped up to support these bold

initiatives, contributing €1.7 million.

Jean-Paul Baudecroux, founder and CEO of NRJ Group, was the biggest BBT patron in 2022. His generous philanthropy reflects his unwavering commitment to the Institute's teams and his irrepressible desire to empower scientists in their work.



Supporting this cutting-edge Institute is a worthy cause. By backing this research we are improving and saving countless lives.

RICHARD MILLE



#### DONORS WHO JOINED THE CIRCLE OF FRIENDS IN 2022

- Pascal Abensour
- AIUTIAMO LA PARAPLEGIA CLUB CLAY REGAZZONI
- ALANTRA
- ALONA
- ANJAC
- Xavier Anthonioz-Rossiaux
- Mrs. Jacqueline Batisse
- Lucien Belloc
- BEX CAPITAL
- Marie Louise & Yves Bourdin
- BREEGA
- CHATEAU CROIX DE LABRIE Mr. & Mrs. Axelle and Pierre Courdurié
- Jean-Sébastien Decaux
- Philippe & Carole Delouvrier
- Laurence Douvin
- Dominique Dupuy
- Paul Ferré
- FONDS DE DOTATION GRAVEYRON
- Kareen Foriel-Destezet
- Mr. & Mrs. Gérard and Danielle Gerbi
- Christian Gueugnier
- Christiane Guillerme
- H8 INVEST
- HALTRA COMMUNITIES
- HORIZON THERAPEUTICS FRANCE
- Mr. Pascal de Jenlis
- Mr. & Mrs. Kuhn
- Diane Labruyère-Cuilleret
- Pierre Lasry
- Patrick Lefort
- LM INVEST FRANCE
- François-Xavier de Mallmann
- Mr. & Mrs. François Manset
- Quentin Maurice
- MUTUELLE DU MEDECIN
- Pascal Oddo
- ORANGE
- PSBO
- Aurore & Stéphane Rougeot
- SCIMMOBILIERE SABATIER
- SOFINNOVA PARTNERS
- Aurélien & Alexandrine Sonet
- TIKEHAU CAPITAL
- Mr. Simon Vouillot
- Philippe & Denise Zanet

#### CRÉDIT MUTUEL NORD EUROPE A LONG-STANDING PATRON OF PARIS BRAIN INSTITUTE

Crédit Mutuel Nord Europe has been a Paris Brain Institute patron for the past decade. In addition to an annual gift, every year the group donates a percentage of SCPI Pierval Santé's premium income. In 2022 that represented nearly €125,000 in direct funding to advance research on nervous system diseases and trauma.

“ We are proud to be a patron of the Institute. We are committed to supporting our regions through meaningful investments. Our customers share our vision and every year they get behind our social initiatives. It is crucial that we all keep playing our part.”

ERIC CHARPENTIER,  
CEO of Crédit Mutuel Nord Europe



#### ■ PARIS BRAIN INSTITUTE FRIENDS COMMITTEE

CERCLE  
DES AMIS  
de l'Institut  
du Cerveau

The Friends Committee is a group of outstanding philanthropists who are not only generous donors but are also actively involved in the development of Paris Brain Institute.

Lindsay Owen-Jones, Honorary President of Paris Brain Institute Friends Committee  
Prof. Gérard Saillant, Founding Member and President of Paris Brain Institute  
Jean Todt, Founding Member and Vice President of Paris Brain Institute  
Martine Assouline and Maurice Lévy, Joint Chairs of Paris Brain Institute Friends Committee  
Jean-Luc Allavena, Cédric de Bailliencourt, Alexandre Barrière, Jean-Charles & Natacha Decaux, François Henrot, Jean-Philippe Hottinguer, Véronique De Kepper, Richard Mille, Eddie Misrahi, Margaux Primat, Christian Schmidt de La Brélie, Sophie Seydoux, François Thomé, Serge Weinberg\*

#### ■ AMBASSADORS

Jean Reno, Guillaume de Tonquédec and Michelle Yeoh, actors



#### OLIVIER GOY, AN INSPIRING AMBASSADOR

#### €1.15 million raised at the Art-Science Breakfast

In partnership with the inaugural "Paris+ par Art Basel" contemporary art fair, the founding members, Paris Brain Institute Friends Committee and the "Invincible été" support committee led by Olivier Goy met for an "Art-Science Breakfast" on October 19<sup>th</sup> at the Café de l'Homme and raised a record €1.15 million for the Institute's research projects. This year's focus was amyotrophic lateral sclerosis (ALS). Olivier Goy's inspiring speech on the importance of research was followed by an excerpt from his documentary *Invincible été*, directed by Stéphanie Pillionca (released in March 2023).

“ The "Art-Science Breakfast" marks the start of our collaboration with Paris Brain Institute, which I firmly believe will strengthen the crucial dialogue between science and the arts.”

CLÉMENT DELÉPINE,  
Director of Paris+ par Art Basel



CIRCLE OF FRIENDS OFFICE  
+33 (0)1 57 27 40 32  
cercle@icm-institute.org

# PUBLIC FUNDRAISING SUPPORTING AND ACCELERATING RESEARCH



Fundraising is crucial for our research teams. In 2022, Paris Brain Institute received 110,000 donations totaling €9,950 million, an increase of nearly 9% compared with 2021. The Institute would like



to thank the 30,000 new donors who joined the ranks this year in support of its scientists.

The Institute's fundraising strategy consists in printed, online, and telephone campaigns. All these campaigns are carefully coordinated using sophisticated tools to keep costs down and maximize the impact of our action plan.

For several years now, the goal has been to increase online giving and develop regular donations, which help optimize donor retention and rationalize investments.

Actor and Paris Brain Institute Patron Guillaume de Tonquédec has been the ambassador of the annual "Discoverers of Hope" campaign since 2018. This year's event in November raised €1.6 million for brain research.

The Institute also remains committed to

sharing discoveries with donors, keeping them informed of the latest scientific progress through regular updates. *Synapse*, the quarterly magazine for donors, presents the latest research news and contains a feature article with in-depth content on a specific topic (neurodegenerative diseases, clinical research, data science for healthcare, etc.). Our regular contacts with donors are a reminder of the importance of donations in advancing research and paving the way for future discoveries.

Despite the difficult socio-economic context in 2022, our donors continued to show their commitment by responding to our appeals throughout the year. It is clear that public support for research remains strong. Paris Brain Institute would once again like to thank all its donors for their generous contributions. Our thanks also goes to Guillaume de Tonquédec for his valuable support.

# SUPPORT FROM BEQUESTS AND LIFE INSURANCE POLICIES

With growing awareness that the fight against brain diseases is a major public health challenge requiring long-term support, generous donors are increasingly opting to donate all or part of their estate to Paris Brain Institute by leaving a gift in their will or naming the Institute as a beneficiary in their life insurance policy. In 2022, the Institute received €4 million from bequests and life insurance policies, 50% more than in 2021. Each year, these resources make a growing contribution to scientific research. As a non-profit foundation with recognized charitable status, the Institute is fully exempt from inheritance tax.

Carole Clément, Testator Relations Officer, is available to speak with anyone considering passing on assets to the Institute and seeking advice on how to proceed or simply wishing to find out more. A meeting can also be arranged with the Institute's legal expert, a notarial law specialist, who can offer guidance and address specific requirements. Any discussions are completely confidential, non-binding, and follow a rigorous code of ethics and conduct. Testators can also arrange a visit to the Institute to find out more about its research. These opportunities for interaction are greatly appreciated by people considering gifting their assets.

## SUPPORT IN ACTION

All year long, donors and volunteers organize fundraising events and initiatives for Paris Brain Institute's research. This constant outpouring of public support reflects an abiding belief and confidence in the work of our scientists. The Institute would like to thank all those involved. Here is a snapshot of some of the many generous fundraising events held in 2022.

### May 4-8

Charity bike ride for dystonia with Tomate contre la Dystonie

### June 4

Afghan dinner by Amour Amour Amour



### June 19

Course des héros (Heroes' Race)



### September 9-11

16<sup>th</sup> Féerissime (Charity Motor Show)

### September 15

First edition of the Men's Golf Tournament

### November 11-13

Interglitches charity video game marathon



### November 19

10<sup>th</sup> Music Passion Parkinson



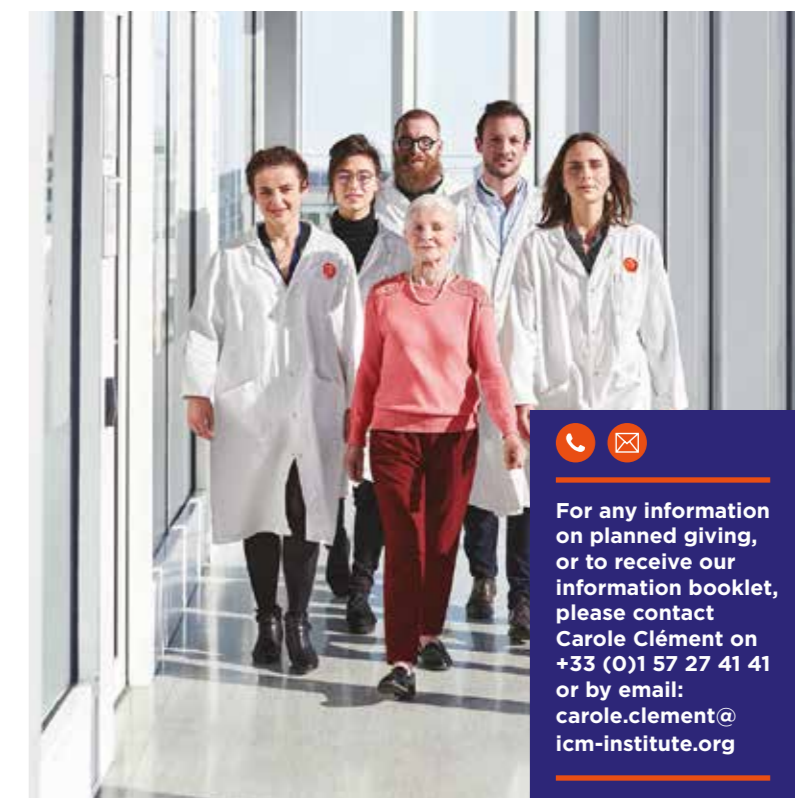
Amour Amour Amour pop-up store

### November 27

Un pied devant l'autre race



Plus fundraising events organized by Antoine Bovyn, Floriane Gasnerie, Neurobike 1 & 2 by Michael Craig Gradwell, Pontault Combault Rotary Club, The Carpenters, Parkidanse by Martine Baratte, Samuel Jerome, etc.



For any information on planned giving, or to receive our information booklet, please contact Carole Clément on +33 (0)1 57 27 41 41 or by email: carole.clement@icm-institute.org

# TRIBUTE TO LILY SAFRA



It was with great sadness that we learned of the death of Lily Safra, Honorary President of our Circle of Friends, in July 2022. Mrs. Safra chaired the Edmond J. Safra Foundation for more than 20 years and was one of the first and most committed supporters of Paris Brain Institute. Here is a look back at her life and her lasting contribution to our Institute.

Brazilian-born Lily Safra led an active international life. She spoke six languages and lived in seven countries. She was known for her elegance, independence, generosity and attention to detail. Her husband, Edmond J. Safra, was one of the 20<sup>th</sup> century's most accomplished bankers, and alongside his business success he was deeply committed to philanthropy. Lily and Edmond had a strong and enduring bond. As she said, *"It was with Edmond that I learned the joy of giving, as well as that when you support people who are making a real difference in the world, you end up receiving far more than you give."*

Mrs. Safra was a constant source of comfort to her husband when he developed symptoms of Parkinson's disease. After his death in 1999, she became the guardian of his legacy. During her time as President, the Edmond J. Safra Foundation supported hundreds of organizations in more than 40 countries in education, science and medicine, religion, humanitarian aid, and social welfare.

Paris Brain Institute was honored to be one of those organizations. Mrs. Safra was one of our first supporters, pledging a transformative donation in 2005 when the Institute was still just an idea. That first gift enabled us to invest in the best scientific talent, equipment and resources.

Thanks to the constant support of the Edmond J. Safra Foundation, our Institute became one of the world's leading neuroscience centers in just 13 years.

We had the pleasure of meeting Mrs. Safra at the Institute on several occasions. She inaugurated the Espace Edmond et Lily Safra, which includes the main entrance and all ground floor conference and meeting rooms, and the Edmond & Lily Safra Auditorium, our main presentation area.

Maurice Lévy, Co-Chair of the Institute's Friends Committee, reflects, *"Lily had a big heart. She was a sincere, caring philanthropist, and personal experience gave her a deep sense of solidarity with those living with brain disorders and their caregivers. She had no hesitation in offering her full support to the Institute's researchers by giving them the means to carry out their work."* We echo these words. It is a privilege for us to uphold the memory of Lily Safra throughout our Institute.

**ALEXIS BRICE,**  
Executive Director of  
Paris Brain Institute



**GÉRARD SAILLANT,**  
President of Paris Brain  
Institute



# THANK YOU

## MAJOR PATRONS

Elisabeth Badinter  
Alexandre Barrière  
Maria Rosa Bemberg  
Dominique Desseigne  
Joy Desseigne-Barrière  
EURYALE  
FIA FOUNDATION  
FONDATION  
BETTENCOURT  
SCHUELLER  
FONDATION EDMOND  
J. SAFRA  
FONDATION LILY SAFRA  
FONDATION GROUPE EDF  
FP JOURNE - INVENIT ET  
FECIT  
Olivier Goy - Invincible été  
HSBC FRANCE  
KLESIA - CARCEPT  
PREV - IPRIAC  
Maurice Lévy  
Dr. Léone Noëlle Meyer  
Richard Mille  
MSDAVENIR  
OCIRP  
ORRICK RAMBAUD MAR-  
TEL  
Lindsay Owen-Jones  
PUBLICIS  
RACE OF CHAMPIONS  
David de Rothschild  
Edouard & Martine de  
Royère  
Michael Schumacher  
Jean Todt & Michelle Yeoh  
4 anonymous

## MAJOR BENEFACTORS

BOLLORÉ  
BOUYGUES  
CRÉDIT MUTUEL NORD  
EUROPE  
FONDATION SUCRES ET  
DENRÉES  
FONDS DE DOTATION  
PIERRE BERGÉ  
Jacques & Dominique  
Garañalde  
GROUPE IDEC  
François Henrot  
Mr. & Mrs. Alain Joly  
PHILIPPE FOUNDATION,  
INC.  
RATP  
Serge Weinberg  
1 anonymous

## PATRONS

AIR FRANCE  
Christine André  
Jan Aron family  
AUDEMARS PIGUET  
HOLDING SA  
AXA SA  
Jean-Paul Baudecroux  
Luc Besson  
BGC PARTNERS  
Marie-Claire Blanckaert  
Jean & Anne-Marie Burelle  
Olivier Carré  
Lucienne Collin  
Jean-Charles & Natacha  
Decaux  
Claude Demole  
Michel Duhoux  
FÉDÉRATION FRANÇAISE  
DU SPORT AUTOMOBILE  
FONDATION AREVA  
FONDATION ARPE  
FONDATION CO-  
GNACQ-JAY  
FONDATION DE FRANCE  
FONDATION D'ENTREPRISE  
IRCEM  
FONDATION D'ENTREPRISE  
MICHELIN  
FONDATION MARIE-ANGE  
BOUVET LABRUYERE  
FONDS DE DOTATION  
JANSSEN HORIZON  
FONDS PATRICK DE BROU  
DE LAURIÈRE  
FONDS SAINT-MICHEL  
GROUPE PASTEUR  
MUTUALITÉ  
HALTRA COMMUNITIES  
Sylvain & Michèle Héfès  
LA FRANÇAISE AM  
Christiane Laborie & Roger  
Lionnet  
MALAKOFF HUMANIS  
Serge Kampf  
Alain Mallart - GROUPE  
ÉNERGIPOLE  
Dominique & Danièle Mars  
Florent Menegaux  
ORACLE  
PATHÉ  
Jean-Luc Petithuguenin  
Christian Poquet  
SCHNEIDER ELECTRIC  
Claude Sfeir  
UNIM  
Dominique Vizcaino  
8 anonymous

## BENEFACTORS

2CRSI  
Benoit Abdelatif - Classic  
Days  
Pascal Abensour  
ACCOR  
ACCURACY  
Benoît André  
Yvon André & Annette Gellé  
Xavier Anthonioz-Rossiaux  
AMAURY MEDIA  
ARB CONSEIL SAS  
ASSOCIATION RMC BFM  
ASSOCIATION SOGNO DI  
CAVALLINO  
AUTOMOBILE CLUB DE  
FRANCE  
Mr. & Mrs. Guy Autran  
AXA RESEARCH FUND  
AXERIA PREVOYANCE  
BANQUE PICTET  
Frédéric Banzet  
Anne Bardinon  
Hubert Beaux  
Lucien Belloc  
Fernande Benveniste  
Gérard Bertinetti  
Mr. & Mrs. Pascal Boileau  
Tatiana & Adrien  
de Boisanger  
Éric Boizel family  
Chantal Bolloré  
Irène Bonnet  
BOREL & BARBEY  
BOSTON SCIENTIFIC  
Yves Boucheny  
Marie Louise & Yves Bourdin  
Mr. & Mrs. Thierry Bourvis  
Jean-Jacques Branger  
BREGGA  
Micheline Bridel  
Bucaille family  
Gérard Buffière  
Daniel Buren  
Antoine & Enrica Van  
Caloen  
Louis Camilleri  
CAMPENON BERNARD  
CONSTRUCTION  
CAPGEMINI  
Marella Caracciolo Agnelli  
P. & J.P. Carle  
Mr. & Mrs. Arnaud Caspar  
Patrick Charpentier  
Suzanne Charpentier  
Dr. André Chérot  
Fabien Choné  
Mr. & Mrs. Léon Cligman

Alberto Colussi  
COMITÉ NATIONAL  
OLYMPIQUE ET SPORTIF  
FRANÇAIS  
CRÉDIT AGRICOLE D'ÎLE-  
DE-FRANCE MÉCÉNAT  
Jean-Patrice & Marie-Anne  
Dalem  
Laurent Dassault  
DAVID HERRO TRUST  
Viscount Olivier Davignon  
Danielle Decaux  
Jean-François Decaux  
Annette Decroix Lavour  
Ghislaine Delattre  
ASSOCIATION DEMAIN  
DEBOUT  
Claude Demole  
Jean-Louis & Marie-Cécile  
Dufloux  
Caroline & Jean-Christophe  
Dumas  
Jacques Dumas  
Rena & Jean-Louis Dumas  
Thierry Dumas  
Marcel Dupuis  
Paul Dupuy  
Henri Dura  
Cécile & Christophe Du-  
rand-Ruel  
ELIVIE  
ÉRIC HOLDING  
Magali Etienne  
EVER NEURO PHARMA  
Claude Félix  
FERBLANC FUNDRAISING  
Roland Fernet  
Emilio Ferré  
Paul Ferré  
FINETFO SA  
FONDATION ABEONA  
FONDATION AIR LIQUIDE  
FONDATION CAP NF  
FONDATION PLENUM  
FONDATION ROGER DE  
SPOELBERCH  
FONDATION RUM-  
SEY-CARTIER  
FONDAZIONE GENERALI -  
THE HUMAN SAFETY NET  
ONLUS  
FONDS DE DOTATION  
LIONS CLUB DOYEN  
Kareen Foriel-Destezet  
Dimitri & Maryvonne Fiotadi  
Jean-René Fourtout  
GALORI TRUST  
GIULIANI S.P.A.  
GLAXO SMITH KLINE  
Florence Gombault  
Mina Gondler

Jean-François & Dominique Gouédard  
 GROUPE BARRIÈRE  
 GROUPE EMERIGE  
 GROUPE PRÉVOIR  
 GROUPE ROUSSELET  
 Monique Guérinat & FISA  
 Christian Gueugnier  
 Christian Haas  
 Mireille & René Hadjadje  
 Pierre Hanriot  
 Bernard Hayot  
 Jean-Marie & Laurence Hennes  
 Paul Hermelin  
 Brigitte Hidden  
 IWC SCHAFFHAUSEN  
 Marie-Jeannine Jacobson  
 Pierre Jardinier  
 William Johnston  
 Anne Jousse  
 Alain Kahn  
 KERALIS  
 Mr. & Mrs. François Lafon  
 Bernard Lange  
 Bertand Lavier  
 Martin Lebeuf  
 Angélique Lenain & Fabrice de Gaudemar  
 Thierry Lepercq  
 Les Amis de Capucine  
 Jean-Jacques Lestrade  
 Hubert & Catherine Levy-Lambert  
 Stéphane Lherbier  
 LIGUE DE FOOTBALL PROFESSIONNEL  
 Daniel Louppe  
 LILLY  
 Chantal & Christian Louvet  
 Georges Louviot  
 François-Xavier de Mallmann  
 Mr. & Mrs. François Manset  
 Pascal Olivier & Ilana Mantoux  
 Jean-Pierre Martel  
 Mr. & Mrs. Patrick Martin-Michaud  
 MAXI SEC  
 Kamel Mennour  
 Mr. & Mrs. Bertrand Meunier  
 Corinne Millet  
 Claude & Isabelle Montero  
 Charles Moore Wilson  
 Hervé de La Morinière  
 Renée Mullie  
 MUTUELLE DU MÉDECIN  
 NESTLÉ FRANCE SAS  
 Éric & Hervé Neubauer  
 ODYSSEY REINSURANCE COMPANY  
 ORANGE  
 ORKYN'  
 Gilles & Sylvie Pélisson  
 Claude Péquart

John Persenda  
 Jean Peter  
 PHILIP MORRIS INTERNATIONAL  
 Mr. & Mrs. Patrice Piccon  
 Luciano Pietropoli  
 Caroline & Olivier Plantefève  
 Jacques Popper  
 Claude & Benoît Potier  
 Bertrand Puech  
 Elisabeth Ratte  
 Alain Rauscher  
 RELAIS & CHATEAUX  
 Jean Reno  
 Christian Revol  
 Jean-Paul Ringard  
 Richard Roth  
 ROTHSCHILD & CIE  
 BANQUE  
 Louise de Rothschild  
 Nelly Rouyrès  
 RSI PROFESSIONS  
 LIBÉRALES ET ARTISANS  
 Jean-Pierre Sabardu  
 SCIMMOBILIERE SABATIER  
 Hubert Saltiel  
 Eckhard Sambach  
 Claire Sarti  
 Guy Savoy  
 Colette Schumacher  
 SCLÉROSE EN PANNE  
 Jérôme Schwab  
 SLA FONDATION RECHERCHE  
 SOCIÉTÉ FRANÇAISE DE MÉDECINE ESTHÉTIQUE  
 SODEXO  
 SOLIDAIR'S  
 SOPAREXO  
 Claudine Soubrié  
 Jean-Cyril Spinetta  
 Yannick Tarondeau  
 Jean-Philippe Thierry  
 Alain Thinot  
 TIKEHAU CAPITAL  
 Nicolas de Turkckheim  
 Albert Uderzo  
 Thierry Varène  
 Patrick Vegeais  
 Jean Veil  
 Antoine Virgili  
 YVES ROCHER  
 Yoël Zaoui family  
 43 anonymous

### FRIENDS

ADCY5.ORG  
 ADELAB  
 AIUTIAMO LA PARAPLEGIA  
 CLUB CLAY REGAZZONI  
 ALANTRA  
 Marie-José Alfandari  
 Jean-Luc Allavena  
 ALONA  
 ALTIUS TEMPORIS

Dorothee Altmayer  
 Gabriel Roland Amare  
 Colette Amram  
 Mireille Favier Amoretti  
 Philippe André  
 ANJAC  
 Manuel & Marie-Thérèse Arango  
 Johanna Arduin  
 ARTEMIS  
 ASSOCIATION JEAN-CLAUDE DUSSE  
 ASSOCIATION PAUL ET PHILIPPE PERROT  
 ASSOCIATION SPORTIVE ET CULTURELLE DE L'AIR  
 ASSOCIATION SPORTIVE GYMNIQUE NEUILLY  
 ASSOCIATION VIVRE  
 A SAINT DAMIEN  
 Jean-Pierre Aubin  
 Nathalie Aureglia-Caruso  
 AUREL BGC  
 AXA BANQUE  
 Nicole Ayanian Schneider  
 Mr. & Mrs. Balas  
 BANQUE DE LUXEMBOURG  
 Mr. & Mrs. Pierre-René Bardin  
 Mrs. Jacqueline Batisse  
 Princess Laure de Beauvau  
 Craon  
 Guy & Denise Bechter  
 François Benais  
 Robert Bensoussan  
 Florence Zoé Bergevin  
 Raynale Berthillier  
 Patrick Bertrand  
 BESINS HEALTHCARE  
 FRANCE  
 BEX CAPITAL  
 BIOCDEX  
 BIOGEN FRANCE SAS  
 Jean-Claude Biver  
 Alain & Blandine Bizot  
 Mr. & Mrs. Jean Blanquet  
 du Chayla  
 BLB SARL  
 SAS BLEURY  
 BMENERGIE  
 Mr. & Mrs. André Bohm  
 Francis Boileau  
 Charles de Boisriou  
 Mr. & Mrs. Michel Yves Bolloré  
 BOURSE CATHY LEITUS  
 Jean Bousquet  
 Emmanuel Boussard  
 Claude Bouygues  
 Renaud Bouygues  
 François Buquet  
 Yves & Pascale Camuset  
 Marie-Noëlle Canu-Duclert  
 Henri Cassin  
 CB RICHARD ELLIS  
 CELIO  
 CHAMPAGNE

LAURENT-PERRIER  
 Jean-Bernard Champeau  
 Jean-Paul Charmes  
 CHATEAU CROIX DE LABRIE  
 Mr. & Mrs. Axelle and Pierre Courdurié  
 Amaury & Alix de Chaumont Quित्रy  
 Dominique Chedal  
 Brigitte Chichignoud  
 Prince & Princess de Chimay  
 Ariane & Antoine de Courcel  
 Gérard Collet  
 Bertrand Collomb  
 ASSOCIATION SPORTIVE PARALYSIE  
 COTY INC.  
 Mr. & Mrs. Robert Counoy  
 Charlit Coutouly  
 CRÉDIT AGRICOLE CENTRE OUEST  
 Mr. & Mrs. Cromback  
 Françoise Crouzet  
 Olivier Dassault  
 Jean-Luc Davesne  
 Mr. & Mrs. Didier Debarge  
 Jean-Sébastien Decaux  
 Cécile Defforey  
 Blandine & Philippe Delaunay  
 Louis Desanges  
 Laurence Douvin  
 Caroline Dresch  
 Gisèle Duc  
 Jérôme Dumont  
 Dominique Dupuy  
 Mr. & Mrs. Claude Elmaleh  
 EMASUR  
 ÉMERAUDE  
 INTERNATIONAL  
 Chantal Engel  
 Jacques-Arthur Essebag  
 EXELGYN  
 Mireille Favier Amoretti  
 Didier Fayard  
 FÉDÉRATION FRANCAISE DE TENNIS  
 FEDEX CORP  
 Charles-Henri Filippi  
 FINANCIÈRE CADO  
 FINANCIÈRE DE L'ÉCHIQUIER  
 FINANCIÈRE POCH  
 Thierry Flecchia  
 FONDATION CHRISTINE GOUDOT  
 FONDATION SERGE DASSAULT  
 FONDATION VEEPEE  
 FONDS DE DOTATION  
 GRAVEYRON  
 Philippe Foriel-Destezet  
 FRANCE GALOP  
 Benoit Gallet  
 Mr. & Mrs. Gilles Gantois

B. Georges Picot  
 Mr. & Mrs. Gérard and Danielle Gerbi  
 Jean Glavany  
 Francis Thomas Gleeson  
 GLG PARTNERS  
 Christian Gloz  
 Mina Gondler  
 Mr. & Mrs. Gorriquer  
 Mr. & Mrs. Pierre-Henri Gourgeon  
 GRAND HÔTEL INTER  
 CONTINENTAL PARIS  
 Allan Green  
 GROUPE BABILOU  
 GROUPE LHOIST  
 Caroline Guerrand-Hermès  
 Christiane Guillerme  
 Catherine Guillouard  
 Pierre Guichet  
 Isabelle Gunther  
 H8 INVEST  
 Claire Habauzit  
 Marc Haeberlin  
 Maria Halphen  
 Joseph Hamburger  
 Bob Harifin  
 Yvette Hémon  
 Camille Henrot  
 HEXAGONE SPORT  
 Brigitte Hidden  
 HORIZON THERAPEUTICS  
 FRANCE  
 HUNTINGTON ESPOIR  
 OUEST  
 Simone Huriot  
 IMPALA SAS  
 ISABELLE AND BERTRAND  
 SCHWAB SOCIAL  
 INITIATIVE FUND  
 Mr. Pascal de Jenlis  
 William Johnston  
 Christophe Karvelis Senn  
 Cyril Kongo  
 Daniel Kouzo  
 Sophie & Frédéric Krebs  
 Mr. & Mrs. Kuhn  
 LA LONGUE ROUTE DES MALADES DE LA SLA  
 LA TOMATE CONTRE LA DYSTONIE  
 Mr. & Mrs. Patrice de Laage de Meux  
 Mr. & Mrs. Antoine Labbé  
 LABORATOIRE ÉCLAIR  
 LABORATOIRE IPSEN  
 PHARMA  
 Jean-François Labrousse  
 Diane Labruyère-Cuilleret  
 Mr. & Mrs. Michel Lacoste  
 Réjane & Michel Lacoste  
 Marc Ladreit de Lacharrière  
 Christian Langlois-Meurinne  
 Pierre Lasry  
 Philippe Lassus  
 Diane de Lasteyrie du Saillant  
 David Layani

Alain Lazimi  
 LE CHEVAL FRANCAIS  
 Patrick Lefort  
 Arlette Le Gall  
 LES VOILES DE SAINT BARTHES  
 Maurice Lesaffre  
 Nicolas Lescure  
 Haim Leshanot  
 LIONS CLUB DES ESSARTS  
 LM INVEST France  
 Jean-François & Marie-Thérèse Loisy  
 L'OREAL  
 Francis Lotigie-Browaeyns  
 Jean-Hugues Loyer  
 Bob Manoukian  
 Gilles de Margerie  
 Mr. Marinopoulos  
 Jean-Pierre Martel  
 Pierre Martinet  
 Bruno Matheu  
 Bernard Maurel  
 Quentin Maurice  
 MEDTRONIC  
 Robert Mell  
 MERCK SERENO  
 Jean-Claude Meyer  
 Thierry & Natacha Millemann  
 MIROVA  
 Christiane Monnet  
 Maylis de Montgolfier  
 Gérald Morand  
 Sophie Mullie  
 Yves Néron-Bancel  
 Eric & Hervé Neubauer  
 NEUROLOGUE  
 NOVARTIS  
 Pascal Oddo  
 Nahed Ojjeh  
 Jacques Olivier  
 Jean-Claude Olivier  
 ONDRA PARTNERS  
 PARTECH PARTNERS  
 David Pastel  
 Daniel Payan  
 Valérie Péresse  
 Henriette Pentecost and her friends from New Caledonia  
 Christophe Perchet  
 Guy Percie du Sert  
 Jacques Pericchi  
 Laurent Pétin  
 PMU  
 Nicolas Poniatowski  
 Mr. & Mrs. Henri de Ponnat  
 PÔTEL & CHABOT SA  
 Philippe Pourchet  
 Pierre Pringuet  
 PRODUCTION ET MARCHÉS  
 Baudouin Prot  
 PSBO  
 Paul Raingold  
 Mr. & Mrs. Patrick Rannou  
 Alain Ranval

Mr. & Mrs. Jean-Pierre Raynal  
 Alain Recoules  
 RICOL, LASTEYRIE & ASSOCIÉS  
 Simon Robertson  
 Bruno Roger  
 Patrick Roque  
 Jean-Jacques Rosa  
 Martin Rosdy  
 Jean Claude Rosenblum  
 Pierre Rosenblum  
 ROTARY CLUB ORLEANS  
 VAL-DE-LOIRE  
 Elisabeth de Rothschild  
 Aurore & Stéphane Rougeot  
 Thierry Roussel  
 Jean-François Roussely  
 Mr. & Mrs. Ruckstuhl  
 Igor Rybakow  
 Angèle Sabardu  
 Patrick Sayer  
 Mr. & Mrs. Christian Schlumberger  
 SFR  
 SICA2M  
 SOFINNOVA PARTNERS  
 Aurélien & Alexandrine Sonet  
 SORIN GROUP  
 SPB  
 SPIFIN  
 Giuliana Spotorno  
 STADE DE FRANCE  
 Mr. & Mrs. Vincent Strauss  
 Hubert Taffin de Givenchy  
 Claude Taittinger  
 Michel Theolierre  
 Henri de Termont  
 Nicole Toulouse  
 TRACE ONE  
 Mr. & Mrs. Guy Ullens  
 VERTU  
 Corinne & Ramon Villagrasa  
 VINCI CONCESSIONS  
 Gérard Viquel  
 Mr. Simon Vouillot  
 Olimpia Weiller  
 Eric Weinberg  
 Georges & Sophie Winter  
 XO EDITIONS  
 Antoine Zacharias  
 Philippe & Denise Zanet  
 Gérard Zimmerlin  
 Vanessa Von Zitzewitz  
 96 anonymous

### TESTATORS

**We would like to express our deepest gratitude and pay tribute to all those who left all or part of their estate to Paris Brain Institute in 2022, through a bequest or life insurance policy.**

Claire A.  
 Lydie B.  
 Maurice B.  
 Hélène C.  
 Claude-Marie C.  
 Colette C.  
 Paul C.  
 Roger C.  
 Yves D.  
 Robert F.  
 Renée G.  
 Michel H.  
 Christine K.  
 André K.  
 Daniel L.  
 Ginette L.  
 Jean M.  
 Suzanne M.  
 Ghislaine P.  
 Anne-Françoise P.  
 Marie P.  
 Maryse P.  
 Michel P.  
 Liliane S.  
 Michelle S.  
 Yvonne S.  
 Aboubakar T.  
 Jocelyne T.  
 Rémy T.  
 Claudine V.

### PARIS BRAIN

### INSTITUTE

### VOLUNTEERS

Patricia Brault  
 Ariane Bucaille  
 Nicole Fourn  
 Anne Mallet  
 Marie-Claude Theguel

### Death of Dr. Antonio Lopez

A retired physician, Dr. Antonio Lopez worked as a volunteer in Paris Brain Institute's Department of Communications and Development since 2017. He was in charge of answering medical questions asked by Institute donors and the public and provided expertise, advice and kindness, for which we are very grateful.



# Paris Brain Institute

PARIS BRAIN INSTITUTE  
Hôpital Pitié-Salpêtrière  
47 boulevard de l'Hôpital  
75013 Paris  
France  
[www.institutducerveau-icm.org](http://www.institutducerveau-icm.org)