PFL Growth Charts

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Overview

Short palpebral fissure lengths (PFL) are one of three facial features that define the unique facial phenotype of fetal alcohol syndrome (FAS). Published PFL growth charts for Caucasians vary greatly in both rate and magnitude of growth (Thomas '87, Hall '89, Farkas '94) , placing their accuracy and validity in question (Astley, 2011).

New PFL growth charts were recently published to reflect a racial/ethnic cross section of Canadian girls and boys 6-16 years of age (Clarren, 2010). PFLs were measured from digital facial photographs using the FAS Facial Photographic Analysis Software. These norms were found to be an accurate reflection of PFL growth among healthy U.S. Caucasians (Astley, 2011). Scandinavian PFL charts for 0-18 years of age also provide an accurate reflection of PFL growth over the lifespan (Stromland '99).

The University of Washington FASD Clinic conducts diagnostic evaluations across the lifespan (birth through adult). Thus the UW FASD Clinic will use the Scandinavian PFL charts to generate accurate PFL z-scores that transition smoothly across the full age span.

The Canadian and Scandinavian PFL growth charts have been added to Version 2.0 of the FAS Facial Photographic Analysis Software (Astley, 2012)

Which PFL Growth Chart to Use

Thomas[6]   Poor curve fit. Curve does not match true growth trajectory from birth to 16 . Growth rate appears too rapid from birth to 3 yrs and too slow after age 3.

Hall[4]   Accurate growth trajectory, but PFL is too large.

Canadian[2]   Accurate growth trajectory, PFL correct size, but chart starts at 6 years of age.

Stromland[5]   Accurate growth trajectory, PFL correct size, chart extends across the full age range.

FAS/D[1]   PFLs for 822 children with FAS and FASD diagnosed in the University of Washington Clinic
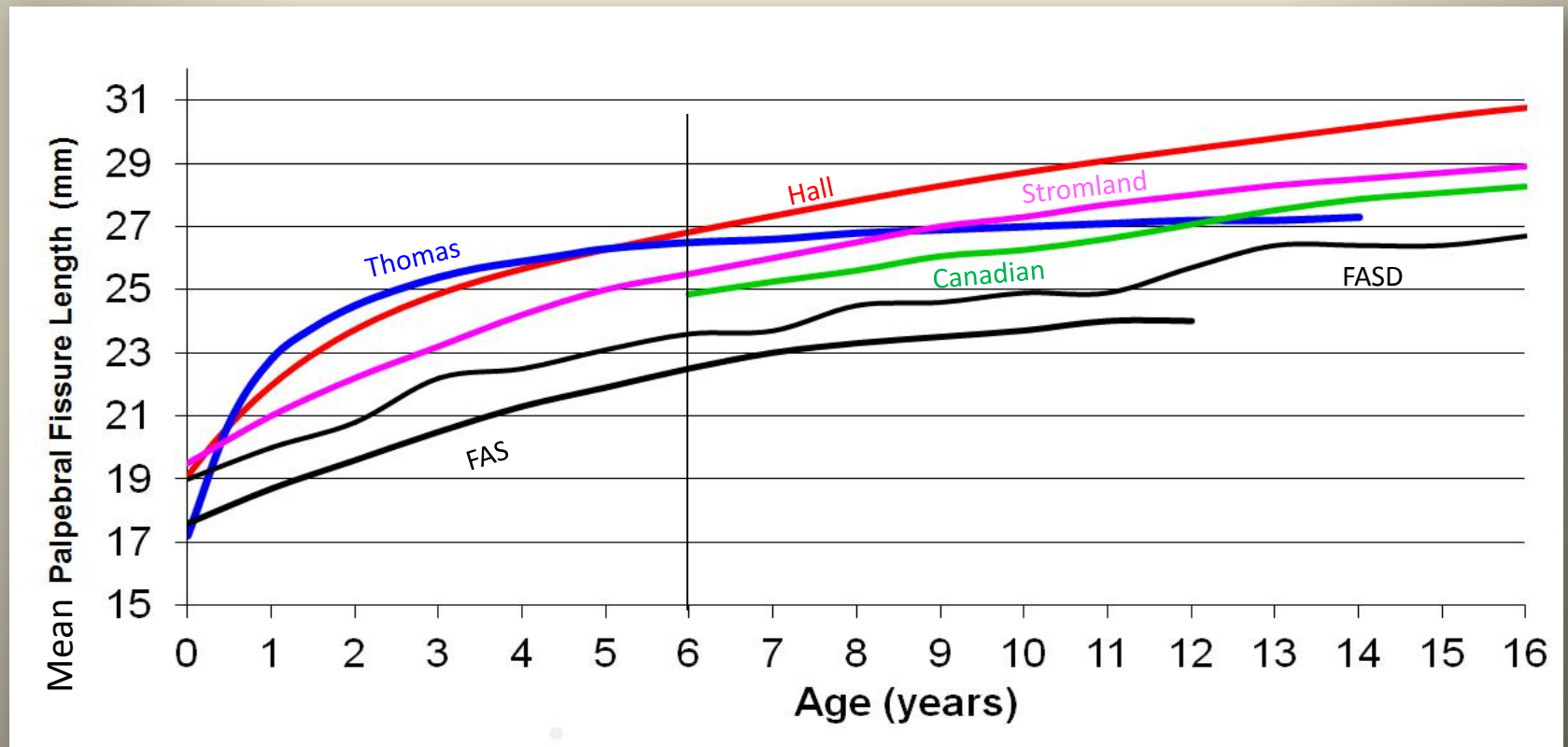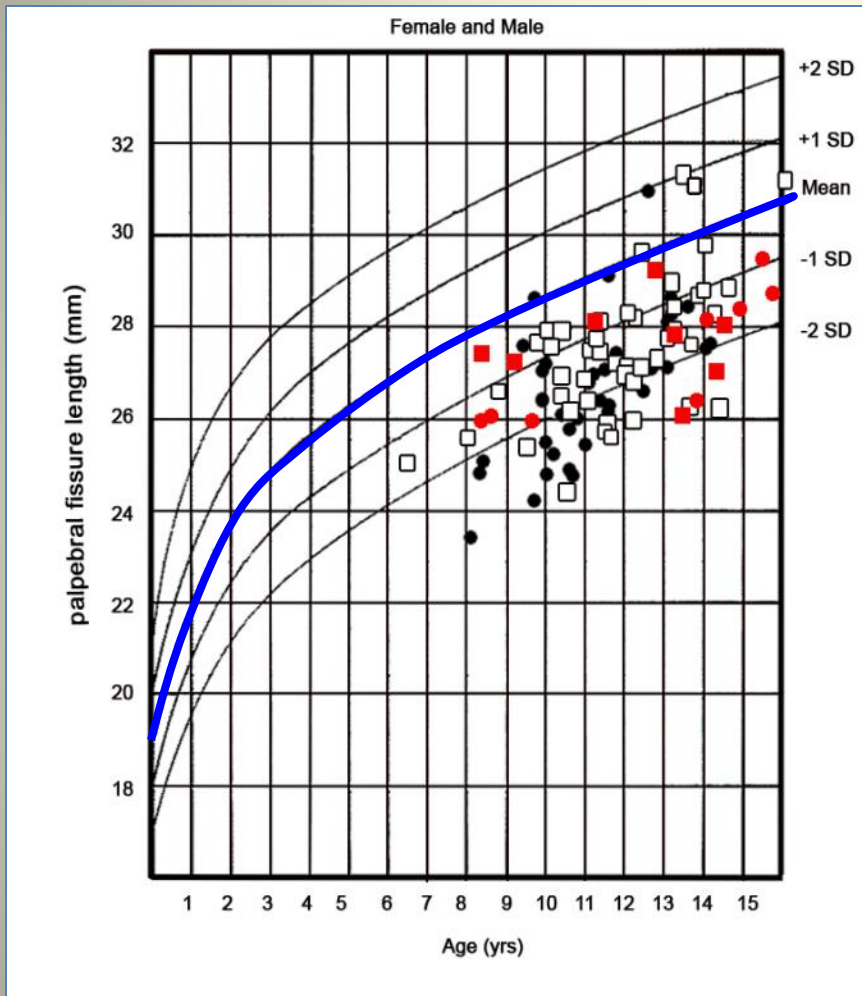
Hall PFL Chart with Canadian Overlays

The Hall (1989) PFL chart over estimates the true PFL by 2mm.
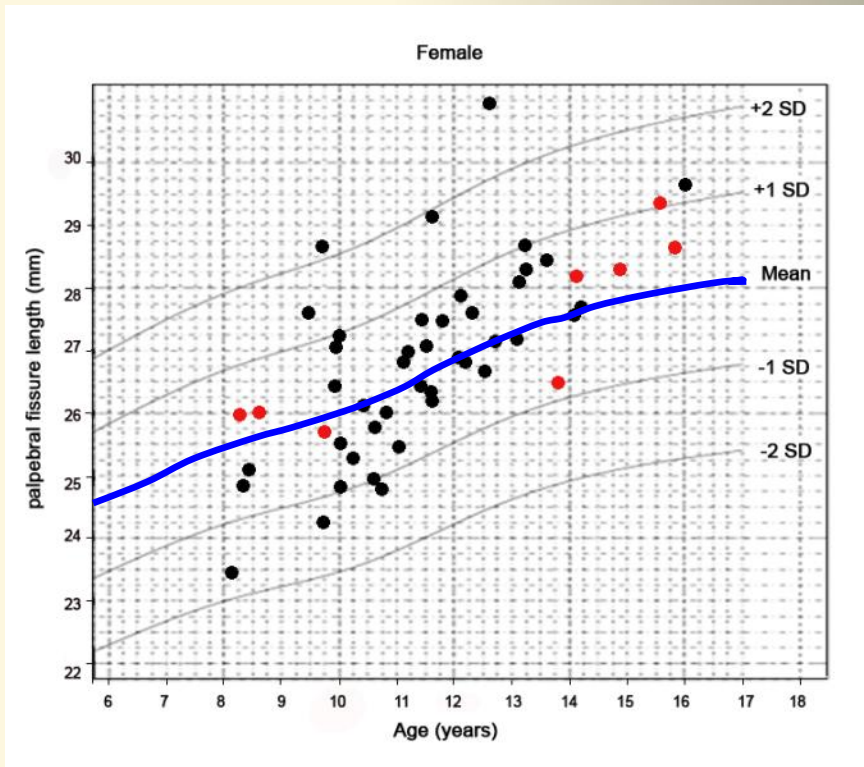The Canadian (2010) mean PFL is 2 SDs below the Hall mean PFL (Astley, 2011).
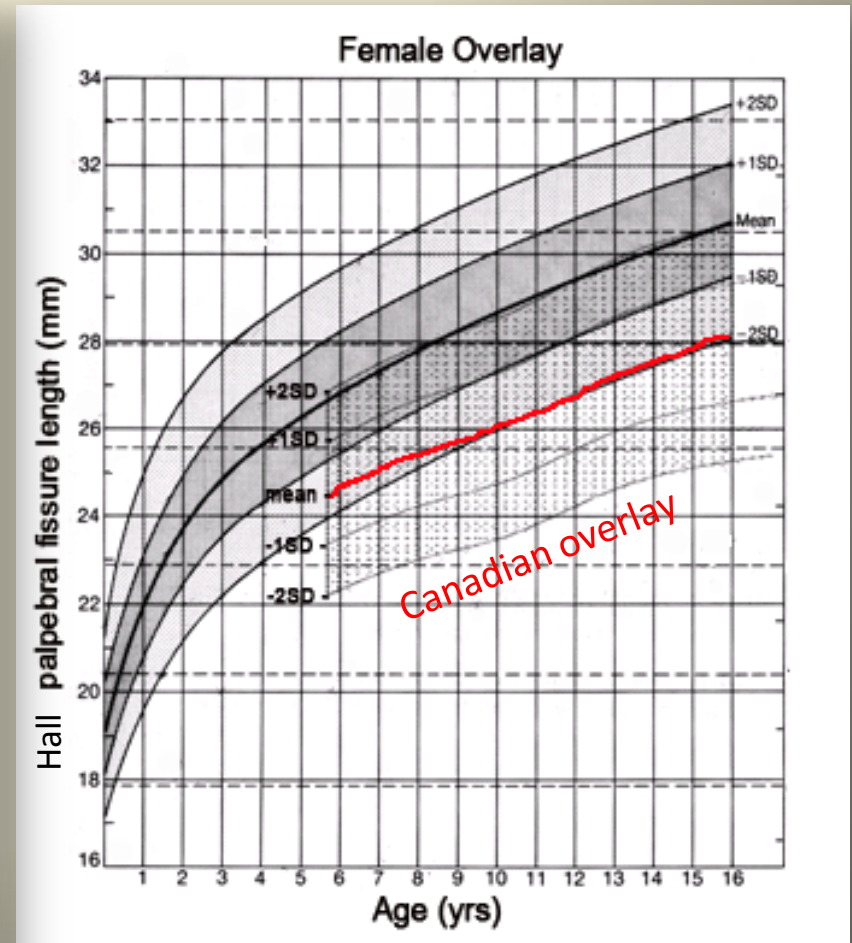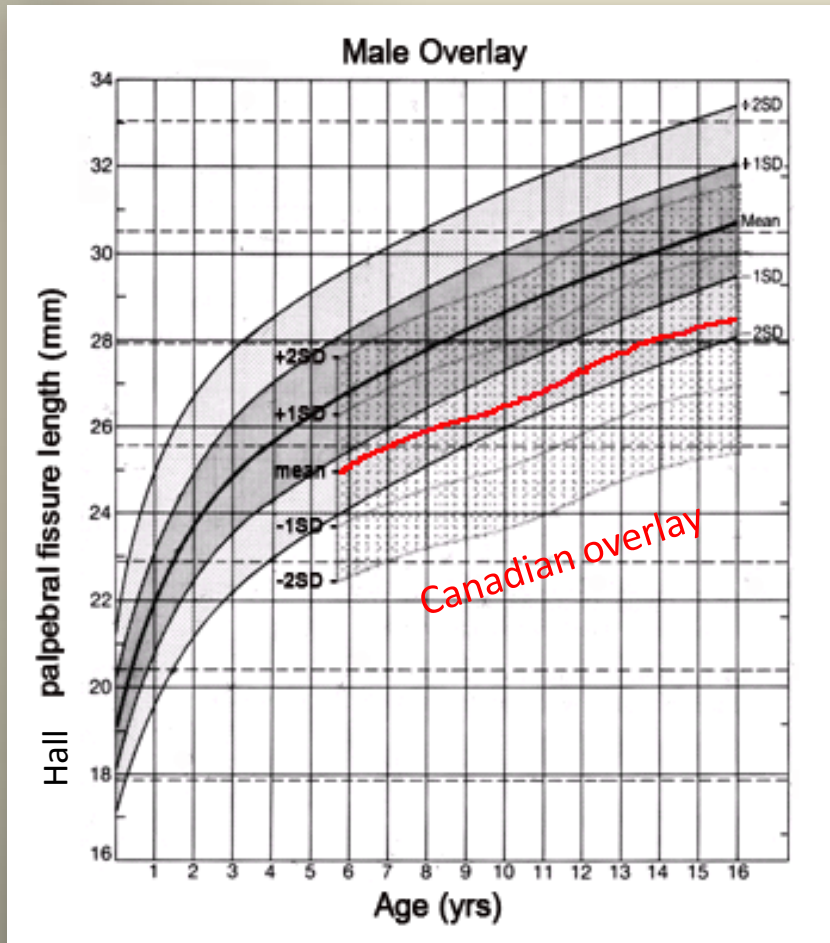
U.S. Caucasians good fit on Canadian PFL Charts

106 healthy U.S. school children plotted on Hall and Canadian PFL charts (Astley, 2011)

Hall Chart:
U.S. population falls 1.5 SDs below mean.

Canadian Chart:
U.S. population clusters around mean.

Use of Hall Charts did not generate inaccurate FAS diagnoses

Since the Hall PFL Chart over estimates the true size of a PFL,
it will over estimate the number of children with short PFLs.

This could lead to an inaccurate over diagnosis of FAS.

To test this concern, all patients who received a diagnosis of FAS in the past
18 years at the FAS DPN clinic had their PFL z-scores recomputed using the
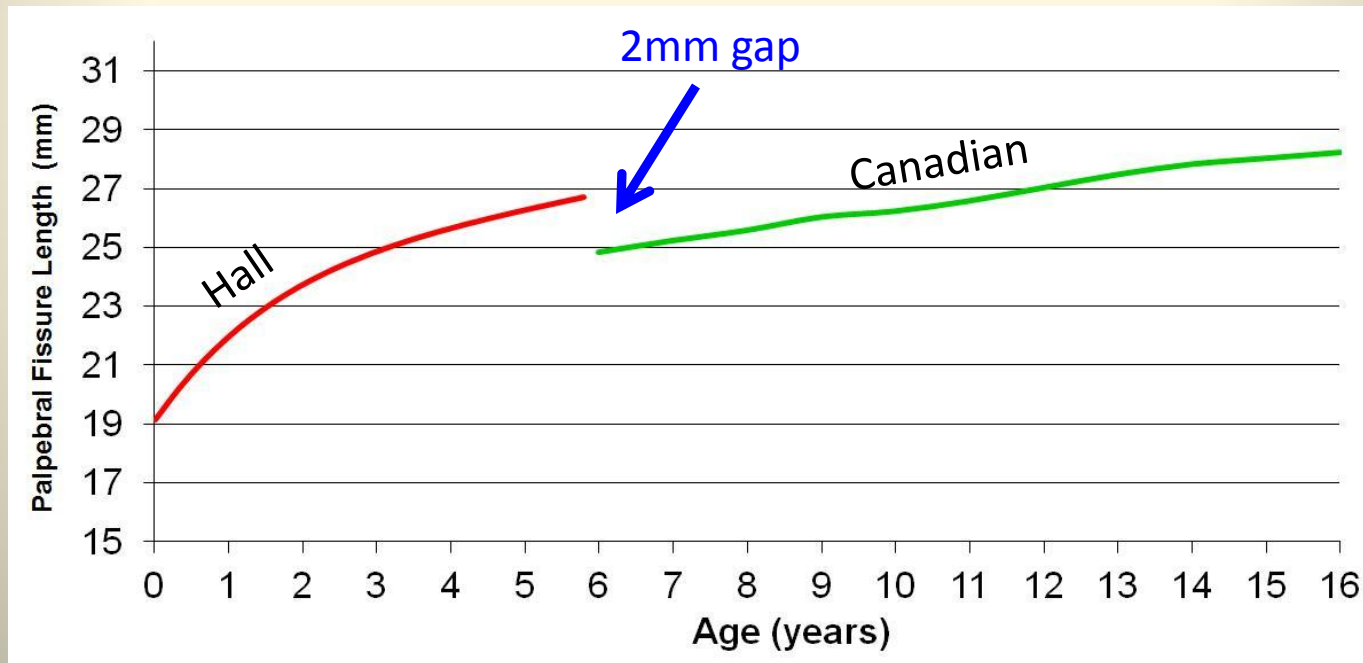Canadian PFL Charts.

<u>No</u> patient lost their diagnosis of FAS. All continued to meet the PFL criteria
of 2 SDs below the mean (Astley, 2011).

| 4-Digit Code PFL Criteria for FAS	2.0 SDs below the mean
Mean PFL for all patients with FAS using Hall PFL chart	3.9 SDs below the mean
Mean PFL for all patients with FAS using Canadian PFL chart	2.4 SDs below the mean

Canadian PFL starts at 6 years old

This will pose a problem for FASD clinics that evaluate children birth to 6 years of age. If the clinic uses Hall's chart for birth to 5.9 years, the prevalence of small PFLs will appear inaccurately higher among these younger children.

The Hall PFL chart over estimates the PFL by 2 mm.
A 5.9 year-old on the Hall PFL chart has PFLs 2 mm larger
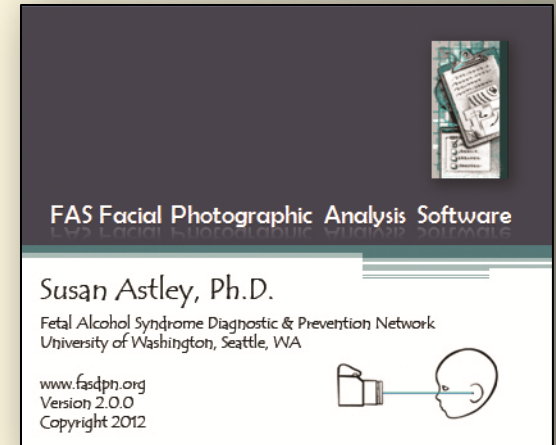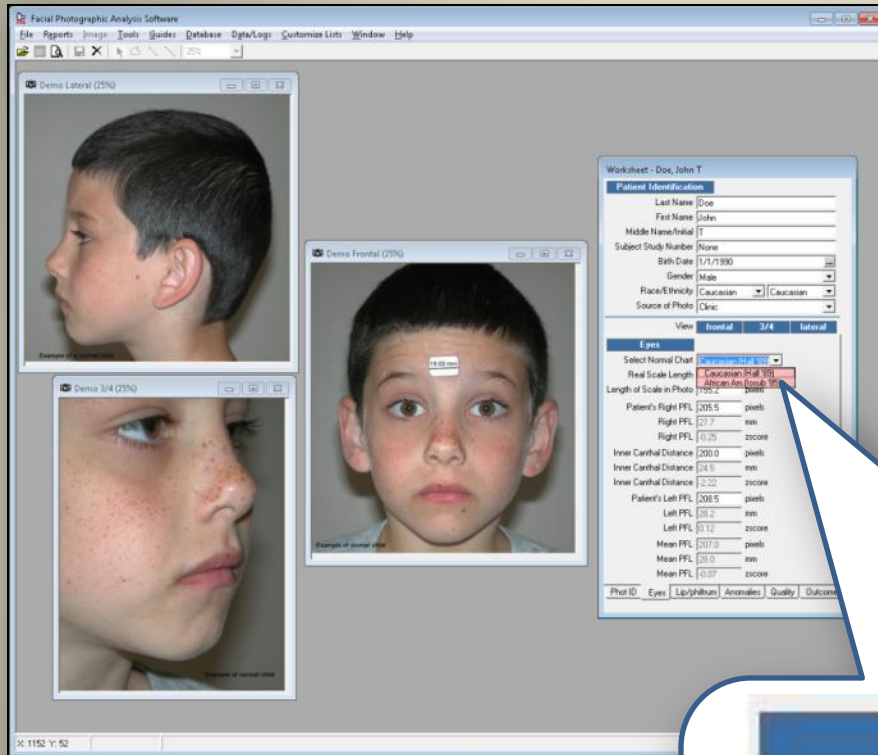than a 6.0 year old on the Canadian PFL chart.

Stromland Scandinavian PFL Chart Covers Full Age Range

University of Washington FASD Clinic will use the Stromland PFL Chart to generate accurate PFL z-scores for Caucasians
that transition smoothly across the age span.
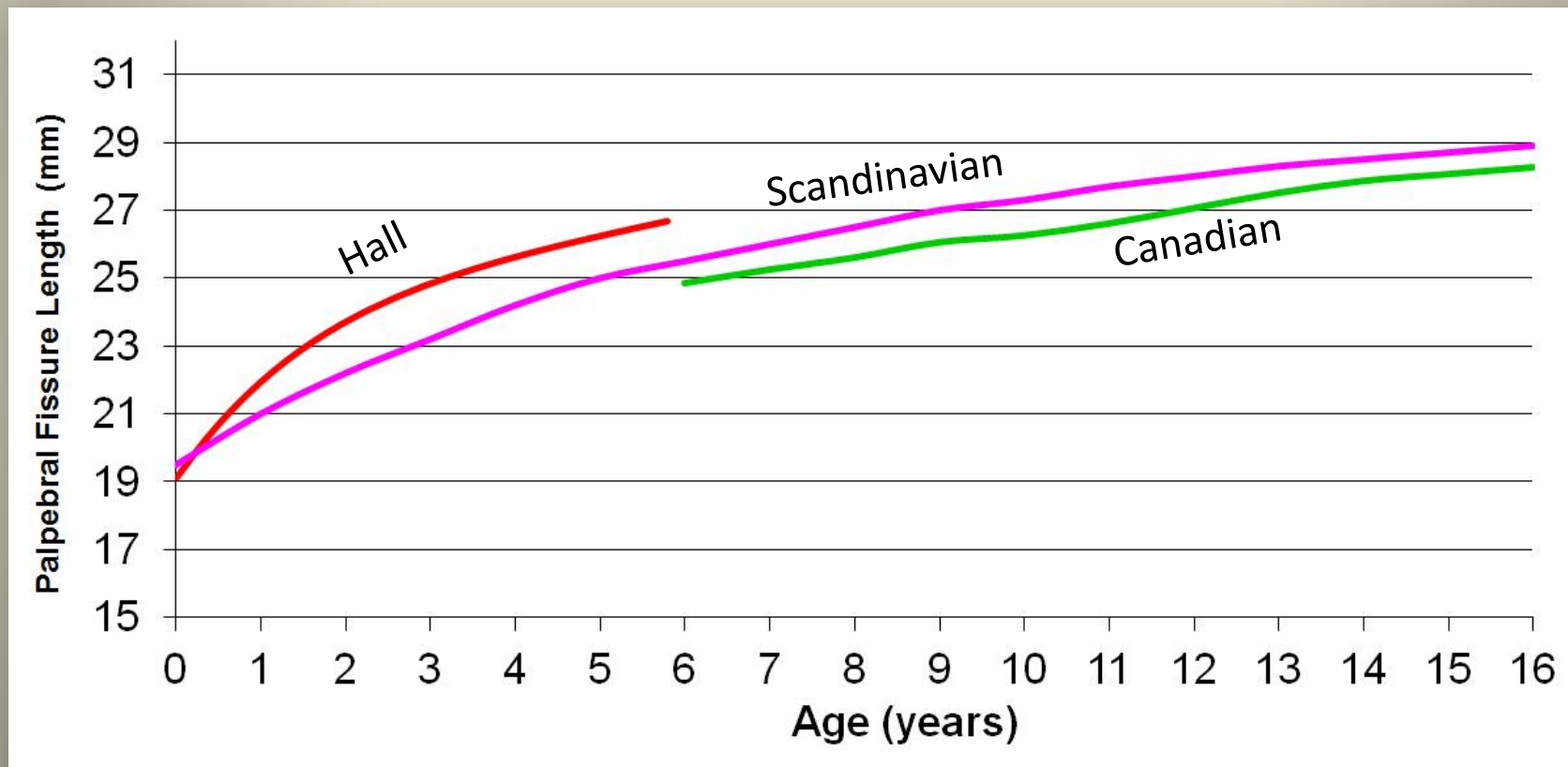
Canadian and Scandinavian PFL Charts
added to Version 2.0 FAS Facial Software ([Astley, 2012](#))

References

1. Astley, SJ. Canadian palpebral fissure length growth charts reflect a good fit for two school and FASD clinic-based U.S. populations .Can J Clin Pharmacology 2011;18(2):e231-e241.
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4. Hall JG, Froster-Iskenius UG, Allanson JE. Handbook of Normal Physical Measurements. New York: Oxford University Press, 1989.
5. Strömland K, Chen YH, Norberg T, Wennerstrom K, Michael G. Reference values of facial features in Scandinavian children measured with a range-camera technique. Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery 1999;33:59-6.
6. Thomas IT, Gaitantzis YA, Frias JL. Palpebral fissure length from 29 weeks gestation to 14 years. Journal of Pediatrics 1987;III(2):267-268.