

# Visual Function, Ocular Morphology and Growth – Children Born Moderate-to-Late Preterm

## Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien,  
Göteborgs universitet kommer att offentligens försvaras i  
hörsal Arvid Carlsson, Academicum, Medicinaregatan 3, Göteborg

Fredagen den 25 november, klockan 09.00

av

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### Avhandlingen baseras på följande delarbeten

- I. Lina H. Raffa, Ann Hellström, Eva Aring, Susann Andersson, Marita Andersson Grönlund. Ocular dimensions in relation to auxological data in a sample of Swedish children aged 4–15 years. *Acta Ophthalmol.* 2014 Nov; 92(7): 682-8. doi: 10.1111/aos.12310. Epub 2014 Jan 22.
- II. Lina Raffa, Eva Aring, Jovanna Dahlgren, Ann-Katrine Karlsson, Marita Andersson Grönlund. Ophthalmological findings in relation to auxological data in moderate-to-late preterm preschool children. *Acta Ophthalmol.* 2015 Nov; 93(7):635-41. doi: 10.1111/aos.12763.
- III. Lina H. Raffa, Jovanna Dahlgren, Ann Hellström, Marita Andersson Grönlund. Ocular morphology and visual function in relation to general growth in moderate-to-late preterm school-aged children. *Acta Ophthalmol.* 2016 May. doi: 10.1111/aos.13085.
- IV. Lina H. Raffa, Josefin Nilsson, Jovanna Dahlgren, Marita Andersson Grönlund. Electrophysiological changes in 12-year-old children born moderate-to-late preterm: Reduced VEP amplitude and altered ERG response in MLP children. *Submitted 2016.*

**SAHLGRENKA AKADEMIN  
INSTITUTIONEN FÖR NEUROVETENSKAP  
OCH FYSIOLOGI**



# Visual Function, Ocular Morphology and Growth – Children Born Moderate-to-Late Preterm

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## Abstract

**Introduction:** In the past, researchers have closely studied both systemic and ophthalmological complications associated with extreme preterm birth. Moderate-to-late preterm (MLP) infants have become the fastest-growing subgroup of preterm infants in the last decade, accounting for 84% of all preterm births. Evidence is currently emerging that even near-term birth predisposes those children to a higher risk of mortality and morbidity than term infants. Effects of extreme prematurity on ocular development are known to include retinopathy of prematurity (ROP), refractive errors, strabismus, low visual performance, decreased contrast sensitivity, visual field defects, colour vision deficits, and abnormal cognitive development. To date, very few studies have focused on the ophthalmological aspects of this particular subset of MLP children. The aim of the project was to investigate the development of ocular morphology and visual function in children born MLP, relating them to auxological data and comparing them with their full-term counterparts. **Methods:** In a prospective population-based study conducted in 2002-2004, 247 potentially eligible children (110 girls and 137 boys) born MLP (gestational age (GA) 32-36 weeks) participated in the neonatal study. None of the participating children had a previous history of ROP. At 5, 8 and 12 years of age, 78, 50 and 22 children respectively who were still included in the study took part in sub-studies that focused on orthoptic evaluation, ocular morphology/visual function and electrophysiology in relation to auxological data in both MLP and sex- and age-matched controls. **Results:** Based on our findings, being MLP born is associated with increased ocular morbidity and may require greater ophthalmic surveillance than full-term counterparts. Auxological data at birth, especially birth weight, seems to be an important risk indicator when establishing an ophthalmological diagnosis in preschool MLP children and visual acuity outcome was positively correlated to GA. Good catch-up growth favoured proper development of ocular growth and morphology. Our results show that macular morphology, visual evoked potential (VEP) and full-field electroretinography (ff-ERG) responses are also affected in the MLP group at 12 years of age. **Conclusion:** It has been confirmed in our study that preterm birth, even just in the moderate to late phase, represents a continuum of risks associated with visual system morbidities. These findings have potentially important implications for the follow-up of premature children and therefore require confirmation in large population-based studies that encompass these MLP premature children.

**Keywords:** Auxological data, Electroretinography, IGF-I, Moderate-to-late preterm, Ocular growth, Optical coherence tomography, Retinal nerve fiber layer, Visual evoked potential, Visual function.