Brief overview of role of OCT in pediatric glaucoma

- In a pediatric glaucoma practice we use OCT to:
  - help in make a diagnosis of glaucoma
  - help detecting progression of glaucoma
- OCT can also be used in other situations relevant to our patients:
  - Hypotony maculopathy
  - Macular edema
  - Amblyopia (exclude retinal pathology)
  - ASOCT – examine anterior segment (cornea, angle structures in difficult cases)

OCT in glaucoma

- OCT provides an anatomical measure of structures involved in glaucoma pathogenesis
  - It provides structural information and quantifications of tissues of interest
  - In adults these measures can be compared statistically normative age-matched databases – to date there are no robust normative databases for children

- Current technologies work best for early/moderately diseased tissue
  - The “floor effect” refers to the inability to detect progression in advanced disease – the RNFL scan values are “on the floor” and values cannot go any lower because of the limitations of the technology to distinguish between the other structures that remain, such as vessels, glial cells, nerve remnants. The floor is approximately 50 um thick. When those few axons that remain in the floor tissue die, the technology cannot detect this progression.

- Several structures of interest:
  - Optic nerve head (ONH)
    - Moderately helpful
  - Peripapillary retinal nerve fiber later (PP RNFL)
    - Most helpful
  - Macular ganglion cell complex (mGCC)
    - Promising
  - Rim width
    - Promising – less prone to floor effect so may have value in advanced disease
  - OCT-Angiography (OCT-A)
    - Exciting!
Different approaches may ultimately find different niches – may be better or worse suited to different aspects of the disease, different stages of the disease, different patient populations – the imaging capabilities are continually refining and improving, image capture is becoming faster and easier (moving towards patient self-monitoring with hand held devices), as are studies understanding their usefulness and appropriateness in clinical practice.

Special considerations in pediatric glaucoma

- Babies – unable to fixate/co-operate; recumbent scanning requires skilled technologist (hand held OCT) and steady eye (sedated exam)
  - Hand-held portable OCT retinal scanner (more like shoulder-held – very heavy, or mounted on stand)
    - No segmentation software
    - No normative values
- Young children – variable co-operation with image acquisition – requires steady head well applied to headrest and fixation
  - No/very small n in normative databases used for statistical comparison
    - “dummy birthdate” can give some comparator
- Poor vision and nystagmus – difficult fixation and movement artefact
- Ocular pathology - high myopia, astigmatism, Haab striae, corneal edema, lens opacities etc affect quality of image and can introduce artefact
- Buphthalmos - increasing axial length between scans make progression analysis difficult; differentiation between myopic retinal thinning and glaucoma progression difficult
- Variable IOP – pliable nerve and globe in younger children (even up to teens) susceptible to variations in structure purely as a function of IOP at the moment of scanning; this introduces further variability that can be difficult to distinguish from true progression (and may mask it if early scans performed at high IOP and later ones at low IOP)