Glaucoma

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Glaucoma:
The Sneak Thief of Sight!
Definition of Glaucoma

• Family of ocular diseases characterized by progressive optic neuropathy and visual field loss
  – Gradual optic disk cupping
  – Associated visual field deficits
  – Progressive retinal ganglion cell loss
• No longer defined alone by elevated intraocular pressure (IOP)
Glaucoma
Challenges

• Identify people at risk for glaucoma
• Detect glaucoma progression earlier
• Develop better ways to treat glaucoma
Risk Factors

- Risk factors for the development and progression of glaucoma
  - Elevated IOP
  - Family history
  - Advanced age
  - Race
  - Genetic factors
Retina

Williams et al, Gray’s Anatomy, 1989
Retinal Ganglion Cell (RGC)

- Axons form optic nerve
- Synapse on neurons in brain
- Susceptible in many vision disorders
  - Glaucoma
Detection
Clinical Examination
Change?
Software tools to detect glaucoma
Structure and Function
Baseline Nerves
Visual Fields
Baseline Visual Fields

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Diagrams showing visual fields for both eyes on different dates.
Jun 29, 2009  Central 24-2 Threshold Test

Graytone

Total Deviation  Pattern Deviation

Threshold (dB)  Total Deviation  Pattern Deviation

GHT: Outside Normal Limits
FL: 0/14  FP: 1%  FN: 0%  Fovea: Off
Pupil Diameter: 7.0 mm  Visual Acuity:  VFI: 97%
MD: -2.85 dB P < 2%  PSD: 2.83 dB P < 2%
Detecting progression
RATE OF PROGRESSION: -0.9 ± 0.5 %/YEAR (95% CONFIDENCE)
SLOPE SIGNIFICANT AT P < 0.01
What are we doing in Progression Analysis?
Second, the application looks for progression events that statistically exceed the amount of random variability found in all but the most variable 2.5% of images. (Yellow events)

Courtesy of Prof. Alain Bron, Dijon
Treating Glaucoma

• The primary strategy for treatment is reducing IOP
  – Data show importance of reducing IOP significantly
Treating Glaucoma

Meds

Laser/Surgery
Treating Glaucoma

Lowering IOP

- Eye drops
- Laser
- Incisional surgery
Precision Glaucoma Surgery

Matching the patient and the procedure
Glaucoma surgery
Trabeculectomy 1982

Figure 31.2. Preparation of a limbus-based conjunctival flap. A: incision through conjunctiva and Tenon's capsule; B: blunt dissection of Tenon's capsule from underlying
Figure 31.2. Preparation of a limbus-based conjunctival flap. A: incision through conjunctiva and Tenon’s capsule; B: blunt dissection of Tenon’s capsule from underlying...
Trabeculectomy

- Standard of filtration surgery for nearly 40 years
- Modifications have improved technique
- Most effective IOP-lowering operation
- Unpredictable complications and results
Trabeculectomy

- Most effective IOP-lowering operation
- Unpredictable results
- "It’s complicated"
Minimally invasive glaucoma surgery
Glaucoma surgery
Thank you