Ocular Examination
FRONT TO BACK
Crystalline Lens Pathology
Examination Tools

• Visual acuity
  – best corrected distant monocular
• Contrast sensitivity chart
• Potential acuity meter (PAM)
  – Attaches to slit lamp
  – Projects Snellen chart onto macula
• Laser interferometer
  – Hand held
  – Presents gradient pattern
• Brightness acuity test (BAT)
  – Glare test

• Slit lamp examination
  – Dilated
  – Direct illumination
    • parallelepiped
    • Optic section
  – Retroillumination
Crystalline Lens

- Avascular
- Transparent
- Moves
  - Accommodation
- Nucleus
- Cortex
- Capsule
- Lens zonules
Ten year old lens

Adult lens

Child lens: largely composed of nucleus with only thin bright band of cortex
Adult lens: cortex growth with nucleus {mostly} unchanged

Y sutures in embryonic nucleus
• Zones of Discontinuity (The onion appearance)
  – Transparent regions are separated by bands of increased light-scatter and reflection

Appreciate the “dark” sulcus
What can be seen?

- Mittendorf’s dot
- Epicapsular stars
- Pigment
  - Anterior
  - Posterior
- Pseudoexfoliation

What can go wrong?

- Dislocation
- Shape abnormalities
- Congenital opacities
- Senile opacities
  - Cataracts
- Replaced
  - Reduced BVA
  - Refractive correction
Signs and Symptoms of lenticular pathology

- None
  - Slow, gradual process
- Color desaturation
- Halos and glare, particularly night time
- Blurry distance vision
- Blurry near vision
- Monocular double vision
- Sudden change in RX
  - Myopic shift

- Congenital opacities
  - Depravation amblyopia
• Mittendorf’s dot
  – Remnant of tunica vasculosa

• Epicapsular stars
  – Pigment “stem” cells
  – Star shaped pigment cells
• Pigment on Anterior capsule
  
  Star-shaped

• Pseudoexfoliation
  
  High doses of chlorpromazine
  
  Vossius’ ring
- **Anterior lenticonus**
  - Anterior ectasia
  - Alport’s syndrome
    - Inherited nephritis

- **Posterior lenticonus**
  - Posterior ectasia
• Spherophakia
  – Congenital, bilateral

• Subluxed lens
  – Marfan’s syndrome
Congenital Opacities

**Causes**
- Maternal infection
  - Rubella
- Genetic
- Metabolic
- Chromosomal
- Ocular Development
- Trauma

**Identify them**
- Appearance
- Location, Location, Location, Location
**Appearance**
- Coralliform
  - Coral-like
- Aculeiform
  - Pickle-like
- Cerulean
  - Blue-ish
- Punctate
  - Dot-like
- Pulverulent
  - Powder-ish
- Coronary
- Cuneiform
  - Spoke-like

**Location**
- Nuclear
- Cortical
- Subcapsular
- Capsular
- Cupuliform
  - Subcapsular
• **Anterior polar**
  – Congenital opacity

• **Posterior polar**
  Optic section gives depth

Posterior polar affect VA worse than anterior polar, Why?
• Sutural
  – Zonular subtype

• Axial Embryonic Cataract
• Nuclear

• Cortical
• Spear or Christmas tree
  – Aculeiform Cataract
  – Rare
  – Very colorful, No effect on VA
  – Involves the superficial layers of the embryonic nucleus and fetal nucleus
Congenital Cataracts Summary

- Detected at birth
- Range from mild and benign to advanced and sight-threatening
  - Important cause of blindness in children
- Bilateral
  - Most inherited
  - Metabolic disorder
- Unilateral
  - In-utero assault
Acquired Cataracts

Causes
• Aging
• Endocrine (DM, hypoparathyroidism)
• Trauma
• Drugs (steroids)
• Radiation
• Intraocular disease (uveitis, retinal dystrophies)
• Late onset genetic

Identify
• Appearance
• Location
Age-related Lenticular Changes

• Increase in light-scatter
  – Constant until about age 40
  – Doubled by age 65
  – Triple by age 77
  – Deep cortex > superficial cortex > nucleus

• Increase in stiffness
  – Decrease in elasticity
  – Determination of onset of presbyopia
  – Nucleus > Cortex

• Increase in coloration
• Traumatic
  – Petalliform
  – Anterior cortex

• Cortical Water Vacuoles
• Cortical water clefts

• Lamellar Separation
• **Cortical spokes**
  – Start peripheral
    • Inferior nasal
  – Anterior and posterior
  – Coalesce into wedges
  – Late stage
    • Encroach into pupillary axis

• **Symptoms**
  – Minimal symptoms of decrease in visual acuity
  – Mild to severe glare
  – Night vision difficulties
    • Impair driving
  – Monocular diplopia
    • Encroaching on visual axis
• Cortical spokes
• Cortical wedges
  – Cuneiform

Cortical Cataract

Mature
Grading system

• Snellen VA usually not greatly effected until spokes/wedges into pupillary axis

• Anterior cortical less effect on vision than posterior cortical

Peripheral cortical changes NOT within PA = less than grade 1
• Nuclear Sclerotic cataract (NS)
  – “Yellowing” or Brunescence
  – Opacification

“Oil drop”
• Symptoms of Nuclear sclerotic cataract
  – Decrease in distance vision
  – Difficulty with night driving,
  – Monocular diplopia
  – Loss of color discrimination ability
  – Myopic shift
<table>
<thead>
<tr>
<th>Grade</th>
<th>BVA</th>
<th>Lens Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>20/20</td>
<td>Slight yellowing, expected for age</td>
</tr>
<tr>
<td>1</td>
<td>20/25-20/30</td>
<td>Definite yellowing</td>
</tr>
<tr>
<td>2</td>
<td>20/30-20/40</td>
<td>Yellow++</td>
</tr>
<tr>
<td>3</td>
<td>20/50-20/60</td>
<td>Yellow/orange</td>
</tr>
<tr>
<td>4</td>
<td>&lt; 20/80</td>
<td>Lots of opacification and hardly any “yellowing”</td>
</tr>
</tbody>
</table>
Mature cataract

- Completely opaque
• Posterior Subcapsular Cataract (PSC)  
  – NOT necessarily associated with age (senile)

  - Young patient - not looking thru NS
  - Older patient - looking thru NS

• Symptoms
  - glare
  - decreased visual acuity especially during bright sunlight, but see well in dim illumination
  - Difficulty reading
• Reminder for me– explain how to find and view with SL
Grading system for PSC

- Other etiologies besides age
- Steroid use
- Trauma
- Reading more difficult than distant vision

Grade 1 PSC will cause visual symptoms.
• Anterior chamber IOL
• Posterior chamber IOL

- Crystalens
- Restor IOL
- Rezoom PCIOL