Bruch’s membrane: inner most layer of choroid; abuts pigmented epithelial cells which are responsible for transport between retina and choroid.
<table>
<thead>
<tr>
<th>Acute Visual Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retinal Detachment</strong></td>
</tr>
<tr>
<td><strong>Retinal Vascular Occlusion</strong></td>
</tr>
<tr>
<td>amaurosis fugax, arterial occlusion, venous occlusion</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Retinal Detachment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features</strong></td>
</tr>
<tr>
<td>spontaneous or traumatic separation from epithelial layer</td>
</tr>
<tr>
<td>high risk: post-cataract surgery, myopia, inflammatory disorders</td>
</tr>
<tr>
<td>most common site: superior temporal</td>
</tr>
<tr>
<td><strong>Signs and Symptoms</strong></td>
</tr>
<tr>
<td>flashers, floaters, “curtain” closing, shadows, bubbles, wavy distortions</td>
</tr>
<tr>
<td>progressive, central vision spared till macula detaches</td>
</tr>
<tr>
<td>relative afferent pupillary response defect</td>
</tr>
<tr>
<td>asymmetric red reflex: detached area appears lighter</td>
</tr>
<tr>
<td>retinal hydration lines (rugae)</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
</tr>
<tr>
<td>refer all detachments</td>
</tr>
<tr>
<td>position head, allow gravity to slow the progression</td>
</tr>
<tr>
<td>cryotherapy, laser photocoagulation, pneumatic retinopathy, surgery</td>
</tr>
<tr>
<td><strong>Prognosis</strong></td>
</tr>
<tr>
<td>80% single occurrence; 15% require repeat treatment;</td>
</tr>
<tr>
<td>5% never re-attach</td>
</tr>
<tr>
<td>worse prognosis: macula detachment</td>
</tr>
</tbody>
</table>

Amaurosis fugax

- transient acute loss of vision
- "curtain" descends, then returns to normal
- unilateral visual loss, lasts several minutes
- meets criteria for a TIA

- usually patients >50 yo, hx or risk of atherosclerosis
- cause: ipsilateral carotid circulation atheroma
- emboli interrupts retinal blood flow, then passes
- check for carotid plaques; endarterectomy

Retinal Artery Occlusion
[embolic, thrombotic]

carotid atherosclerotic disease
- cardiac valvular disease
- giant cell arteritis
- thrombosis
  - hypercoagulative states
  - cardiac myxoma
  - IDU, talc emboli
  - trauma

lipid emboli (cholesterol emboli)
DIC
sickle cell anemia
polyarteritis nodosa
corticosteroid injections
retinal migraine
syphilis
- cat-scratch disease

Central Retinal Artery Occlusion

<table>
<thead>
<tr>
<th>symptoms</th>
<th>sudden, <strong>painless</strong>, often complete unilateral visual loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>signs</td>
<td>early: narrowing of arterioles, &quot;boxcarring&quot;</td>
</tr>
<tr>
<td></td>
<td>hours later: <strong>opalescent retina</strong> (edema);</td>
</tr>
<tr>
<td></td>
<td><strong>cherry red spot</strong> (perifoveal pallor)</td>
</tr>
<tr>
<td></td>
<td>later: ganglion cell death, optic atrophy, pale disc, blind eye</td>
</tr>
<tr>
<td>treatment</td>
<td>true ophthalmic emergency</td>
</tr>
<tr>
<td></td>
<td>intermittent firm pressure/release massage (contraindicated if recent surgery or trauma)</td>
</tr>
<tr>
<td></td>
<td>immediate referral, vessel dilation, paracentesis</td>
</tr>
</tbody>
</table>
Central Retinal Vein Occlusion

**risk factors**
- elderly, hypertension, glaucoma, diabetes
- increased blood viscosity: polycythemia vera, sickle cell anemia, lymphoma, leukemia

**symptoms**
- *subacute unilateral blurriness* to loss of vision

**signs**
- relative afferent pupillary defect
- *“blood and thunder” fundus*
- dilated veins, flame-shaped hemorrhages, edema, exudates, optic disk swelling
- later: neovascularization

**treatment**
- typically resolves somewhat with time (20/200)
- laser treatments, prevent neo-vascular glaucoma
- work up for underlying cause
optic neuritis
sudden inflammation of nerve; destruction of myelin at risk

<table>
<thead>
<tr>
<th>causes</th>
<th>symptoms/signs</th>
<th>treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>autoimmune dz</td>
<td>loss of vision, unilateral</td>
<td>may resolve spontaneously, 2-3 weeks</td>
</tr>
<tr>
<td>SLE, sarcoid</td>
<td>loss of pupillary reaction to light</td>
<td>corticosteroids, IV</td>
</tr>
<tr>
<td>infection</td>
<td>loss of color vision</td>
<td></td>
</tr>
<tr>
<td>tb, syphilis, lyme, meningitis, encephalitis, others</td>
<td>pain with EOMs</td>
<td>prognosis good unless MS or SLE</td>
</tr>
<tr>
<td>multiple sclerosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>toxicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>methanol, ethambutol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vitamin B&lt;sub&gt;12&lt;/sub&gt; def</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronic Visual Loss

Glaucoma
Cataract
Macular Degeneration
Retinopathy

Glaucoma
Increased intraocular pressure (IOP)
AND optic nerve damage

- visual field loss → blindness
- PREVENTABLE!
- prevalence 0.5%; 3-4 female:1 male
- ocular htn (IOP without optic nerve damage) 1.5%
- highest risk
  - African Americans
  - diabetes mellitus
  - family history
Glaucoma, pathophysiology
• aqueous humor—produced by epithelium of ciliary body
• flows past lens, around iris, through pupil
• anterior chamber drains through trabecular meshwork to canal of Schlemm
• any resistance to drainage leads to increased pressure

Glaucoma
(normal intraocular pressure: 8 - 21 mmHg)

<table>
<thead>
<tr>
<th>Open Angle</th>
<th>Angle-Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insidious, asymptomatic rise in IOP</td>
<td>sudden complete occlusion</td>
</tr>
<tr>
<td>Chamber remains open</td>
<td>typically IOP &gt;60 mmHg</td>
</tr>
<tr>
<td>Bowing of iris on exam</td>
<td>pain, blurred vision, photophobia</td>
</tr>
<tr>
<td>Arcuate scotomata</td>
<td>colored halos or rainbows</td>
</tr>
<tr>
<td>Contraction of peripheral field</td>
<td>vasovagal: nausea, vomiting, diaphoresis</td>
</tr>
<tr>
<td>Central vision spared</td>
<td>red, teary; hazy cornea; fixed mid-dilated pupil</td>
</tr>
</tbody>
</table>

Acute angle closure glaucoma

http://commons.wikimedia.org/wiki/File:Acute_Angle_Closure-glaucoma.jpg
**Glaucoma**, screening ➔ all 3 steps!

- Check anterior chamber angle risk of closure, avoid anticholinergics
- Optic Nerve Exam
  - temporal pallor
  - cup:disc ratio ≥0.5
  - vessels bending over edge of disc edema
- IOP
  >21 mmHG

http://www.icoph.org/med/glaucoma/glaucoma55.html

**Glaucoma**, treatment

Angle Closure

- **True Ocular Emergency**
- lower IOP: multiple medications
  - beta blocker: timolol topical
  - carbonic anhydrase inhibitor: intravenous acetazolamide
  - osmotic agent: mannitol
- Laser iridectomy

**Glaucoma**, medical treatment

<table>
<thead>
<tr>
<th>promote drainage</th>
<th>prostaglandin-like</th>
<th>latanoprost (Xalatan)</th>
<th>bimatoprost (Lumigan)</th>
<th>redness, stinging, change in eyelid pigment, retinal edema</th>
</tr>
</thead>
<tbody>
<tr>
<td>cholinergic agents</td>
<td>pilocarpine</td>
<td>carbachol</td>
<td>pain, blurring vision, stuffy nose, diaphoresis, salivation, GI upset</td>
<td></td>
</tr>
<tr>
<td>epinephrine components</td>
<td>dipivefrin (Propine)</td>
<td></td>
<td>redness, allergy, palpitations, elevated BP, h/a, anxiety</td>
<td></td>
</tr>
<tr>
<td>decrease production</td>
<td>beta blockers</td>
<td>timolol (Timoptic)</td>
<td>betaxolol (Betoptic)</td>
<td>dyspnea, bradycardia, hypotension, impotence, fatigue, depression</td>
</tr>
<tr>
<td>carbonic anhydrase inhibitors</td>
<td>dorzolamide (Trusopt)</td>
<td>brinzolamide (Azopt)</td>
<td>acetazolamide (Diamox) po methazolamide (Naprazane) po</td>
<td>frequent urination, panoesophagitis, rash, depression, fatigue, impotence, metallic taste</td>
</tr>
<tr>
<td>both</td>
<td>alphagonists</td>
<td>brimonidine (Alphagan)</td>
<td></td>
<td>fatigue, dizziness, red/itchy eyes, dry mouth</td>
</tr>
</tbody>
</table>
### Glaucoma, surgical treatment

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser trabeculoplasty</td>
<td>Open clogged canals</td>
</tr>
<tr>
<td>Filtering trabeculopathy</td>
<td>Remove small piece of trabecular meshwork</td>
</tr>
<tr>
<td>Electrocautery</td>
<td>Remove strip of trabecular meshwork</td>
</tr>
<tr>
<td>Drainage implants</td>
<td>Silicone tube placement</td>
</tr>
</tbody>
</table>

### Cataract

#### Epidemiology
- 50% of 65-74 yo
- 70% of > 75 yo
- 1.4 million extractions/year in US

#### Causes
- Congenital/genetic (0.4% of births)
- Acquired: trauma, inflammation, radiation/UV light, metabolic/nutritional defects (diabetes)

#### Pathophysiology
- Normal lens is 35% protein
- Lens continues to grow in size, weight, density
- Increased proportion of insoluble protein
- Brown to yellow discoloration

### Cataract, cont'd

#### Symptoms
- Slowly progressive loss of vision; blurriness, glare, fixed spots, reduced color perception
- "Second sight" less reliance on reading glasses

#### Signs
- Cataract appears dark against red reflex
- Use +5 diopters to view
- Prohibits exam of fundus

#### Treatment
- Early: magnifying glasses, dilation
- Later: surgical removal (improve ADLS, permit fundus exam, prevent secondary glaucoma or uveitis)
- Surgical risk: bleed (<0.1%), retinal detachment, secondary glaucoma, after-cataract
Age-related Macular Degeneration

| drusen | - yellowish hyaline nodules (colloid bodies)  
|---|---
| - deposit in Bruch's membrane  
| - small, discrete bumps OR large, irregular indistinct deposits  
| - limit the nutritional and metabolic support  
| degenerative changes | - can occur without drusen  
| "dry AMD" (most common) | - clumps of hyperpigmented or depigmented atrophic areas  
| | - degeneration of supporting structures  
| subretinal neovascularization | - subretinal hemorrhagic fibrosis  
| "wet AMD" (most advanced) | - pigment epithelium degeneration  
| | - photoreceptor atrophy  
| | - further breakdown of Bruch's membrane  
| | - hemorrhage—acute visual loss  

ARMD, cont'd

| symptoms | - blurry vision, gradual  
|---|---
| - wavy or distorted vision (metamorphopsia)  
| - central blind spot (scotoma)  
| signs | - decreased acuity  
| - Amsler grid distortion  
| - drusen mottling  
| - atrophy, loss of pigment, macular scarring  
| - subretinal or intra-retinal bleed or serous leak  
| treatment | - laser photocoagulation, subretinal surgery  
| | - intravitreous injections (wet AMD):  
| | - Lucentis (recombinant antibody fragment)  
| | - Macugen (selective vascular endothelial growth factor antagonist)  
| | - antioxidants, carotenoids, omega 3 fatty acids, zinc  

UMDNJ PANCE/PANRE Review Course
### Retinopathy

<table>
<thead>
<tr>
<th>Diabetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1: screen 3-5 yrs after diagnosis, annually</td>
</tr>
<tr>
<td>Type 2: screen at diagnosis, annually</td>
</tr>
<tr>
<td>Ischemic injury to retinal vascularity</td>
</tr>
<tr>
<td>- Background “simple” (microaneurysms, hemorrhages, exudates)</td>
</tr>
<tr>
<td>- Preproliferative (arteriolar ischemia, cotton wool spots)</td>
</tr>
<tr>
<td>- Proliferative “malignant” (neovascularization, macular edema)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypertensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute or accelerated hypertension more likely</td>
</tr>
<tr>
<td>- Diffuse arteriolar narrowing</td>
</tr>
<tr>
<td>- “Copper wire” narrowing</td>
</tr>
<tr>
<td>- “Silver wire” sclerosis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Refer all!</td>
</tr>
<tr>
<td>- Laser photocoagulation</td>
</tr>
<tr>
<td>- Treat underlying disease</td>
</tr>
</tbody>
</table>

- What structure is responsible for the greatest proportion of refraction?
  1. Cornea
  2. Lens
  3. Retina
  4. Sclera
What structure is responsible for the greatest proportion of refraction?

1. cornea  43%
2. lens  43%
3. retina  13%
4. sclera  2%

The innermost layer of the choroid is:

1. Bruch's membrane
2. optic disk
3. sclera
4. uvea

The innermost layer of the choroid is:

1. Bruch's membrane  93%
2. optic disk  2%
3. sclera  5%
4. uvea  0%
The majority of retinal attachments occur in what quadrant?

1. inferior nasal
2. inferior temporal
3. superior nasal
4. superior temporal

The majority of retinal attachments occur in what quadrant?

1. inferior nasal
2. inferior temporal
3. superior nasal
4. superior temporal

A patient describes a loss of vision as a curtain closing and then re-opening several minutes later. Most likely diagnosis?

1. amaurosis fugax
2. central retinal venous occlusion
3. open angle glaucoma
4. retinal detachment
A patient describes a loss of vision as a curtain closing and then re-opening several minutes later. Most likely diagnosis?

1. amaurosis fugax
2. central retinal venous occlusion
3. open angle glaucoma
4. retinal detachment

What is the most common cause of retinal artery occlusion?

1. cardiac arrhythmia
2. carotid plaque
3. thrombosis
4. trauma

What is the most common cause of retinal artery occlusion?

1. cardiac arrhythmia
2. carotid plaque
3. thrombosis
4. trauma
A “blood and thunder” fundus describes which condition?

1. central retinal artery occlusion
2. central retinal venous occlusion
3. diabetic retinopathy
4. hypertensive retinopathy

A painful red eye with hazy cornea and fixed pupil describes which condition?

1. acute angle closure glaucoma
2. acute retinal detachment
3. cortical cataract
4. neovascular macular degeneration
A painful red eye with hazy cornea and fixed pupil describes which condition?

1. acute angle closure glaucoma
2. acute retinal detachment
3. cortical cataract
4. neovascular macular degeneration

An Amsler grid is helpful to document:

1. contracted visual field
2. intraocular pressure
3. loss of pupillary reflex
4. metamorphopsia

An Amsler grid is helpful to document:

1. contracted visual field
2. intraocular pressure
3. loss of pupillary reflex
4. metamorphopsia
What is the hallmark of wet ARMD?

1. cotton wool spots
2. depigmentation of retina
3. drusen deposits
4. neovascularization

Adnexal Diseases

Blepharitis
Dacryocystitis
Hordeolum
Chalazion
Ectropion, Entropion
Xanthelasma
Epithelial Inclusion Cysts
Orbital Cellulitis
**Blepharitis**

Seborrhea; infection (Staph, Strep); Meibomian gland dysfunction

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>irritation, burning, FB sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tearing, photophobia, intermittent blurry vision</td>
</tr>
<tr>
<td>Signs</td>
<td>red-rimmed lid margins, lash loss</td>
</tr>
<tr>
<td></td>
<td>scurf: dandruff-like deposits</td>
</tr>
<tr>
<td></td>
<td>collarettes: fibrous scales</td>
</tr>
<tr>
<td></td>
<td>thick, cloudy meibomian glands</td>
</tr>
<tr>
<td></td>
<td>may lead to stye, chalazion, dec tear production</td>
</tr>
<tr>
<td>Treatment</td>
<td>scrub daily with dilute baby shampoo; avoid makeup</td>
</tr>
<tr>
<td></td>
<td>remove scurf, collarettes, colonies</td>
</tr>
<tr>
<td></td>
<td>massage to express sections if blocked</td>
</tr>
<tr>
<td></td>
<td>topical antibiotics if recalcitrant (erythromycin, polymyxin/bacitracin)</td>
</tr>
<tr>
<td></td>
<td>oral antibiotics: resistant or recurrent events, corneal or conjunctival involvement (doxycycline)</td>
</tr>
</tbody>
</table>

**Blepharitis**

[Image: Blepharitis.jpg]

Dacryocystitis, Dacryoadenitis

Inflammation of lacrimal gland +/- duct; idiopathic, infectious, secondary

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>pain, swelling, tearing, drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td>swelling, tenderness, erythema</td>
</tr>
<tr>
<td>Treatment</td>
<td>warm to cool compresses</td>
</tr>
<tr>
<td></td>
<td>oral antibiotics if infectious cause</td>
</tr>
<tr>
<td></td>
<td>I&amp;D if abscess forms</td>
</tr>
<tr>
<td></td>
<td>recalcitrant: surgery</td>
</tr>
<tr>
<td></td>
<td>dacryocystorhinostomy or dacryocystectomy</td>
</tr>
</tbody>
</table>
**Hordeolum (stye)**

infection of sebaceous gland (Staph)

| symptoms               | - subacute onset  
|                       | - mildly painful nodule or pustule on lid |
| signs                  | - often pointed, red, tender  
|                       | - external: skin surface  
|                       | - internal: conjunctival surface |
| treatment              | - warm compresses [often all needed]  
|                       | - topical antibiotics (fluoroquinolones, polymixin/trimethoprim)  
|                       | - I&D if fail to heal |

**Chalazion**

chronic granulomatous inflammation of Meibomian gland  
may arise post-hordeolum

| symptoms               | - painless or minimally tender  
|                       | - may be associated with chronic blepharitis, conjunctivitis, recurrent stye |
| signs                  | - grayish discoloration on conjunctival surface  
|                       | - local conjunctival erythema |
| treatment              | - warm compresses  
|                       | - triamcinolone injections (may depigment skin)  
|                       | - marsupialization if unresolved after 1 month |
chalazion

Ectropion (lids turn outward)
Entropion (lids turn inward)

<table>
<thead>
<tr>
<th>causes</th>
<th>involutional (laxity with age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cicatrical (scarring of lid)</td>
</tr>
<tr>
<td></td>
<td>paralytic (7th nerve palsy)</td>
</tr>
<tr>
<td></td>
<td>mechanical (mass on lower lid or cheek)</td>
</tr>
<tr>
<td></td>
<td>congenital (rare)</td>
</tr>
<tr>
<td>symptoms</td>
<td>irritation, burning, FB sensation</td>
</tr>
<tr>
<td></td>
<td>visible space between globe and lid (ectropion)</td>
</tr>
<tr>
<td></td>
<td>trichiasis (abrating) (entropion)</td>
</tr>
<tr>
<td>treatment</td>
<td>surgical correction</td>
</tr>
</tbody>
</table>

Xanthelasma

- bilateral plaque-like yellow lesions
- medial upper and/or lower lids
- idiopathic >> hyperlipidemia, diabetes
- middle aged to elderly females
- cosmetic concern
- surgical excision for cosmetic wishes
Epithelial Inclusion Cyst

- traumatic implantation of epidermis into dermis or plugged follicle
- rarely—associated with Gardner's syndrome
- slow-growing, white, round, firm
- usually < 1 cm
- ddx: neoplasm
- tx: excision, marsupialization

Epithelial inclusion cyst

[Image of an epithelial inclusion cyst]

Orbital Cellulitis

| secondary to: | URI, sinusitis (especially children) |
| symptoms     | erythema, low grade fever, decreased vision |
| signs        | sluggish pupillary reflex, proptosis, restricted motility, edema, erythema of lids and surrounding skin, retinal hemorrhage, venous congestion, disc edema |
| diagnostic studies | increased WBC, CT: broad infiltration of orbital fat |
| treatment    | broad spectrum antibiotics, IV then po, 2-3 weeks ampicillin-sulbactam, cephalosporin, chloramphenicol, monitor for local spread, optic nerve damage, meningitis/cerebral infection, surgical drainage if large or recalcitrant, sinus drainage as indicated |
Orbital cellulitis

Conjunctival Conditions

Conjunctivitis
- viral, bacterial, chlamydial, allergic

Pingueculum

Pterygium

🌟 Viral Conjunctivitis

<table>
<thead>
<tr>
<th>basic science</th>
<th>adenovirus (epidemic keratoconjunctivitis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>clinical</td>
<td>acute onset</td>
</tr>
<tr>
<td></td>
<td>redness, mild discomfort</td>
</tr>
<tr>
<td></td>
<td>watery discharge, diffuse injection, lid edema</td>
</tr>
<tr>
<td></td>
<td>+/- follicular response, inner lid usually photosensitivity</td>
</tr>
<tr>
<td></td>
<td>tender preauricular adenopathy</td>
</tr>
<tr>
<td>treatment</td>
<td>usually self-limiting</td>
</tr>
<tr>
<td></td>
<td>cold to warm compresses</td>
</tr>
<tr>
<td></td>
<td>artificial tears, vasoconstrictor/antihistamine drops</td>
</tr>
</tbody>
</table>

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### Bacterial Conjunctivitis

**Basic Science**
- *Staph aureus, Haemophilus, Moraxella, Pseudomonas*
- *Neisseria*: rare but serious, risk corneal perforation

**Clinical**
- Red, irritated, discomfort; often bilateral
- *Mucopurulent exudate*, adhesions
- Erythema, edema of lids
- *Neisseria*: copious, purulent, often unilateral

**Treatment**
- Broad spectrum antibiotic (drops preferred over ointment)
- Fluoroquinolone, polymixin, sulfa
- *Neisseria*: frequent irrigation, topical and systemic Abs, prompt referral

### Chlamydial Conjunctivitis

**Basic Science**
- Serotypes D-K
- Sexually transmitted

**Clinical**
- Typically unilateral
- *Scant mucopurulent* discharge
- Nontender preauricular adenopathy
- Marked follicular response, marked keratitis
- Giemsa stain: inclusion bodies

**Treatment**
- Systemic tetracycline or erythromycin, 3 weeks
- Topical Abx as well, ointment preferred
**Allergic Conjunctivitis**

<table>
<thead>
<tr>
<th>basic science</th>
<th>atopic individuals at highest risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>typically seasonal</td>
</tr>
<tr>
<td>clinical</td>
<td>mild conjunctival injection, edema</td>
</tr>
<tr>
<td></td>
<td><em>stringy mucoid</em> discharge</td>
</tr>
<tr>
<td></td>
<td>severe edema: photophobia, vision impaired</td>
</tr>
<tr>
<td>treatment</td>
<td>removal of allergen, desensitization</td>
</tr>
<tr>
<td></td>
<td>systemic antihistamines</td>
</tr>
<tr>
<td></td>
<td>topical: vasoconstrictor/antihistamine</td>
</tr>
<tr>
<td></td>
<td>antihistamines (levocabastine)</td>
</tr>
<tr>
<td></td>
<td>mast cell stabilizers (lodoxamide)</td>
</tr>
<tr>
<td></td>
<td>nonsteroidal (ketorolac)</td>
</tr>
<tr>
<td></td>
<td>systemic steroids: control acute, recurrent exacerbations</td>
</tr>
</tbody>
</table>

**Pinguecula**

- elevated, fleshy, yellow to brown conjunctival mass
- nasal side, on sclera toward cornea
- causes: chronic sun, repeated trauma, dry or windy conditions
- usually no symptoms, no treatment
- may become inflamed (pingueculitis)

**Pterygium**

- triangular or wedge-shaped fleshy growth
- vascularized, folds over and onto cornea
- interferes with vision
- localized inflammatory process
- most often in tropical climates
- surgical excision, artificial tears, topical NSAIDs or steroids

**Corneal Conditions**

- Dry Eye Syndrome
- Herpes Simplex Keratitis
- Herpes Zoster Ophthalmicus
- Corneal Ulcer
- Corneal Abrasions
### Dry Eye Syndrome

<table>
<thead>
<tr>
<th>causes</th>
<th>clinical</th>
</tr>
</thead>
</table>
| - idiopathic, aging, contact wearers  
- lid palsy, ectropion, blepharitis, graft-vs-host, collagen vascular diseases (Sjogren’s, RA), sarcoidosis, medication side effect (anticholinergics) | - irritation, dryness, redness, foreign body sensation  
- worsens as day progresses  
- exacerbated by smoke, cold, low humidity, wind  
- mild conjunctival injection, if anything  
- punctate staining of cornea (fluorescein) |

<table>
<thead>
<tr>
<th>diagnosis and treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Schirmer’s test</td>
<td></td>
</tr>
<tr>
<td>- artificial tears, ointments</td>
<td></td>
</tr>
<tr>
<td>- punctal plug to prevent tear outflow</td>
<td></td>
</tr>
<tr>
<td>- cyclosporine drops (Restasis)</td>
<td></td>
</tr>
</tbody>
</table>

### Herpes Simplex Keratitis

<table>
<thead>
<tr>
<th>basic science</th>
<th>clinical</th>
</tr>
</thead>
</table>
| - 98% are unilateral  
- HSV-1 >> HSV-2  
- direct contact | - irritation, light sensitivity, redness  
- pain mild or absent  
- mild conjunctival injection  
- **dendritic lesion** (fluorescein)  
- advanced: scarring, vascularization |

<table>
<thead>
<tr>
<th>treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- REFER!</td>
<td></td>
</tr>
<tr>
<td>- topical antiviral</td>
<td></td>
</tr>
<tr>
<td>- NO steroids—will cause tissue loss, ocular perforation</td>
<td></td>
</tr>
</tbody>
</table>

[http://medlinks.blogspot.com/2012/01/photos-for-herpes-simplex-keratitis-hsk.html](http://medlinks.blogspot.com/2012/01/photos-for-herpes-simplex-keratitis-hsk.html)
Herpes Zoster Ophthalmicus

**basic science**
- Latent varicella virus
- Trigeminal (5th) ganglion, 1st division

**clinical**
- Pain, headache, photophobia
- Vesicular rash
- Hutchinson's sign: lesions on tip of nose; indicates ocular involvement (cornea, conjunctivae)
- Complications: uveitis, glaucoma, scleritis, optic neuritis

**treatment**
- REFER!
- Oral (or IV) acyclovir, famcyclovir, valacyclovir
  +/- topical steroids

**prevention**
- Zostavax, > 60 year old; 3/11/11: > 50 years old
- Reduce risk of zoster and post herpetic neuralgia
- Adverse effects: redness, pain, headache

---

Corneal Ulcer

**basic science**
- Infection or inflammation
- History of trauma, poor lid apposition or contact lens use

**clinical**
- Dense corneal infiltrate with overlying epithelial defect (fluorescein)
- Hypopyon (layering of WBC in anterior chamber)
- Ciliary flush is common
- Severe: rapid corneal destruction
- Fungal: feathery border

**treatment**
- REFER!
- Scraping, Gram stain
- Treat per causative agent
- Avoid contact use

---

Corneal Abrasion

**basic science**
- History of mild trauma

**clinical**
- Conjunctival injection, hyperemia
- Photophobia, blepharospasm
- Swollen lids, tearing
- Pain, foreign body sensation
- Epithelial defect (fluorescein)
- Search for foreign bodies

**treatment**
- Topical anesthetic—immediate relief—DO NOT DISPENSE – may retard healing
- Cycloplegic, systemic analgesic
- Antibiotic ointment, pressure patch (max 24 hours)
- Follow up daily till resolved
Trauma

Foreign Bodies

Subconjunctival Hemorrhage

Orbital Fracture (Blow Out)

Hyphema

Radiant Energy Burns

Lacerations, Penetrating Injuries

Chemical Burns

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Foreign Bodies

• conjunctiva or cornea (more dangerous)
• tearing, red, irritated, painful
• hyperemia, laceration, obvious FB
• hemorrhage or abrasion may occur
• **evert lids for exploration**
• remove under topical anesthesia
• irrigate with saline; use forceps or Q-tip
• apply antibiotic ointment after removal
• refer if suspect laceration, globe penetration

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Subconjunctival Hemorrhage

| causes           | spontaneous
|                 | after Valsalva
|                 | associated with conjunctivitis, hypertension, bleeding diathesis, trauma
| clinical         | acute, dense blood in subconjunctival space
|                 | flat, red spot to massive hemorrhage with edema
| treatment        | reassurance, 2-3 wks to clear
|                 | artificial tears, relieve discomfort
|                 | refer if suspect clotting disorder, trauma, ruptured globe

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subconjunctival hemorrhage

http://commons.wikimedia.org/wiki/File:Redeye_photograph.JPG

Orbital Fracture

orbital floor = maxillary, zygomatic, palatine

<table>
<thead>
<tr>
<th>cause</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>clinical</td>
<td></td>
</tr>
<tr>
<td>-blunt impact to the orbit; fist, tennis ball, etc.</td>
<td></td>
</tr>
<tr>
<td>-“blow out” into maxillary sinus</td>
<td></td>
</tr>
<tr>
<td>-trapped inferior rectus, inferior oblique</td>
<td>restricted, painful vertical eye movement</td>
</tr>
<tr>
<td>-double vision, edema, subcutaneous emphysema</td>
<td>posteriorly displaced globe, proptosis</td>
</tr>
<tr>
<td>treatment</td>
<td></td>
</tr>
<tr>
<td>-REFER</td>
<td></td>
</tr>
<tr>
<td>-CT: delineate extent of disease</td>
<td></td>
</tr>
<tr>
<td>-risk: increased IOP, retinal detachment, vitreous hemorrhage, lens subluxation, local damage nasal decongestants, antibiotics</td>
<td></td>
</tr>
<tr>
<td>-cold compresses, ice packs, avoid sneezing</td>
<td>surgical repair</td>
</tr>
</tbody>
</table>

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**Hyphema**

| basic science | -blood in anterior chamber  
- microhyphema (suspended RBCs) to massive hemorrhage  
- history of blunt trauma common |
| clinical | - pain, blurry vision, red eye  
- examine for further injury, neoplasm, abuse  
- injection, sluggish pupil, iris tears, active bleeding |
| treatment | - REFER!  
- admit, monitor closely  
- bed rest, eye shield, cyclopegia |

**Radiant Energy Burn**

| causes | - sunbathing, sunlamps, welding, no protection |
| clinical | - moderate to severe pain  
- 6-12 hours after the event  
- red, tearing, blurry vision, photophobia, blepharospasm  
- dense punctate staining of cornea (fluorescein)  
- injection, lid edema, corneal edema |
| treatment | - cyclopegic, antibiotic ointment  
- pressure patch (max 24 hours)  
- systemic analgesic  
- very good prognosis  
- risk: cataract |

**Lid Laceration/Penetrating Injuries**

- URGENT REFERRAL
- Surrounding structures at risk
  - Keep patient still; avoid pressure
  - DO NOT remove embedded objects
  - no pressure, no drops or ointments
  - start systemic antibiotics
- Surgery will be required
**Chemical Burns**

- IRRIGATE! Immediately and Profusely
  
  **Eyewash or Tap Water**
  
- Continue until pH normalizes
  
  and Then Irrigate More!
  
- Severe pain, redness, visual loss, spasm
- Cycloplegics, antibiotic ointment
- Corneal epithelial loss, edema, hemorrhage
- Corneal scarring, blindness

**Visual Disorders**

**Refractive Errors**

- correction: concave lenses
- correction: convex lenses


**Color Blindness**

- usually hereditary (x-linked, others)
  
  [acquired: aging, Parkinson, Alzheimers, glaucoma, mac degeneration, alcoholism, leukemia]
  
- males (8%) > > females (1%)
- red-green deficiency most common
  
  [blue-yellow deficiency 1/100,000]
- test using **Ishihara plates**
Amblyopia

• Loss of visual acuity not correctable by glasses in an otherwise healthy eye
• Normal eye that is prohibited from developing
• 2% of adult population US affected
• 50% due to strabismus
• others: refractive error, form-deprivation syndrome, occlusion

Strabismus

• concomitant (nonparalytic)
  * angle/degree of misalignment is equal in all directions of gaze
  * more common, congenital/genetic
• incomitant (paralytic)
  * degree of misalignment differs with direction of gaze
  * more likely due to neurologic disorder or trauma
• heterophoria (latent, intermittently apparent)
• heterotropia (manifest)
Amblyopia and Strabismus

- Cover/uncover test
  heterotropia (manifest): cover normal eye; affected will move in place
  heterophoria (latent) cover suspected eye; uncover and misalignment may become apparent

- Treatment basics:
  amblyopia: patch good eye; start young
  strabismus: glasses, surgical correction

What is the hallmark of a blow-out orbital fracture?

1. afferent pupillary defect
2. anisocoria
3. restricted vertical eye movement
4. subcutaneous emphysema
A patient has a pointed, tender, red lesion on the upper lid. Treatment?

1. daily scrubs
2. incision and drainage
3. topical antibiotic
4. warm compresses

Conjunctivitis that is associated with tender preauricular lymphadenopathy is most likely caused by:

1. allergy
2. bacteria
3. chlamydia
4. virus
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Six hours after a skiing trip a patient complains of severe bilateral pain and photophobia. Diagnosis?

1. atopic conjunctivitis
2. corneal ulcer
3. orbital cellulitis
4. radiant energy burn

Six hours after a skiing trip a patient complains of severe bilateral pain and photophobia. Diagnosis?

1. atopic conjunctivitis
2. corneal ulcer
3. orbital cellulitis
4. radiant energy burn
In children, orbital cellulitis is most commonly associated with what underlying disorder?

1. chronic blepharitis
2. dacryocystitis
3. recurrent hordeolum
4. sinusitis

---

Manifest inward concomitant strabismus is known as:

1. esotropic heterotropia
2. esotropic heterophoria
3. exotropic heterotropia
4. exotropic heterophoria
Manifest inward concomitant strabismus is known as:

1. esotropic heterotropia
2. esotropic heterophoria
3. exotropic heterotropia
4. exotropic heterophoria

An adolescent complains of irritated lash lines. Exam reveals red lid margins and flaky debris. First-line treatment?

1. cyclopegics
2. cortisone preparation
3. daily scrubs with baby shampoo
4. topical antibiotics

An adolescent complains of irritated lash lines. Exam reveals red lid margins and flaky debris. First-line treatment?

1. cyclopegics
2. cortisone preparation
3. daily scrubs with baby shampoo
4. topical antibiotics
Schirmer's test measures:

1. intraocular pressure
2. corneal pH
3. Meibomian gland function
4. tear production

Fluorescein staining reveals a dendritic shaped corneal lesion. Diagnosis?

1. corneal abrasion
2. herpes keratitis
3. myotic ulcer
4. pterygium
Fluorescein staining reveals a dendritic shaped corneal lesion. Diagnosis?

1. corneal abrasion
2. herpes keratitis
3. myotic ulcer
4. pterygium

What is the treatment for subconjunctival hemorrhage?

1. intermittent patching
2. reassurance and monitoring
3. topical antibiotic
4. warm compresses
What is scurf?

1. edema of palpebral conjunctiva
2. enlargement of Meibomian glands
3. fibrous scales at lash follicles
4. dandruff-like deposits on lid margins

Persons with myopia require what type of lens to correct vision?

1. concave
2. convex
Persons with myopia require what type of lens to correct vision?

1. concave
2. convex

14%
86%

Thank you and good luck!