



No Wonder You Don't See Well

Lynn E. Lawrence, OD(Reg), USAF
MDO, CROT, ABCO, CDA, OSC

1

Financial Disclosure Slide



Lynn Lawrence has no relevant financial relationships to disclose.



The content and format of this course is presented without commercial bias and does not claim superiority of any commercial product or service.

2

Objectives

This lecture will focus on common eye diseases and their impact on vision. It will identify the disease, characteristics of the disease and the affects of the disease on a patient's vision. The course will also discuss clinical presentations and testing associated with the disease.

3

Overview

- Anatomy overview
- Identify common eye diseases
- Discuss the characteristics of each disease
- Identify characteristics of each disease
- Testing procedures



4



The consumer health alert poses five important questions for consumers, including:

- Can you find the U.S. Food and Drug Administration (FDA) approval statement for the company and its test, and is the company operating within that authority?
- Do you know the doctor of optometry or ophthalmologist who is prescribing your contact lenses?
- Are you asked to sign any forms that seek to release the company from liability?
- Can you ask the doctor who is prescribing the contact lenses any questions when you are using an online vision test?
- What does a particular online vision test actually assess?

[AOA issues consumer health alert for online vision tests | AOA](#)

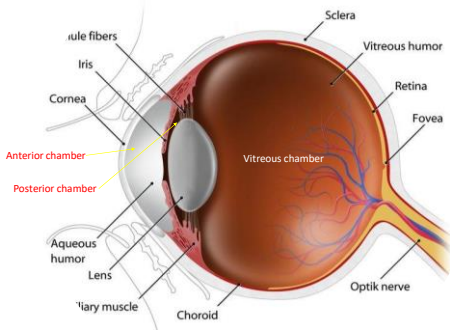
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5

Anatomy

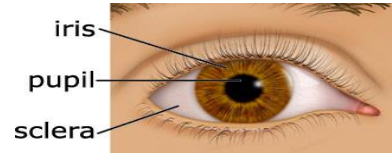
- Eyelid
- Dry Eye
- Conjunctivitis
- Corneal Ulcers
- Subconjunctival Hemorrhages
- Pinguecula
- Pterygium
- Meibomian Gland Dysfunctions
- Cataracts
- Glaucoma
- Floaters
- Retinal Detachment
- Age Related Macular Degeneration
- Diabetes
- Strabismus
- Retinoblastoma

6



7

Anatomy

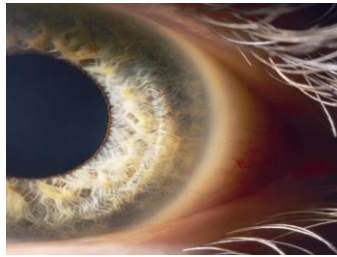
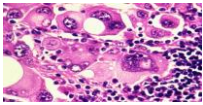


What function does the pupil have?

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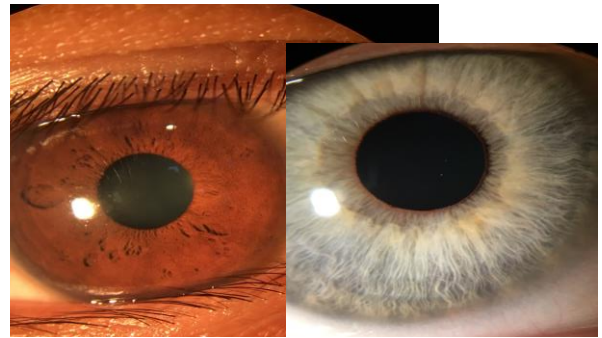
Blue Eyes

- More Like to have:
 - Melanoma
 - AMD
 - Photophobia
 - Better with pain



<http://www.msn.com/en-us/health/medical/7-things-your-eye-color-says-about-your-health/ar-BB1N5Gg?i=AaA0d;B&ocid=IDMD&page=4&fullscreen=true#image=4>

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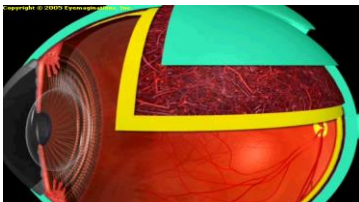


10

3 Layers

- Fibrous Layer
 - *Cornea
 - *Sclera
- Vascular Layer
 - *Choroid
 - *Ciliary body
 - *Iris
- Nerve Layer
 - *Retina
 - *Macula
 - *Optic nerve

Anatomy and Physiology of the Eyeball



What is the main function of each layer?

11



Cornea

What is it called when blood vessels grow onto the cornea?

What happens when a patient gets a scar in the visual pathway?

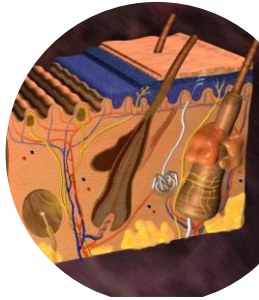
- 5 layers: Epithelial, Bowman's layer, Stroma, Descemet's membrane, endothelial
- Index of refraction is 1.37
- Approximately .5mm in thickness
- Transparent Organ (no blood vessels / avascular)
- Primary function is refraction of light rays
- Refractive power approx + 45.00 D

What is the crossover point for the nasal optic nerves?

12

The Eyelid

- 7 Layers of the eyelids
 1. Epidermis – Skin - thinnest layer
 2. Subcutaneous connective tissue
 3. Striated Muscle
 4. Sub-muscular cone
 Active tissue
 5. Tarsal plate or fibrous layer – thickest layer
 6. Smooth muscle
 7. Conjunctiva (Bulbar/Palpebral)



13

Eyelid Positions

- Disease:
- Trichiasis ... eye lashes turned in
 - Entropion ... lid turned in no drain
 - Ectropion ... lid turned out drain
 - Tear deficiency / instability
 - Trigeminal nerve (5th CN) irritation
 - Oculomotor nerve (3rd CN) levator
 - Facial nerve (7th CN) orbicularis muscle
 - Lagophthalmus ... lid won't close



14

Hypersecretion = Pump Failure

- Ectropion – eyelid turns out
- Crocodile-tears Syndrome
- Gustatory Hyperlacrimation or Gustatory epiphora or Gustolacrimal reflex (could be congenital)
- Ocular Surface Irritation



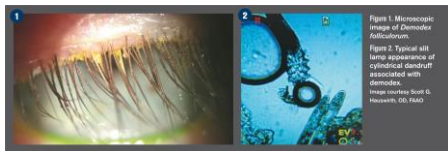
The tear lake is really high
What is a normal tear lake measurement?

15



Floppy Eye Lid Syndrome – the lid no longer has tension and does not remove the bacteria from the eye

16



Demodex mites are microscopic ectoparasites found in human skin. They are extremely common, and their rate of infestation increases with age. The life span of demodex outside the living body is very limited. Direct contact is thought to be required for transmission of the mites. The lifecycle of demodex from egg/molt to an adult is quite short and no longer than two to three weeks. The adult stage is less than a week, and this is when mating occurs.


http://optometrytimes.modernmedicine.com/optometrytimes/news/what-s-all-criaze-about-demodex?am_campaign=SponsoredResourceCenter&am_source=the_ama&am_medium=email&am_content=27975804&hsrc=424Nq1z:9RqjC6eARW9K6w4kPGSW3_GFvzPTVYuruZAgw9SRbaq3l_2D_X3FHLvABARozpT-Vaxgq9YKRXXGc_8q1H4Jw8_fam=27975804

17



18

Eyebrows and Eyelashes



- Eyebrows
 - Thickened ridge of skin with short hairs
 - Diverts perspiration
- Eyelashes
 - Also protects
 - Sebaceous glands at base of each lash are called Glands of Zeis which produce a lubricating fluid
 - Fluid can harden and clog the gland, producing a sty or painless chalazion, if painful and infected, it is called an external hordeolum

19

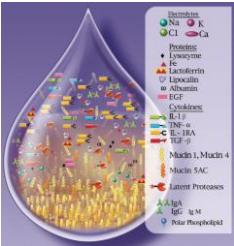


20

Tear Anatomy

A complex mixture of proteins, mucins, and electrolytes coated by a lipid layer

- Antimicrobial proteins
- Growth factors & suppressors of inflammation
- Soluble mucin helps stabilize tear film
- **Electrolytes for proper osmolarity (295-300)**
 - pH slightly alkaline (7.4)



21

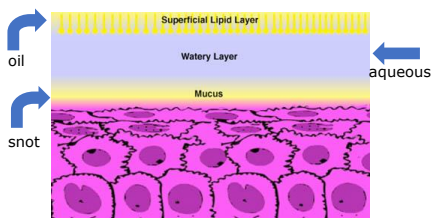
The Impact Of Tears On Vision

- Refractive Status
- Health of the Cornea, the most refractive surface of the eye
- Visual Acuity
- **Fluctuating vision**



22

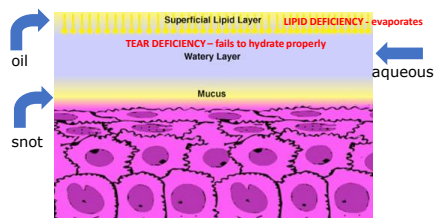
Lacrimal System: Tear Film Layers



What functions does each layer of the tear perform?
What are functions of tears?

23

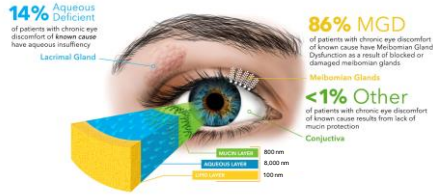
Lacrimal System: Tear Film Layers



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24

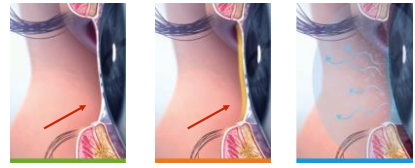
Two Primary Forms of Dry Eye



The two primary forms of dry eye are Evaporative Dry Eye, also known as Meibomian Gland Dysfunction or MGD and Aqueous Dry Eye. The majority of dry eye sufferers have MGD.

25

The Tear Film Structure In Our Eyes



The aqueous (water) layer provides natural lubrication and is produced by the lacrimal glands.

The aqueous layer is protected by the lipid (oil) layer that is produced by the meibomian glands located in the eyelids.

When your meibomian glands do not produce sufficient oil, water evaporates causing burning, redness, dryness, irritation and eye fatigue. This is called Meibomian Gland Dysfunction or MGD.

26

Symptoms

Dry Eye

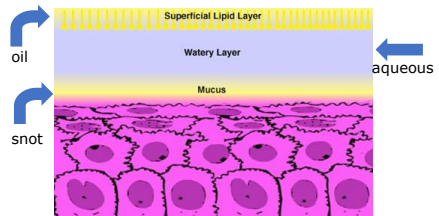
- A stinging, burning or scratchy sensation in your eyes
- Stringy mucus in or around your eyes
- Increased eye irritation from smoke or wind
- Eye fatigue
- Sensitivity to light
- Difficulty wearing contacts
- Periods of excessive tearing
- Blurred vision, often worsening at the end of the day (reading/computer)

Treatment

- Depends on the cause
- Drops must address the problem if used
- Punctal Plugs
- Surgery may be necessary

27

Tear Film Layers

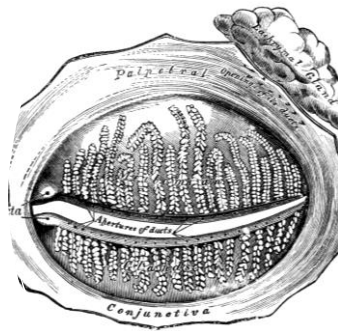


What functions does each layer of the tear perform?

28

Tear Components

- Lipid Layer – prevents evaporation
- Aqueous Layer - hydration
- Mucus Layer – sticks tear to the eye
- Other components



29

Lipid Secretion: Meibomian Glands



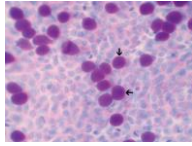
Left: Transillumination of eyelid showing meibomian glands

Right: Secretion of lipid at lid margin

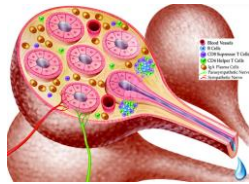
- The lipid layer restricts evaporation to 5-10% of tear flow
 - Also helps lubricate

30

Mucin Secretion: Goblet Cells



Superficial layer of bulbar conjunctiva.
Goblet cells violet, epithelial cells blue.



- Soluble mucins
 - Lower surface tension allowing tear film to spread over surface

Lipid Aqueous Mucin

31

Medications that cause dryness

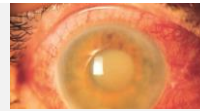
- Glaucoma medications
- Certain types of drugs used to treat high blood pressure, such as central-acting agents and diuretics
- Antihistamines and decongestants
- Birth control pills
- Certain antidepressants
- Pain relievers, such as ibuprofen (Advil, Motrin, others) and Naproxen (Aleve)
- Isotretinoin-type drugs for treatment of acne

32

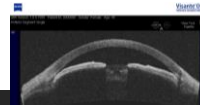
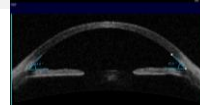
Risk factors

- Increasing age
- Being a woman
- Taking medications that can cause dry eyes
- Having laser eye surgery
- Undergoing radiation therapy, such as is used to treat cancer, aimed at the eyes
- Eating a diet that is low in vitamin A, which is found in liver, carrots and broccoli, or low in omega-3 fatty acids, which are found in fish, walnuts and vegetable oils

33

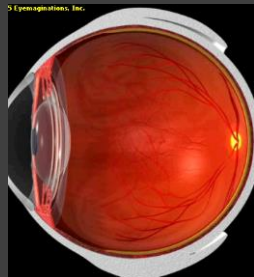


Acute Angle-Closure Glaucoma



- Rapid onset
- Painful
- Very serious
- Can lead to permanent blindness
- Common in patients with high hyperopia and mature cataracts

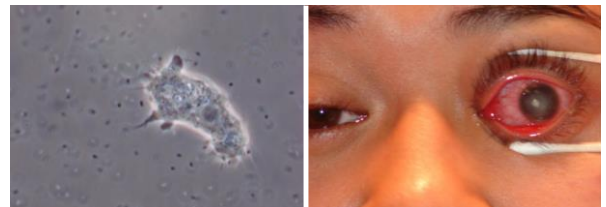
34



Length of the Eye

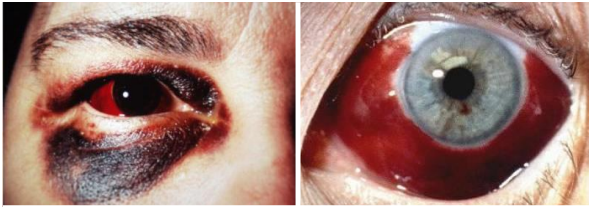
- The average axial length of an adult eye is about 23 mm. Some people have hyperopia because, in essence, their eye is too short (i.e., less than 23 mm long). As a rule of thumb, each millimeter of axial length amounts to approximately 3.00 diopters of refractive power.
- The shape of the eye matters as well!

35



Contact Lenses – Acanthamoeba

36



Call it

37

Subconjunctival Hemorrhage

- | Symptoms | Causes |
|---|---|
| <ul style="list-style-type: none"> • Redness on the white portion of the eye due to bleeding between the conj and sclera | <ul style="list-style-type: none"> • Dehydration • Sneezing • Coughing • Constipation • Straining • Heavy Lifting |

38



39



40



Call it

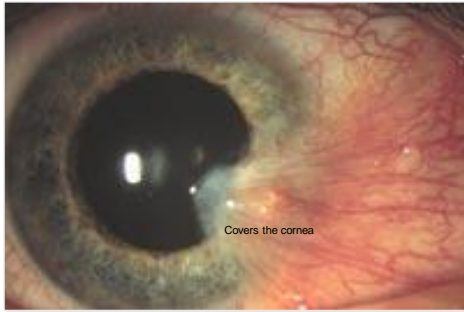
41

Pinguecula ...is small like penguin

- | Symptoms | Treatment |
|--|---|
| <ul style="list-style-type: none"> • Irritations at the 3 and 9 o'clock positions | <ul style="list-style-type: none"> • Medications / Ointments • Sunglasses |

42

Call it



43

Pterygium...is large like pterodactyl

Symptoms

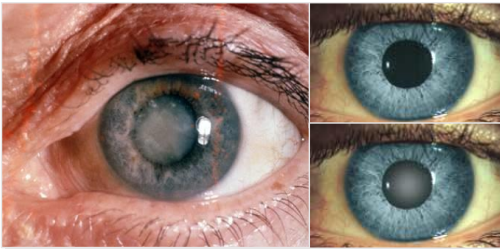
- Eye irritation
- FB sensation
- Redness
- Dryness
- Induced astigmatism
- Reduced vision

Treatment

- Removal through surgical excision
- Surgery is very painful
- Can grow back

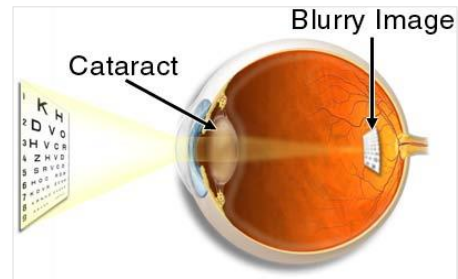
44

Call it



45

Cataract



46

Cataract

Symptoms

NSCs are the most common type of cataracts, and many consider them to be a normal maturation of the lens. Over time, the lens becomes larger and brunescent (yellow or brown), especially in the denser central nucleus. If this process goes on long enough the opacity eventually leads to visual obstruction and problems with glare. The lens can become so big that it pushes the iris forward, placing the patient at increased risk for angle closure glaucoma.

Treatment

- Surgery:
- Cataract Extraction and IOL implant
 - There are different types of IOLs and different locations in which they can be placed

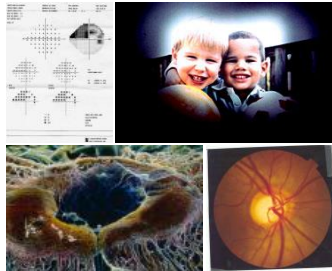
47

Call It



48

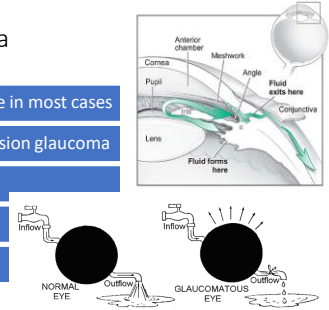
Glaucoma



49

Types of Glaucoma

- Not curable/but treatable in most cases
- Low-tension/ normal tension glaucoma
- Angle-closure glaucoma
- Congenital glaucoma
- Secondary glaucoma



50

Congenital Glaucoma

- Children are born with a defect in the angle of the eye that slows drainage of aqueous. The children usually have obvious symptoms such as cloudy eyes, sensitivity to light, and excessive tearing.
- Early intervention could lead to a great outcome



51

Glaucoma...acute and open angle

- Increased intraocular pressure
- Increased cupping (cup to disc ratio)
- Decrease in peripheral vision
- Optic Nerve Head (ONH) involvement



52

Call it

Floating cells



Floaters

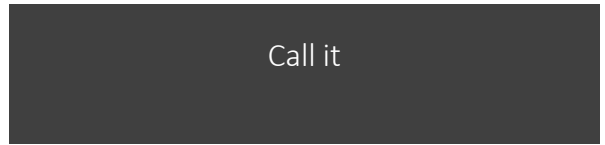
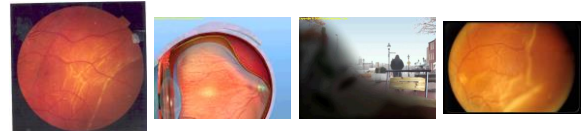
- | | |
|--|---|
| <p>Symptoms</p> <ul style="list-style-type: none"> • Status of vitreous • Age of patient • Could be nothing/could be something ☺ • Post Vitreous Detachment (PVD) | <p>Treatment</p> <ul style="list-style-type: none"> • Dilated exam • Surgery • Vitrectomy |
|--|---|

53

54



55



56

Retinal Detachment

Symptoms

- Veil in vision
- Part of vision missing
- Flashes of light

Treatment

- Send to retina specialty immediately
- Depends on its intensity
- Scleral buckle
- Laser reattachment

57



58

Macular Degeneration



59

Dry Macular Degeneration

- The need for increasingly bright light when reading or doing close work
- Increasing difficulty adapting to low light levels, such as when entering a dimly lit restaurant
- Increasing blurriness of printed words
- A decrease in the intensity or brightness of colors
- Difficulty recognizing faces
- A gradual increase in the haziness of your overall vision
- A blurred or blind spot in the center of your field of vision
- Hallucinations of geometric shapes or people, in cases of advanced macular degeneration

60

Wet Macular Degeneration

- Blood vessels growing in the macula
- Fluid build up
- Visual distortions, such as straight lines appearing wavy or crooked, a doorway or street sign looking lopsided
- Decreased central vision
- Decreased intensity or brightness of colors
- Well-defined blurry spot or blind spot in your field of vision
- Abrupt onset
- Rapid worsening
- Hallucinations of geometric shapes, animals or people, in cases of advanced macular degeneration
- Retinal Ophthalmologist

61



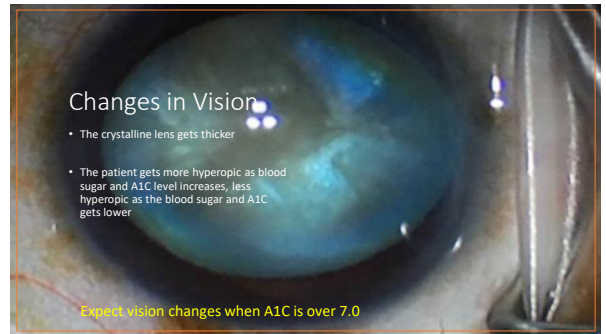
62

Diabetic Retinopathy

Diabetic retinopathy often has no early warning signs. Even **macular edema**, which may cause vision loss more rapidly, may not have any warning signs for some time. In general, however, a person with macular edema is likely to have blurred vision, making it hard to do things like read or drive. In some cases, the vision will get better or worse during the day.

As new blood vessels form at the back of the eye as a part of *proliferative diabetic retinopathy* (PDR), they can bleed (**ocular hemorrhage**) and blur vision. The first time this happens, it may not be very severe. In most cases, it will leave just a few specks of **blood**, or spots, floating in a person's visual field, though the spots often go away after a few hours.

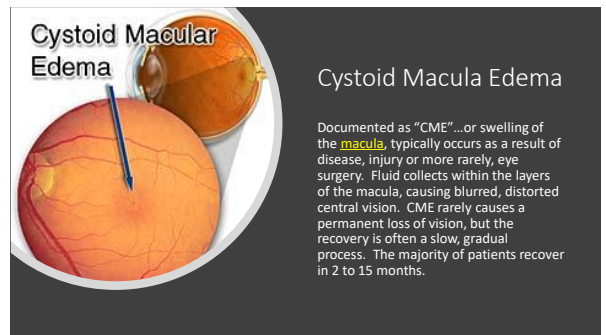
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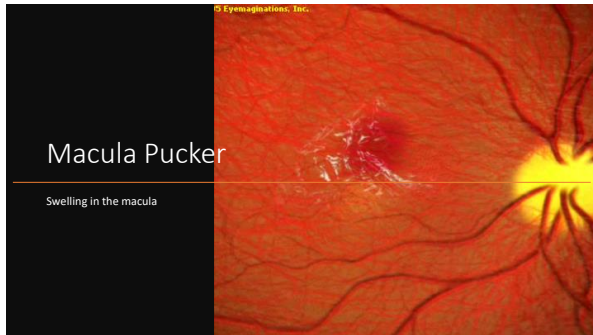
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65

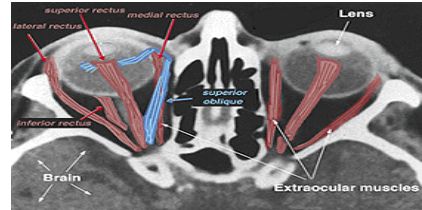


66



67

Extra Ocular Muscles

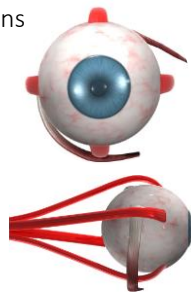


What is the name of the point where the muscles come together?

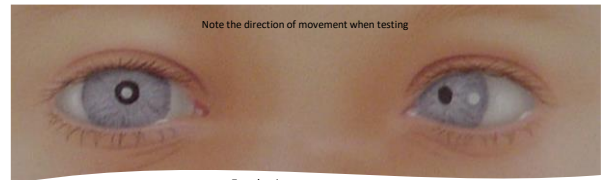
68

Extraocular Muscle Actions

Muscle	Primary Action	Secondary Action	Tertiary action
Lateral rectus	Abduction	None	None
Medial rectus	Adduction	None	None
Superior rectus	Elevation	Intorsion	Adduction
Inferior rectus	Depression	Extorsion	Adduction
Superior oblique	Intorsion	Depression	Abduction
Inferior oblique	Extorsion	Elevation	Abduction



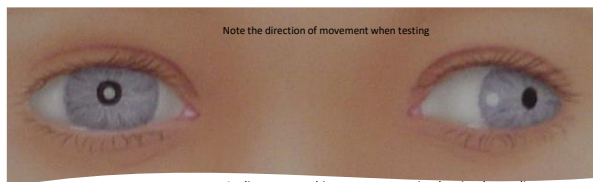
69



Eso

- Esophoria
- Lateral rectus muscle
- Esotropia – eye is turned inward in constant position – eye swings out
- **Symptoms**
 - Decreased vision
 - Misaligned eyes
 - More commonly associated with diplopia

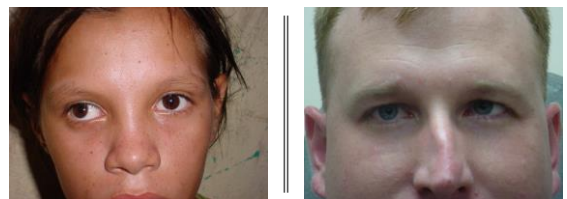
70



Exo

- In divergent strabismus, or exotropia, the visual axes diverge
- Medial rectus muscle
- Exotropia is when the eyes normal position rest outward ...
- **Symptoms**
 - Decreased vision
 - Misaligned eyes
 - Sensitivity to light

71



Call both photos

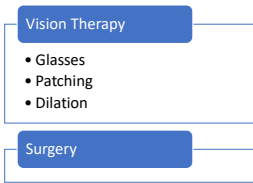
72

Strabismus

symptoms

Strabismus: A condition in which the visual axes of the eyes are not parallel, and the eyes appear to be looking in different directions. The danger with strabismus is that the brain cones may come to rely more on one eye than the other and that part of the brain circuitry connected to the less-favored eye fails to develop properly, leading to amblyopia (blindness) in that eye.

treatment



73



Call it

74

Retinoblastoma / Leukocoria

- A white color in the center circle of the eye (pupil) when light is shone in the eye, such as when taking a flash photograph
- Eyes that appear to be looking in different directions
- Eye redness
- Eye swelling
- Retinoblastoma occurs when nerve cells in the retina develop genetic mutations that cause the cells to continue growing and multiplying when healthy cells would die. This accumulating mass of cells forms a tumor. Retinoblastoma cells can invade further into the eye and nearby structures. Retinoblastoma can also spread (metastasize) to other areas of the body, including the brain and spine.

75

Coates Disease

Subretinal material		Coats Disease
<p>Coats disease</p> <p>Xanthocoria</p>	<p>Retinoblastoma (Exophytic)</p> <p>Leukocoria</p>	<ol style="list-style-type: none"> 1. Abnormal retinal vessels, telangiectasia (anomalously grape-like clusters) 2. Subretinal exudates (yellow in appearance on retina examination) 3. Usually unilateral 4. Detachment can occur 5. Males more frequently affected than females 6. Pathology – leaking anomalous vessels 7. Typical age of diagnosis 8-10 years 8. Treated with laser or cryoablation of leaking vessels. 9. Scleral buckle for detachment. 10. After treatment more than half of patients stable or improved.

76



Upgaze

77

Call it



78

Papilledema / Optic Neuritis

Pain. Most people who develop optic neuritis experience eye pain that's worsened by eye movement. Pain associated with optic neuritis usually peaks within several days.

Vision loss. The extent of vision loss associated with optic neuritis varies. Most people experience at least some temporary reduction in vision. If noticeable vision loss occurs, it usually develops over the course of hours or days, and may be worsened by heat or exercise. Vision loss may be permanent in some cases.

- **Loss of color vision.** Optic neuritis often affects the perception of colors. You may notice that the colors of objects, particularly red ones, temporarily appear "washed out" or less vivid than normal.
- **Flashing lights.** Some people with optic neuritis report seeing flashing or flickering lights.
- **Multiple sclerosis**
- **Neuromyelitis optica**

79



80

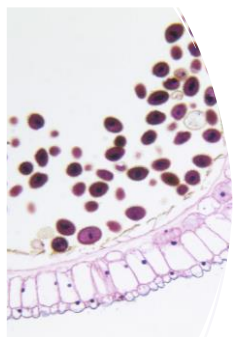
Central Retinal Vein Occlusion

- Painless loss of monocular vision is the usual presenting symptom of retinal artery occlusion (RAO). Ocular stroke commonly is caused by embolism of the retinal artery, although emboli may travel to distal branches of the retinal artery, causing loss of only a section of the visual field. Retinal artery occlusion represents an ophthalmologic emergency, and delay in treatment may result in permanent loss of vision.
- Immediate intervention improves chances of visual recovery, but, even then, prognosis is poor, with only 21-35% of eyes retaining useful vision. Although restoration of vision is of immediate concern, retinal artery occlusion is a harbinger for other systemic diseases that must be evaluated immediately.

81



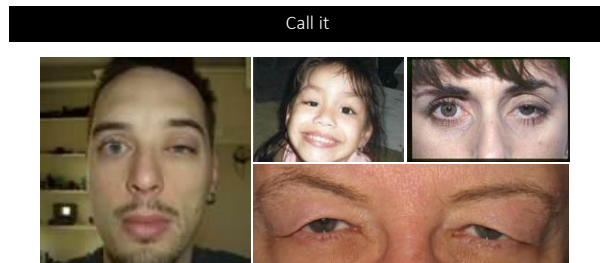
82



Retinitis Pigmentosa

- Retinitis Pigmentosa (RP) is a group of eye diseases that affect the retina. The retina, which is located at the back of the eye, sends visual images to the brain where they are perceived. The cells in the retina that receive the visual images are called photoreceptors. There are two types of photoreceptors: rods (which are responsible for vision in low light) and cones (which are responsible for color vision and detail in high light).
- Signs of RP can usually be detected during a routine eye exam when the patient is around 10 years old. However, symptoms usually do not develop until adolescence.

83



84

Ptosis (toe-sis)

Ptosis is a drooping or falling of the upper eyelid. The drooping may be worse after being awake longer when the individual's muscles are tired. This condition is sometimes called "lazy eye", but that term normally refers to the condition amblyopia. If severe enough and left untreated, the drooping eyelids can cause other conditions, such as amblyopia or astigmatism. This is why it is especially important for this disorder to be treated in children at a young age, before it can interfere with vision development.



85



Blepharochalasis

86

Lids and lashes

1. Ptosis = muscles

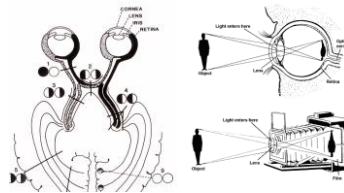


2. Dermatochalasis = skin/fat



87

Visual Pathway



- Visual pathway has seven structures
- Retina
- Optic Nerve – light superhighway information
- Optic Chiasm
- Optic Tract
- Lateral Geniculate Body (LGB)
- Optic Radiations
- Visual Cortex ...where vision occurs

88



Floppy Eyelid Syndrome

- Punctum
- Tear coverage
- Exposure issues
- Diagnosis assistance

89

Droopy or Floppy Eyelids



- Can be caused by nerve or muscle defects
- Can be excess skin (Dermatochalasis)
- Poor eyelid muscle tension (lid ptosis)
- Brow ptosis

- Corrected by:
- Blepharoplasty
 - Ptosis repair
 - Brow lift
 - Face lift

90



Common Lid Conditions

• None are true emergencies

91

Presbyopia

Reduction in the ability to accommodate

Occurs normally with age

- Reduction in lens elasticity
- Reduction in strength of the ciliary muscle

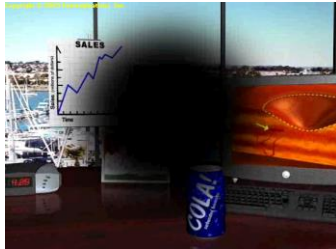


Using the Worth 4-Dot test, if only two or three lights are seen _____ is indicated?

92

The Retina

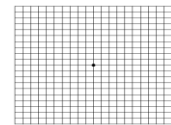
- AMD
- Retinitis Pigmentosa
- ERM
- Diabetic Retinopathy
- Glaucoma
- The ultimate receiver



93

Age Macular Degeneration

- Wet – more aggressive
- Dry – can turn more aggressive without warning



VISION

94

Acute Angle Glaucoma

- Steamy cornea
- Elevated pain
- Elevated IOP
- Decreased vision
- Irregular shaped pupil



95

Reinoblastoma



- A white color (leukocoria) in the center circle of the eye (pupil) when light is shone in the eye, such as when taking a flash photograph
- Eyes that appear to be looking in different directions
- Eye redness
- Eye swelling
- a mutation on **chromosome 13**, called the **gene**

96

Diabetes

- Fluctuations with vision
- Bleeding in retina is called retinopathy
- Dried blood leaves yellowish clumps in the retina called, Exudates



The white spot in this photo come from ____ deposits?

97

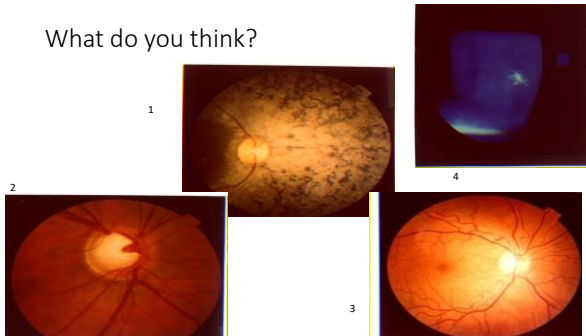
CRVO

- Since the central retinal artery and vein are the sole source of blood supply and drainage for the retina, such occlusion can lead to severe damage to the retina and blindness, due to [ischemia](#) (restriction in blood supply) and [edema](#) (swelling).^[2]
- It can also cause [glaucoma](#).



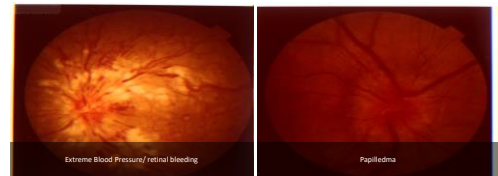
98

What do you think?



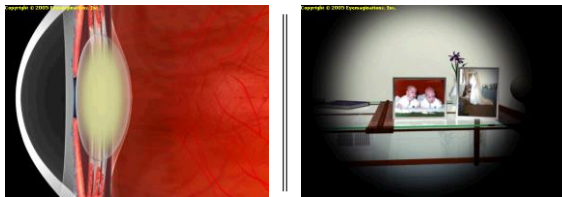
99

What is wrong in these photos?



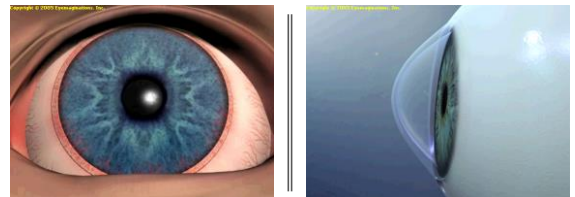
100

Call it



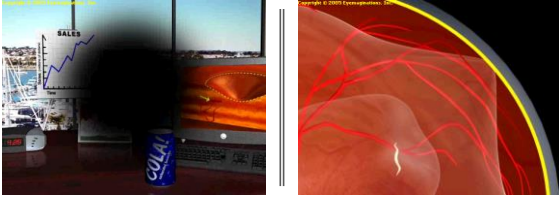
101

Call it



102

Call it



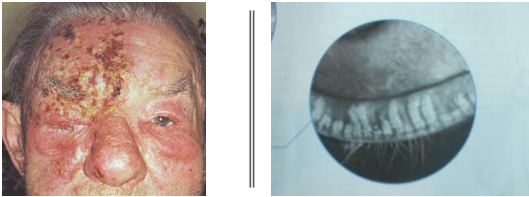
103

Call it



104

Call It



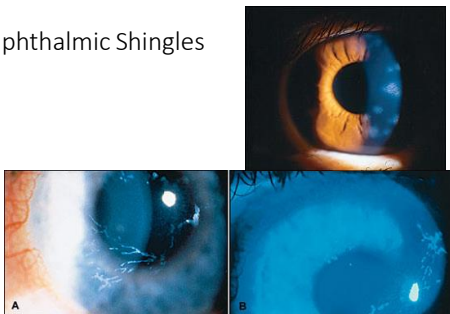
105



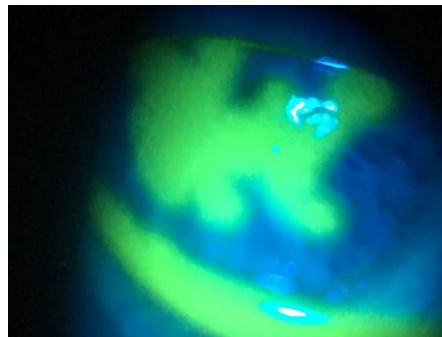
Call it

106

Ophthalmic Shingles



107



108

Giant Cell Arteritis (GCA)

109

TABLE 1
Symptoms in giant cell arteritis*

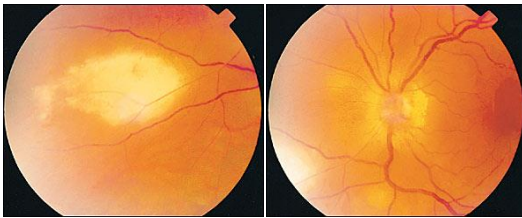
Category	Symptoms
Symptoms due to involvement of cranial vessels	Headache Jaw claudication (pain on chewing) Scalp tenderness Loss of vision Abnormalities of the temporal artery (pain, nodules, absence of pulse)
Symptoms due to involvement of great vessels (aorta and branches of aorta)	Claudication of extremities (especially arm)
Symptoms due to systemic inflammation	Fever, night sweats, weight loss
Polymyalgia rheumatica	Mainly proximal myalgia and stiffness of the neck and shoulder and pelvic girdles



modified from [3, 11, 12, 39]

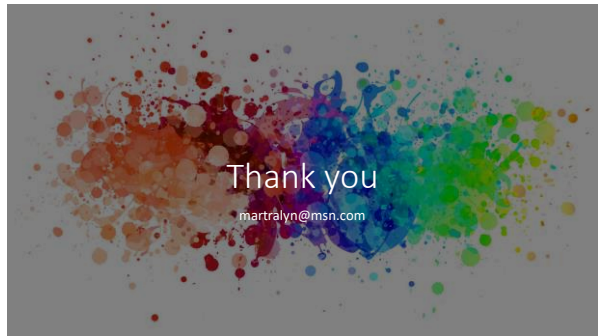
Symptoms of GCA

110



Zoster Peripheral Retinitis

111



112