Extraocular Structures

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Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

VISION EXPO

Financial Disclosure

Carrie Wilson has no financial interests to disclose.

Course Objectives

By the end of this course, you will be able to

- Identify the extraocular structures
- Understand the form and function of the structures
- Identify how deficiencies within the structures will affect the globe and contact lens wear

Eyebrows

- Shield eye from light
- Divert rain and sweat
- Moved by the Frontalis Muscle
- Sags as you age

Interesting Facts about the Brow

- The average brow has 250 hairs; the never-plucked brow can have as much as 1100
- Brows have a 4-month lifespan
- They grow faster in the summer
- The hair follicle tries to save the brow hair by closing around a plucked hair

Eye Lashes

- Air filter
- Touch defense mechanism
- Nourished by glands in the lid
- Like brow hairs, only last about 4 weeks

Cosmetic Procedures on Brows and Lashes

- **Tinting:** semi-permanent dye is painted onto the eyebrows or eyelashes to make them appear thicker, darker, and fuller.
- **Eyebrow microblading:** Tattooed into the skin using a needle mounted on a small handheld tool.
- **Eyebrow lamination**: A perming cream is brushed into the eyebrows to allow the hair to be sculpted into a more desirable shape.
- **Eyelash perm**: The lashes are coated with an adhesive and curled around rollers. Chemical solutions are then applied to the lashes to create a long-lasting curl.
- **Eyelash lift:** An eyelash lift, often combined with an eyelash tint, involves combing eyelashes to a silicone shield and holding them there with adhesive while a chemical lotion is applied to break down the protein in each eyelash and encourage it to grow upward instead of outward.

Cosmetic Procedure Warning Signs

- Allergic Reactions
- Loss of eyelashes
- Chemical burns
- Tint, silicone, chemical deposits on contacts

Eyelids

- AKA Palpebrae
- When open, called palpebral aperture or fissure
- Should be examined at each exam
- Droopy lids may mean
  - Neurological
  - Past injury
  - Long-term RGP wear

Meibomian Gland

- Aka Tarsal gland
- Sebaceous
- Open into lid margin
- Approximately 20 – 30 glands in the lower lid
- Approximately 40 – 60 glands in the upper lid

Glands of Zeis and Moll

- Gland of Zeis
  - A ciliary gland, opens around the lashes
  - Protects the lash
- Gland of Moll
  - A ciliary sweat gland
  - Function not known

Lacrimal Glands and Wolfring & Krause

- Wolfring & Krause
  - Accessory lacrimal gland. Produces 10% of aqueous layer
- Lacrimal Gland
  - Produces the aqueous layer of the tear film

Muscles of the Eyelid

- Levator Palpebrae Superioris
  - Raises upper lid
  - Operated by cranial nerve III
  - Has some function pumping tears
- Muller's Muscle
  - Tones the lid
  - Contracts when awake
  - Relaxes when sleepy

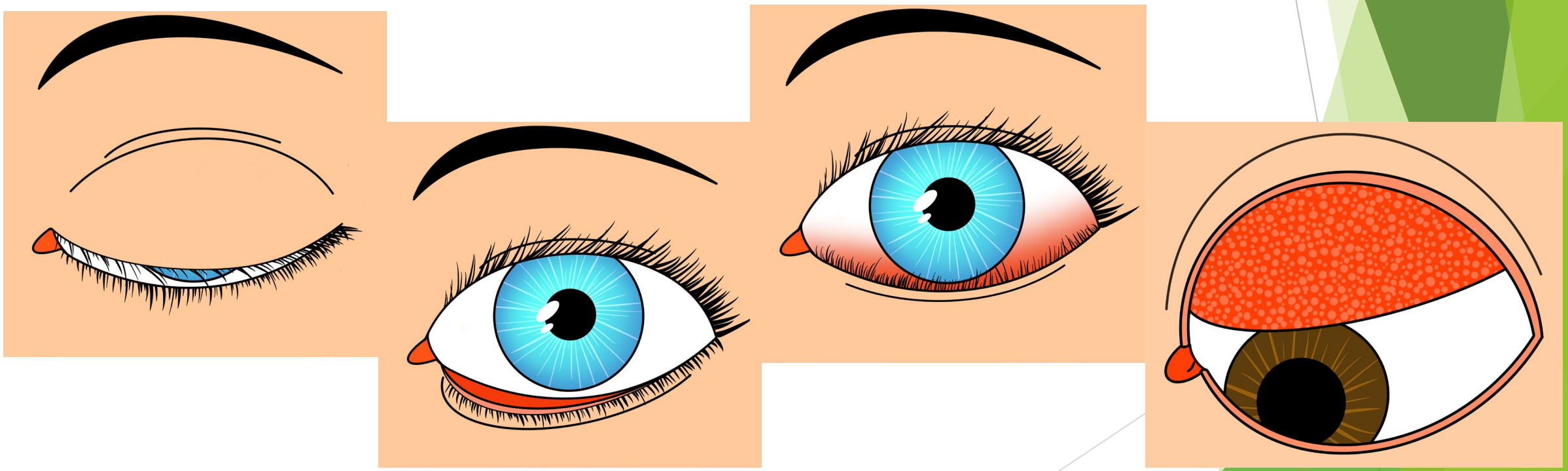
Muscles of the Eyelid

- Orbicularis Oculi Muscle
  - Closes the lids
  - Aids in tear drainage
  - Operated by cranial Nerve VII

The Function of Lids

- Keep eye moist through blinking
- Distribute tears, oxygen, and nutrients
- Flushes debris toward the inner canthus
- Protect the globe from injury or light

Eyelid Conditions that Impact CL Wear



Lacrimal Apparatus

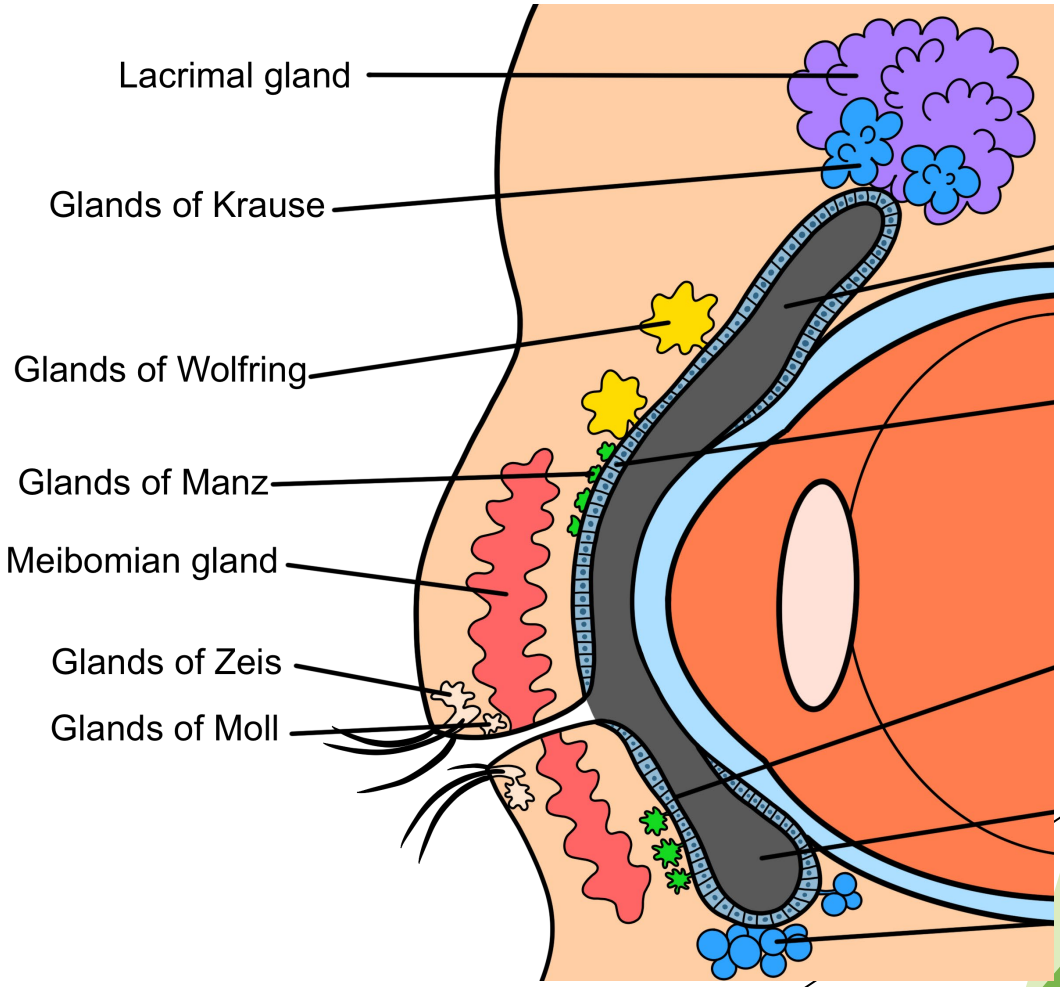
Reflex Tears

- Require stimulus
- Contain mostly water
- Can be seen in dry eye sufferers due to irritation
- Not seen in most newborns

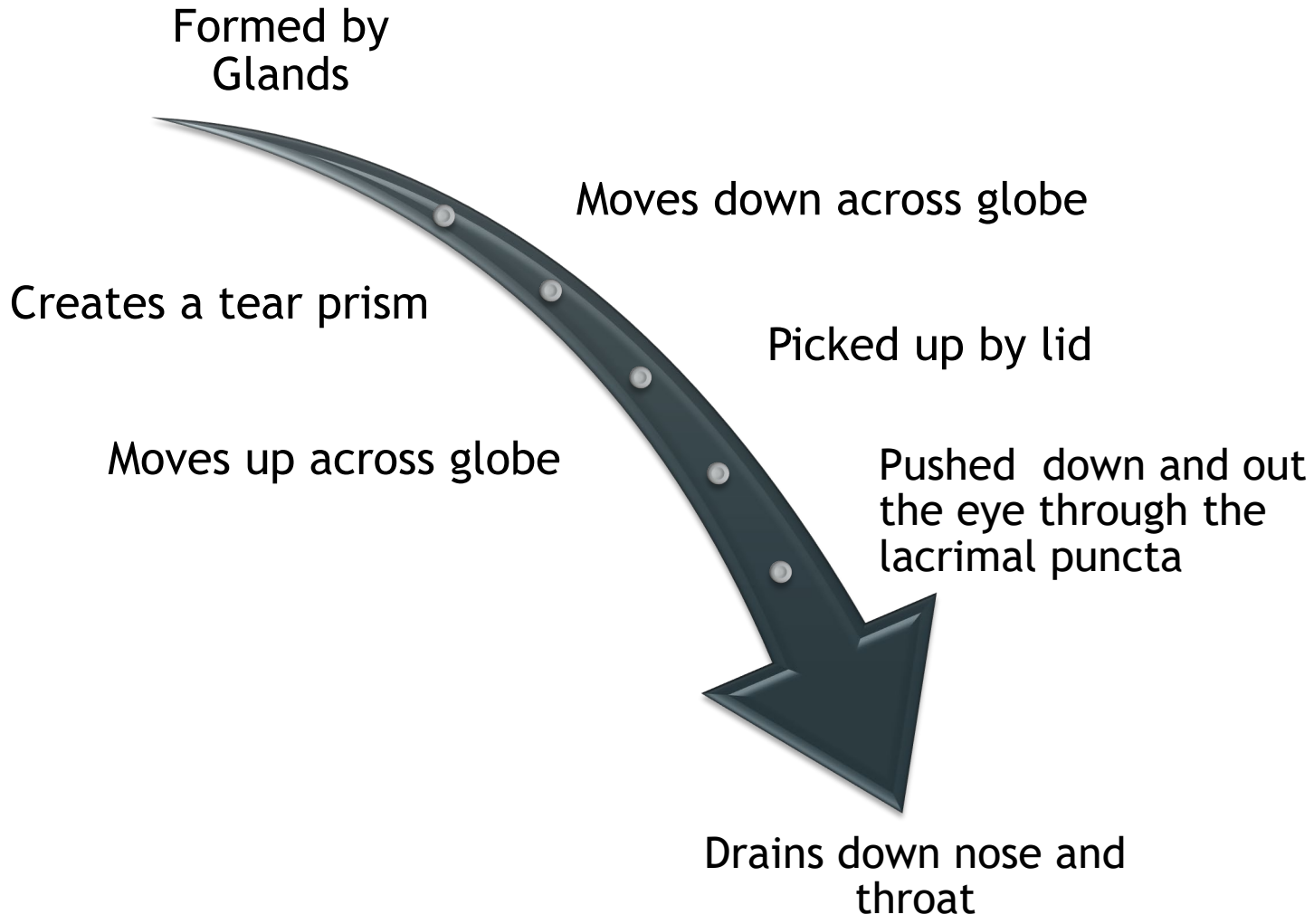
Lacrimal Apparatus

Basic Tear Secretion

- Also called basal
- A lubricating tear film
- Spreads across the globe with the blink
- Contains anti-bacterial agents
- Flushes debris



Kinetics of Tears



Precorneal Tear Film

- First refractive medium of the eye
  - Lipid or Oily Layer
  - Aqueous or Water Layer
  - Mucin or Mucous Layer
- Has an average pH of 7.4
- Injury makes the tears more alkaline (higher pH)

The Lipid Layer

- Primary function is to slow evaporation
- Secreted by meibomian gland and glands of Zeis
- 0.1 microns thick
- Composed of waxes, cholesterols and triglycerides
- Also prevents tears from spilling over cheeks

The Aqueous Layer

- Primary function is to
  - Provide nutrition and oxygen to cornea
  - Hydrate cornea
  - Provide antibacterial protection
- Secreted by all lacrimal glands. The Gland of Krause and Gland of Wolfring make 10%
- 7 microns thick
- Composed of water, salts, glucose, proteins, lysozymes and immunoglobulins

The Mucin Layer

- Primary function is to stabilize the tear film
- Produced by goblet cells
- 0.02 to 0.05 microns thick
- Composed of glycoproteins and mucopolysaccharides
- Works because it reduces the tension of the aqueous layer

Tear Integrity

- Normal tear Break Up Time (BUT) is longer than blink time with no corneal drying; about 15-30 sec
- Tests
  - Schirmer
  - Tear BUT test
  - Rose Bengal

Schirmer

- Measure tear production
- Schirmer 1 – Basal
  Schirmer 2 – Reflex
- Uses no 41 Whatman filter paper
- 5mm stuck into the lower conjunctival sac
- Reviewed over 5 minutes

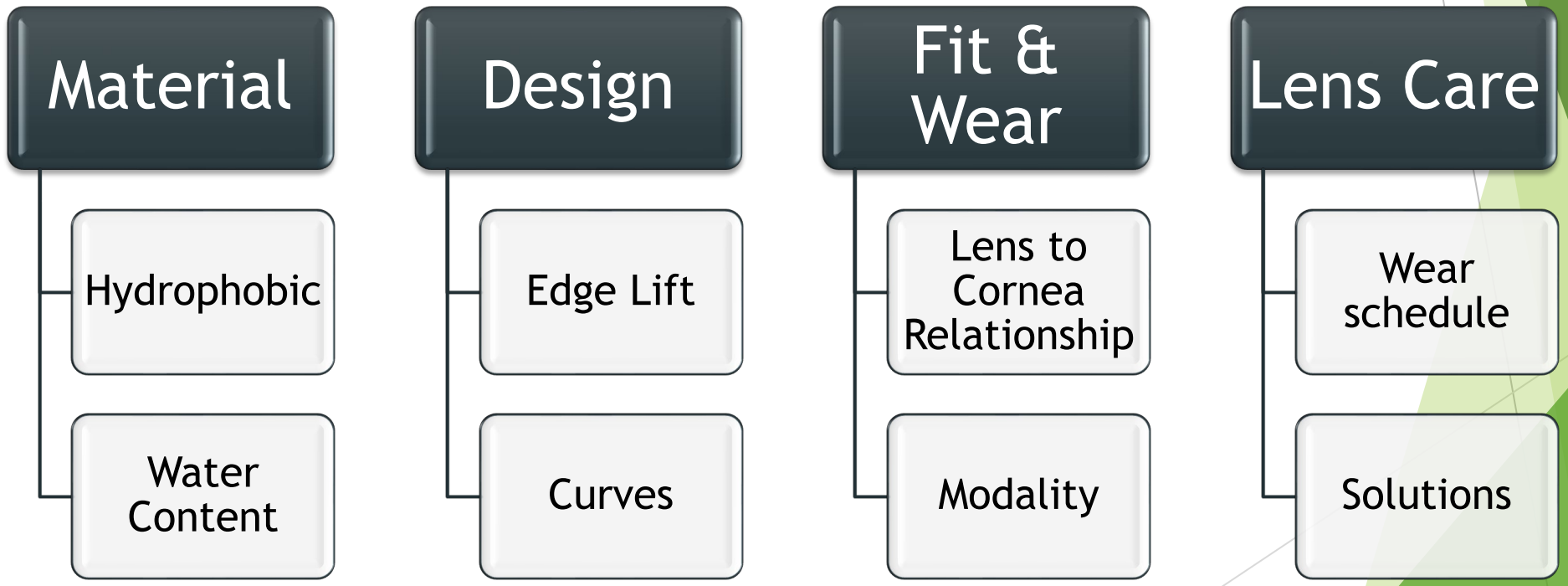
Break Up Time

- Fluorescein is placed into the conjunctival sac
- Cornea is viewed with Cobalt blue illumination
- BUT of less than 10 sec indicates a mucin deficiency
- Helps determine therapies and contact lens wear suitability

Rose Bengal or Lissamine Green

- Dye adheres to degenerated cells
- Green makes vascularization easier to see
- Rose Bengal has a high irritation rate

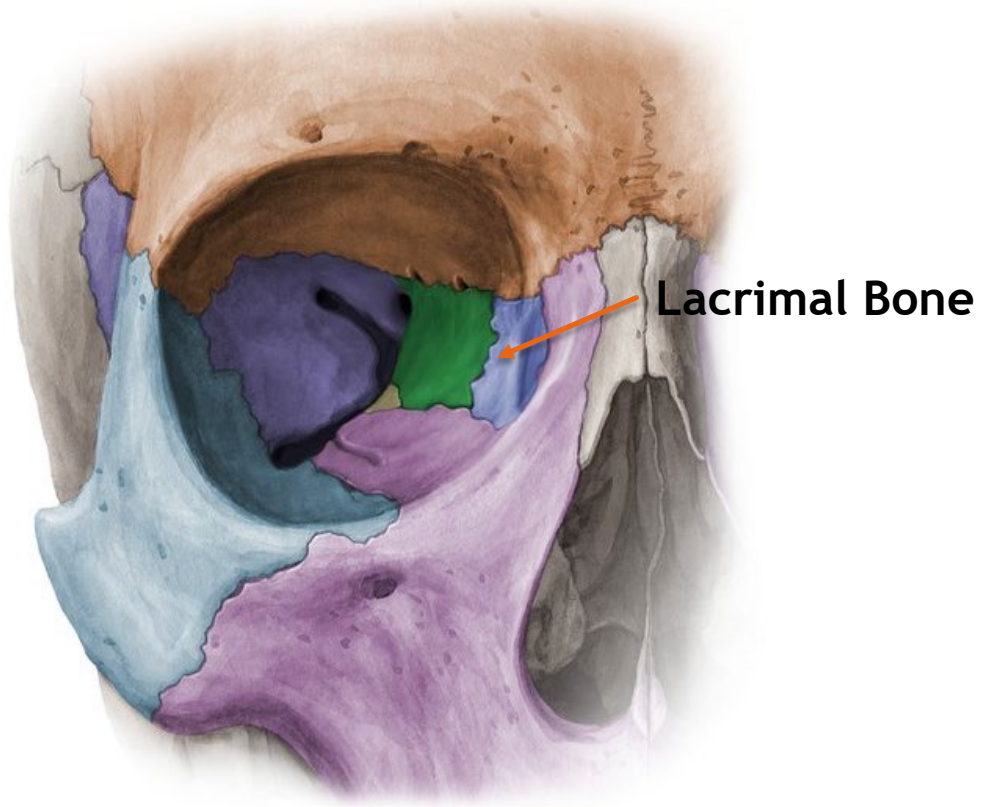
Contact Lens Induced Dry Eye



The Bony Orbital Cavity

The Bony Orbital Cavity

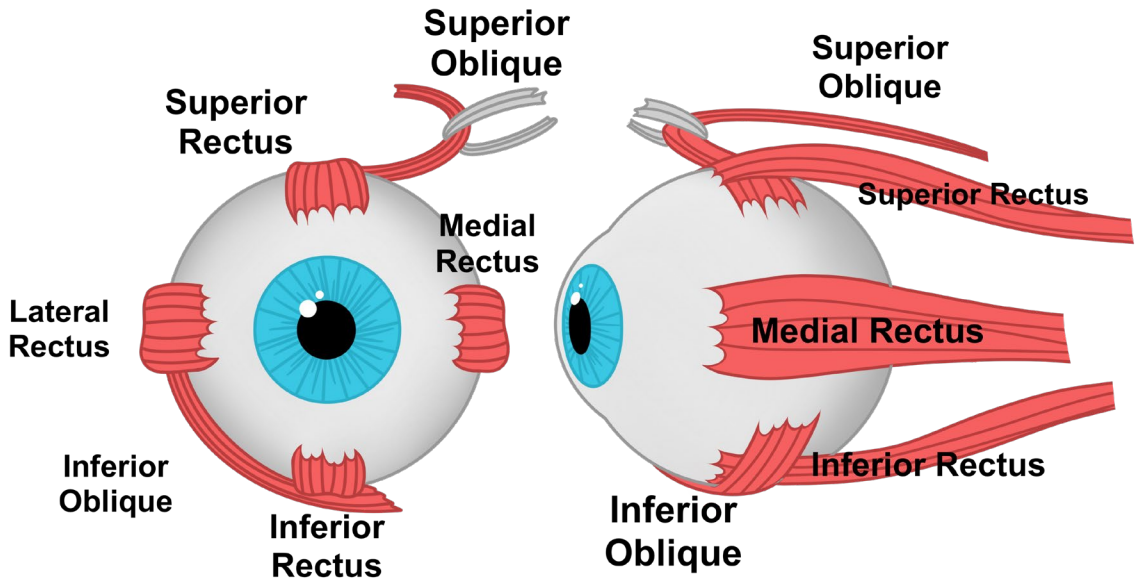
- Maxilla
- Palate
- Frontal
- Sphenoid
- Zygomatic
- Ethmoid
- Lacrimal bone – supports lacrimal



Extraocular Muscles

Extraocular Muscles

- Superior Rectus – Moves eye up
- Superior Oblique – Rolls eye toward the nose
- Medial Rectus – Moves eye toward the nose
- Lateral Rectus – Moves eye toward temple
- Inferior Rectus – Moves eye down
- Inferior Oblique – Rolls eye toward the temple



Muscle Placement for Right Eye

Ocular movements

- Abduction – eye move temporally
- Adduction – eye moves nasally
- Elevation – eye moves up
- Depression – eye moves down
- Intorsion – eye rotates toward nose
- Extorsion – eye rotates toward temple
- Convergence – both eyes move nasally
- Divergence – both eyes move temporally

Exophthalmos/Proptosis

- Bulging that develops slowly in both eyes suggests Graves' disease.
- Bulging in only one eye that develops over a few days may be due to bleeding in the eye socket, or infection or inflammation of the eye socket.
- Bulging that develops slowly in one eye may be due to a tumor in the eye socket.
- Rapid bulging in both may be hypertension in a short time period

Exophthalmos and Contact Lenses

Complications

- Poor lid interaction
- Lens decentration
  - Down and Out with equal retraction or with increased inferior retraction
  - Up with increased superior retraction
- Severe dry eye
- Bacterial or viral keratitis
- Corneal ulcer

Treatments

- Scleral contacts
- Dry eye ointment at night
- Lubricating drops during the day
- Conscientious hand hygiene
- Hydrogen Peroxide based care systems
- Cool compresses
- Protective eyewear

While the globe is often the focus of contact lens fitters, the extraocular structures are just as important as the corneal surface when it comes to contact lens success.