Ocular Dissection

Introduction & Safety Guidelines

This course is presented in partnership with the United Opticians Association and its member schools. We are excited to bring this hands-on anatomical experience to you.

At the conclusion of this course, you will be asked to provide feedback. Please take a few moments to let us know what we did well and how we can continue to improve. Our goal is to help you understand the structures of the eye in a safe, engaging, educational environment.Please be aware that this is a hands-on anatomical lab involving sharp instruments and biological tissue. Professional conduct, controlled movements, and full attention are required at all times.

Your safety and the safety of those around you depend on discipline, awareness, and respect for the instruments and specimen.

We have several formal educators serving as co-instructors during this session. If you are uncertain about a step, need clarification, or require assistance, please ask for guidance immediately.

If you feel lightheaded, uncomfortable, or unsure at any point, stop immediately and notify an instructor.

Complete the statements below before beginning the lab.

1. *Always wear_____ during the dissection.*
2. *When using a scalpel or scissors, always cut _____ from yourself and others.*
3. *Biological tissue and disposable materials must be placed in the designated _____ container.*
4. *Hands should remain clear of the blade path, and instruments should always be passed _____.*
5. *If a participant feels lightheaded or uncomfortable during the lab, they should immediately _____ and notify the instructor.*

- *Gloves*
- *Away*
- *Biohazard*
- *Handle-first*
- *Step back*
- *Stop immediately*
- *Designated waste*
- *Pocket*
- *Toward*
- *Snack table*
- *Laugh it off*
- *Wave it dramatically*
- *Continue bravely*

Ocular Dissection

Adipose Tissue

What Is Adipose Tissue?

- *Adipose tissue is connective tissue composed primarily of fat cells that surround and cushion the globe within the orbit.*
- *Although it is not part of the globe itself, it plays an essential protective role in ocular function.*

Primary Functions

- *Cushions the globe against impact*
- *Absorbs shock during trauma*
- *Insulates surrounding structures*
- *Allows smooth movement of the globe within the orbit*

Clinical Connections

- *"My eyes look like they are bulging."*
  → May relate to increased orbital tissue in thyroid eye disease.

- *"My eye was hit but my vision seems okay."*
  → Orbital fat provides cushioning during trauma.

- *"My eyelids feel swollen or puffy."*
  → May relate to orbital inflammation or swelling.

Dissection Tips

- *Use scissors and to gently remove the surrounding fat.*
- *Avoid puncturing the sclera.*
- *Notice the muscles*
- *Identify the optic nerve early to confirm posterior orientation.*
- *Take your time*

Ocular Dissection

Adipose Tissue

1. *What color best describes the adipose tissue you removed?*
2. *How would you describe the texture (soft, lobulated, fibrous, slippery)*
3. *Were you able to identify extraocular muscle attachments?*
4. *Were you able to identify the optic nerve?*

_____

Complete the statements below using the word bank.

1. *Adipose tissue functions primarily to _____ the globe.*
2. *The fat surrounding the eye is located within the _____.*
3. *Increased orbital fat volume is commonly associated with _____ eye disease.*
4. *Orbital fat helps protect the globe during _____.*
5. *Adipose tissue is removed before deeper dissection to improve _____ and control.*
6. *The optic nerve is located at the _____ portion of the globe.*

Word Bank

- *Cushion*
- *Orbit*
- *Thyroid*
- *Trauma*
- *Visibility*
- *Posterior*
- *Cornea*
- *Retina*
- *Accommodation*
- *Snack Layer*
- *Macula*

Ocular Dissection

Extraocular Muscles

What Are the Extraocular Muscles?

- *The extraocular muscles are responsible for controlled movement of the globe. They attach to the sclera and allow coordinated ocular movement in all directions.*

- *There are six extraocular muscles:*
    - *Superior Rectus*
    - *Inferior Rectus*
    - *Medial Rectus*
    - *Lateral Rectus*
    - *Superior Oblique*
    - *Inferior Oblique*

Primary Functions

- *Control ocular movement in all directions*
- *Maintain binocular alignment*
- *Allow smooth tracking and fixation*
- *Stabilize gaze during head movement*

Clinical Connections (What Opticians May Hear)

- *"My eyes don't line up."*
  → Possible strabismus
- *"I see double."*
  → Diplopia
- *"My eye turns inward or outward."*
  → Muscle imbalance
- *Sixth nerve palsy*
  → Lateral rectus dysfunction

Dissection Tips

1. *After adipose removal, identify thick fibrous bands attaching to the sclera.*
2. *You may not see all six clearly in a cow eye — that is normal.*
3. *Focus on clearly identifying at least one rectus muscle insertion.*
4. *Note that muscles attach to the sclera, not the cornea.*

Ocular Dissection

Extraocular Muscles

- *Were you able to identify at least one muscle insertion on the sclera? If so, which one?*
- *How does the texture of muscle attachments differ from adipose tissue?*
- *Why are muscle insertions located on the sclera rather than the cornea?*
- *If the lateral rectus muscle is weak, in which direction would the eye drift?*
- *Why is coordinated extraocular muscle function essential for clear, single binocular vision?*

_____

Complete the statements below using the word bank.

1. *The extraocular muscles attach to the _____.*
2. *The muscle responsible for moving the eye outward is the _____ rectus.*
3. *The muscle responsible for moving the eye inward is the _____ rectus.*
4. *Double vision caused by muscle imbalance is called _____.*
5. *Misalignment of the eyes is referred to as _____.*
6. *The muscle primarily responsible for elevating the eye is the _____ rectus.*
7. *The muscle primarily responsible for depressing the eye is the _____ rectus.*

Word Bank

- *Sclera*
- *Lateral*
- *Medial*
- *Superior*
- *Inferior*
- *Diplopia*
- *Strabismus*
- *Retina*
- *Cornea*
- *Accommodation*
- *Macula*

Ocular Dissection

Sclera

What is the sclera?

- *The sclera is the tough, white, fibrous outer layer of the eye.*
- *It maintains the structural integrity of the globe and serves as the attachment site for the extraocular muscles.*
- *It is continuous anteriorly with the cornea at the limbus.*

Primary Functions

- *Protects internal ocular structures*
- *Maintains globe shape*
- *Serves as the attachment site for extraocular muscles*
- *Resists intraocular pressure*

Clinical Connections

- *"• "My eye looks red."*
  → Dilated vessels overlying the sclera (episcleral vessels)
- *"The white of my eye looks yellow."*
  → May indicate a systemic condition
- *"My eye feels sore."*
  → Could involve scleral inflammation (scleritis)

Dissection Tips

- *After adipose removal, observe the white fibrous exterior.*
- *Note the difference in opacity between sclera and cornea.*
- *Palpate gently — the sclera should feel firm.*
- *Identify extraocular muscle insertions attaching to the sclera.*
- *Do not confuse the sclera with the conjunctiva (the thin membrane covering it).*

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Sclera

1. *How does the sclera compare in thickness to the cornea?*
2. *Is the sclera transparent or opaque? Why is that important?*
3. *Can you identify where the extraocular muscles attach on the sclera?*
4. *Why must the sclera remain strong under intraocular pressure?*
5. *Where does the sclera transition into the cornea (what is this junction called)?*

_____

Complete the statements using the word bank.

1. *The sclera provides _____ to the globe.*
2. *Extraocular muscles attach to the _____.*
3. *The junction between sclera and cornea is called the _____.*
4. *Inflammation of the sclera is known as _____.*
5. *The sclera must resist _____ pressure.*

Word Bank

- *Protection*
- *Sclera*
- *Limbus*
- *Scleritis*
- *Intraocular*
- *Retina*
- *Macula*
- *Cornea*
- *Accommodation*

Ocular Dissection

Cornea

What Is the Cornea?

- *The cornea is the transparent anterior portion of the fibrous (outer) tunic of the eye.*
- *It provides approximately 43 diopters of refractive power.*
- *It must remain clear, smooth, and properly hydrated to maintain optical clarity.*

Primary Functions

- *Primary refractive surface of the eye*
- *Protects the anterior chamber*
- *Allows transmission of light*
- *Maintains optical clarity*

Clinical Connections

- *""I see glare or halos at night."*
  → Corneal irregularity or edema
- *"I scratched my eye."*
  → Corneal abrasion
- *Progressive thinning*
  → Keratoconus
- *Endothelial failure*
  → Fuchs' dystrophy

Dissection Tips

- *Identify the limbus before making any incision.*
- *Make a careful circumferential incision along the limbal border.*
- *Apply steady, controlled pressure.*
- *Observe the anterior chamber immediately after removal.*
- *Compare central thickness to peripheral thickness.*

Ocular Dissection

Cornea

1. *Was the cornea clear or cloudy?*
2. *If cloudy, which corneal layer may no longer be functioning properly?*
3. *How does the central thickness compare to the periphery?*
4. *What fluid becomes visible in the anterior chamber after corneal removal?*
5. *Why is corneal transparency essential for accurate refraction?*

_____

Complete the statements using the word bank.

1. *The cornea provides approximately _____ diopters of power.*
2. *The innermost corneal layer responsible for maintaining corneal dehydration is the _____.*
3. *Progressive thinning of the cornea is called _____.*
4. *Inflammation of the cornea is called _____.*
5. *A painful scratch on the cornea is a _____.*

Word Bank

- *43*
- *Endothelium*
- *Keratoconus*
- *Keratitis*
- *Corneal abrasion*
- *Retina*
- *Sclera*
- *Macula*

Ocular Dissection

Iris

What is the Iris?

- *The iris is the colored portion of the eye that regulates light entry by adjusting pupil size.*
- *It functions like the aperture of a camera.*

Primary Functions

- *Regulates the amount of light entering the eye*
- *Contributes to depth of focus*
- *Adjusts pupil diameter*

Clinical Connections

- *"My pupils are uneven."*
  → Anisocoria
- *"My pupils don't react to light."*
  → Possible neurological involvement
- *"My eye is painful and light sensitive."*
  → Iritis

Dissection Tips

- *After removing the cornea, locate the colored circular structure surrounding the pupil — this is the iris.*
- *Gently lift the edge of the iris using forceps to observe its thin, flexible structure.*
- *Note that the iris sits anterior to the lens and is continuous with the ciliary body at its outer margin.*
- *Avoid tearing aggressively — the iris is delicate and easily damaged during manipulation.*
- *Observe the relationship between the iris and the anterior chamber before proceeding deeper.*
- *Identify the pupil as the central opening — it is not a separate structure, but an aperture within the iris.*

Ocular Dissection

Iris

1. *Describe the color and texture of the iris.*
2. *What structure lies at the center of the iris?*
3. *Does the iris appear thin or thick? How would you describe its flexibility?*
4. *Why must pupil size adjust to lighting conditions?*
5. *What symptoms might inflammation of the iris cause?*

_____

Complete the statements using the word bank.

1. *The iris controls the size of the _____.*
2. *Unequal pupil size is _____.*
3. *Inflammation of the iris is _____.*
4. *The iris functions like a camera _____.*

Word Bank

- *Pupil*
- *Anisocoria*
- *Iritis*
- *Aperture*
- *Retina*
- *Cornea*

Ciliary Body

What Is the Ciliary Body?

- The ciliary body is part of the middle tunic (uvea) located behind the iris.
- It connects to the lens via zonular fibers (suspensory ligaments) and produces aqueous humor.

Primary Functions

- Controls accommodation
- Produces aqueous humor
- Anchors the lens via zonular fibers
- When the ciliary muscle contracts, zonular tension decreases and the lens becomes thicker.
- When the ciliary muscle relaxes, zonular tension increases and the lens flattens.

Dissection Tips

- After removing the cornea and iris, locate the ridged tissue just posterior to the iris.
- Identify the ciliary processes.
- Note its position relative to the lens.
- Observe attachment fibers (zonules) if visible.
- Maintain orientation before removing the lens.

Ocular Dissection

Ciliary Body

1. *Describe the appearance of the ciliary body.*
2. *Where is the ciliary body located relative to the iris and lens?*
3. *Were you able to identify the zonular fibers?*
4. *Why must aqueous humor production be balanced with drainage?*
5. *How does contraction of the ciliary muscle affect lens shape?*

_____

Complete the statements using the word bank.

1. *The ciliary body produces _____ humor.*
2. *The fibers attaching the lens are called _____.*
3. *Loss of accommodation with age is _____.*
4. *Increased intraocular pressure may lead to _____.*
5. *The ciliary body is part of the _____ (uveal) tunic.*

Word Bank

- *Aqueous*
- *Zonules*
- *Presbyopia*
- *Glaucoma*
- *Middle*
- *Retina*
- *Sclera*
- *Muscle*

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Crystalline Lens

What Is the Crystalline Lens?

- *The crystalline lens is a transparent, biconvex structure located posterior to the iris that fine-tunes focus by directing light onto the retina.*

Primary Functions

- *Fine-tunes focus onto the retina*
- *Changes shape during accommodation*
- *Transmits light with minimal distortion*

Clinical Connections

- *"My vision is cloudy."*

→ Cataract

- *"I need reading glasses now."*

→ Presbyopia

- *After cataract surgery*

→ Intraocular lens (IOL)

Dissection Tips

- *Gently separate the lens from its zonular attachments.*
- *Remove carefully without tearing surrounding tissue.*
- *Hold the lens up to light and observe its clarity.*
- *Compare its firmness to that of the cornea.*

Ocular Dissection

Crystalline Lens

1. *Is the lens clear or opaque?*
2. *Describe its shape.*
3. *Does it feel firm or flexible? How might this change with age?*
4. *Why does the lens become less flexible with age?*
5. *How would clouding of the lens affect vision quality?*

_____

Complete the statements using the word bank.

1. *The lens focuses light onto the _____.*
2. *Clouding of the lens is called a _____.*
3. *Age-related stiffening of the lens results in _____.*
4. *The artificial lens implanted after surgery is an _____ lens.*
5. *The lens changes shape during _____.*

Word Bank

- *Retina*
- *Cataract*
- *Presbyopia*
- *Intraocular*
- *Accommodation*
- *Cornea*
- *Macula*
- *Capsule*

Vitreous Humor

What is it?

- *The vitreous humor is a clear, gel-like substance that fills the posterior cavity (vitreous chamber) and helps support the retina.*

Primary Functions

- *Maintains globe shape*
- *Supports and stabilizes the retina*
- *Allows transmission of light to the retinaSupports retina*

Clinical Connections

- *"I see floaters."*
  → Vitreous changes
- *"I see flashes of light."*
  → Retinal detachment risk

Dissection Tips – Vitreous Humor

- *After removing the lens, gently widen the opening using scissors to access the posterior cavity.*
- *Use the blunt end of the scalpel or scissors to gently lift the vitreous — avoid stabbing motions.*
- *Expect a clear, gel-like consistency. Do not mistake it for "empty space."*
- *Avoid pulling suddenly. Sudden traction may tear the retina.*
- *Remove small portions at a time to maintain orientation.*
- *Observe how the vitreous attaches to the retina before disturbing large areas.*
- *Once partially removed, identify the underlying retina before proceeding deeper.*
- *After removing the vitreous (and retina if detached), the globe may be gently inverted to expose the underlying choroid.*
- *Expect to see a dark, vascular layer and in bovine specimens, a reflective tapetum lucidum.*

Ocular Dissection

Vitreous Humor

1. *Describe the texture of the vitreous.*
2. *Is it firmly attached to the retina?*
3. *Why must the vitreous remain clear?*
4. *What happens when the vitreous shrinks with age?*
5. *Why are flashes a red flag symptom?*

_____

Complete the statements using the word bank.

1. *The vitreous fills the _____ chamber.*
2. *Age-related separation is called _____ detachment.*
3. *Floaters originate in the _____.*
4. *A tear may lead to _____ detachment.*
5. *The vitreous supports the _____.*

Word Bank

- *Posterior*
- *Posterior vitreous*
- *Vitreous*
- *Retinal*
- *Retina*
- *Cornea*
- *Macula*
- *Gel*

Choroid

What Is the Choroid?

- *The choroid is the vascular layer of the middle tunic (uvea) located between the sclera and the retina.*
- *It supplies oxygen and nutrients to the outer retina.*
- *In bovine eyes, it contains a reflective layer called the tapetum lucidum.*

Primary Functions

- *Provides blood supply to the outer retina*
- *Absorbs excess light to prevent scatter*
- *Regulates ocular temperature*
- *Supports retinal metabolism*

Clinical Connections

- *"I see a shadow or curtain."*
  → Possible retinal detachment (loss of support from choroid)

- *Inflammation of the choroid*
  → Choroiditis

- *Poor blood supply*
  → Can affect retinal health

Dissection Tips – Choroid

- *After removing vitreous and retina, gently invert the globe to expose the inner surface of the sclera.*
- *Identify the dark, vascular layer lining the sclera — this is the choroid.*
- *In bovine specimens, locate the shiny, iridescent tapetum lucidum.*
- *Note the difference between:White sclera (outer layer)*
- *Dark vascular choroid (middle layer)*
- *Thin retina (inner layer)*
- *Do not confuse the choroid with retina — the retina is thinner and more delicate.*

Ocular Dissection

Observation Questions

1. *Describe the color and texture of the choroid.*
2. *Where is the choroid located relative to the sclera and retina?*
3. *In the bovine eye, do you see a reflective area? What is it called?*
4. *Why is the choroid highly vascular?*
5. *How might damage to the choroid affect the retina?*

_____

Complete the statements using the word bank.

1. *The choroid is part of the _____ tunic.*
2. *The choroid lies between the sclera and the _____.*
3. *The choroid provides _____ supply to the outer retina.*
4. *The reflective layer seen in cows is called the _____ lucidum.*
5. *Inflammation of the choroid is called _____.*

Word Bank

- *Retina*
- *Choroiditis*
- *Neural*
- *Vascular*
- *Tapetum*
- *Capsule*
- *Middle*
- *Sclera*

Ocular Dissection

Retina

What is it?

- The retina is the neural layer that converts light into electrical signals.
- It has multiple layers
    - 10 layers
        - Retinal Pigment Epithelium (RPE)
        - Photoreceptor Layer (Rods and Cones)
        - External Limiting Membrane
        - Outer Nuclear Layer
        - Outer Plexiform Layer
        - Inner Nuclear Layer
        - Inner Plexiform Layer
        - Ganglion Cell Layer
        - Nerve Fiber Layer
        - Inner Limiting Membrane

Primary Functions

- Phototransduction
- Color vision (cones)
- Peripheral/night vision (rods)

Clinical Connections

- "My central vision is blurry."
  → Macular degeneration
- "I lost part of my vision."
  → Retinal detachment
- Diabetes-related changes

Ocular Dissection

Retina

1. *Describe the appearance of the retina.*
2. *Can you identify the macula?*
3. *Where is the optic disc located?*
4. *Why is the macula critical for fine detail?*
5. *Why would detachment cause vision loss?*

_____

Complete the statements using the word bank.

1. *The retina converts light into _____ signals.*
2. *Cells responsible for night vision are _____.*
3. *The area of sharpest vision is the _____.*
4. *Separation of the retina is called _____ detachment.*
5. *The optic nerve exits at the _____.*

Word Bank

- *Electrical*
- *Rods*
- *Macula*
- *Retinal*
- *Optic disc*
- *Cornea*
- *Sclera*

Ocular Dissection

Final Reflection & Clinical Integration

1. *What structure surprised you the most during the dissection, and why?*
2. *Which anatomical relationship became clearer to you after physically seeing it?*
3. *How did handling the vitreous or retina change your understanding of retinal detachment?*
4. *What structure felt more delicate than you expected?*
5. *Which patient complaint now makes more sense after completing this lab?*
6. *How does the physical thickness of the sclera compare to your previous mental image of it?*
7. *What part of the dissection required the most controlled technique?*
8. *How does understanding orbital fat change the way you think about trauma or thyroid eye disease?*
9. *Which structure do you think is most vulnerable to long-term disease progression, and why?*
10. *If you were explaining one key anatomical concept from today to a patient, what would it be?*

Ocular Dissection

Thank you for participating in this hands-on ocular dissection workshop presented in partnership with the United Opticians Association and its member schools.

Today, you moved beyond diagrams and models and examined the structures of the eye directly. By identifying and exploring each anatomical component, you strengthened your understanding of how ocular anatomy relates to vision, lens design, and patient care.

Throughout this session, you:

- *Identified the external and internal structures of the eye*
- *Examined the three tunics and their functions*
- *Observed how light travels through ocular media*
- *Connected anatomy to clinical and dispensing applications*

Our goal was not only to review anatomy, but to reinforce its relevance to daily opticianry practice.

We encourage you to continue reviewing the structures and terminology introduced today. The more confidently you understand ocular anatomy, the more effectively you can educate patients and support clinical decision-making.

At the conclusion of this session, please take a few moments to provide feedback. Your input helps us refine and strengthen future workshops.

The remaining pages of this workbook are designed to support your independent review and continued study.

We hope you found this session engaging, practical, and professionally valuable.

Thank you for your participation and commitment to advancing your knowledge.

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UNITED OPTICIANS ASSOCIATION