VET 433A Anterior Uvea

Uveal Tract

- Iris
  - Anterior Border
    - Fibroblasts
    - Melanocytes
    - No continuous epithelial layer
  - Stroma
    - Blood Vessels
    - Collagen fibers
    - Fibroblasts
    - Melanocytes
  - Iris Muscles
    - Sphincter muscle- CN III (wants to constrict with inflammation) *stronger
    - Dilator muscle - Sympathetic Innervation
  - Posterior epithelium
    - Densely melanotic: iris atrophy, posterior synechia
- Ciliary Body
  - Muscles
    - Parasympathetic
    - CN III
      Spasms>Pain
    - Accommodation "Magic Eye" important in some species, less in others (horses)
  - Ciliary processes (pars plicata)
    - Lens zonules insert within all the plicated tissues, lots of surface area
      - Pigmented epithelium
      - Non-pigmented epithelium: Makes aqueous humor!

Blood-Eye Barriers

- Endothelial and epithelial tight-junctions with various degrees of leakiness that prevent protein and molecule movement
- **Blood Aqueous Barrier** (BAB)- Anterior
  - Junction between NPE cells, endothelial cells of iris/CB vessels

Epithelial Portion	Endothelial Portion
Tight junctions of non-pigmented epithelium of the ciliary body	Iris vessels – non-fenestrated capillaries Ciliary body vessels- located in stroma, fenestrated and leak plasma

- **Blood Retinal Barrier** (BRB)- Posterior

- Junction between RPE, endothelial cells of retinal capillaries

Epithelial Portion	Endothelial Portion
Tight junctions of retinal pigmented epithelial cells	Retinal capillary endothelium (non-fenestrated) Choroidal capillaries (highly permeable)

- Choroid

Function of the Anterior Uvea

- Regulate light entry (pupil size)
- BAB
- Accommodation (refraction)
- Produce aqueous humor (nutrition)

Iridocorneal angle: Inside of cornea meets peripheral part of the iris

- When this is closed, we get pressure buildup inside the eye- glaucoma etc.
- There is never too much aqueous being produced, it is always a drainage issue!
- 95% of the time the ICA is the issue

General Signs of Disease

- Change in appearance of the iris
- Change in pupil size
- Change in aqueous
- Secondary effects on the cornea
- Secondary effects on the lens
- Secondary effects on the globe size

Uveitis

- Inflammation of the uveal tract
  - Most common uveal disease
  - Happens in all species
  - Recurrence common
  - Many causes basically anything that can cause ocular or systemic inflammation
  - Most common ophthalmic manifestation of systemic disease

VET 433A Anterior Uvea

- Terminology
  - Anterior Uveitis: Iris and ciliary body
  - Posterior Uveitis: Choroid
    - Chorioretinitis: Inflammation of choroid and retina (rare that the retina is not also involved
  - Panuveitis: Iris + Ciliary Body + Choroid

Pathogenesis of Anterior Uveitis

1. Damage to anterior uvea
2. Release of inflammatory mediators
3. Increase vascular permeability
4. Breakdown BAB
5. Leakage protein, fibrin, RBC cells into aqueous

Clinical Signs (Acute)

- Blepharospasm
- Epiphora
- Enophthalmos
- Conjunctival hyperemia
- Episcleral injection
- Decreased IOP initially
- Corneal edema
- Corneal vascularization
- **Aqueous flare* Hallmark Sign!**
- Miosis*
- Change in iris color – Blue eyes turn yellow/green
- Hypopyon* does not mean infection, just WBC in eye
- Hyphemia* blood in eye
- Keratic precipitates* (inflammatory cells in corneal endothelium)
- Swollen, inflamed iris*
- Rubiosis iridis*

Clinical Signs (Chronic)

- Corneal scarring
- Anterior/posterior synechia
- Iridal scarring
- Iris bombé
- Cataracts -uveitis is the main cause of cataracts in horses

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- Secondary glaucoma

Causes of Uveitis

- #1 Cause is idiopathic
- Primary ocular disease
    - Corneal ulcer
        - Reflex uveitis
    - Lens-induced uveitis
        - Cataract *can come first or second
        - Lens capsule rupture
- Trauma "eye concussion"
- Ocular manifestations of systemic disease DAMNIT scheme
    - Infectious (viral, bacterial, fungal, etc.)
    - Metabolic (systemic hypertension)
    - Immune-mediated (VKH) uveodermatologic syndrome
    - Neoplasia

Reflex Uveitis

- Any stimulation of corneal nerves > reflex stimulation of CN V nerve branch to anterior uveal tract
- Corneal ulcer> stimulation of CN V > reflex uveitis with painful ciliary body muscle spasm
    - Can relieve with cycloplegic drugs such as atropine

More severe the keratitis = more severe the uveitis *usually

Lens-Induced Uveitis

- Lens
    - Immune-privileged structure
    - Formed BEFORE immune system
    - Involved by capsule
    - Lens fibers are non-self to the immune system
    - Phacolytic uveitis
    - Eye does not like the lens fibers and mounts an immune-mediated response

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How can uveitis cause glaucoma? 3 Mechanisms

1. Obstruction of ICA
    - Inflammatory debris
    - Proteins
    - WBCs RBCs (huge)
    - Neoplasia
2. Pre-Iridal Fibrovascular Membrane and Glaucoma PIFVM *chronic
    - Membrane that grows in front of the iris, fine membrane but wreaks havoc on the plumbing in the eye and causes major issues
3. Iris Bombé + posterior synechia (pupil margin) and Anterior synechia (peripheral) *chronic
    - Iris comes forward and the anterior chamber is shallow peripherally
    - Can't do much once this has developed

Diagnosis of Anterior Uveitis

- Diagnosis
    - History-Vaccination/Travel
    - Ophthalmic Exam
- Work-up
    - Physical Exam
    - Minimum database
        - CBC/CHEM/UA/4Dx
        - Imaging (thoracic rads, abdo us)
        - Blood pressure
        - Infectious dz panel
- Goals of treating
    - Prevent complications of uveitis
    - Reduce/eliminate intraocular inflammation
    - Stabilize and restore the blood-aqueous barrier
    - If eye is blind and unresponsive to therapy > surgical removal
        - Submit globe intact for analysis to gain more info on the potential pathogenesis

Treatment

*Stain eye first to check for an ulcer, then check the IOP

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- Topical anti-inflammatories
  - Corticosteroids
    - Prednisolone acetate, dexamethasone
  - NSAIDs
    - Diclofenac, ketorolac
- Systemic anti-inflammatories
  - Corticosteroids
    - Prednisone/prednisolone
  - NSAIDS
    - Carprofen / Meloxicam / Robenacoxib

<u>*Can give TOPICAL steroids and NSAIDS concurrently NOT systemically</u>

- Topical atropine
  - Parasympatholytic
  - Stabilize blood-aqueous barrier
    - Blocks acetylcholine *which dilates blood vessels)
  - Cycloplegic
    - Stops ciliary spasms *pain
  - Mydriatic
    - Prevents synechia
    - <u>NEED TO CHECK IOP FIRST</u>
      - Dilating pupil pushes iris tissue to periphery and this can plug the ICA
      - Careful with eyes with hyphemia!
  - **Treat Underlying Cause!**

<u>Lipemic Aqueous / Lipid-laden aqueous</u>

Lipid in aqueous humor
Milky-white appearance
Fast onset
Hyperlipidemia (triglycerides and cholesterol)
Acute, temporary blindness
May lead to glaucoma
Treat as regular uveitis + cause

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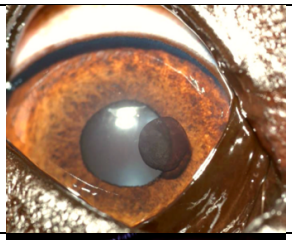
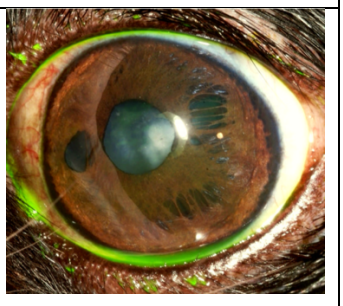
Uveodermatologic Syndrome (VKH)

Vogt-Koyanagi-Harada Syndrome (VKH-like)
Nordic breeds (akita, husky, Samoyed, malamute) but can be other breeds!
Immune-mediated auto-destruction of melanocytes
Eye-skin condition- eyes often precede dermatological dz but not always
Uvea > uveitis > retinal detachment > Glaucoma > Blindness
Skin – Vitiligo
-Mucocutaneous junctions (eyelids, lips) nasal planum
Can be generalized but this is uncommon

Pigmentary Uveitis

AKA Golden Retriever Uveitis/Pigmentary and Cystic Glaucoma
Golden Retrievers, Great Danes, American Bulldogs
Unknown Cause- Inherited/genetic
Clinical signs include classic signs of uveitis and glaucoma

Congenital Uveal Abnormalities

<u>Uveal Cysts</u> Usually not pathogenic but can increase pressures if there are too many or if they block vision Idiopathic or secondary to inflammation Usually just monitor	
<u>Persistent Pupillary Membrane PPM</u> Developmental defect Not progressive Normal developmental structure Normally regresses later Don't breed these dogs but not extremely detrimental to vision Originate at collarette of iris	
<u>Iris Atrophy</u> Normal aging change (10-15yrs) Can be very prominent in dogs Scalloping at pupil margin Moth eaten appearance to iris stroma Slow, incomplete PLRs Anisocoria Discordia Don't treat, just an aging change	

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Uveal Neoplasia

- Primary uveal neoplasia
    - Melanoma/melanocytoma
    - Ciliary body adenoma
- Secondary uveal neoplasia
    - Lymphoma **can look like uveitis without any other signs of lymphoma (1st sign)*
    - Many others
- Dogs and horses: Primary are more common
- Cats: Secondary are more common