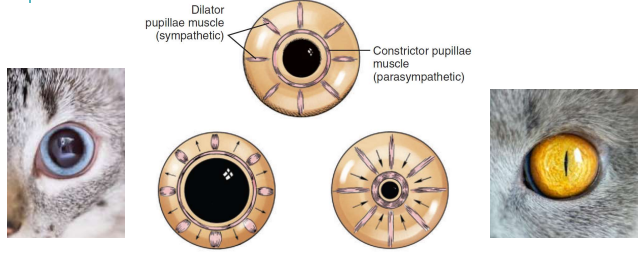




**WE DIDN'T START THE FIRE!**

An overview of uveitis and select case presentations  
 Nicole Langer, DVM  
 Ophthalmology Specialty Intern  
 VCA NWVS

### IRIS



Dilator pupillae muscle (sympathetic)  
 Constrictor pupillae muscle (parasympathetic)

DILATION (mydriasis)      CONSTRICTION (miosis)

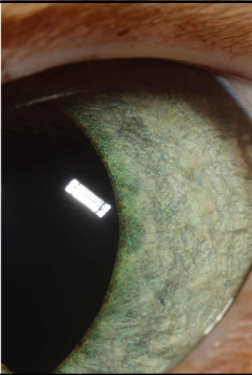
### OVERVIEW

Anatomy and function of uveal tissue

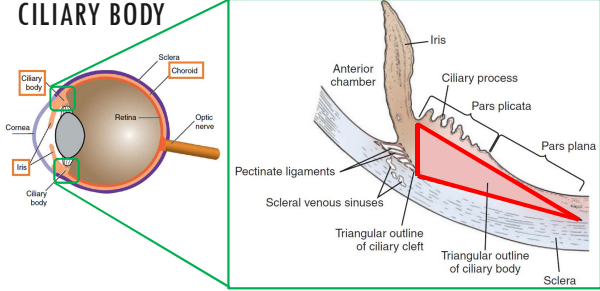
Blood-ocular barrier and role in the ocular immune response

Diagnosis, clinical signs, complications, and treatment of uveitis

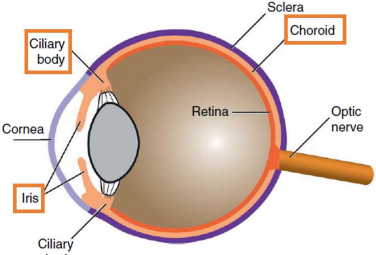
Review specific case presentations of uveitis



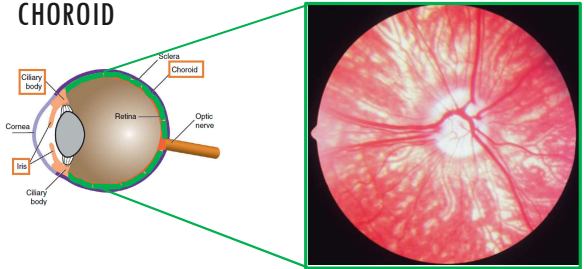
### CILIARY BODY



### ANATOMY AND FUNCTION OF UVEA



### CHOROID

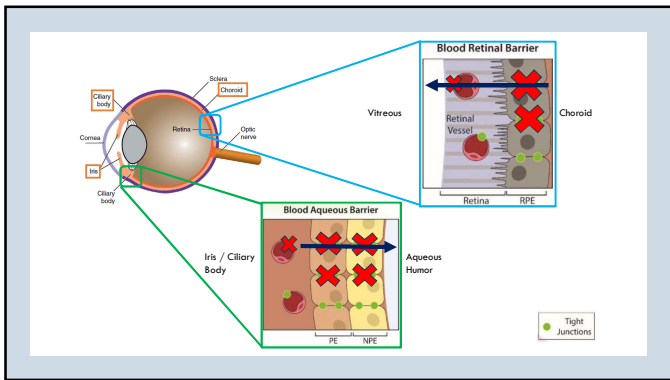


Choroid of subalbinotic dog

## BLOOD-OCULAR BARRIER OCULAR IMMUNE RESPONSE

## CLINICAL SIGNS OF UVEITIS

Non-specific Ocular Pain  
Anterior Uveitis  
Posterior Uveitis and Panuveitis

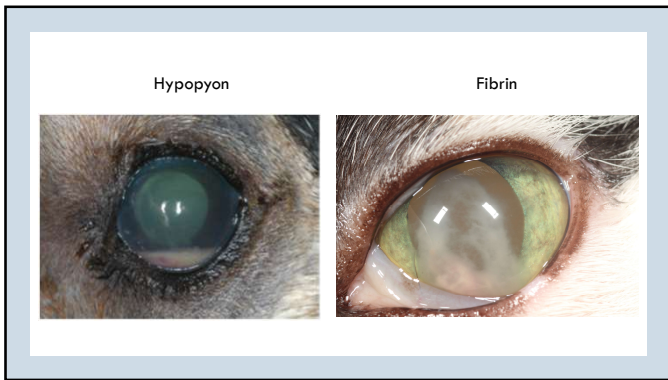
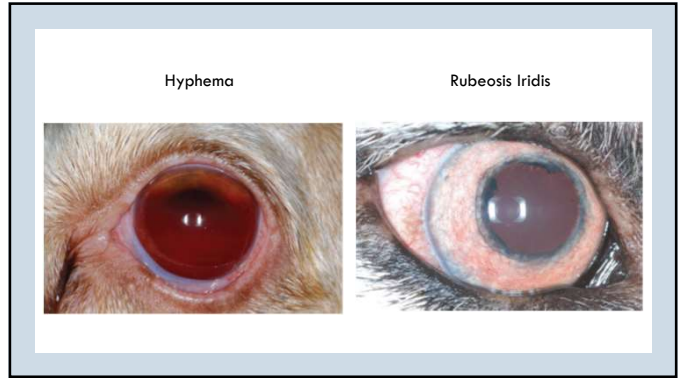
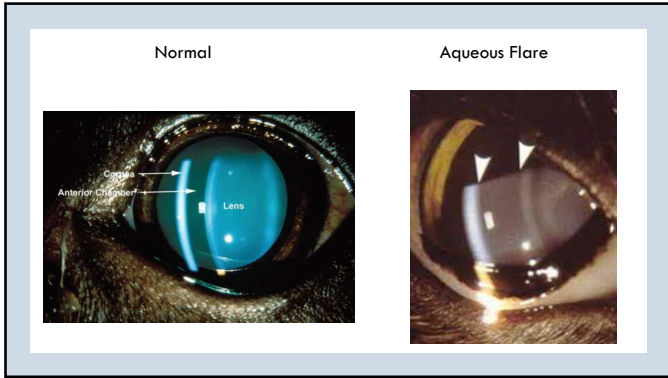


- ### CLINICAL SIGNS OF ANTERIOR UVEITIS
- |  |  |
|--|--|
| <p>Non-specific signs of ocular pain</p> <ul style="list-style-type: none"> <li>• Blepharospasm</li> <li>• Epiphora</li> <li>• Elevated third eyelid</li> <li>• Conjunctival hyperemia</li> <li>• Corneal edema</li> <li>• Miosis</li> </ul> | <p>Signs indicative of uveitis</p> <ul style="list-style-type: none"> <li>• Aqueous Flare</li> <li>• Hypopyon</li> <li>• Fibrin</li> <li>• Keratic precipitates (KPs)</li> <li>• Hyphema</li> <li>• Rubeosis iridis</li> </ul> |
|--|--|

### UVEITIS

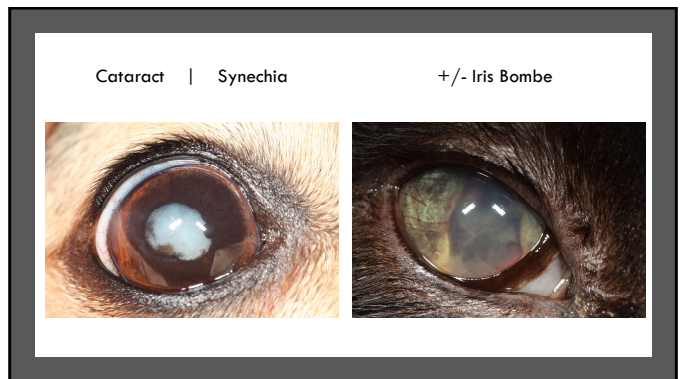
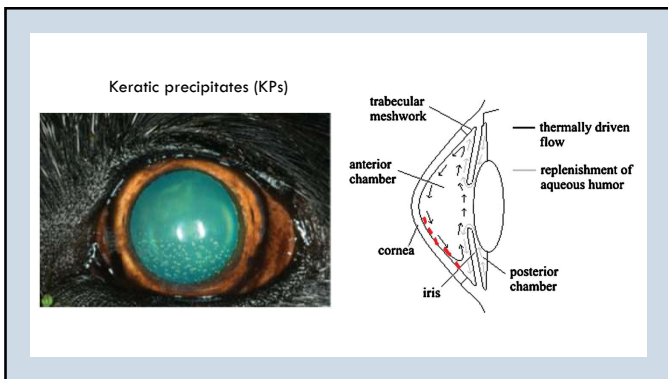
- Anterior Uveitis
- Posterior Uveitis
- Panuveitis

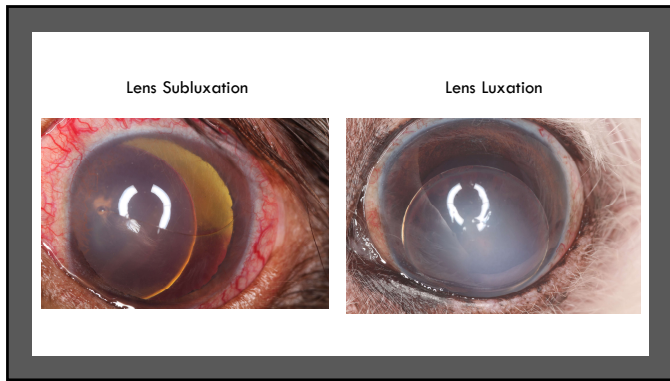
### NON-SPECIFIC SIGNS OF OCULAR PAIN



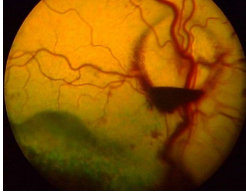
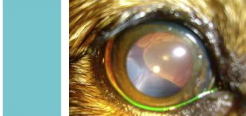
**SEQUELAE TO ANTERIOR UVEITIS**

- Cataract
- Synechia +/- iris bombe
- Lens sublux or luxation
- Phthisis bulbi
- Preiridal fibrovascular membranes (PIFMs)
- Secondary Glaucoma +/- buphthalmos





## POSTERIOR UVEITIS AND PANUVEITIS


**Posterior uveitis:**

- Vision deficits
- Hazy vitreous
- Retinal edema, exudate, or detachment

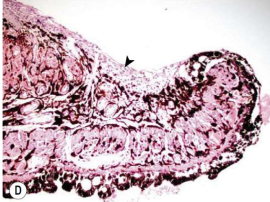
**Panuveitis:**

- Vision deficits
- Retinal edema / detachment

**Phthisis bulbi**



**Preiridal Fibrovascular Membranes (PIFMs)**



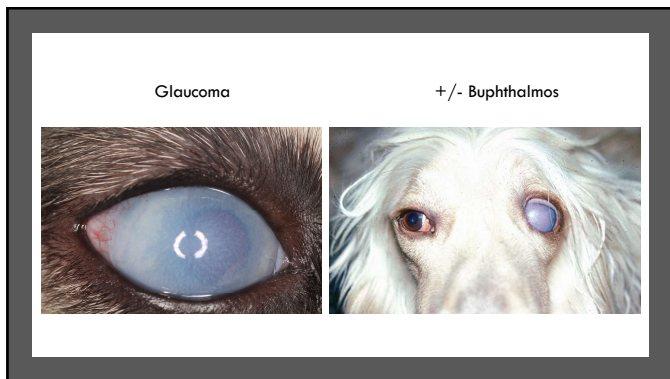
**Table 21.1 Diseases proved or suspected of causing uveitis in the dog.**

	Metabolic
<b>Algal</b>	Diabetic mellitus (particularly diabetic cataract induced uveitis)
<b>Fungal</b>	<i>Aspergillus</i> sp. <i>Blastomyces</i> sp. <i>Coccidioides immitis</i> <i>Cryptosporidium parvum</i> <i>Exophiala</i> sp. <i>Geotrichum</i> sp. <i>Phycomyces</i> sp. <i>Sporothrix</i> sp. <i>Trichosporon</i> sp.
<b>Bacterial</b>	<i>Bordetella pertussis</i> <i>Brucella canis</i> <i>Brucella abortus</i> <i>Brucella melitensis</i> <i>Brucella suis</i> <i>Campylobacter</i> sp. <i>Citrobacter</i> sp. <i>Coccidioides immitis</i> <i>Cryptosporidium parvum</i> <i>Exophiala</i> sp. <i>Geotrichum</i> sp. <i>Phycomyces</i> sp. <i>Sporothrix</i> sp. <i>Trichosporon</i> sp.
<b>Viral</b>	Adenovirus Canine distemper virus Canine herpesvirus-1 Canine parvovirus Canine coronavirus Canine morbillivirus Canine herpesvirus-2 Canine adenovirus-1 Canine adenovirus-2 Canine adenovirus-3 Canine adenovirus-4 Canine adenovirus-5 Canine adenovirus-6 Canine adenovirus-7 Canine adenovirus-8 Canine adenovirus-9 Canine adenovirus-10 Canine adenovirus-11 Canine adenovirus-12 Canine adenovirus-13 Canine adenovirus-14 Canine adenovirus-15 Canine adenovirus-16 Canine adenovirus-17 Canine adenovirus-18 Canine adenovirus-19 Canine adenovirus-20 Canine adenovirus-21 Canine adenovirus-22 Canine adenovirus-23 Canine adenovirus-24 Canine adenovirus-25 Canine adenovirus-26 Canine adenovirus-27 Canine adenovirus-28 Canine adenovirus-29 Canine adenovirus-30 Canine adenovirus-31 Canine adenovirus-32 Canine adenovirus-33 Canine adenovirus-34 Canine adenovirus-35 Canine adenovirus-36 Canine adenovirus-37 Canine adenovirus-38 Canine adenovirus-39 Canine adenovirus-40 Canine adenovirus-41 Canine adenovirus-42 Canine adenovirus-43 Canine adenovirus-44 Canine adenovirus-45 Canine adenovirus-46 Canine adenovirus-47 Canine adenovirus-48 Canine adenovirus-49 Canine adenovirus-50 Canine adenovirus-51 Canine adenovirus-52 Canine adenovirus-53 Canine adenovirus-54 Canine adenovirus-55 Canine adenovirus-56 Canine adenovirus-57 Canine adenovirus-58 Canine adenovirus-59 Canine adenovirus-60 Canine adenovirus-61 Canine adenovirus-62 Canine adenovirus-63 Canine adenovirus-64 Canine adenovirus-65 Canine adenovirus-66 Canine adenovirus-67 Canine adenovirus-68 Canine adenovirus-69 Canine adenovirus-70 Canine adenovirus-71 Canine adenovirus-72 Canine adenovirus-73 Canine adenovirus-74 Canine adenovirus-75 Canine adenovirus-76 Canine adenovirus-77 Canine adenovirus-78 Canine adenovirus-79 Canine adenovirus-80 Canine adenovirus-81 Canine adenovirus-82 Canine adenovirus-83 Canine adenovirus-84 Canine adenovirus-85 Canine adenovirus-86 Canine adenovirus-87 Canine adenovirus-88 Canine adenovirus-89 Canine adenovirus-90 Canine adenovirus-91 Canine adenovirus-92 Canine adenovirus-93 Canine adenovirus-94 Canine adenovirus-95 Canine adenovirus-96 Canine adenovirus-97 Canine adenovirus-98 Canine adenovirus-99 Canine adenovirus-100

**Table 21.2 Potential causes of feline uveitis.**

Exogenous Factors	Infectious	Idiopathic
Traumatic Blunt injury Penetrating wound Ocular surgery	Bacterial <i>Bordetella</i> sp. <i>Campylobacter</i> sp. <i>Citrobacter</i> sp. <i>Coccidioides immitis</i> <i>Cryptosporidium parvum</i> <i>Exophiala</i> sp. <i>Geotrichum</i> sp. <i>Phycomyces</i> sp. <i>Sporothrix</i> sp. <i>Trichosporon</i> sp.	Lymphocytic-plasmacytic uveitis Immune-mediated Lens-induced Pilo-lytic (cataract) Pneumonic (blue tumor) Purulent Retinitis nodosa
Toxic Drug-related Paracetamol/acetaminophen (paracetamol) Phenothiazine (antipsychotic) Fluorethylmercury (fish oil) Ibuprofen (NSAID)	Viral Feline infectious peritonitis Feline leukemia virus Feline immunodeficiency virus Feline coronavirus Feline herpesvirus-1 Feline morbillivirus Feline parvovirus Feline panleukopenia virus Feline reovirus Feline rotavirus Feline coronavirus Feline herpesvirus-2 Feline adenovirus Feline adenovirus-1 Feline adenovirus-2 Feline adenovirus-3 Feline adenovirus-4 Feline adenovirus-5 Feline adenovirus-6 Feline adenovirus-7 Feline adenovirus-8 Feline adenovirus-9 Feline adenovirus-10 Feline adenovirus-11 Feline adenovirus-12 Feline adenovirus-13 Feline adenovirus-14 Feline adenovirus-15 Feline adenovirus-16 Feline adenovirus-17 Feline adenovirus-18 Feline adenovirus-19 Feline adenovirus-20 Feline adenovirus-21 Feline adenovirus-22 Feline adenovirus-23 Feline adenovirus-24 Feline adenovirus-25 Feline adenovirus-26 Feline adenovirus-27 Feline adenovirus-28 Feline adenovirus-29 Feline adenovirus-30 Feline adenovirus-31 Feline adenovirus-32 Feline adenovirus-33 Feline adenovirus-34 Feline adenovirus-35 Feline adenovirus-36 Feline adenovirus-37 Feline adenovirus-38 Feline adenovirus-39 Feline adenovirus-40 Feline adenovirus-41 Feline adenovirus-42 Feline adenovirus-43 Feline adenovirus-44 Feline adenovirus-45 Feline adenovirus-46 Feline adenovirus-47 Feline adenovirus-48 Feline adenovirus-49 Feline adenovirus-50 Feline adenovirus-51 Feline adenovirus-52 Feline adenovirus-53 Feline adenovirus-54 Feline adenovirus-55 Feline adenovirus-56 Feline adenovirus-57 Feline adenovirus-58 Feline adenovirus-59 Feline adenovirus-60 Feline adenovirus-61 Feline adenovirus-62 Feline adenovirus-63 Feline adenovirus-64 Feline adenovirus-65 Feline adenovirus-66 Feline adenovirus-67 Feline adenovirus-68 Feline adenovirus-69 Feline adenovirus-70 Feline adenovirus-71 Feline adenovirus-72 Feline adenovirus-73 Feline adenovirus-74 Feline adenovirus-75 Feline adenovirus-76 Feline adenovirus-77 Feline adenovirus-78 Feline adenovirus-79 Feline adenovirus-80 Feline adenovirus-81 Feline adenovirus-82 Feline adenovirus-83 Feline adenovirus-84 Feline adenovirus-85 Feline adenovirus-86 Feline adenovirus-87 Feline adenovirus-88 Feline adenovirus-89 Feline adenovirus-90 Feline adenovirus-91 Feline adenovirus-92 Feline adenovirus-93 Feline adenovirus-94 Feline adenovirus-95 Feline adenovirus-96 Feline adenovirus-97 Feline adenovirus-98 Feline adenovirus-99 Feline adenovirus-100	Neoplastic Lymphosarcoma Melanoma Other primary intraocular tumors Other metastatic tumors

**Potential Causes of Uveitis**



## COMMON CAUSES OF UVEITIS

Cause	Dog	Cat
<b>Idiopathic / Immune-Mediated</b>	57%	30 – 45%
<b>Neoplasia</b> Primary intraocular tumor Metastatic (lymphoma)	25%	5 – 25%
<b>Infectious</b>	18%	9 – 32%
<b>Inconclusive</b>	-	29 – 39%



## DIAGNOSING UVEITIS

Signalment, history, travel, tick exposure

Ophthalmic exam

Physical exam: Lymph Nodes

Diagnostics

- Tonometry (IOP < 10 mmHg)
- Fluorescein stain
- CBC, Chemistry, UA
- +/- Selected titers or antigen testing
  - Cryptococcus
  - FeLV/FIV; Feline corona virus; Toxoplasma, etc.
- +/- Diagnostic Imaging



## ANTI-INFLAMMATORIES: CORTICOSTEROIDS

Topical

- Prednisolone acetate 1%
- Dexamethasone 0.1%
- Hydrocortisone 1% - wimpy
- Frequency:
  - BID – QID with gradual taper

Systemic

- Contraindicated in most systemic infectious diseases
- Prednisone
  - 1 – 2 mg/kg/day with gradual taper

If corneal ulcer present, do NOT use topical corticosteroid

## THERAPEUTIC OPTIONS FOR ANTERIOR UVEITIS

Goals  
Medical Management  
Surgical Options

## ANTI-INFLAMMATORIES: NSAIDS

Topical

- Diclofenac 0.1%
- Ketorolac 0.5%
- Flurbiprofen 0.03%
- Frequency:
  - BID – QID with gradual taper

Systemic

- Rimadyl®
- Metacam®
- Onsiar®

If corneal ulcer present, do NOT use topical NSAID

## THERAPY

Goals

- Control inflammation
- Address underlying cause if possible
- Improve ocular comfort

Medical Management

- Anti-inflammatories
- Immunosuppressives
- Antimicrobials
- Parasympatholytic Drugs
- +/- Glaucoma Medications

Surgery

- Enucleation vs. Evisceration + ISP
- Intravitreal Cidofovir Injection (dogs only)

## IMMUNOSUPPRESSIVES

Cyclosporine

- GI signs → curb via freezing medication
- Monitoring: Baseline CBC and chemistry; repeat chemistry q 3 – 6 months

Mycophenolate

- GI signs
- Monitoring: Baseline CBC, Chemistry, UA, and UC&S; frequent CBCs when initially starting

Azathioprine

- GI signs, bone marrow suppression, hepatotoxicity, and pancreatitis
- Monitoring: Baseline CBC and chemistry, q 2 weeks x2 months, q 1 – 2 months

## ANTIMICROBIALS

### Topical:

- Corneal ulcerations

### Systemic:

- Treatment of specific systemic diseases
  - Rickettsial disease
  - Fungal infection
- Prophylaxis against infection with corneal perforation

## SURGICAL OPTIONS

### Indications:

- Unable to maintain ocular comfort
- Glaucomatous
- Blind

### Options:

- Enucleation
- Evisceration and Intraocular Prosthesis (IOP)
- Intravitreal Cidofovir Injection (dogs only)
  - *\*only manages IOP, must continue anti-inflammatory therapy\**



## PARASYMPATHOLYTIC AGENT - ATROPINE

Cycloplegia

Mydriasis

Frequency: use to effect (QD or QOD)

**\*\* Potential to precipitate acute glaucoma \*\***



## CASE PRESENTATION OF UVEITIS

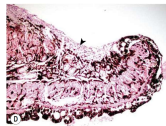
Pigmentary Uveitis

## +/- GLAUCOMA MEDICATIONS

Indicated with IOP high normal with obvious flare or high IOP

Short term vs long-term

- Clogged drainage angle from inflammatory cells vs PIFMs



Options

- Dorzolamide +/- Timolol BID – TID
- Latanoprost BID – TID

## PIGMENTARY UVEITIS

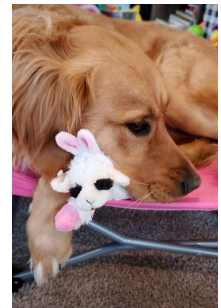
Presumptive inherited eye disease of Golden Retrievers

- Middle-aged to senior (6-10 y.o.)
- Painful, blinding

Recommend annual OFA eye exam by an ophthalmologist life-long

- Currently, no genetic test available

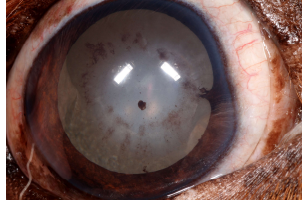
**Early diagnosis is the best chance to minimize complications**



## CLINICAL SIGNS

### Early stages

- Mild, conjunctival hyperemia
- Epiphora
- Anterior lens capsule pigment
- Iris hyperpigmentation
- Lightly pigmented attached uveal cysts
  - Heavily pigmented free-floating cyst not concerning



## TREATMENT

### Medical Management

- Topical NSAID vs. steroid QD - BID
  - Concern for possible exacerbation of glaucoma with topical NSAID use
  - Use steroid if ↑ IOP
- +/- Glaucoma medication

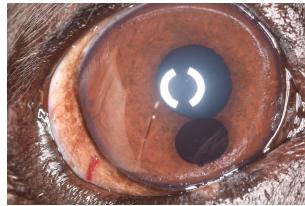
### Surgical Management

- Same as previously discussed

## UVEAL CYST COMPARISON



Lightly Pigmented, Attached Uveal Cysts



Heavily Pigmented Free-Floating Cysts



## CASE PRESENTATION OF UVEITIS

Chronic Anterior Uveitis - Cat

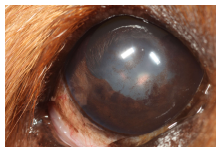
## CLINICAL SIGNS CONT.

### Mid stages

- Corneal epithelial degeneration
- Synechia
- Cataract

### Late stages

- Glaucoma
- Blind




## CHRONIC ANTERIOR UVEITIS

Middle age to older cats

Possible FHV-1 trigger

Up to 70% of cases are considered idiopathic / immune-mediated





## CLINICAL SIGNS

**Early signs**

- Anisocoria
- Dyscoria
- Iris "lymphoid" nodules
- Keratic Precipitates

**Late signs**

- Cataract
- Lens luxation
- Glaucoma
- Blind

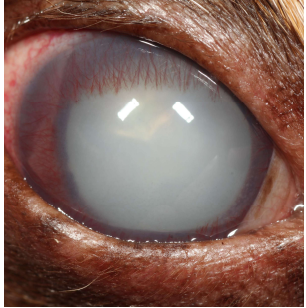
## LENS-INDUCED UVEITIS

**Rapid development of cataracts**

- Diabetics
- Genetic, young dogs
  - i.e. Siberian Husky

**Sudden exposure to large amount of lens proteins**

- Lens capsule rupture
- Penetrating trauma



## TREATMENT

**Topical steroid > NSAID**

- Avoid triple antibiotic, concern for neomycin / polymyxin anaphylaxis

**Risk of FHV-1 flare-up**

- Topical cidofovir or ganciclovir BID
- Oral famciclovir BID
- Usually develop w/in 2 weeks
  - Switch to oral pred to address uveitis if recurrent herpetic ulcers OR try topical NSAID

**Enucleation if glaucomatous, painful +/- blind**



## CLINICAL SIGNS

**Low IOP**

**Associated with anterior uveitis**

**Advanced or quickly forming cataract**

**History of ocular penetrating trauma**

## CASE PRESENTATIONS OF UVEITIS

Lens-Induced Uveitis

## TREATMENT

**Aggressive anti-inflammatory therapy to minimize sequela**

**Can be difficult to manage**

**Surgery**

- Phacoemulsification dependent upon individual
  - Mild, easily controlled LIU may remain good candidate
  - Severe, uncontrolled LIU poor candidate
- Enucleation



## KEY TAKE AWAYS

History of Travel?

Majority of cases are idiopathic / immune-mediated

Goal of therapy is to control inflammation and improve ocular comfort

Prompt, aggressive anti-inflammatory treatment is key to prevent secondary complications

THANK YOU / QUESTIONS?

