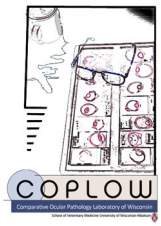
AAPSP
Australian Animal Pathology Standards Program
Davis-Thompson Foundation
Veterinary Pathology Roadshow 2026

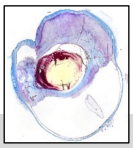
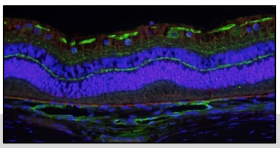
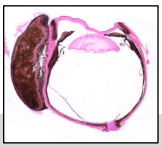
School of Veterinary Medicine

The Comparative Ocular Pathology Laboratory of Wisconsin



The Pathology of Spontaneous and Iatrogenic Trauma to the Eye



1

School of Veterinary Medicine

Importance of ocular trauma

Reason for enucleation:

1. Glaucoma
2. Tumors
3. Trauma

20% of all canine enucleations submited to COPLOW are related to non-surgical trauma

2

School of Veterinary Medicine

Trauma-related ocular lesions

Anterior segment

1. Rupture and doubling of Descemet's membrane
2. Angle recession
3. Iridociliary cysts
4. Hyphema
5. Cataract
6. Lens luxation
7. Lens capsule rupture

3

School of Veterinary Medicine

Trauma-related ocular lesions

Posterior segment

1. Retinal detachment and tear
2. Vitreal hemorrhage
3. Expulsive choroidal hemorrhage
4. Retinal necrosis, atrophy and hemorrhage
5. Optic nerve schemic necrosis and atrophy

4

Spontaneous Ocular Trauma (non-cirgical)

5

Types of ocular trauma

- **Blunt force trauma**
  - The result of the impact of a body against a blunt surface, the impact of an object with a blunt surface against a body, or a combination of both
- **Penetrating trauma**
  - Sharp objects causing rupture of the ocular tissues
  - Cornea or Sclera → Uvea, retina and lens

6

School of Veterinary Medicine

Blunt Force Trauma

- This is a mechanism that we diagnose very often
- We only occasionally receive a specific history

Noteworthy:

- **Corgi**

  Injured the eye while snowboarding

- **Sheperd mixed**

  Eye pecked by a Magpie

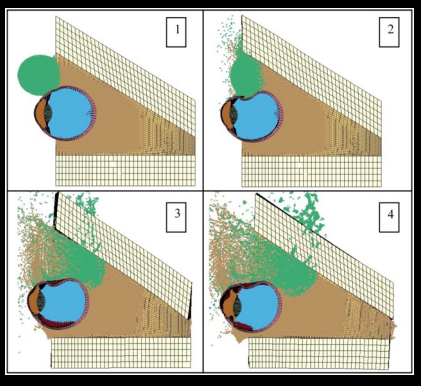
- **Boxer**

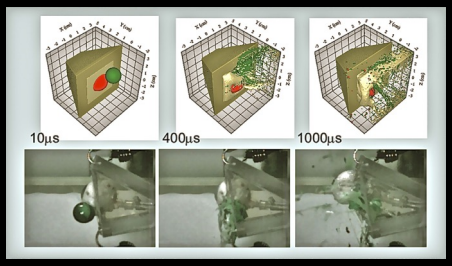
  Ran head-first into the garage door, floor is slippery, happens once a week

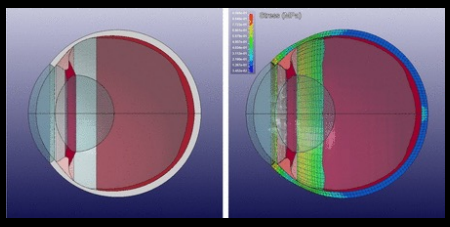
7

Spontaneous Ocular Trauma

Blunt force trauma







Paintball Trauma and Mechanisms of Optic Nerve Injury: Rotational Avulsion and Rebound Evulsion Invest. Ophthalmol. Vis. Sci.. 2011;52(13):9624-9628. doi:10.1167/iovs.11-8472

8

Blunt Force Trauma

These are some of the features we look for

Cornea
- Multiple Descemet's breaks
- Doubling of Descemet's

Anterior Uvea
- Cyclodialysis or angle recession
- Free pigment in the angle
- Iris cysts (cats only)

Chambers of the glove
- Otherwise unexplained hemorrhage

Lens
- Cataract
- Luxation
- Lens capsule rupture

Retina
- Disruption of the outer segments
- Detachment
- Regional or global disorganization, atrophy and gliosis
- Retinal tear or shattering
- Atrophy with "naked" blood vessels

Sclera
- Scleral rupture
- Fibrosis extending through the uvea
- Tissues from inside the globe deposited in the episclera

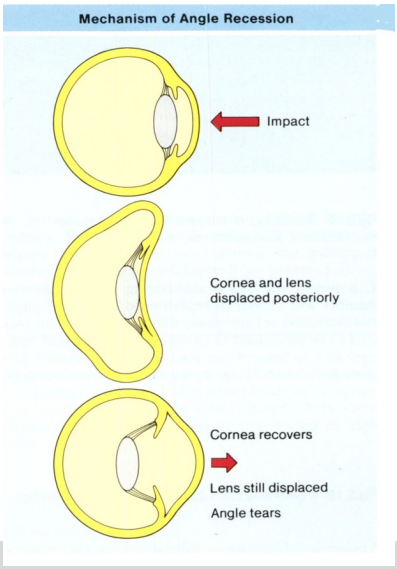
9

School of Veterinary Medicine
University of Wisconsin-Madison

Contusion Glaucoma / Angle Recession

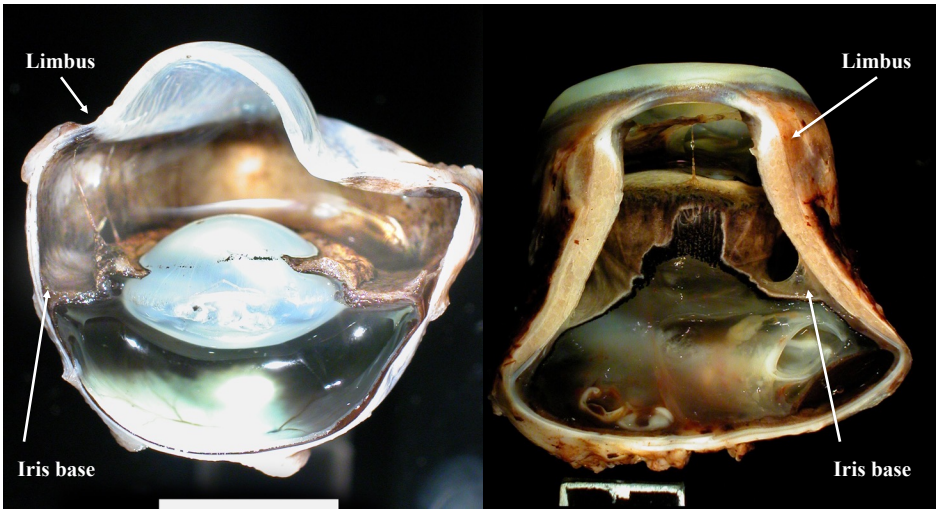
57 cases in dogs
- No particular breed
- 16 less than 6 years-old
- 21 greater than 10 years-old
- 22 male and 34 female

278 cases in cats
- 141 DSH, 23 DLH, 10 Siamese
- 43 less than 6 years-old
- 139 greater than 10 years-old
- 184 male and 85 female



10

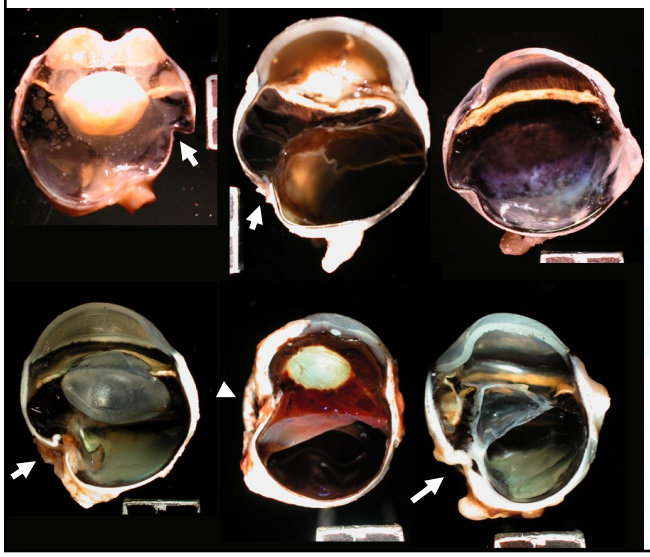
Angle Recession



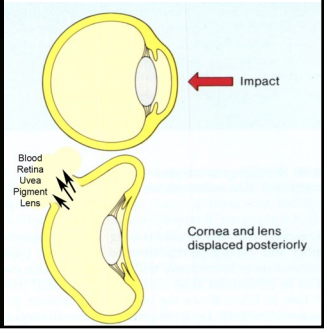
Cat Owl

11

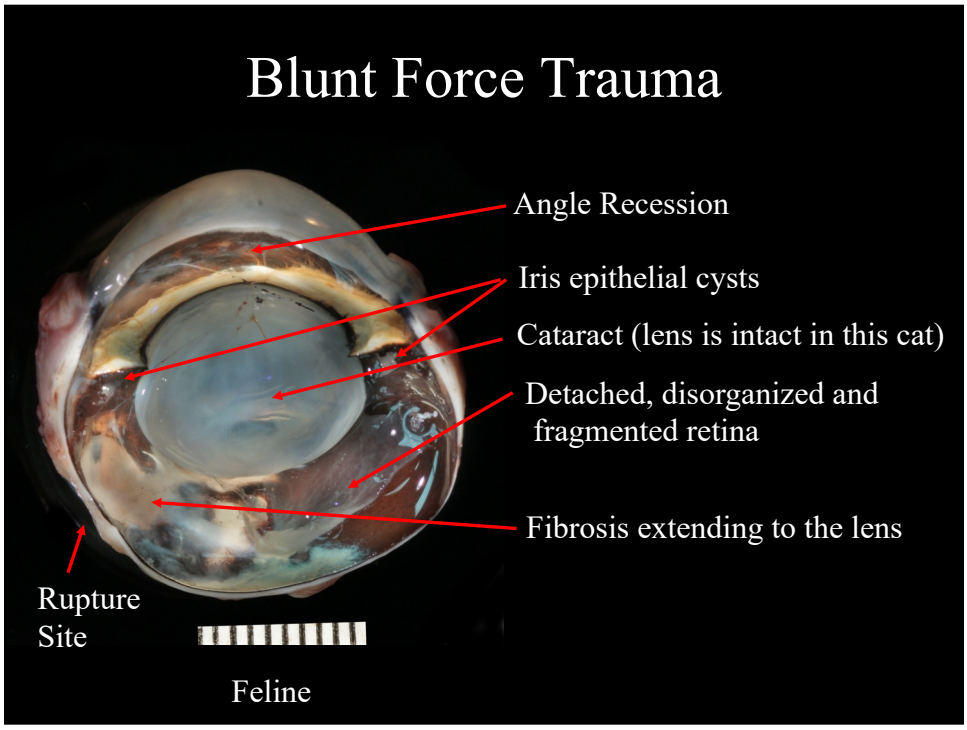
Scleral Rupture - Blunt Trauma



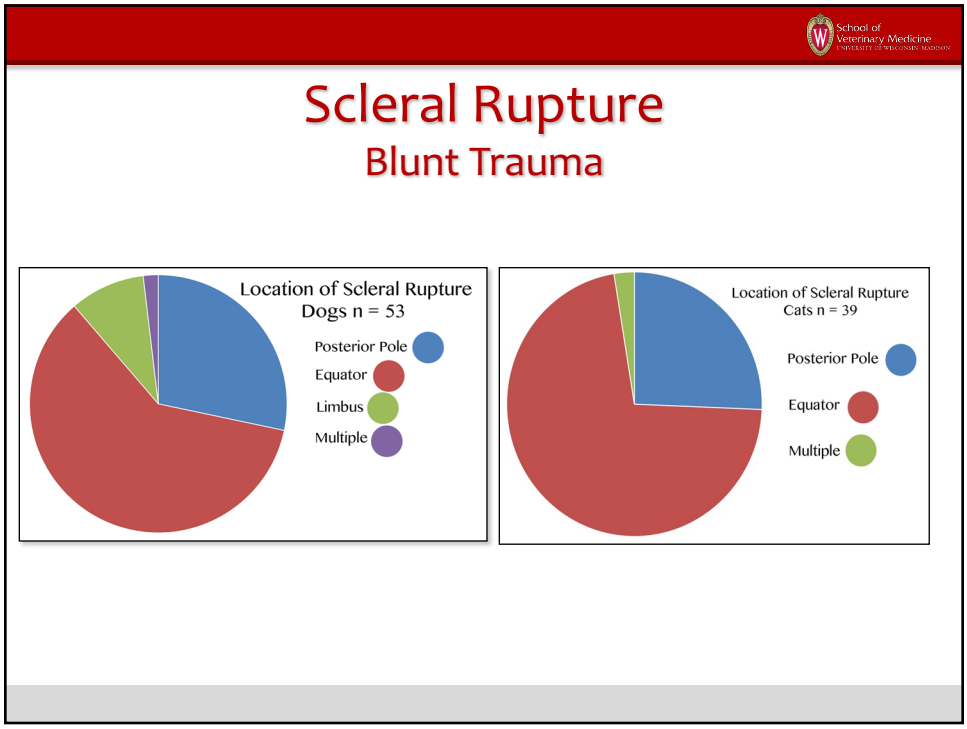
Expulsion



12


Blunt Force Trauma
Angle Recession
Iris epithelial cysts
Cataract (lens is intact in this cat)
Detached, disorganized and fragmented retina
Fibrosis extending to the lens
Rupture Site
Feline

13

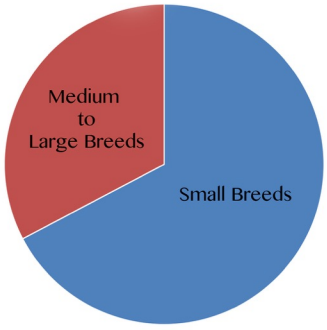

School of Veterinary Medicine
Scleral Rupture
Blunt Trauma
Location of Scleral Rupture
Dogs n = 53
Posterior Pole
Equator
Limbus
Multiple
Location of Scleral Rupture
Cats n = 39
Posterior Pole
Equator
Multiple

14

School of Veterinary Medicine

Scleral Rupture
Blunt Trauma

Dog Breeds: Scleral Rupture

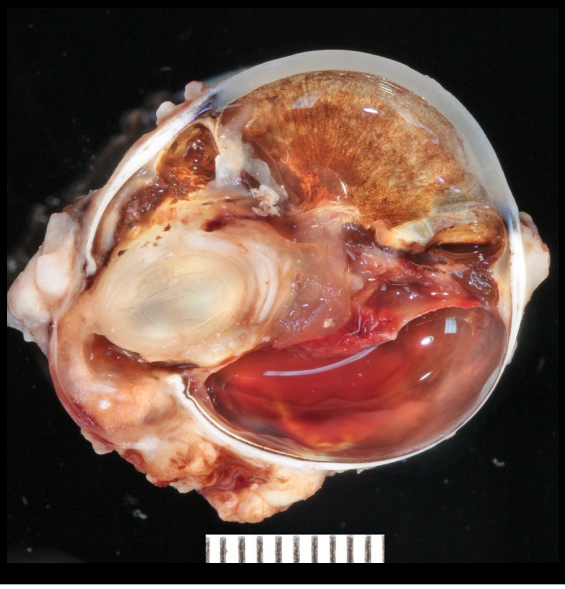


Named traumatic events

Events	dogs na n=13	dogs acute n=11	cats na n=8	cats acute n=1
kicked by horse	2	0	0	0
hit by car	1	0	2	0
cage-dryer(groomer)	1	0	0	0
dog encounter	4	5	0	0
globe proptosis	1	0	0	0
hit by baseball	1	1	0	0
ran into tree	0	1	0	0
coyote attack	0	0	1	0
fight with raccoon	0	0	1	0
gun shot	0	0	1	0
head trauma	0	1	0	0
occurred outside	0	1	0	1
trauma	3	0	3	0
ocular trauma	0	2	0	0

15

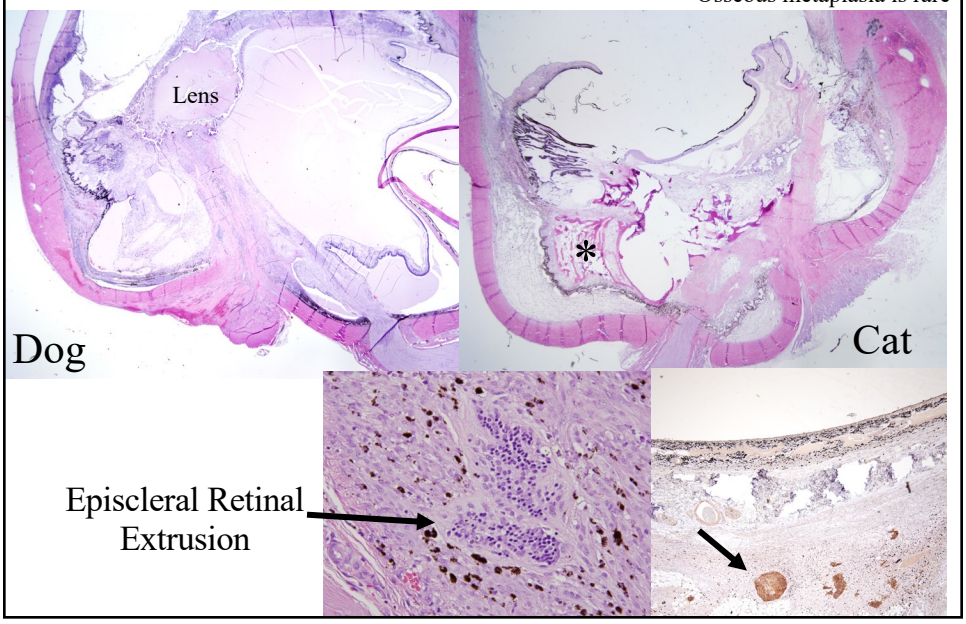
Scleral rupture with lens extrusion



16

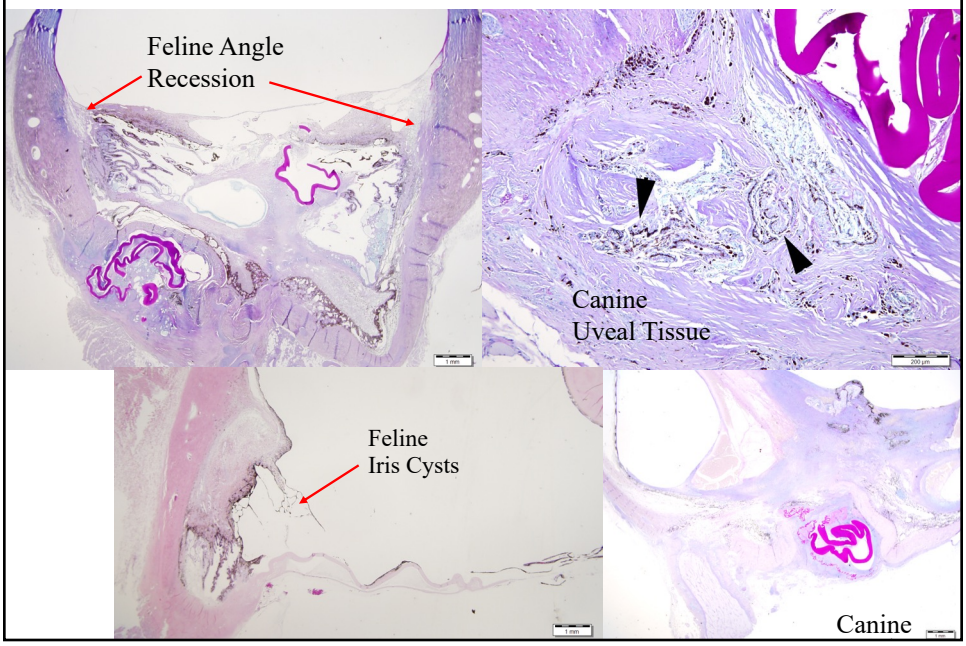
Scleral Rupture

* Osseous metaplasia is rare



17

Scleral Rupture



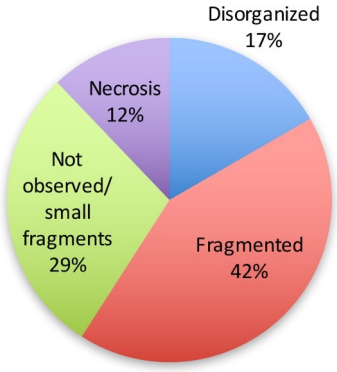
18

19

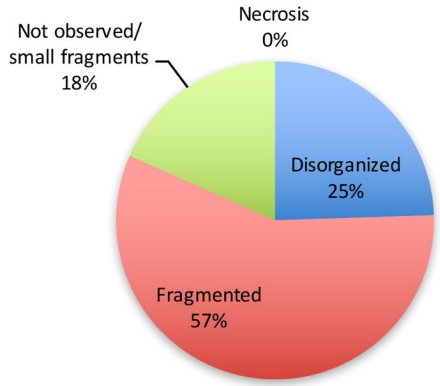
School of Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Scleral Rupture
Retinal Pathology

Retina in dogs; n=57

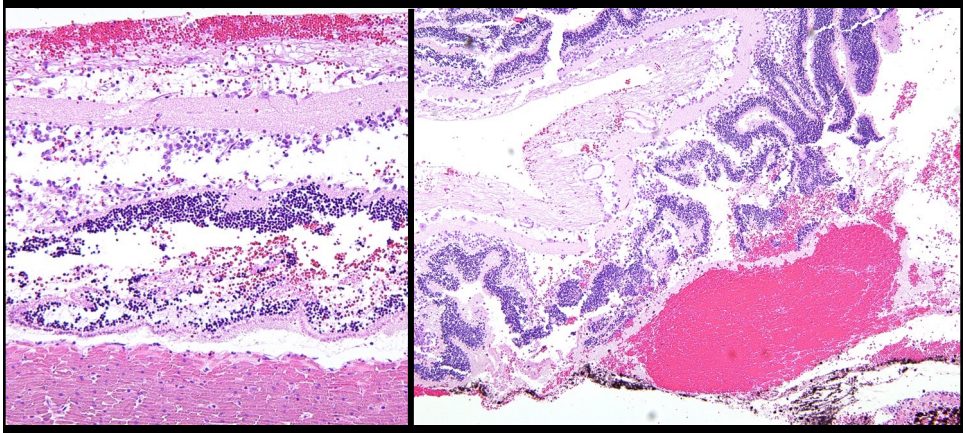


Retina in cats; n=41



20

Blunt Trauma to the Retina

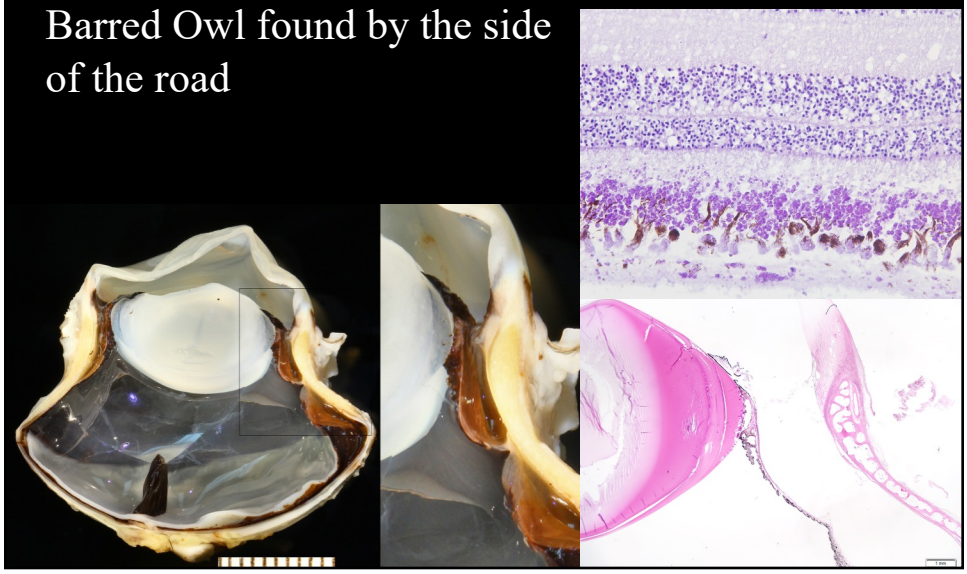


12 hours After Blunt Trauma

21

Retinal Effects of Blunt Trauma in Birds (Acute)

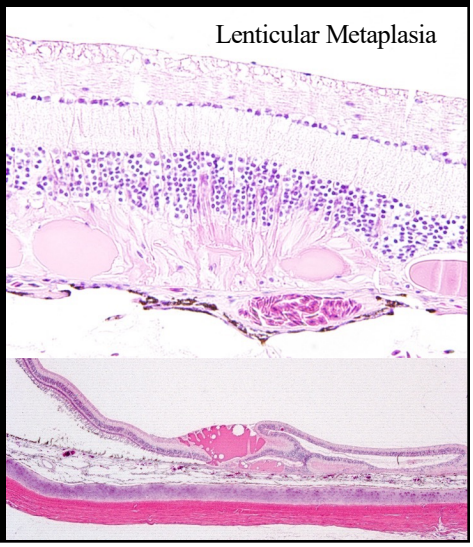
Barred Owl found by the side of the road



22

Retinal Effects of Blunt Trauma in Birds (Chronic)

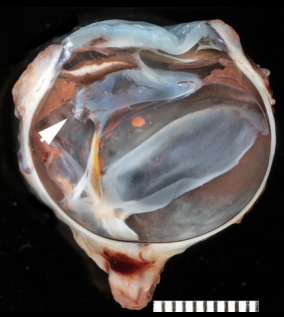
Great Horned Owl



23

Ocular Trauma Bullets

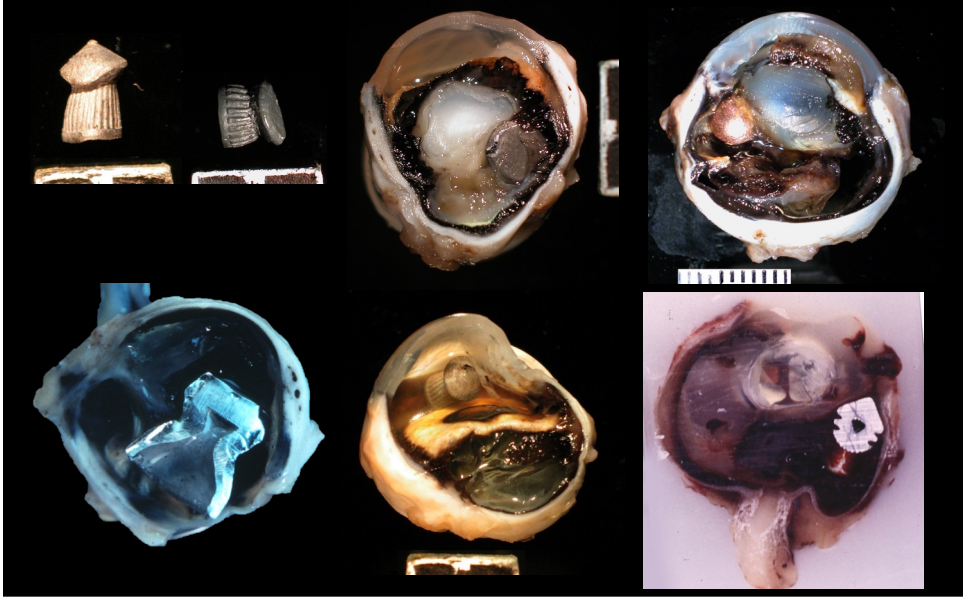
- 21 cases
  - 9 dogs (All large breeds)
  - 8 cats
  - 2 horses
  - 2 Pinnipeds
- Combine features of blunt trauma and penetrating trauma



Shotgun - birdshot pellets

24

Ocular Trauma Bullets



25

Penetrating Trauma

- We only occasionally have a history of a traumatic event
- The resulting pathology is often endophthalmits
- Some of the common traumas with penetrating injuries
  - Cat Scratch
  - Corneal laceration, *can be complicated by collagenolysis*
  - Dog fight or dog bite
  - Dental procedure, anesthetic needle or dental instrument
  - Foreign body found in the eye, *usually plant material*
  - Limbal penetration from a sharp object
  - Most remain idiopathic

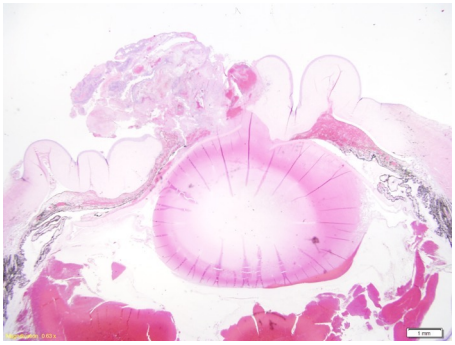
26

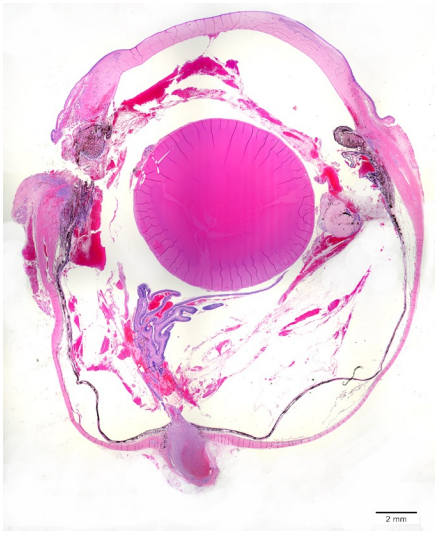
Spontaneous Ocular Trauma

Corneal Perforation

Hard to distinguish traumatic perforation vs perforation secondary to corneal disease

- Clinical History!

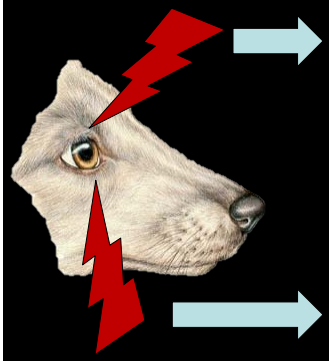


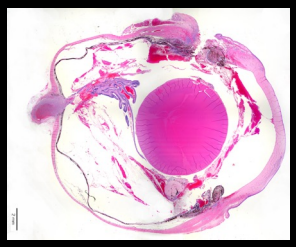


27

Scleral perforation

Rarely receive the a history of perforation/trauma





- Animal bites
- Objects coming from above

- Objects coming from the oral cavity

28

Penetrating Trauma

Corneal laceration -Iris prolapse – Acquired aniridia

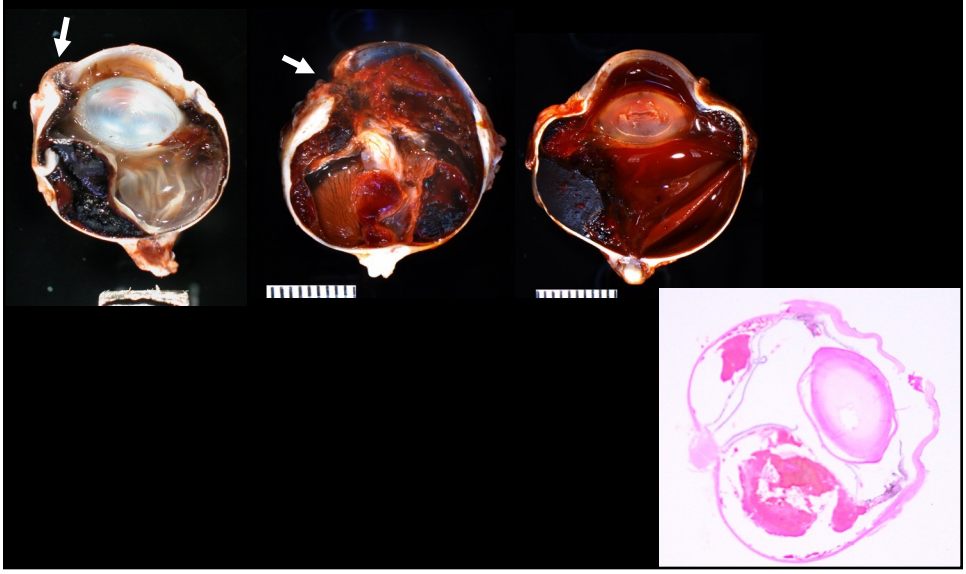
Before

After

29

Expulsive Choroidal Hemorrhage

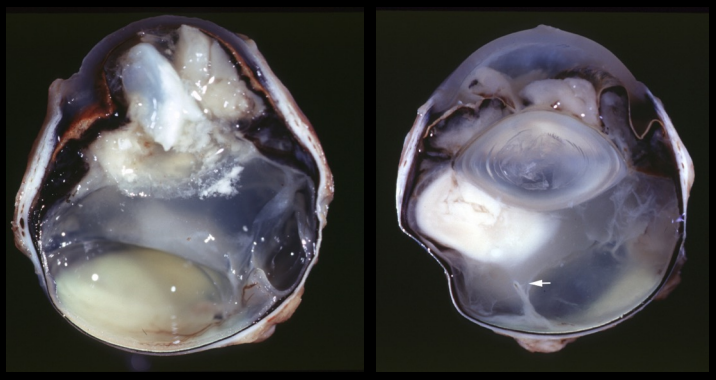
Sudden Loss of Intraocular Pressure



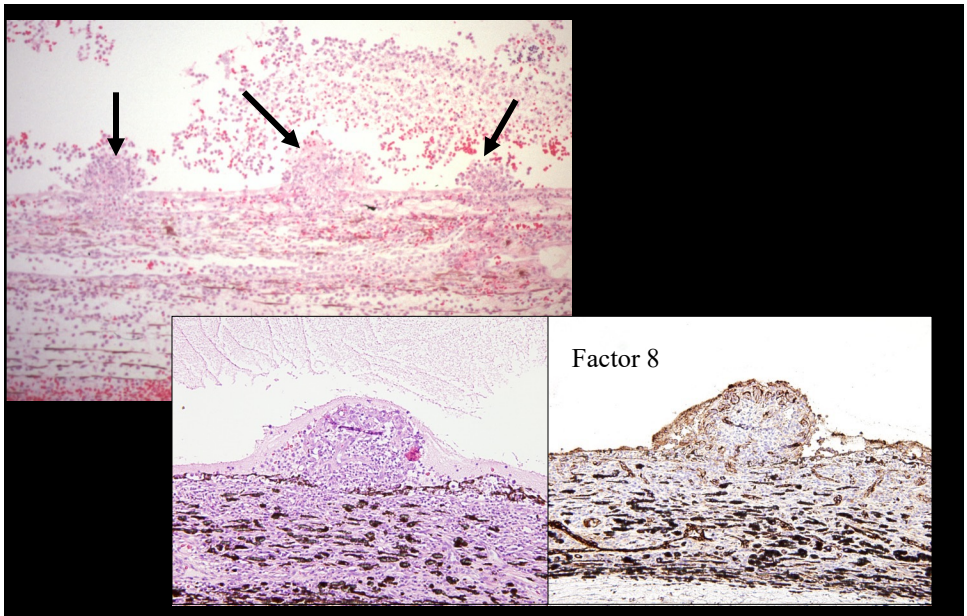
30

Endophthalmitis Following foreign bodies

- 68 cases in dogs
- Large Breed dogs are over-represented
- Plant foreign body the most common by far

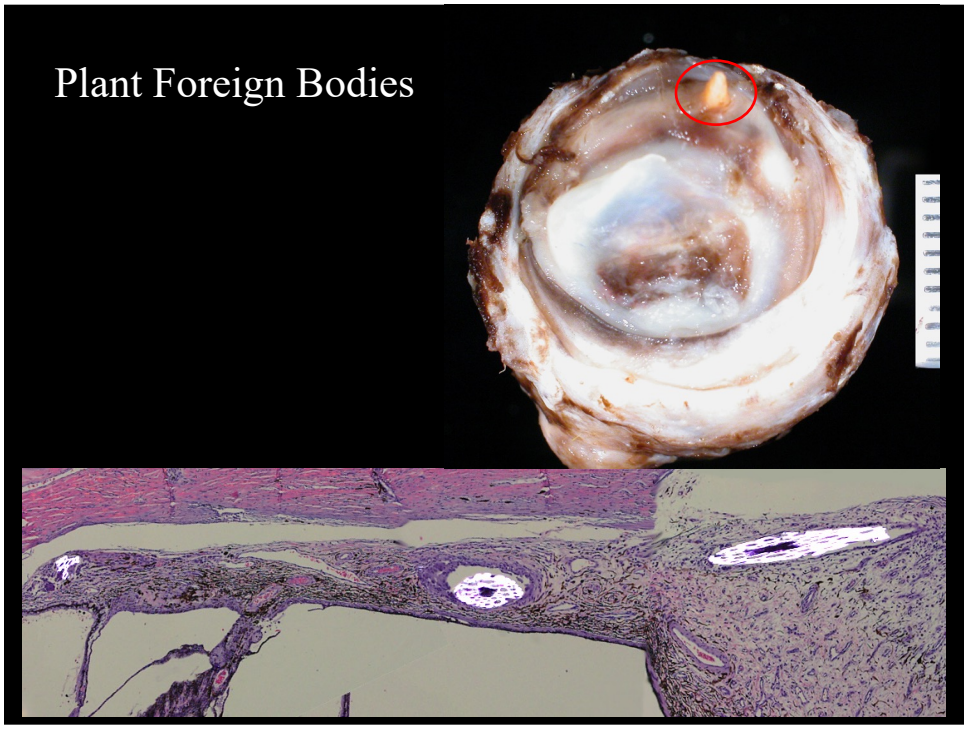


31

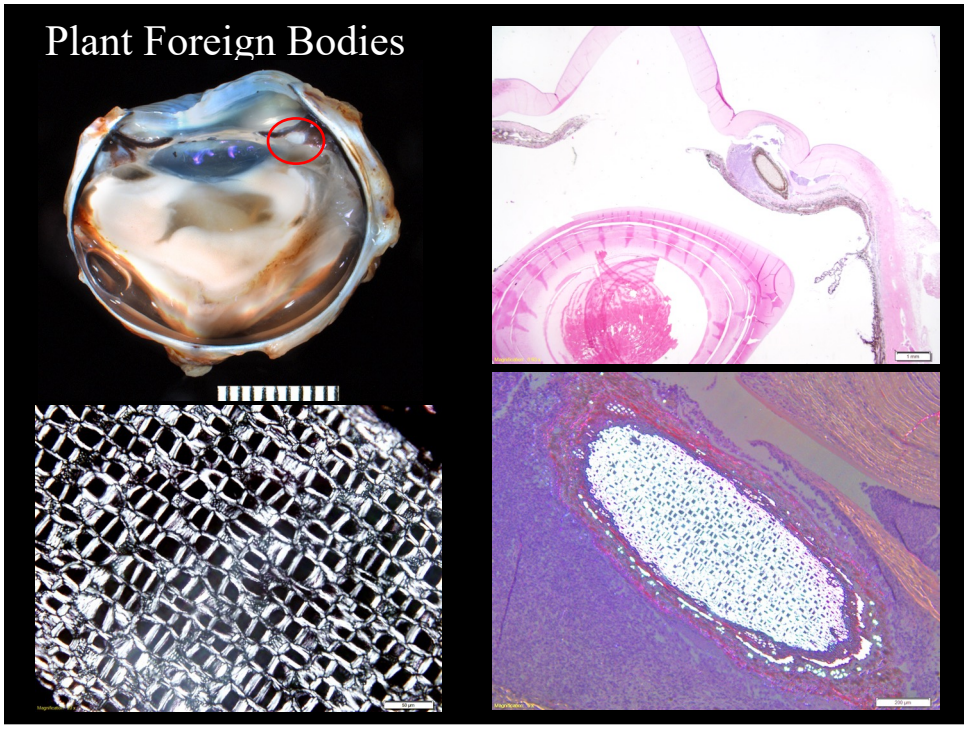


"Volcanoes" in the subretinal space, extending from the choriocapillaris

32



33



34

Septic Implantation Syndrome

Veterinary Ophthalmology (2013) 16, 3, 180–185 DOI:10.1111/j.1463-5224.2012.01046.x

Septic implantation syndrome in dogs and cats: a distinct pattern of endophthalmitis with lenticular abscess

Cynthia M. Bell,* Simon A. Pot†,[1] and Richard R. Dubielzig*

- 202 dogs and 57 in cats
- Young animals < 6 years of age
- No breed predisposition
- History of trauma – 20% cats and 39% dogs
  - 100% of the known traumatic events are cat scratches
- Organisms
  - 70% cats
  - 65% dogs

35

Septic Implantation Syndrome

Atack

Implantion of bacteria in the lens

Endophthalmitis Initialy bland

Secondary cataract Lens capsule rupture

Severe peri-lenticular endophthalmitis Secondary glaucoma

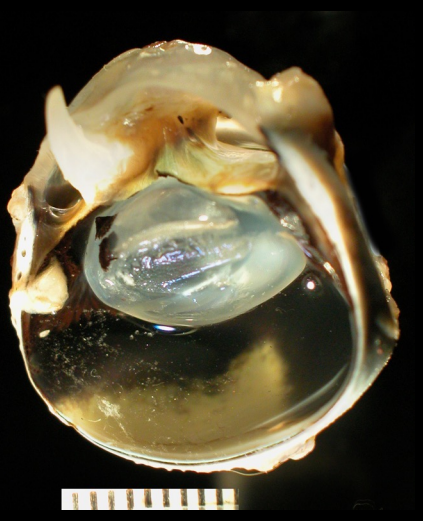
36

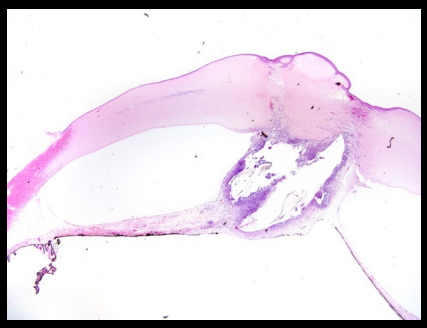
Septic Implantation Syndrome

- Histologic features:
  - Suppurative endophthalmitis
  - Fibrous posterior synechia
  - Lens capsule rupture with a suppurative infiltrate into the lens
  - Bacterial colonies in the lens protein away from the neutrophils, less often, fungi

37

Septic Implantation Syndrome

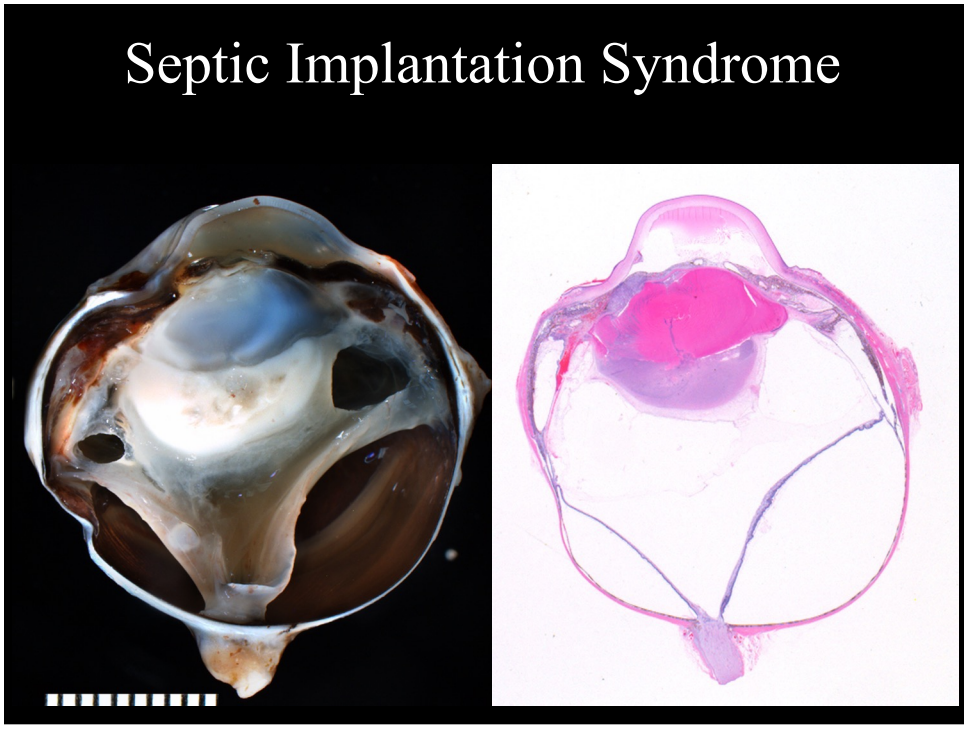




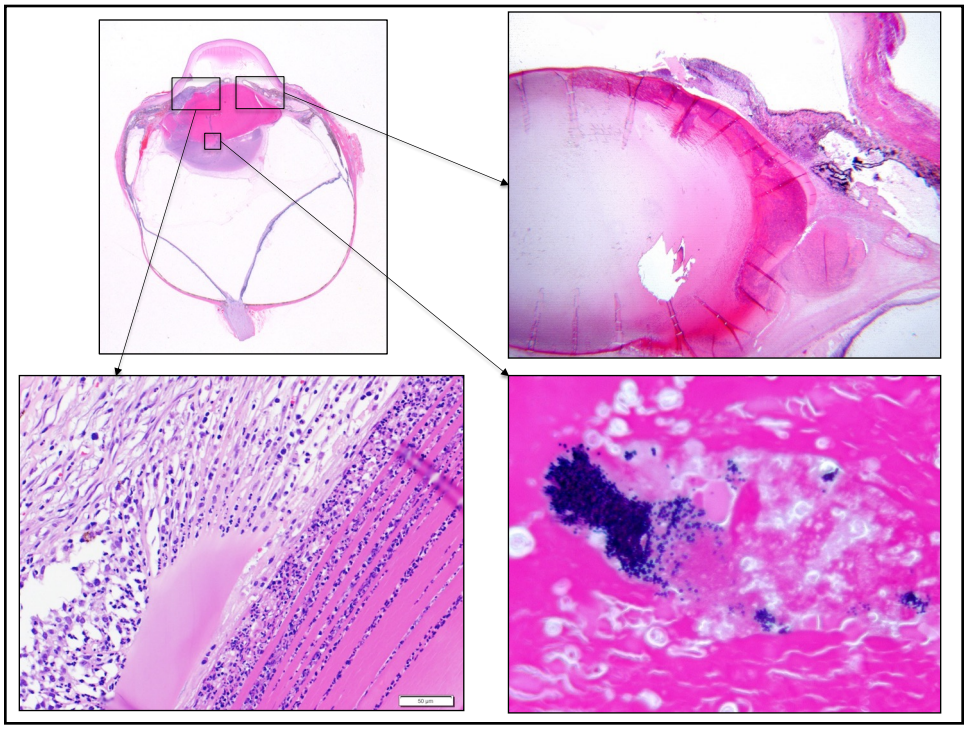
38


Septic Implantation Syndrome

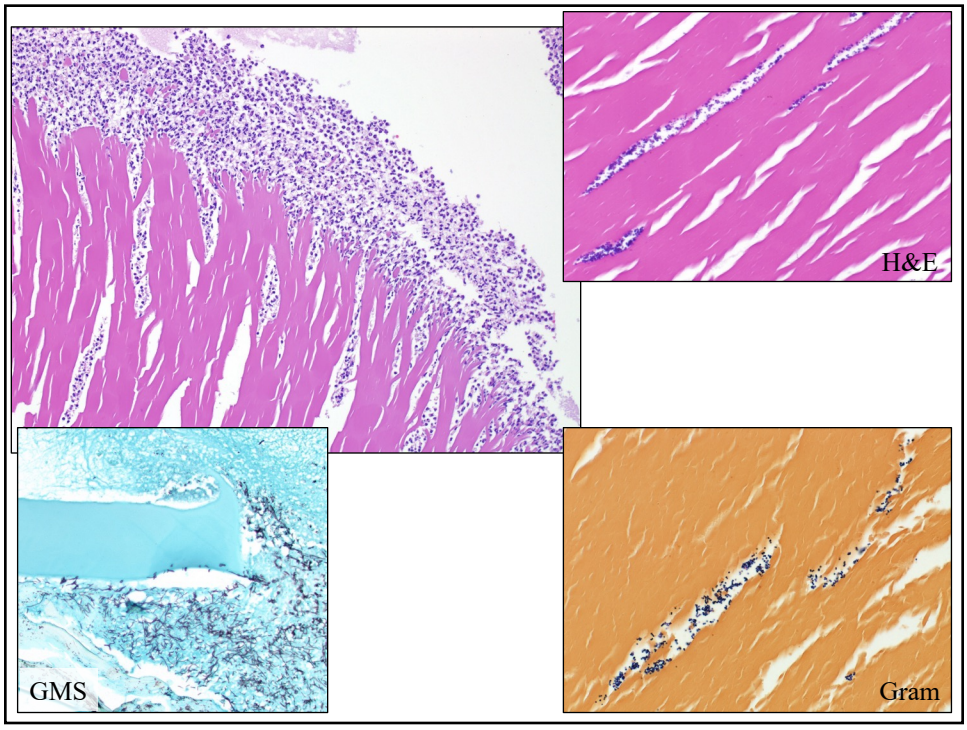
39


Septic Implantation Syndrome

40



41



42

Early-life Trauma
Anterior Chamber Collapse Syndrome

Definition

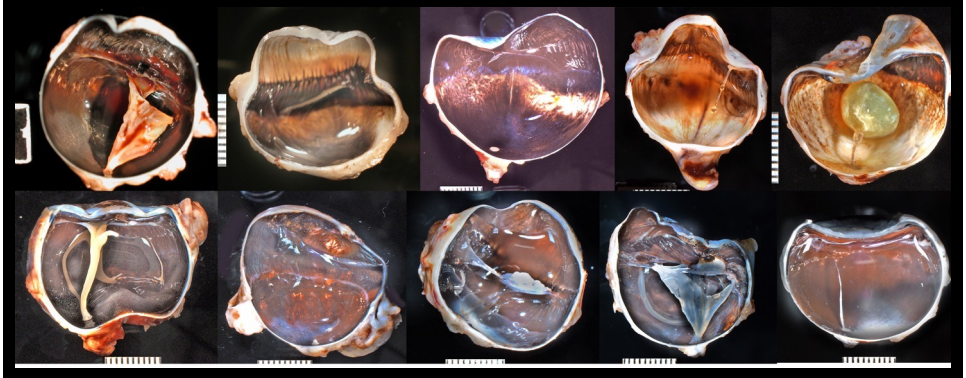
"Traumatic event that happens early in the life of the patient and that causes collapse of the anterior chamber and secondary glaucoma."

- Lens absence (extrusion of lens)
- Broad breaks in Descemet's membrane,
- Broad anterior synechia and
- Retinal detachment and tear

43

Early-life Trauma
Anterior Chamber Collapse Syndrome

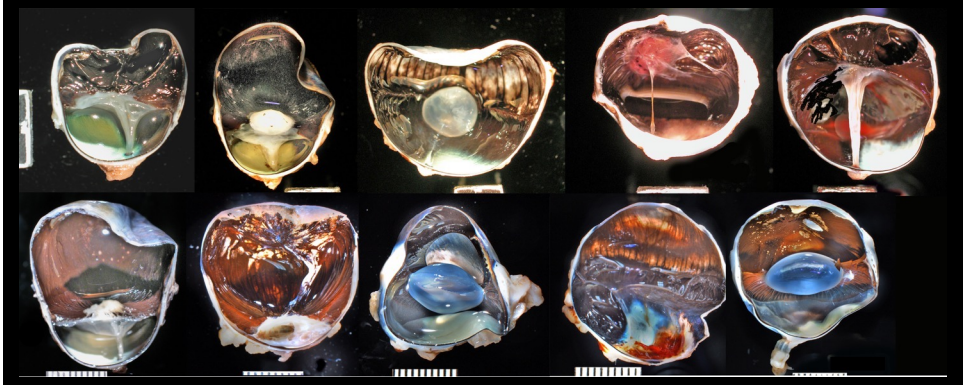
Dogs



44

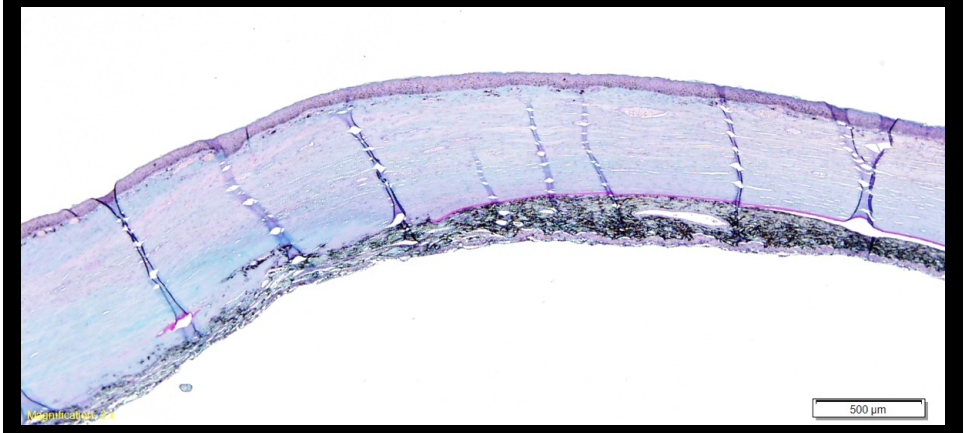
Early-life Trauma
Anterior Chamber Collapse Syndrome

Cats



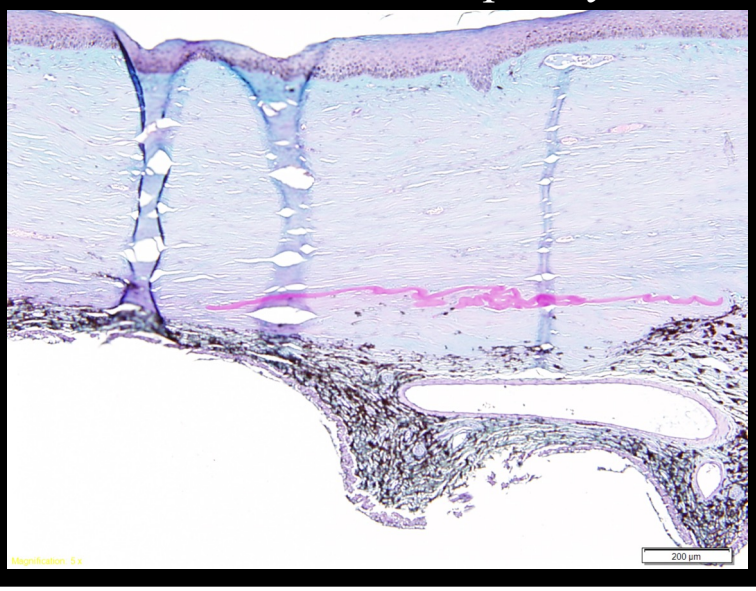
45

Early-life Trauma
Anterior Chamber Collapse Syndrome



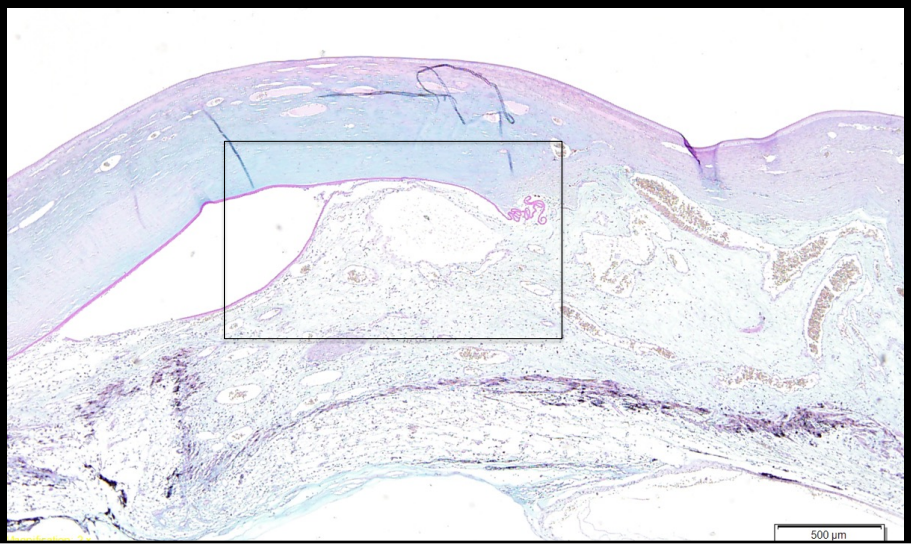
46

Early-life Trauma
Anterior Chamber Collapse Syndrome



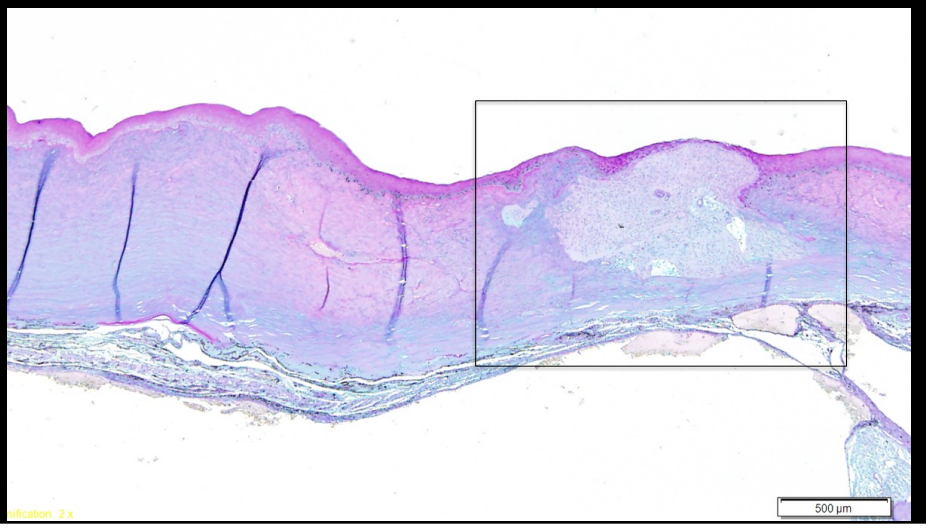
47

Early-life Trauma
Anterior Chamber Collapse Syndrome



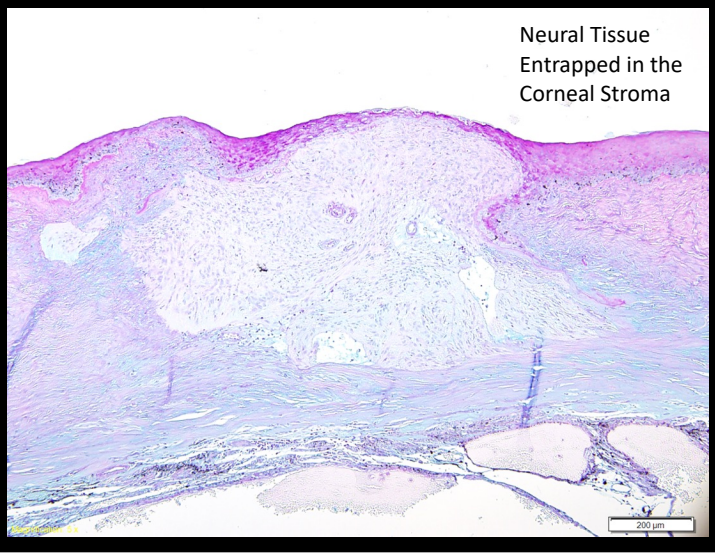
48

Early-life Trauma
Síndrome do colapso da câmara anterior



49

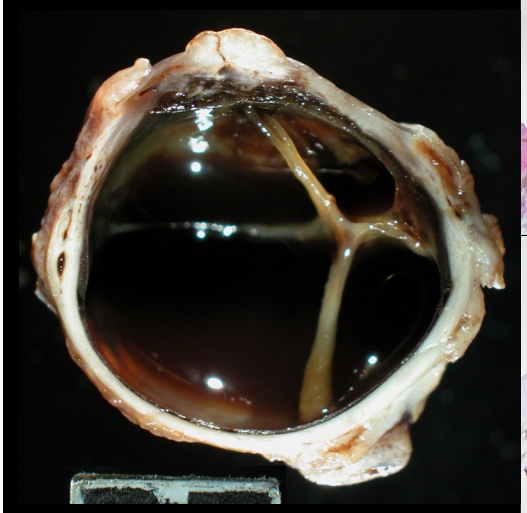
Early-life Trauma
Anterior Chamber Collapse Syndrome

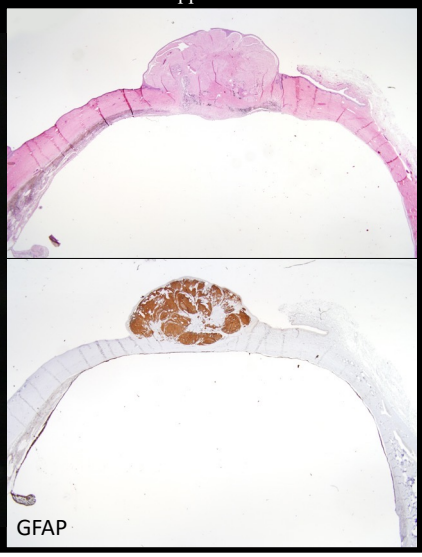


50

Early-life Trauma
Anterior Chamber Collapse Syndrome

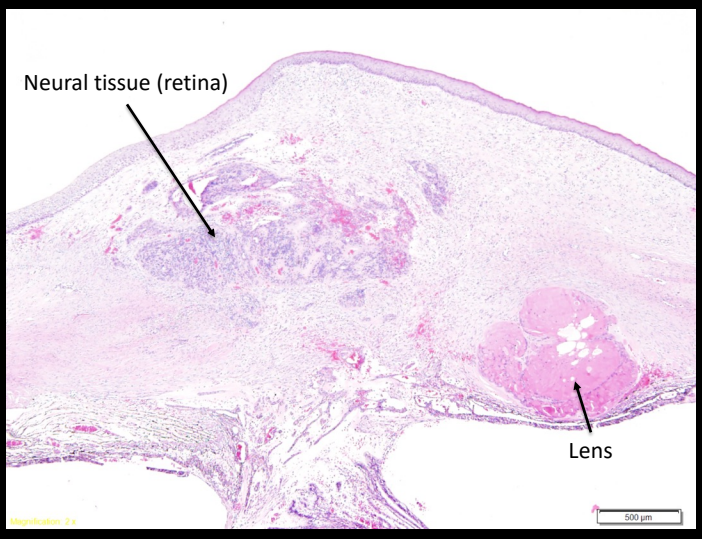
Neural Tissue Entrapped in the Corneal Stroma





51

Early-life Trauma
Anterior Chamber Collapse Syndrome



52

Early-life Trauma
Anterior Chamber Collapse Syndrome

Patogenesis:

- Globe rupture before the eyelids are open?
- Inexperience mothers?

53

Early-life Trauma
Anterior Chamber Collapse Syndrome

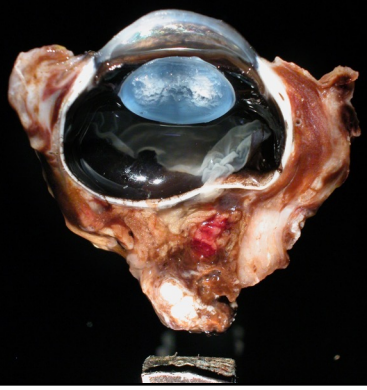
Alternatively…

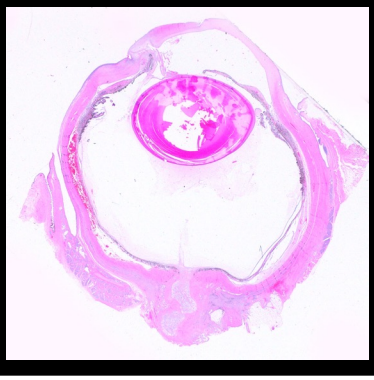
54

Proptosis

Big Dog vs Little Dog

- 150 cases in dogs
  - 35 Shih Tzu, 15 Pekingese, 12 Pugs (just 7 bigger than Cockers)
  - 69 less than 6 years and 31 more than 10





55

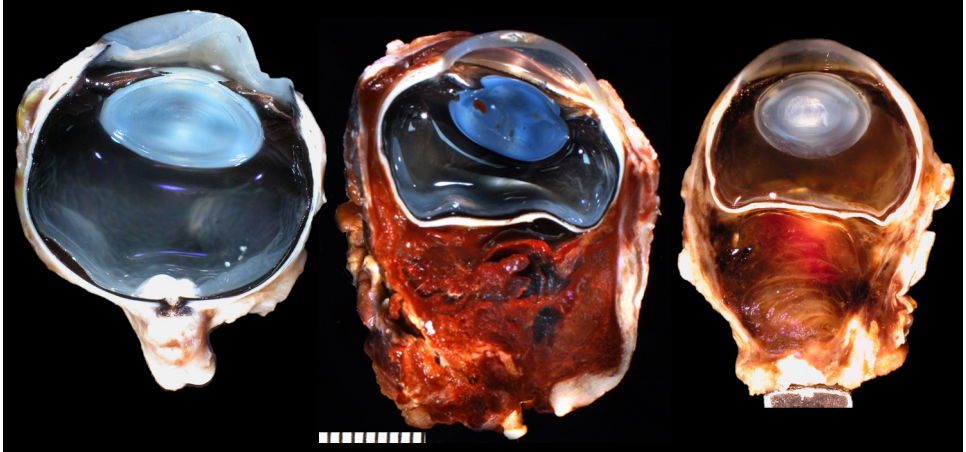
Proptosis

Typical Lesions Seen

- Muscle tearing
- Episcleral fibrosis
- Extension of the conjunctival epithelium toward or beyond the equator
- Hair in the episclera
- Corneal desiccation
- Optic nerve necrosis
  - First pure necrosis
  - Second Gitter cells and malacia
  - Finally fibrosis and atrophy

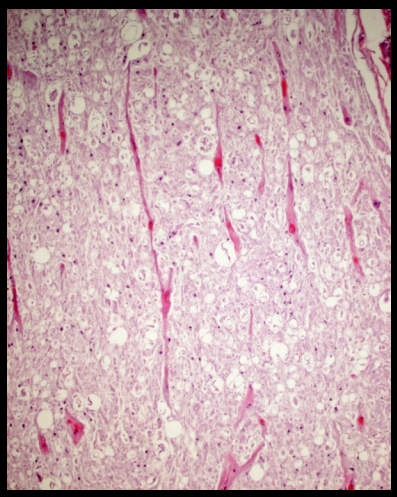
56

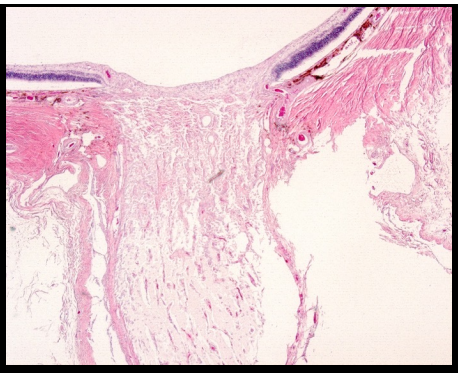
Optic Nerve Trauma/Proptosis

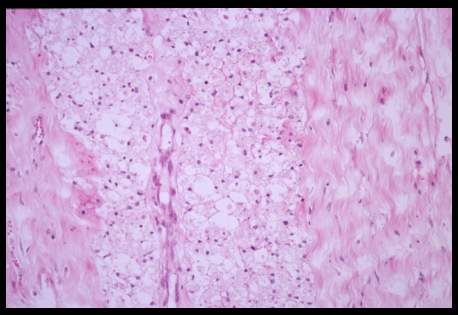


57

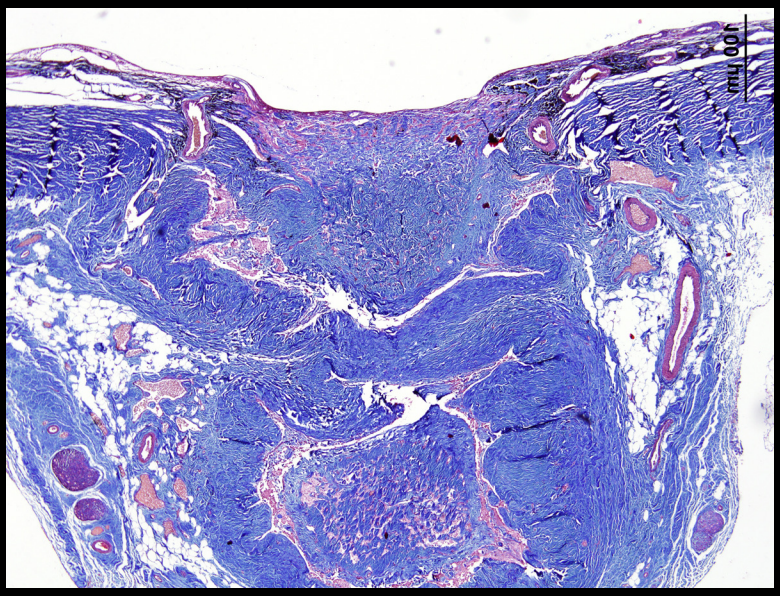
Acute Optic Nerve Necrosis







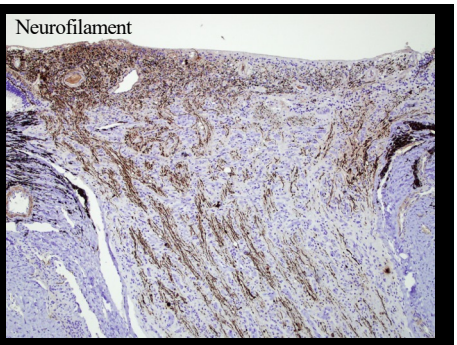
58

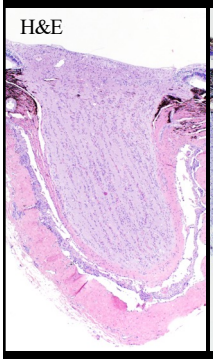


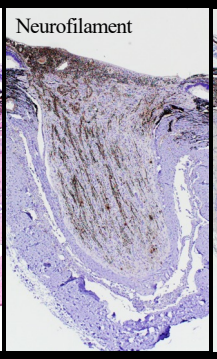
End-stage Fibrosis of the Optic Nerve (Trichrome Stain)

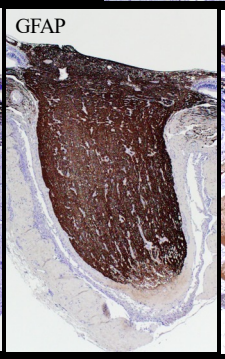
59

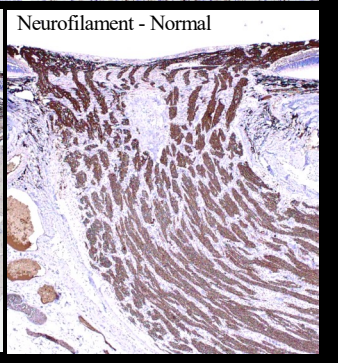
Optic nerve necrosis











60

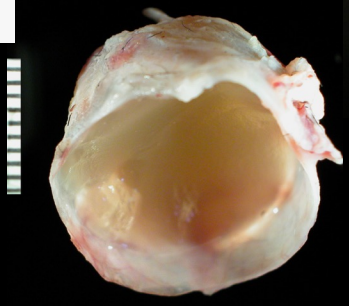
School of Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Iatrogenic / Surgical Ocular Trauma

61

Orbital Conjunctival Cyst after Enucleation Surgery

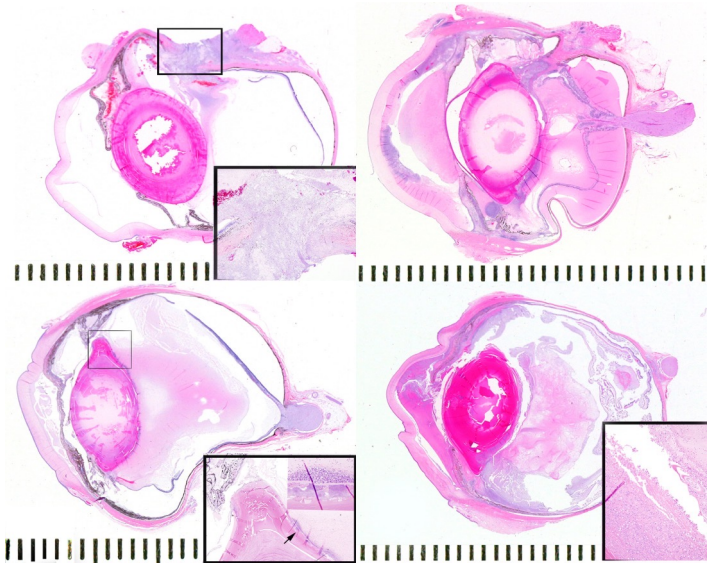
35 dogs *(10 Shih Tzu 5 Labrador)* 16 Cats *(11 DSH)*



62

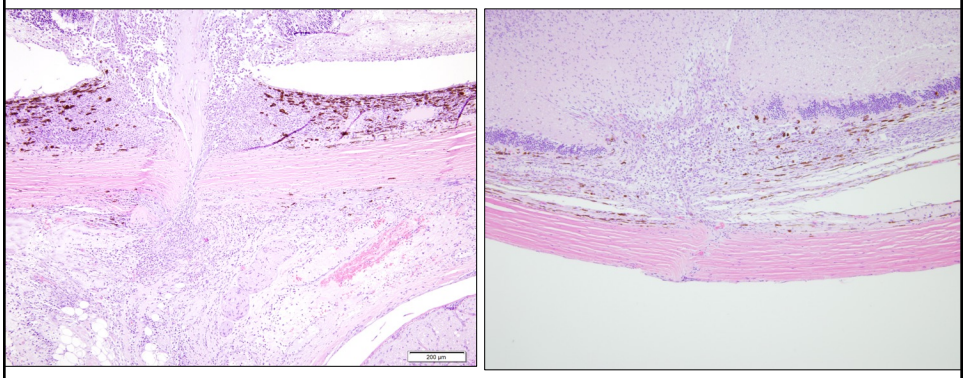
Endophthalmitis Following a Dental Accident

7 cats and 14 dogs



63

Endophthalmitis Following a Dental Accident



Narrow penetration point possibly during anesthetic administration

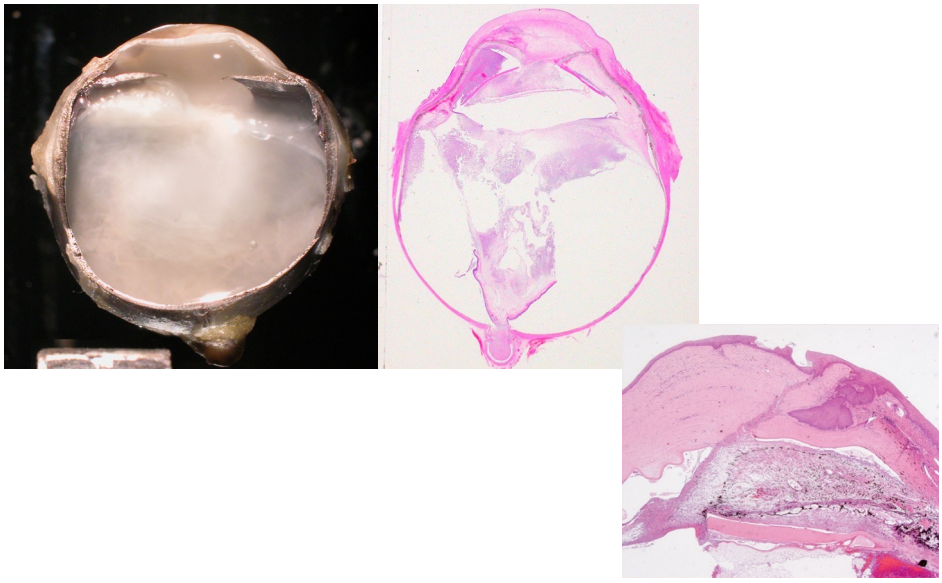
64

Complications following Phacoemulsification

- The most frequent histopathological abnormalities detected were:
  - Endophthalmitis, shortly after surgery
  - Glaucoma, delayed onset
    - Retinal detachment and neovascular glaucoma
    - Posterior synechia
    - Lens epithelial membranes
- The most frequent clinical abnormalities reported were:
  - glaucoma (86%)
  - uveitis (82%)

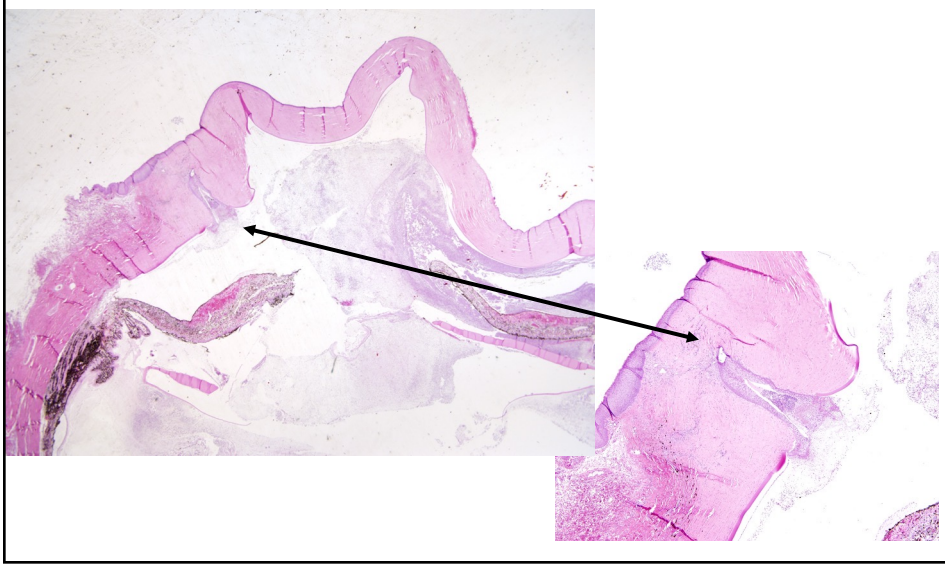
65

The morphology of eyes enucleated due to complications following phacoemulsification



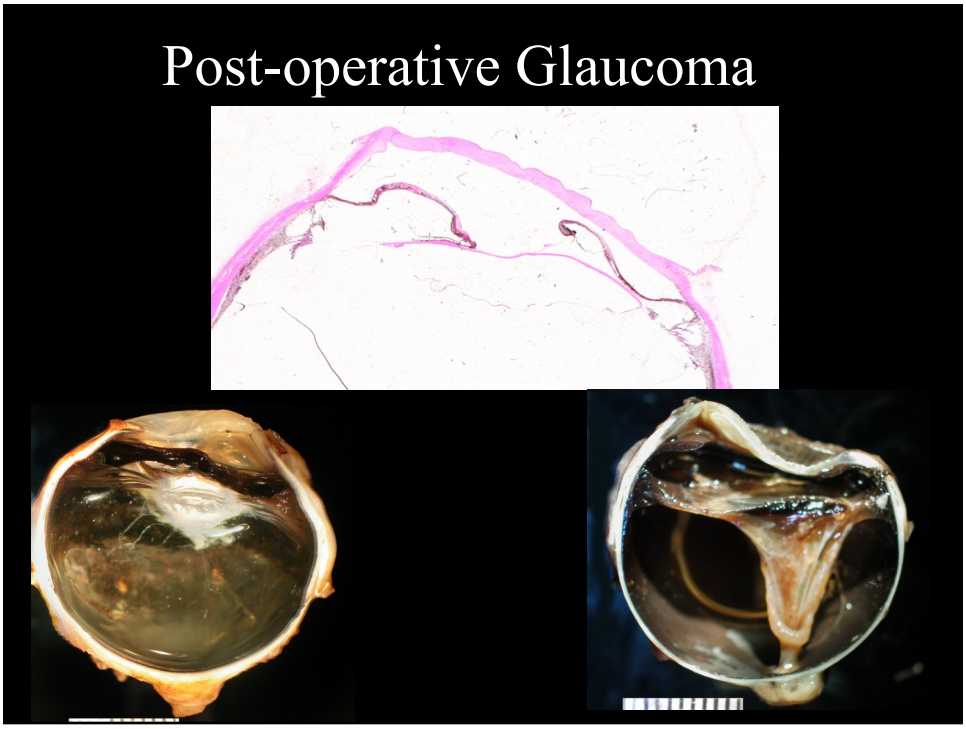
66

Dehiscence of the Surgical Wound and/or Epithelial Down growth

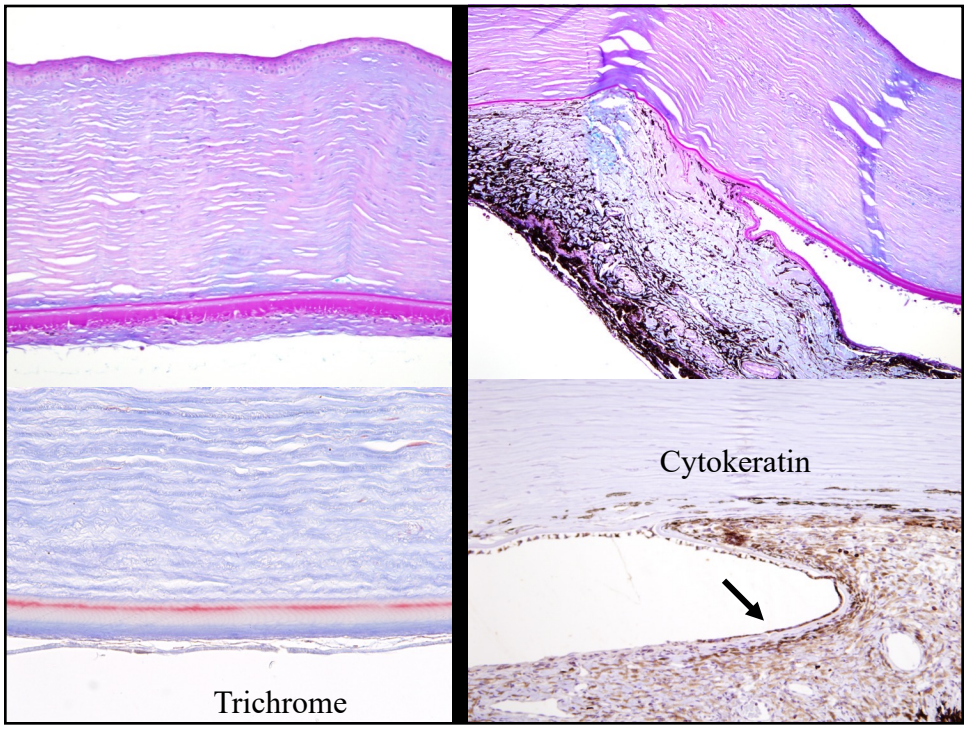


67

Post-operative Glaucoma



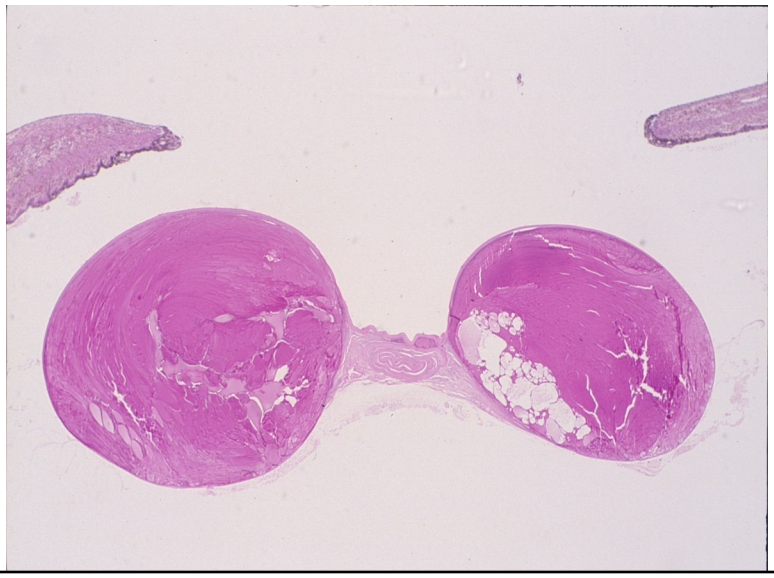
68



69

Lens Fiber Regrowth

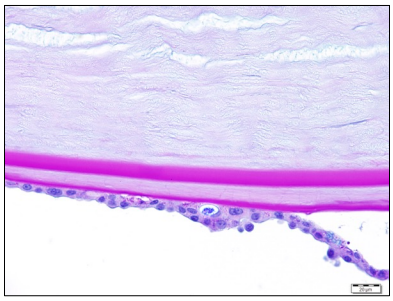
Soemmering's Ring Cataract

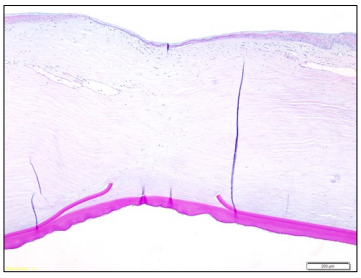


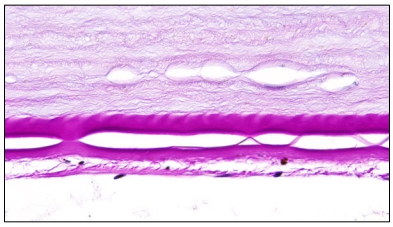
70

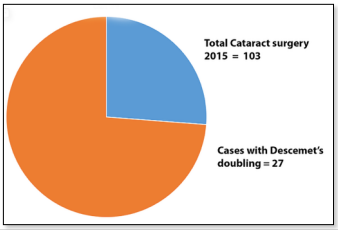
School of Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Doubling of Descemet's Membrane





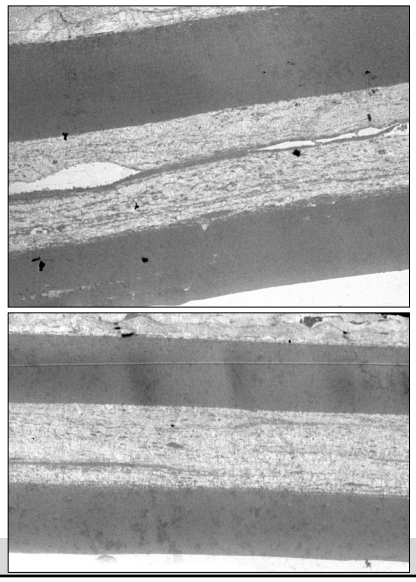




71

School of Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Doubling of Descemet's Membrane

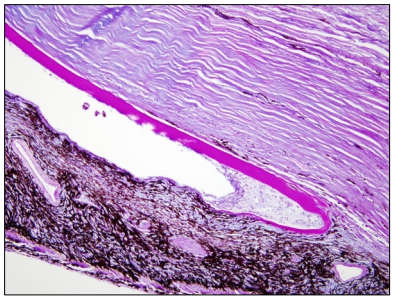


Vet Pathol 46:464–473 (2009)
DOI: 10.1354/vp.08-VP-0183-K-FL

Canine Duplication of Descemet's Membrane

C. KAFARNIK, C. J. MURPHY, AND R. R. DUBIELZIG

Department of Pathobiological Sciences, Comparative Ocular Research Laboratories of Wisconsin (CK, RRD); and Department of Surgical Sciences (CJM), School of Veterinary Medicine, UW-Madison, Madison, WI



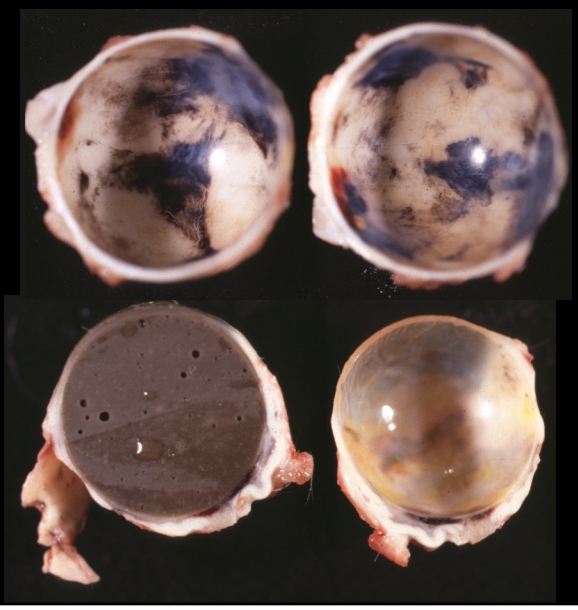
72

Intrascleral Prosthesis Failures

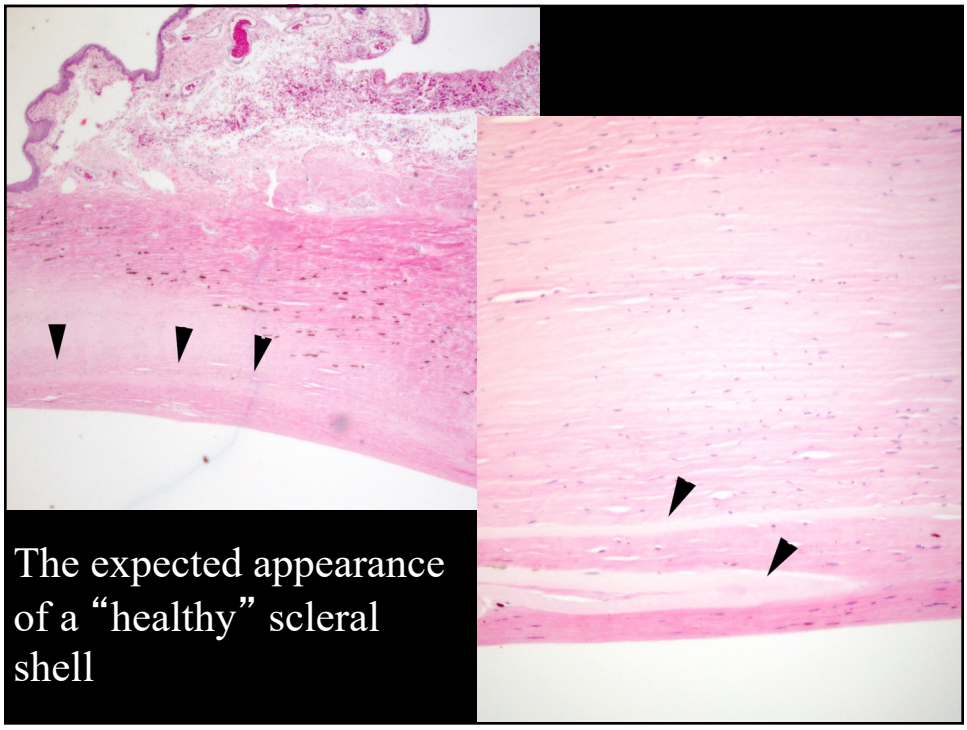
- 62 in Dogs
  - 23 because of tumors
  - 12 because of epithelial downgrowth
  - 30 because of corneal degeneration
  - 28 had severe inflammation
- 11 in Cats
  - 9 because of tumors
    - 8 melanoma, 1 post-traumatic sarcoma

73

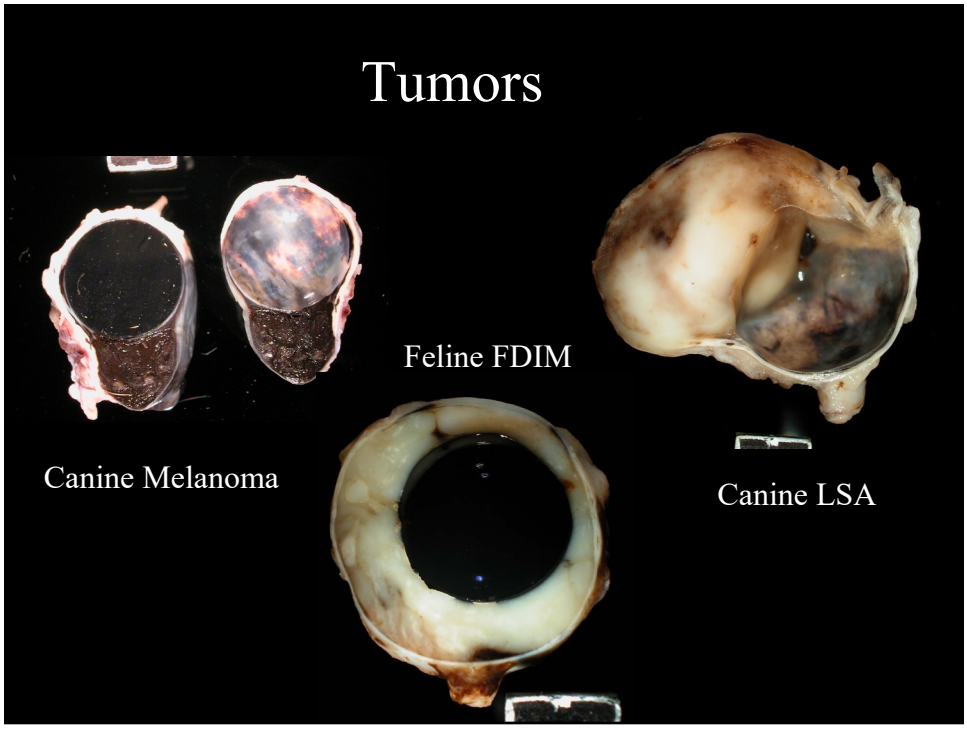
Intrascleral Prosthesis



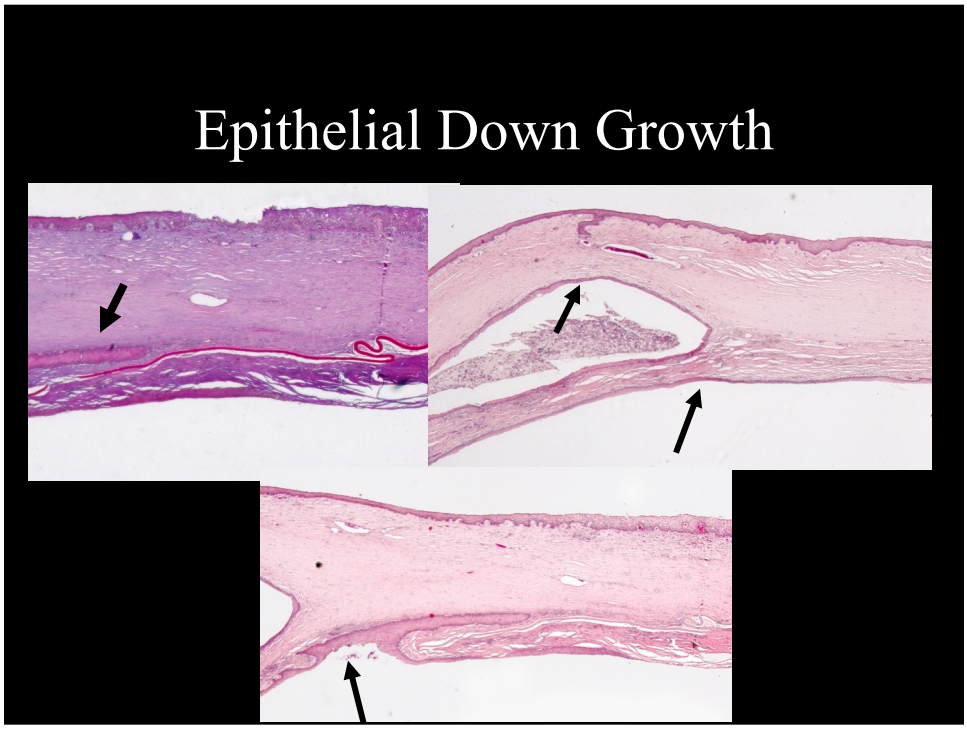
74


The expected appearance of a "healthy" scleral shell

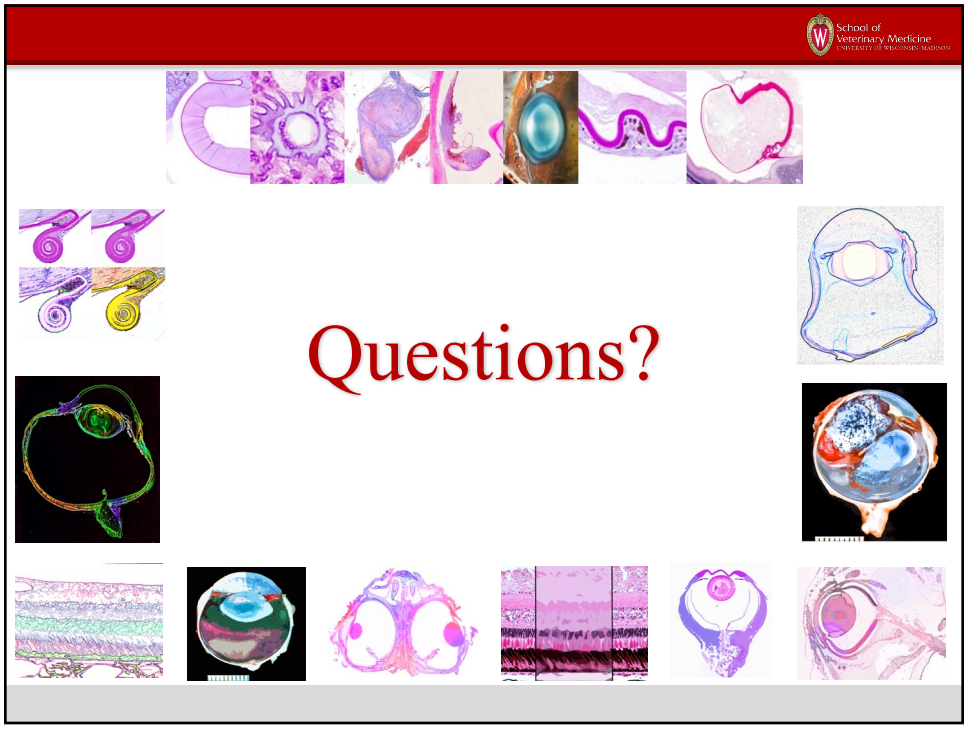
75


Tumors
Canine Melanoma
Feline FDIM
Canine LSA

76


Epithelial Down Growth

77


School of Veterinary Medicine
Questions?

78