LIVE

2021 Online Seminar on Veterinary Ophthalmology in Companion Animals

Veterinary Continuing Education PSU

05 th Sep

SPEAKERS

- Dr. Thanate Anusaksathien
- Prof.Dr.med.vet. Rüdiger Korbel
- Dr.med.vet. Tanawan Soimala
- Asst.Prof.Dr. Nalinee Tantivanich
- Dr. Ulrike Koch

2021 Online Seminar on Veterinary Ophthalmology in Companion Animals
5th September 2021
Faculty of Veterinary Science Prince of Songkla University (PSU)

Time	Topic	Speaker
08.30 – 08.45	Registration and Checking live systems	
08.45 – 09.00	Opening Ceremony	
09.00 – 10.00	"Pocket Pet Ophthalmology Principle and Applications" (TH)	Dr. Thanate Anusaksathien, M.SC., DTBVS
10.00 - 12.00 (CEST: 05:00 – 07:00)	"I am seeing something you don't see" The Worst Case Scenario and solution in avian Ophthalmology (ENG)	Prof.Dr.med.vet. Rudiger Korbel, ECZM (Avian), Cert. Spec. Vet. Ophthalmol
12.00 – 13.00	Lunch break	
13.00 – 14.00	"Principle Ocular Examination in dog and cat and how to approach emergency condition" (TH)	Dr.med.vet. Tanawan Soimala, M.Sc.
14.00 – 15.00	"Medical Management in Ophthalmic Emergency" (TH)	Asst.Prof.Dr. Nalinee Tantivanich, PhD, DTBVS, DAiCVO
15.00 – 16.00 (CEST: 15:00 – 16:00)	"Essential Surgical Management in Ophthalmic Emergency" (ENG)	Dr. Ulrike Koch, cert. Spec. Vet. Ophthalmol, ECVO Panellists
16.00 – 16.30	Closing Ceremony	

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Our Speaker

Pocket pet ophthalmology
Principles and applications (TH)

Thanate Anusaksathien
M.Sc., DTBVS
Faculty of Veterinary Medicine
Mahanakorn University of Technology

I am seeing something you don't see!
The worst case scenarios and solutions in avian ophthalmology (ENG)

Prof.Dr.med.vet. Rüdiger Korbel
ECZM (Avian), Cert. Spec. Vet. Ophthalmol.
Clinic for Birds, Small Mammals,
Reptiles & Ornamental Fish
Ludwig Maximilian University of Munich,
Munich, Germany

Medical managements in ophthalmic emergency (TH)

Asst.Prof.Dr. Nalinee Tantivanich
PhD, DTBVS, DAiCVO
Faculty of Veterinary Science
Chulalongkorn University

Principle Ocular Examination in dog and cat and how to approach emergency condition (TH)

Dr.med.vet. Tanawan Soimala
M.Sc.
Faculty of Veterinary Science,
Prince of Songkla University

Essential surgical managements in ophthalmic emergency (ENG)

Ulrike Koch
Cert. Spec. Vet. Ophthalmol., ECVO Panellists
Veterinary clinic Oerzen
Melbeck, Germany

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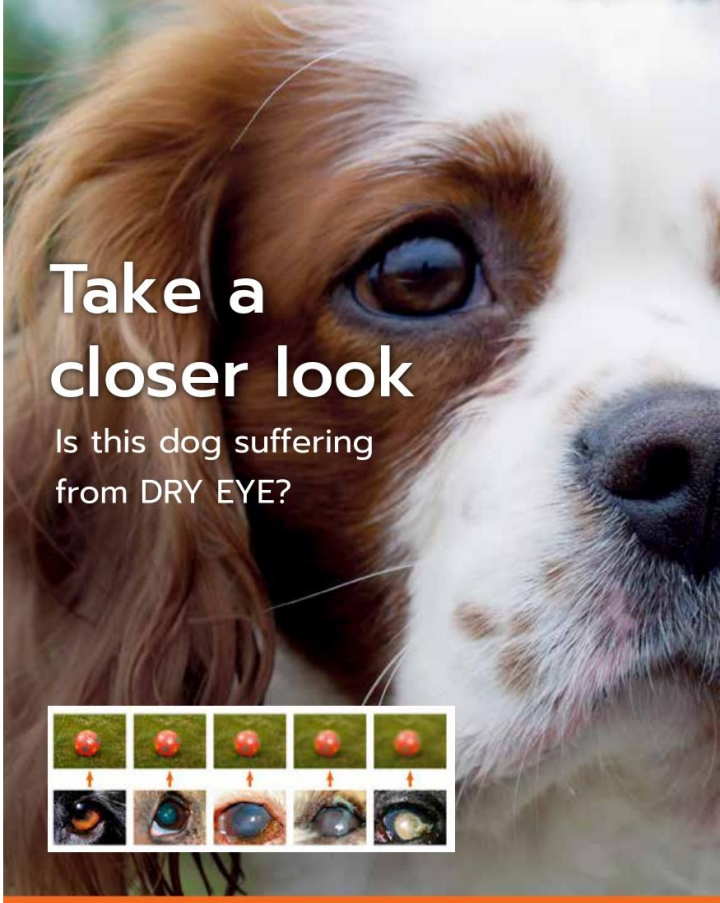

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- **ข้อบ่งใช้**
  ใช้ในการรักษาอาการตาแห้งเรื้อรังที่ไม่ทราบสาเหตุ (Keratoconjunctivitis sicca) และ Chronic superficial keratitis ในสุนัข

- **ขนาดและวิธีใช้ยา**
  ป้ายตาในปริมาณที่เพียงพอ (ประมาณ ¼ นิ้ว หรือ ½ เซนติเมตร) ทุก 12 ชั่วโมง
  ควรล้างสิ่งที่ขับออกจากตาออกก่อนด้วยยาล้างตาที่ไม่ระคายเคือง จากการทดลองทางคลินิก พบว่า 90% ของสุนัขที่เป็น KCS จำเป็นต้องได้รับการรักษาอย่างต่อเนื่อง

- **อาการข้างเคียง**
  อาจเกิดการระคายเคืองเฉพาะที่ ซึ่งแสดงอาการโดยขอบตาแดง เปลือกตาหดเกร็ง และสุนัขขยี้ตามาก แต่พบได้น้อยมาก

- **ข้อห้ามใช้และคำเตือน**
  - ห้ามใช้ในสุนัขที่ตั้งท้อง เนื่องจากยังไม่มีการศึกษาที่ยืนยันถึงความปลอดภัย
  - อาจเกิดการระคายเคืองเล็กน้อยใน 2-3 วันแรกของการป้ายตา และถ้าการระคายเคืองยังคงอยู่ ควรหยุดใช้ยา
  - ห้ามใช้ยาเมื่อสงสัยว่าจะเกิดการติดเชื้อราในตา
  - ผู้ใช้ใช้ยา ควรสวมถุงมือเมื่อใช้ยา หลีกเลี่ยงการสัมผัสยากับผิวหนัง และล้างมือทุกครั้งหลังใช้ยา

ขนาดบรรจุ
หลอดละ 3.5 กรัม

หลังการรักษา 7 วัน | หลังการรักษา 21 วัน | หลังการรักษา 69 วัน

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ชุดเครื่องมือศัลยกรรมพื้นฐาน สำหรับการทำศัลยกรรมทางจักษุสัตวแพทย์

- สามารถใช้ในการศัลยกรรมผ่าตัดเปลือกตา, ขนตา, เยื่อบุตา และ กระจกตา
- ประกอบไปด้วยเครื่องมือทั้งหมด 16 ชิ้น ผลิตจากประเทศเยอรมนี
- เครื่องมือแต่ละชิ้นสามารถจำหน่ายแยกได้

จัดจำหน่ายโดย : บริษัท เบสท์ อีควิปเม้นท์ เซ็นเตอร์ จำกัด

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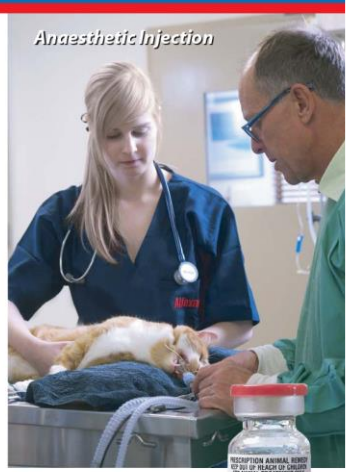

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Alfaxan® has proven, over millions of anesthetic procedures, to have a high degree of reliability and a consistent effects. As an induction agent it has been used in a wide array of surgical procedures from dentistry, castration and ovariohysterectomy, abscess and wound debridement, tumour removal, radiography, caesarean section, cryosurgery, tail amputation, biopsy, nasopharyngeal endoscopy, rectal exam and many others.

Alfaxan® has been the subject or over 100 papers published in per reviews journals or presented at international veterinary conferences. These papers have included comparisons to other anesthetic induction agents, safety, efficacy, administration in a diverse group of species, case report, and use in research for other objectives. This literature can be found readily online or through contacting Jurox Technical Services.

Research literature and clinical case report publication describe Alfaxan® 's use in a wide range of species. (over 200 species) eg. Dog, Cat, Rabbit, Bird, Duck, Chicken, Reptile, Turtle, Crocodile, Pocket pets, Small mammals, Wildlife, Primates, Fish, Rat, Pig, Sheep, Goats, Alpaca, Cattle, Horse and Foal ,etc.

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- Alfaxan has a very **wide safety margin**
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PRINCE OF SONGKLA UNIVERSITY

VETERINARY SCIENCE

"Pocket pet ophthalmology
- Principles and applications (TH)"

Thanate Anusaksathien
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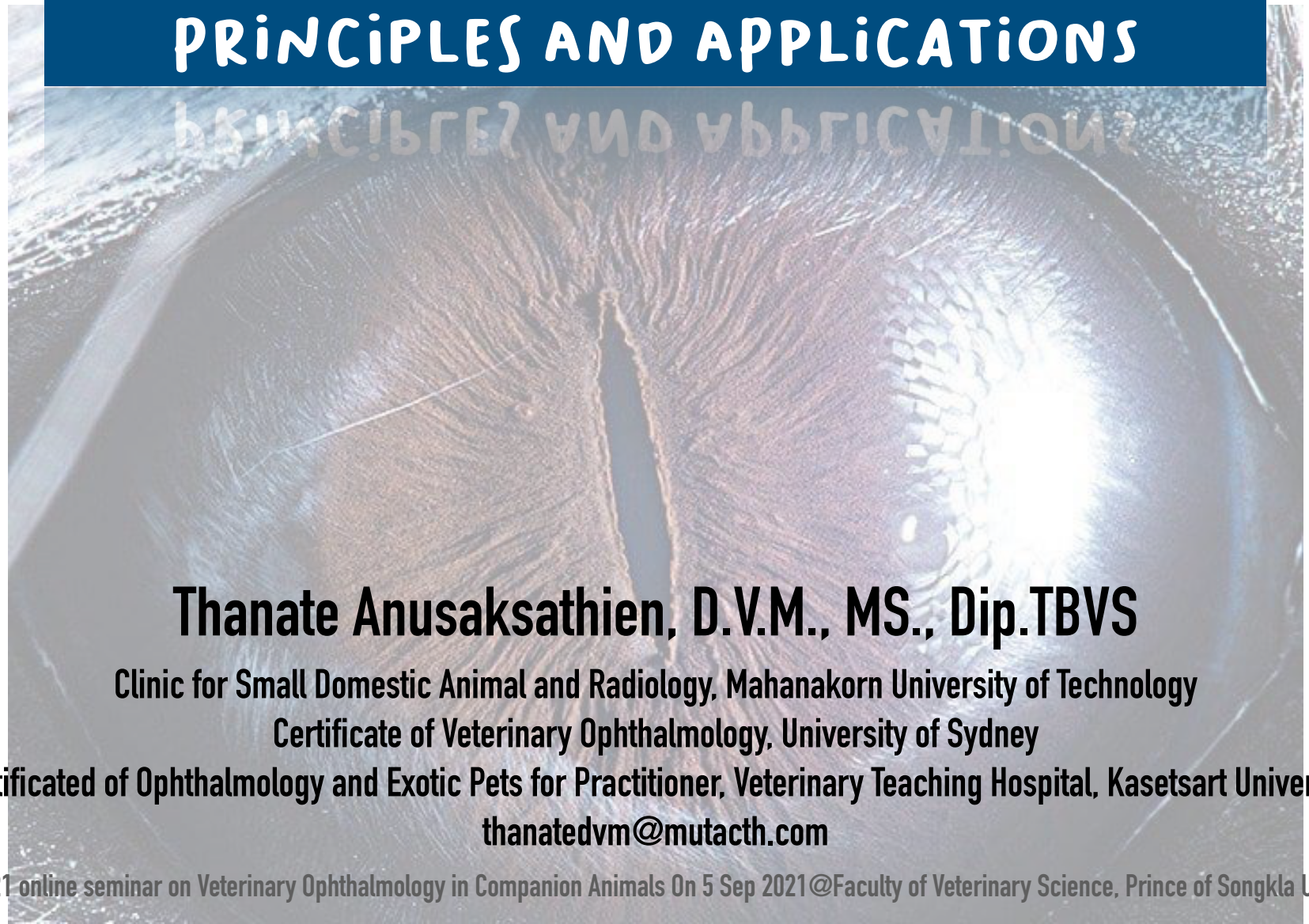
Faculty of Veterinary Medicine
Mahanakorn University of Technology

เอกสารประกอบการบรรยาย **Pocket pets Ophthalmology – Principles and applications**

2021 online seminar on Veterinary Ophthalmology in Companion Animals
On 5 Sep 2021@@Faculty of Veterinary Science, Prince of Songkla University

POCKET PETS OPHTHALMOLOGY

PRINCIPLES AND APPLICATIONS



Thanate Anusaksathien, D.V.M., MS., Dip.TBVS

Clinic for Small Domestic Animal and Radiology, Mahanakorn University of Technology

Certificate of Veterinary Ophthalmology, University of Sydney

Certificated of Ophthalmology and Exotic Pets for Practitioner, Veterinary Teaching Hospital, Kasetsart University

thanatedvm@mutacth.com

2021 online seminar on Veterinary Ophthalmology in Companion Animals On 5 Sep 2021@Faculty of Veterinary Science, Prince of Songkla University

Outline

- What are a Pocket Pets?
- Ocular Anatomy in Pocket pets – Same or different in Dogs and Cats
- Principle Ocular Examination – Tool and Instruments, Technique
- Clinical Ocular Pharmacology and Therapeutics – Medications and therapies for eye diseases in Exotic pets
- Common Ocular diseases

What are a Pocket Pets?

- **Pocket Pet** refers to small animals such as Rabbits, Guinea pigs, Hamsters, Mice, Rats, Gerbils, Chinchillas, Prairie dogs, Degu, Sugar gliders, Hedgehogs, and Ferrets

- Pocket pets' nutritional requirements can range from a simple diet of pellets to a specialized diet, and knowing their specific needs is very important

- For example, **guinea pigs** need Vitamin C supplements

- **Sugar gliders/ Hedgehog** eat a variety of foods from produce to insects

What are a Pocket Pets?

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Ocular Anatomy in Pocket pets
- Same or different in Dogs and Cats

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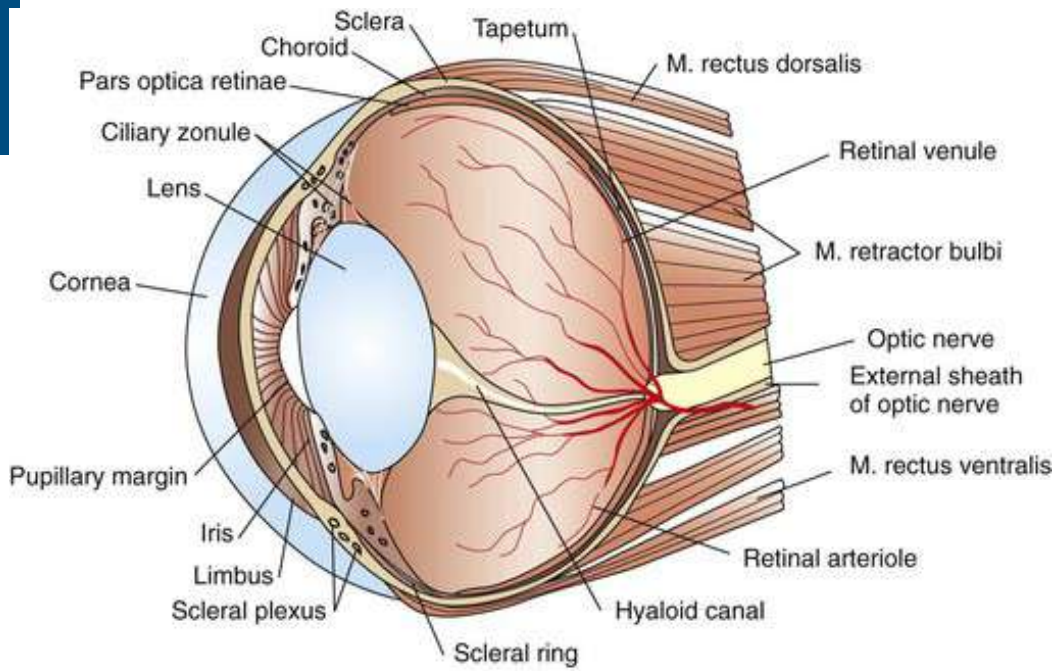

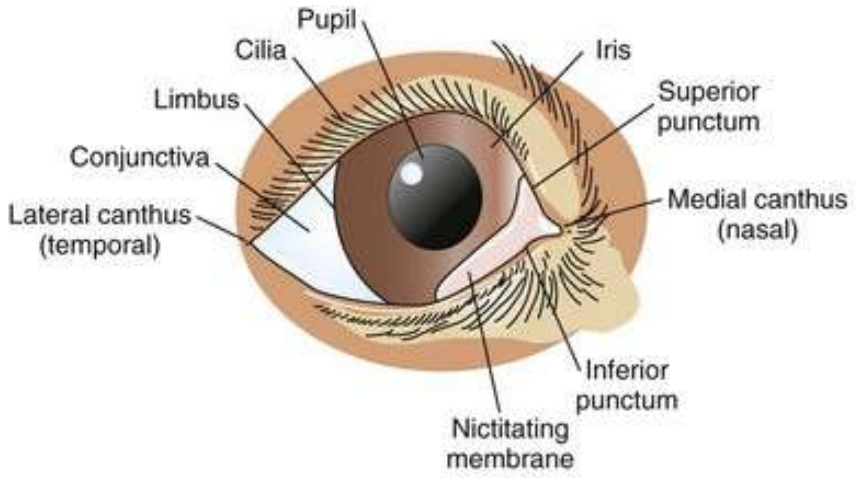

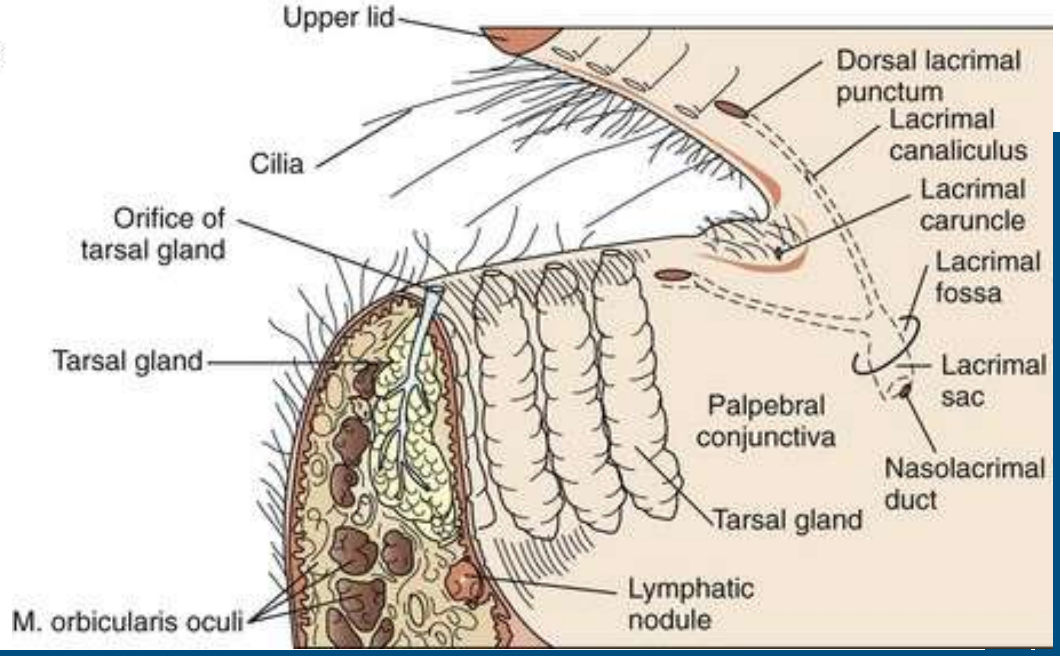

Ocular Anatomy in Pocket pets
- Same or different in Dogs and Cats

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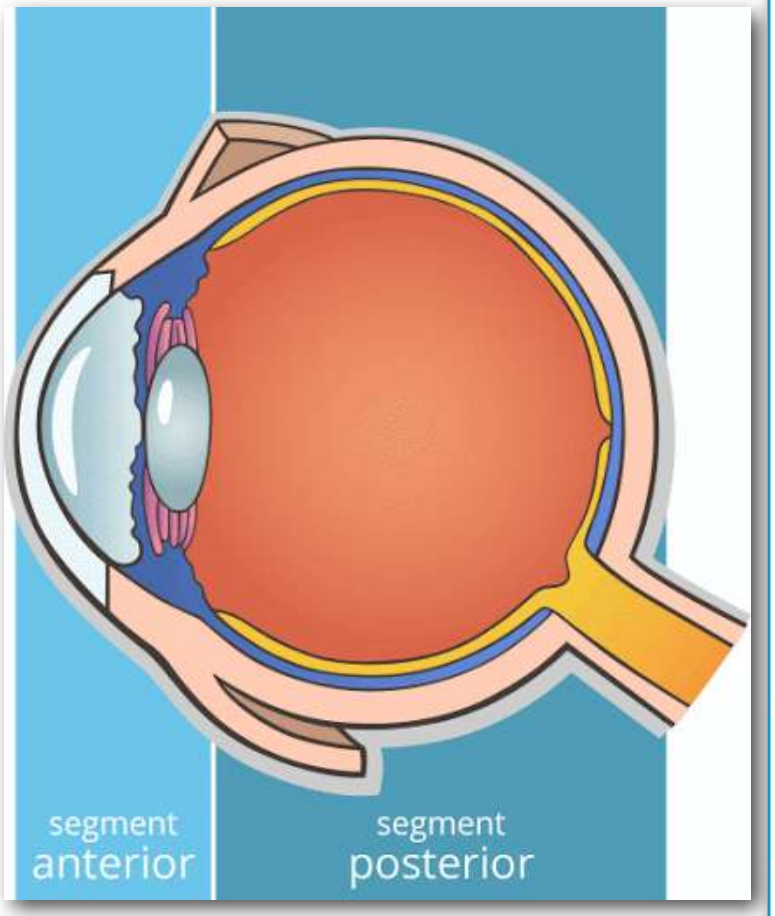
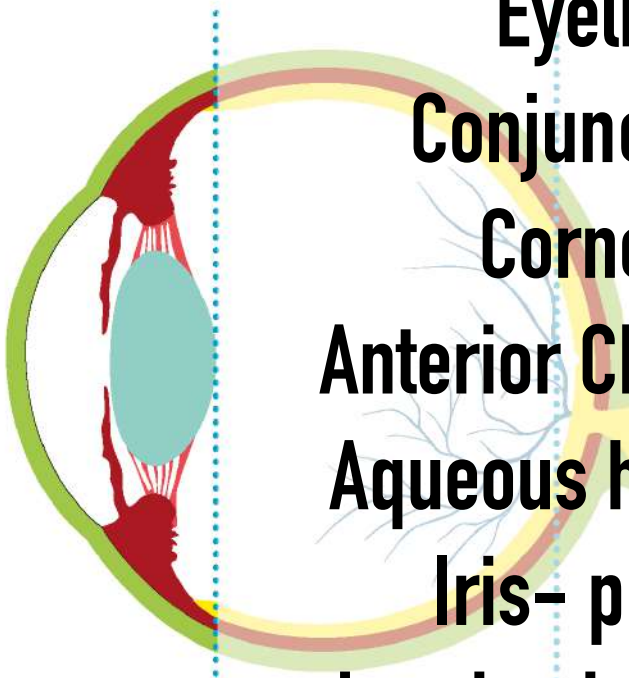


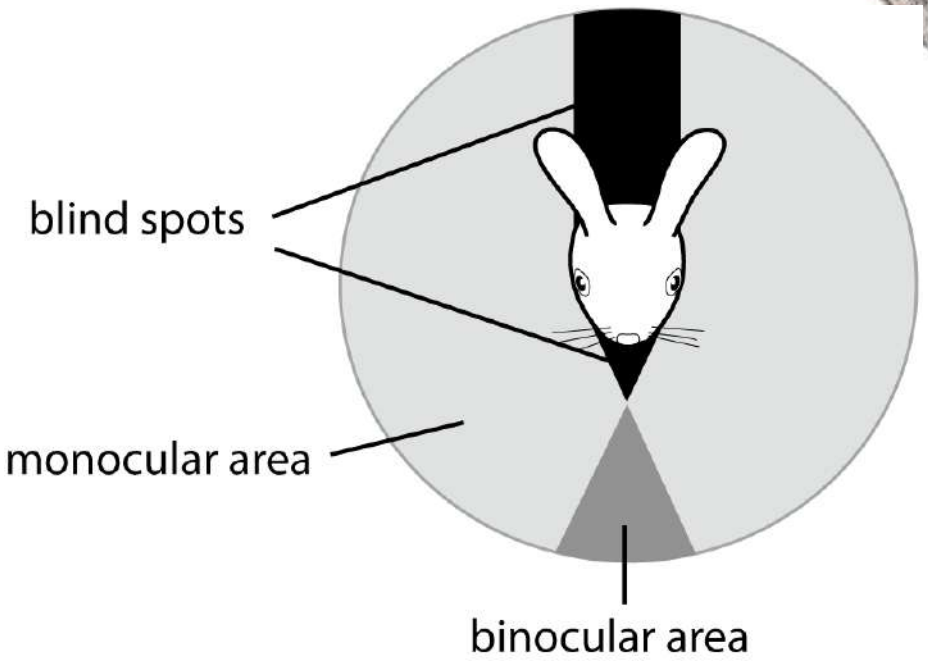


Eyelid
Conjunctiva
Cornea
Anterior Chamber
Aqueous humour
Iris- pupil
Lacrimal system
Meibomian gland
Nasolacrimal duct
Lens

Anterior segment

Rabbit's vision

- The large eyes are located laterally and have a very wide filed of vision to aid detection of predators
- Rabbits have a "blind spot" in the area beneath the mouth, so food is detected by the sensitive lips and vibrissae
- eyes open in 10 days



Ocular Anatomy of Rabbits

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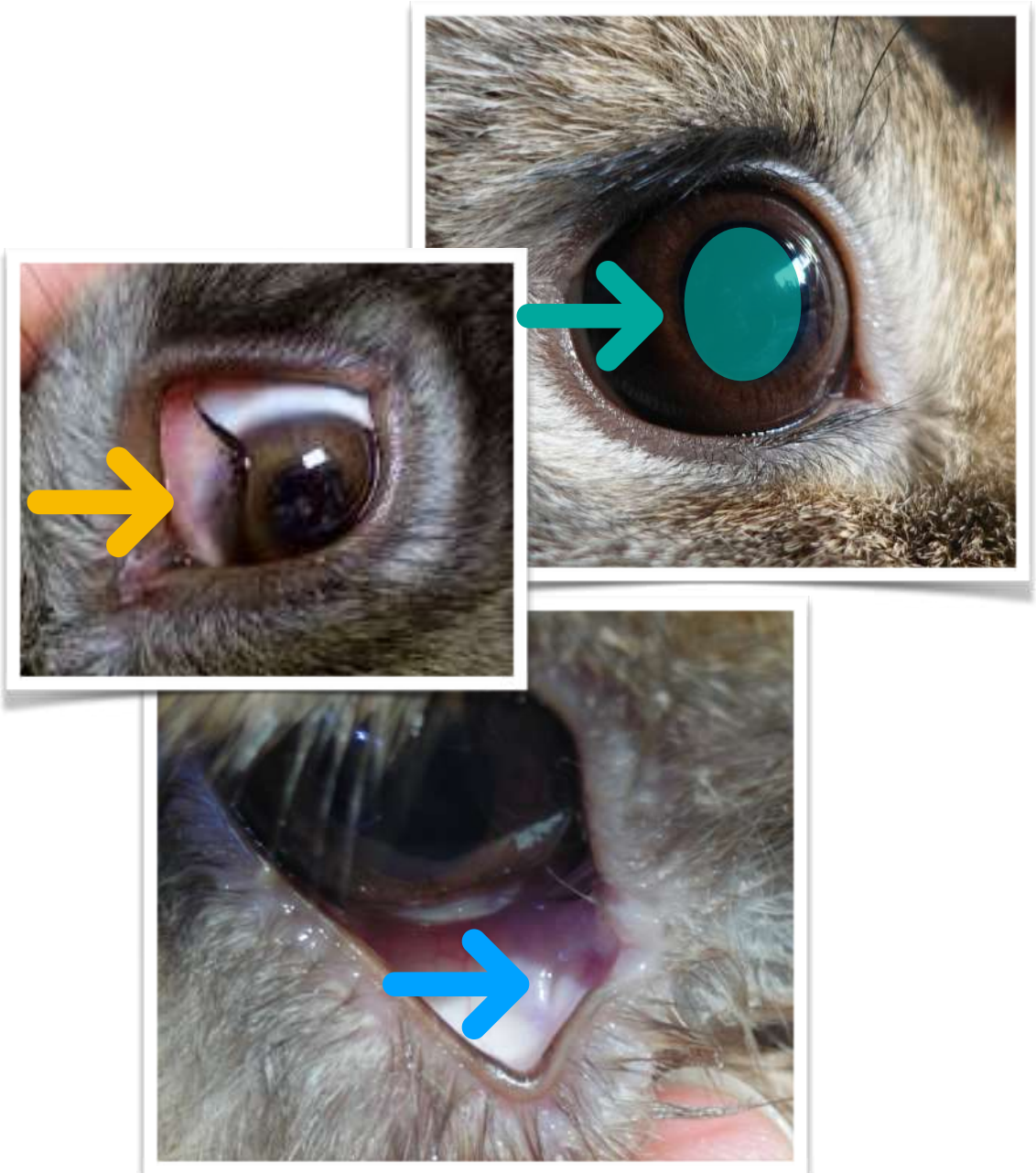
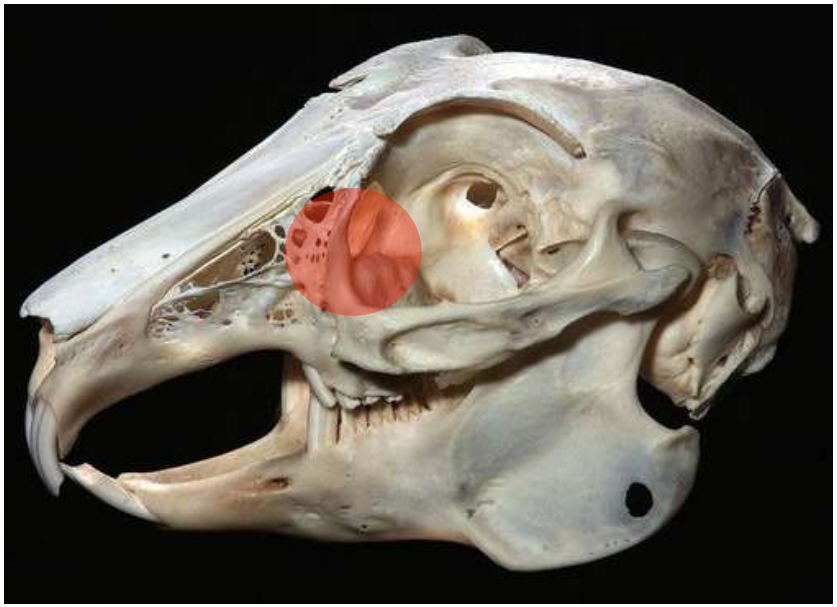
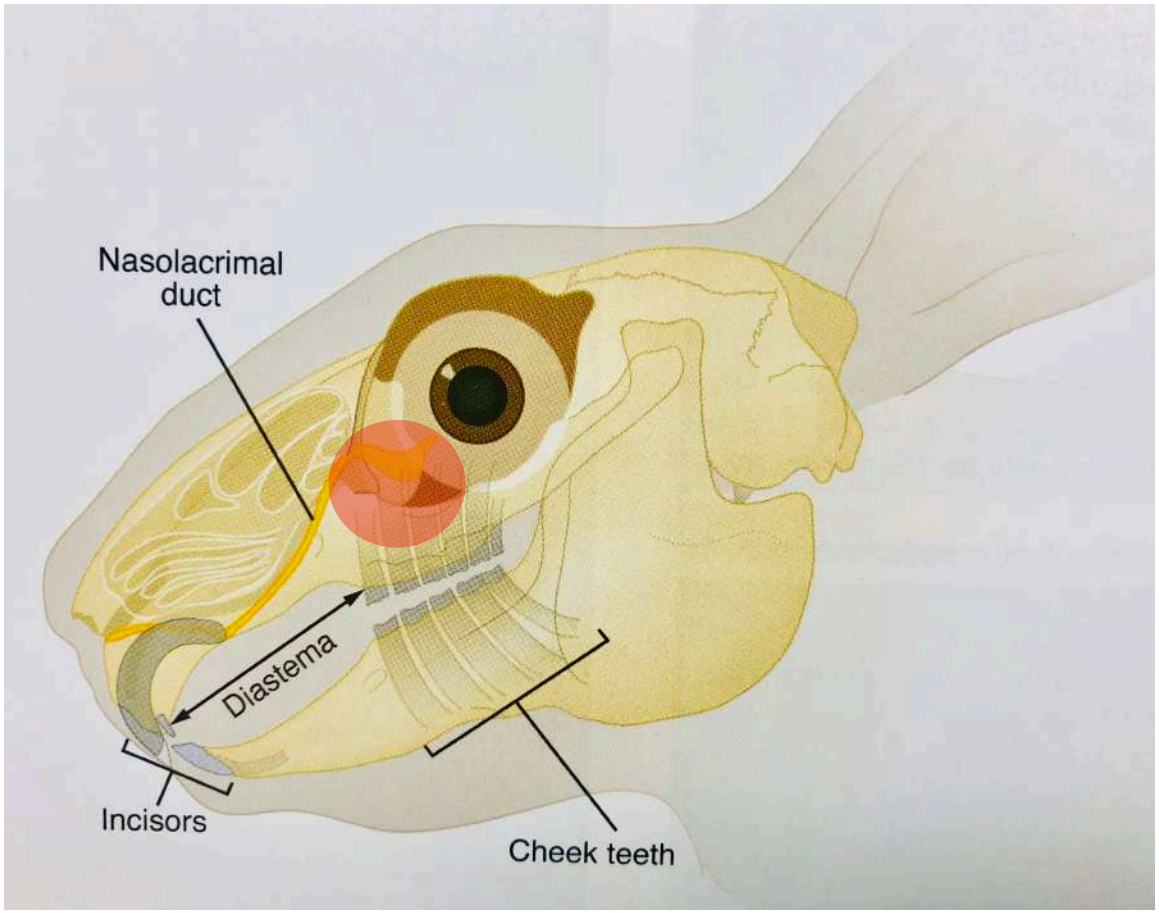
- Large cornea and very large crystalline Lens
- Cornea 30% of the globe
- Pupil is a vertical ovoid
- Small nictitans (third eyelid)
- Single large ventral lacrimal punctum



Ocular Anatomy of Rabbits





- Floor of orbit contains roots or premolar arcade

– Eruption of tooth roots due to dental disease is a major risk factor for retrobulbar abscessation

Ocular Anatomy of Rabbits

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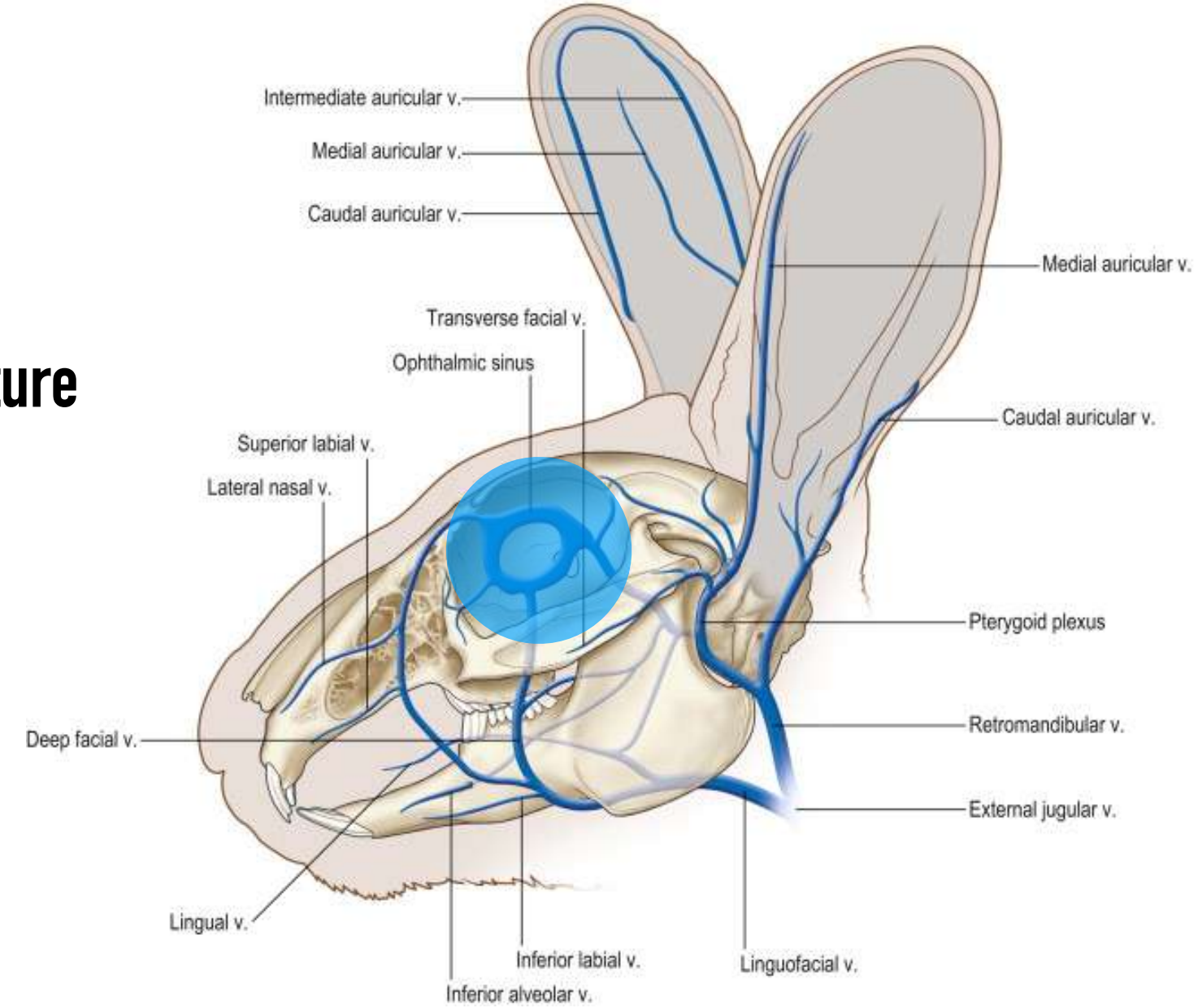
- An important feature is the retrobulbar venous plexus
- Exophthalmos



Prepare to Ocular examination Same or different in Small animals

- Similarly the orbital vascular plexus, present in rodents and lagomorphs, differs substantially between species and understanding its anatomy is important in orbital surgery and enucleation

Prepare to Ocular examination Same or different in Small animals

- First, wherever they occur, ocular pain and blindness may compromise animal welfare
- Second, several eye diseases are important signs of systemic disease with important implications both for pets
- Third, ocular disease may complicate and compromise

Prepare to Ocular examination Same or different in Small animals

- An important feature of the rodent eye is the small volume of tear film on the ocular surface
- Application of even one standard-size drop will flood the ocular surface, thereby leading to nasolacrimal overflow
- Drugs delivered topically may also be absorbed systemically in significant amounts relative to the size of the animal
- This has important implications in both the treatment of ocular disease and potential side effects, as the drug may be acting through circulating blood levels as well as by direct ocular penetration

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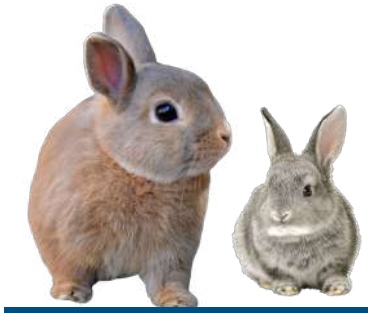
Prepare to Ocular examination
Same or different in Small animals

- Distant hands-off examination
- Hands-on examination
  - "Bunny burrito"



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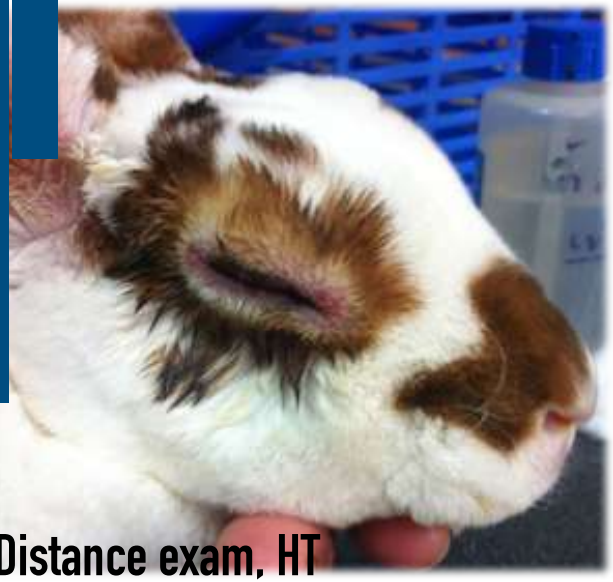
Ocular examination



Distance exam, HT

Schirmer tear test; STT

Intraocular pressure; IOP

fluorescein stain

Nasolcarimal puncta

Principle Ocular Examination
- Tool and Instruments, Technique












Principle Ocular Examination - Tool and Instruments, Technique

- First, wherever they occur, ocular pain and blindness may compromise animal welfare
- Second, several eye diseases are important signs of systemic disease with important implications both for pets
- Third, ocular disease may complicate and compromise

Principle Ocular Examination - Tool and Instruments, Technique

- The menace response is unreliable, but the dazzle reflex is a very useful baseline test of visual function and potential
- Pupillary reflexes are often sluggish and incomplete in the consulting room environment, owing to high catecholamine levels
- Obstacle courses are of limited use; blind rabbits are often able to negotiate obstacles, presumably replying on use of their vibrissae
- Visual placing reflexes can be of use, as can a visual cliff made from a sheet of glass or Perspex placed on top of low blocks

Principle Ocular Examination - Reflex

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Dazzle reflex

Pupillary reflexes

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Spp.	Dazzle	PLR	Menace
 Dogs	+/-	+/-	+/-
 Cats	+/-	+/-	+/-
 Rabbits	+/-	+/-	NF
Rodents			
Hedgehog, Sugar glider			

+Positive,- Negative

*NF= not found

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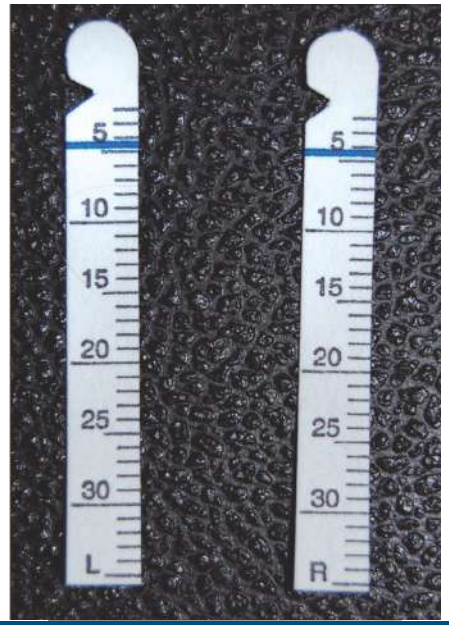
Schirmer tear test

- Determination of tear production
- Schirmer test strip of 5 – 8 mm/min
- Keratoconjunctivitis sicca is rare in rabbits
- Different breeds of rabbit have very different normal ranges of STT



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Schirmer tear test

- The Schirmer tear test is applicable to **rabbits** and **guinea pigs** but the test strip is too large for rats and mice

- Breed differences are significant, with Netherland dwarf rabbits having an unusually high Schirmer tear test reading of 12.0±2.5 mm/min compared with an average of 5.3±2.9 mm/min in other breeds, and a range from 0 to 15 mm/min in 142 normal eyes

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Schirmer tear test

Normal values for tear quantification tests in Exotic species

Species	Schirmer tear test (mm/min)
 Dogs	15 – 25
 Cats	< 10
 **Rabbits**	**5 – 8**
 Guinea pig	0.5 – 1
 Chinchilla	1 – 1.5
 Long-Hard hedgehogs	1.7 ± 1.2

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Schirmer tear test / Phenol Red tear test strip

- Evaluation of the tear film in smaller rodents is difficult, if not impossible, with the Schirmer tear test strip
- The Phenol Red Thread Test may be useful
- This test has been used to measure tear volume rather than production in the mouse while another study compared the PRTT with the Schirmer tear test in rabbits finding mean wetting of the Schirmer test strip of 4.9±2.9mm/min and mean PRTT wetting of 20.9±3.7mm/15 s
- A recent paper on tear evaluation in the guinea pig gave a mean STT of 0.6±1.83 mm wetting/min and a mean PRTT-value of 16±4.7 mm wetting/15 s)

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Phenol Red tear test strip

Ocular Examination

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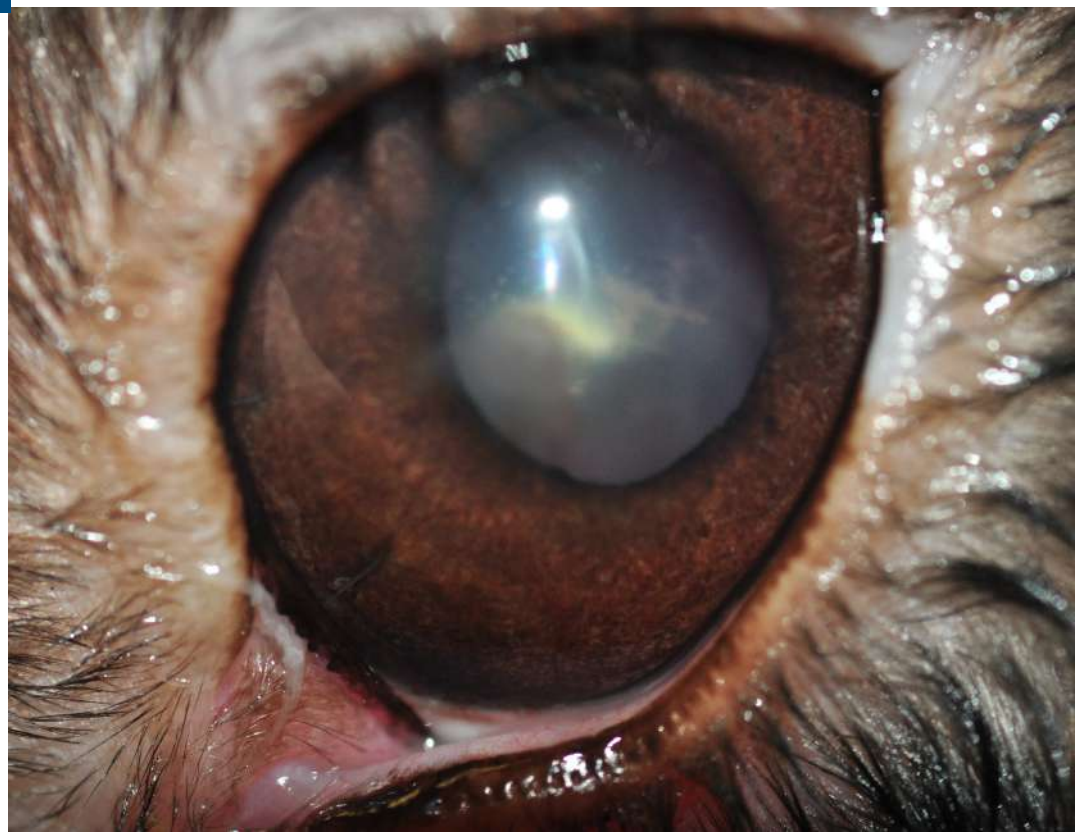


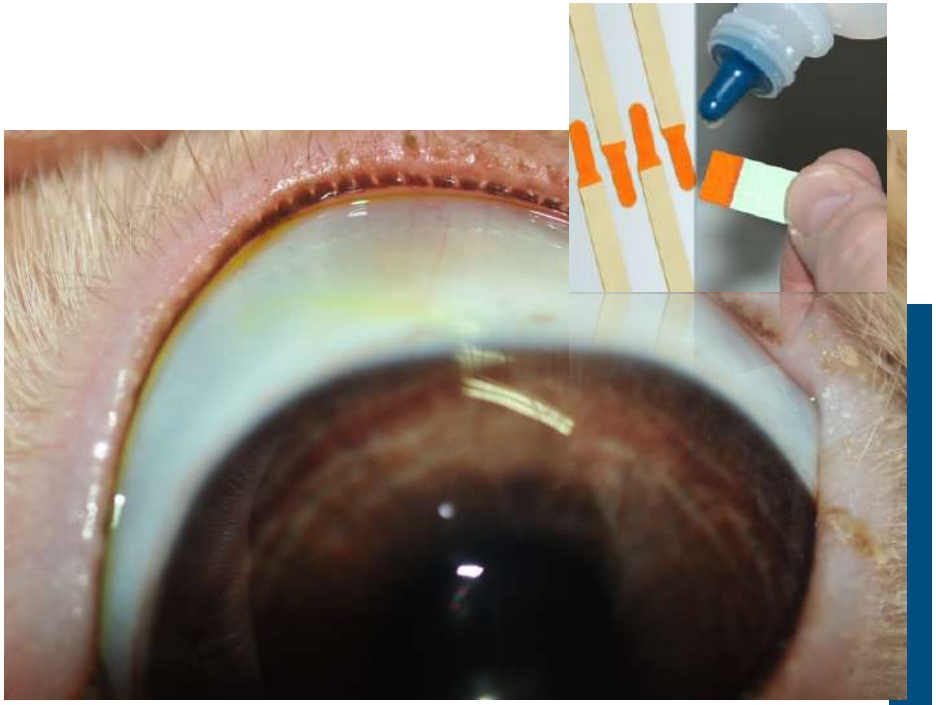
- The normal secretion is milky and libricates the eyelid edges

- The whitish secretion may be noticeable of epiphora is present as a result of blockage of the nasolacrimal duct and should not be confused with a purulent discharge

Ocular Examination

Fluorescein

- Determination of corneal ulcer
- Determination of nasolarimal obstruction



Ocular Examination

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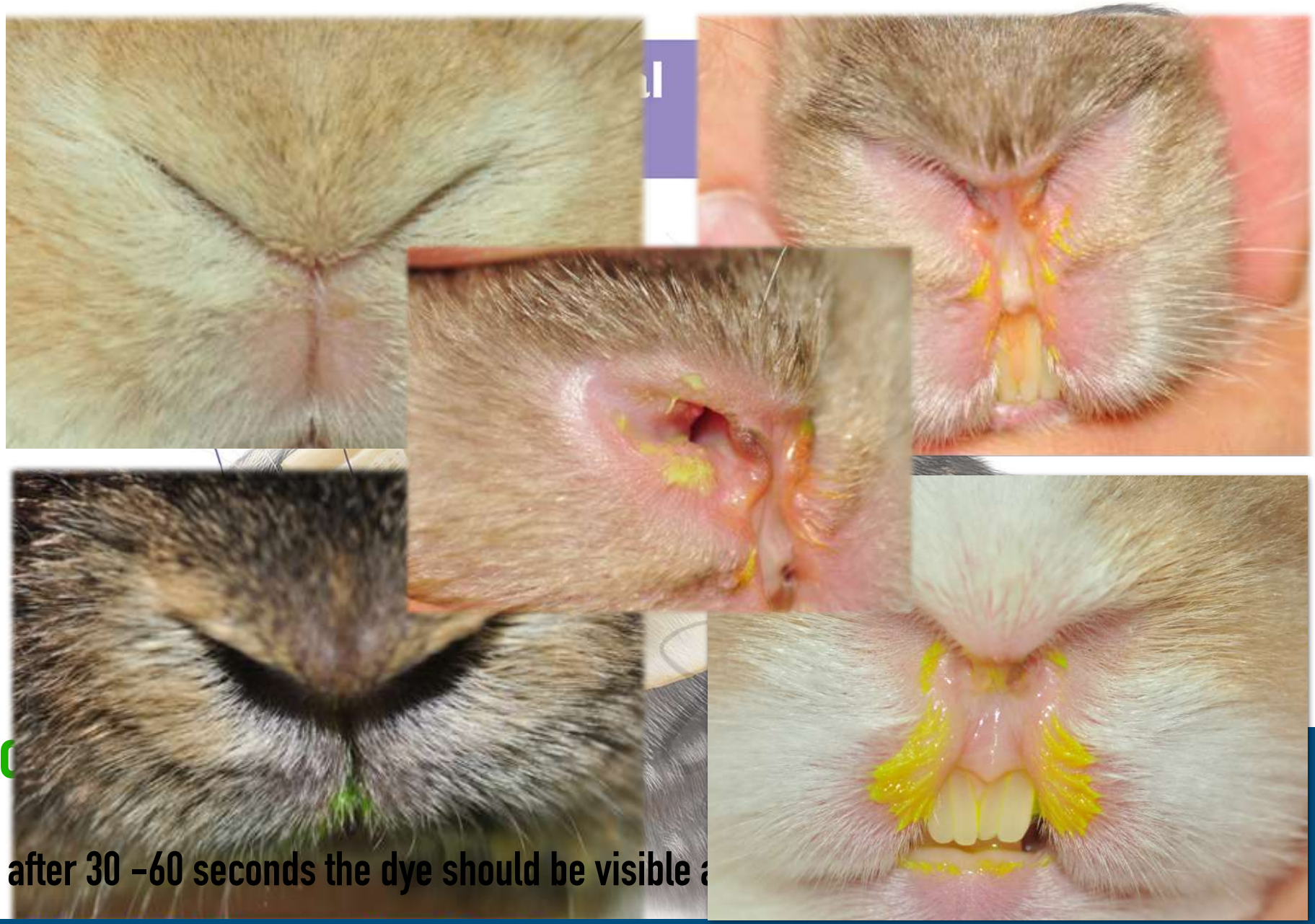


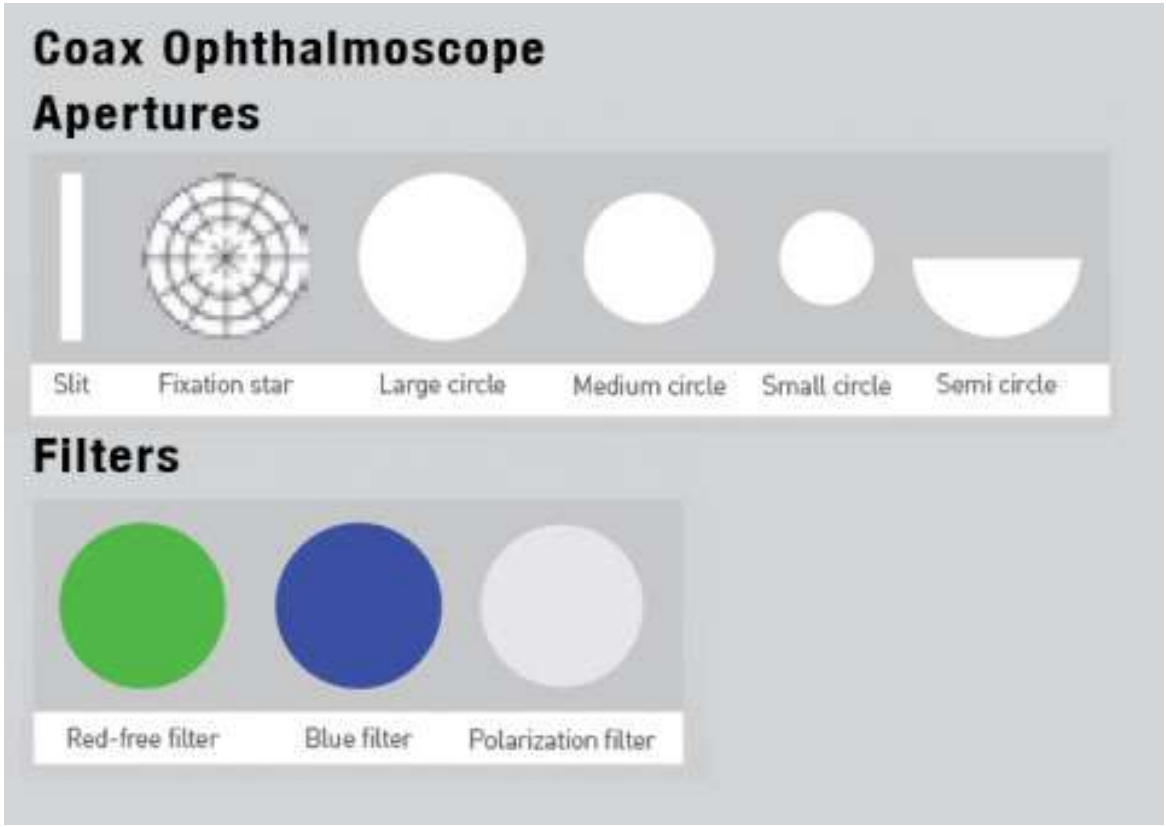
Fluo

after 30 -60 seconds the dye should be visible a

Ocular Examination

slit lamp biomicroscopy – get a better look at the structures

- a stereoscopic magnified view of the eye structures in detail
- a high-intensity light source

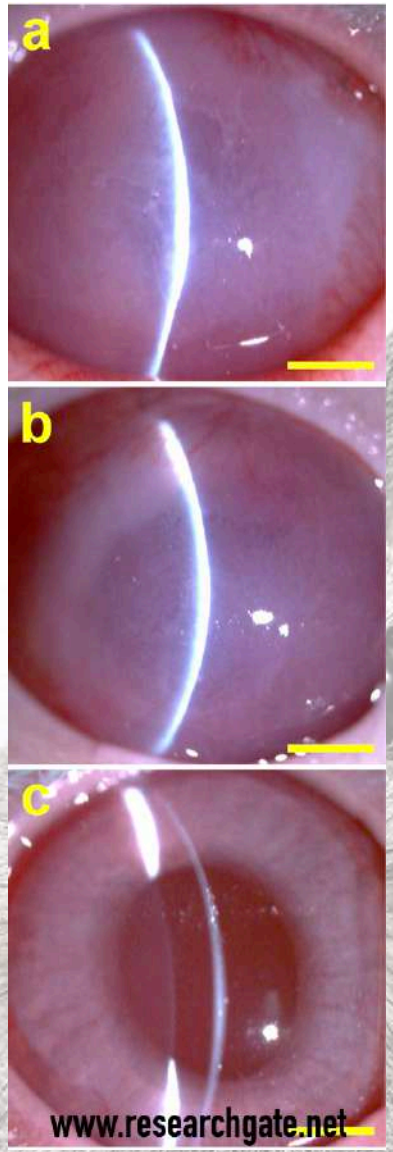


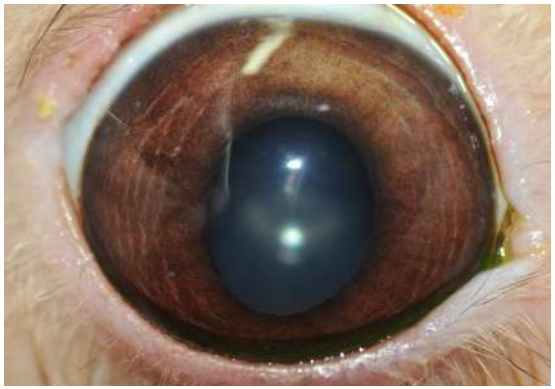
The small size of the eye means that the slit lamp with its high magnification is very useful in many of these species

Slit beam

Ocular Examination

slit lamp biomicroscopy



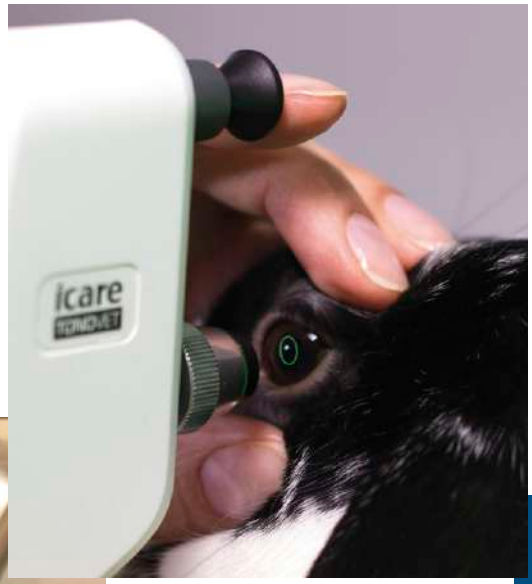


Direct ophthalmoscope

Slit beam

Ocular Examination

Tonometer



Ocular Examination

Tonometer

- Measuring intraocular pressure
- Normal 13 – 20 mmHg
  - Measuring intraocular pressure (IOP) should be a "standard test" for any animal with a red eye, with glaucoma (and a raised IOP) or uveitis (with a correspondingly lower value)
  - Two important diagnoses differentiated by tonometry
    - Applanation tonometry (TonoPen)
    - Rebound tonometer (TonoVet) : a corneal diameter less than 5mm

- Over 20 mmHg (glaucoma) or under 10 mmHg (uveitis)

Ocular Examination

Tonometer


- The small size of the globe in many species also complicates methods for measuring intraocular pressure
- The Tonopen has been favorably evaluated in rabbits and the small eyes of rats but the footplate is too small for mice
- The new rebound tonometer (TonoVet) is small enough to provide accurate measurements of intraocular pressure in even the smallest rat and mouse eyes as shown experimentally yet its accuracy and repeatability have yet to be reported in the clinical setting for any rodent species

Ocular Examination

Tonometer

EJCAP – Vol. 17 – Issue 3 December 2007

Normal intraocular pressure (IOP) values in Exotic species

Species	Tonometry value (mmHg)
 Dogs	15 – 25
 Cats	15 – 25
 Rabbits	13 – 20
 Guinea pig	18.27 +/- 4.55
 Chinchilla	4.7-14.7
 Long-Hard hedgehogs	20.1 ± 4.0
 Ferret	14.50 +/- 3.27

Ocular Examination

Fundus examination

- Direct/ Indirect/ Panoptic ophthalmoscope
- Using +20 D the cornea can be seen at high magnification
- Regularly examine rodents use the indirect technique and a +30D lens to examine the ey
- 90D

Ocular Examination

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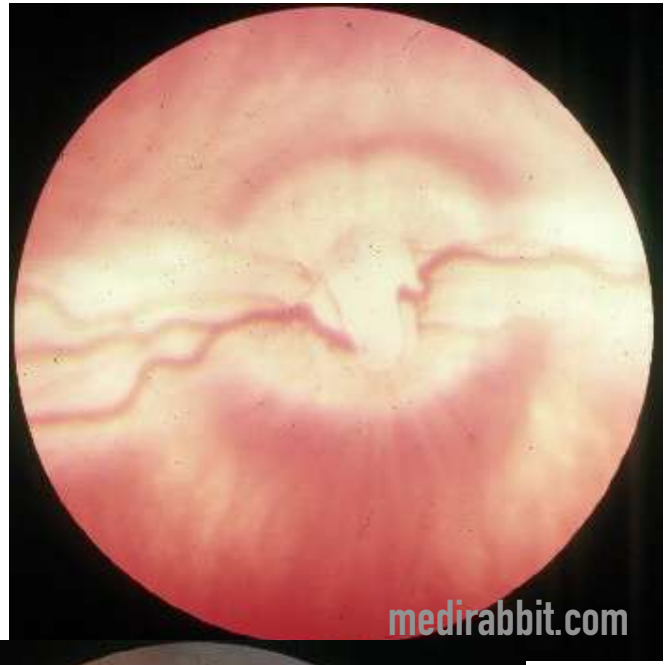
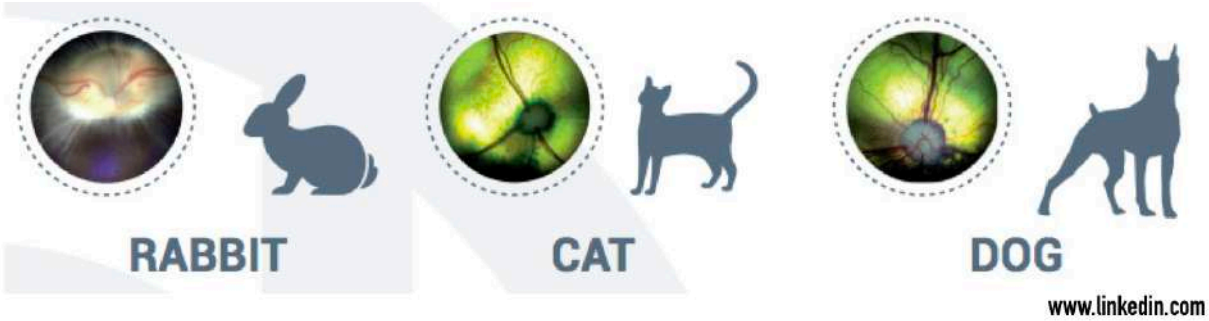
Rabbits

- **Merangiotic fundus**: large extensively myelinated optic disc with natural pit in centre

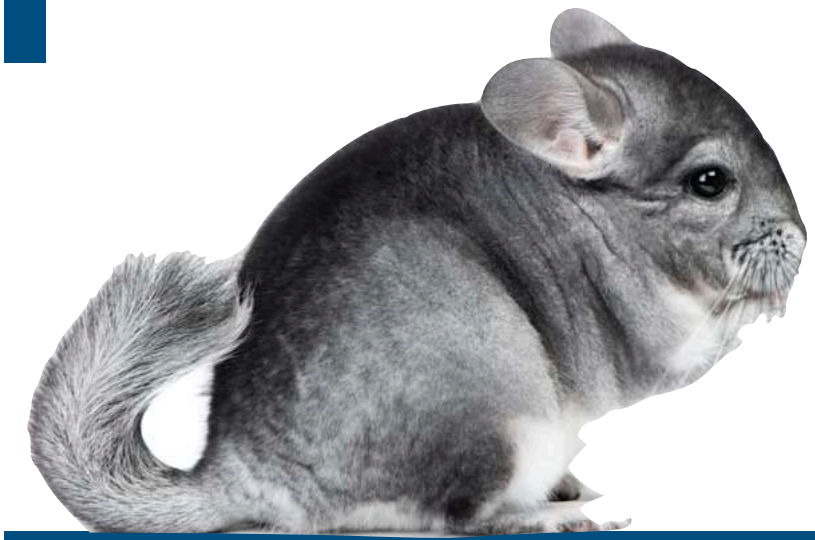


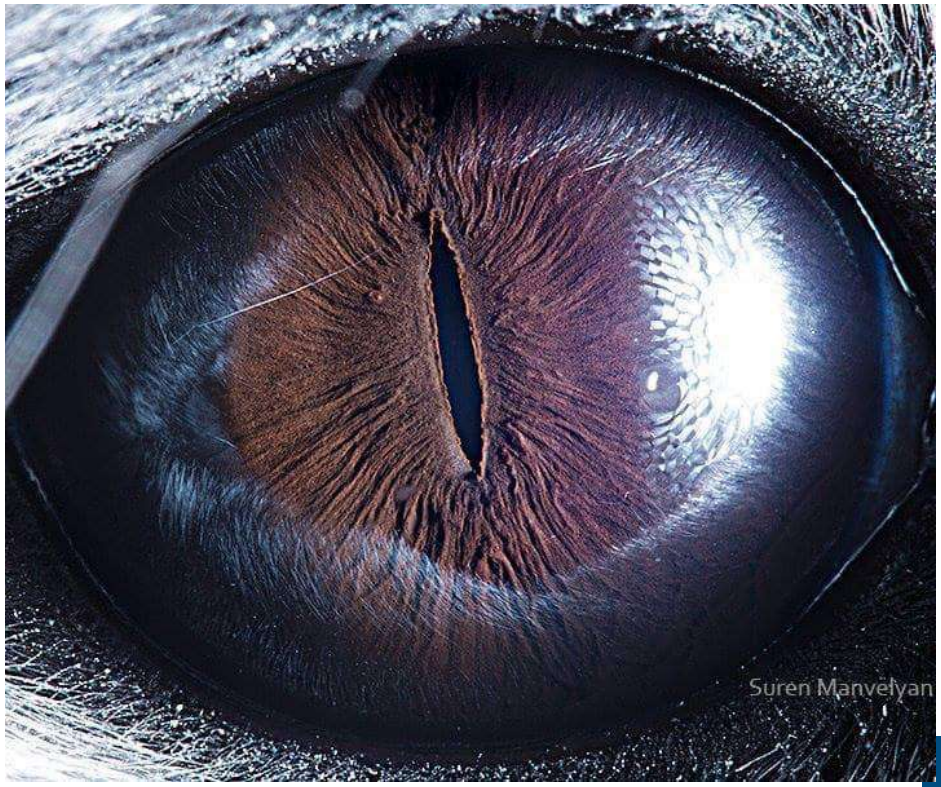
- Retinal vessels radiate medially and laterally



Ocular Examination

- **Chinchilla,** a vertical slit pupil, and an anangiotic fundus with variable vascularization of the optic disc





Guideline Ocular Examination

By Thanate Anusaksathien, DVM, M.S, Dip. TBVS

History taking / Distance Examination

- Epiphora
  - Irritation / Obstruction
  - Pain / Photophobia
- STT
  - < 15 mm/min → KCS
  - >25 mm/min
- Special considerations
  - Menace response → non- specific
  - Dazzle reflex → non-specific
  - Pupillary light reflex → non-specific
  - Pupil size: Miosis may suggestive Uveitis; Mydriasis may suggestive Glaucoma
  - Obstacle course: Photopic and Scotopic
- Neuro-Ophthalmology
- Adnexa examination
- Eyelid
  - Meibomian gland
  - Ectopic cilia
  - Districhiasis
  - Trichiasis
  - Mass
  - En / Ectropion
- Conjunctival hyperaemia
  - Palpebral → Conjunctivitis
  - Bulbar → More indicative of Cornea/Intraocular diseases
- Cornea/Scleral examination
  - Fluorescein stain → Ulcer + / - ve
  - Corneal neovascularization → Superficial/ Deep
  - Corneal edema → Diffuse/General*
  - Pigment /Cellular / Abscess/ Metabolic infiltration
- Anterior segment examination
  - Iris → Iritis/ Iris edema; Synechia: Ant./Posterior
  - Aqueous flare → Negative → Observe; Positive → Fibrin, Hyphema, Hypopyon, KPs
- Posterior segment examination
  - Lens
    - Position: Subluxation (Aphakic crescent) Luxation (Ant./Posterior)
    - Nuclear sclerosis
    - Cataract
  - Vitreous
    - Haemorrhage
    - Degeneration
  - Retina → Normal / Abnormal
    - Ultrasonoghaphy
    - Electroretinography
- Tonometer
  - < 15 mmHg → Uveitis* → Primary/Secondary
  - > 25 mmHg → Glaucoma* → Primary / Seconadary
    - Gonioscopy → Open angle / Angle closure
- Fundus examination
  - Direct / Indirect / Panoptic Ophthalmoscopy

Clinical Ocular Pharmacology and Therapeutics

Atropine and tropicamide

- are generally effective in providing pupil dilation

- **Mydriasis** can be a significant problem in different exotic animals
- The mammals have autonomically innervated iris musculature
- Parasympatholytic agents

Clinical Ocular Pharmacology and Therapeutics

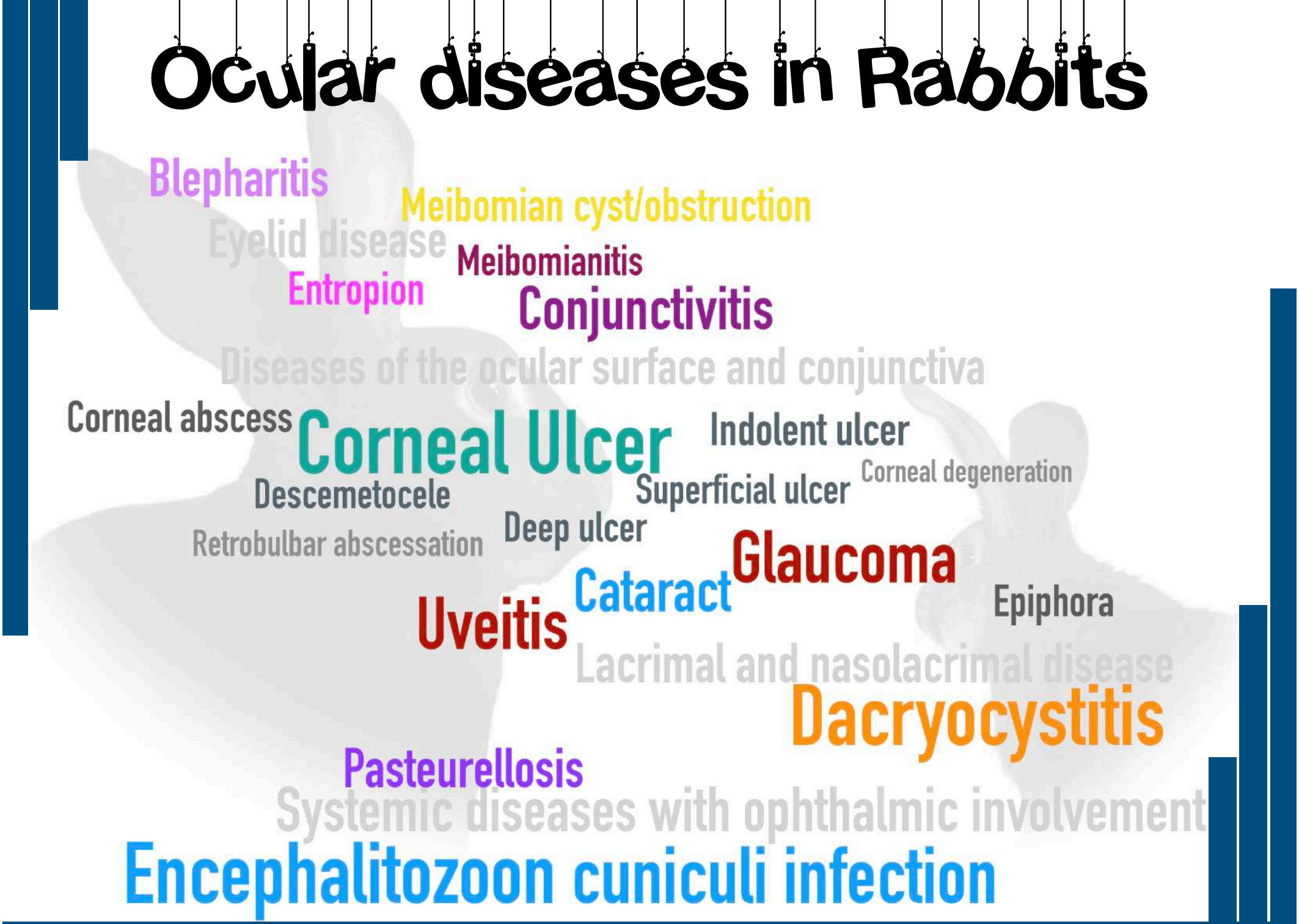
- "Rabbits and rodents" with pigmented irides
- Often show poor or slowly acting pharmacologically mediated mydriasis
  - Some contain atropinase
  - An enzyme that breaks down atropine
  - While in others the drug is bound to pigment, changing its efficacy

Ocular diseases in Pocket pets

The rat and mouse

- Conjunctivitis
- Corneal ulceration
- Porphyrin pigmented
- Corneal opacification is relatively common in rodents
- Exposure keratopathy
- Glaucoma has also been noted in rodents
- Cataract
- Uveitis
- Lens luxation (Anterior or/and Posterior)
- Abnormalities of the fundus may be congenital lesions, inherited retinal dystrophies, inflammatory lesions, degenerations and detachments

Ocular diseases in Rabbits



Thanate Anusaksathien

Ocular diseases in Pocket pets

The rabbits

Conjunctivitis and dacryocystitis

Purulent ocular discharge with conjunctival hyperemia often relates not just to conjunctivitis but also to nasolacrimal duct infections

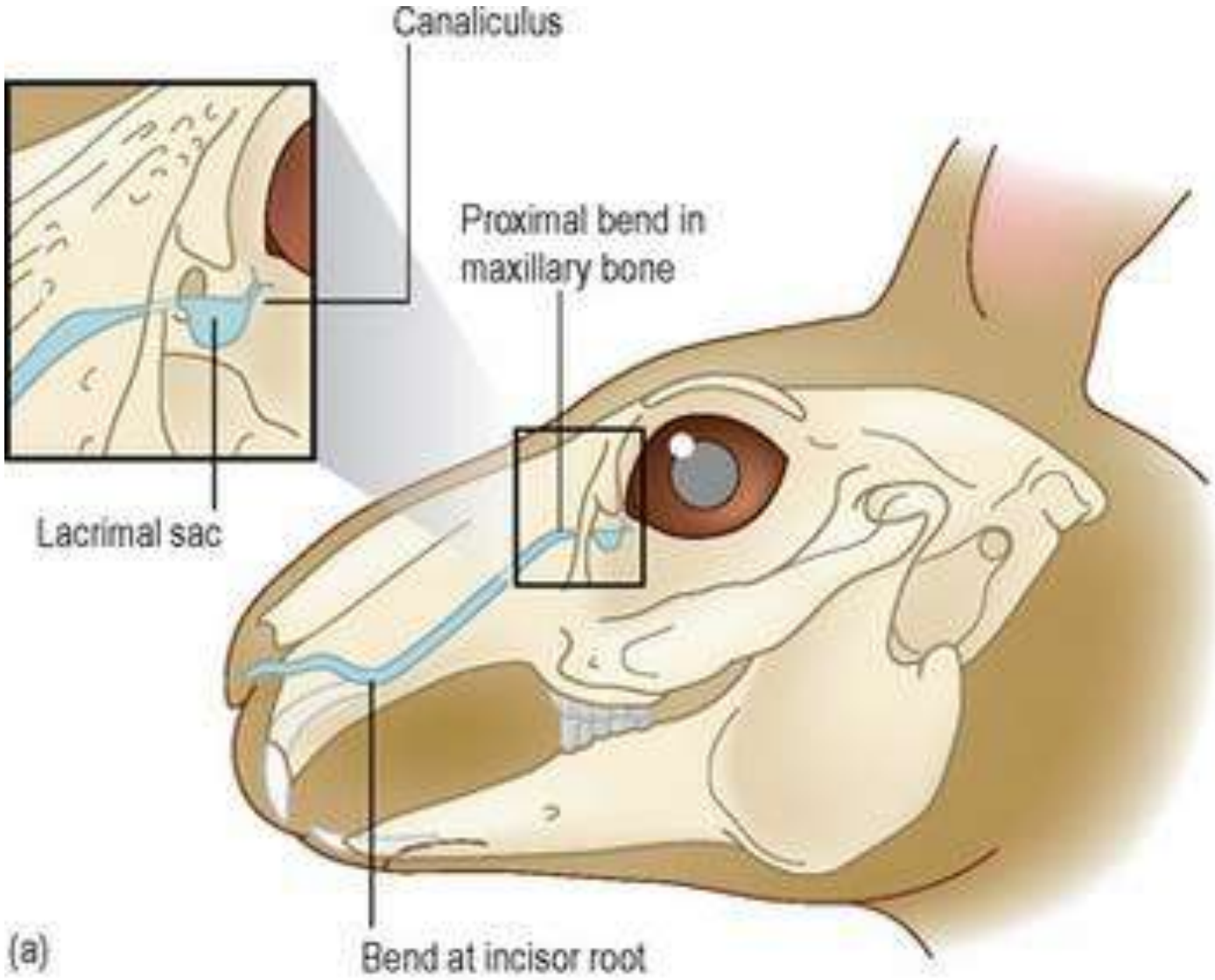
- The diagnosis of infective conjunctivitis and dacryocystitis should be approached on the basis of understanding the normal bacterial flora of the conjunctival sac
- Pasteurella sp. is considered by many to be the most common bacterial pathogen in the rabbit, but it is important not to forget Staphylococcus aureus
- In a survey of staphylococcal disease in rabbits, more than 60% had nasal exudate with conjunctivitis and in another report of conjunctival flora in rabbits with conjunctivitis and dacryocystitis, Pasteurella was not the most commonly isolated species: bacteria were isolated from 78% of swabs with Staphylococcal species found in 42% of isolates while Pasteurella species were only detected in 12%

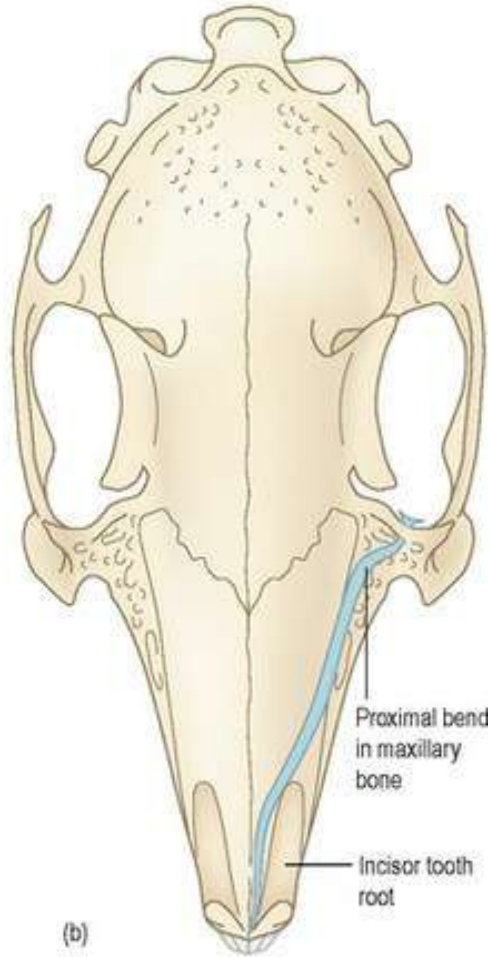
Ocular diseases in Pocket pets

The rabbits

Ocular diseases in Rabbits

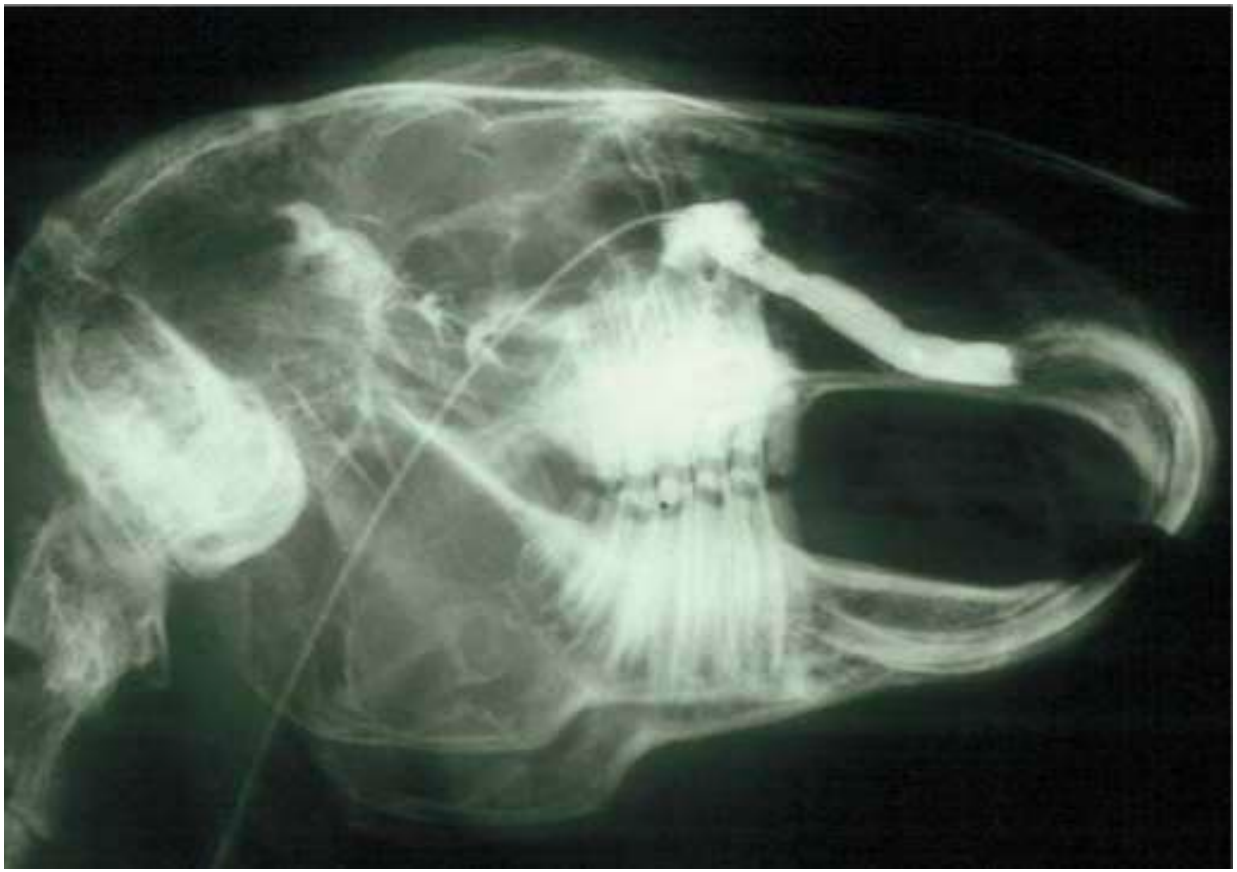
Dacryocystitis





Ocular diseases in Pocket pets

The rabbits



Dacryocystorhinography

Radiography: Rabbits skull

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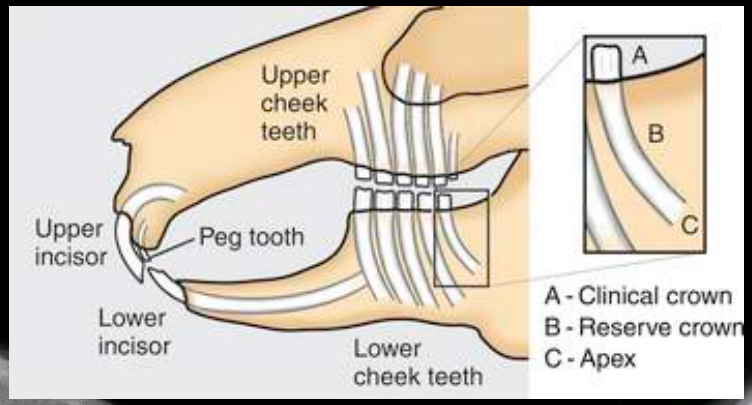
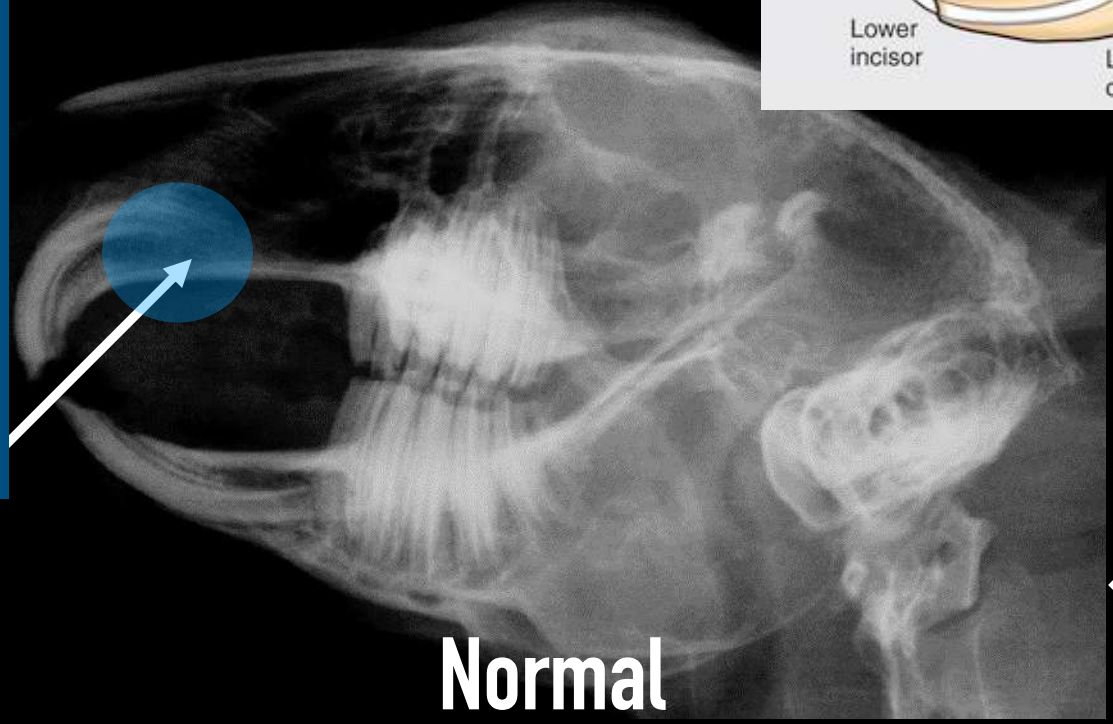
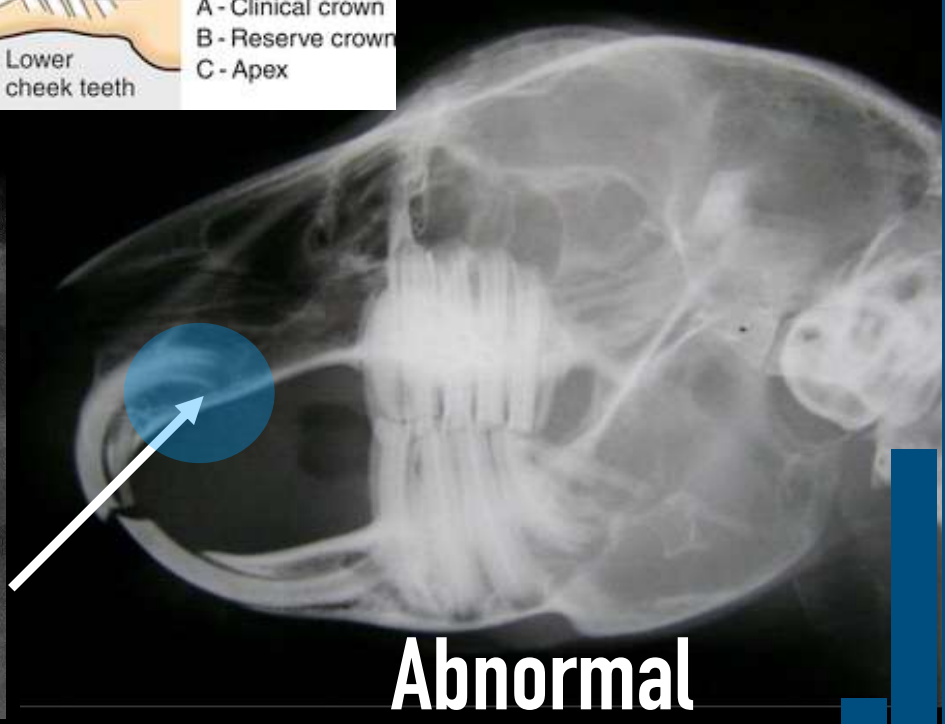




Normal



Abnormal

Radiography: Rabbits skull

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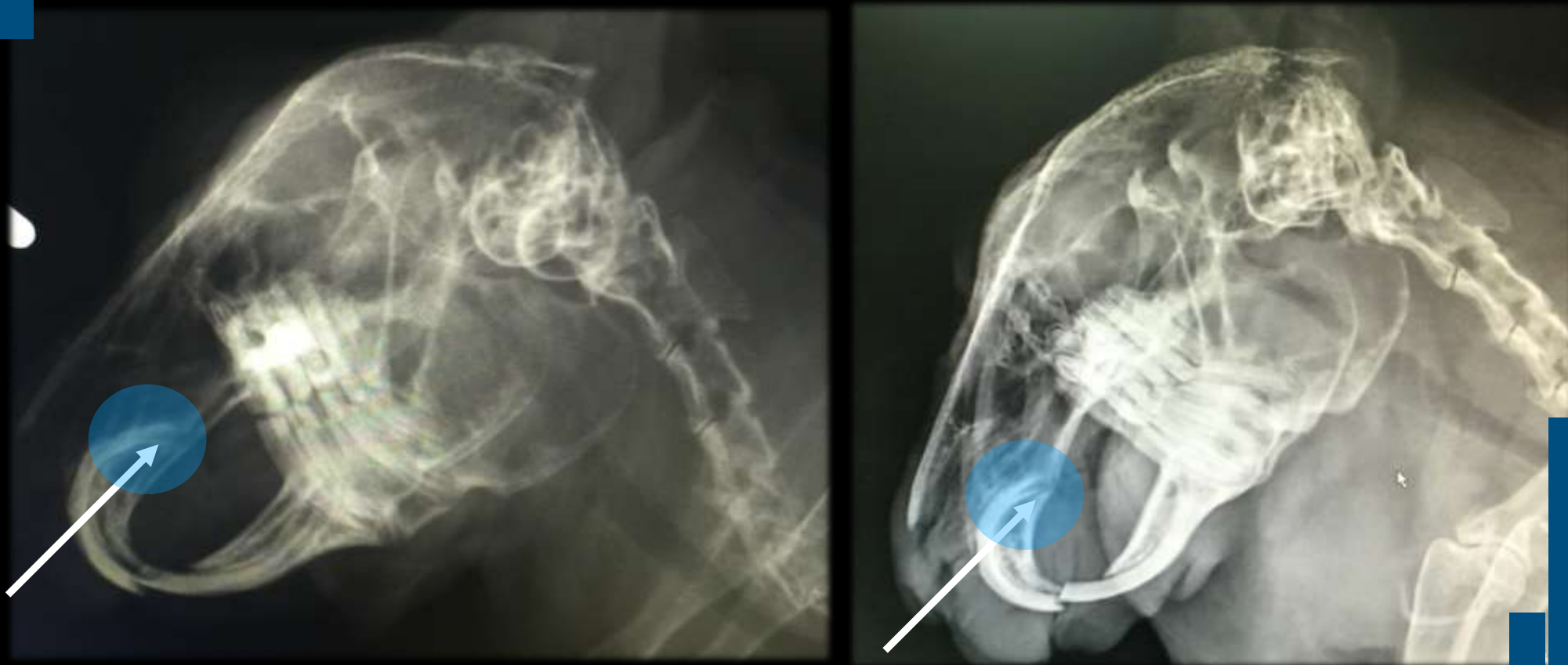

malocclusion

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Radiography: Dacryocystography

- Dacryocystography using an iodinated contrast medium can be used to outline the nasolacrimal duct

Radiography: Dacryocystography

Adapted from Harcourt-Brown F: Dacryocystitis in rabbits. Exotic DVM 4(3):47–49, 2002.

Ocular diseases in Pocket pets

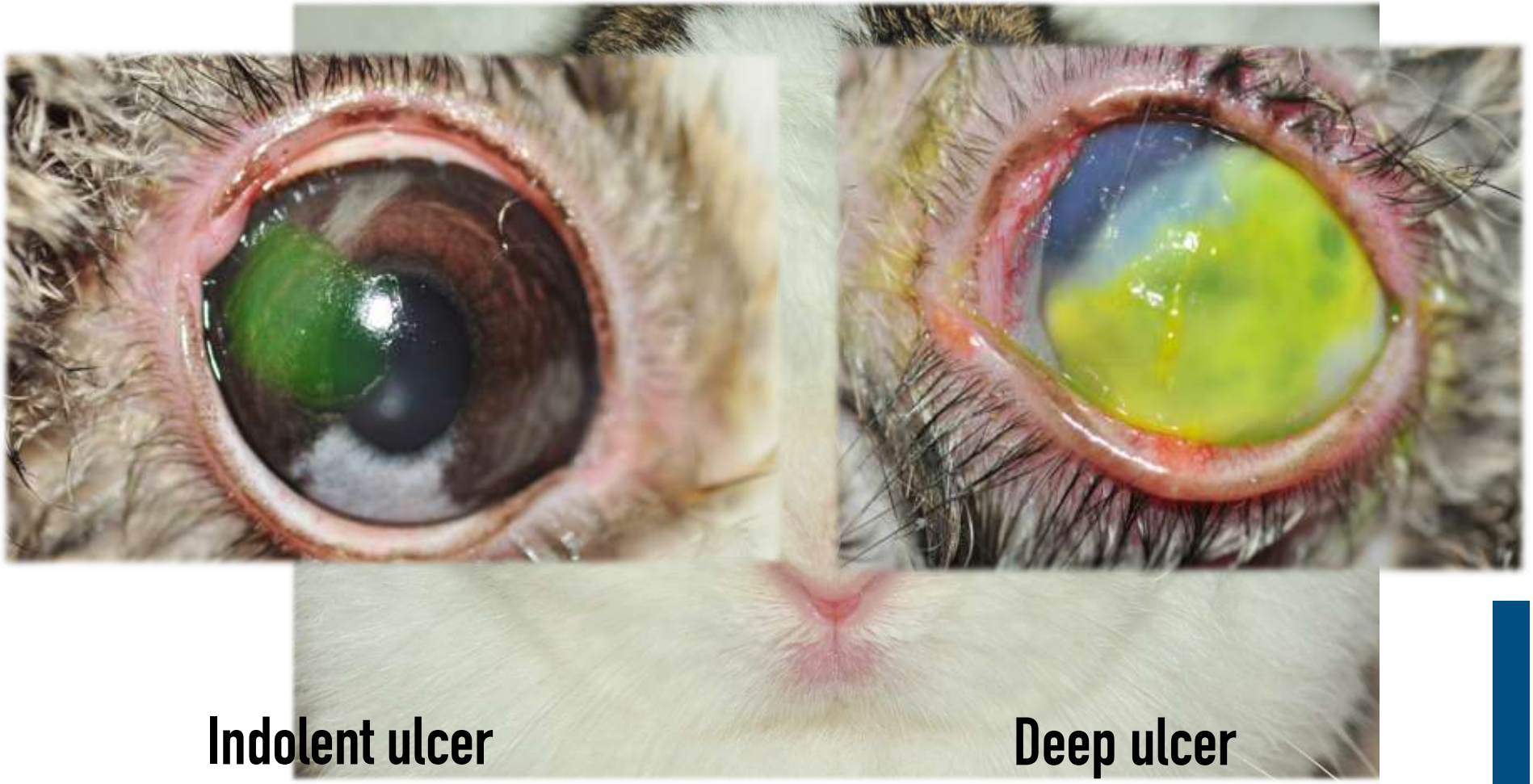
The rabbits

- Conjunctivitis and dacryocystitis
- Culture of nasolacrimal flushes from affected rabbits

Ocular diseases in Pocket pets

The rabbits

- Corneal ulceration



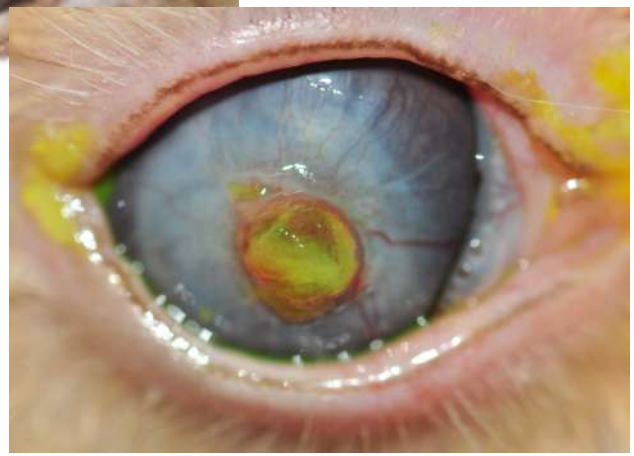
Indolent ulcer

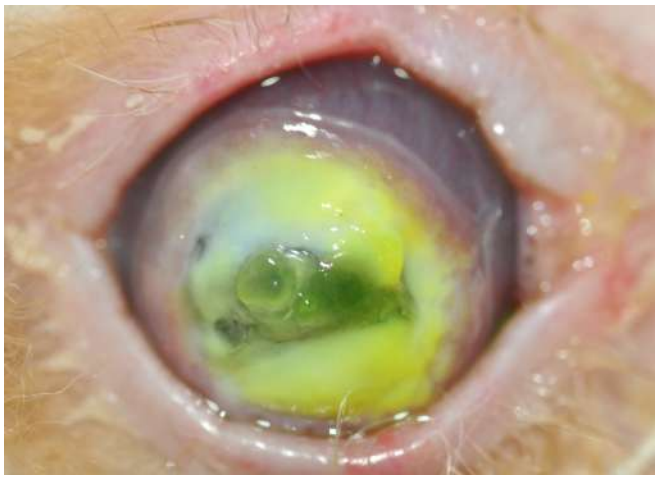
Deep ulcer

Ocular diseases in Pocket pets

The rabbits

- Corneal ulceration





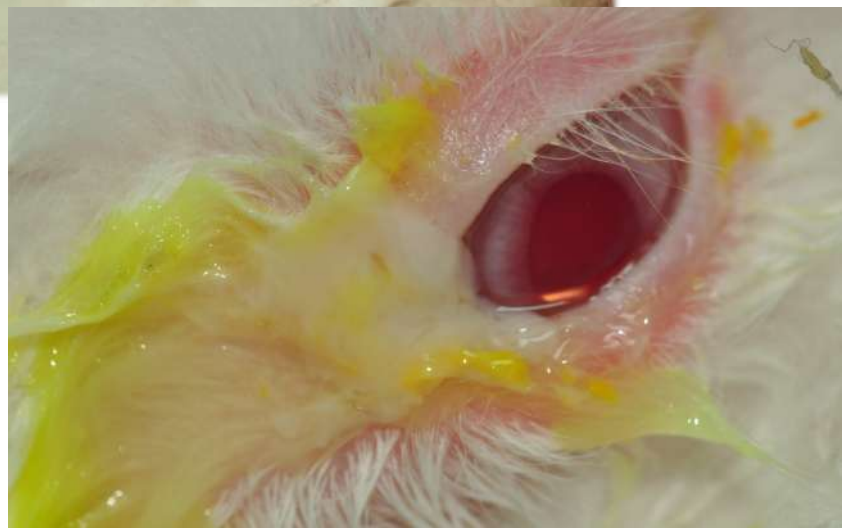
Ocular diseases in Pocket pets

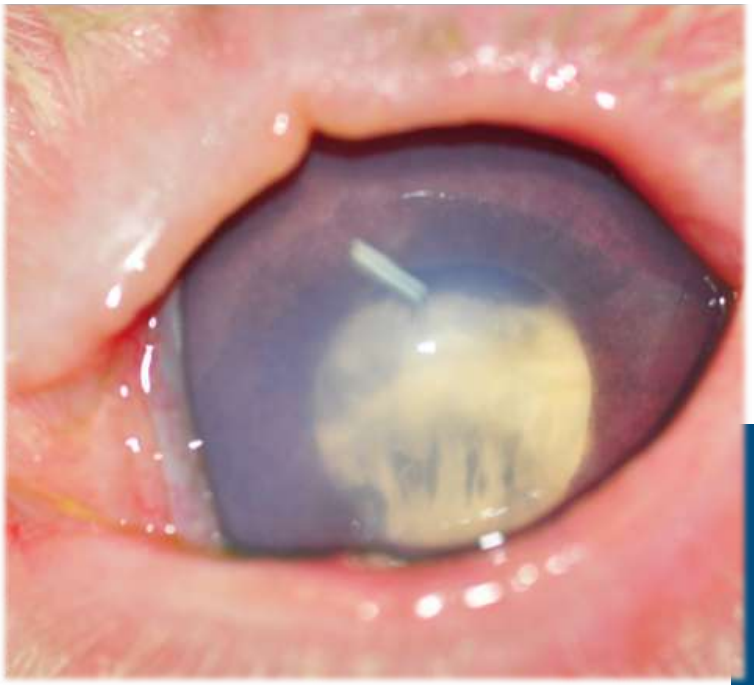
The Rabbits

- Blepharitis
- Meibomitis / Meibomian obstruction
- Entropion
- Aberrant overgrowth of conjunctiva
- Corneal epithelial dystrophy
- Cataract
- Uveitis (Encephalitozoon-associated lens induced uveitis)
- Glaucoma
- Lens luxation / subluxation (Anterior and Posterior)

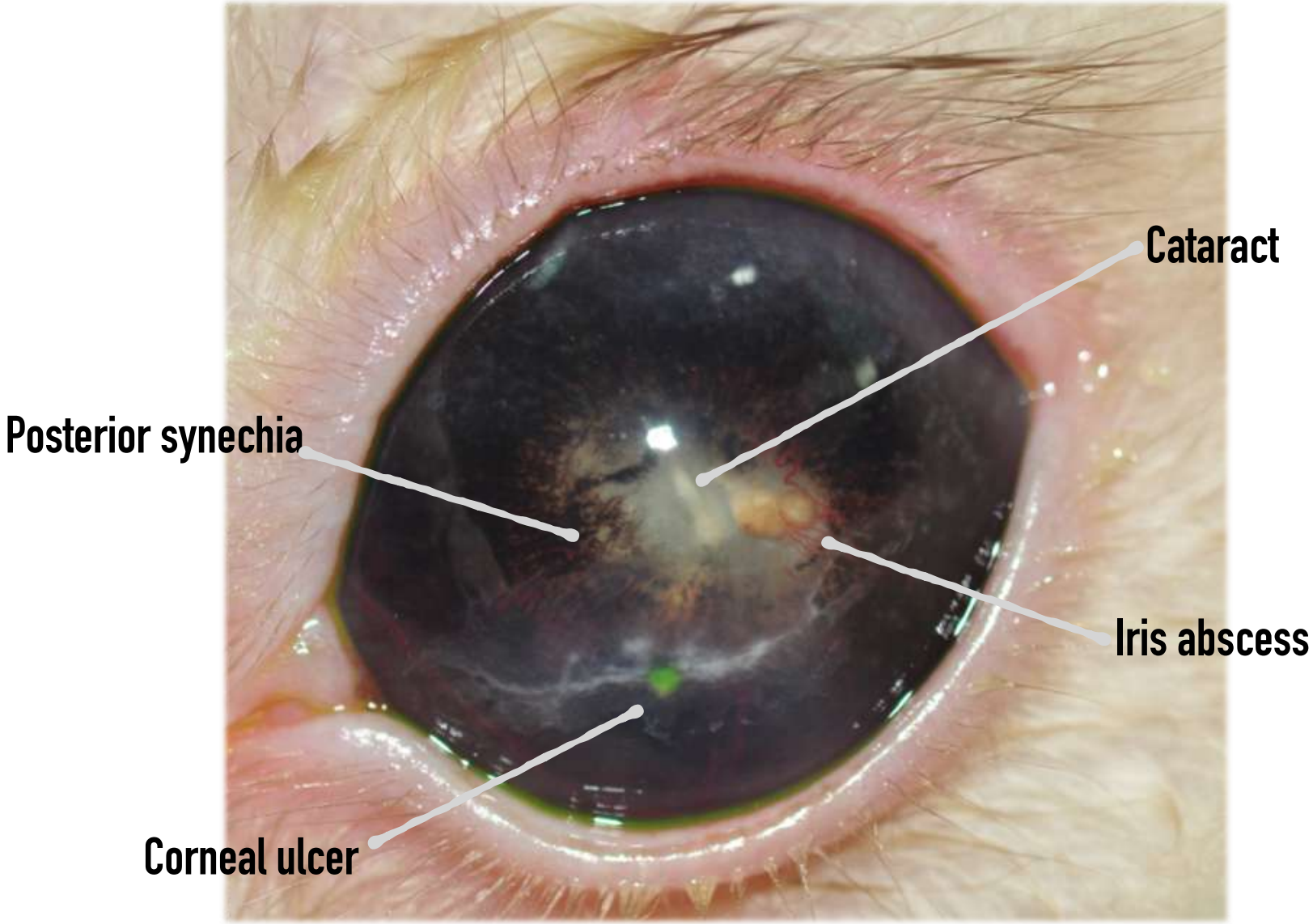
Ocular diseases in Pocket pets

The Rabbits





Encephalitozoon-associated lens induced uveitis



Ocular diseases in Pocket pets

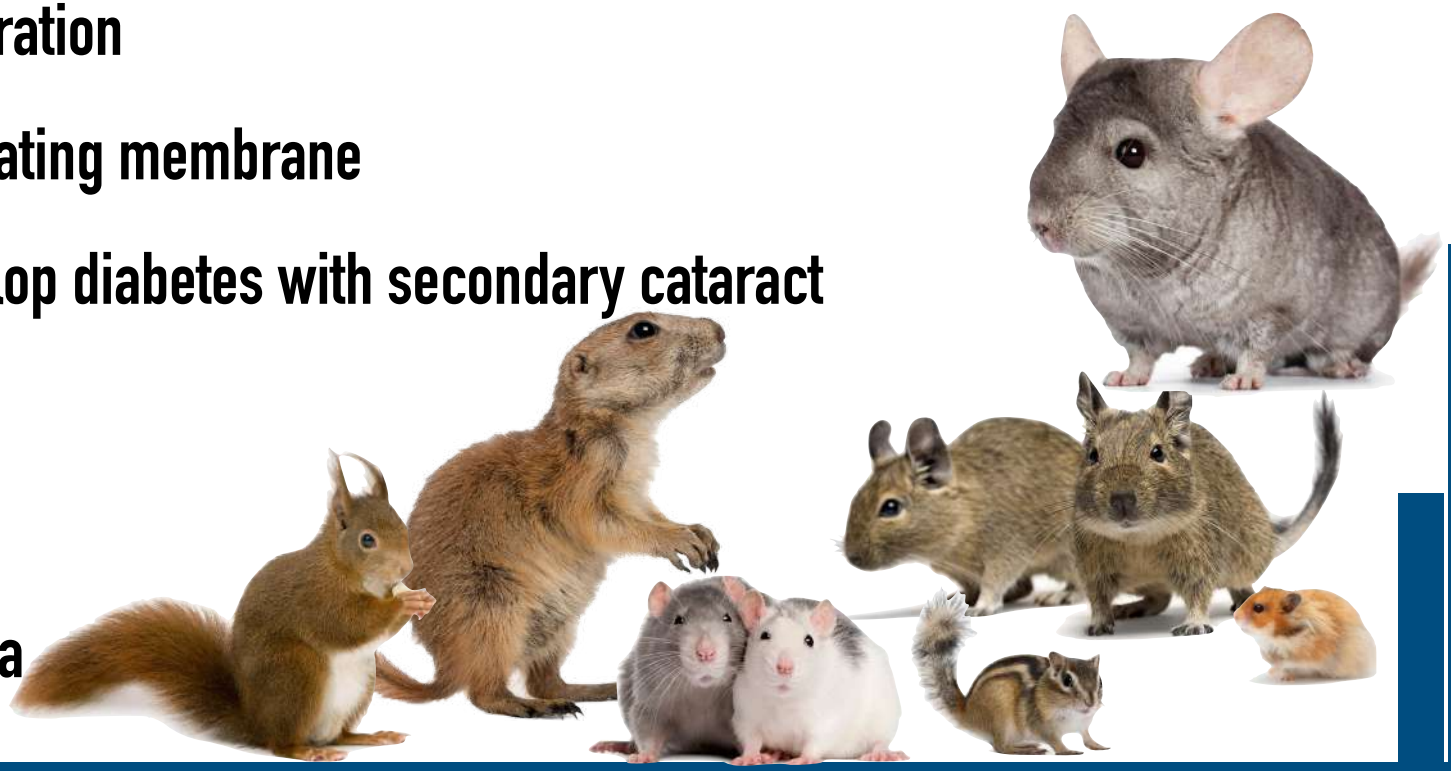
The Guinea pigs

- Keratoconjunctivitis sicca
- Corneal ulceration
- Corneal degeneration
- Prolapsed nictitating membrane
- Cataract
- Uveitis
- Glaucoma
- Heterotopic bone formation

Ocular diseases in Pocket pets

The Other rodents: the chinchilla, Prairie dogs, degu and hamster

- Keratoconjunctivitis sicca
- Corneal ulceration
- Proptosis
- Corneal degeneration
- Prolapsed nictitating membrane
- Cataract – develop diabetes with secondary cataract
- Uveitis
- Glaucoma
- Retinal dysplasia



Ocular diseases in Pocket pets

The Ferrets

- Corneal ulceration
- Cataract
- Uveitis
- Glaucoma

Ocular diseases in Pocket pets

The Sugar gliders

- Corneal ulceration
- Corneal degeneration
- Corneal dystrophy
- Cataract
- Uveitis
- Lens luxation / subluxation (Anterior and Posterior)
- Glaucoma

Ocular diseases in Pocket pets

The Hedgehogs

- Corneal ulceration
- Cataract
- Uveitis
- Proptosis

Conclusion

- The similarity of the eyes of these rodents and rabbits yet also the differences in
  - Anatomy
  - Pathology
  - Treatment and prognosis render laboratory mammal ophthalmology a continually fascinating and challenging area.
- Much still remains to be discovered with new diagnoses and improved treatments to be determined and evaluated

MEET OUR SPEAKERS

"Pocket pet ophthalmology - Principles and applications (TH)"

Thanate Anusaksathien

M.Sc., DTBVS
Faculty of Veterinary Medicine
Mahanakorn University of Technology

"I am seeing something you don't see! The worst case scenarios and solutions in avian ophthalmology (ENG)"

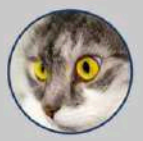
Prof.Dr.med.vet. Rüdiger Korbel

ECZM (Avian), Cert. Spec. Vet. Ophthalmol.
Clinic for Birds, Small Mammals, Reptiles & Ornamental Fish
Ludwig Maximilian University of Munich, Munich, Germany

"Principles ocular examination in dog and cat and how to approach emergency condition (TH)"

Dr.med.vet. Tanawan Soimala

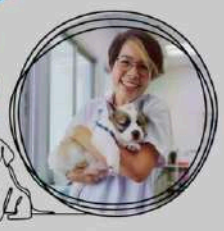
M.Sc.
Faculty of Veterinary Science
Prince of Songkla University



"Medical managements in ophthalmic emergency (TH)"

Asst.Prof.Dr. Nalinee Tantivanich

PhD, DTBVS, DAICVO
Faculty of Veterinary Science
Chulalongkorn University



"Essential surgical managements in ophthalmic emergency (ENG)"

Ulrike Koch

Cert. Spec. Vet. Ophthalmol., ECVO Panellists
Veterinary clinic Oerzen
Melbeck, Germany

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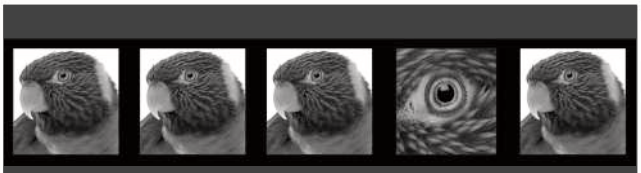
@Faculty of Veterinary Science, Prince of Songkla University



„Worst case avian ophthalmology scenarios“
I AM SEEING SOMETHING YOU DON´T SEE

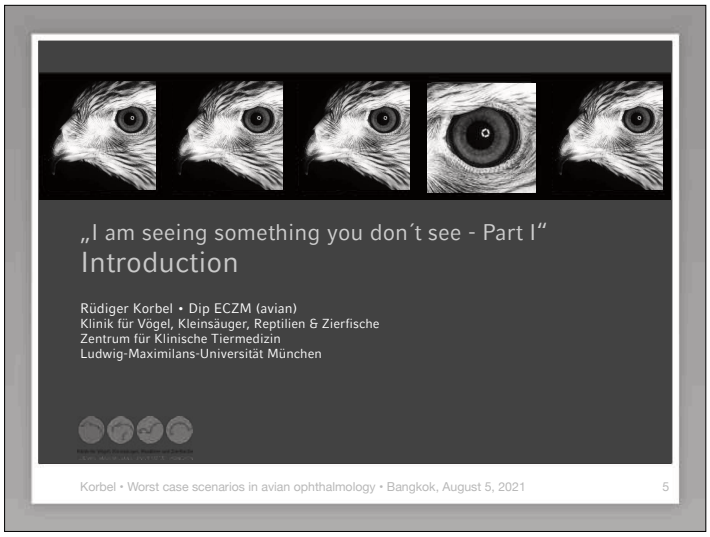
Online Seminar in
Veterinary Ophthalmology in Compagnion Animals
September 5, 2021

ยินดีต้อนรับ - Yindī t̂xnrạb

What is an ophthalmological worst case in birds?

- Any partial or complete impairment of vision
- Dependent on living conditions
  - Pet birds, wild birds, falconry, poultry
- Dependent on localisation
  - Central, upper or lower fundus area


Some Q & A


„I am seeing something you don´t see - Part I“
Introduction
Rüdiger Korbel • Dip ECZM (avian)
Klinik für Vögel, Kleinsäuger, Reptilien & Zierfische
Zentrum für Klinische Tiermedizin
Ludwig-Maximilans-Universität München
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The „Bird Clinic“
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Fakultät der Ludwig-Maximilians-Universität München, Sonnenstraße 18, D - 85764 Oberschleißheim,
Fon: +49.89.2180 76070 · www.vogelklinik.de
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Jahre
Tierärztliche Fakultät in München (1914 - 2014)
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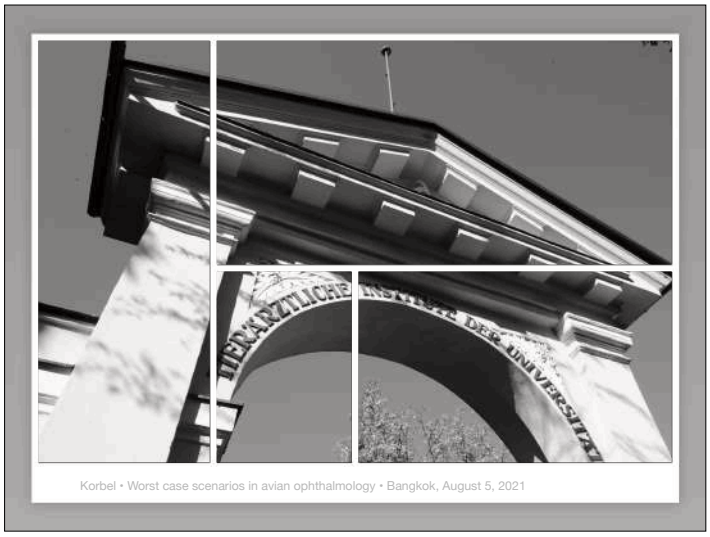
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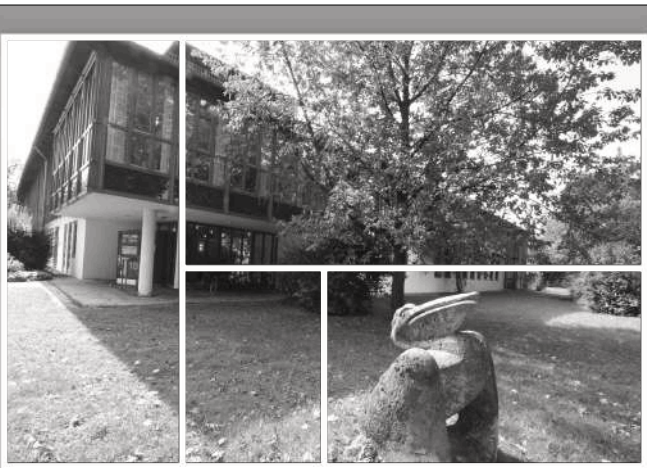

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„I am seeing something you don´t see - Part I“
Significance of vision

Rüdiger Korbel • Dip ECZM (avian)
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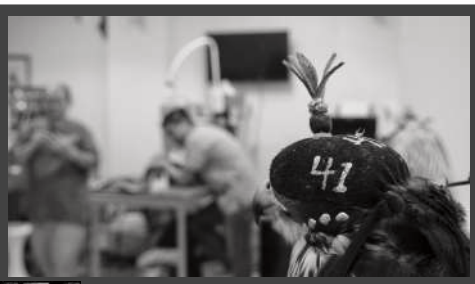
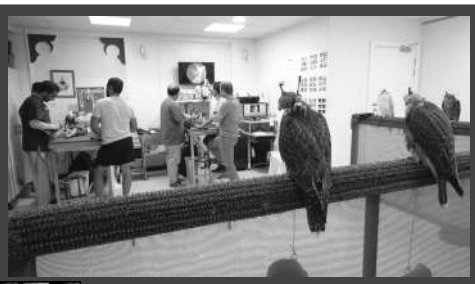
Background

- Significance of avian vision (pet birds vs falconry, wild birds, poultry)
- 100 Mio. „traumatized wild birds“/year (Germany)
- Wind power plants, hunting accidents, shot gun leasons, windshield and window glass accidents etc.
- Incidence for posttrauma intraocular haemorrhage: 35 - 37 %

Background (Emirates)



Background (Emirates)



Background (Emirates)

Background (Emirates)

Avian Medicine
Basics & Challenges

- Anatomicial variety
- Physiological variety
- From Hummingbirds to Ostriches
- 8.800 Species, > 28.000 Subspecies
- Estimated Species spectrum in specialized clinic: 1000 species/5 years

Challenges in exotic ophthalmology

- Handling
- Anatomical variety
- Size
  (pupillary vs. fundus diameter)
- Bony scleral ring (avian)
- Image resolution

Challenges in exotic ophthalmology

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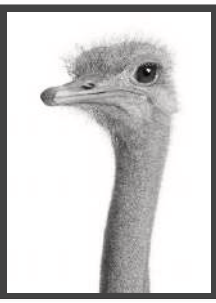
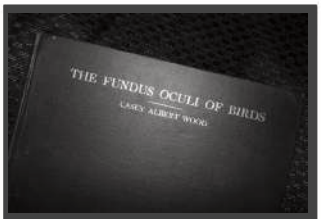


„Big Book on Avian Ophthalmoscopy“

- Casey Albert Woods
- Chicago 1917



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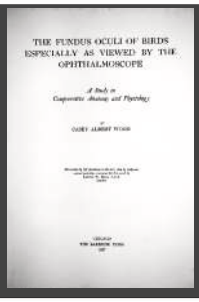
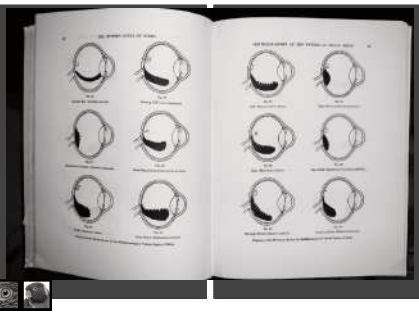


„Big Book on Avian Ophthalmoscopy“

- Examination techniques
- Flash light
- Hypnosis
- Examination at the border „between life & death“

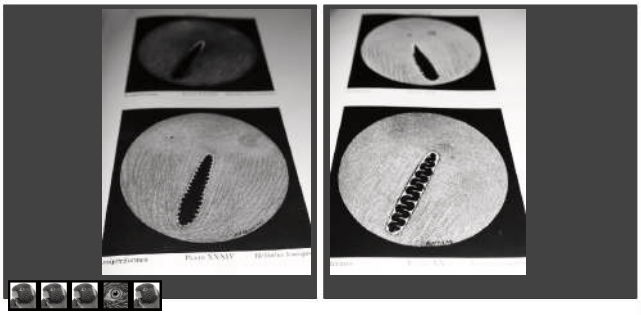
„Big Book on Avian Ophthalmoscopy“



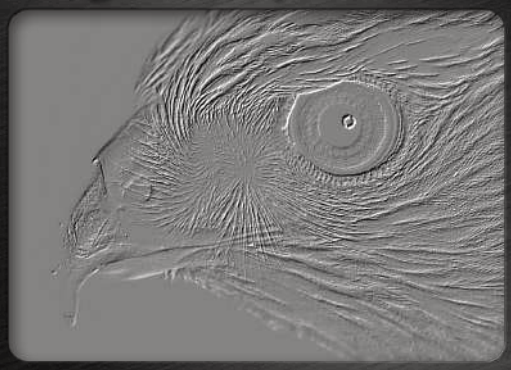
„Big Book on Avian Ophthalmoscopy“

- Ophthalmoscopy „Anno 1918“
- Severe rib contusion (Student)
- Almost broken leg (Professor)
- Broken nose (Student & Prof.)

„Big Book on Avian Ophthalmoscopy“



Through the eyes of a bird



Through the eyes of a bird

Through the eyes of a bird

Through the eyes of a bird

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Visual Perception

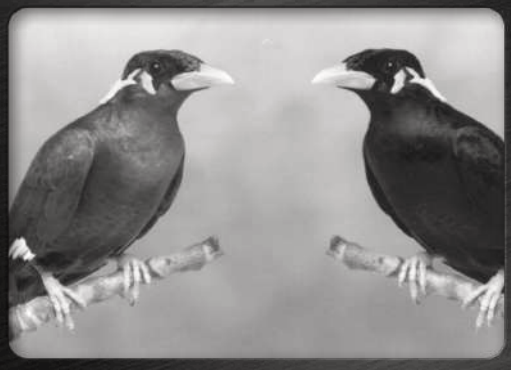
Visual Perception

as probably seen by Birds & Reptiles

Visual Perception

Bird (left) versus Man (right)

Visual Perception



Bird (left) versus Man (right)

UV - Vision

- UV-Perception (mammals)
  - Trichromatic vision
  - Visual spectrum: 400 - 680 nm
- UV-Perception (avian)
  - Pentrachromatic vision
  - Visual spectrum: 320 - 680 nm
  - UV - translucent lens
  - Retinal UV-cones

Why UV-Perception?

- Conventional light sources do not emit UV
- Intra & interspecific communication
- Sexual dimorphism
- Sexual attraction
- Crypsis & Rearing
- Assessment of food
- Detection of prey patches

Flicker fusion frequency

The ability to dissolve movements into single frames (18 Hz (man) vs. < 160 Hz (avian)

Flicker fusion frequency

Flicker fusion frequency

- CFF = Critical Flicker Fusion Frequency

Flicker fusion frequency

- CFF = Critical Flicker Fusion Frequency
- Man: 15 - 80 hz (f/s)

Flicker fusion frequency

- CFF = Critical Flicker Fusion Frequency
- Man: 15 - 80 hz (f/s)
- Cinematic movie: 24 hz

Flicker fusion frequency

- CFF = Critical Flicker Fusion Frequency
- Man: 15 - 80 hz (f/s)
- Cinematic movie: 24 hz
- Avian: > 160 hz (f/s)

Flicker fusion frequency

- CFF = Critical Flicker Fusion Frequency
- Man: 15 - 80 hz (f/s)
- Cinematic movie: 24 hz
- Avian: > 160 hz (f/s)
- Velocity: < 200 mp/h

UV & Flicker - Deficiency

- Conventional fluorescent light sources are flicker light for birds!
- Malfunction of vision
- Malfunction of food selection
- Malfunction of rearing
- Social misbehaviour
- Low reproduction rates
- Featherplucking
- Cannibalism

Flicker Consequences

- Flicker in man
  - Headache
  - Epilepsy
- Flicker in birds
  - Feather plucking
  - Cannibalism?
  - High flicker appreciated

Artificial light recommendations

- Artificial light sources
  - Flicker free light
  - High frequency light source
  - ECG (Electronic Control Gear)
  - UV - Extended light spectrum
  - 320 - 680 nm
  - „True light“ - light sources
  - „Full spectrum“ - light sources

UV-Meter

- High intensity UV-Meter
  - Solarmeter 5.0
  - Total-UV (A & B), 280 - 400 nm
  - Measurement of lightsource intensity & aging factor
  - Solarmeter 6.0!
  - UV - B, 280 - 320 nm
  - Lightsource intensity & Acrylic glass transmission

„I am seeing something you don´t see - Part IIa“
Clinical background - anatomy

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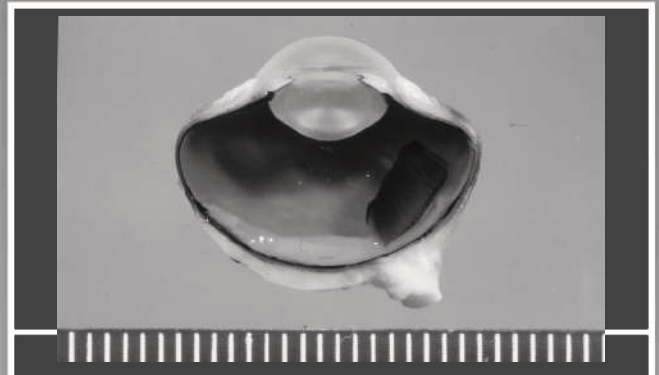
Comparative Aspects

What´s the difference to mammals?

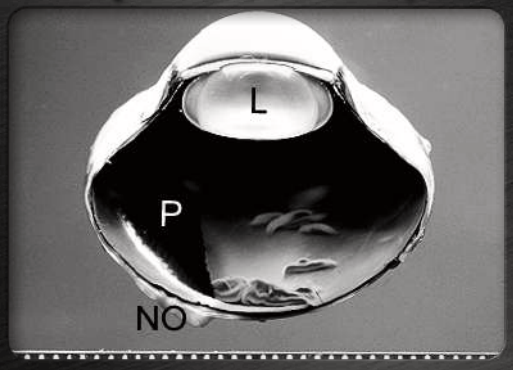
- Adnexal structures
  - Ear opening
  - Oscillatory (saccadic) eye movements
  - Tarsal plate
- Anterior eye segment
  - Striated rather than smooth intraocular musculature
  - Spontaneous (voluntary) pupillary movements
  - Unreliable pupillary response to light stimuli
  - No indirect pupillary reflex
  - Juvenile & immature lens might appear as „cataract“

What´s the difference . . . to mammals?

- Posterior eye segment (fundus)
  - Pecten oculi
  - Optic nerve head (almost) obscured by pecten
  - No tapetum lucidum
  - One, two or no fovea
  - Lack of retinal vascularisation (retina (anangiotic retina)
  - Heavily pigmentation of RPE in diurnal birds
  - Little pigmentation of RPE in nocturnal bird species

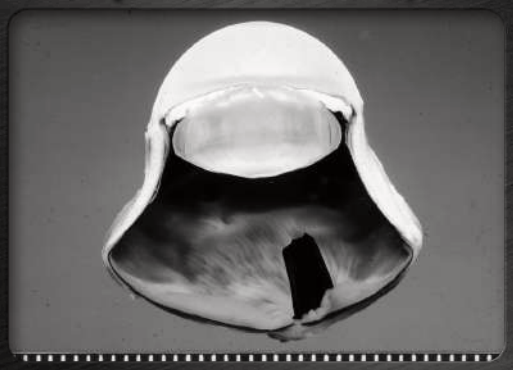


Shape of avian eyes



Common buzzard (OD, ventral half)

Shape of avian eyes



Tawny Owl (OS, ventral half)

Bony Sceral Ring

Bony Sceral Ring

Bony Sceral Ring

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Reptiles

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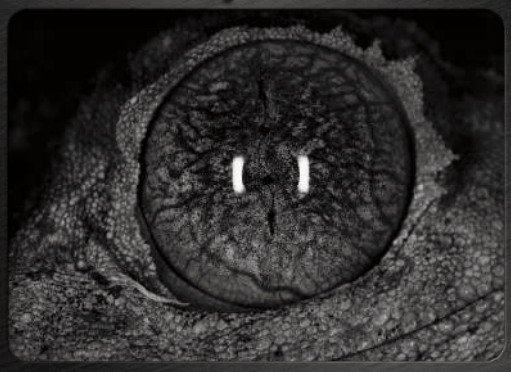
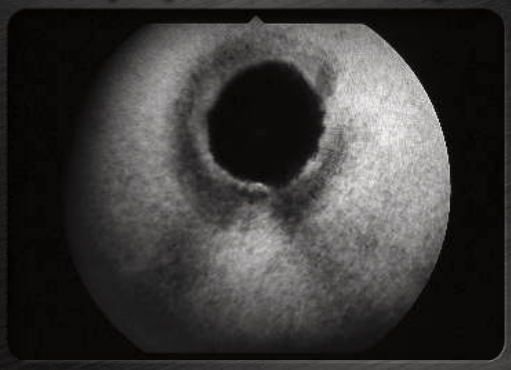
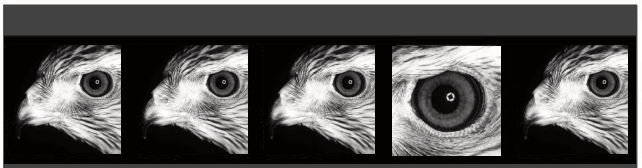
Reptiles



Conus papillaris in reptiles





„I am seeing something you don´t see - Part IIb“
Clinical background - instrumention

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Instrumentation

- Finoff Transilluminator
  - Heine/Germany
  - Welch Allyn/USA
- Anterior eye segment examination
- Posterior eye segment examination

Instrumentation

- Finoff Transilluminator
  - Heine/Germany
  - Welch Allyn/USA
- Anterior eye segment examination
- Posterior eye segment examination

Instrumentation

- Direct Ophthalmoscope
- Viewing angle (only) 5 degrees
- Useability?!

Instrumentation

- Veterinary Panoptic Ophthalm. (Welch Allyn)
- Three spot sizes
- Viewing angle 25 degrees
- Add-on magnifying lens (x3)

Instrumentation

- Veterinary Panoptic Ophthalm. (Welch Allyn)
- Three spot sizes
- Viewing angle 25 degrees
- Add-on magnifying lens (x3)

Ophtho - Instrumentation

- Headband Ophthalmoscope
- Increased viewing angle (depending on lense used)
- 3D-image

Ophtho - Instrumentation

- Ophthalmol. lenses (VOLK/USA)
- 30 (28) D (Raptors)
- 40, 78 D (Psittacines, Pigeons)
- 90 D (Budgies, canary)
- Nota bene: Clearview

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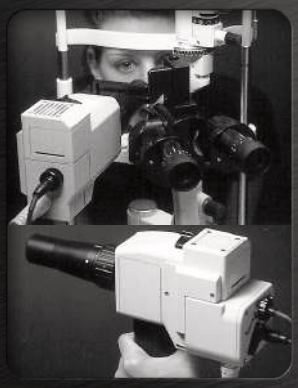
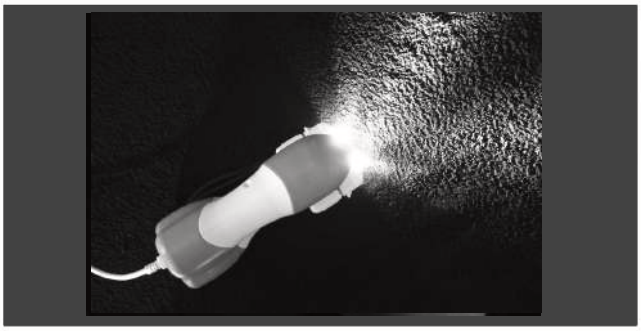
Photo Documentation



- High quality DSLR
- 100 mm Macro lens
- Ring/Twinhead flash
- Leica/Wild SDO
- Kowa Genesis with slit lamp adapter
- TopCon Desktop slit lamp



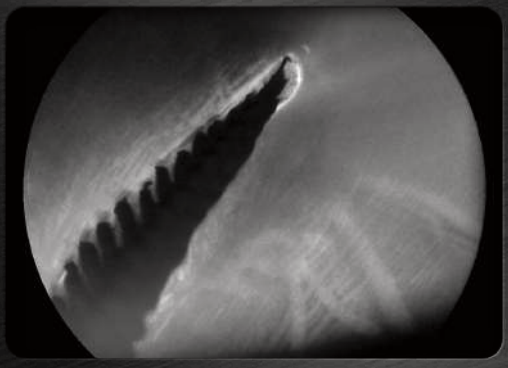
Fundus Photography

Fundus Camera

Fundus Camera

Fundus Camera

Fundus Camera



Fundus Camera

Fundus Camera

„I am seeing something you don´t see - Part IIc“

Clinical background - examination

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Hints for visual impairment

- Non touching techniques
  - Adspection - avoid acustical stimulation
- Hints for on visual impairment
  - Problems in orientation within aviary
  - Reluctance to fly
  - No food intake if position of food dishes is altered
  - Noticeable social misbehaviour
  - Absent fugue with . . .
  - . . . exaggerated reactions following gentle touching

Examination - Procedures

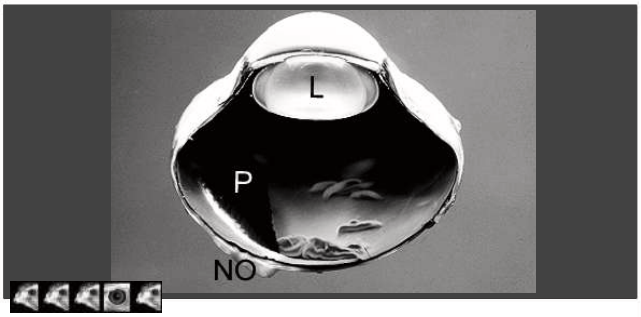
Examination - Procedures

Examination - Procedures

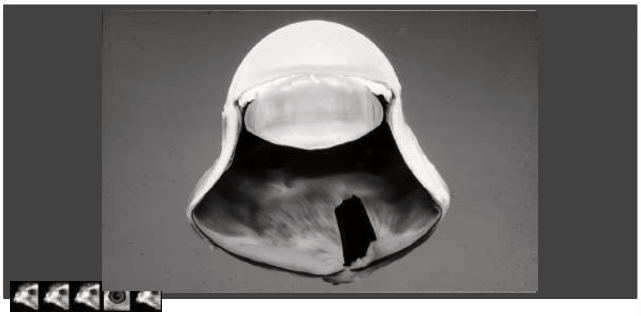
Examination - Procedures

Fundus oculi in birds

Fundus oculi in birds



Fundus oculi in birds



Fundus oculi in birds

Fundus oculi in birds

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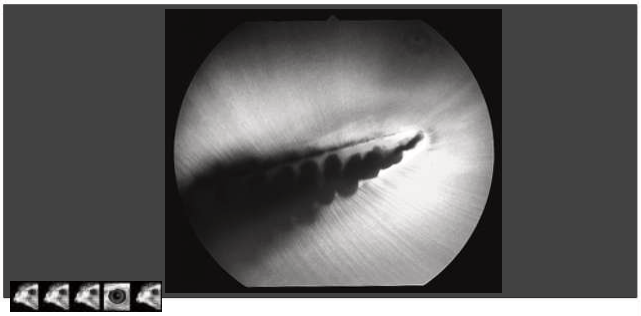
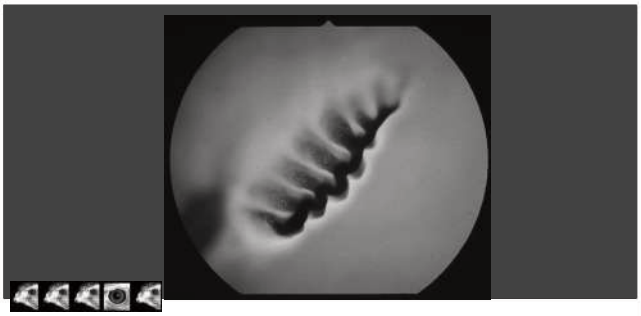
Fundus oculi in birds



Fundus oculi in birds

Fundus oculi in birds

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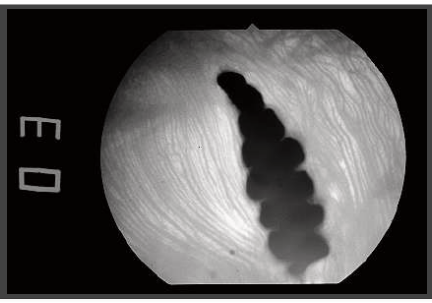
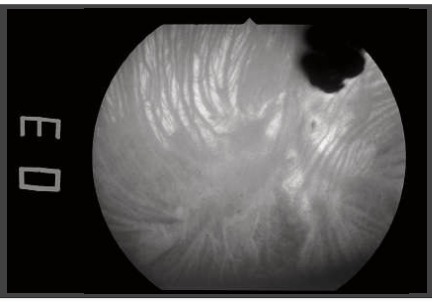
Fundus oculi in birds

Fundus oculi in birds



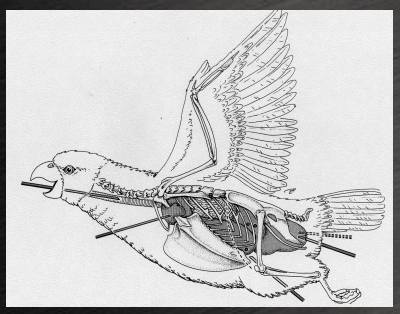
Fundus oculi in birds



Ophthalmoscopy Techniques

- Induction of mydriasis
  - Stress induced mydriasis (owls)
  - Anaesthesia induced mydriasis
  - d-Tubocurarine application (long duration of action)
  - Rocuronium (short duration of action)
  - Monocular direct ophthalmoscopy
  - Binocular indirect ophthalmoscopy

Air sac - Perfusion Anaesthesia (APA)

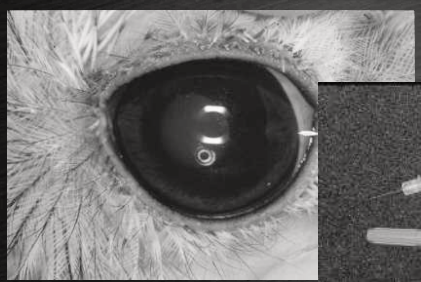


Korbel & Erhardt: Proc Ass Avian Vet 1993 - 2021

Inducing Mydriasis in Birds

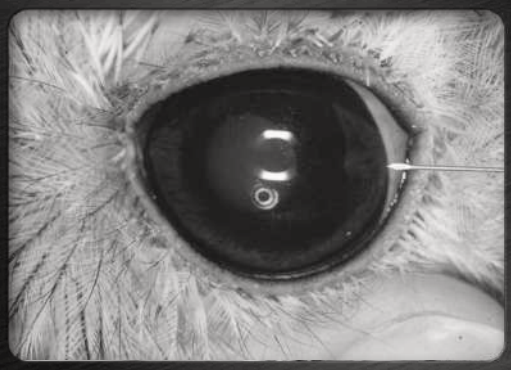
„Old school-version“

(d-tubocurarine intraocular)



Paracentesis

Paracentesis



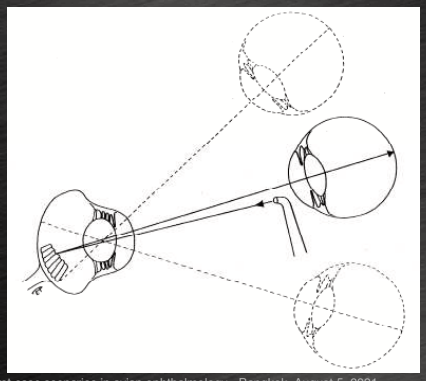
Inducing Mydriasis in Birds

- Stress induced Mydriasis
- Anaesthesia (Recovery period)
- Airsac Perfusion Anaesthesia
- Rocuronium
  20 - 30 mykrol. konj.
- d-Tubocurarine
  (3mg/ml; 0.01 - 0.03 ml i. o.)

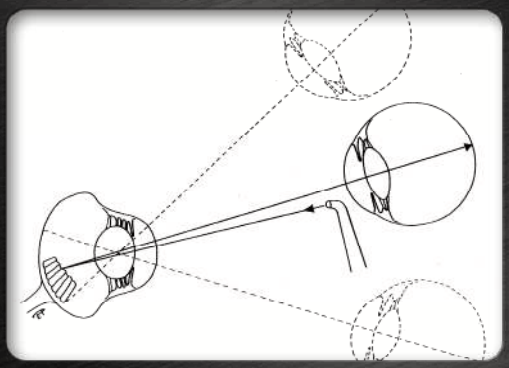
Mydriasis & Mydriatics

- Guzman et al 2013, Petritz et al. 2014
  20 myl/eye (Amazone), 20 - 360 min
- Barsotti et al. 2012
  12 myl/eye (Common kestrel)
- 35 myl/eye 1 (!) (Common buzzard, nach 90 min
- Sigg/Korbel (pers. Mitteilung)
  20 myl/eye (African Grey, 20-60 min)

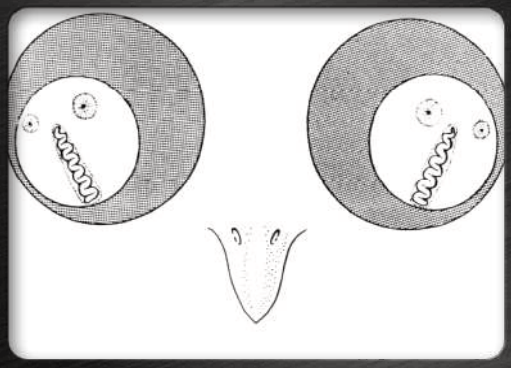
Ophthalmoscopy



Examination - Procedures



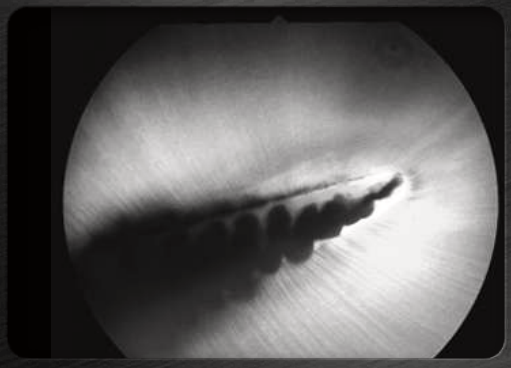
Examination - Procedures



Fundus oculi

Fundus of diurnal birds (Common buzzard) (left eye)

Fundus oculi

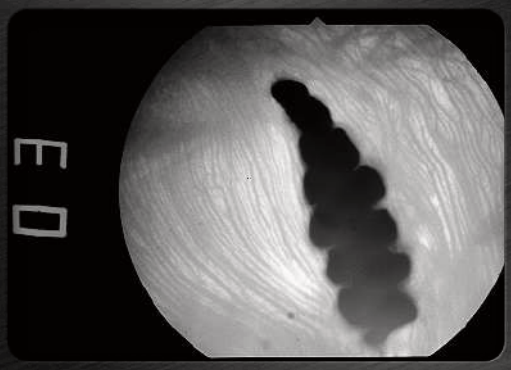


Fundus of diurnal birds (Common buzzard) (left eye)

Fundus oculi

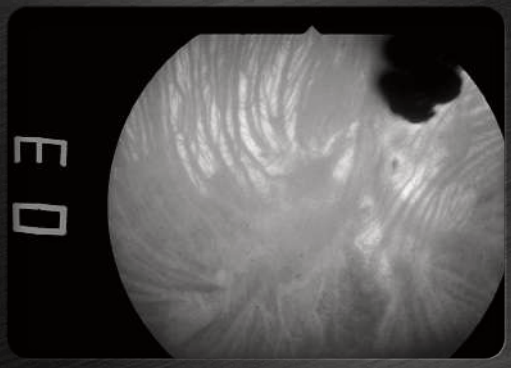
Saw whet owl

Fundus oculi



Great horned owl, OD

Fundus oculi



Great horned owl, OD

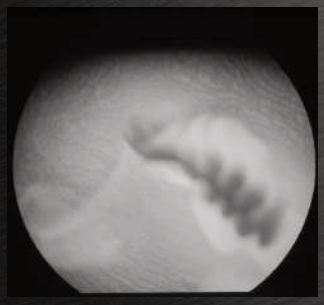
Ophthalmoscopy

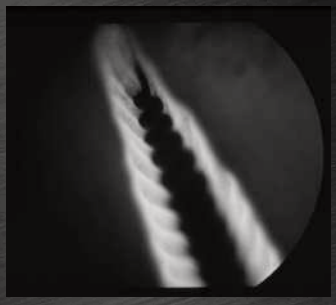
The fundus of diurnal birds: Common buzzard

Ophthalmoscopy

The fundus of diurnal birds: Common buzzard

Fluorescein Angiography





Optical Coherence Tomography (OCT)

- Spectralis OCT Plus (Heidelberg Engeenier. Inc/D)
- Forier-Domain OCT
- „Eye tracking“ function
- Simultanious OCT & Infrared-Reflection-Imaging

Optical Coherence Tomography (OCT)

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- Simultanious OCT & Infrared-Reflection-Imaging

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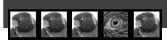
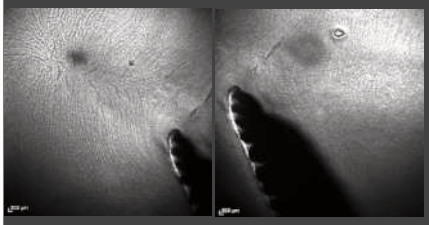
Common Buzzard, OD, central fundus, normal?

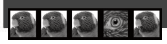
OCT





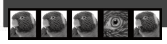
Common Buzzard, OD, central fundus, normal?

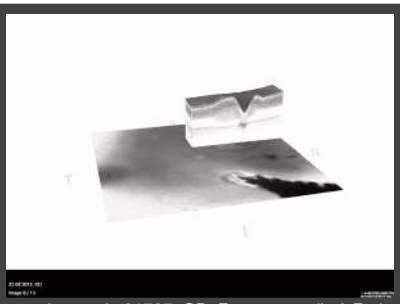
OCT



Common Buzzard, OD, central fundus, normal?

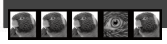
OCT





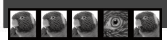
Common buzzard , 21707, OD, Fovea centralis & Retinal oedema

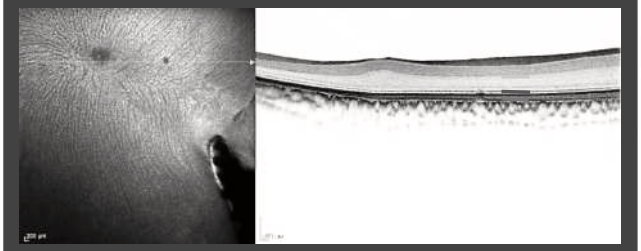
OCT



Common buzzard , 21707, OD, Fovea centralis & Retinal oedema

OCT

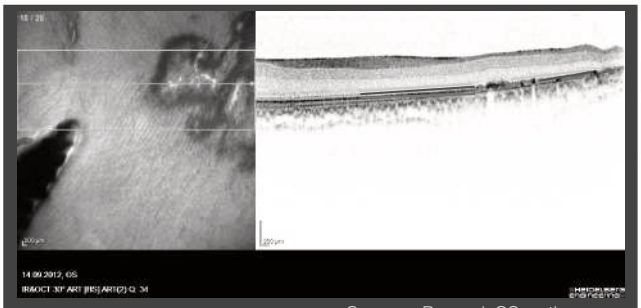




Common Buzzard, OD, central fundus

External limiting membrane (ELM)
Inner/Outer segment layer (IS/OS layer)
Retinal pigment epithelium (RPE)

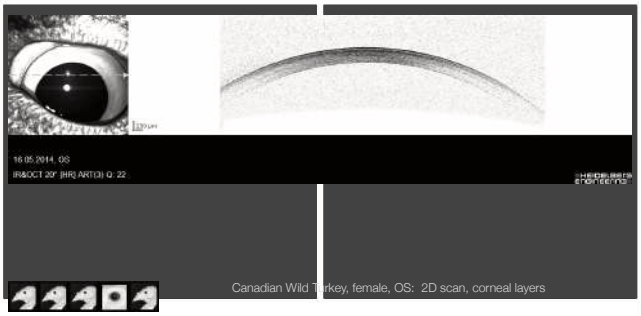
OCT



Common Buzzard, OS, path.

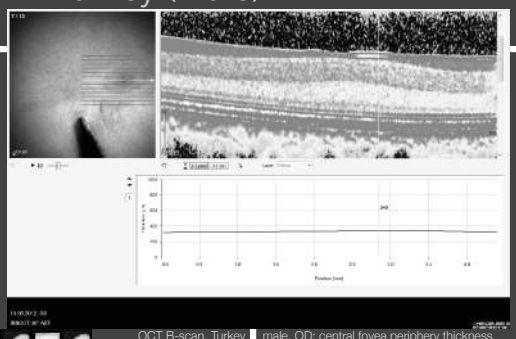
OCT - Fundus Pathology

Results - OCT



Canadian Wild Turkey, female, OS: 2D scan, corneal layers

OCT - Turkey (male)



OCT B-scan, Turkey | male, OD: central fovea periphery thickness

Koi, OD, Central fundus area

Sonography in Fish

Koi, OD, Central fundus area

Sonography in Fish

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Koi, OD, Central fundus area

Sonography in Fish

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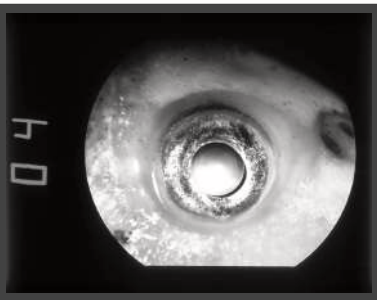
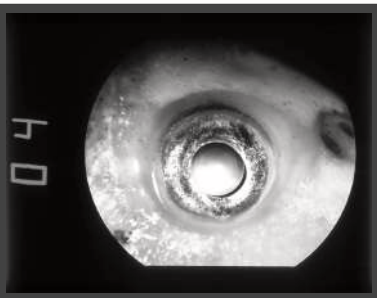


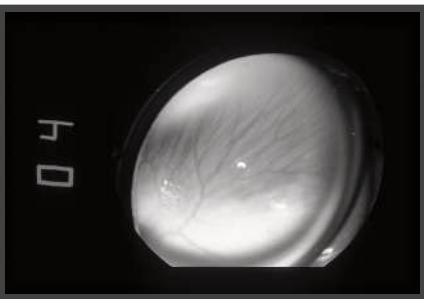
Nishikigoi (Koi, Cyprinus karpio), OD, Hemisection

Ophthalmoscopy in Fish



Nishikigoi (Koi, Cyprinus karpio), OD, Hemisection

Ophthalmoscopy in Fish



Nishikigoi (Koi, Cyprinus karpio), OD, Hemisection

Ophthalmoscopy in Fish

Worst case avian ophthalmology scenarios

I am seeing something you don´t see

- Part I: Introduction
- Part II: Basics
- Part III: Ophthalmoscopy and worst case scenarios

„I am seeing something you don´t see - Part III“

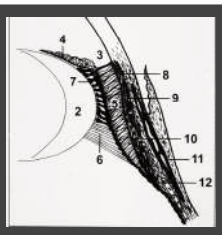
Clinical Fundus Worst Case Scenarios

Rüdiger Korbel • Dip ECZM (avian)
Klinik für Vögel, Kleinsäuger, Reptilien & Zierfische
Zentrum für Klinische Tiermedizin
Ludwig-Maximilans-Universität München

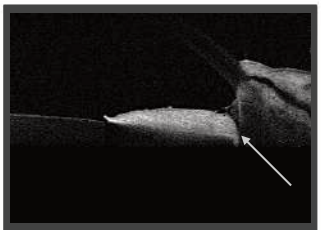
Clinical worst case scenarios

Clinical worst case scenarios

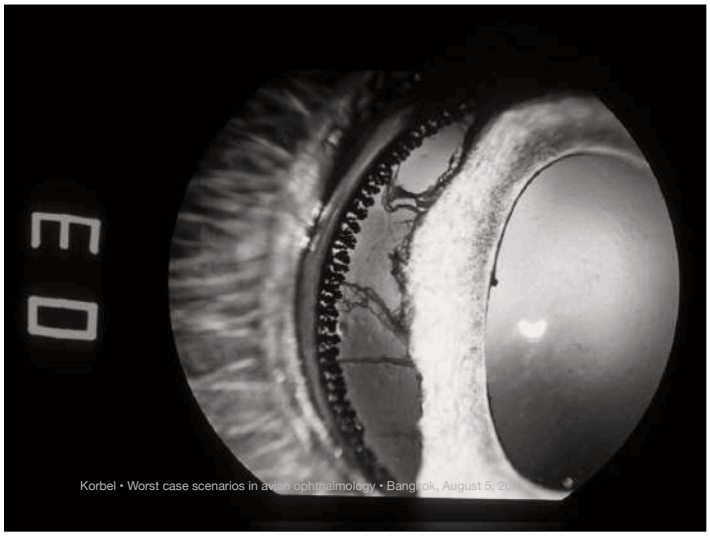
Linsenaufhängung bei Vögeln
Ligamentum pectinatum & Ziliarkörperfortsätze



Broiler chicken



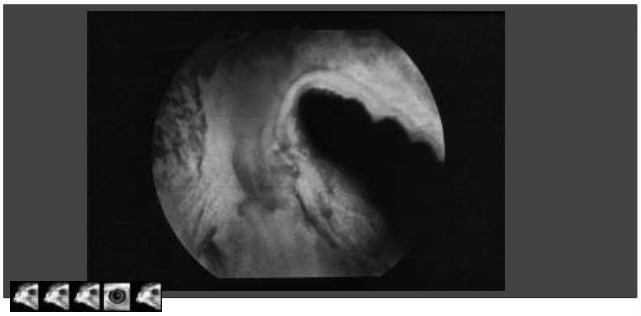
female, OD: 2D scan, anterior eye chamber



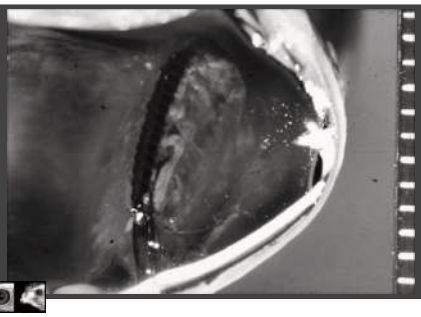
Clinical worst case scenarios

Clinical worst case scenarios

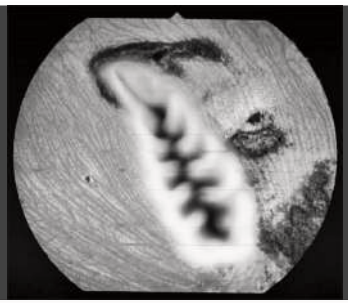
Clinical worst case scenarios



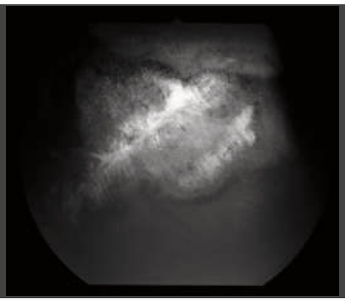
Clinical worst case scenarios



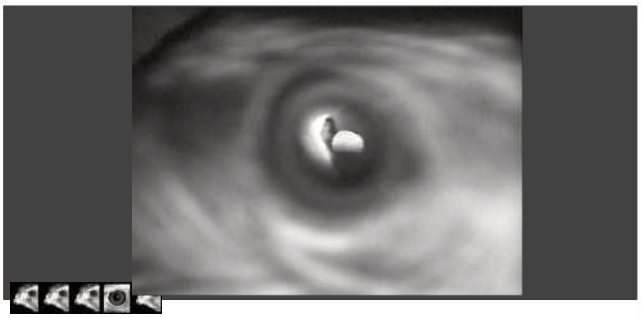
Clinical worst case scenarios



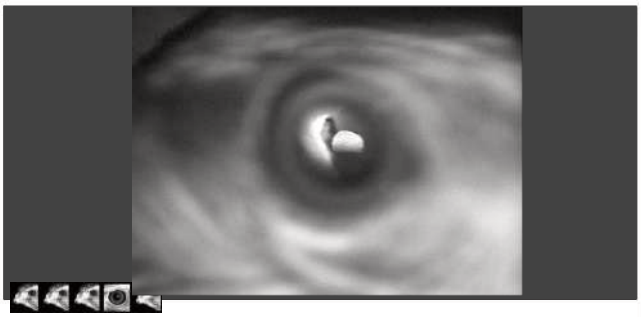
Clinical worst case scenarios



Common buzzard (OS)



Common buzzard (OS)



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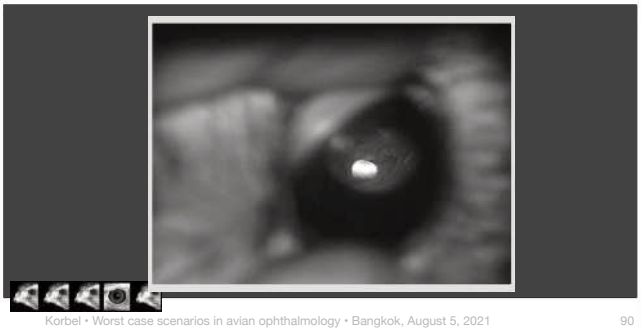
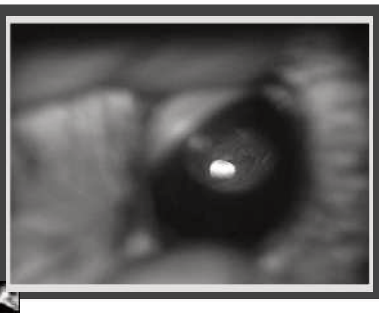
Tawny owl (OS)

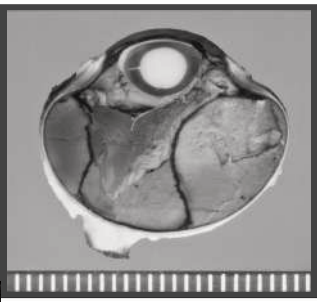


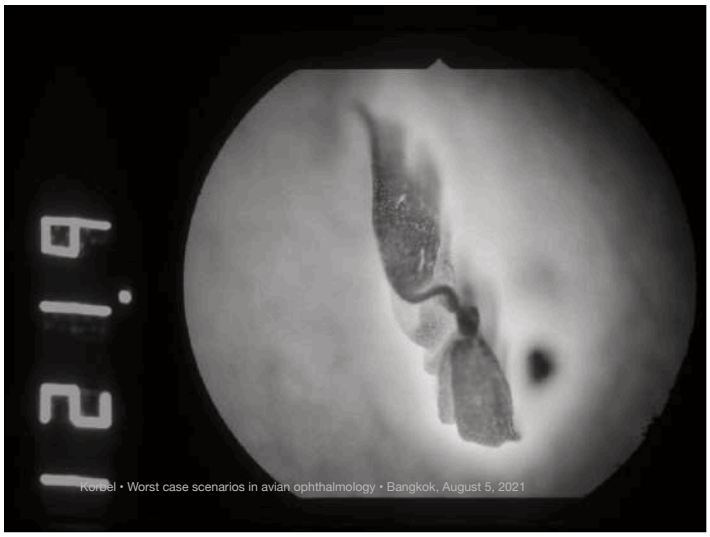
Tawny owl (OS)



Ultranosonography

Worst worst case scenarios




bird
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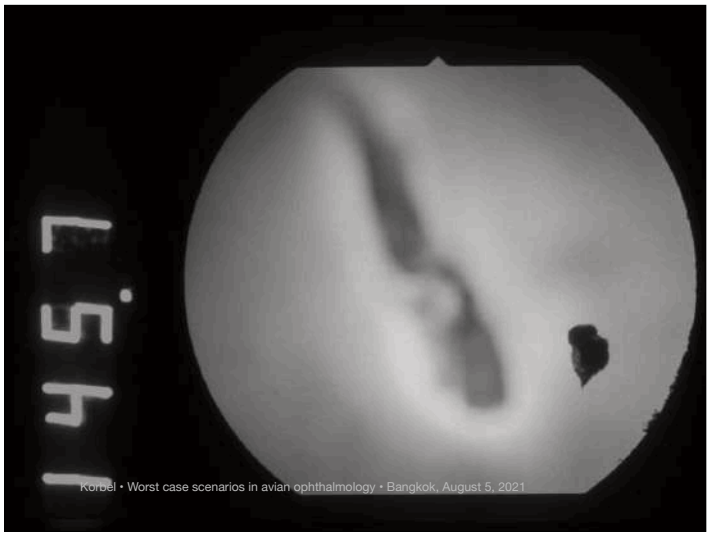
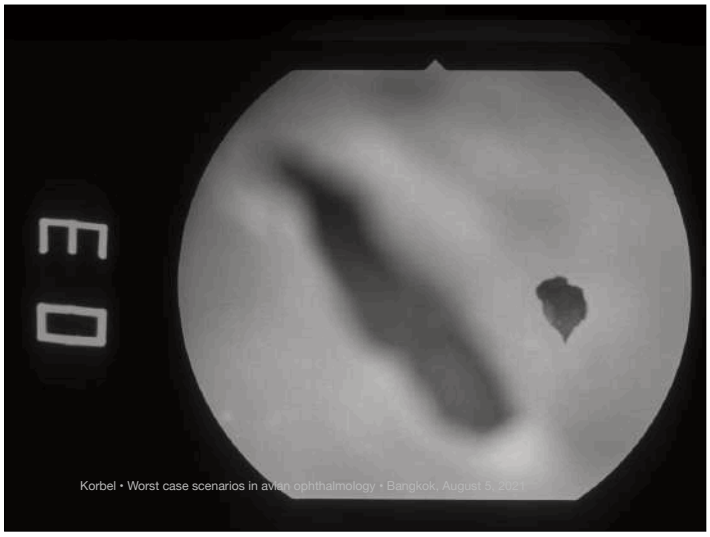
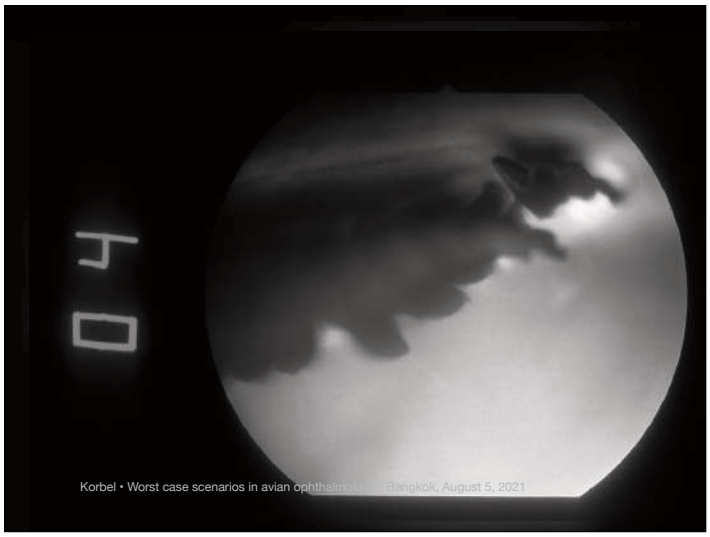
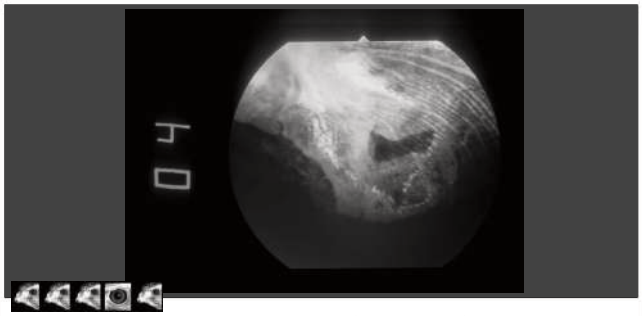

fish
Korbel • Worst case scenarios in avian ophthalmology • Bangkok, August 5, 2021

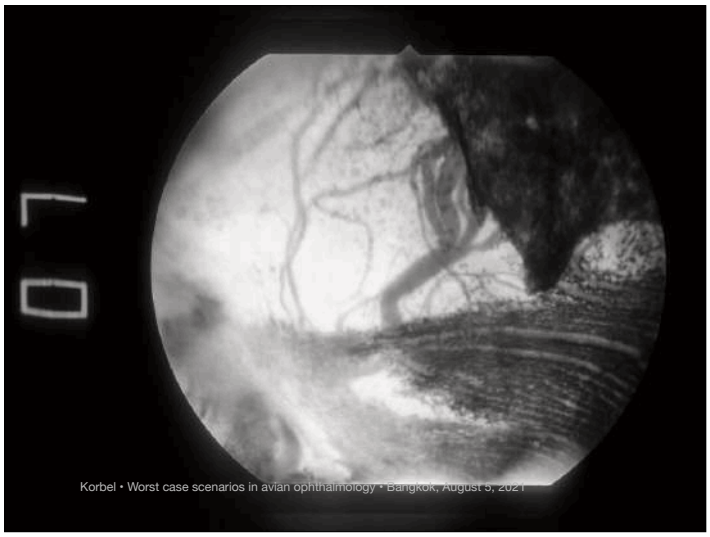

DEAD
Korbel • Worst case scenarios in avian ophthalmology • Bangkok, August 5, 2021



„Dead end“

„Dead end“




OD
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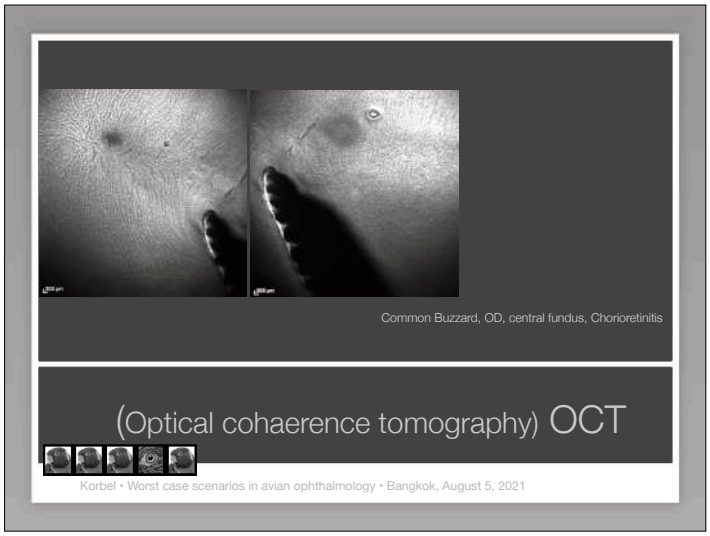
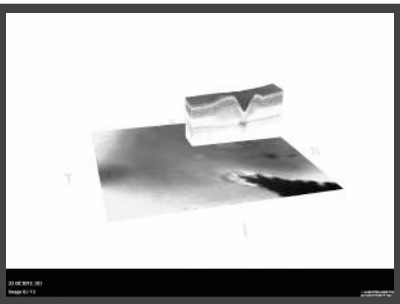
Common Buzzard, OD, central fundus, Chorioretinitis
(Optical cohaerence tomography) OCT
Korbel • Worst case scenarios in avian ophthalmology • Bangkok, August 5, 2021


Common Buzzard, OD, central fundus, Chorioretinitis
(Optical cohaerence tomography) OCT
Korbel • Worst case scenarios in avian ophthalmology • Bangkok, August 5, 2021

Common Buzzard, OD, central fundus, Chorioretinitis

(Optical cohaerence tomography) OCT

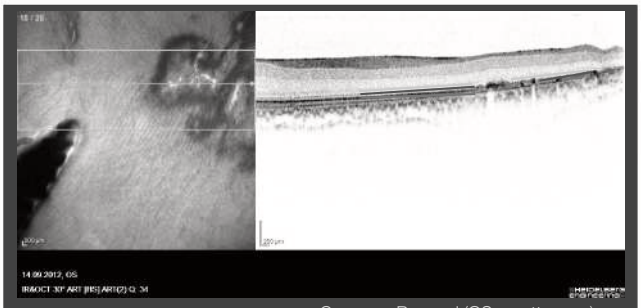


Common buzzard (OD, 21707, Fovea centralis & Retinal edema; Korbel et al. 2014)

OCT (3D)

Common buzzard (OD, 21707, Fovea centralis & Retinal edema; Korbel et al. 2014)

OCT (3D)

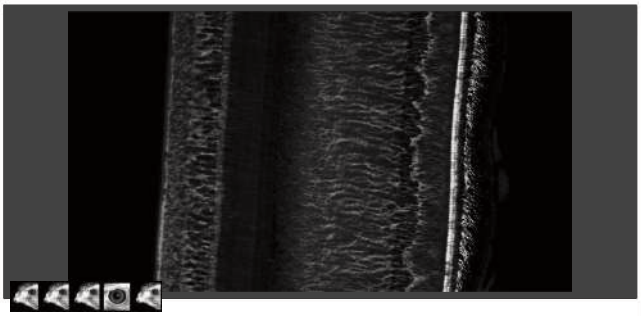


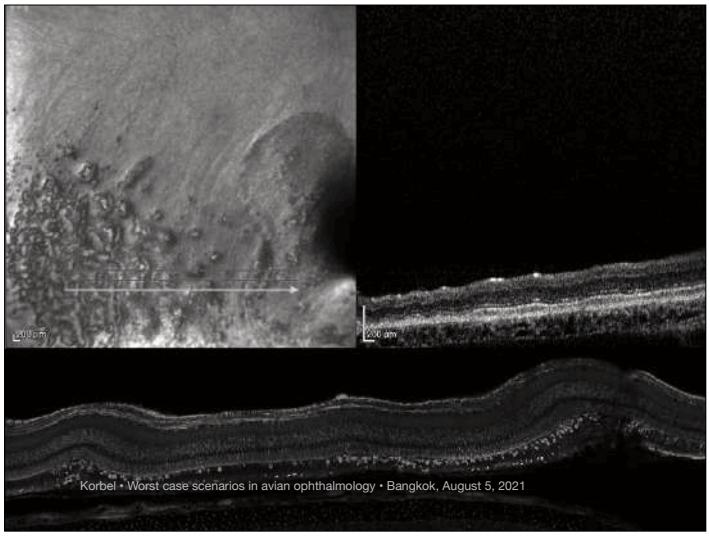
Common Buzzard (OS, posttrauma)

OCT - Post Trauma

Diagnostic validation (LKFM)

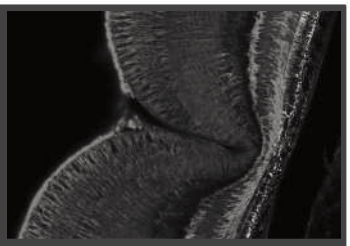
E. Hagen (Vet Diss. München 2020): Konfokalmikroskopische Darstellung der Retina - Habicht
Anti-Glutamin-Synthetase (rot) – Müllerglia, Lektin PNA (grün) – Zapfen, Hoechst 33258 (blau) - Zellkerne





Therapy!?

- Rest
- (Corticosteroids - cave!)
- Plasminogenactivator (Actilyse(R))
- Application route!

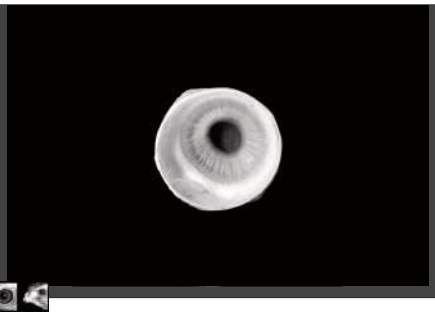


- Fovea centralis (Wanderfalke, OD) (Konfokalmikroskopie; Hagen & Korbel 2021)

Small mammals

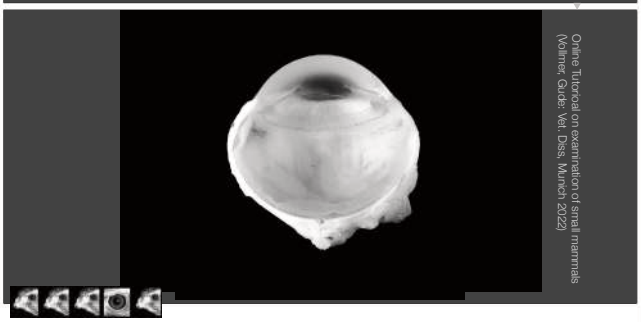
Online Tutorial on examination of small mammals (Kölmel, Gudde; Vet. Diss, Munich 2022)

Small mammals



Online Tutorial on examination of small mammals (Kölmel, Gudde; Vet. Diss, Munich 2022)

Small mammals



Online Tutorial on examination of small mammals (Kolmer, Gudel; Vet. Diss, Munich 2022)

Take home messages (Q & A)

- Avian vs mammalian vision?

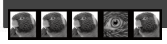
Take home messages (Q & A)

- Avian vs mammalian vision?
- Tri- vs. Pentachromasia!

Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!

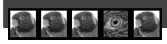
- Tri- vs. Pentachromasia!



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!

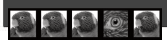
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?

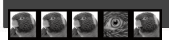
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?

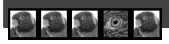
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects
- UV - spectrum & flicker free!



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?
- And what lies behind . . .?

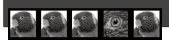
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects
- UV - spectrum & flicker free!



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?
- And what lies behind . . .?

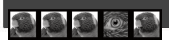
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects
- UV - spectrum & flicker free!
- Pecten oculi - non visual!



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?
- And what lies behind . . .?
- Biggest challenge & why?

- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects
- UV - spectrum & flicker free!
- Pecten oculi - non visual!



Take home messages (Q & A)

- Avian vs mammalian vision?
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- Light - what light?
- And what lies behind . . .?
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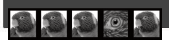
- Tri- vs. Pentachromasia!
- Orientation, food assessment, rearing - animal welfare aspects
- UV - spectrum & flicker free!
- Pecten oculi - non visual!
- Mydriasis & striated i. o. muscles



Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?
- And what lies behind . . .?
- Biggest challenge & why?

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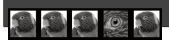

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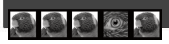

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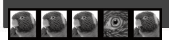

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Take home messages (Q & A)

- Avian vs mammalian vision?
- Signifcance of vision - name 3!
- Light - what light?
- And what lies behind . . .?
- Biggest challenge & why?
- Worst case scenarios?
- Important disorders - name 4!

- Tri- vs. Pentachromasia!
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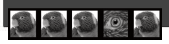

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YOU GOT IT!

;-)

What's going on in „München"?

What's going on in „München"?

What's going on in „München"?

What's going on in „München"?

ขอบคุณ

How to approach emergency conditions in dog and cat

Tanawan Soimala, DVM, M.sc, Dr.med.vet.

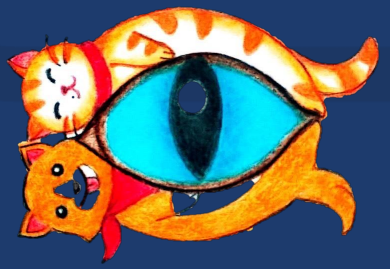
Lecturer, Faculty of Veterinary Science, Prince of Songkla University

2021 online seminar on Veterinary Ophthalmology in Companion Animals
5 September 2021 8.30 -16.30

PRINCE OF SONGKLA UNIVERSITY

No conflict of interest

Discussion Topics



- What is ophthalmic emergency?
- Presentations
  - Globe proptosis and exophthalmos
  - Acute glaucoma and bupthalmos
  - Lens luxation
  - Severe corneal lesions
  - Eyelid laceration
  - Severe ocular and adnexal contusions
  - Sudden blindness

Eule, 2012, FU Berlin

Eye inspection

- In the darkened room
- Focal light and magnification
- From front to back

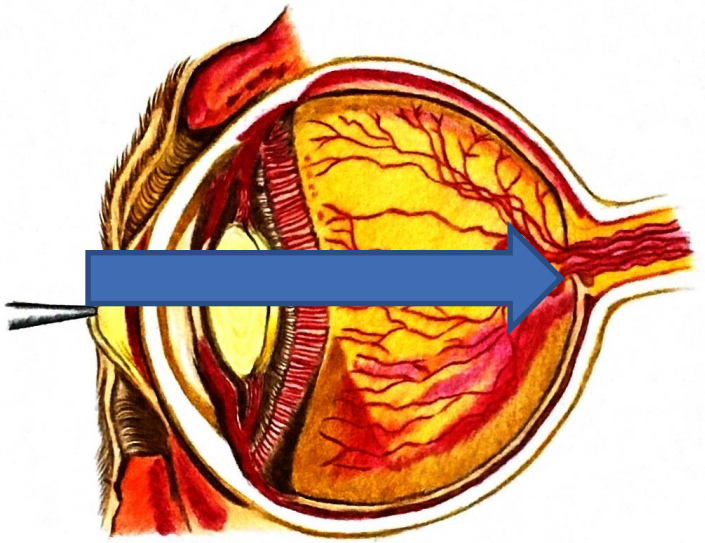
Eyelid -

Conjunctival – Third eyelid -

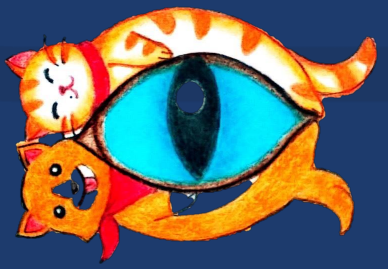
Cornea/Sclera – Anterior chamber -

Iris/Pupil - Lens -

Vitreous - Fundus

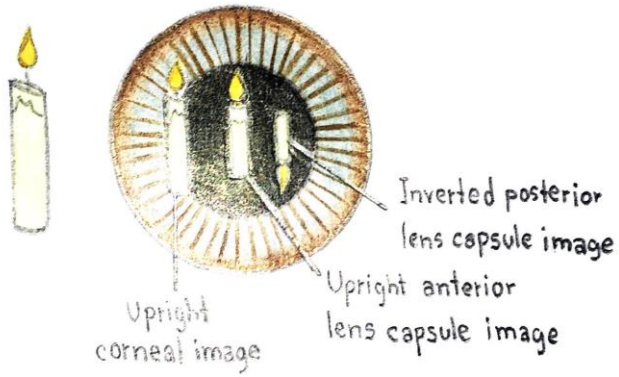


Slit lamp

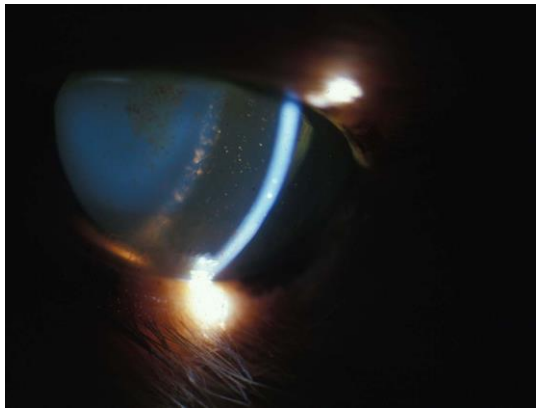


Light refraction of the eye

- First line convex = cornea
- Second line convex = anterior lens capsule
- Third line concave = posterior lens capsule

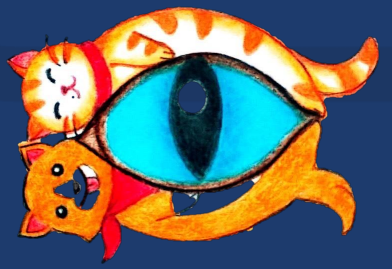


Soimala, 2020, PSU, Songkhla



Eule, 2019, FU, Berlin

Presenting complains for common ocular emergencies



Acute eye pain
- Corneal ulcer
- Glaucoma
- Anterior lens luxation
- Anterior uveitis
- Proptosis

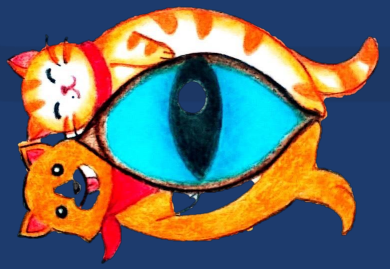
Red eye
- Glaucoma
- Scleritis
- Uveitis
- Conjunctivitis
- Keratitis (ulcers)

Cloudy eye
- Glaucoma
- Anterior lens luxation
- Anterior uveitis

Bulging/swollen eye
- Glaucoma
- Buphthalmos
- Exophthalmos
- Hypersensitivity (periocular)

Acute blindness
- Glaucoma
- Retinal disease
- SARDS
- Detachment
- Optic neuritis

Globe Proptosis



Clinical signs

- Pain
- Bruised
- Hyperemic and swollen conjunctiva and periorbital tissue
- Lateral globe retraction
- Exposure Keratitis
- (Miosis)

Eule, 2016, FU Berlin

Globe Proptosis

Prognostic Indicators

- Presence of vision = good
- Normal PLR = good
- Damage to ≥ 3 extraocular muscles = bad
- Hyphema = bad
- Dry cornea = bad

Eule, 2012, FU Berlin

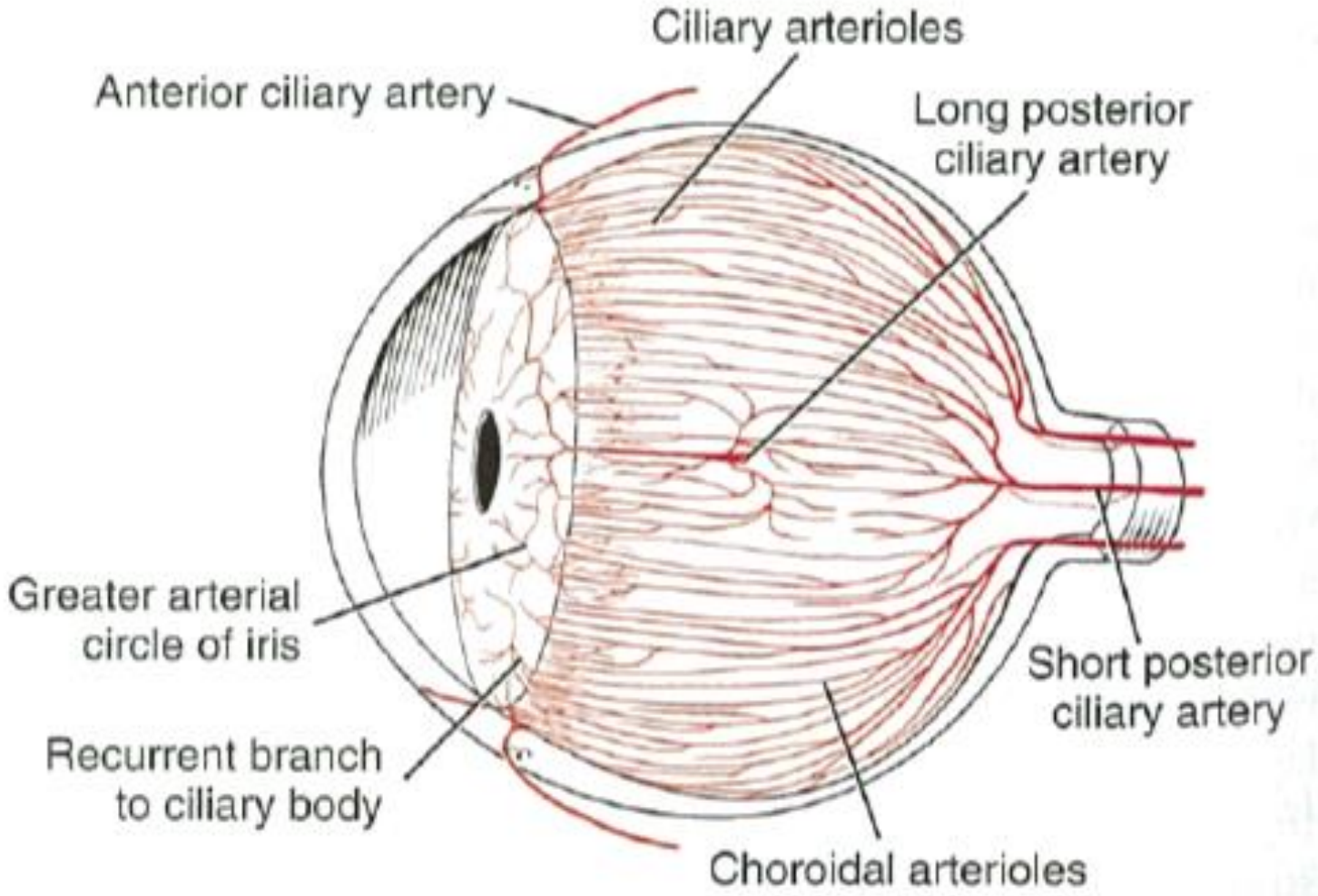
Overall Prognosis

- Brachycephalic dogs
  Guarded (30% regain vision)

Eule, 2015, FU Berlin

Eule, 2016, FU Berlin

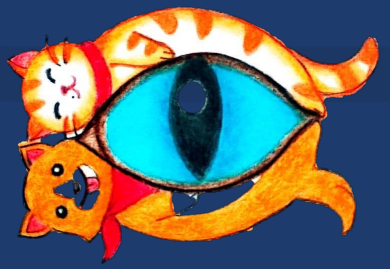
Eule, 2016, FU Berlin



Source:http://rodsncones.blogspot.com

Eule, 2014, FU Berlin

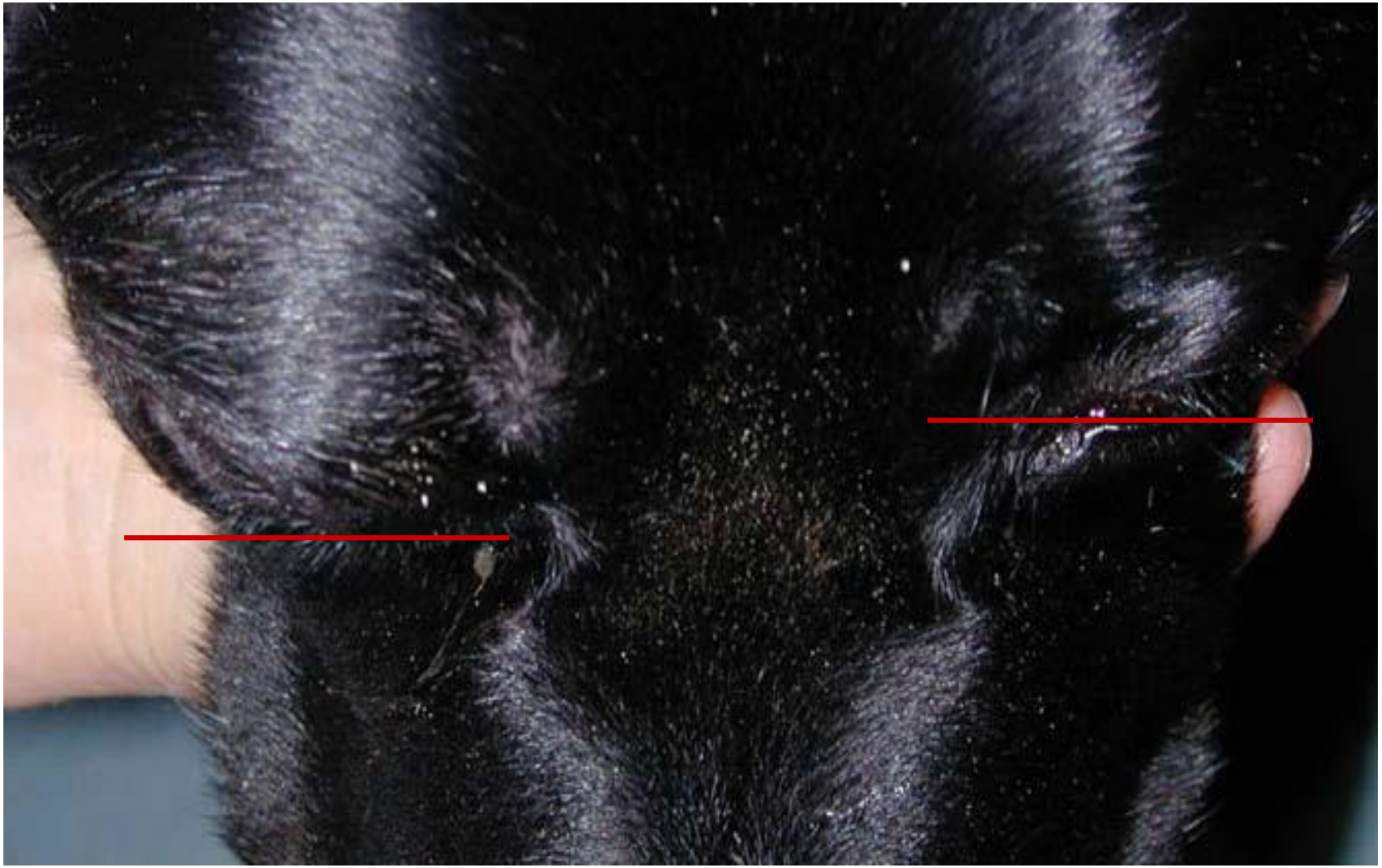
Exophthalmos

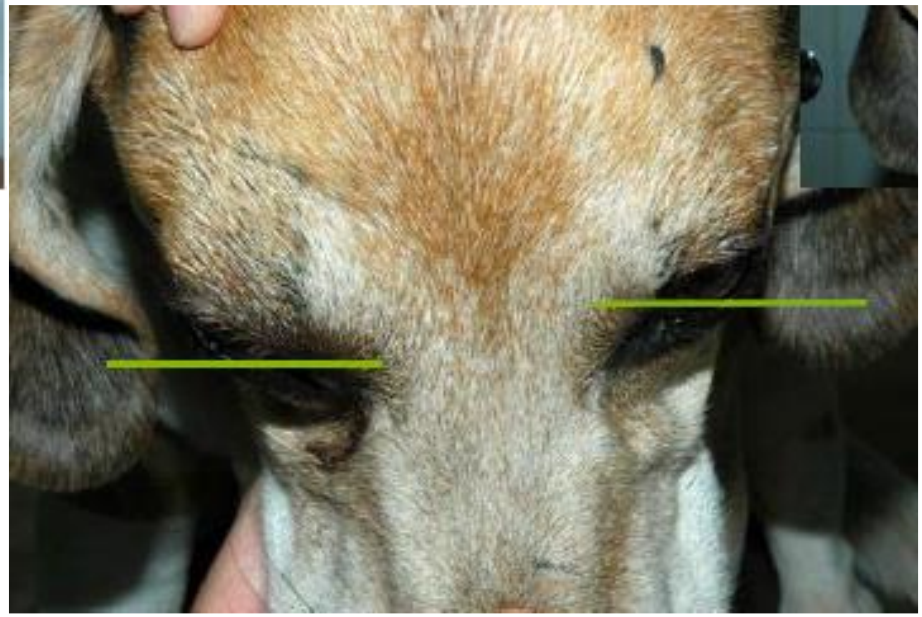


- Eye pushed forward, happens when there is a space occupying lesion (inflammation, cellulitis, abscess, neoplasia, cysts).
- May see a prolapsed 3rd eyelid.

Source: Small animal ophthalmology, 2009

Eule, 2016, FU Berlin





Exophthalmos

Orbital Abscess

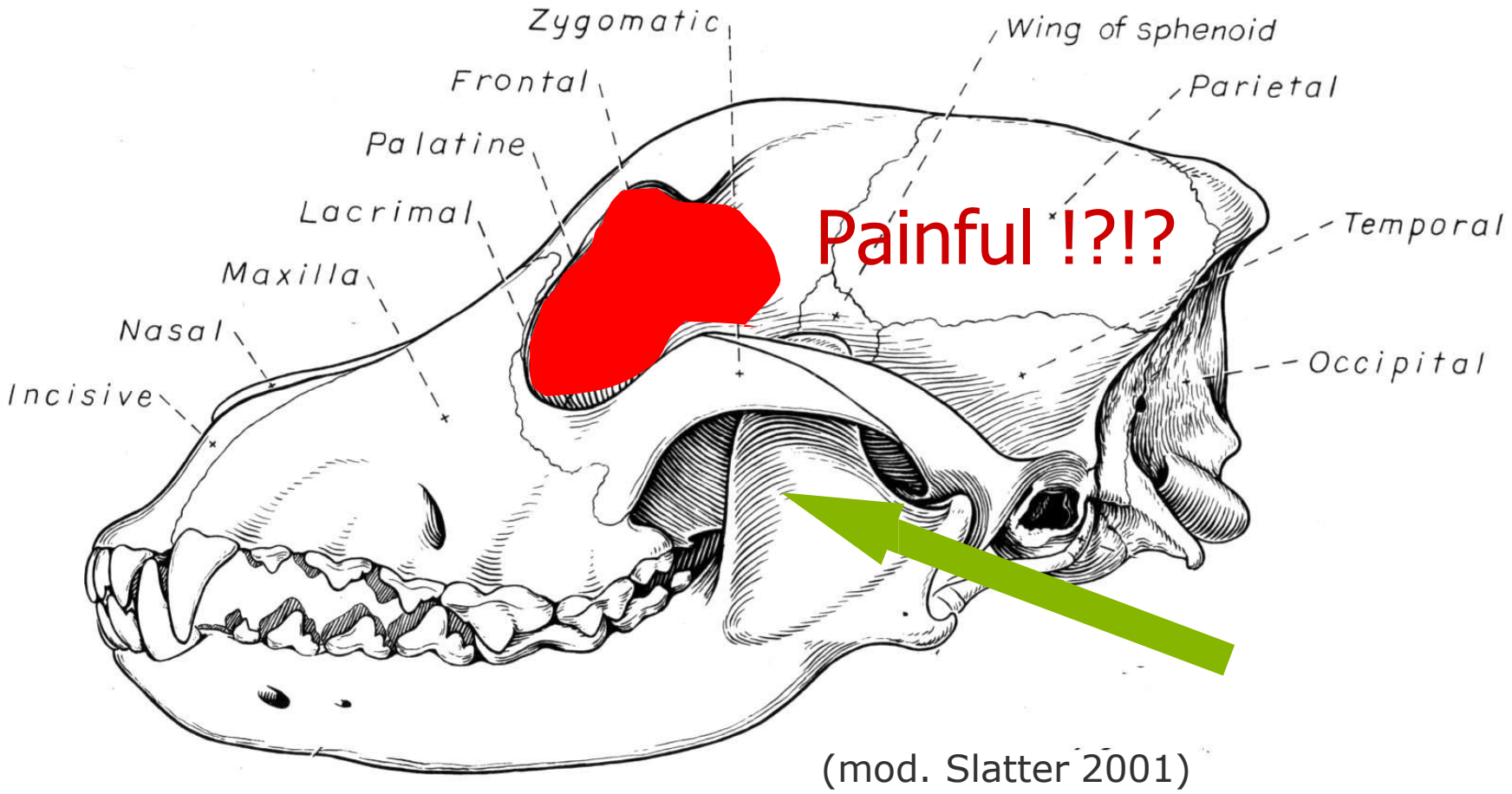
- Acute and often painful
- Rapid response to therapy
- Often young age
- Stick chewer ?

Orbital Neoplasia

- Chronic, slowly progressive, and typically non-painful
- Typically older age v +/- decreased nasal air flow

Diagnostic

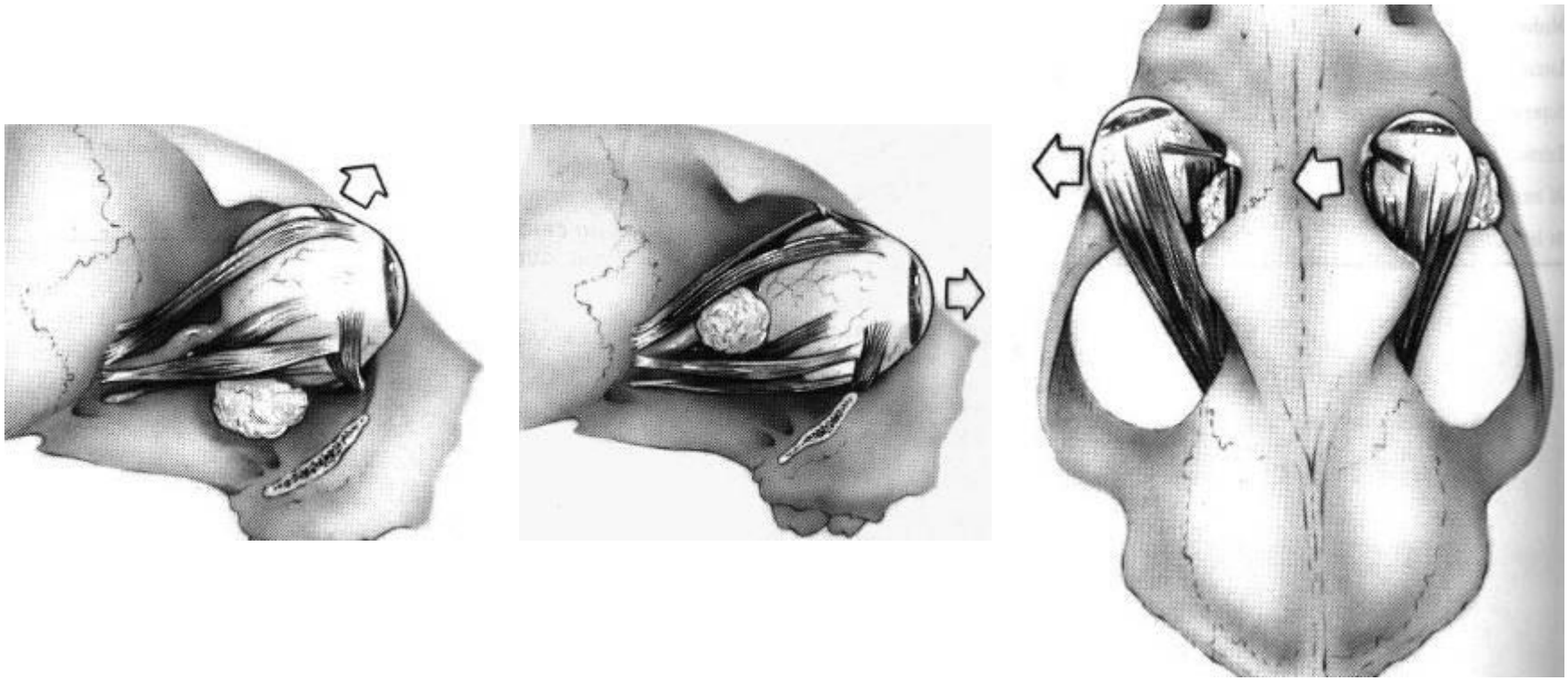
- Open mouth
- Ultrasound
- X-rays
- FNA/Cytology
- CT/MRI



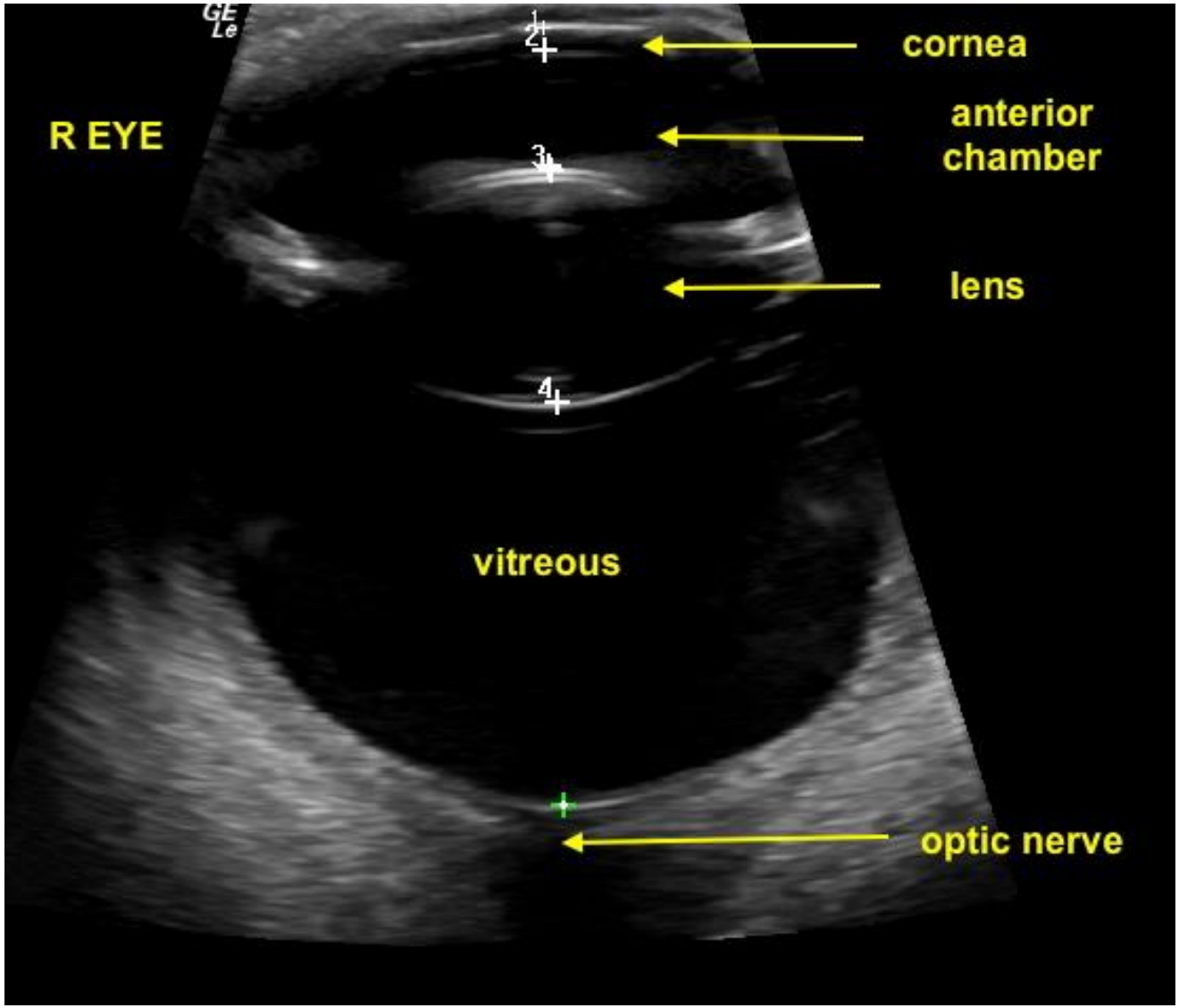
(mod. Slatter 2001)

Eule, 2016, FU Berlin

Eule, 2016, FU Berlin

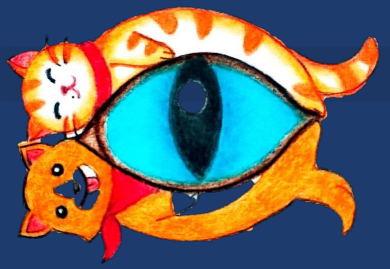


Slatter, 2011



Eule, 2016, FU Berlin

Glaucoma



Study from Switzerland (1995-2009)

- 5984 Dogs
- Congenital glaucoma 4/5984
- Prim. Glaucoma 123/5984
- Sec. Glaucoma 217/5984

Strom et al. VO 2011

Glaucoma

Primary Glaucoma

Signalment

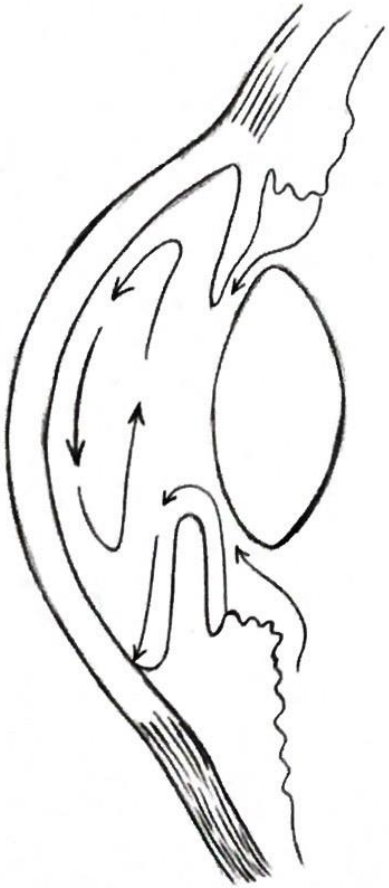
- 3-9 year old Cocker Spaniel, Basset Hound, Mixed breed

Clinical signs

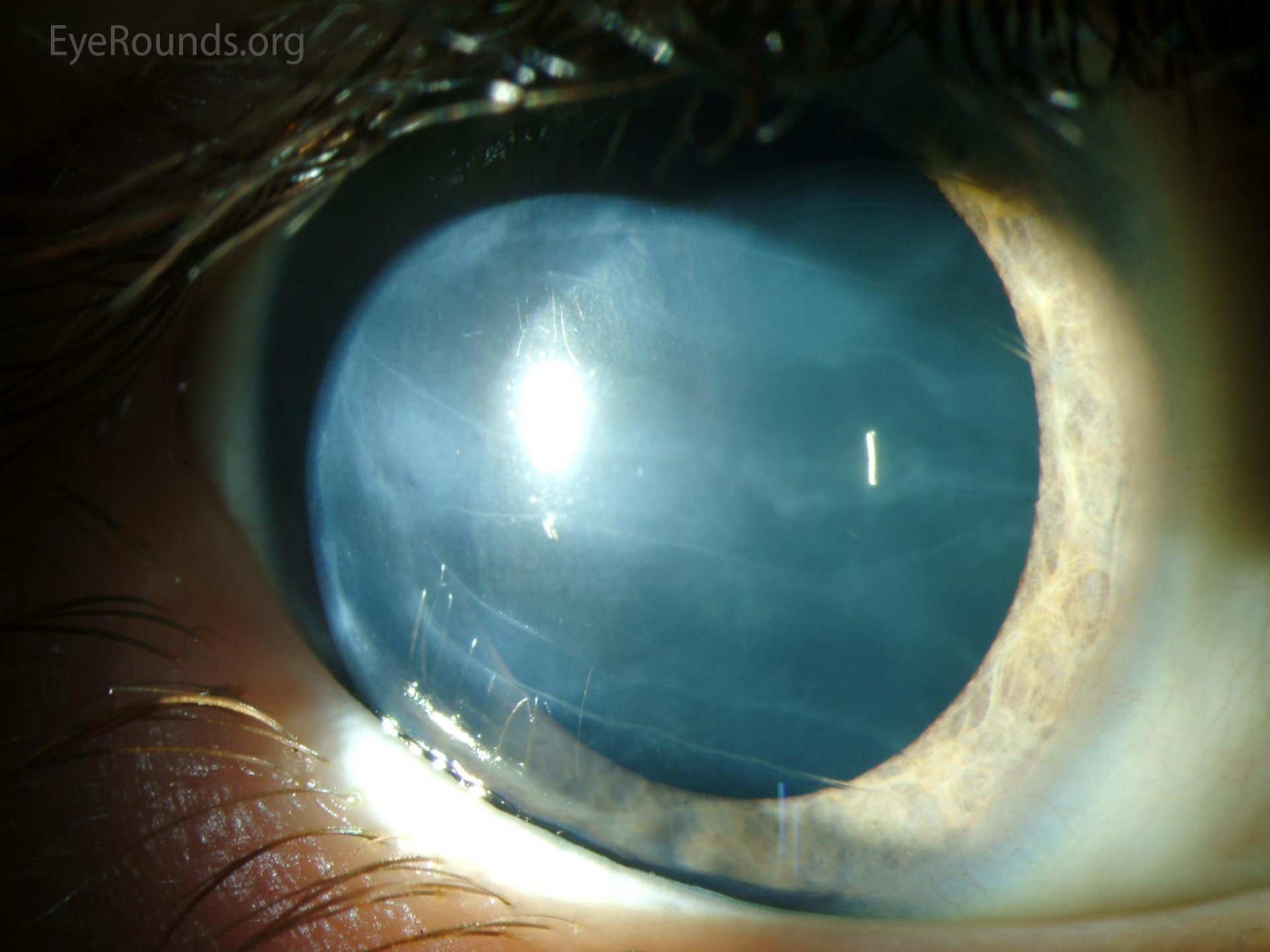
- Acute redness, pain, corneal edema, episcleral vessel injected

Prognosis

- guarded to poor



Eule, 2017, FU Berlin



Glaucoma

Secondary Glaucoma

Most common etiologies

- Anterior lens luxation
  - Terrier breeds
- Anterior uveitis (many DDx)
- Previous cataract surgery
  - Chronic low-grade uveitis
- Common in cat
  - FIV, FLV, FeLv and Toxoplasmosis
  - Aqueous humor misdirection syndrome

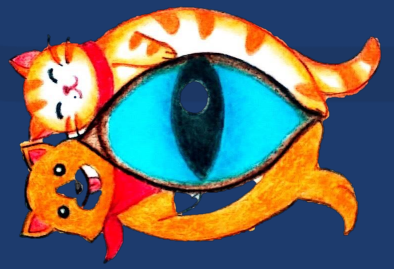
Clinical signs

- redness, pain, corneal edema, episcleral congestion, the pupil mid-dilated and non-responsive, loss of vision, buphthalmos in chronic stage

Must rule out an anterior lens luxation and uveitis before giving latanoprost

Latanoprost contraindicated & will make anterior lens luxation and uveitis worse

Secondary Glaucoma

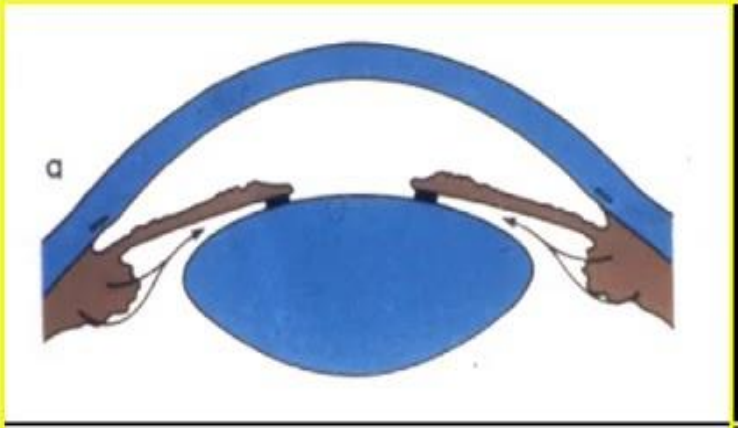


Causes:

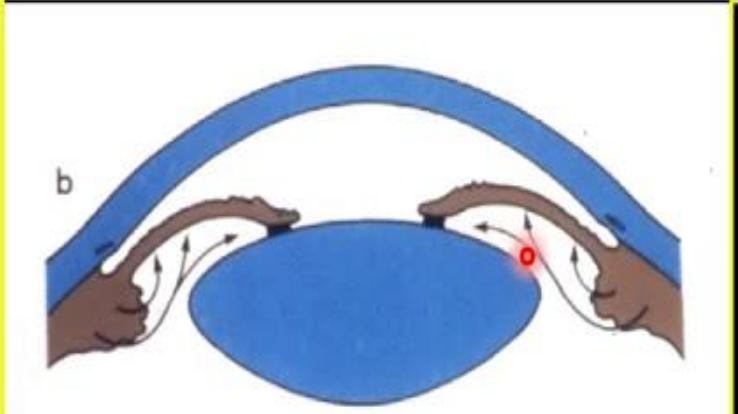
- Study in North America (Gelatt & MacKay, 2004)
  - 81 % secondary to cataract (20% within one year after cataract)
  - 12 % Lens luxation
  - 5,1 % Cataract OP
  - 7,1 % Uveitis
  - 7,3 % Bleeding
  - 3,5 % Neoplasia
- Schweizer Study (Strom et al. VO 2011)
  - 23.0% anterior uveitis
  - 22.6% Lens luxation
  - 13.4% after intraocular surgery
  - 10.6% Neoplasia
  - 8.3% Trauma
  - 6,9% ocular melanosis
  - 6,9% hypermature cataract
  - 3.23% Bleeding

Eule, 2011, FU Berlin

Pupil block

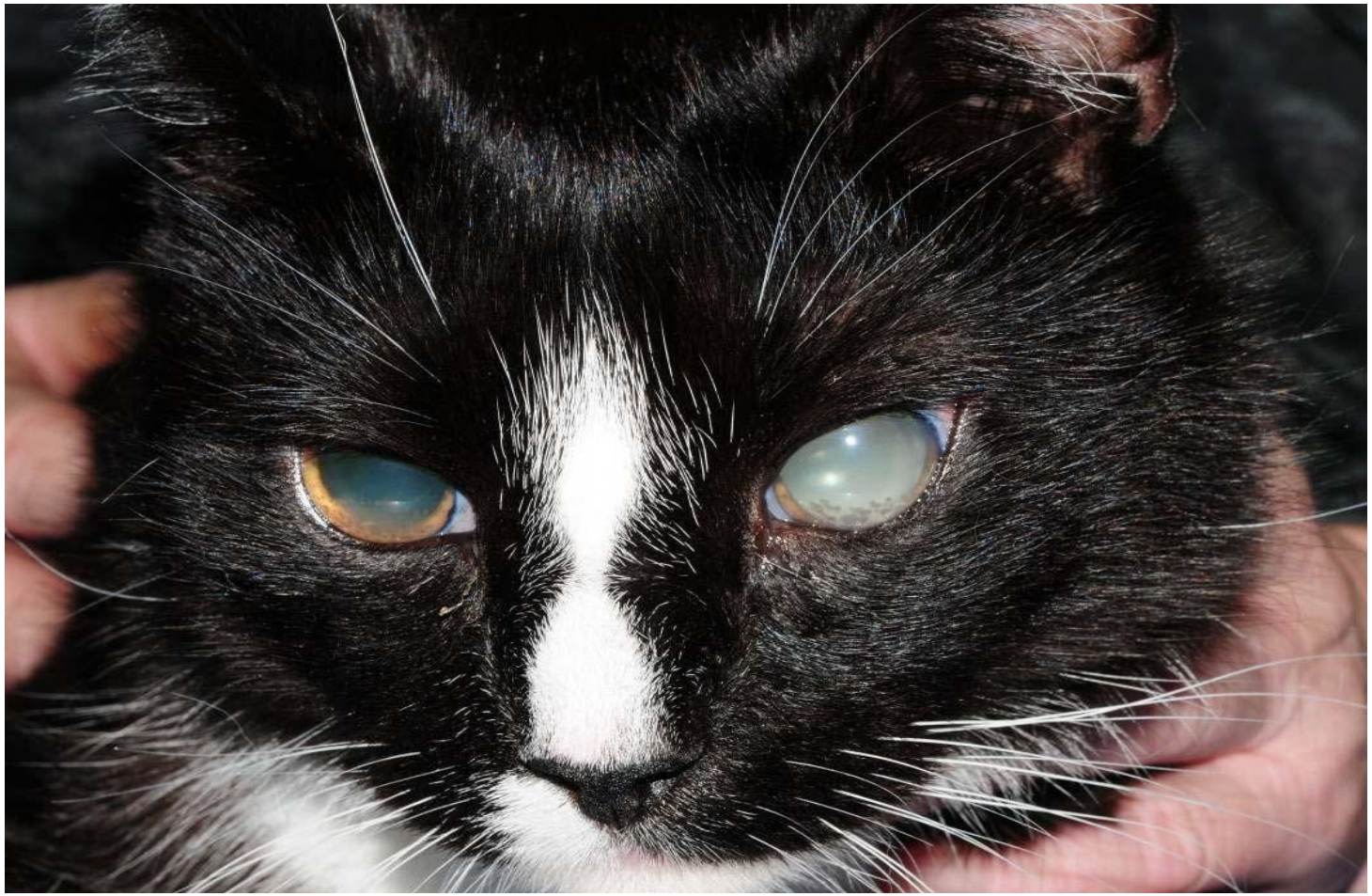


- Increase in physiological pupil block



- Dilatation of pupil renders peripheral iris more flaccid
- Increased pressure in posterior chamber causes iris bombe´

- Angle obstructed by peripheral iris and rise in IOP

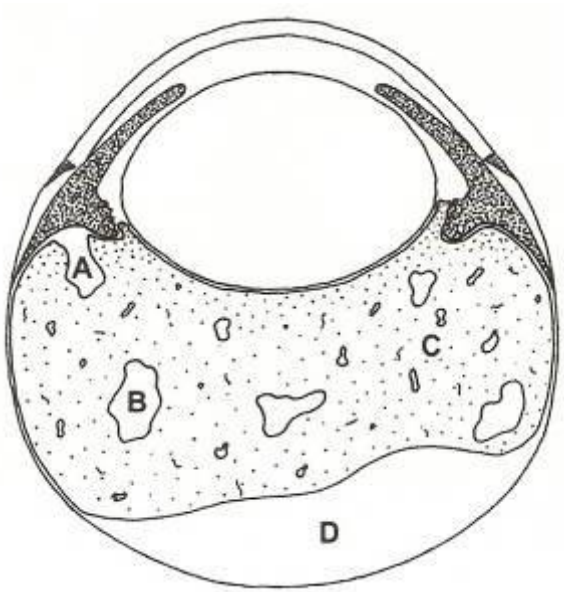


Romkes, 2011, FU Berlin

Glaucoma

Aqueous humor misdirection syndrome

- Aqueous water is fed into the vitreous
- Vitreous body expands and displaces iris and lens forward



(© JAVMA 2005, 227(9), 1434)

Normal

Aqueous misdirection syndrome

Glaucoma

- Loss of visual acuity - optic nerve
  - Increased IOP reduces axoplasmic flow
  - Dog:
    - 25mmHg->10% of axons with reduced flow
    - 50mmHg-> 100% of axons with reduced flow
  - Acute blindness may be reversible in the first 24-48 hours
  - Persistent high pressure irreversibly damages retinal ganglion cells

Glaucoma

Prognosis indicators

- Presence of vision = good
- Normal PLR = good
- IOP 10-25 mm/Hg = good
- IOP over 60 mm/Hg than 24 hours = bad
- Buphthalmos = bad

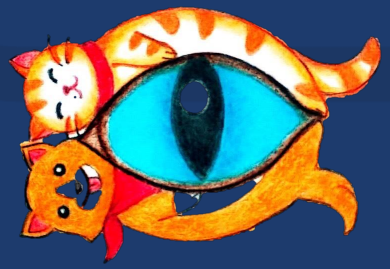
Bupthalmos

Clinical signs

- Chronic red eye
- High IOP
- Blind in affected eye
- Enlarged globe
- Lens subluxation
- Aphakic crescent
- Phacodonesis
- Iridodonesis
- Vitreal prolapse in to the anterier chamber

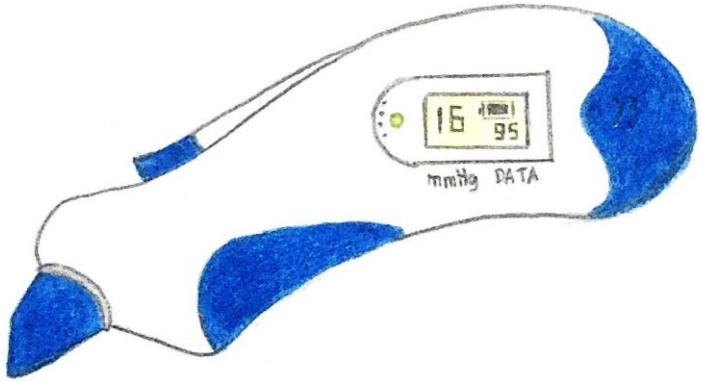
Perth animal eye hospital

Glaucoma



Tonometer

Rebound Tonometer



Applanation Tonometer

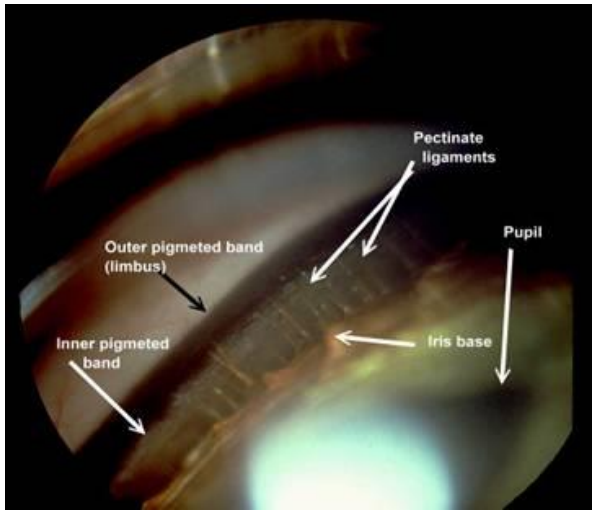
Glaucoma

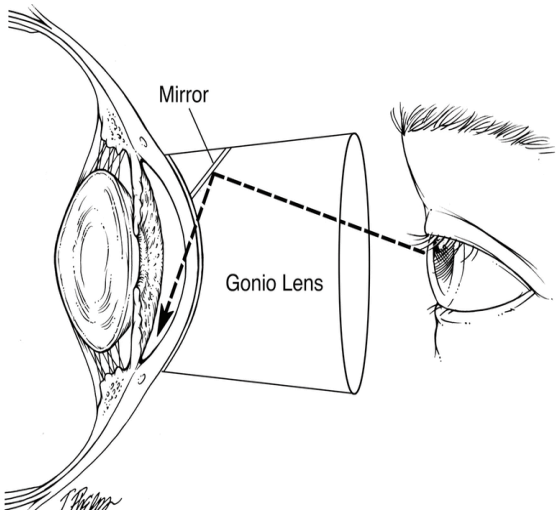
Tonometer

The normal IOP in dogs and cats should be 10–25mmHg, and if it remains higher than 60mmHg for over 24 hours, the prognosis for return of vision is poor (Mandell and Holt, 2008).

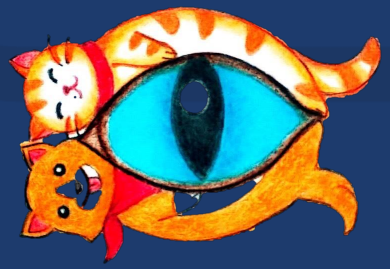
Glaucoma

Gonioscopy





Glaucoma



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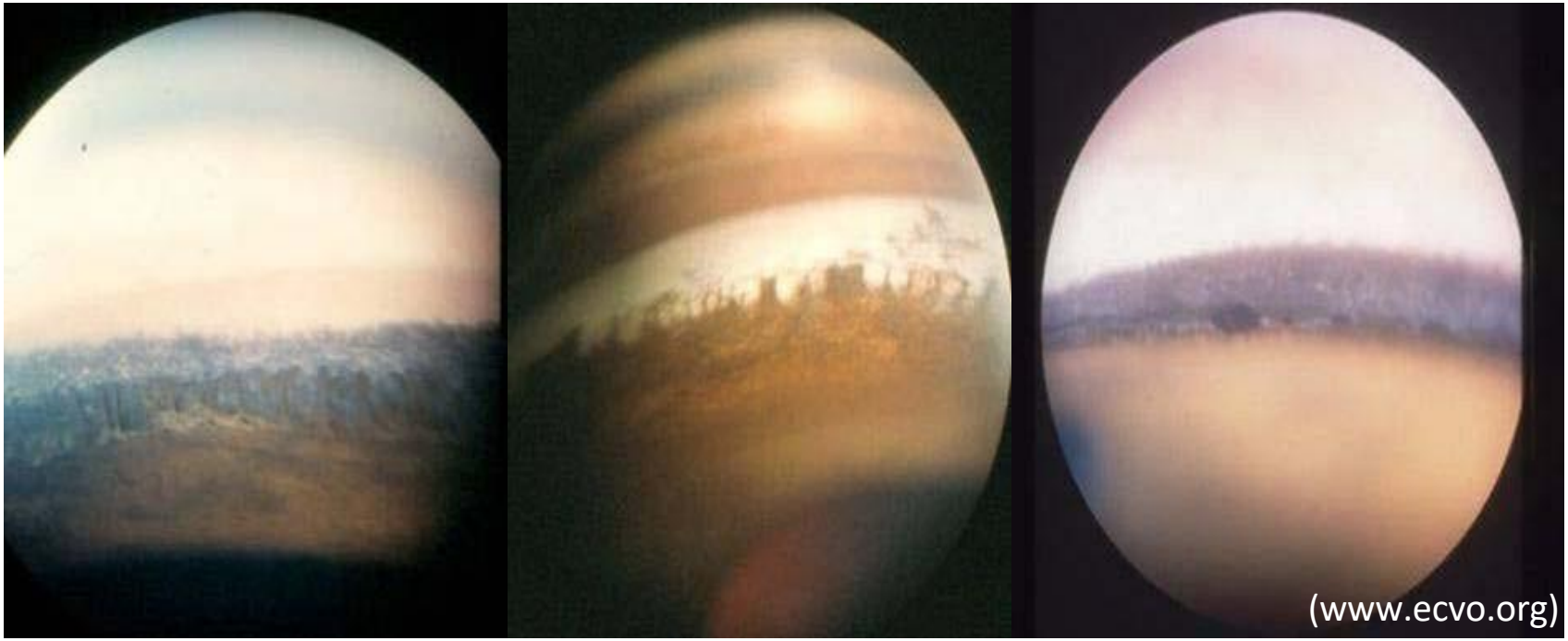


Fibrae latae

Laminae

Occlusio

Exophthalmos vs Buphthalmos

- Caused by orbital mass Abscess, neoplasia and mucocele
- Typically maintain vision
- Decreased retropulsion
- Globes are same size

- Caused by chronic glaucoma
- Blind & lose light perception
- Typically normal or near normal retropulsion
- Globes are different sizes

Anterior Lens Luxation

Primary lens luxation

- Breed predisposition
  - Terrier breeds the Chinese Crested dog, Shar Pei, Border Collie and Lancashire Heeler
  - dogs aged four to seven years
  - Not common in cat

Secondary lens luxation

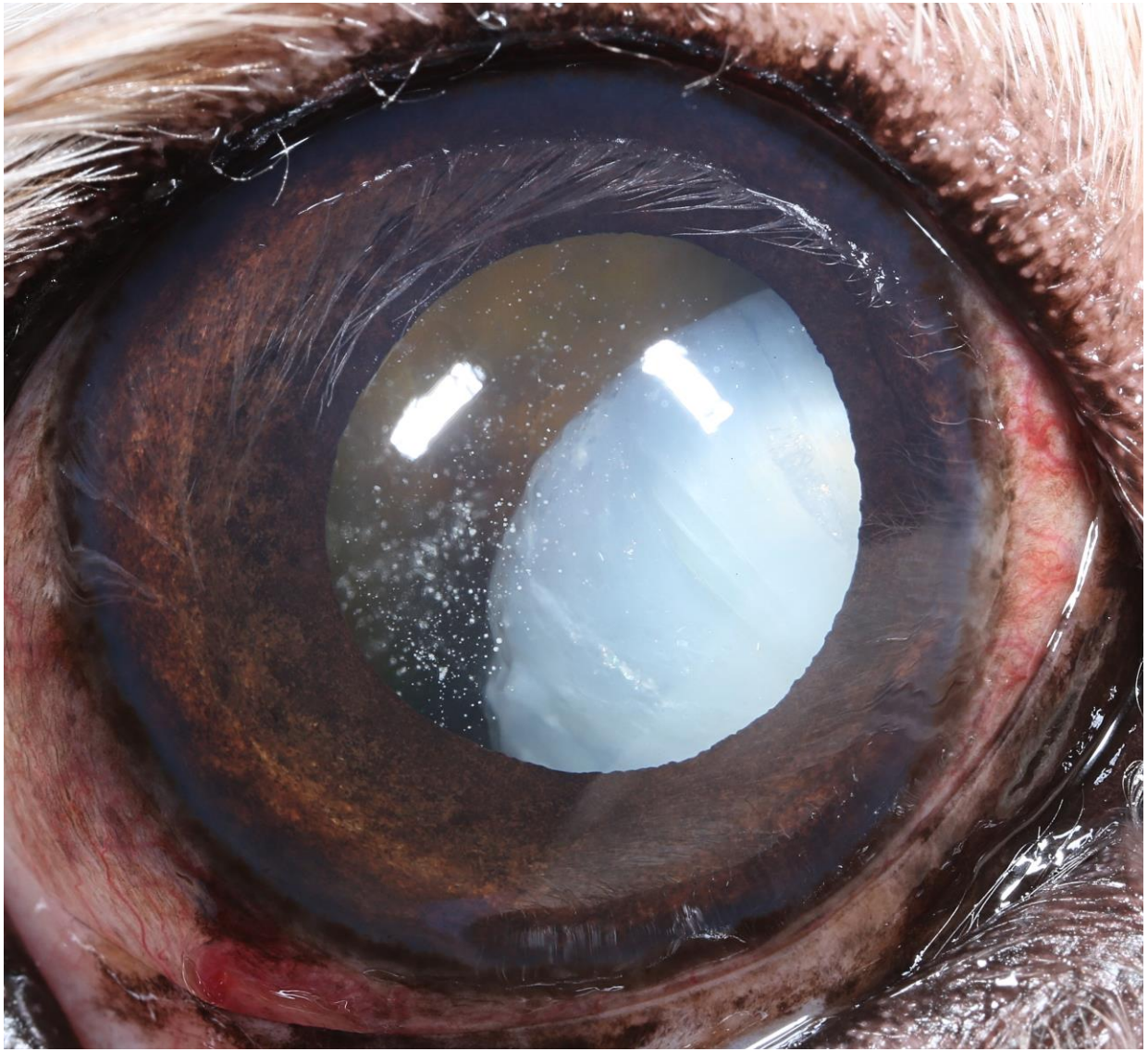
- Causes
  - Uveitis, tumor glaucoma, cataract, trauma
  - No breed predisposition
  - More common in cat

Anterior Lens Luxation

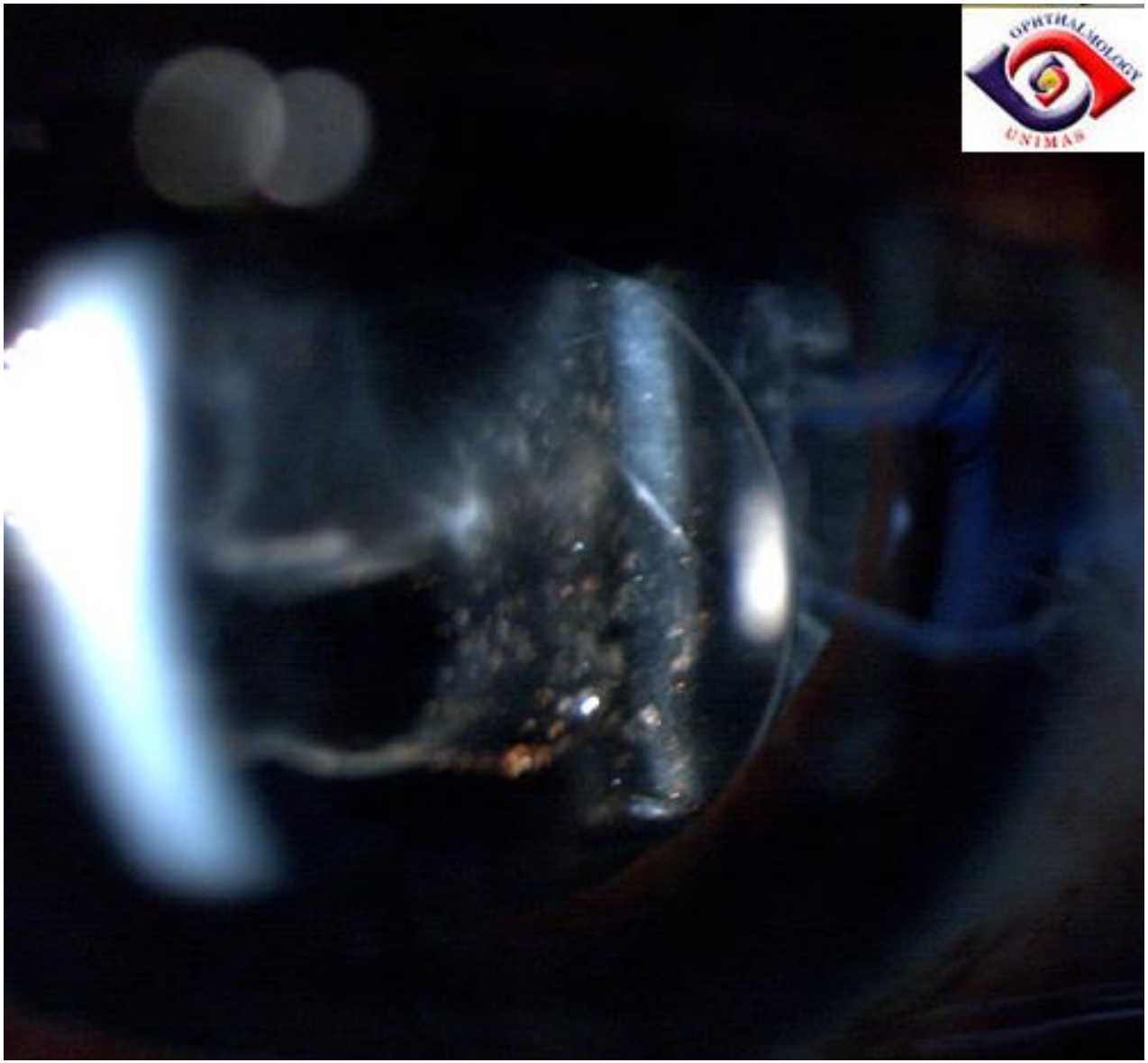
Clinical signs

- Elevated IOP
- Corneal edema
- Blepharospasm
- Epiphora
- Episcleral and conjunctival hyperemia

Eule, 2016, FU Berlin



https://www.msdvetmanual.com/



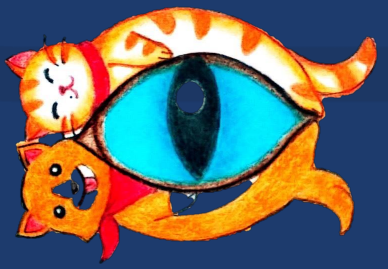
http://www.sarawakeyecare.com

Anterior Lens Luxation

Prognosis indicators

- Presence of vision = good
- IOP over 60 mm/Hg than 24 hours = bad
- Anterior lens luxation = bad
- Vitreous prolapse = bad

Severe Corneal lesions



Cause of corneal ulcer

- Decrease corneal protection
  - Tear flim protection
    - -KCS
  - Eyelid problems
    - -Lagophthalmos
    - -CN 7 paralysis
    - -CN 5 paralysis
    - -Ectropion
- Increase epithelial cell turn over
  - Endogenous
    - -Entropion
    - -Ectopic cilia
    - -Distichiasis
    - -Trichiasis
    - -Eyelid tumors
  - Exogenous
    - -Trauma
    - -Foreign body
    - -Infection

Severe Corneal lesions

Lesions

- Corneal foreign body
- Deep corneal ulcer
- Corneal laceration
- Melting corneal ulcer
- Descemetocele
- Corneal perforation

Clinical signs

- Blepharospasm
- Epiphora
- Corneal edema
- Pain
- Ocular surface redness and swelling
- Vision may become blurred
- (Mucopurulent ocular discharge)
- Miosis

General anesthesia or sedation is needed for ophthalmic examination

Topical anesthesia

Topical Anesthetics

- Diagnostic use only
- Not to be prescribed
- Toxic to corneal epithelium

Severe Corneal lesions

Diagnostics

- Swab (Antibiogram)
- Fluorescein test
- Schirmer tear test (also in contralateral eye)
- Intraocular pressure measurement
- Seidel test
- Cytology
- Look under third eyelid

Bacteriological examination

- In case of purulent discharge
- Swabs from the conjunctival sac
- Before administration of local anesthetic

Fluorescein test

- For representing corneal defects
- Fluorescein is a water-soluble dye that the intact cornea (epithelial) does not stain

Corneal foreign body

Eule, 2020, FU Berlin

Deep corneal ulcer

Eule, 2020, FU Berlin

Corneal laceration

Gent, 2013

Melting corneal ulcer

Descemetocele

Eule, 2013, FU, Berlin

Corneal perforation

https://www.vettimes.co.uk/

Eule, 2011. FU Berlin

Schirmer tear test

- Determination of the aqueous portion of the tear film

Normal: 15 - 25 mm/min.

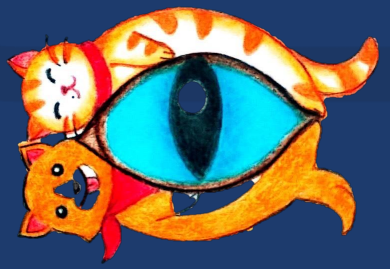
Sufficient: 10 - 15 mm/min.

Critical: 5 - 10 mm/min.

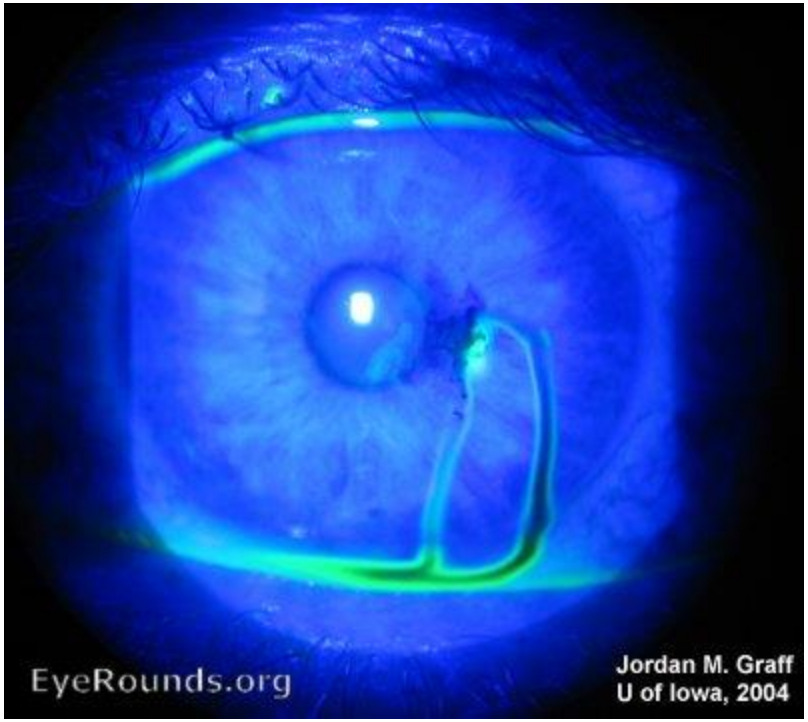
Pathological: 0 - 5 mm/min.

With every eye with purulent discharge
you have to make an STT!

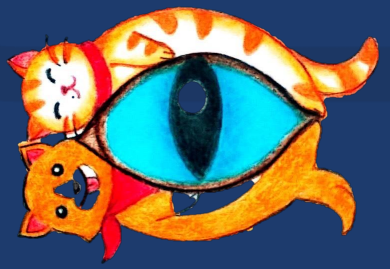
Seidel Test



The test is used to reveal leaks from the cornea, sclera, or conjunctiva following injury or surgery.



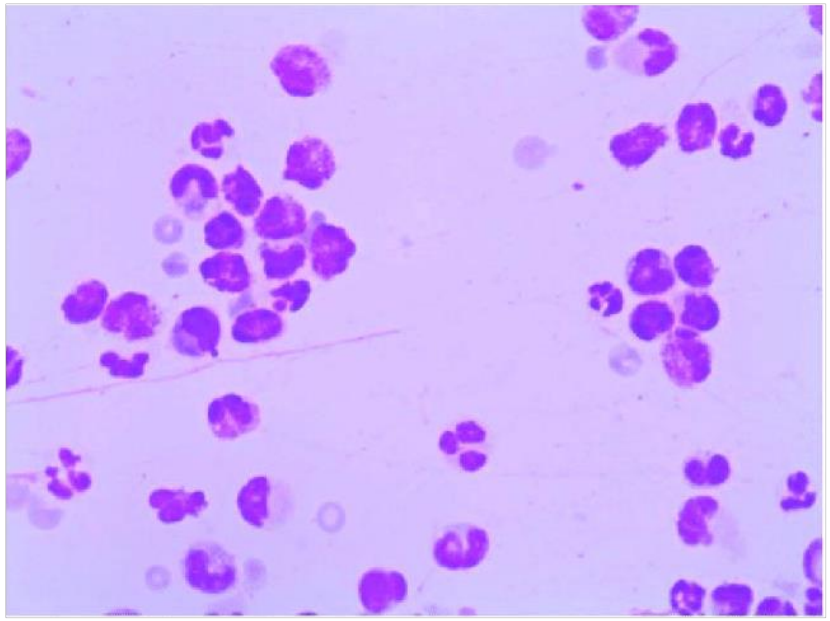
Cytology



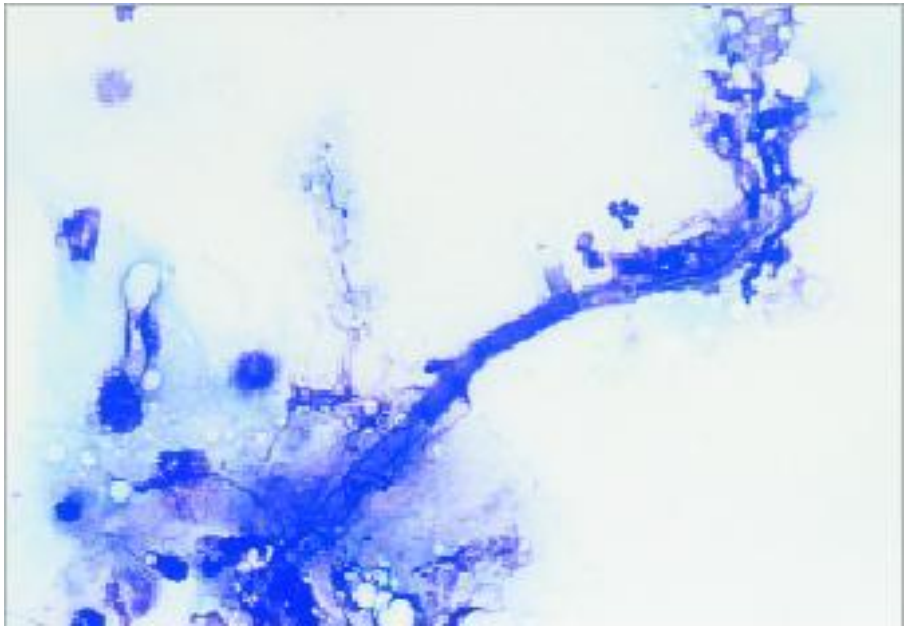
- To investigate the environment of the ocular surfaces.
- With tropical anesthesia

Eule, 2019, FU Berlin

Cytology



https://www.researchgate.net/



www.vetfolio.com

Look under third eyelid

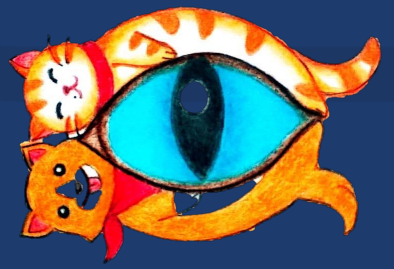
Soimala 2020, Songkhal, Thailand

Severe Corneal lesions

Prognosis indicators

- Presence of vision = good
- Good neovascularization to the edge of the wound = good
- Corneal perforation more than 48 hours = bad
- Globe collapse = bad
- IOP over 60 mm/Hg = bad

Eye lid laceration



Causes

- Cat scratches
- Dog bite
- In animate objects

Eyelid laceration

Clinical signs

- Blepharospasm
- Epiphora
- Pain
- Erythema, edema, or tissue disruption around the eyelid
- Displacement of the punctum

Eule, 2013. FU Berlin

Gent, 2013

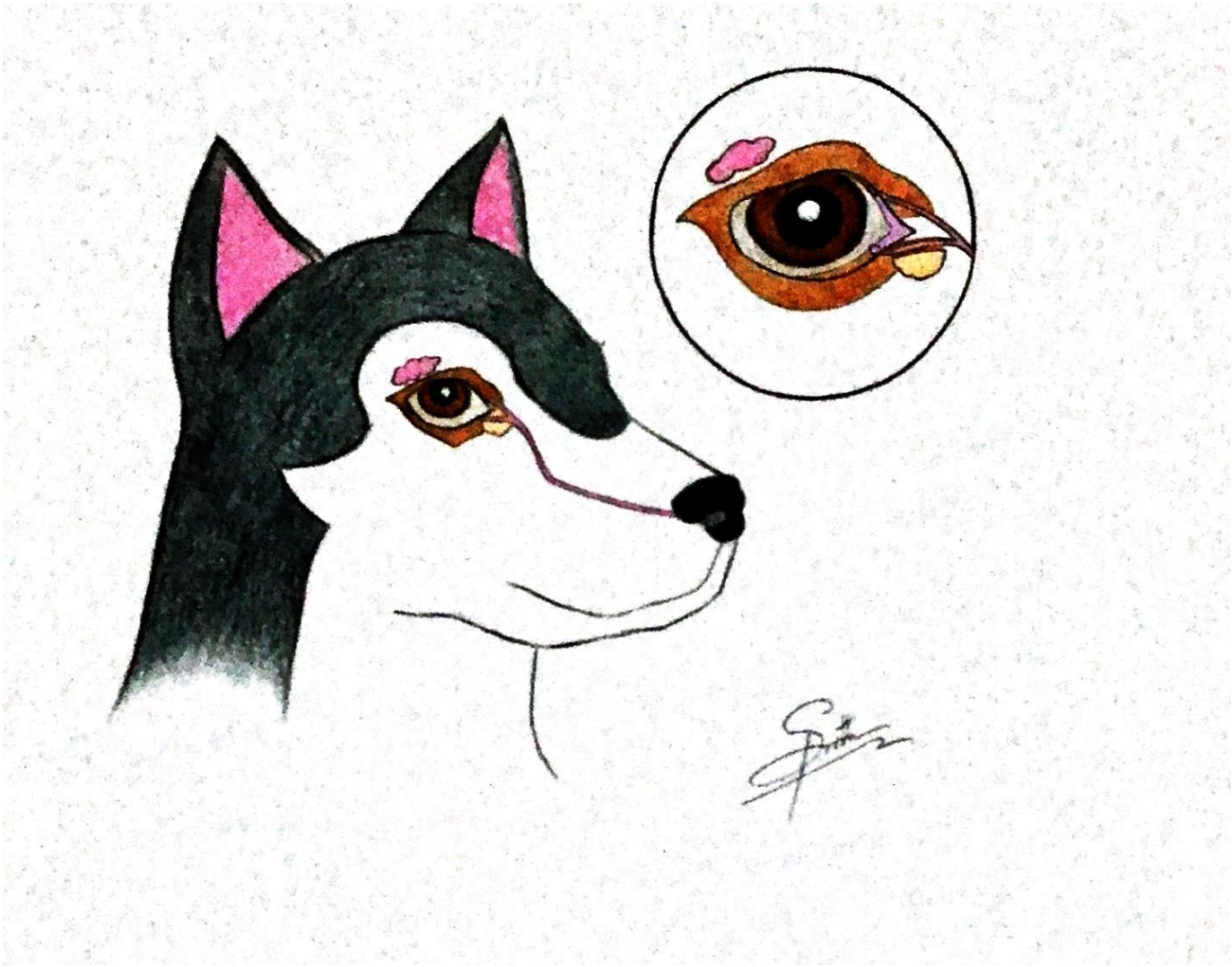
Eye lid laceration

Diagnostic procedures

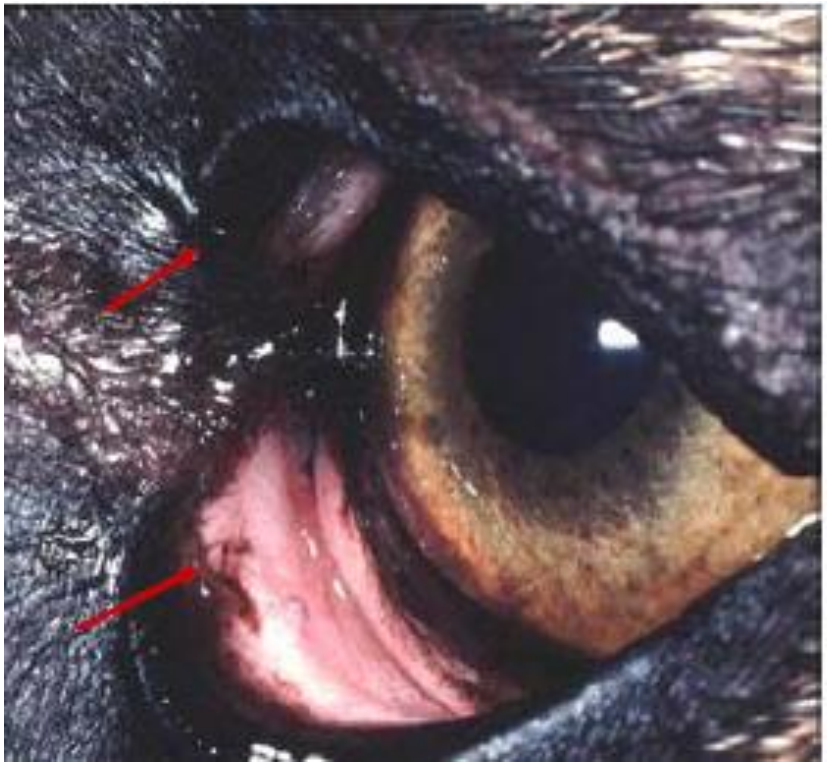
- Palpation
- Fluorescein Test
- Intra ocular pressure measurement
- Nasolacrimal punctum examination
- Visual tests
- Ultrasound
- X-Ray
- (CT-Scan)

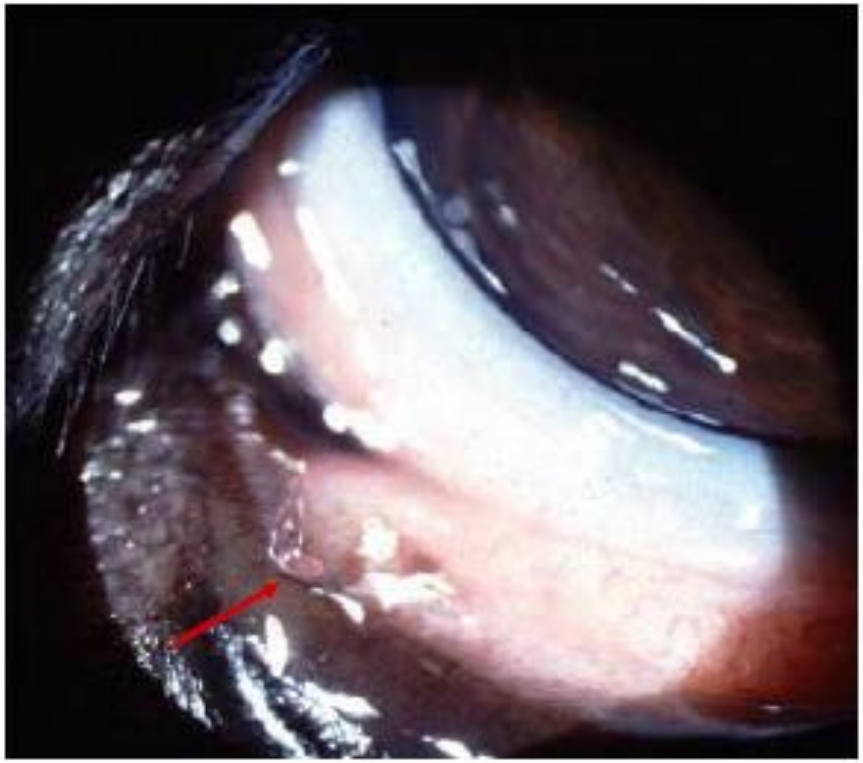
Prognosis indicators

- Fresh wound less than 24 hours = good
- Wound with infection = fair
- Lid laceration with nasolacrimal punctum= fair (CE)



Soimala, 2020. Songkhla Thailand





Eule, 2001. FU Berlin

Sudden blindness

Diagnostic procedure

Assess Vision

- Menace
- Obstacle course
- Cotton balls
- Visual placing
- (Dazzle reflex)
- (PLR)

Ophthalmic exam

- Opacity that impairs vision
- Normal fundus?

Sudden blindness

Disease

- **S**udden **A**cquired **R**etinal **D**egeneration syndrome (SARD)
- Retinal detachment
- Optic neuritis

SARD

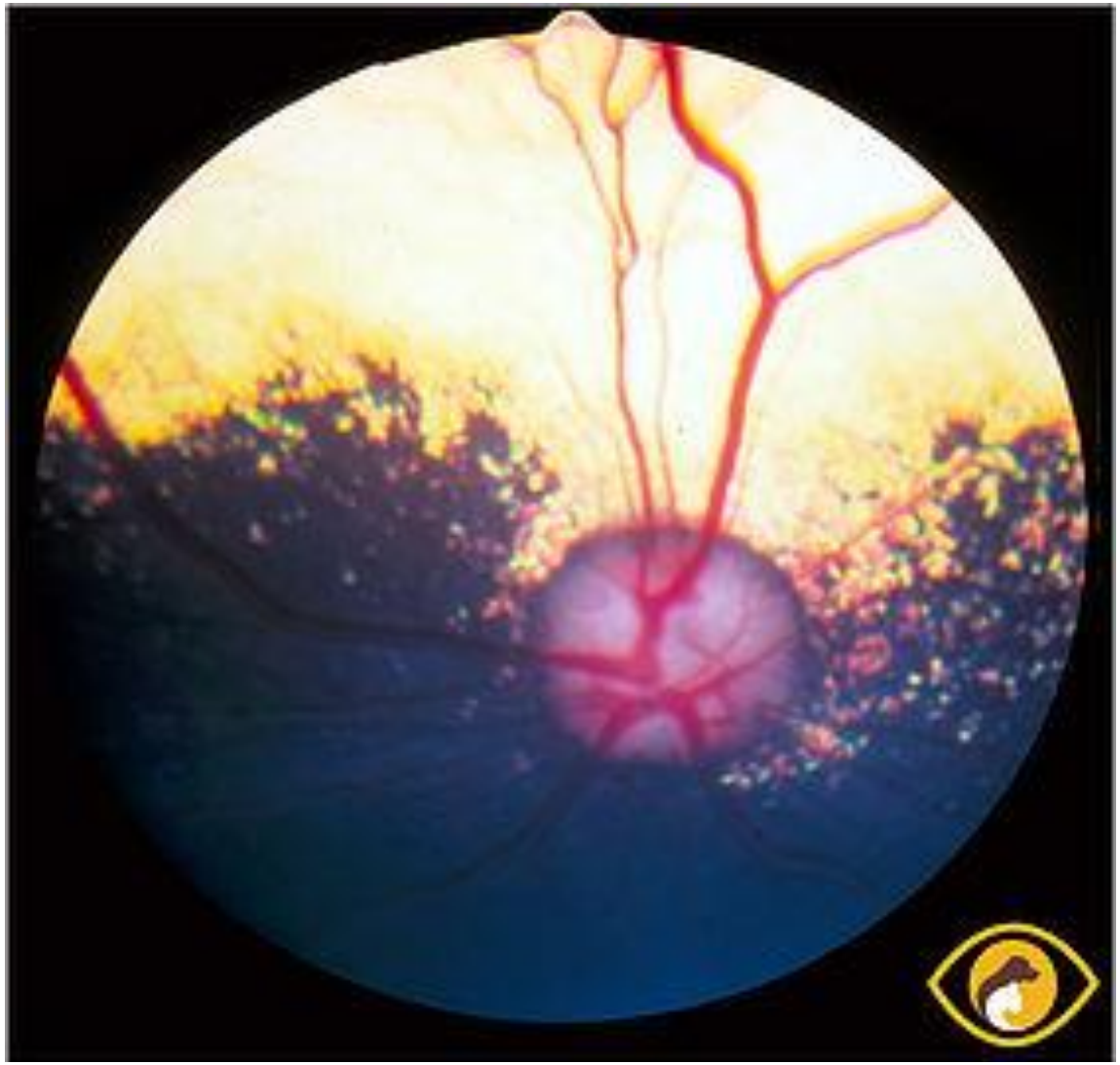
(**S**udden **A**cquired **R**etinal **D**egeneration syndrome)

Suggestive findings

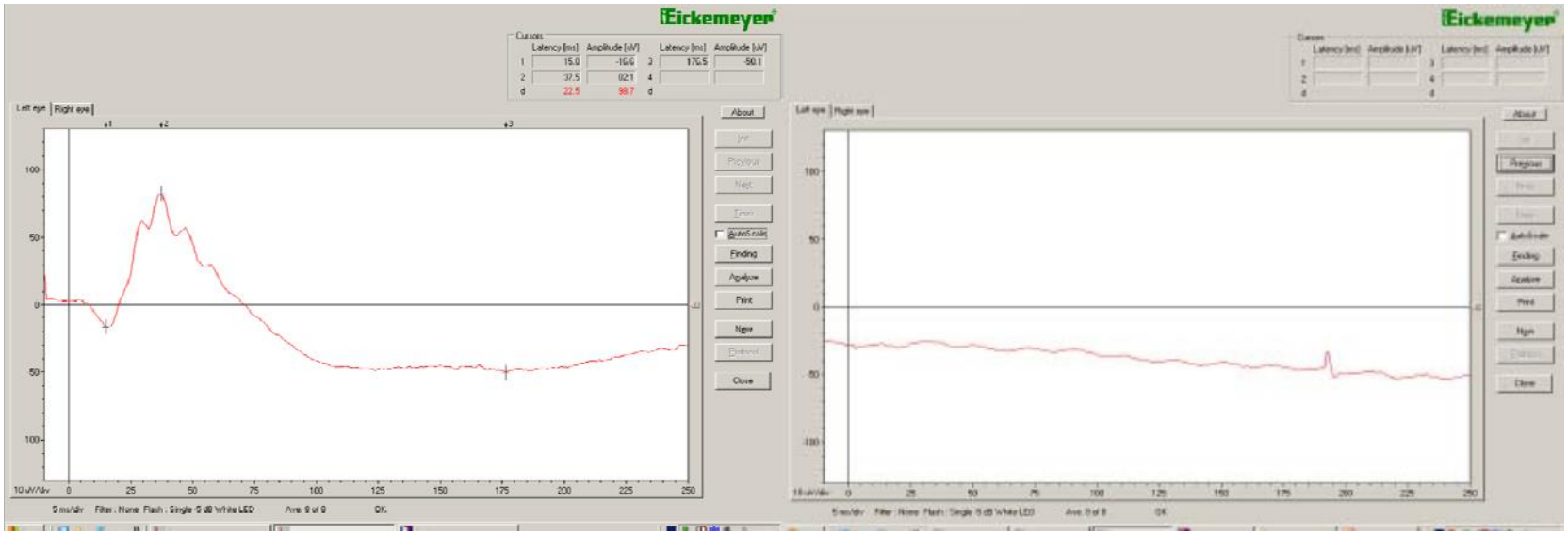
- Bilateral blindness
- History of: polyuria, polydipsia, polyphagia, weight gain
- Dachshunds
- Normal fundus
- No neurologic disease

Diagnostic tests

- Electroretinogram → Normal = brain disease



https://animalvisioncare.com/



Eule 2014, FU Berlin

Retinal detachment

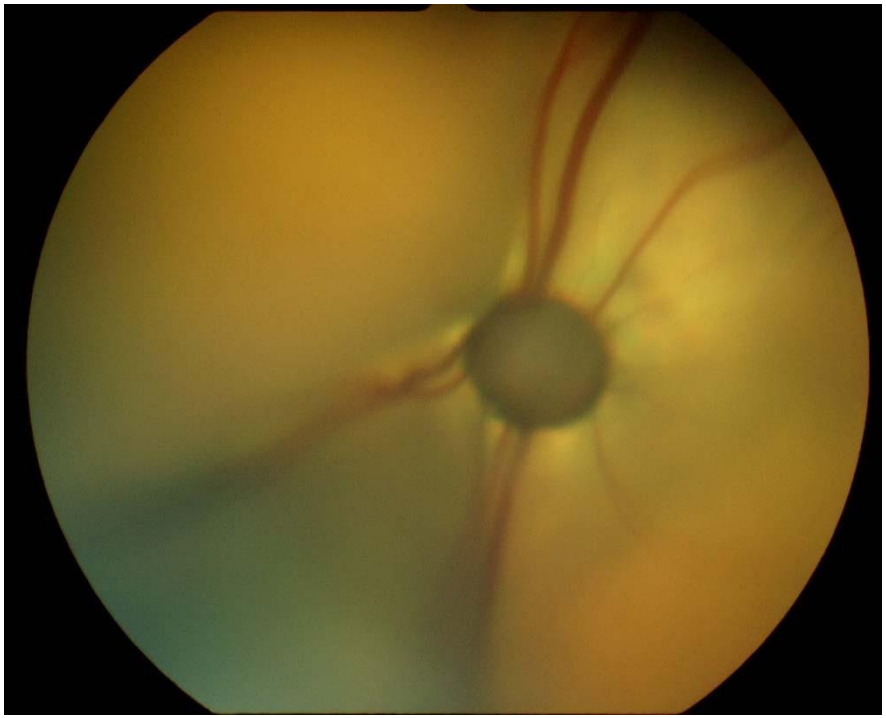
Suggestive findings

- Lack of menace response
- Anisocoria
- Affected eye = larger pupil
- Abnormal" fundus

Diagnostic tests

- Blood pressure measurement
- Should be >200 mmHg
- Systemic workup DDX: Systemic mycosis, toxoplasmosis, neoplasia, blood parasite etc.

Eule 2019, FU Berlin



Eule 2019, FU Berlin

Eule 2017, FU Berlin

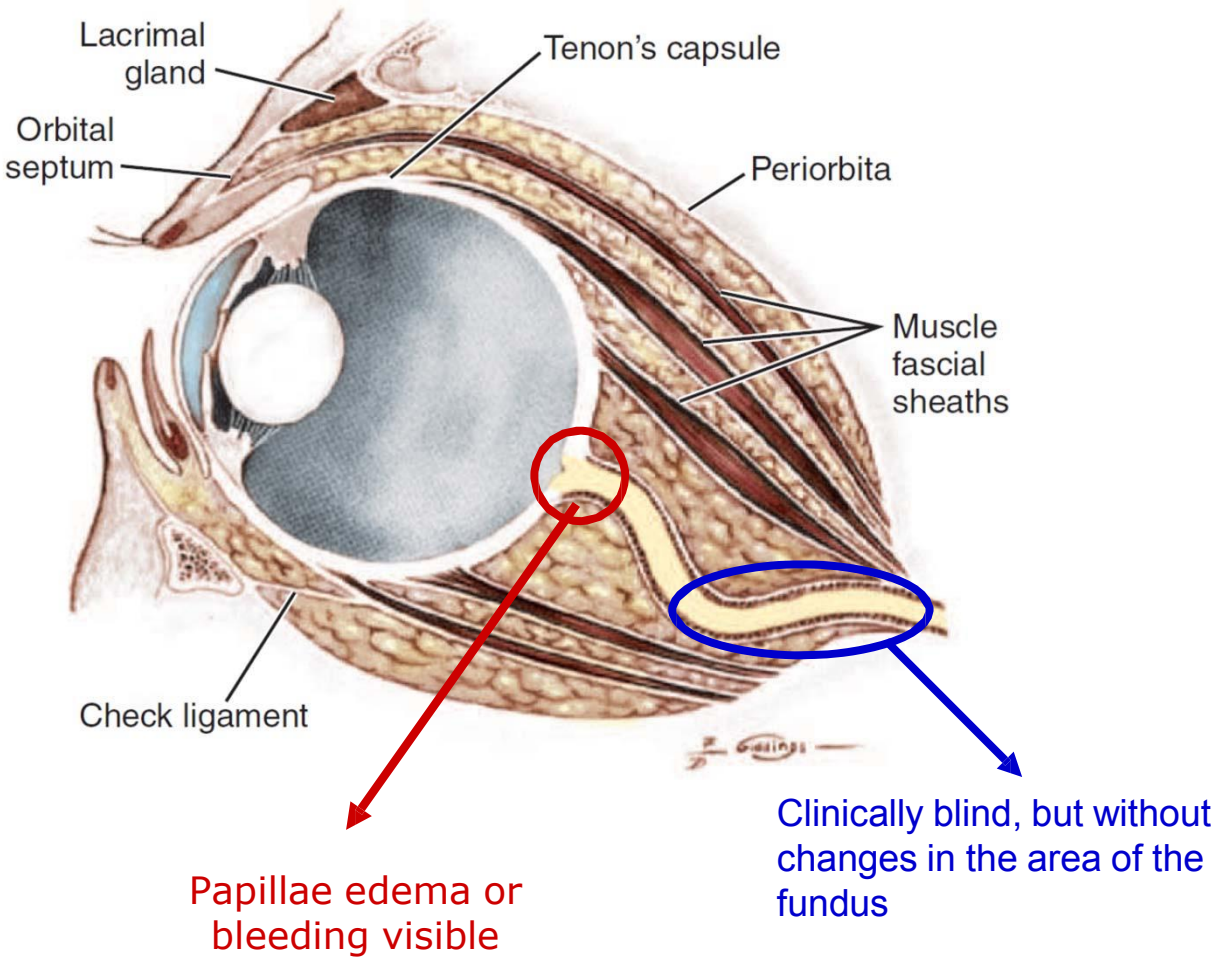
Optic neuritis

Suggestive findings

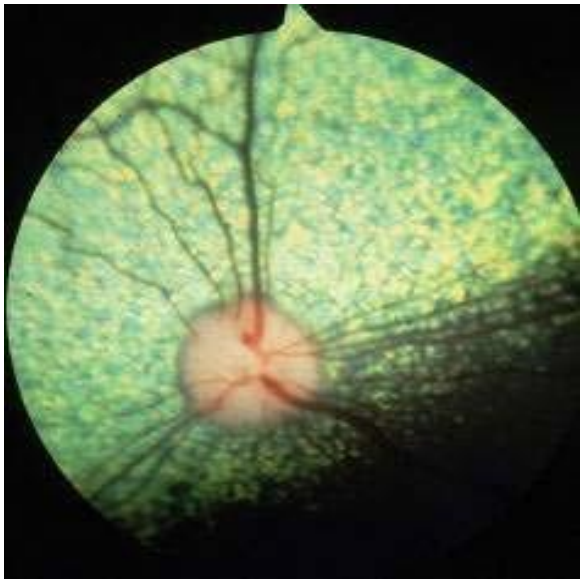
- Unilateral or bilateral blindness
- Myrdiasis & absent PLRs
- Pupils may be minimally responsive to light
- Optic nerve = normal/nbnormal

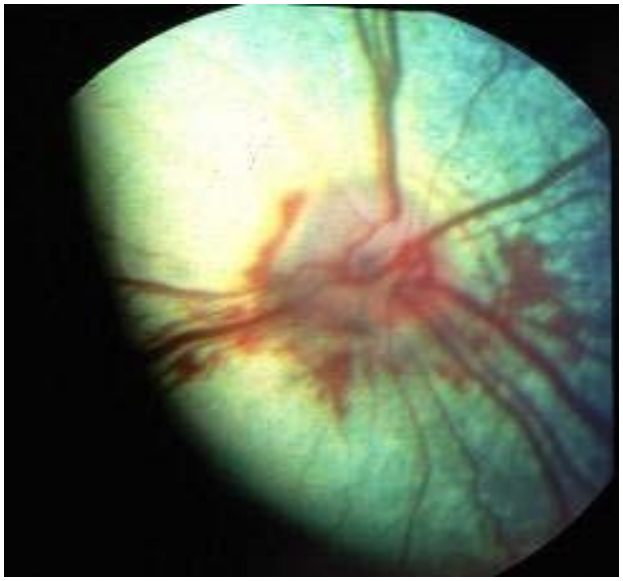
Diagnostic tests

- Electroretinogram (normal)
- Systemic work up
- CSF evaluation

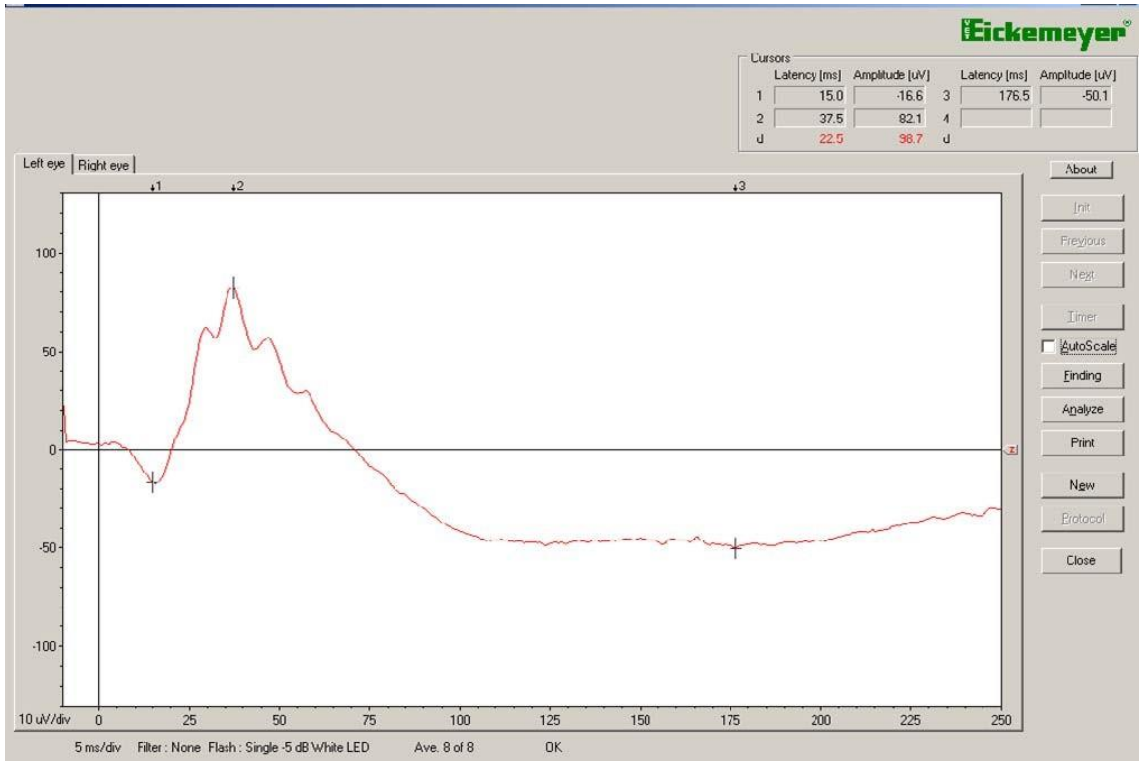


Slatter 2008





Eule 2017, FU Berlin



Eule 2017, FU Berlin

Thank you for your attention

contact: tanawan.s@psu.ac.th

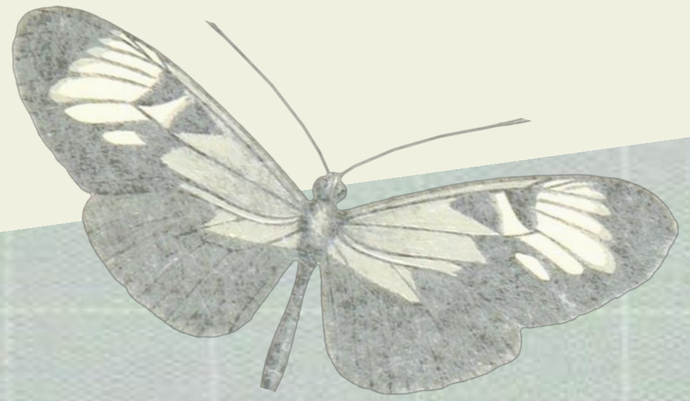
2021 Online Seminar on Veterinary Ophthalmology in Companion Animals

Prince of Songkla University

Medical managements in ophthalmic emergency

Nalinee Tuntivanich

(DVM, PhD, DAiCVO, DTBVS)



Emergency?

Important conditions for which *early action* is necessary to prevent *severe* or *permanent damage* to the eye.

Ocular Emergency

- Visual loss
- Ocular pain
- Dramatic signs

Ocular emergency

Visual loss

N Tuntivanich

- Acute: short duration but typically severe
- Imminent: likely to happen very soon
- Potential: developing in the future

Ocular pain

- Ophthalmic signs: blepharospasm, 3° lid protrusion, enophthalmos
- Ocular adnexa
- Intra-ocular structures

N Tuntivanich

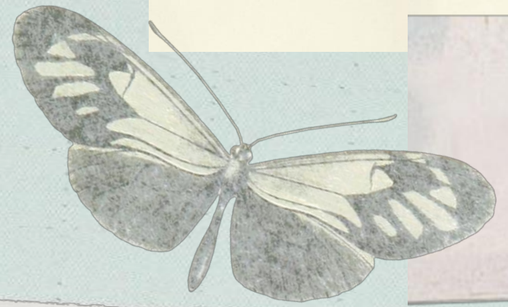
Dramatic signs

N Tuntivanich

- Colors: red, white/blue, yellow-green, dark
- Size: large vs. small
- Position: displacement, deformity

Case-based lecture

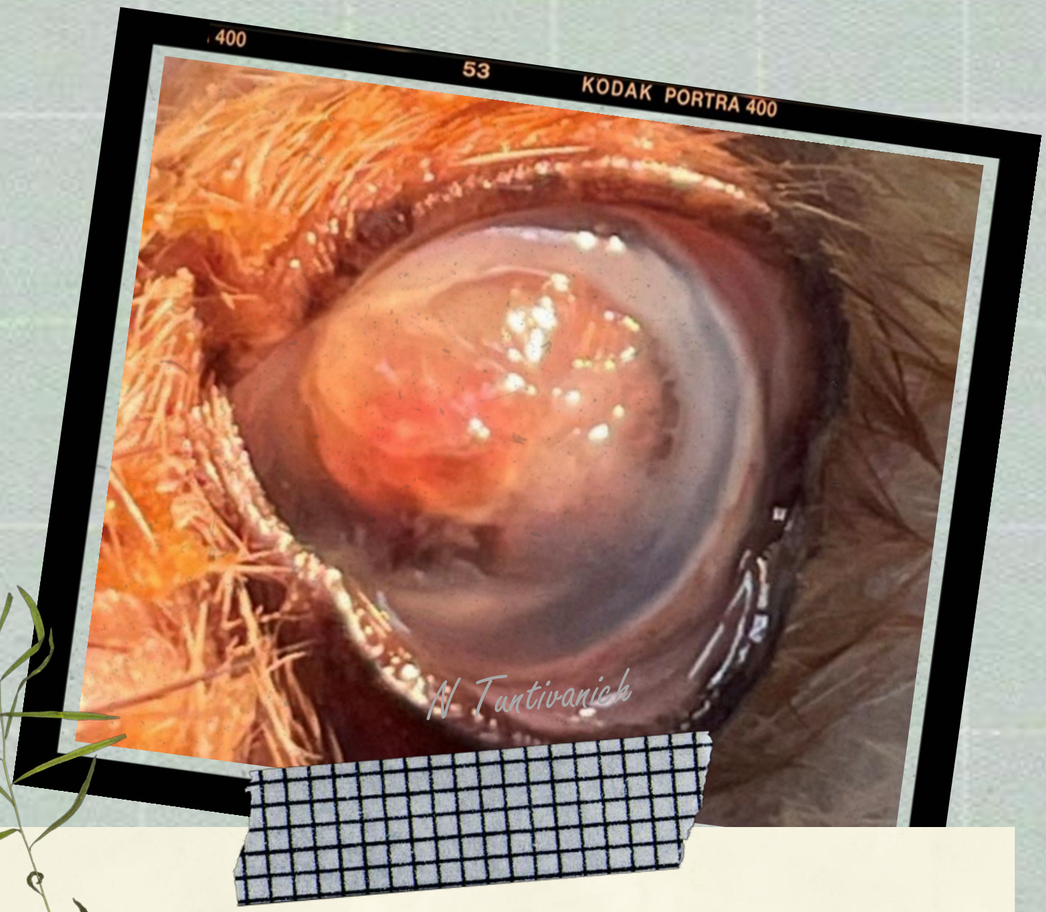
Case I - VIII



Case History

- A 9 yr-old male Shih Tzu
- Duration: 5 days
- Severe ocular pain
- Been treated with topical Terramycin ointment

What is your diagnosis?



Case I

Melting cornea

- Usually involving with micro-organism
- Adherence of bacteria to injured cells → replication and invasion
- A break of corneal epithelium occurs (broken barrier) → bacterial (ulcerative) keratitis
- Pseudomonas aeruginosa, Staphylococcus intermedius, β-hemolytic Streptococcus spp. → activate endogenous MMP enzymes → rapid melting of corneal stroma

Corneal infection – Med treatment

ABO:

- Topical fluoroquinolone
- Combination of topical fluoroquinolone and aminoglycoside → Frequency = q1-2hr
- Oral doxycycline (5-10 mg/kg)

Anti-collagenase inhibitors (MMP inhibitors):

- N-acetylcysteine, EDTA, fresh serum

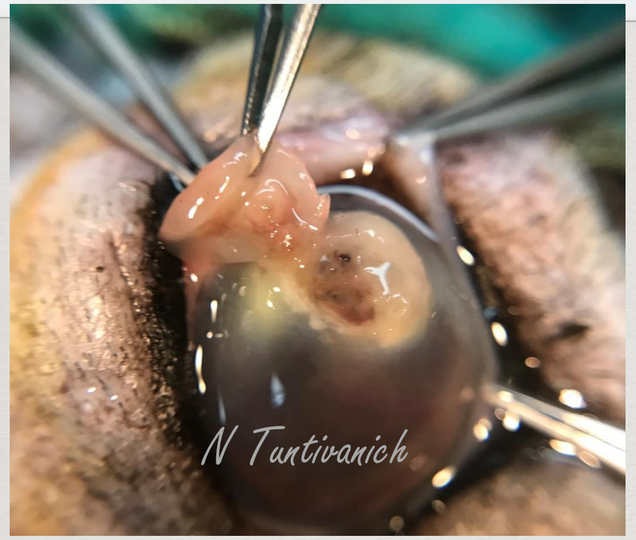
Mydriatics & cycloplegics: topical atropine

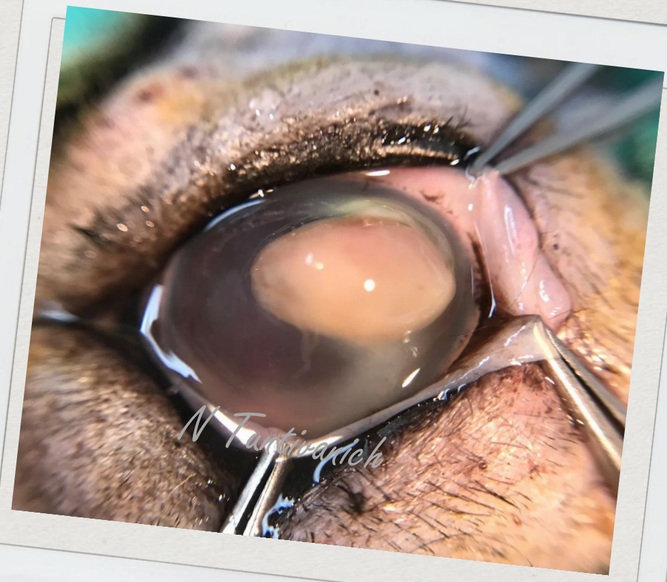
Hospitalization may be necessary.

If viral infection in cats:

- Topical antivirals q4-6hrs
- Oral famciclovir (40 mg/kg) q8hr
- Interferon: topical 0.5-1 IU drop with artificial tear qid for 2-3weeks
- Oral L-lysine (400 mg) q24hr

Corneal laceration



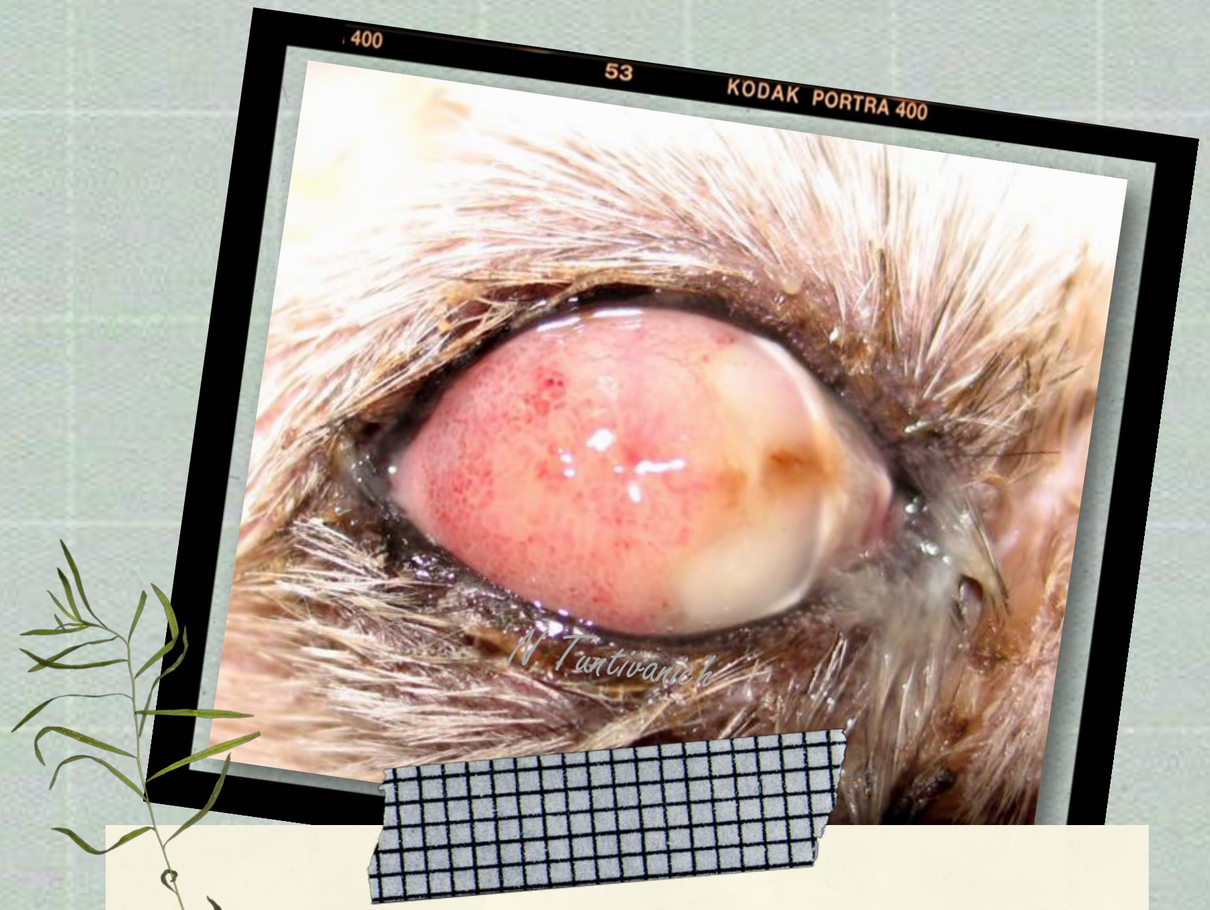


- Surgery is required to save globe and vision.
- Potential infection must be treated: intensive topical and systemic ABO

History:

- A 12 yr-old female Shih Tzu
- Attacked by another bigger dog 2 weeks ago
- Severe ocular pain; loss of appetite
- Been treated with topical fluoroquinolone for 2 weeks

What is your diagnosis?



Case II

Panophthalmitis

- Endophthalmitis = inflammation of inner tunic → progression to the orbit
- Panophthalmitis = inflammation involving all tissues of the eye
- Septic / Aseptic
- Blindness and severe pain → devastating result rapidly
- Most common organism: Gram+ (normal flora, contamination, etc)

Panophthalmitis – Med treatment

Removal of an eyeball is required if uncontrolled infection.

Intravitreal injection of ABO
- Combination of Gram+ and Gram- & bactericidal
- Vancomycin 0.4%/0.1ml and/or Ceftazidime 2.25 mg/0.1ml

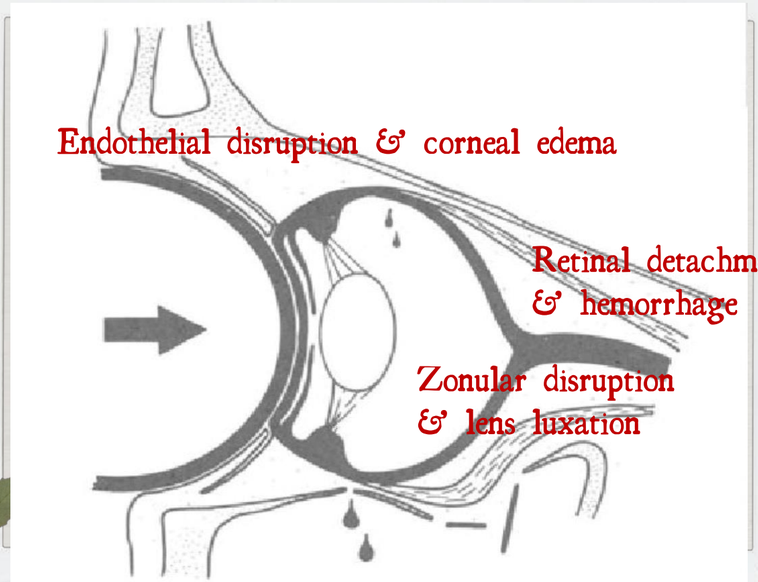
Intracameral injection of tPA

Topical atropine

Systemic NSAID

Ocular surface cleansing

Globe contusion/ rupture



Iridodialysis and hemorrhage

Nicholas Jones, 1989

- Serious trauma, previous history of eyeball repositioning
- Systemic ABO & Anti-inflammatory agent
- Close monitoring (clinical signs)
- Guarded prognosis

History:

- A 10 yr-old mixed-breed dog
- Bitten by a dog in the same household a week ago
- Been treated with topical tobramycin combined with corticosteroid (ointment)

What is your diagnosis?

Case III

Eyelid laceration

- Common etiology = fighting, accident
- If not treated → disfigured characteristics & loss of normal function
- 2 types = (1) perpendicular to lid margin: opposing tension from orbicularis oculi muscle (2) parallel to lid margin: excision of skin → irritation of eyelashes to ocular surface

Eyelid laceration – Med treatment

Thorough examinations

Surgical repair ASAP

- Otherwise → indurated and thick edges → detraction from ultimate cosmetic appearance

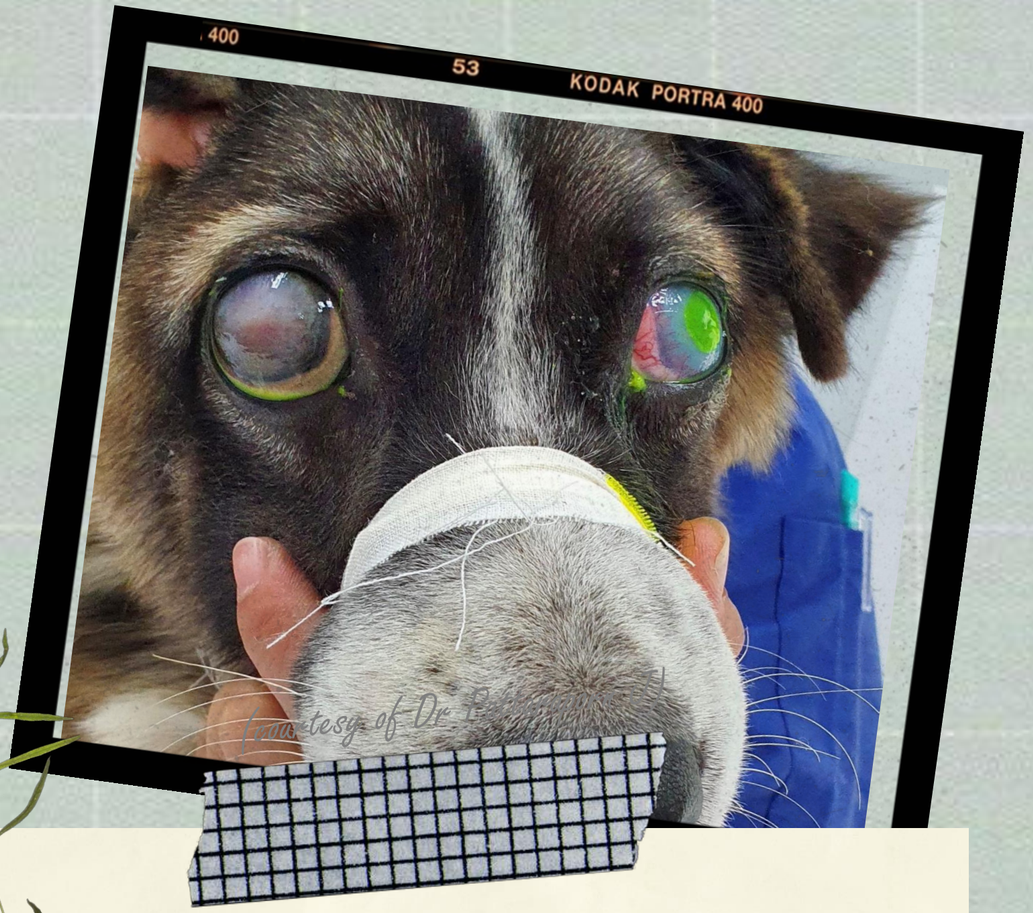
Postoperative therapy

- Systemic and topical ABO
- Systemic anti-inflammatory agent

History:

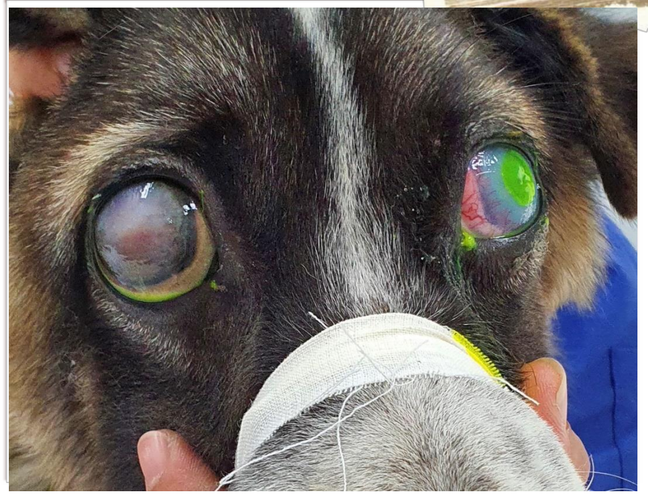
- A young, rescued mix-breed dog (unknown age)
- Suddenly impaired vision
- Ocular pain
- Previous IOP = 55 mmHg
- Treatment begun after visual loss

What is your diagnosis?



Case IV

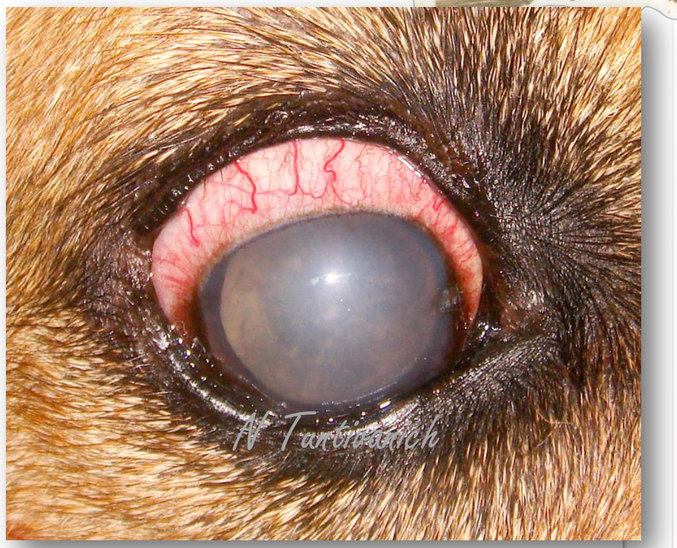
Glaucoma



(courtesy of Dr Pattaraporn J)

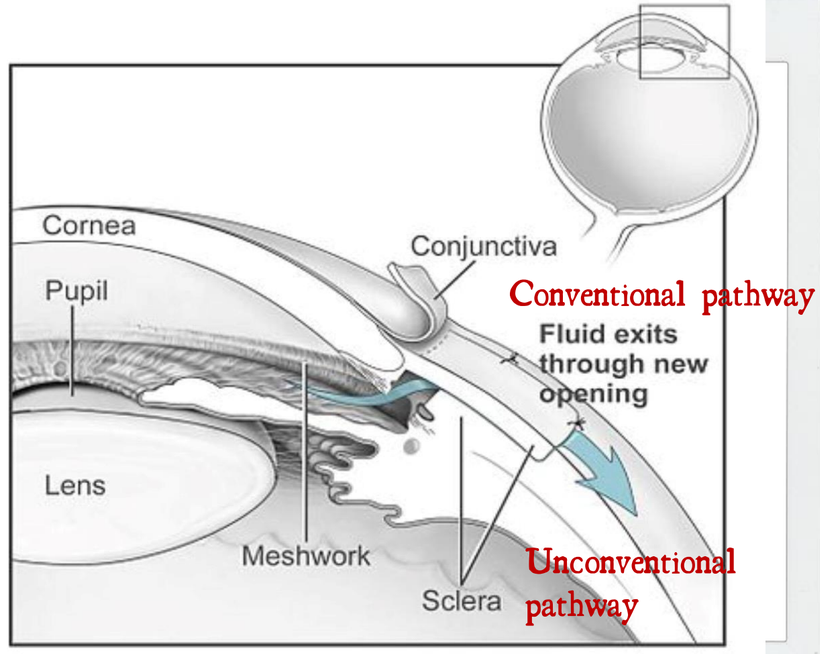
- Elevation of the IOP, together with relevant ophthalmic signs
- 2 major types = (1) primary: (1.1) closed/narrow-angled (goniodysgenesis) (1.2) opened-angle (2) secondary: association with other ocular disorders
- Considerations of treatment: progressive worsening of Dz, resistance to IOP lowering effects of drug overtime

Acute glaucoma



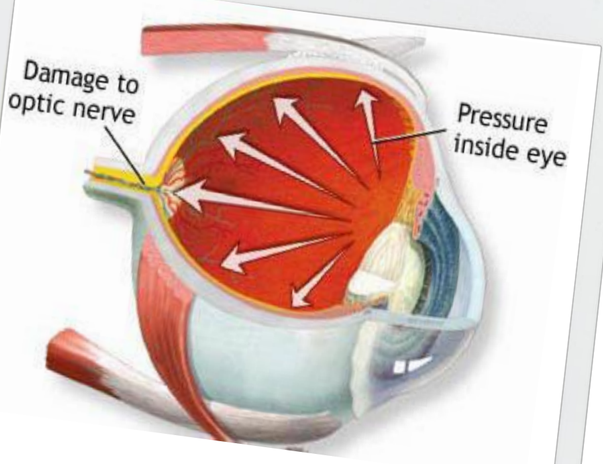
- Usually angle closure → sudden onset / extremely high IOP (>60 mmHg)
- The longer high IOP, the more rapid visual loss, the less chance of visual return
- Ophthalmic signs: severe ocular pain, episcleral injection, corneal edema, change of pupil size (constriction vs. dilation)

Principles of glaucoma treatment



www.stringfixer.com

Aqueous humor pathway



Saba Khodadadian

- Pathway of aqueous humor drainage
- Enhance aqueous outflow
- Reduce aqueous production
- Dehydration of vitreous and anterior segment

Acute glaucoma – Med treatment

Dehydration of vitreous and anterior segment:

- Pulling water out from vitreous to choroidal, retinal, iris vessels
- Mannitol (20%sol) = 1-2 g/kg IV with water intake restriction 2-4 hrs → IOP reduction up to 4-6 hrs (repeat in 8-12 hrs if unresponsive)
- Glycerol (glycerine USP) = 1-2 ml/kg BW diluted with milk or soft food

* Heart Dz, Renal Dz, DM
* Multiple dose → rebound effect

Acute glaucoma – Med treatment

Enhance aqueous outflow by prostaglandin analogue (PG):

- Topical q15-30 minutes → reduction of IOP within 45 min
- Pupil constriction (increase aqueous drainage)
- Avoid combination with diuretics, oral CAI
- Latanoprost, Travoprost, Bimatoprost, Tafluprost

Enhance aqueous outflow by miotics:

- Pupil constriction
- Topical 2% Pilocarpine, topical demecarium bromide

Acute glaucoma – Med treatment

Reduce aqueous production by carbonic anhydrase (CAI):

Oral CAI = acetazolamide, dichlorphenamide, methazolamide

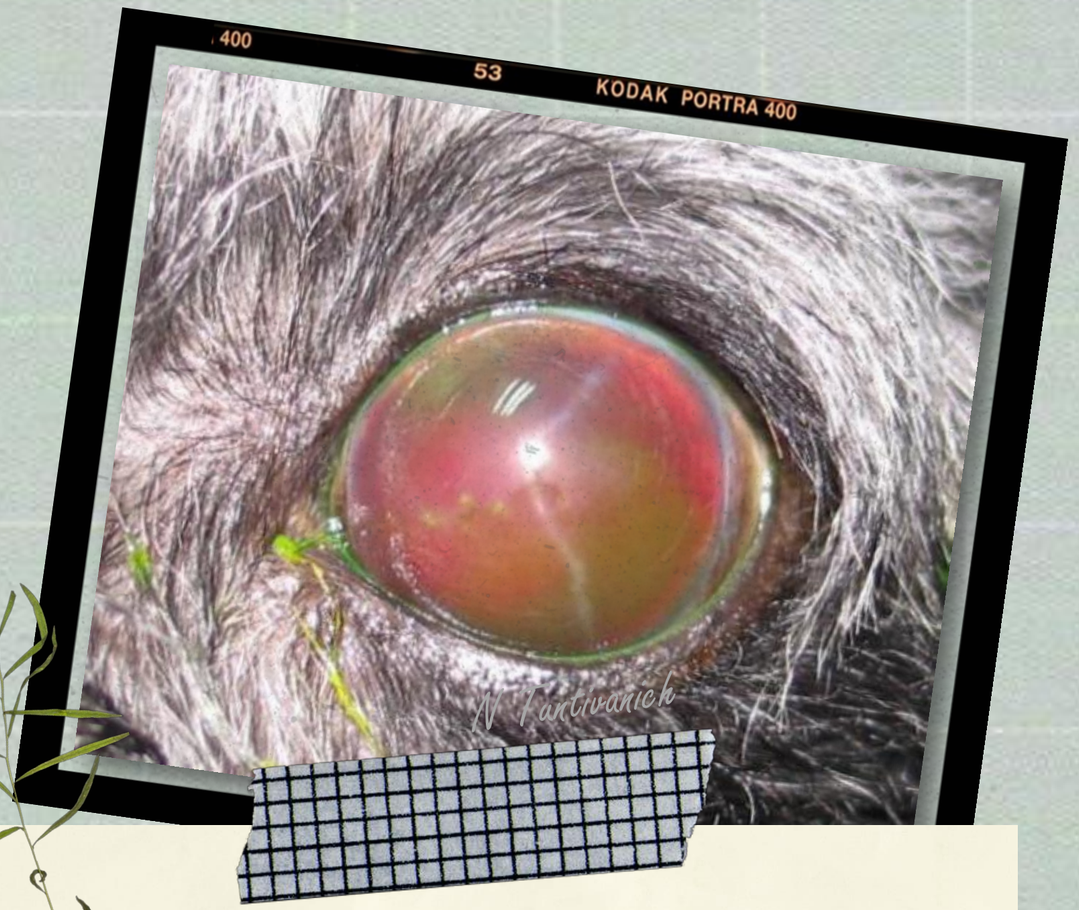
- Frequency = q12hrs
  * adverse effect: hypokalemia, metabolic acidosis, panting, GI upset, weakness, depression, lameness, urine/stone formation, KCS

Topical CAI = dorzolamide, brinzolamide

- Combination with miotics and/or beta blocker
- Re-evaluation within 1 hr
- If IOP under control → re-evaluation in 18-24 hrs
- If IOP uncontrolled → combined with diuretics

History:

- A 9 yr-old poodle
- Sudden red eye
- Sudden blindness
- Never been treated for red eye
- History of anemia being treated with ferrous supplement



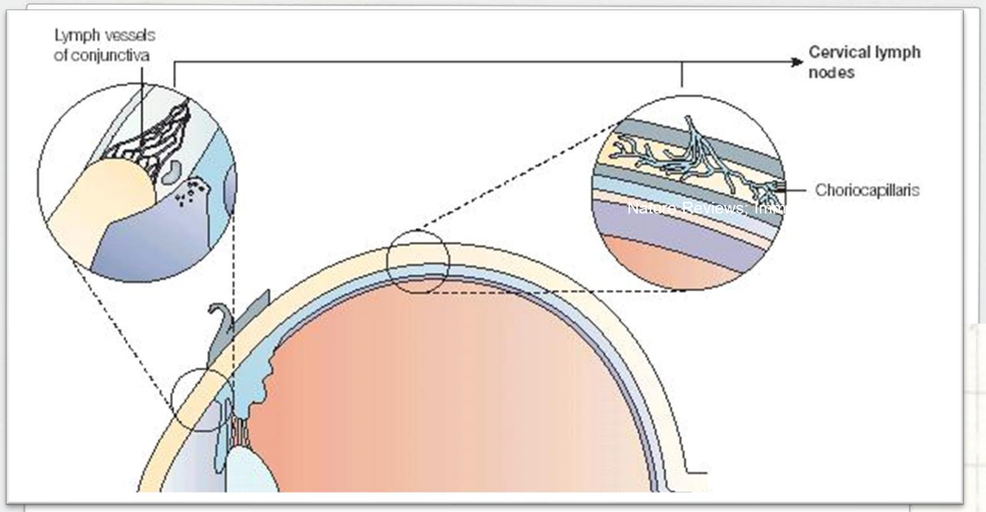
What is your diagnosis?

Case V

Hyphema

- Anterior uvea = iris and ciliary body
- Ocular immune privilege: a protection of itself against pathogen by diverse strategies
- Common etiology: trauma, clotting deficiency, vasculitis, systemic hypertension, blood dyscrasias (leukemia, thrombocytopenia, hyper viscosity)
- Acute stage: dark vs. fluid blood

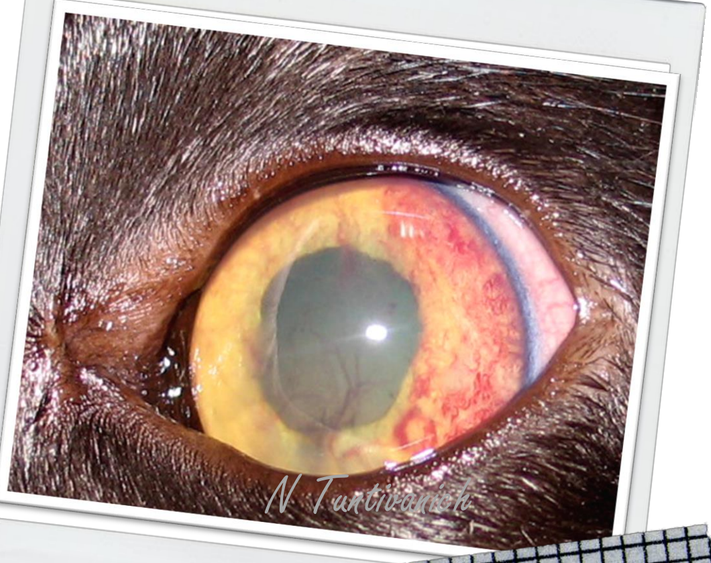
Blood Ocular Barrier



Blood Aqueous Barrier

Blood Retinal Barrier

Nature Reviews; Immunology 3 (11), 2003



- Tight junction in ciliary body & retinal pigment epithelium = prevention of large MW protein
- Vascular endothelial property of iris & retina = immunosensitive to inflammation (due to rich blood supply)

Uveitis / hyphema – Med treatment

Anti inflammatory agents:

- Corticosteroid: if topical → corneal status ⁄ if systemic → side effects
- NSAID: if topical → corneal status ⁄ if systemic → clotting disorder

Mydriatics & Cycloplegics:

- Topical atropine (with phenylephrine)

Miotics: controversy (uveal vasculature dilation → re-bleeding, ciliary spasm, posterior synechia

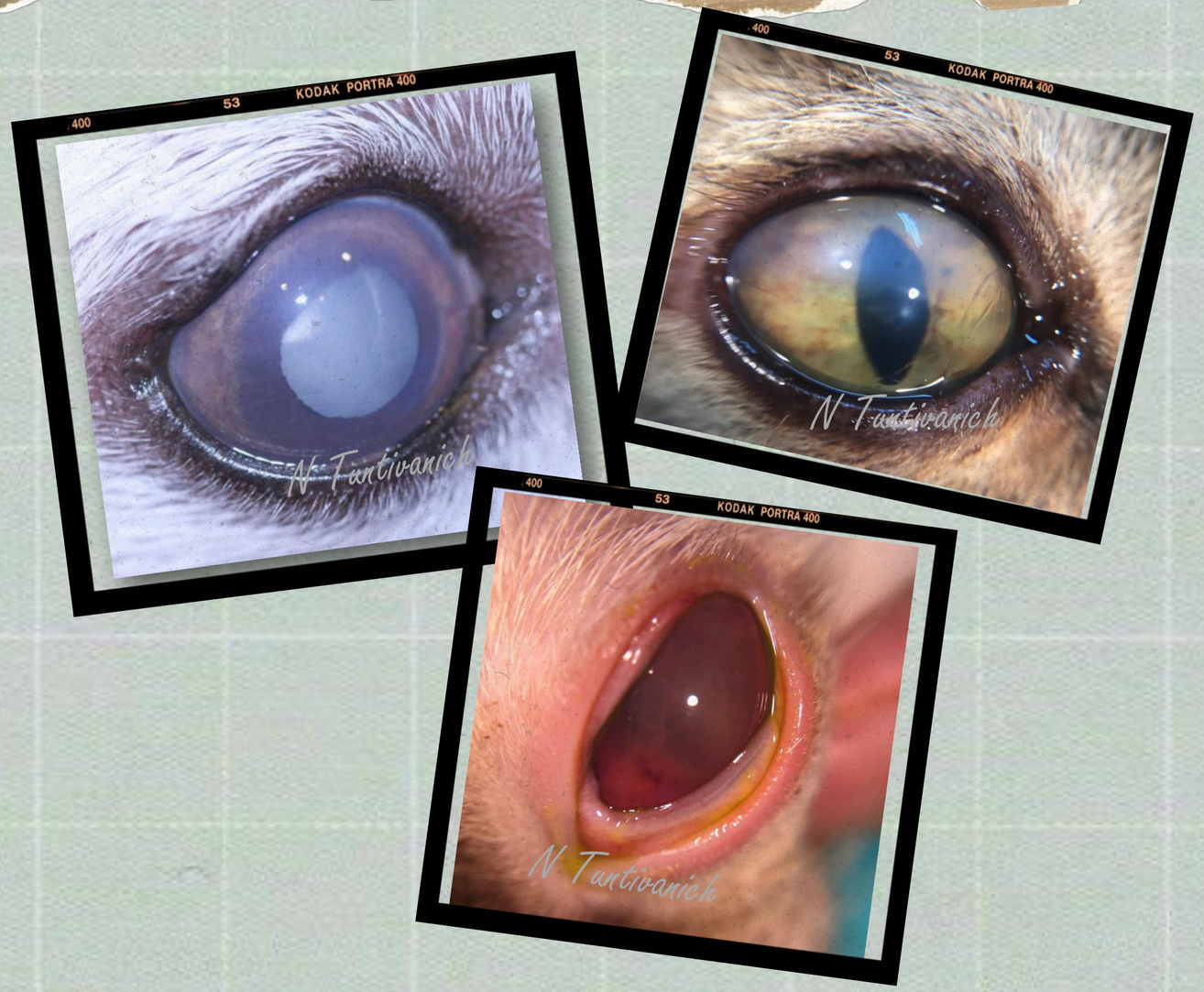
Fibrinolytic agent: tPA 25µg → repeat in 5 days if severe

Immunosuppressive agents: azathioprine

- Systemic steroid combined with azathioprine (2mg⁄kg⁄d) for 3-5days, then 1mg⁄kg⁄d for 10days

Uveitis / hyphema – Med treatment

- Limit activity
- Tranquilization
- Prevention from bright light stimulus



History:

- A 13 yr-old Miniature pinscher
- White eye noticed for a few days
- Impaired vision
- Moderate ocular pain
- Not yet received treatment

What is your diagnosis?

Case VI

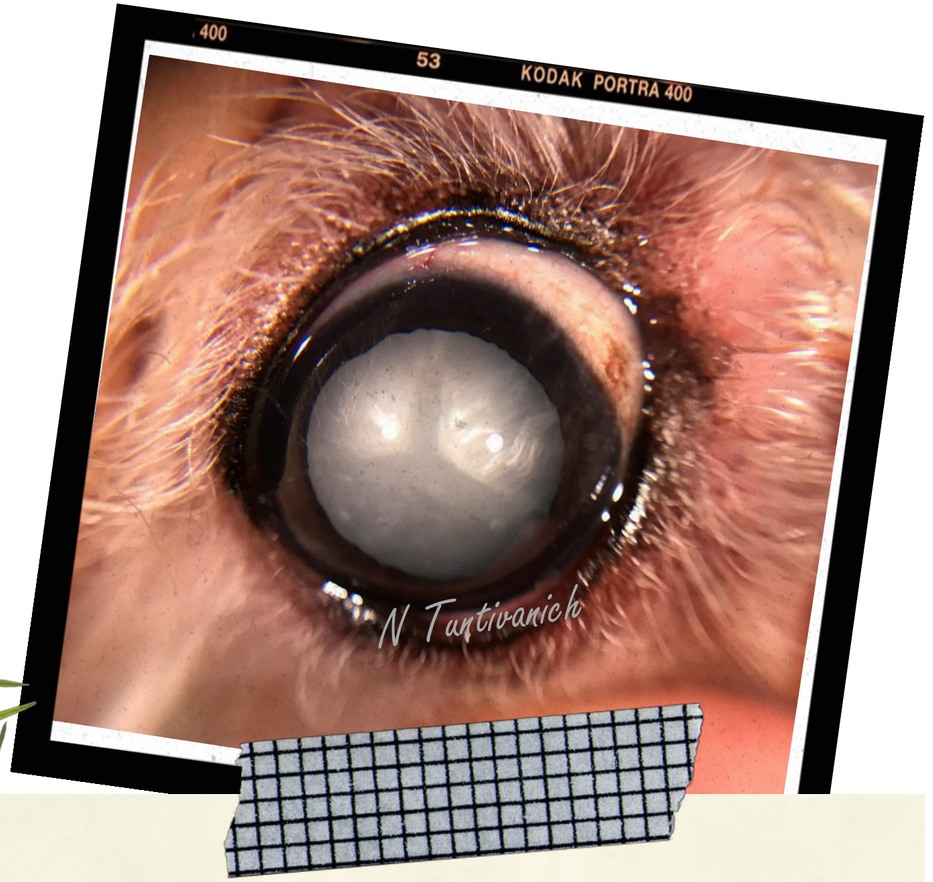
Lens luxation – Med treatment

- Displacement of lens → complete or sub luxation
- Displaced location: anterior vs posterior
- Sequelae after lens luxation
- Medical treatment = only delay Sx
- Miotics or PG q12hr
- Anti-inflammatory agent if needed

History:

- A 9 yr-old Poodle
- PU/PD
- Uncontrolled food consuming
- FBG = 425 mg%
- Fructosamine = 650 µmol/L

What is your diagnosis?



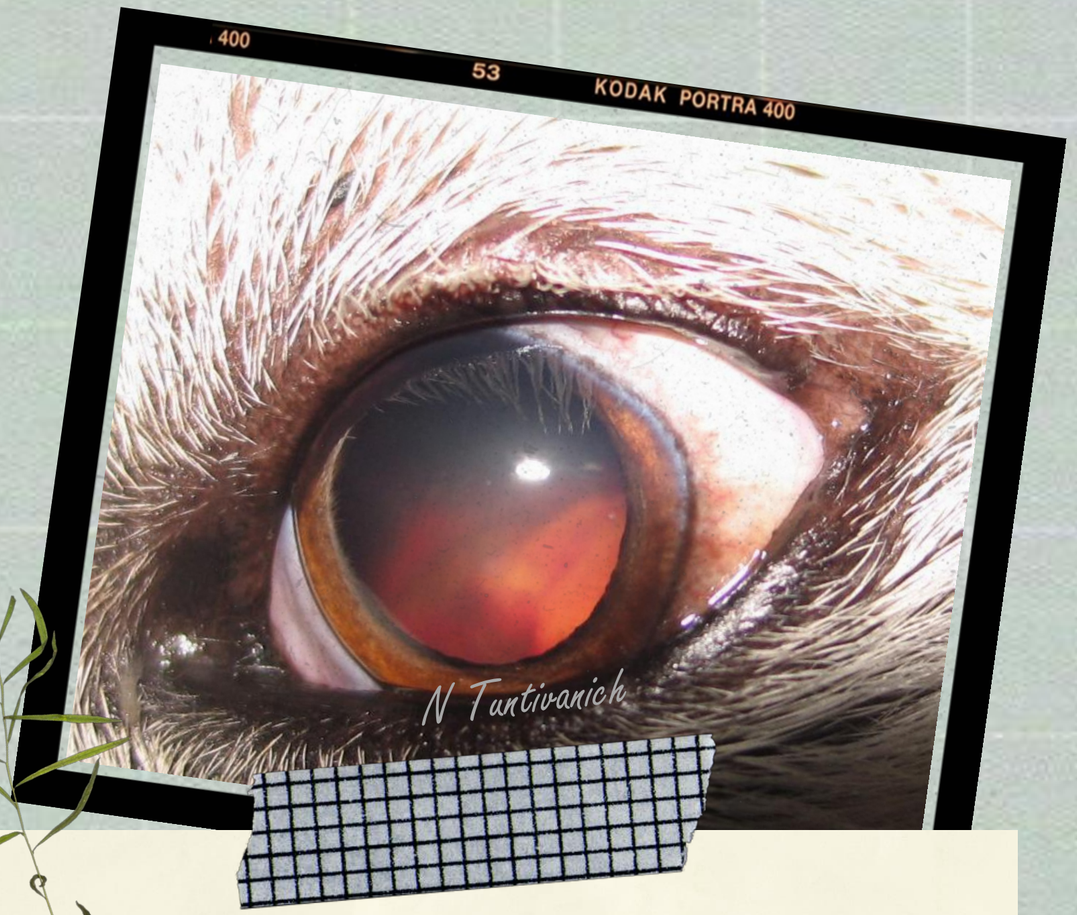
Case VII

DM Cataract

- Increased glucose in the AC → increased sorbitol accumulation in the lens → water absorption & protein aggregation
- Medical treatment = to relieve complications
  - Lens-induced uveitis (anti-inflammatory agent)
  - Impaired vision by pupil constriction (topical atropine)

History:

- An 8 yr-old mixed-breed dog
- Blindness within a day
- Being treated with tick manifestation
- No ocular pain
- Depression



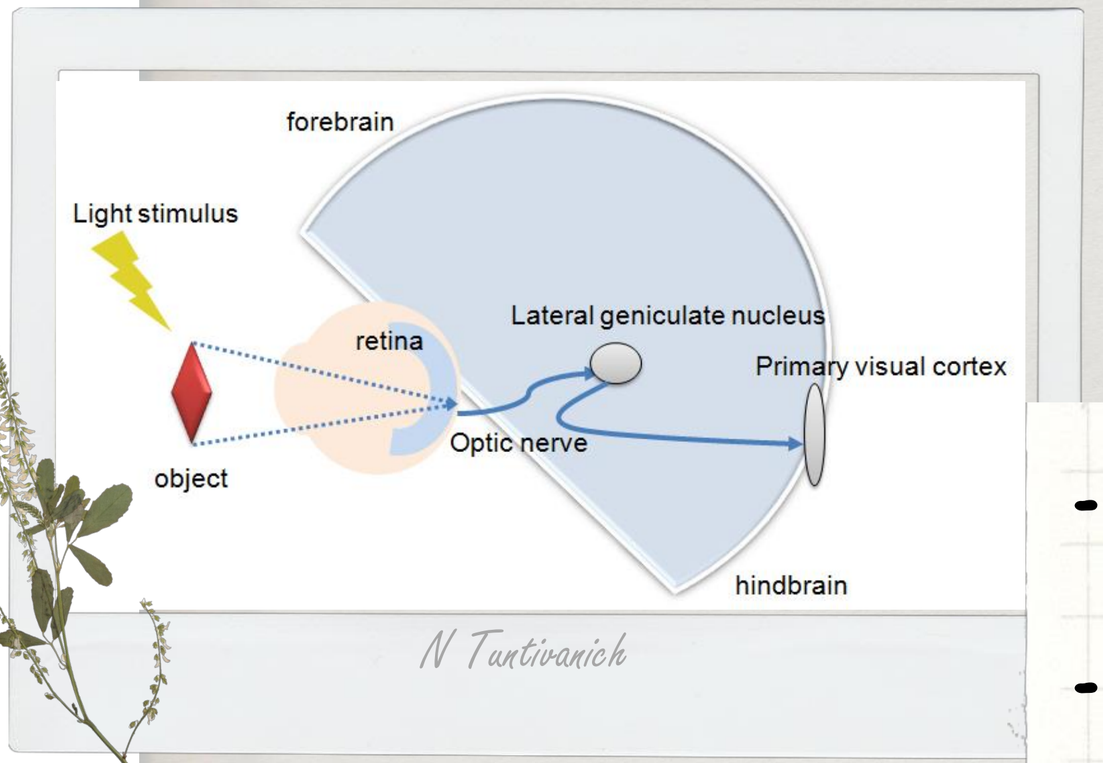
What is your diagnosis?

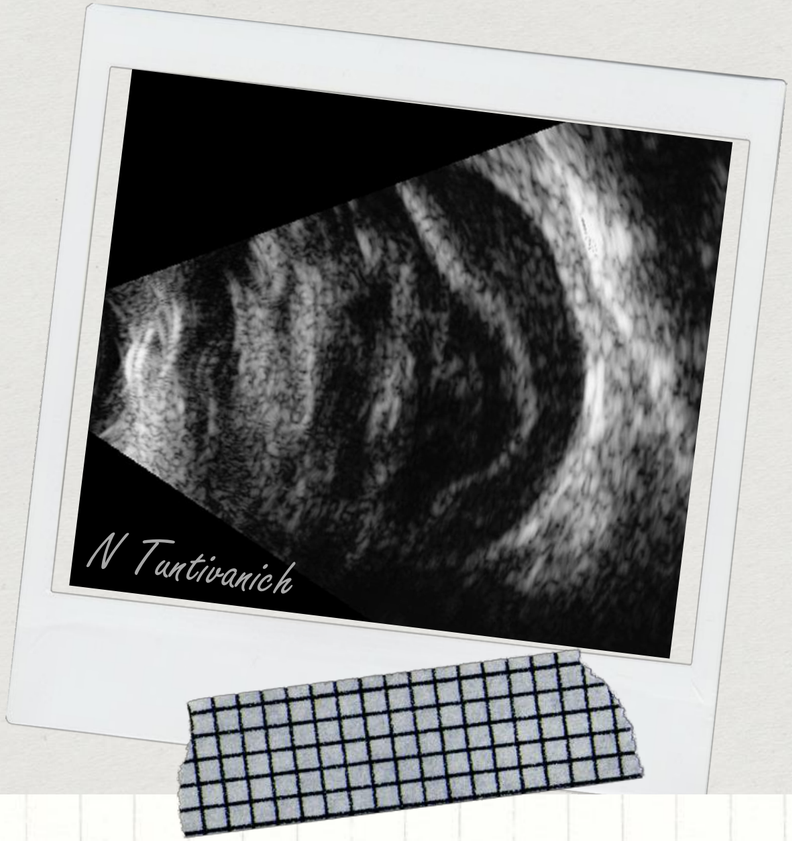
Case VIII

Retinal detachment

- Separation of neuroretina from RPE
- 3 types: (1) serous/exudate = subretinal effusion/exudation of fluid (2) tractional (bands/membranes producing traction forces) (3) rhegmatogenous = holes/tears in the retina allowing vitreous leakage into subretinal space
- Greyish veil with vascularized bullae or blood from behind

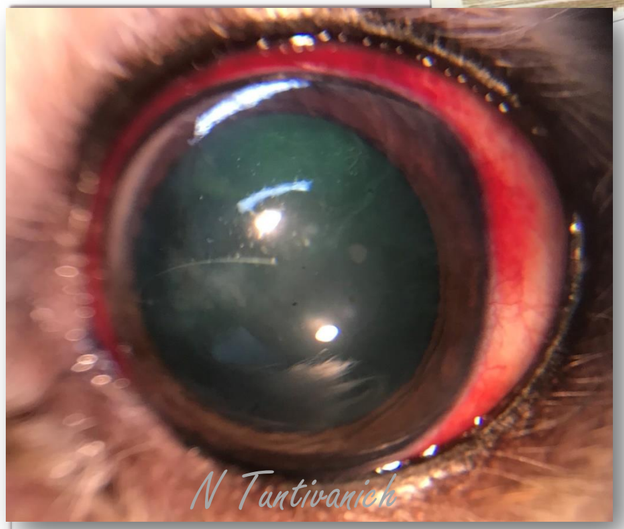
Blindness – retinal detachment





- Obstruction of electrical impulse from retina to brain → no image
- Rapid diagnosis; U/S if unclear ocular media
- Always check systemic disorders → treat the underlying cause

Inflammation of the posterior segment



- Retinochoroiditis / Chorioretinitis
- If severe inflammation → papillo-chorio-retinitis
- Change in retinal vascular bed → congestive blood vessels or cellular exudation or disc edema & hyperemia
- If severe damage to vascular wall → hemorrhage or retinal detachment
- Various etiology (infection & non-infectious)

Retinal inflammation – Med treatment

Anti inflammatory agents:

- Prednisolone = 0.5-2mg/kg for 2wk (to prevent rebound inflammation inducing blindness)
- Dexamethasone = 0.5-1mg/kg for 3 days, then 0.25-0.5mg/kg for another 3 days
- Carprofen = 2mg/kg bid PO (Less GI irritation)
- Aspirin = 25mg/kg tid PO (dog) / 10mg/kg q48hr PO (cat) (beware of gastric ulcer)

- Anemic retinopathy
- Hypertensive retinopathy
- Retinal toxicity (IVM, Fluoroquinolone in cats)

What about SARD?

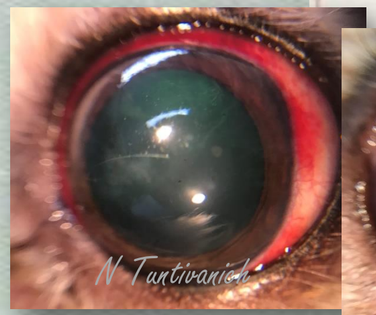
Ocular emergencies & medical management

Glaucoma - acute

Adnexa injury - cornea - eyelid

Lens - luxation - cataract

Blindness - retina - uvea



Orbital - panophthalmitis

Thank you for your attention

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Essential surgical managements in ophthalmic emergencies

Ulrike Koch

Tiergesundheitszentrum Oerzen
Tierärztliches Gesundheitszentrum für Kleintiere,
Praxis für Augenheilkunde

Surgical Emergencies

What are emergencies?

-danger for life
-danger for health
-danger for vision
-danger for the eye
-pain

Surgical Emergencys

Life/health:
panopthalmitis/endophthalmitis
tumors

Therapy:
enucleation
exenteration
tumor surgery/plastic surgery

Surgical Emergencys

For vision

<u>acute danger:</u>
-glaucoma
-proptosis
-melting ulcer
-lens luxation

<u>longtime danger:</u>
-glaucoma
-melting ulcer
-lens luxation
-lid lacerations
-foreign bodies
-corneal lacerations

-foreign bodies in the eye
-perforating traumas of the globe

Surgical Emergencys

For the eye (if it is already blind)
blunt trauma
perforating trauma
Glaucoma (pain)

Therapy
enucleation
prothesis
laser

Surgical Emergencys

Pain as an emergency

should not been underestimated
-many nerves in the cornea (more than in every other tissue in the body)
-pain in the head is usually more sensitized than in other body regions

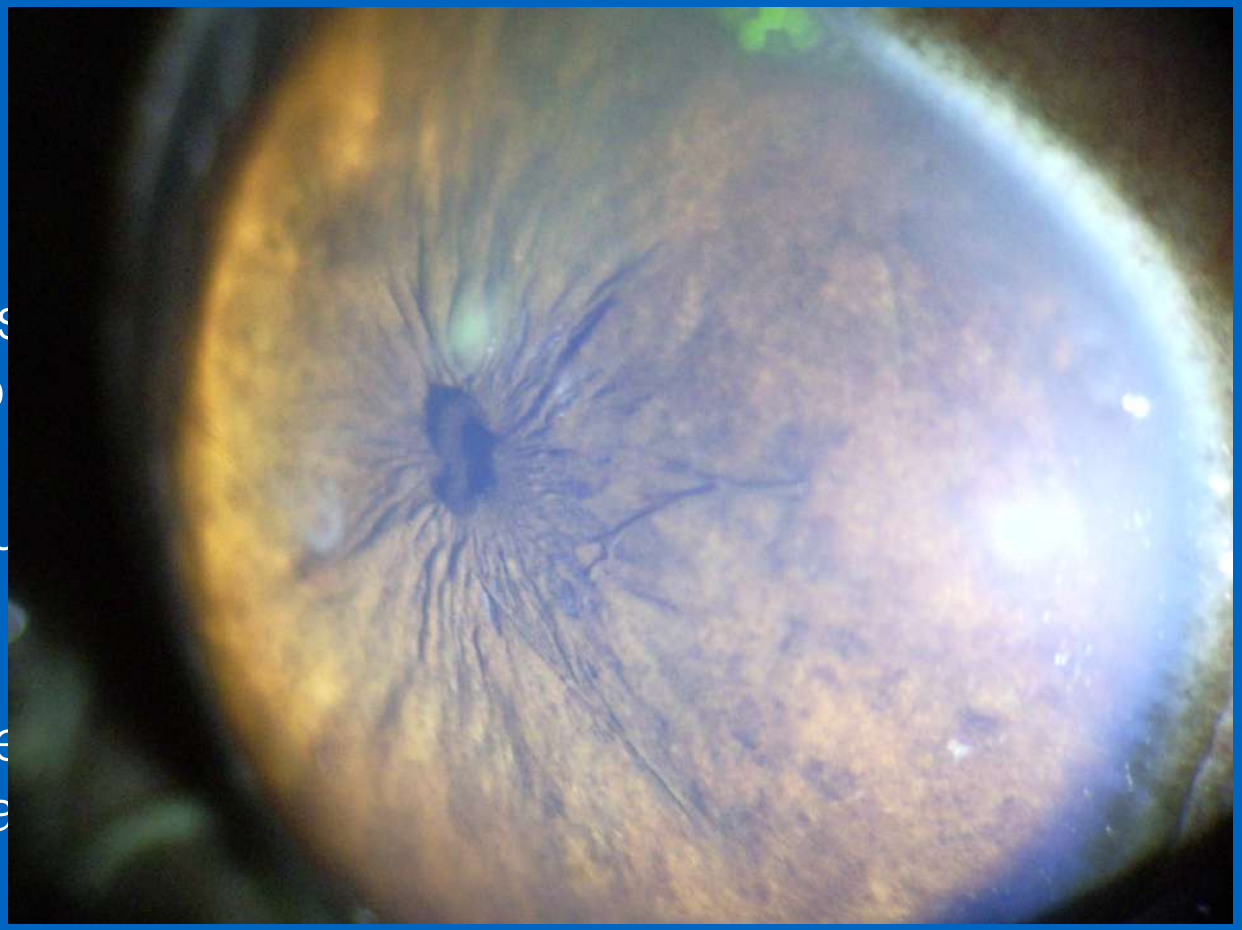
Symptoms not often clear for the owners.
-sleeps a little more than usual

Surgical Emergencys

Pain as an emergency

should not been underes
-many nerves in the co
the body)
-pain in the head is usu
regions

Symptoms not often cle
-sleeps a little more tha



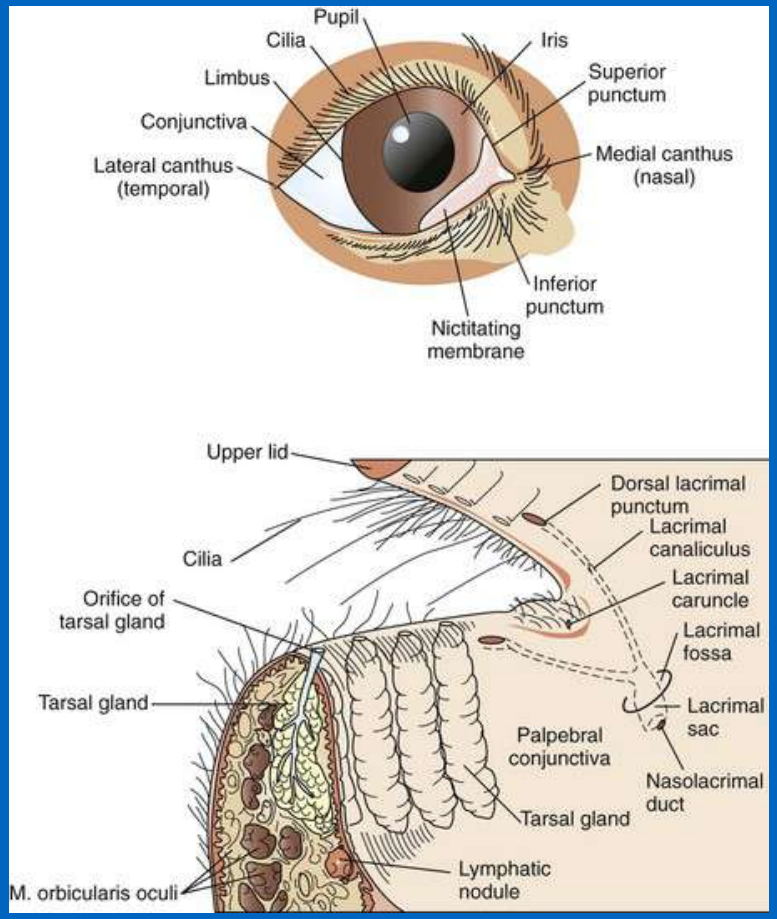
Enucleation

Indikations

Intraocular tumor
Panophthalmitis/Endophthalmitis
Chronic glaucoma
Severe blunt traumas
Severe perforating traumas
Retrobulbar tumors/foreignbodies/abscesses

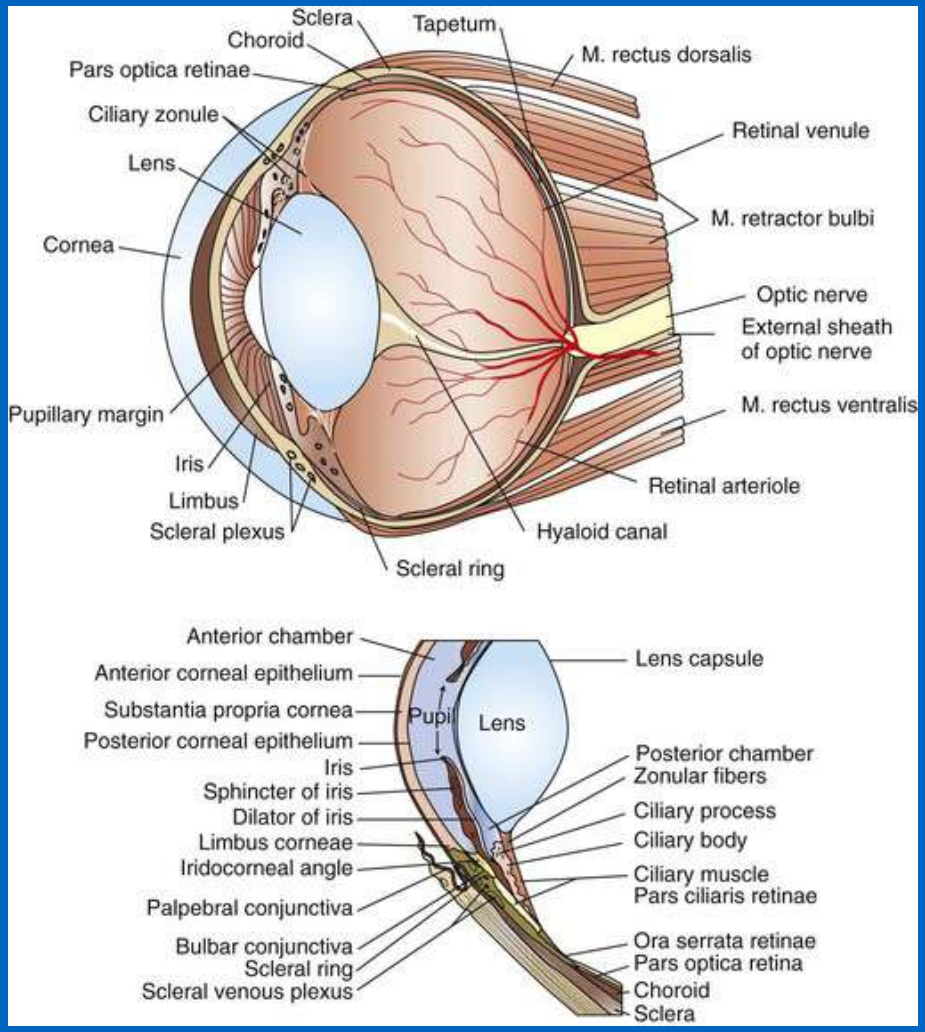
Enucleation

Anatomy

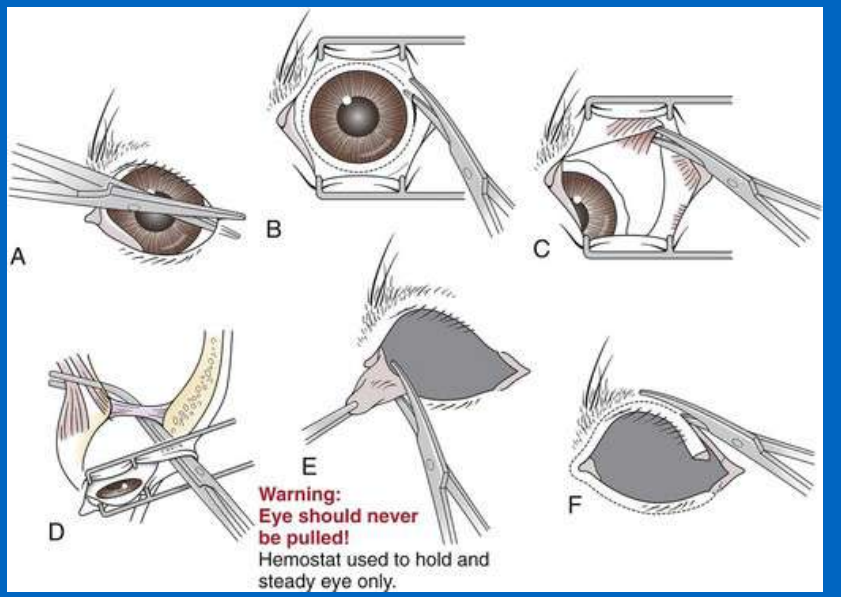


Enucleation

Anatomy



Enucleation

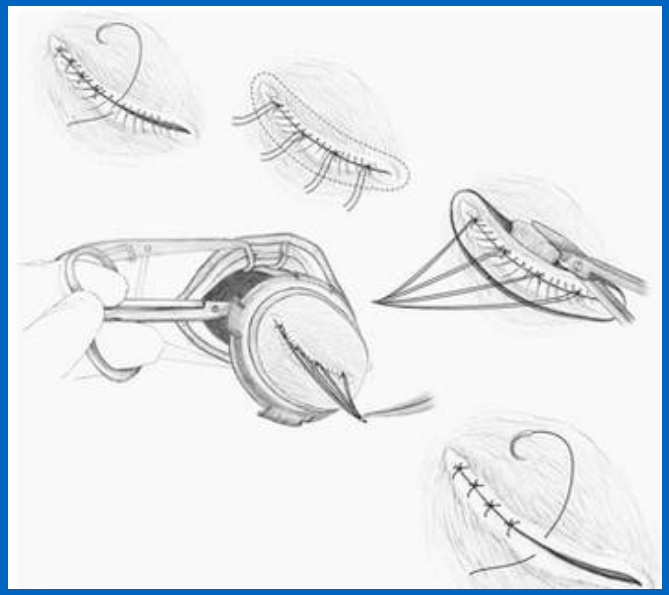


Techniques:

<u>1. transconjunctival</u>

-inject some lokal anesthesia near the optic nerve
-lateral canthotomy
-360 degree conjunctival incision
-cut the extraocular muscles
-clamp the optic nerve, ligate it, **never cautery on the nerve!**
-**never pull on the optic nerve!**
-excise the conjunctiva, nicitating membrane and lacrimal gland
-excise the lid and tarsal plate
-sutures 3-0 up to 5-0 slowly absorbable material

Enucleation



Techniques:
2. transpalpebral
-inject some lokal anesthesia near the optic nerve
-close the lids (either suture or with hemostat)
-incision of skin around the lids (about 4-5 mm apart)
-blunt dissection of conjuctiva and extra ocular tissue
-ligate the optic nerve or just clamp with hemostat
-**no cautery at the nerve!**
-never pull on the optic nerve!
-suture like in transconjunctival technique
-preferred in infectious cases

Exenteration of the orbit

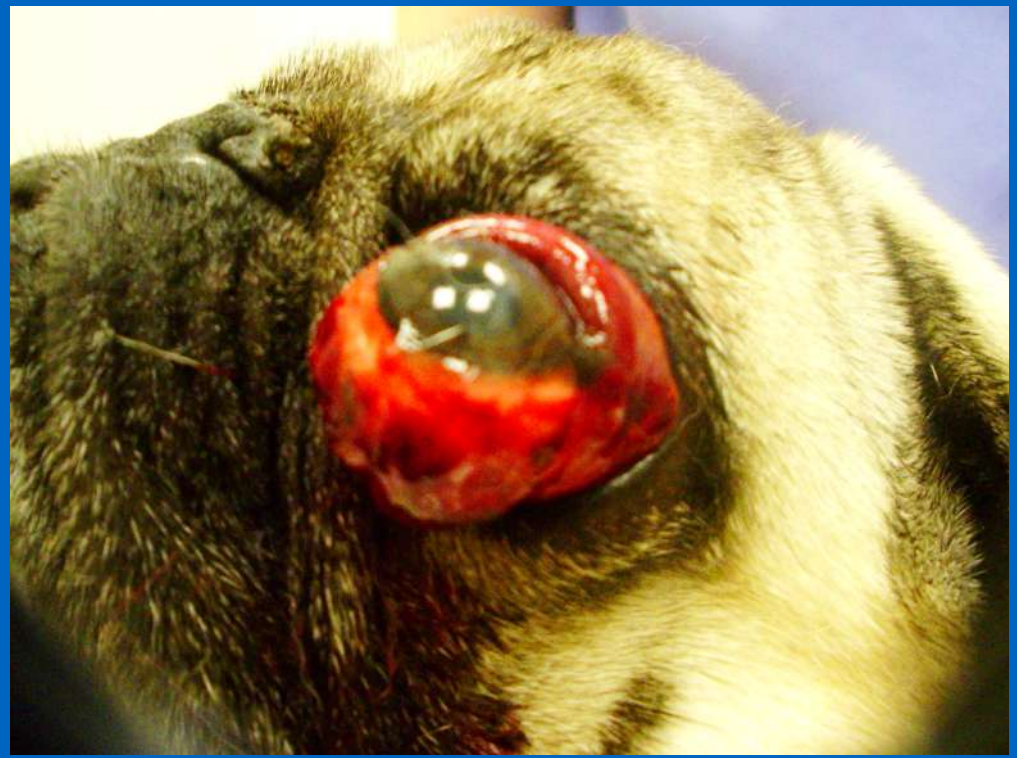
- all tissue in orbit is to be resected

- indications:
tumors in the orbit
perforating tumors of the eye
abscesses

Prolapse of the bulbus, proptosis

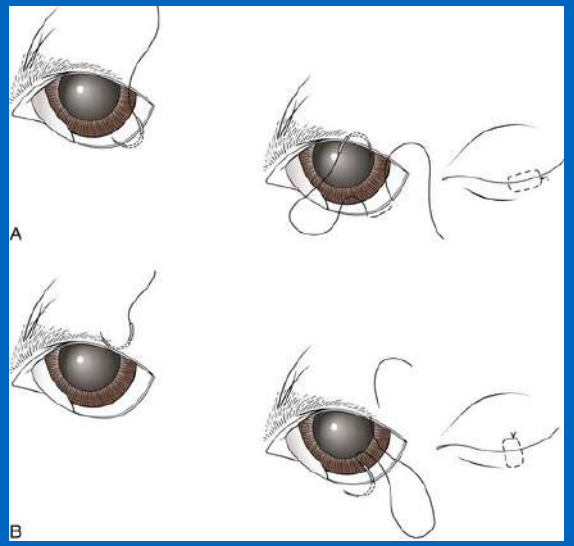
-result of trauma
-globe is entrapped from the eyelids behind the equator
-prognosis depends on
    extend of trauma
    depth of orbit/breed
    duration of proptosis
    pupil size (does not say too much about prognosis)
    Pupillary light response (PLR) direct/indirect
    dazzlereflex (good prognosis, if trigger-able)

Prolapse of the globe, proptosis



Prolapse of the bulbus, Proptosis

Veterian key



Therapy:
Keep moisture
Clean carefully
Try to replace it as soon as possible
Don´t take to much time to clean the skin

Do a lateral canthotomy
Grasp the upper and lower eyelid canthus (with Allis forceps) and pull them in front
While softly pushing the globe back into the orbit
Close the incision and put on a tarsorraphy over the whole lid
Leave a small window open for application of medication
Open the first suture after about 10 -14 days

Prolapse of the bulbus, Proptosis

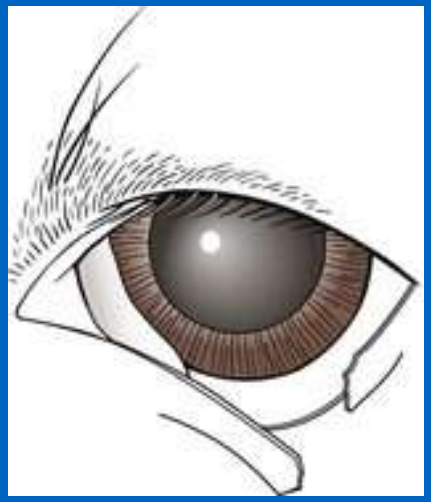
Long term problems:
Usually at least the medial rectus muscle ruptures with the proptosis-> strabismus
Neurogenic keratitis sicca
Corneal desensitization
Less blinking
Often the eye remains blind

Lid trauma

Blunt Trauma
Sharp Trauma

Lid trauma

Blunt Trauma
-usually no surgery necessary
-try to cool it softly at the beginning
-keep it clean
-ointment if necessary
-keep it moist and a little warm after one to two days

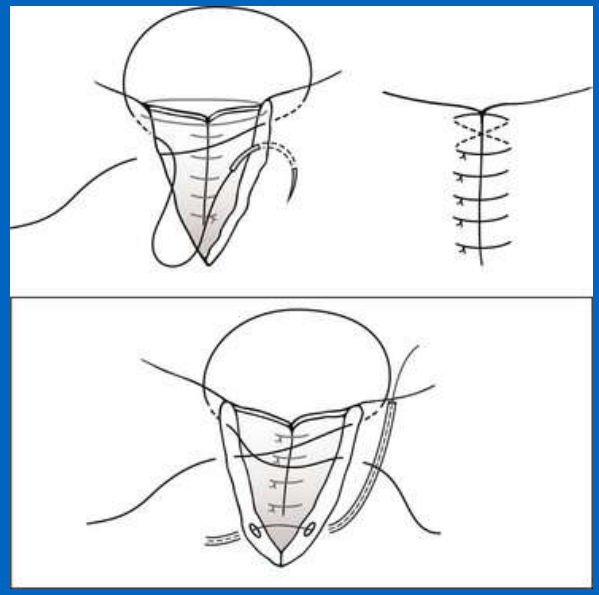


Veterian key

Lid trauma

Sharp Trauma
-cut or bite
-why is it necessary to suture it? — >homogenous tearfilm is essential for nutrition of cornea
-should be sutured as perfect, as possible especially on the eye side
-the lid also works like a windscreen wiper
-fresh, up to 3 days old, ->suture, may be with a little scratching of the wound edges
-older wounds: may be necessary to do a reconstruction (may be with grafts)

Lid trauma



Veterian key

Sharp Trauma
Lidsurgery
-Conjunctiva 7-0 or 6-0 Vicryl (resorbable, but softer, than monofilament), continuous or interrupted, be careful with the knots

-Lid: upper margin: Figure of eight suture, with 7-0 down to 5-0 Vicryl

Lid traum

Sharp Trauma
Lidsurgery
-Conjunctiva 7-0 or 6-0 Vicryl (resorbabl
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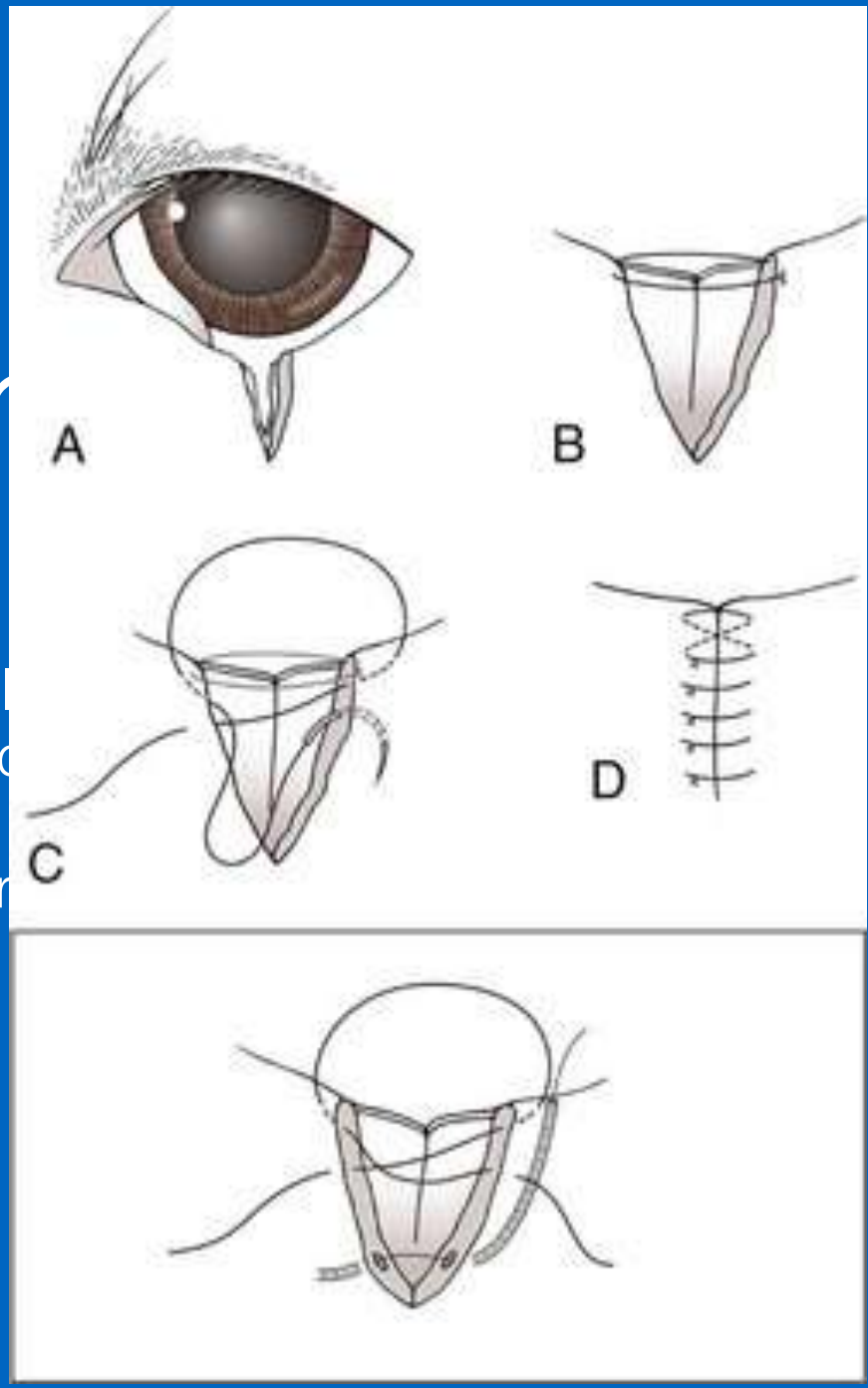
-Lid: upper margin: Figure of eight sutur

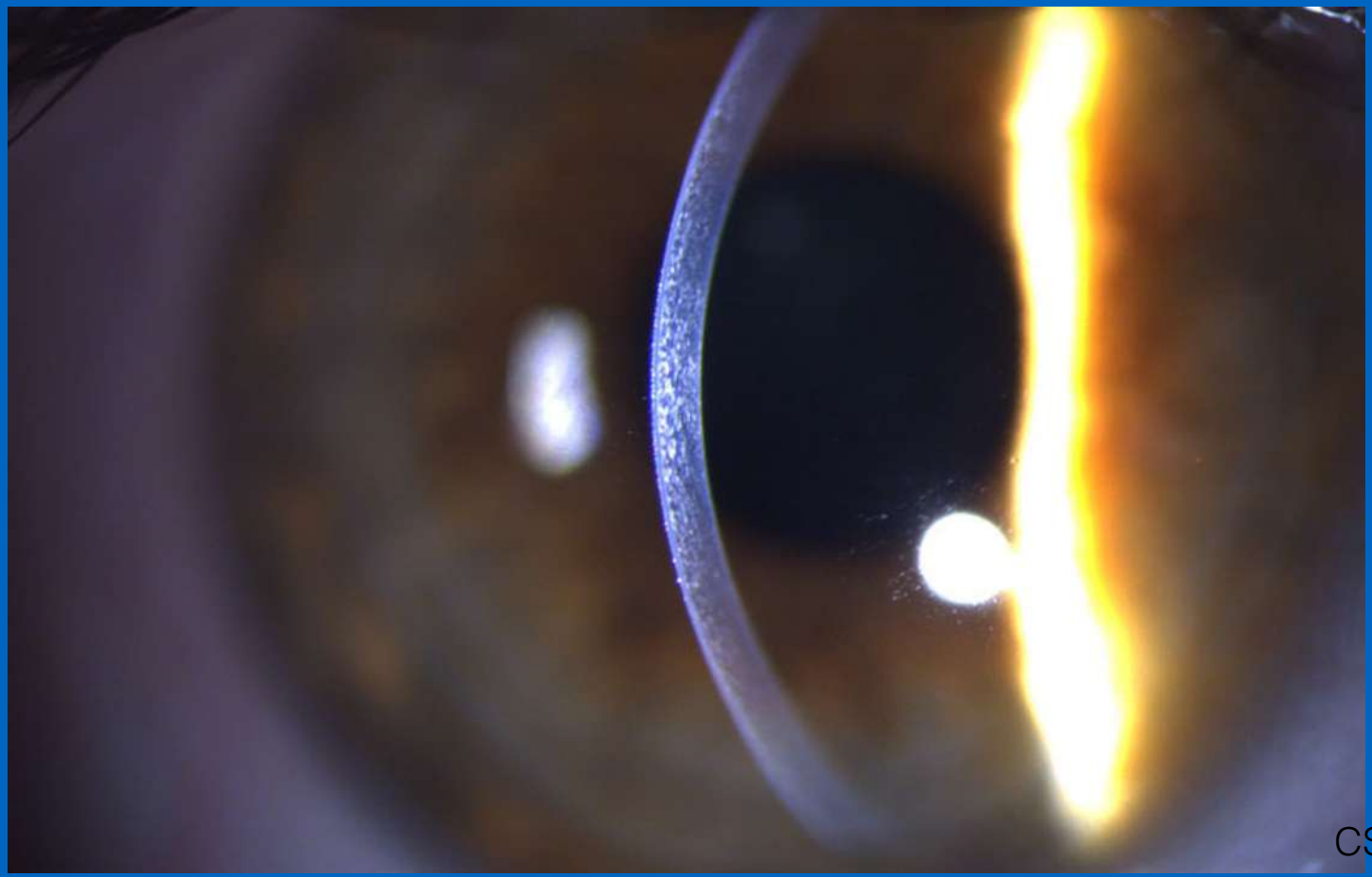


Veterian key

Corneatrauma

Blunt Trauma - no surgery usually, corneaedema (hyperosmolaric eyedrops)

Sharp Trauma- cat scratch, foreign body, …



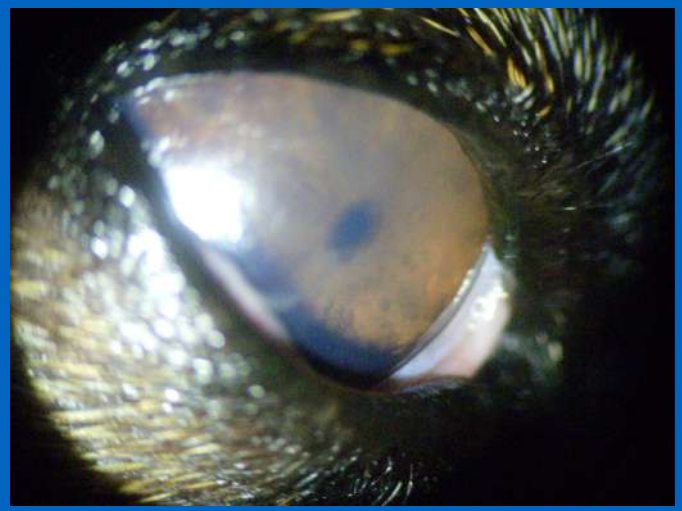
CSM Auge, Cornea

Trauma of Cornea

Very painful, usually reflex-uveitis, miosis, photosensitivity,

Therapy:
If not too deep, konservative treatment, Atropin, antibiotics if necessary, lubricant, Vit A ointment…

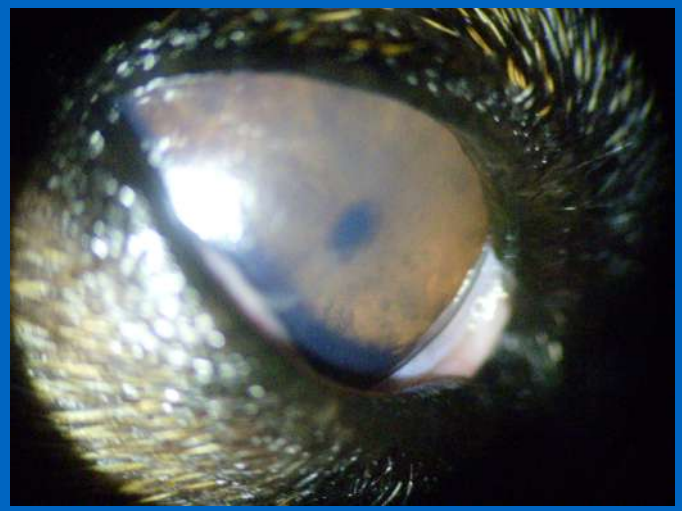
Healing time: corneaepithelium: 1 mm/h, corneastroma: 1mm/12h, corneaendothelium (no good healing, just by stretching of the cells) 1mm/24h



Trauma of Cornea

Very painful, usually reflex-uveitis, miosis, photosensitivity,

Therapy:
If not infected, but deep or perforated, but no loss of substance
-> suture it (9-0 Vicryl, interrupted or continuous)



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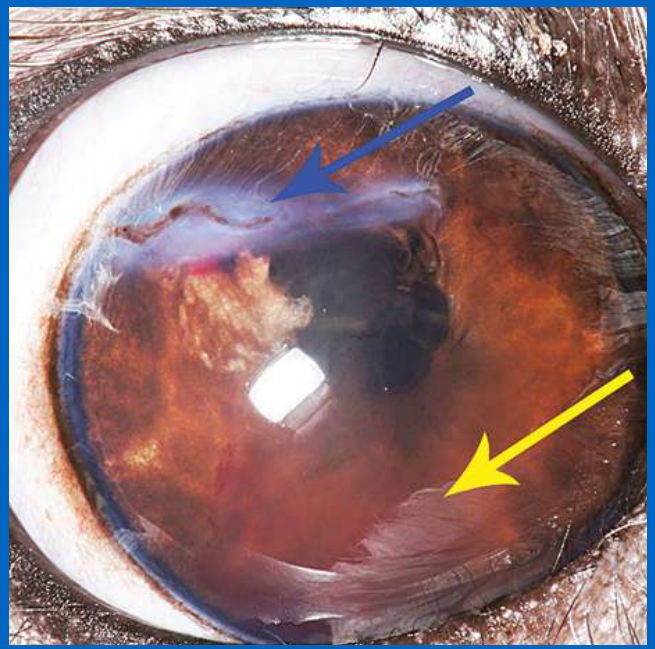
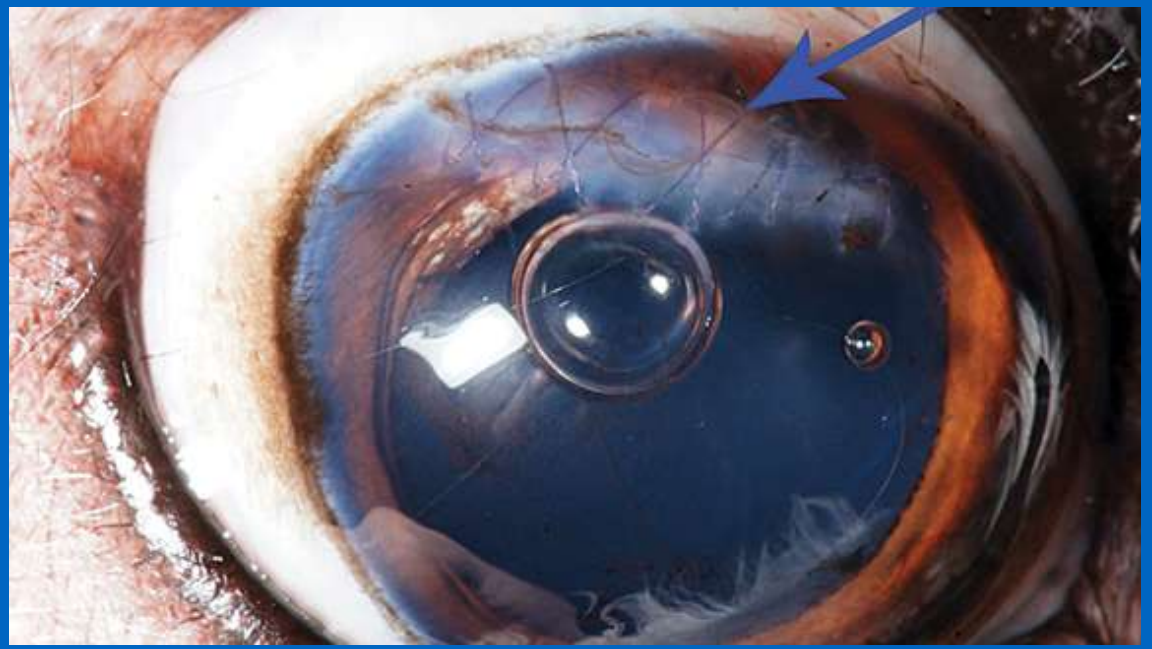


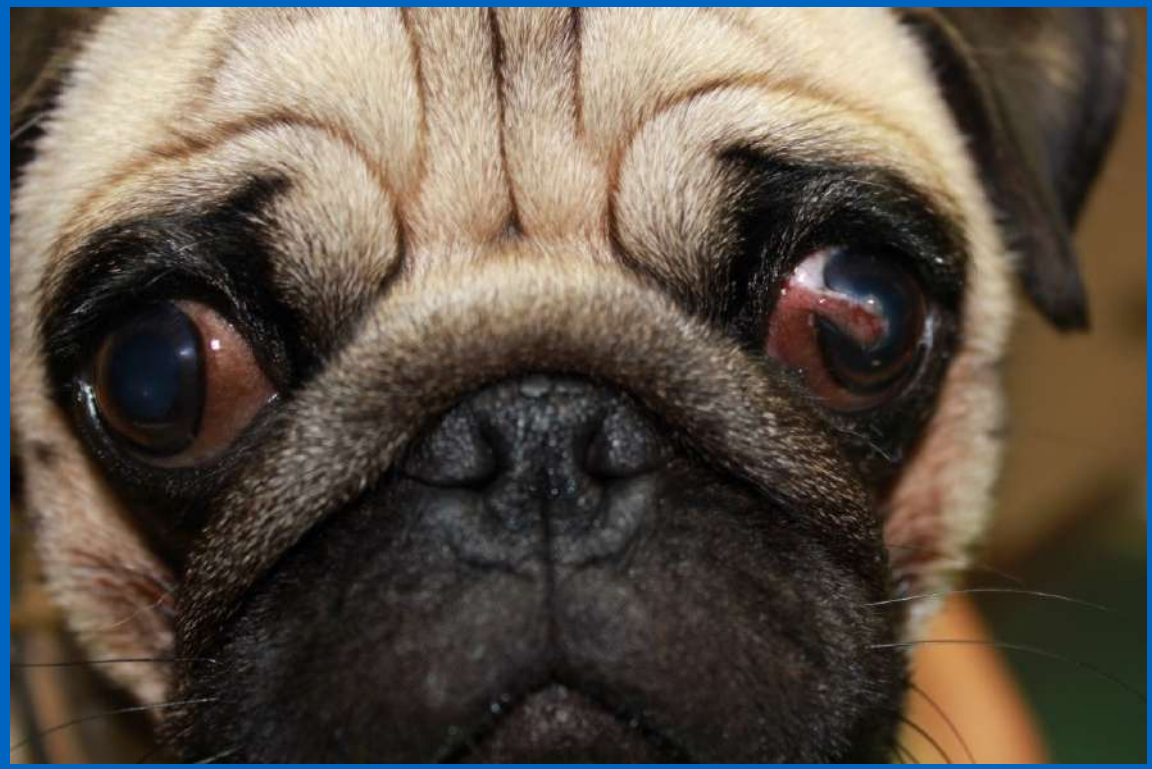


Complicated ulcer

Kontamination with bacteria/melting ulcer

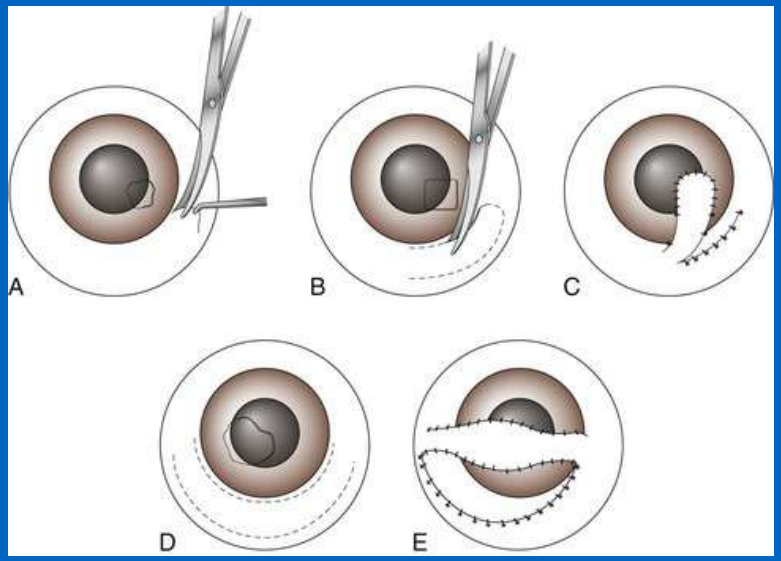
Therapy:
konservative treatment, lokal: antibiotics (broad-spectrum), serum/amnion eyedrops, acetylcystein-eyedrops, EDTA-eyedrops
systemic: non-steroidals, antibiotics
Check every or every second day

If it fails -> surgical options
-conjunctival flap/hood-flap, 360 degree
-nicitating flap (for stabilisation)
-corneal-cross-linking (CXL)



Complicated ulcer

Veterian key



Conjunctival flap

-for peripheral middle-deep defects/ulcers

-for smaller defects

-blood supply to the wound, little stabilization

-not for deep ulcers (not enough stability), not best choice in zentral defects (cornea is not transparent in this area anymore)

technique:
-cut conjunctiva pedicle parallel to limbus, as long, as required
-blunt preparation of the conjunctiva
-resect episclera (otherwise it contracts later and puts tension on the graft)
-suture it in the defect, without traction
-9-0 Vicryl (in cornea)

Complicated ulcer

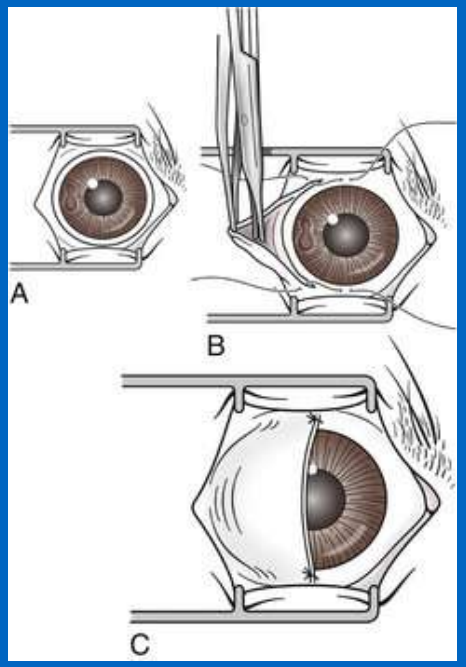
Hood flap

-for middle-deep, big defects/ulcers, melting ulcers (if not over the whole cornea)

-blood supply to the wound, stabilization

-not for deep ulcers (not enough stability), not best choice in zentral defects (cornea is not transparent in this area anymore)

Technique:
-cut conjunctiva parallel to limbus 180 degrees near the lesion
-blunt preparation of the conjunctiva
-resect episclera (as in the conjunctival pedicle)
-place it flat on the cornea
-place 2 sutures in sclera with single interrupted pattern (no suture in cornea)
-Vicryl 6-0 up to 8-0



Veterian key

Complicated ulcer

Hood flap

-for middle-deep, big defects/ulcers, melting ulcers (if not over the whole cornea)

-blood supply to the wound, stabilization

-not for deep ulcers (not enough stability), not best choice in zentral defects (cornea is not transparent in this area anymore)

Technique:
-cut conjunctiva parallel to limbus 180 degrees near the lesion
-blunt preparation of the conjunctiva
-resect episclera (as in the conjunctival pedicle)
-place it flat on the cornea
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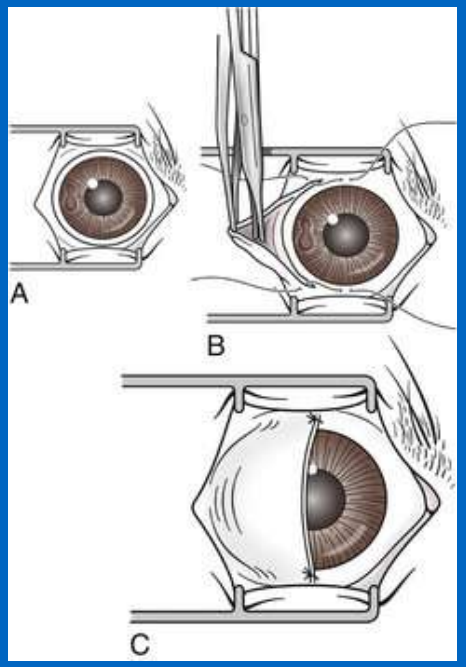
-Vicryl 6-0 up to 8-0



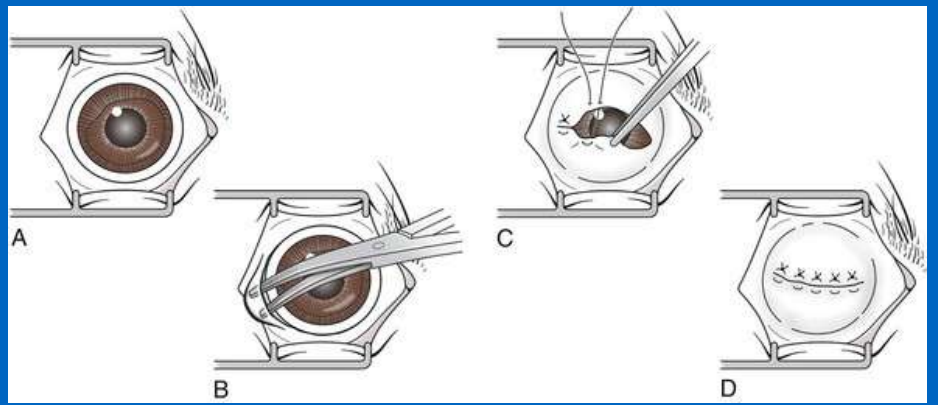
Veterian key

Complicated ulcer

360 degree flap

-for middle-deep, very big defects/ulcers, melting ulcers (if the whole cornea is affected)
-blood supply to the wound, stabilization
-not for deep ulcers (not enough stability)
-alternative to third eyelid flap, more attached to the cornea

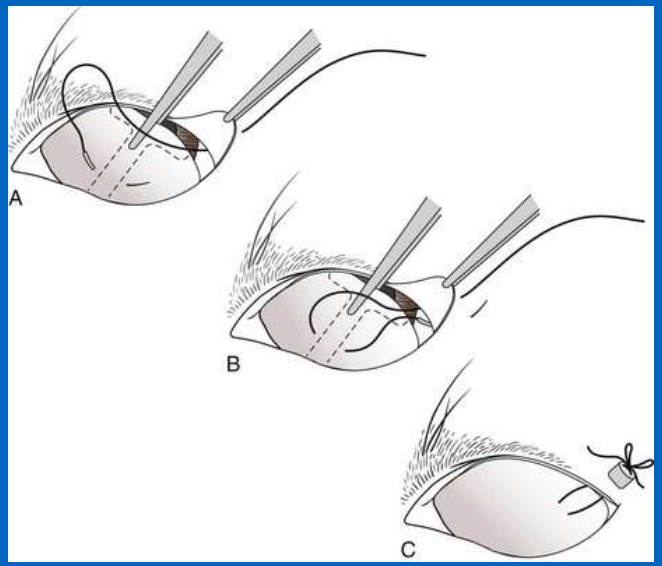
Technique:
-cut conjunctiva parallel to limbus 360 degrees
-blunt preparation of the conjunctiva
-resect episclera (as in the conjunctival pedicle)
-place it flat on the cornea
-place sutures in conjunctiva to close it, interrupted mattress sutures, the knots have to be outside, no supermaterial should be on the cornea
-Vicryl 6-0 up to 8-0
-open it after 4-6 weeks



Veterian key

Complicated ulcer

Veterian key



Third eyelid flap

-for superficial or middle-deep, defects/ulcers, melting ulcers
-covering the wound, stabilization
-not for deep ulcers!
-not the best choice, but if no other way to help, easy to put on

Technique:
-suture material: 3-0 or 4-0 monofilament non-absorbable
-pass the needle from outside into the fornix of the temporal upper eyelid
-direct it on the external surface of the third eyelid, below the T-shaped cartilage (A)
-exit on the opposite side of the cartilage and go back through the dorso-lateral fornix, through the lid (B)
-avoid the bulbar side of the third eyelid
-tie the knot over a stent, that is big enough and with ends long enough (to tie a bow) to get a look at the eye (C) if necessary
-leave it for up to 6 weeks (controll at least every week)
-put on lokal antibiotics and if necessary atropin

Complicated ulcer

Melting/infected ulcer

Newer therapy:
Cornea-Cross linking
Method: a chromophore (riboflavin) helps to stabilize the collagenfibres of the stroma and to kill the bacterias in contact with UV A light and oxygen

-remove the epithelium (if it is there some left)
-put on riboflavin eyedrops (0,1%)
-drop 1 drop every minute over 30 minutes
-put on UV A (365-370 nm) light 3 mW/cm^2 for 30 min

Complicated ulcer

Deep and perforated ulcers

-goal: stability, closure, good healing, vision

Complicated ulcer

Deep and perforated ulcers

-different problems

deep and big,

small, but perforating

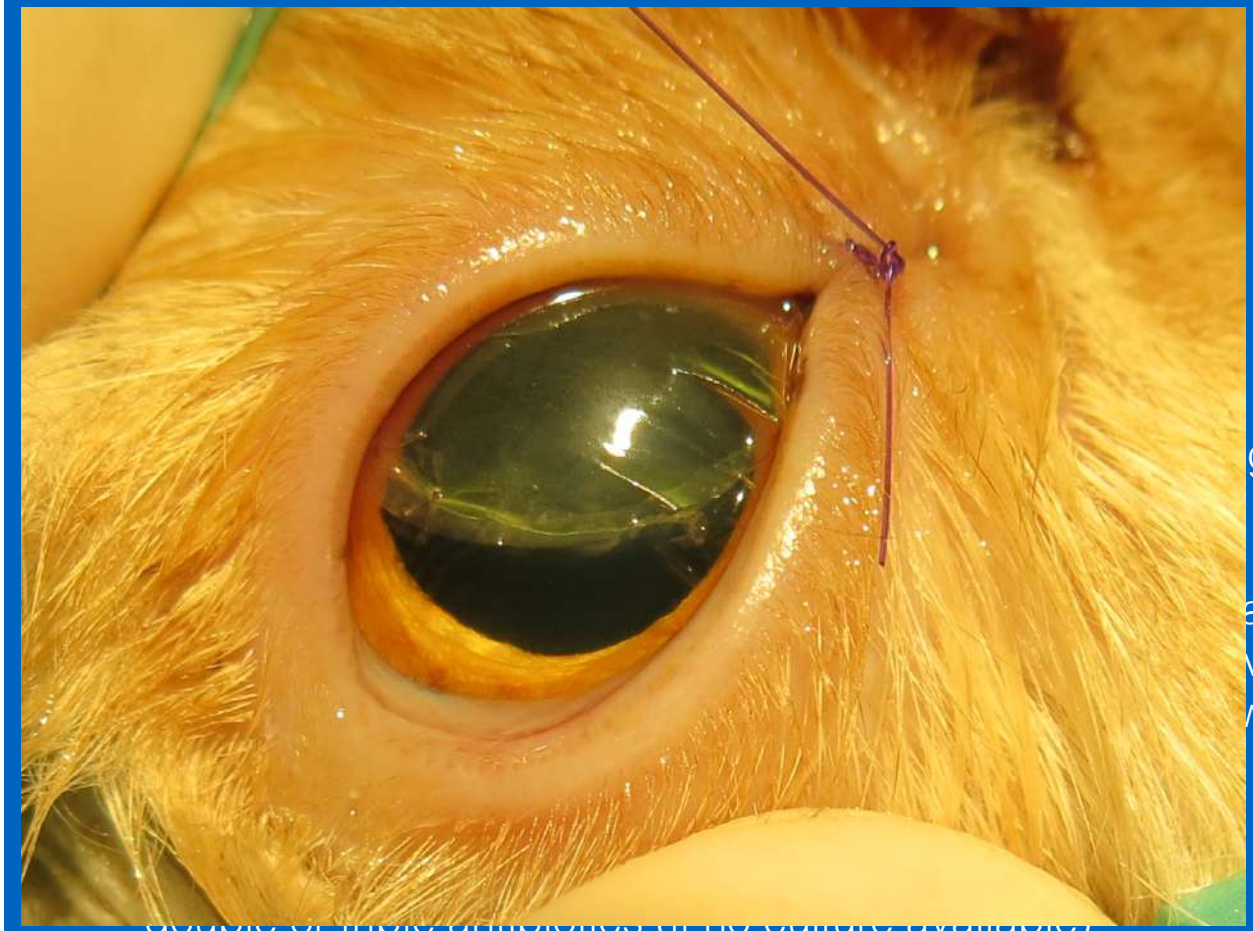
Complicated ulcer

Deep ulcers
-how to deal with this problem?
-stroma is edemic and swollen
-big hole in the central vision axis

a plan for this could be:
-amnion, bovine pericardium, porcine bladder or tissue engineered graft (Biosis, ACellVet)
-or fresh frozen cornea (if available)
-the transplant may additionally coverd by a conjunctiva-flap
-be careful while setting the sutures, this cornea could be very unstable and soft
-if the ulcer is not too deep or too big you can also glue it with cyanoacrylate

But continue the conservative treatment!
-double or triple antibiotics (if no culture available)
-antiproteolytic agents (Doxycycline, EDTA, NAC, Serum…)

Complicated ulcer



gineered graft (Biosis,

ap
very unstable and soft
with cyanoacrylate

double or triple antibiotics (if no culture available)
-antiproteolytic agents (Doxycycline, EDTA, NAC, Serum…)

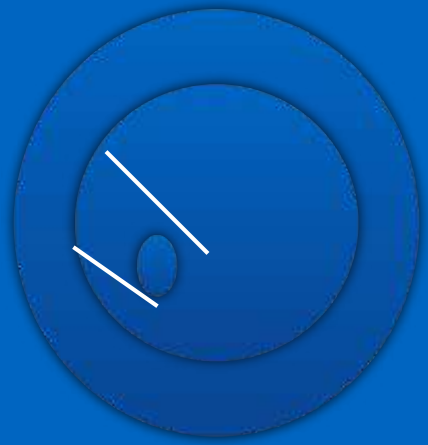
Complicated ulcer

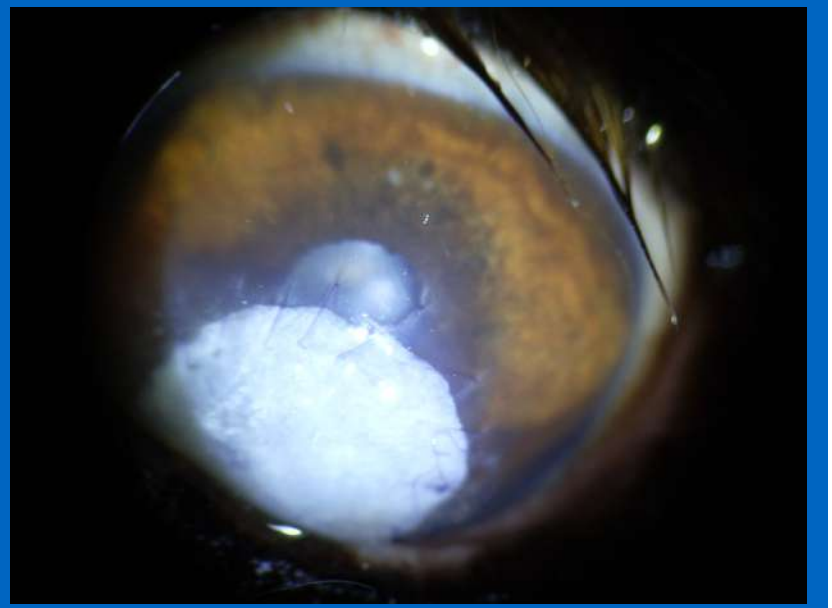
perforated ulcers

-how to deal with this problem?
-aquous humor is getting out

A plan for this ulcer could be an autologous cornea grafting
- corneo-conjunctival transposition

-incision in the cornea
-try to be a little divergent in the direction to the sclera
-prepare the cornea carefully
-split and undermine it to the limbus





Complicated ulcer

perforated ulcers

-how to deal with this problem?
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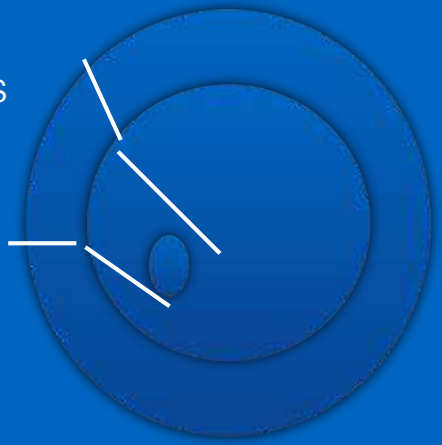
A plan for this ulcer could be an autologous cornea grafting
- corneo-conjunctival transposition

-incision in the cornea
-try to be a little divergent in the direction to the sclera
-prepare the cornea carefully
-split and undermine it to the limbus
-then cut the conjunctiva
even more divergent
-dissect it bluntly



Complicated ulcer

perforated ulcers

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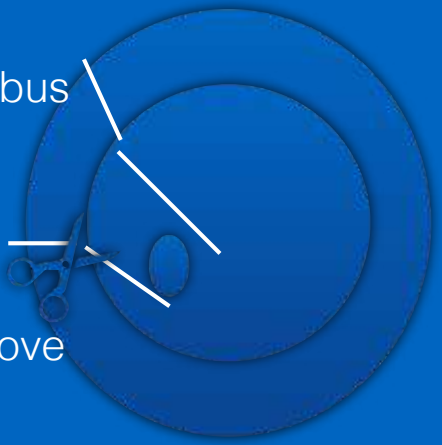
A plan for this ulcer could be an autologous cornea grafting
- corneo-conjunctival transposition

-incision in the cornea
-try to be a little divergent in the direction to the sclera
-prepare the cornea carefully
-split and undermine it up to the limbus
-then cut the conjunctiva
even more divergent
-dissect it bluntly
-finally cut very carefully the limbus
parallel to the cornea so you can move
the graft into the cornea



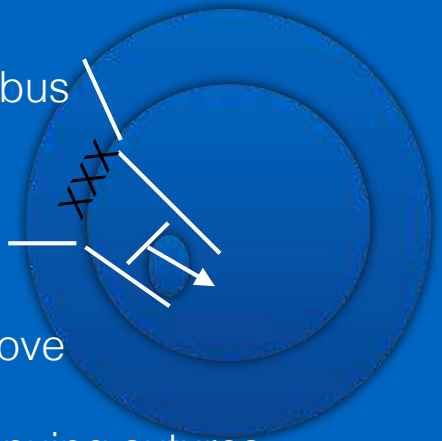
Complicated ulcer

perforated ulcers

-how to deal with this problem?
-aquous humor is getting out

A plan for this ulcer could be an autologous cornea grafting
- corneo-conjunctival transposition

-incision in the cornea
-try to be a little divergent in the direction to the sclera
-prepare the cornea carefully
-split and undermine it up to the limbus
-then cut the conjunctiva
even more divergent
-dissect it bluntly
-finally cut very carefully the limbus
parallel to the cornea so you can move
the graft into the cornea
-fix it with single interrupted or continuing sutures
-Vicryl 9-0
-always suture the cornea without tension!



Glaucoma in dogs

Non healable illness ! No cure !

Congenital glaucoma (early age)

-goniodysgenesis
-pectinate ligament dysplasia

Primary glaucoma (breed related) (clinic at about 6-8years)

- primary open angle (POAG)
- narrow or closed angle and/or pectinate ligament abnormalities (PACG)

Secondary glaucoma

-uveitis
-lens luxation (could be also genetic)
-cataract
-phacolytic/phacoclastic uveitis
-hyphema
-intraocular tumor
-uveal cysts
-melanosis (pigmentary uveitis, pigment glaucoma)
-post operative

Glaucoma in dogs

Congenital glaucoma
-goniodysgenesis
-pectinate ligament dysplasia

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Glaucoma in dogs

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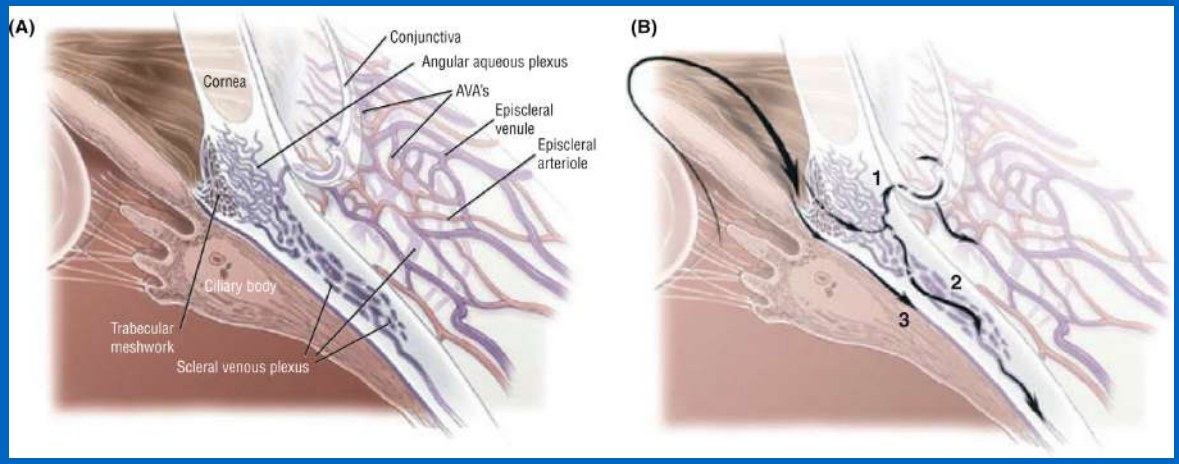
-post operative

Glaucoma in dogs

<u>Primary glaucoma- prophylactic?</u>

-inherited diseases!
-breeders advice, genetical testing…



A.Komaromy- future in glaucoma therapy

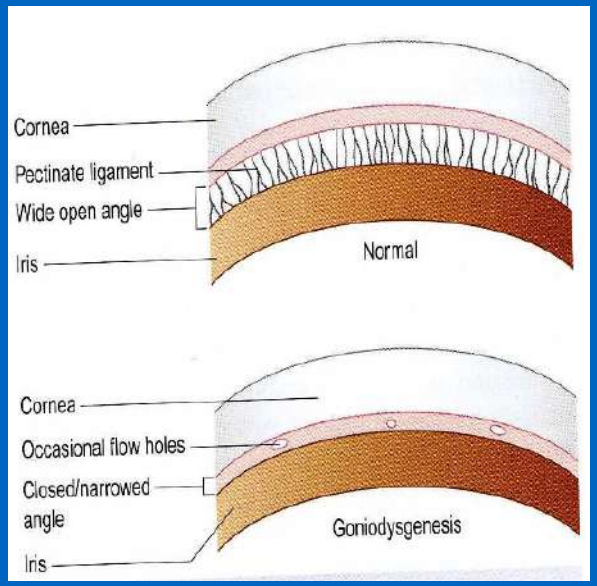
Congenital glaucoma
-goniodysgenesis
-pectinate ligament dysplasia

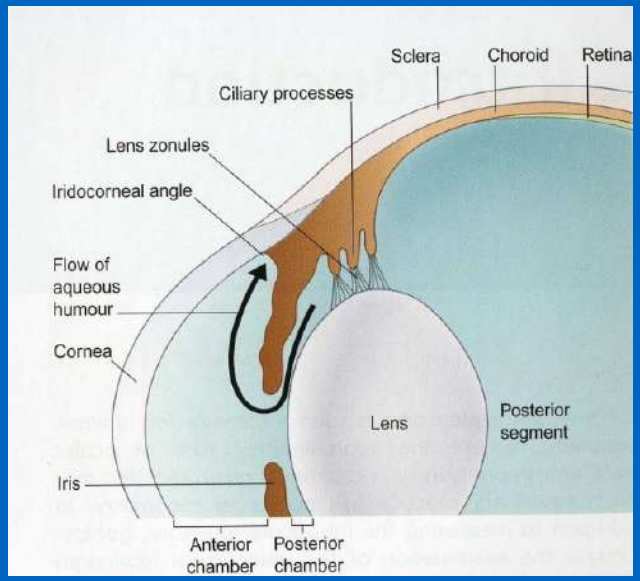
Primary glaucoma (breed related)
- primary open angle
- narrow or closed angle and/or pectinate ligament abnormalities

Glaucoma in dogs

Primary glaucoma
The pectinate ligament

-goniodysgenesis
-pectinate ligament dysplasia
- narrow or closed angle and/or pectinate ligament abnormalities





Glaucoma in dogs

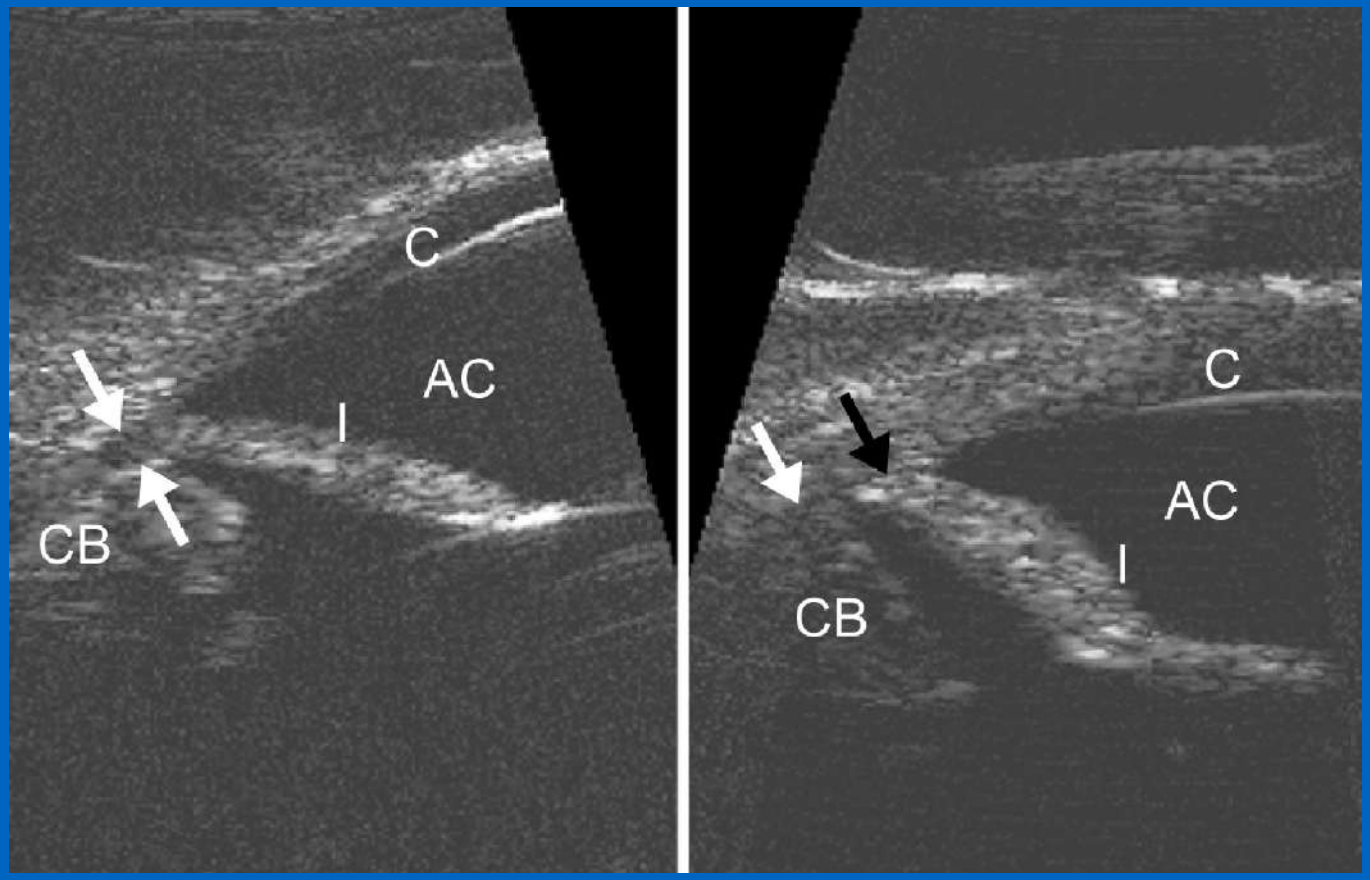
Pectinate ligament abnormalities

Normal angle and ligament

Abnormal ligament and narrow angle

Glaucoma in dogs

Angle closure glaucoma- high resolution ultrasound



Open/normal

Closed -PACG

A.Komaromy- future in glaucoma therapy

Glaucoma in dogs

Secundary glaucoma - prophylactic?

-try to stop the reason for, better try to avoid it before a glaucoma comes

-cataract surgery if cataract is progressive, if intraocular pressure is lower (hint for uveitis)- check at latest every 6 months (if no possibility for surgery)
-LIU (lens induced uveitis) - cataract surgery

-uveitis treatment should be effective and may be longer necessary (always remember you can just control it visually and by intraocular pressure)

-pigmentary uveitis and pigment glaucoma are genetically based (breeders advise)

-punctate or laser cysts, if too many (no treatment if just some)

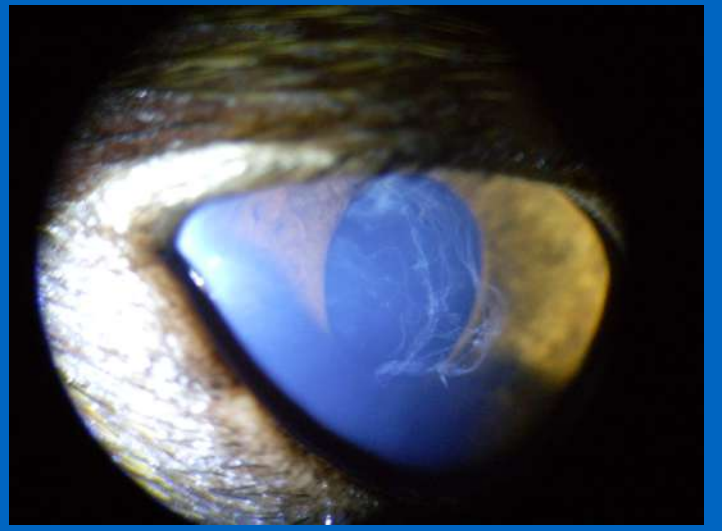
-lens luxation (in Terrier breeds genetically ->primary lens luxation, comes often with an open angle glaucoma), -there frustrating to therapy

-lens luxations in other breeds: if anterior, emergency for surgery, complete lens extraction (ICLE- intracapsular lens extraction)

Glaucoma in dogs

Surgical treatment
secondary glaucoma
-lens luxation

Lensluxation



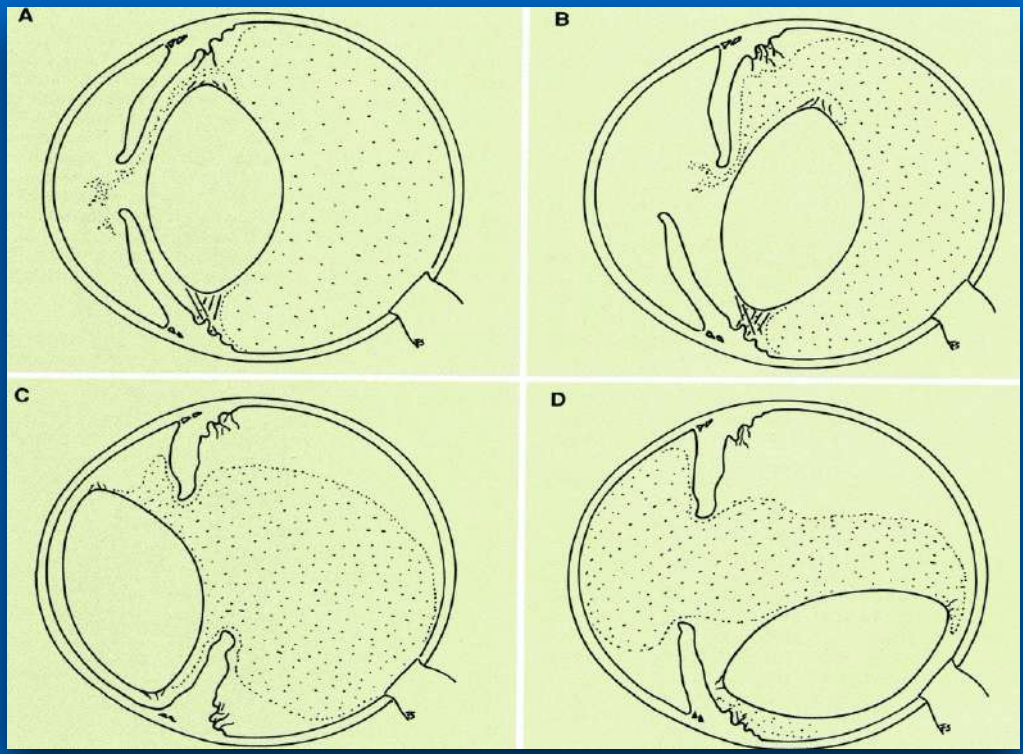
-different types of luxation

A.->vitreus is visible in the anterior chamber

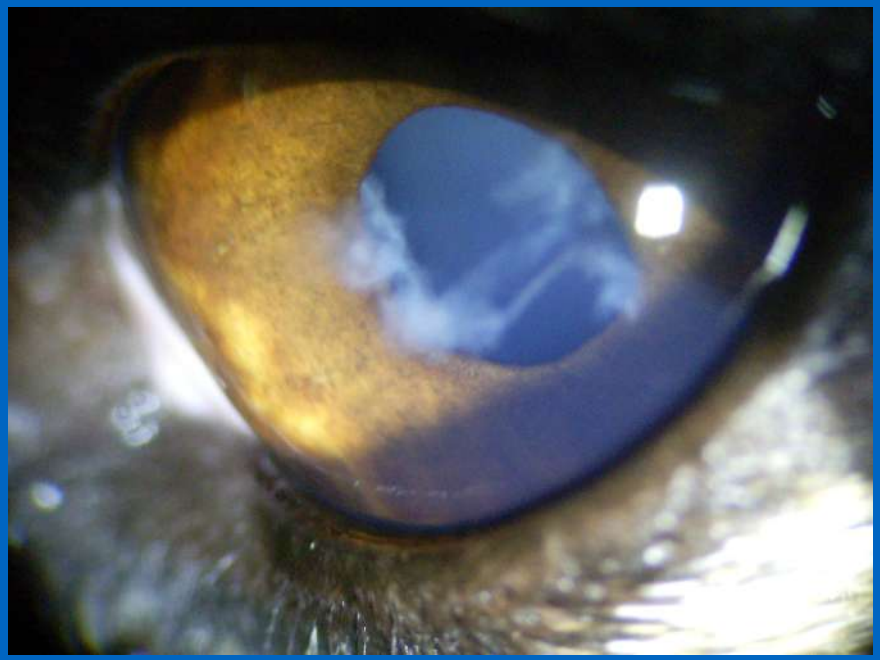
B.->subluxated lens

C.->anterior lens luxation

D.->posterior lens luxation



Aus Stades Neumann Boeve, praktische Augenheilkunde für den Tierarzt

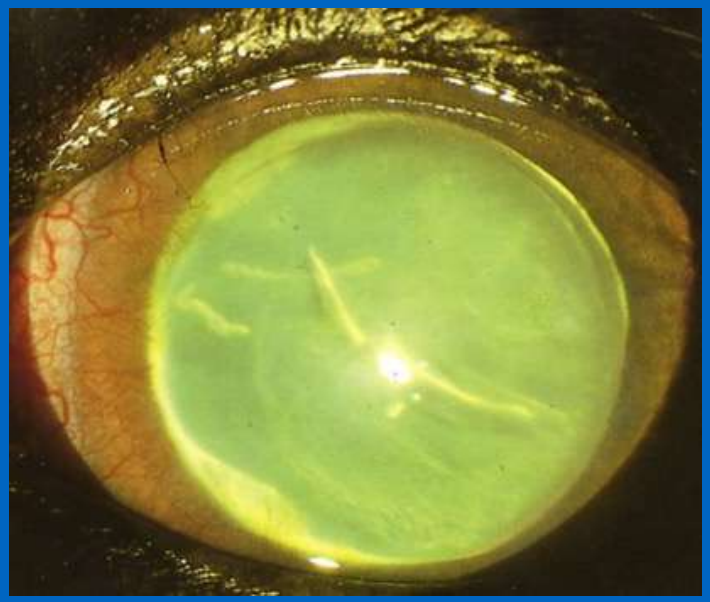


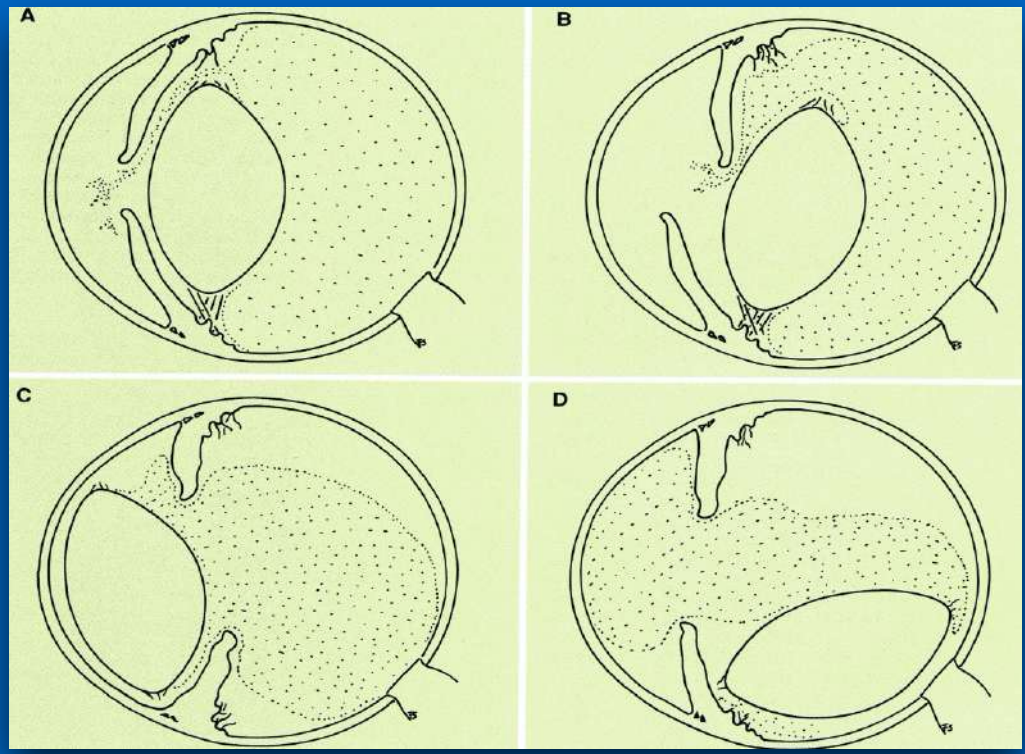
A.

Lensluxation

-different types of luxation

-other kind of lens luxation:
->lens gets stucked in the iris
-> pupillary block
-> high intraocular pressure
-> surgical emergency





Stades Neumann Boeve, praktische Augenheilkunde für den Tierarzt

Lensluxation

-different types of Luxation

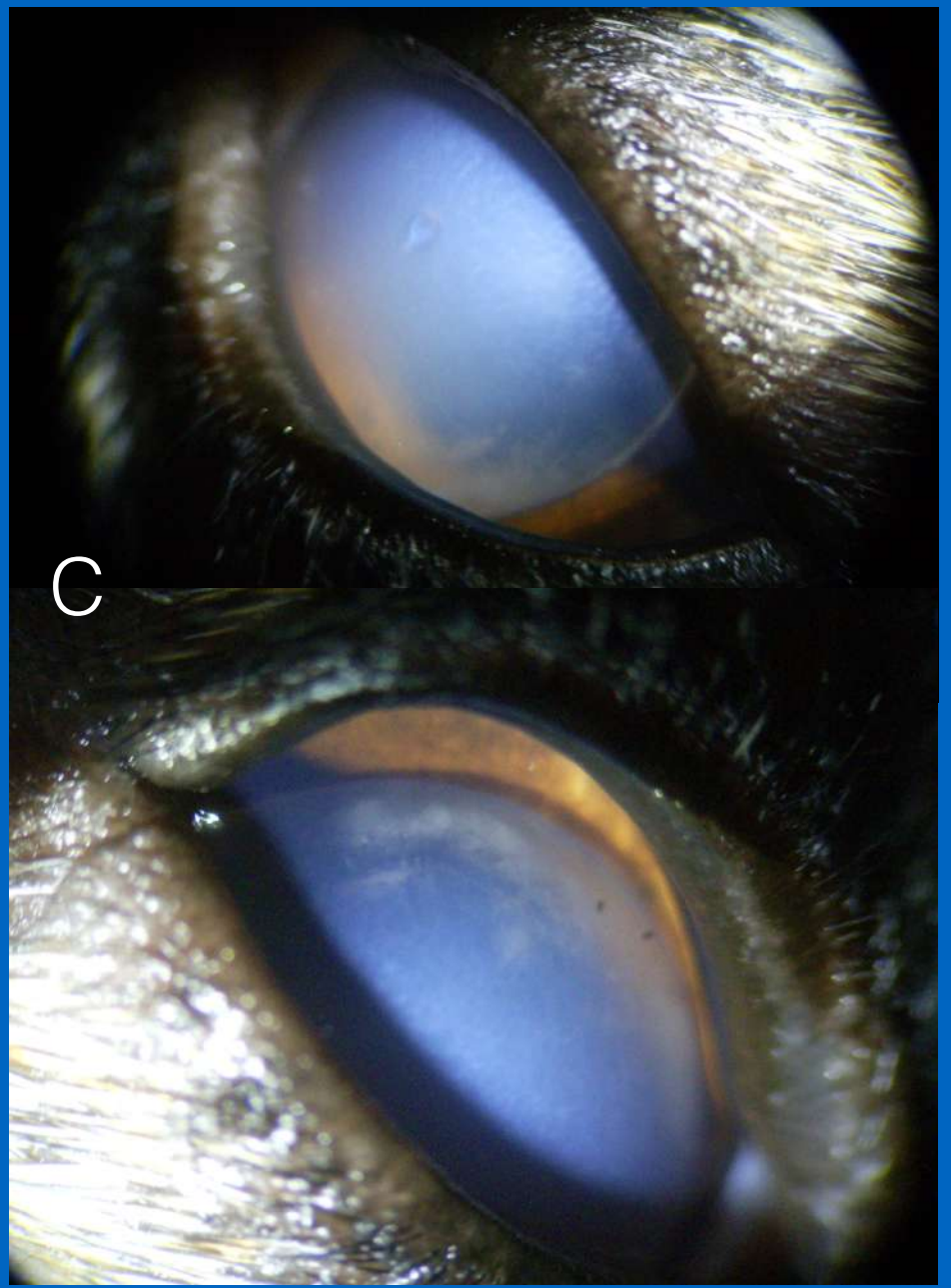
A.->vitreus is visible in the anterior chamber

B.->subluxated lens

C.->anterior lens luxation

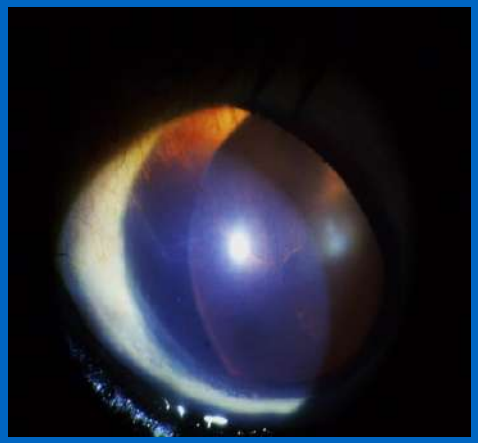
D.->posterior lens luxation

-is always an emergency
-intraocular pressure rises
-lens irritates the cornea endothelium

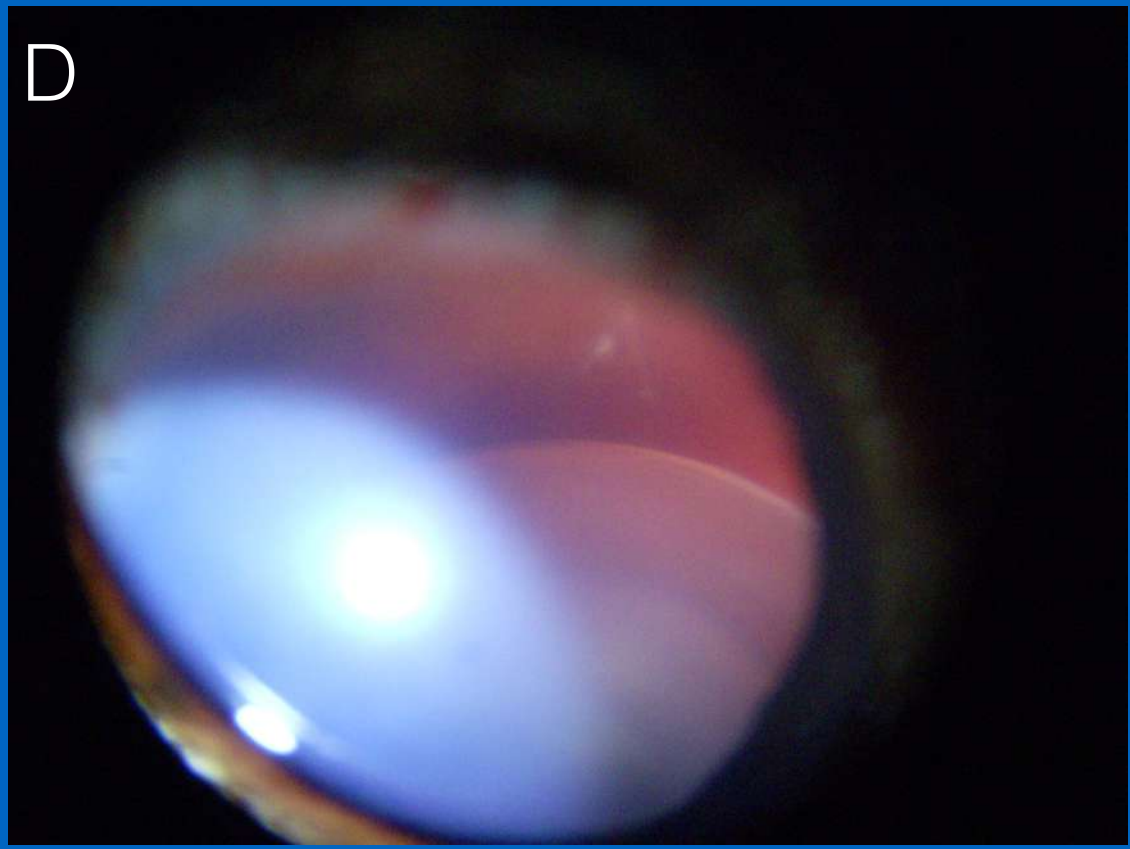


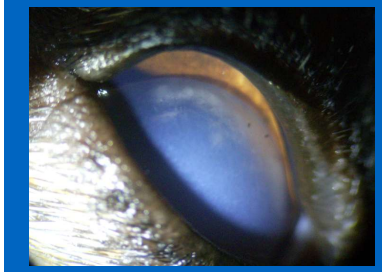
Lens luxation

Posterior lens luxation

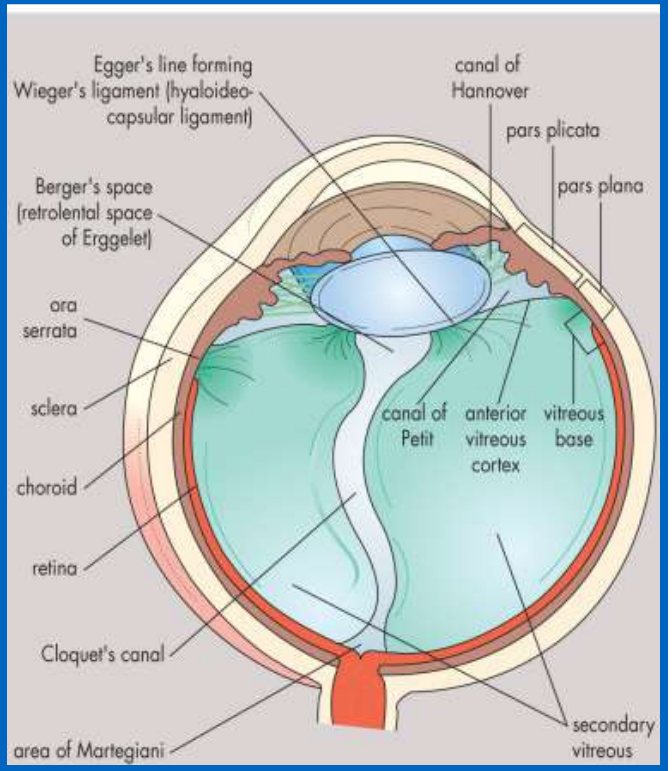


-if no surgical treatment is possible
-use motics to keep it posterior





Lensluxation



Therapy: (at least) anterior lens luxation /pupillary block (ICLE)

-open cornea near and parallel to limbus
-about 120-160 degree (from 10 to 2 o´ clock)
-take the lens (with loop or kryoprobe…)
-cut off the vitreus from the backside of the lens, before you take the lens out
-close the cornea in the middle
-do anterior vitrectomy
-close the cornea completely

-you can put in sulcus lenses
-but aphacic is quite oK for most dogs (less complications)

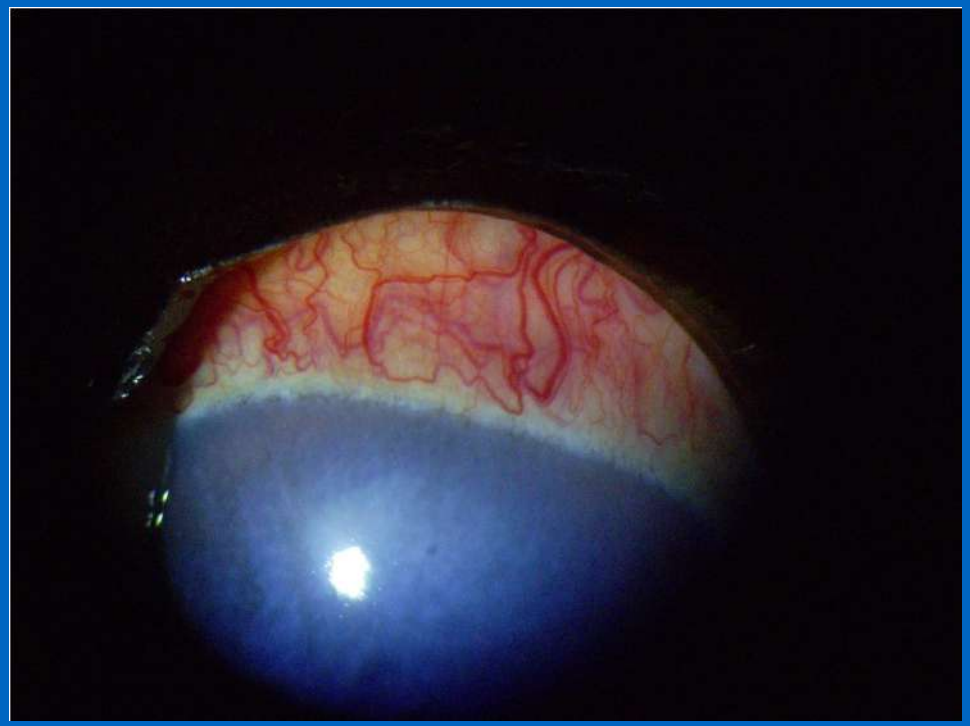
Usually all kinds of lens luxation should undergo a lens extraction, especially if the eye has vision

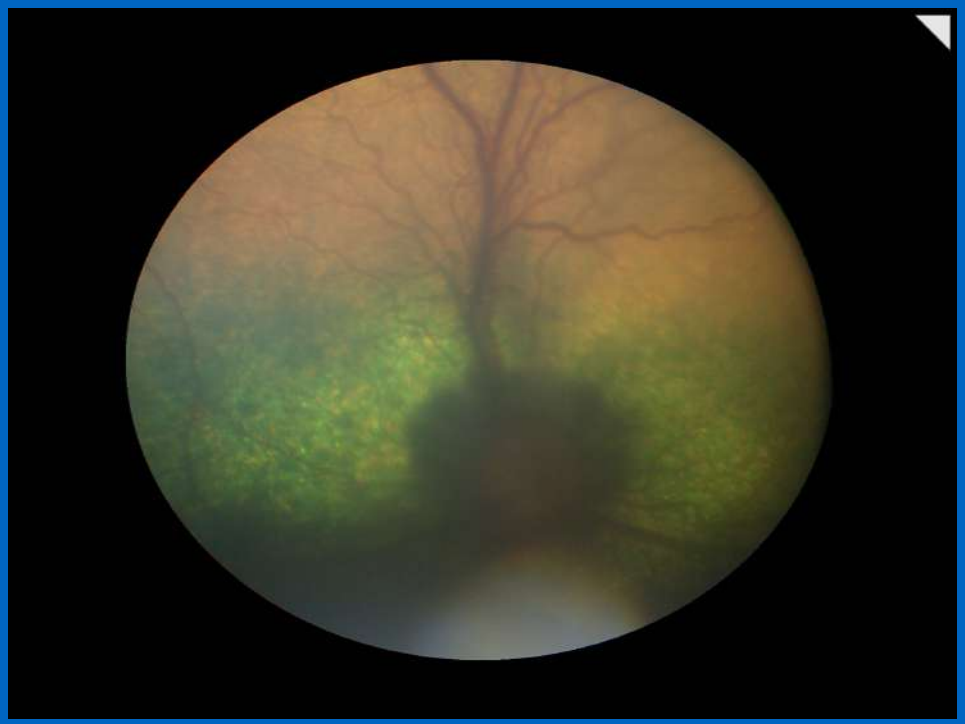
Lens luxation

treatment without surgery -anterior lens luxation
-a try! (because the owner didn't agreed to surgery)
-use mydriatics (Atropine/Phenylephrine 10%),
-let the dog look upwards
-if the lens is freshly luxated, it may go posterior into the vitreous by itself
-konstant medication (miotics) to keep the pupil small, so lens stays posterior

Glaucoma in dogs

Signs of akute glaucoma
-pain
-corneal edema
-middlewide, non responsive pupil
-skleral injection





Glaucoma in dogs

Therapy:
First try conservative

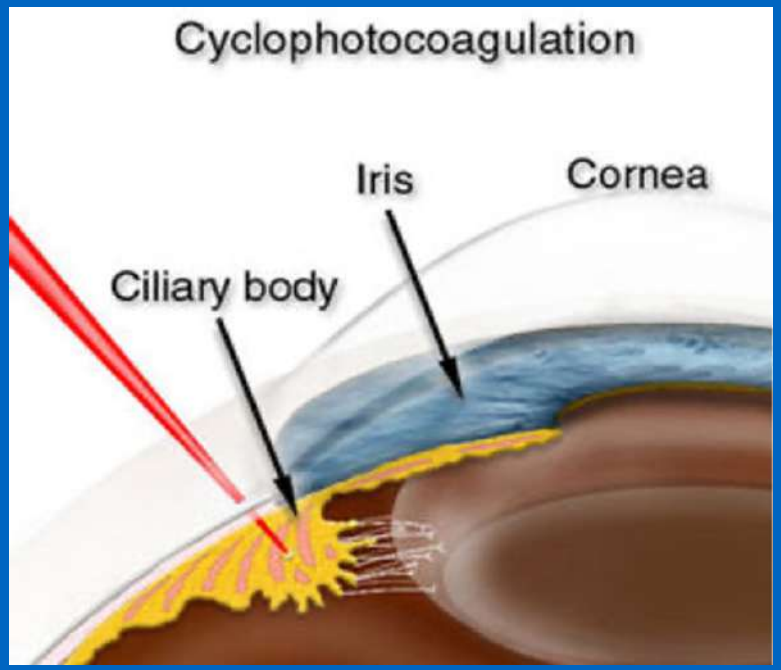
-> carboanydrase inhibitors (reduce the aqueous production)
-> prostaglandineanaloga (support the outflow-uveoscleral)

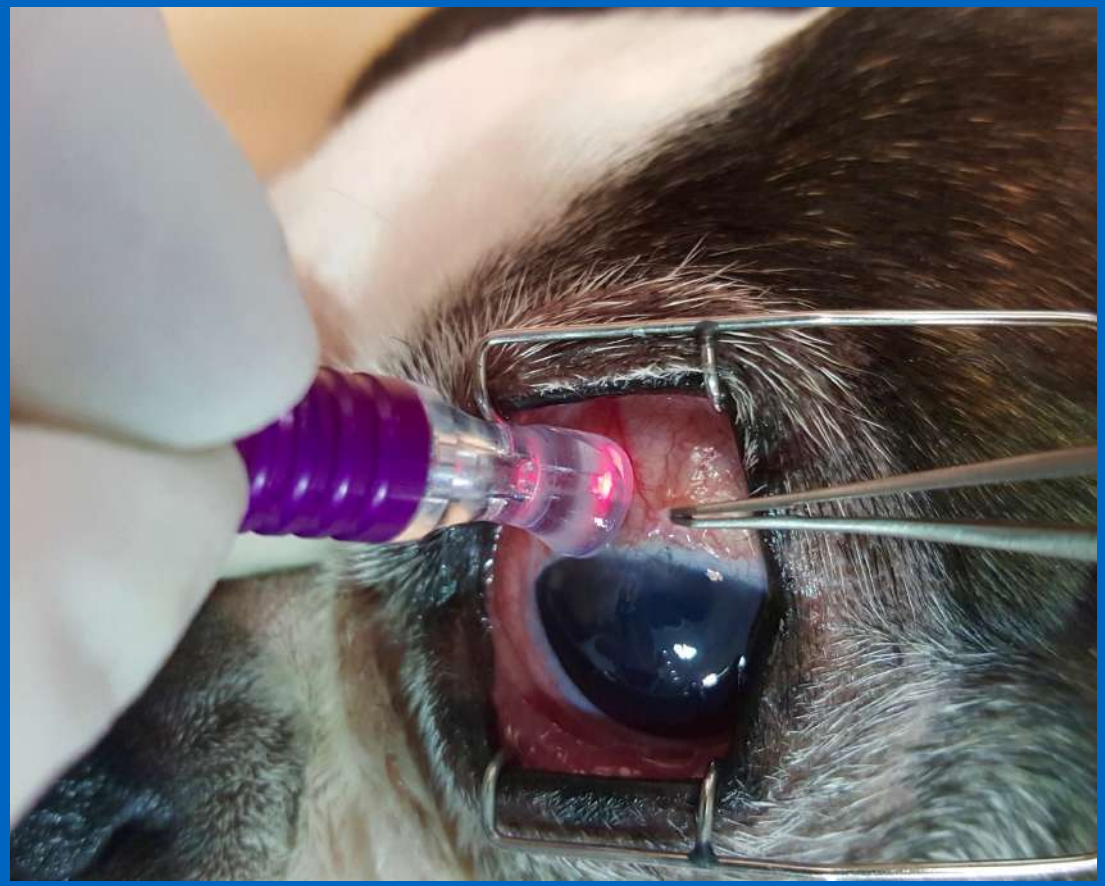
-> miotics and ß-blocking agents
-> neuroprotective agents (amlodipine?)

?

Glaucoma in dogs

Surgical treatment
primary glaucoma:





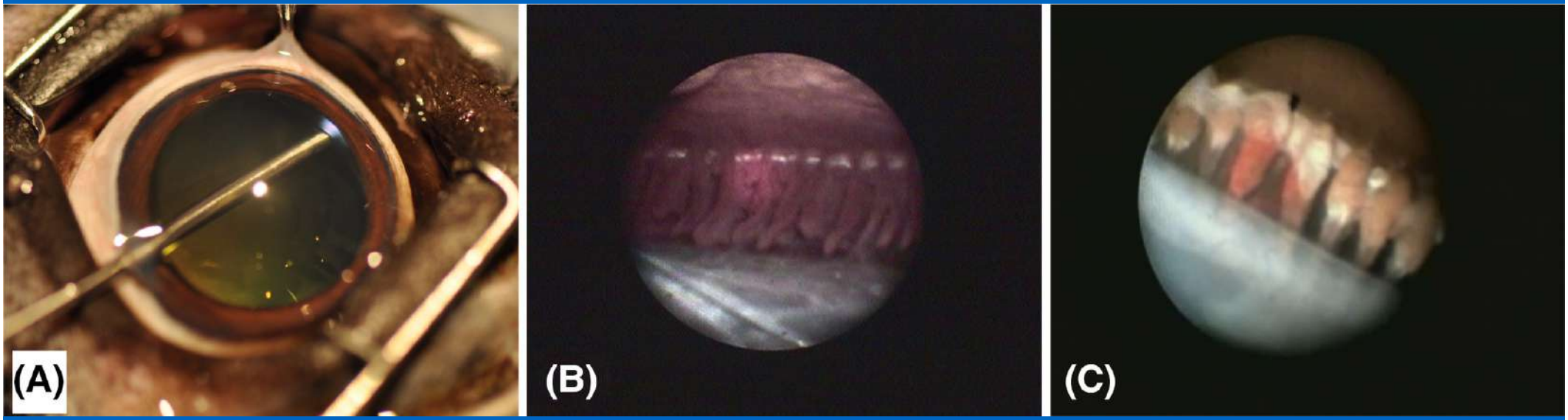
Cyclodestructive techniques transscleral
-kryo
-laser

A.Komaromy- future in glaucoma therapy

Glaucoma in dogs

Surgical treatment
primary glaucoma:

Cyclodestructive techniques
-diode endoscopic laser

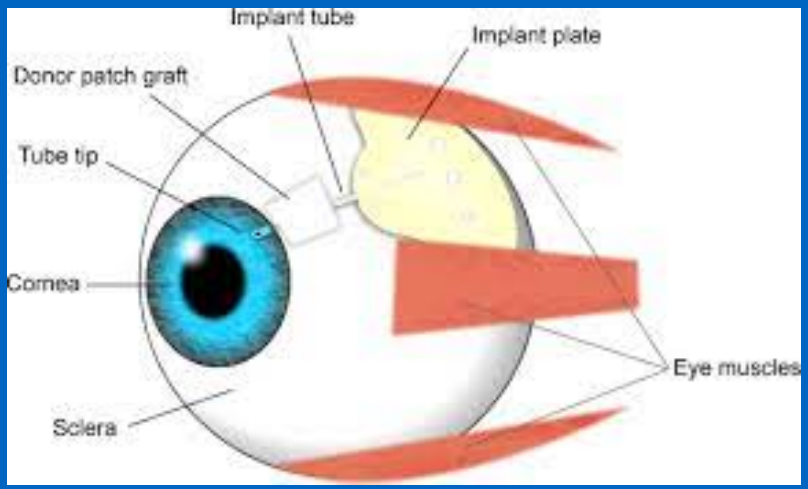


A.Komaromy- future in glaucoma therapy

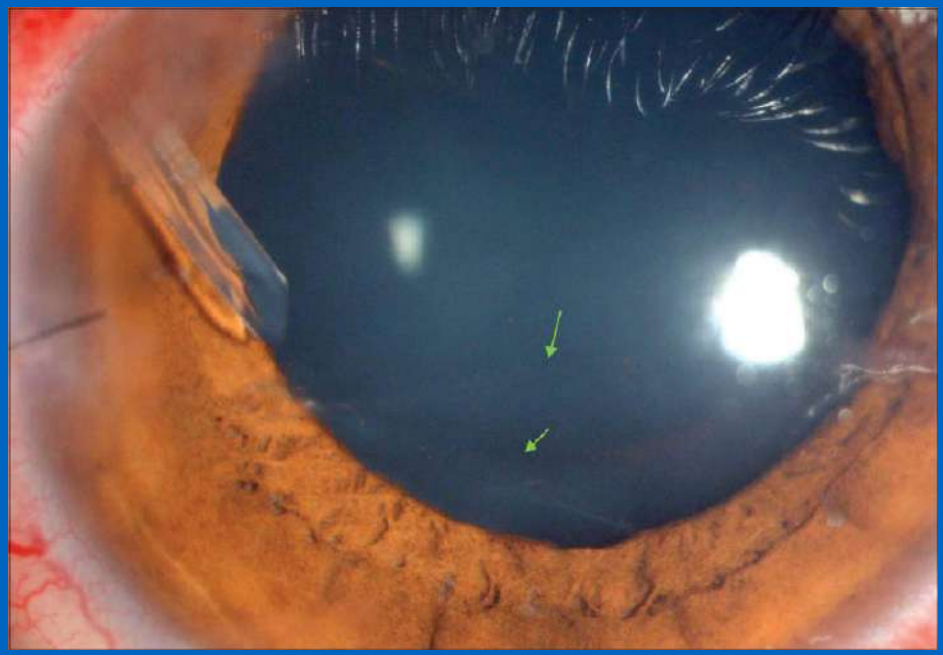
Glaucoma in dogs

Surgical treatment
primary glaucoma:

Anterior chamber shunt



sanantonioeyeinstitute



OmanJOpthtalmol

Glaucoma in dogs

Surgical treatment
primary glaucoma:

Anterior chamber shunt

A.Komaromy- future in glaucoma therapy

Glaucoma in dogs

Endstage glaucoma

The circle closes

Elly: Bernese Mountain Dog, 8y, female

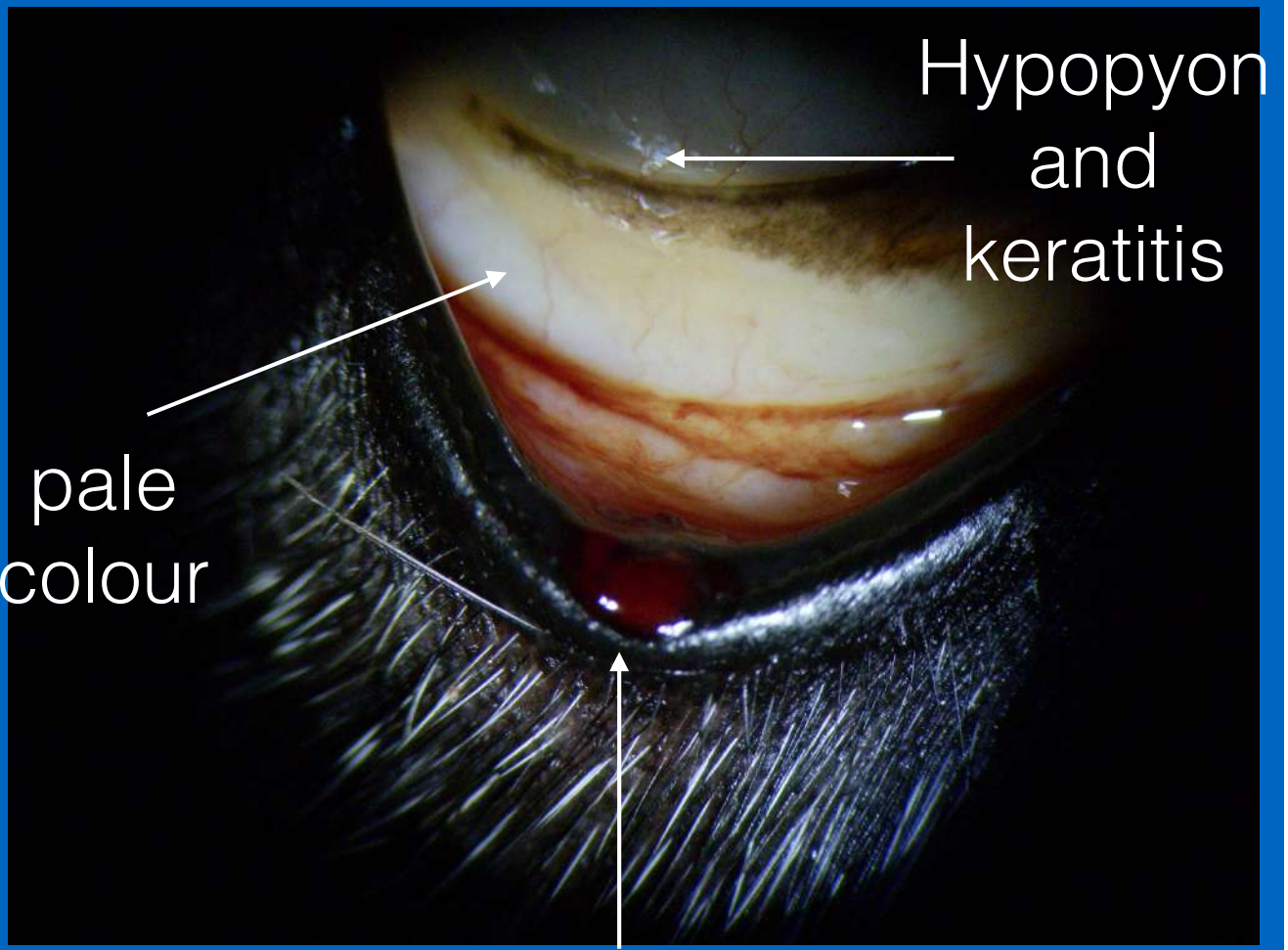
-owner reported that his dog has been attacked by a cat- he is not sure, but he thinks, the cat hit the eye

Now it is your turn!

what do you see?
is it an emergency?
what would be the best treatment?

Now it is your turn!

what do you see?
is it an emergency?
what would be the best treatment?



Elly: Bernese Mountain Dog, 8y, female

not a case for surgery

had lymphoma and pancytopenia

Question 1

What do you see?

A. bullous keratopathy

B. big cornea defect

C. anterior lens luxation

Question 1

What do you see?

A. bullous keratopathy

B. big cornea defect

C. anterior lens luxation

Question 2

What do you see?

A. bullous keratopathy

B. big cornea defect with hypopyon

C. anterior lens luxation

Question 2

What do you see?

A. bullous keratopathy

B. big cornea defect with hypopyon

C. anterior lens luxation

Now it is your turn!

what do you see?

is it an emergency?

what would be the
best treatment?

Complicated ulcer

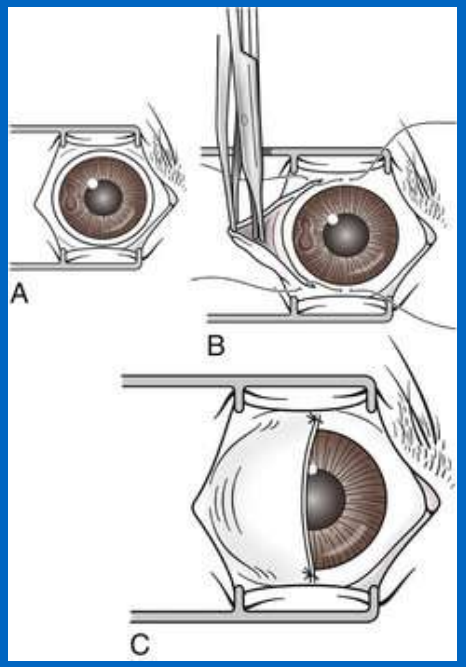
Hood flap

-for middle-deep, big defects/ulcers, melting ulcers (if not over the whole cornea)

-blood supply to the wound, stabilization

-not for deep ulcers (not enough stability), not best choice in zentral defects (cornea is not transparent in this area anymore)

Technique:
-cut conjunctiva parallel to limbus 180 degrees near the lesion
-blunt preparation of the conjunctiva
-resect episclera (as in the conjunctival pedicle)
-place it flat on the cornea
-place 2 sutures in sclera with single interrupted pattern (no suture in cornea)
-Vicryl 6-0 up to 8-0



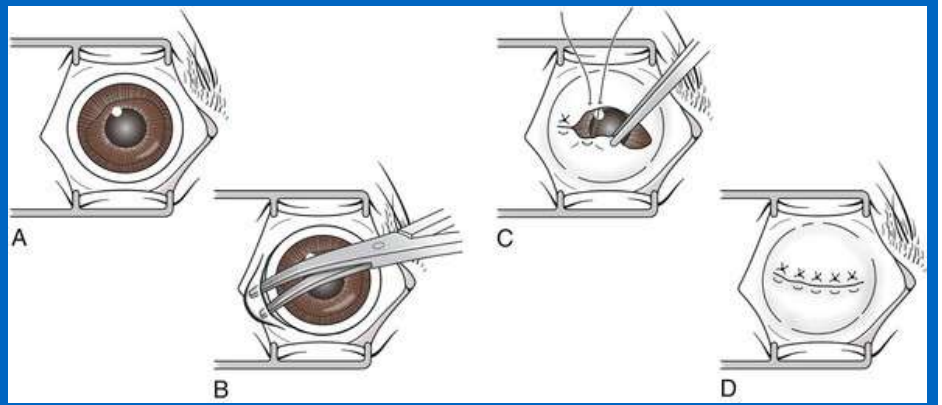
Veterian key

Complicated ulcer

360 degree flap

-for middle-deep, very big defects/ulcers, melting ulcers (if the whole cornea is affected)
-blood supply to the wound, stabilization
-not for deep ulcers (not enough stability)
-alternative to third eyelid flap, more attached to the cornea

Technique:
-cut conjunctiva parallel to limbus 360 degrees
-blunt preparation of the conjunctiva
-resect episclera (as in the conjunctival pedicle)
-place it flat on the cornea
-place sutures in conjunctiva to close it, interrupted mattress sutures, the knots have to be outside, no supermaterial should be on the cornea
-Vicryl 6-0 up to 8-0
-open it after 4-6 weeks



Veterian key

Complicated ulcer

Melting/infected ulcer

Newer therapy:
Cornea-Cross linking
Method: a chromophore (riboflavin) helps to stabilize the collagenfibres of the stroma and to kill the bacterias in contact with UV A light and oxygen

-remove the epithelium (if it is there some left)
-put on riboflavin eyedrops (0,1%)
-drop 1 drop every minute over 30 minutes
-put on UV A (365-370 nm) light 3 mW/cm^2 for 30 min

Questions?