The uvea

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Lógyógyászati Tanszék és Klinika

LTK

Department and Clinic of Equine Medicine

The Uvea

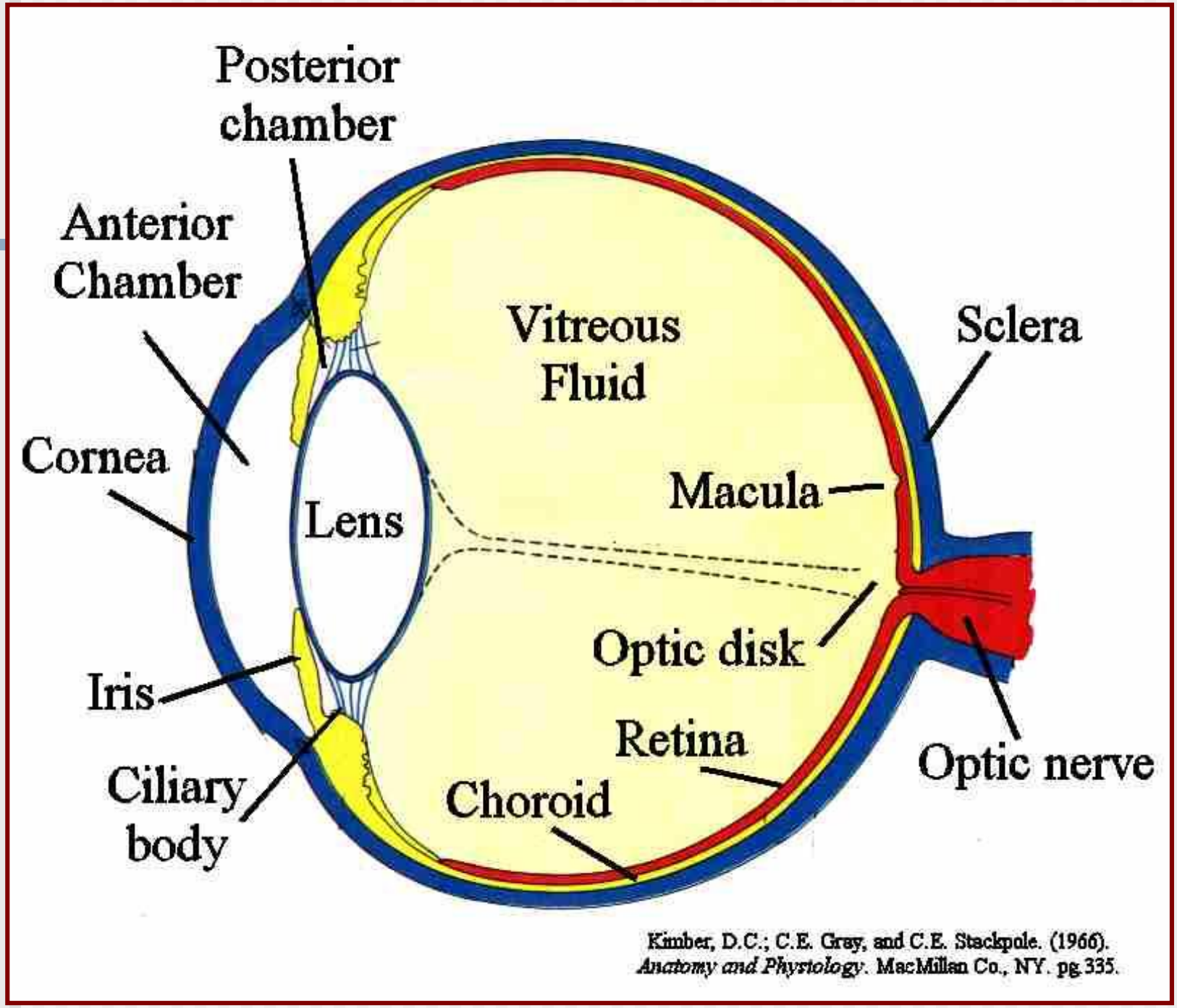
- Anatomy
- Physiology
- Congenital disorders
- Uveitis
- Trauma
- Neoplasia

Terminology

- ***Uvea***=vascular layer (tunica vasculosa)

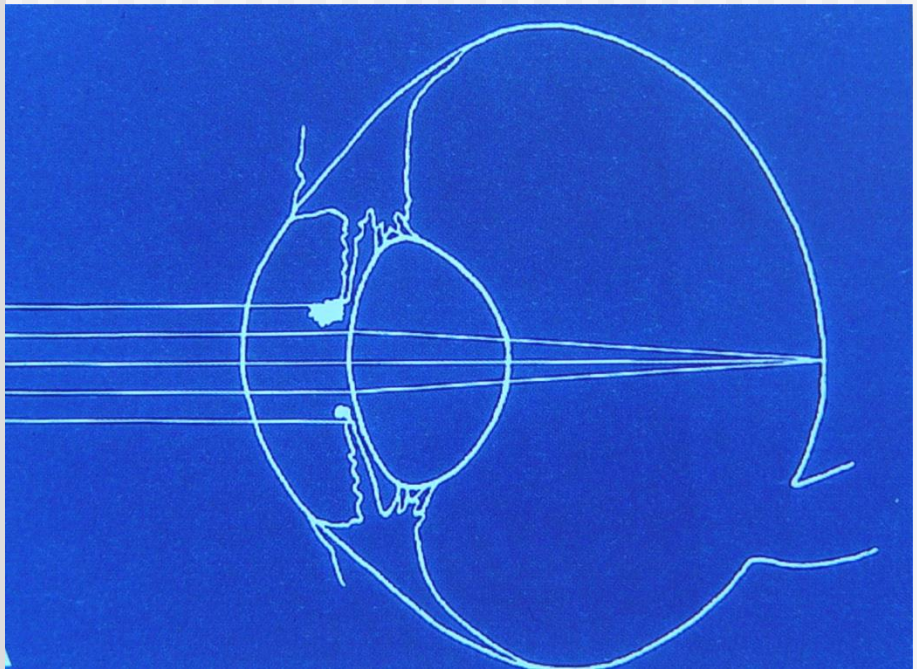
ANTERIOR UVEA: Iris & ciliary body
POSTERIOR UVEA: Choroid

- **Immunologicaly active** (Ly-s can form lymphoid follicles)

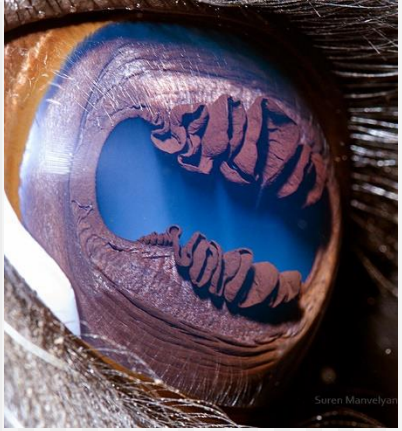

Posterior chamber
Anterior Chamber
Vitreous Fluid
Sclera
Cornea
Lens
Macula
Optic disk
Iris
Retina
Optic nerve
Ciliary body
Choroid
Kimber, D.C.; C.E. Gray, and C.E. Stackpole. (1966).
Anatomy and Physiology. MacMillan Co., NY. pg.335.

Iris

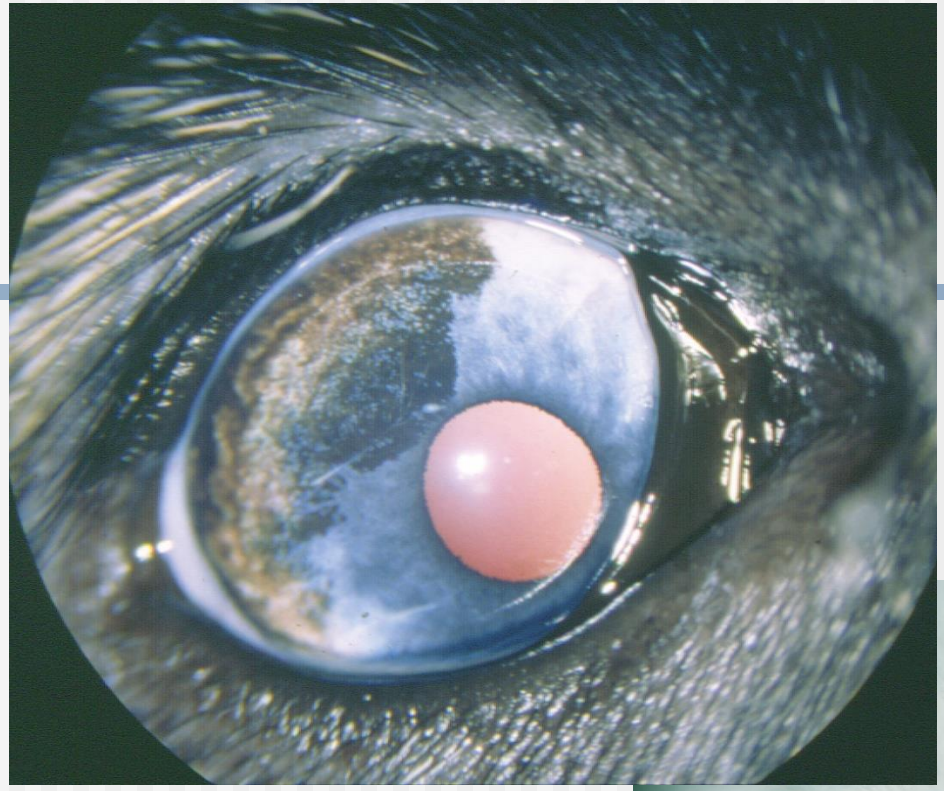
- Separates anterior & posterior chambers
- Regulates the amount of light (pupil)
- Layers: - anterior epithel
  - stroma (muscles, vessels, pigment-cells)
  - posterior pigment epithel (pars iridica retinae)



Iris



- Iris surface has many folds and furrows
- Most irises are brown (blue, gold, white)
- Heterochromia
  - -husky, paint horse, appaloosa, pinto
- Granula iridica (Eq, Ru)



Heterochromia

Iris musculature

Iris dilator muscle

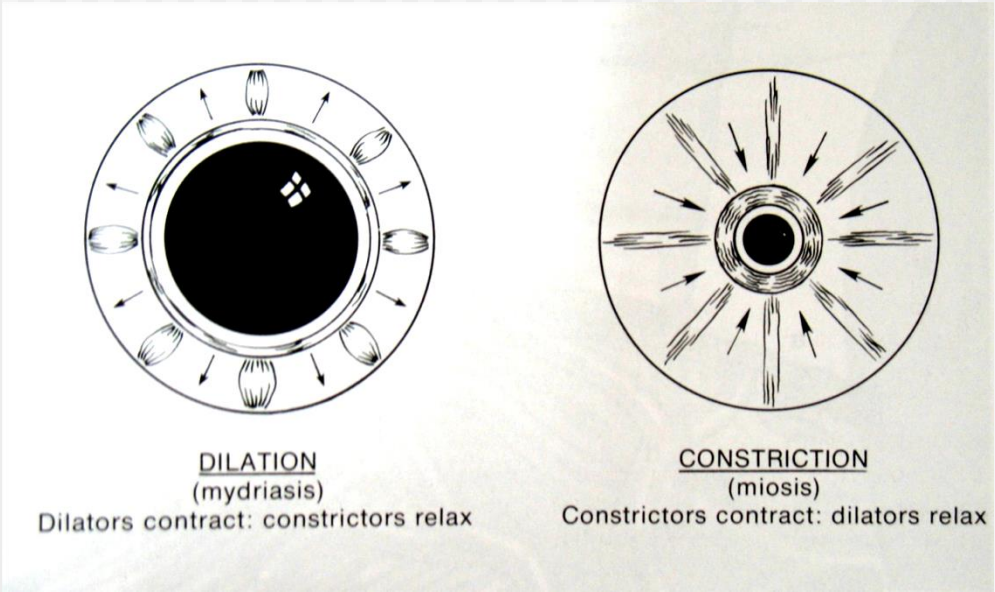
-sympathetic innervation

-better developed in vertical meridians

Iris sphincter muscle

-parasympathetic innervation

-circumferencially near pupil



Slatter, 2001.

Ciliary body

- ≈ triangular outline
- Ciliary muscle (parasympathetic innervation)
- Pars plicata:
  - ciliary body processes produce aqueous humor
  - lens zonules hold the lens in place (+accomodation)
- Pars plana:
  - joins the retina: ora ciliaris retinae

Ciliary body

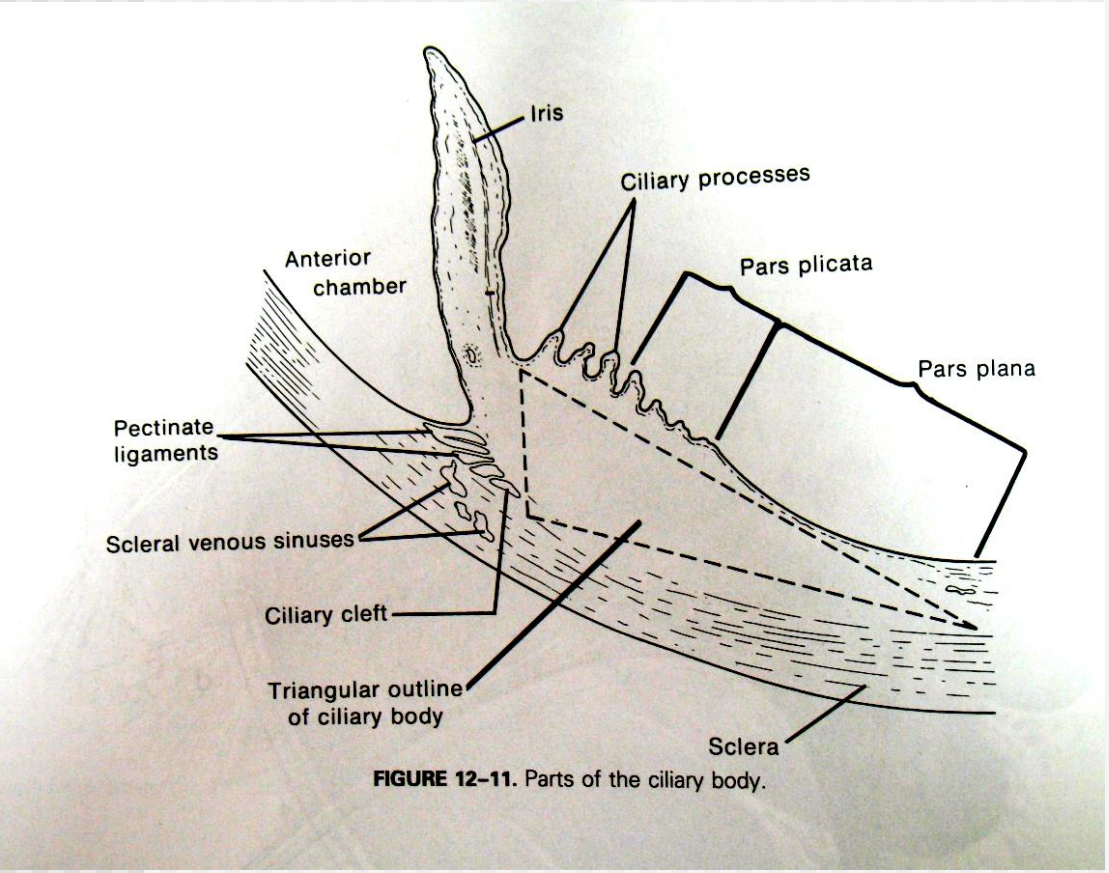
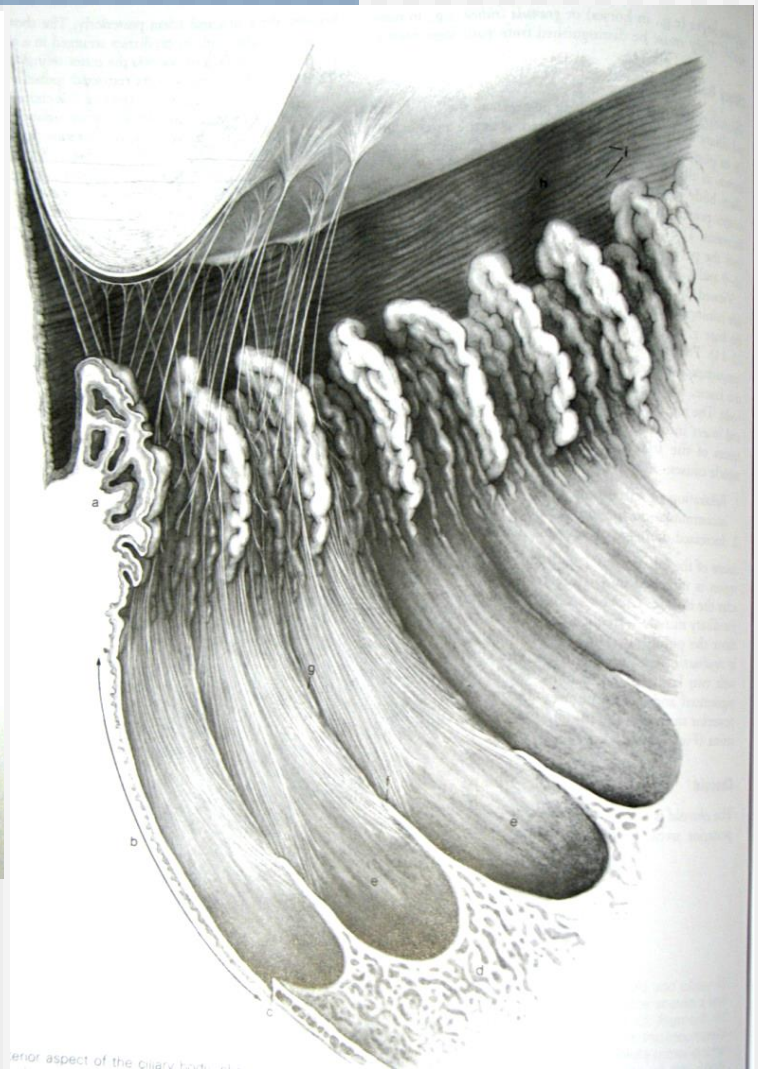


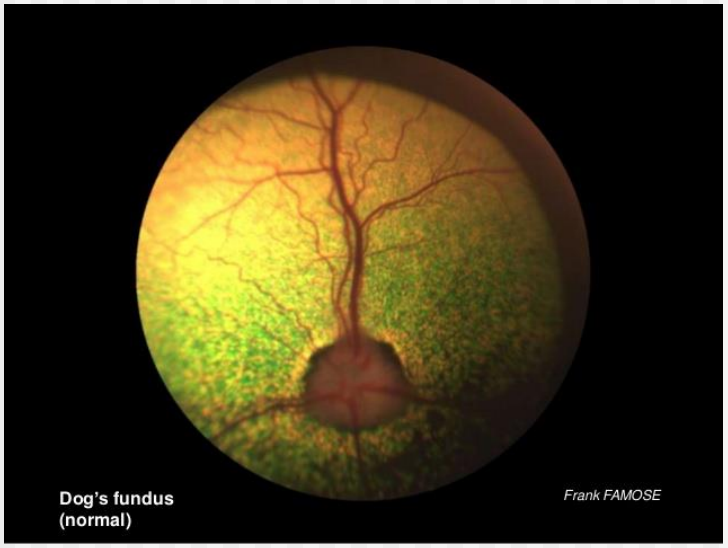
FIGURE 12–11. Parts of the ciliary body.

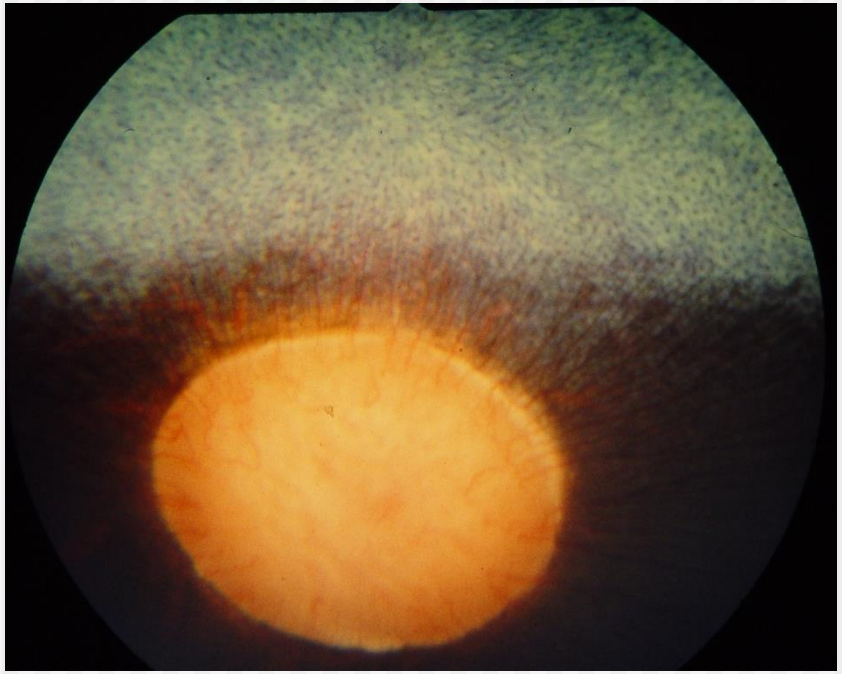


Slatter, 2001.

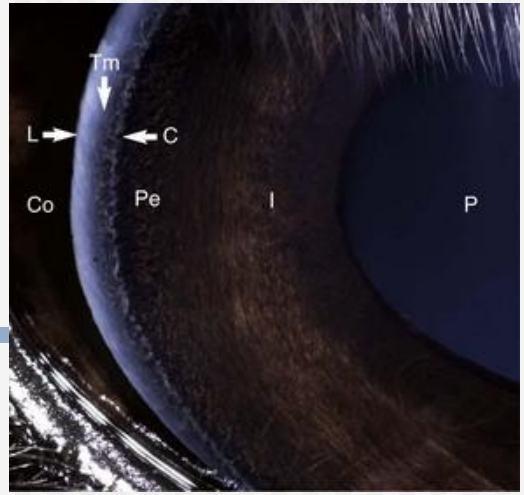
Choroid

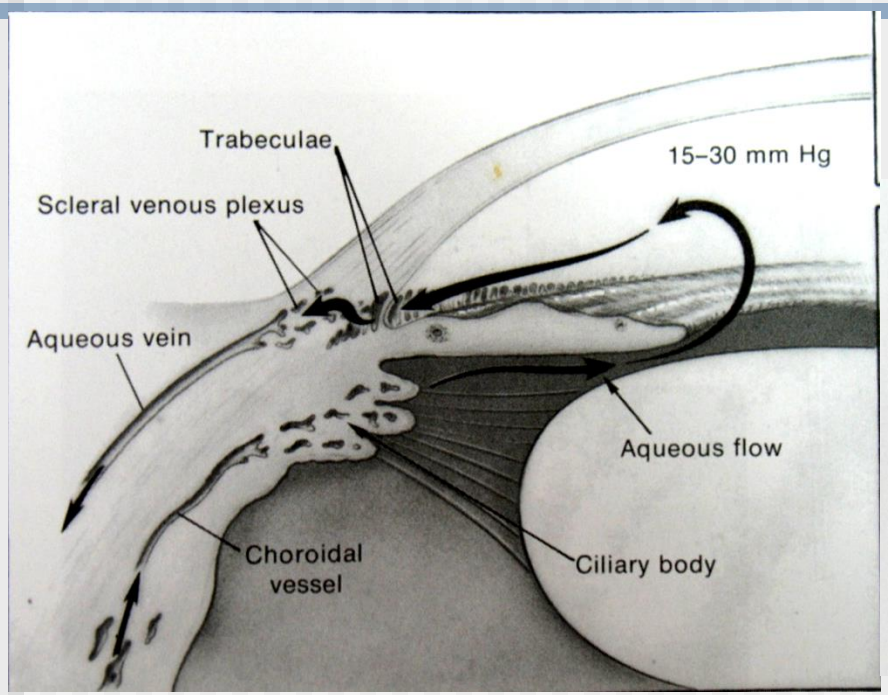
- Between the retina & sclera, rich in vessels
- Histologically has 4 layers
- Supplies the outer layer of the retina(eq:whole retina)
- At the dorsal fundus, between the retina and chorioid
  tapetum (reflective layer, except the pig),
  stars of Winslow



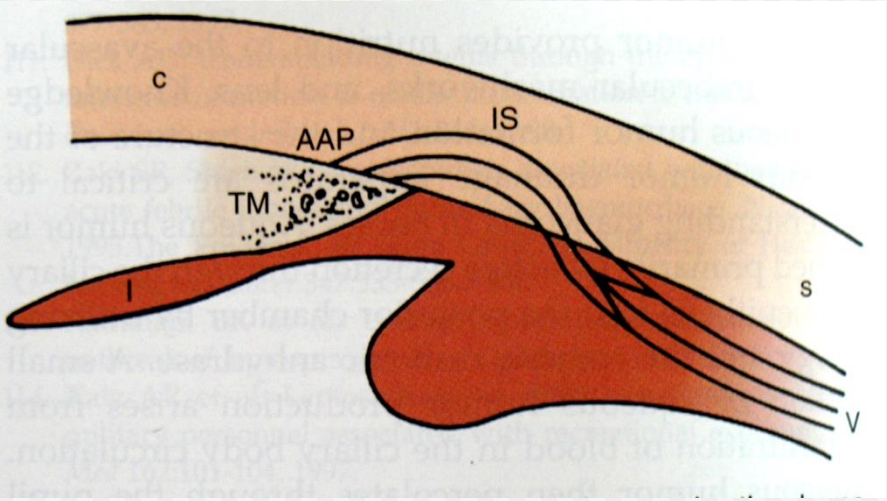


Aqueous humor





Slatter,2001.



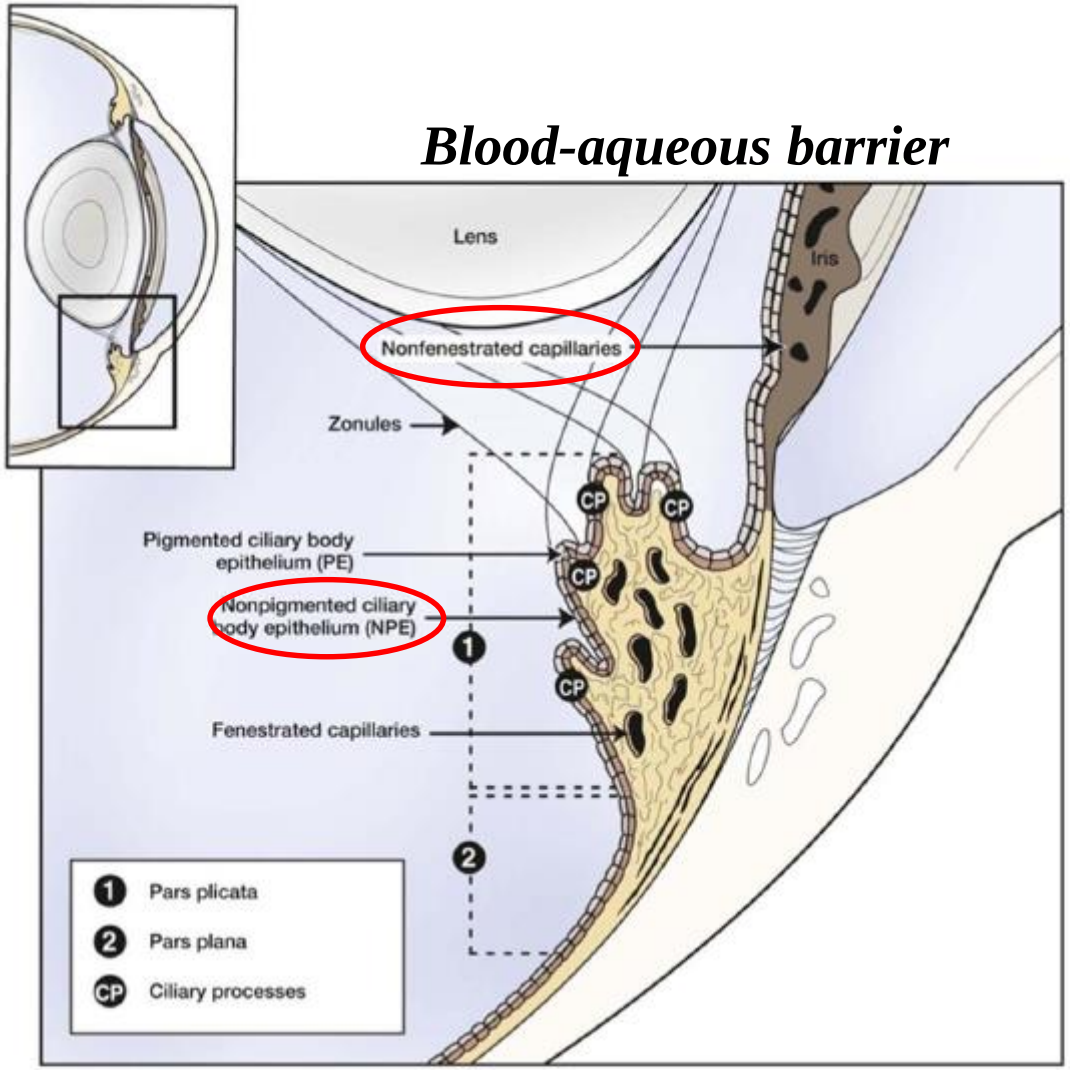
Gilger,2005.

Irido-corneal
outflow
conventional

Uveo-scleral
outflow
horse

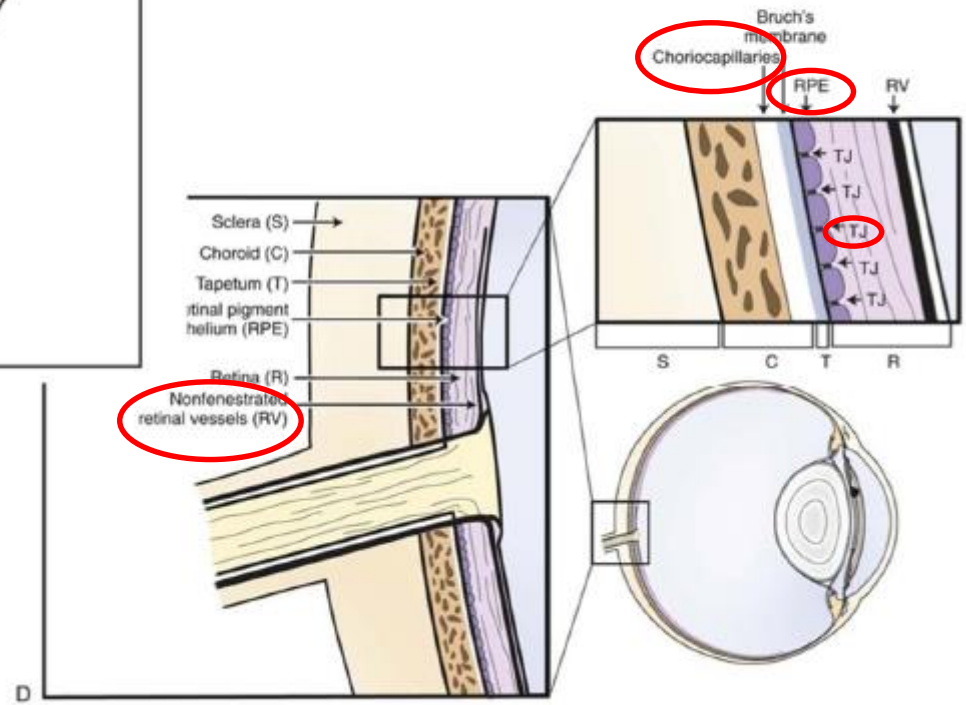
Blood-Eye Barrier

Blood-aqueous barrier



Blood-retina barrier

TJ-RPE, capillaries



2 layer epithel: PE+NPE

Tight junction-NPE

Abnormal aqueous humor-AH

Breakdown of the blood-aqueous barrier

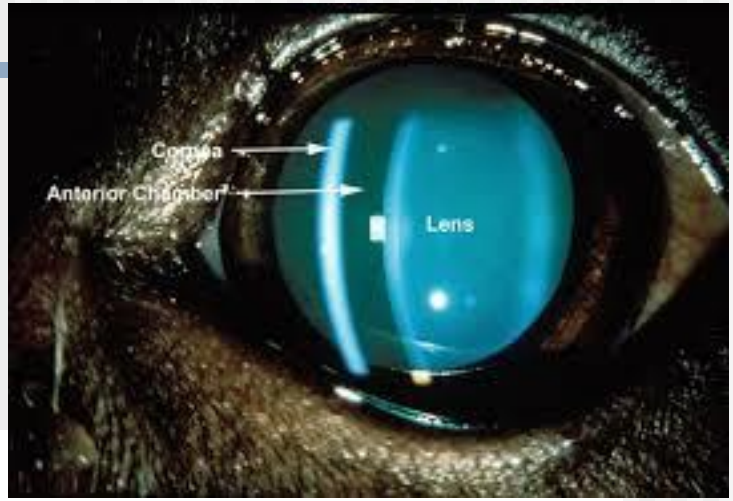
- Aqueous flare: increased protein in AH
- Fibrin in AH
- Hypopyon=white blood cells in AH
- Hyphema=blood in AH

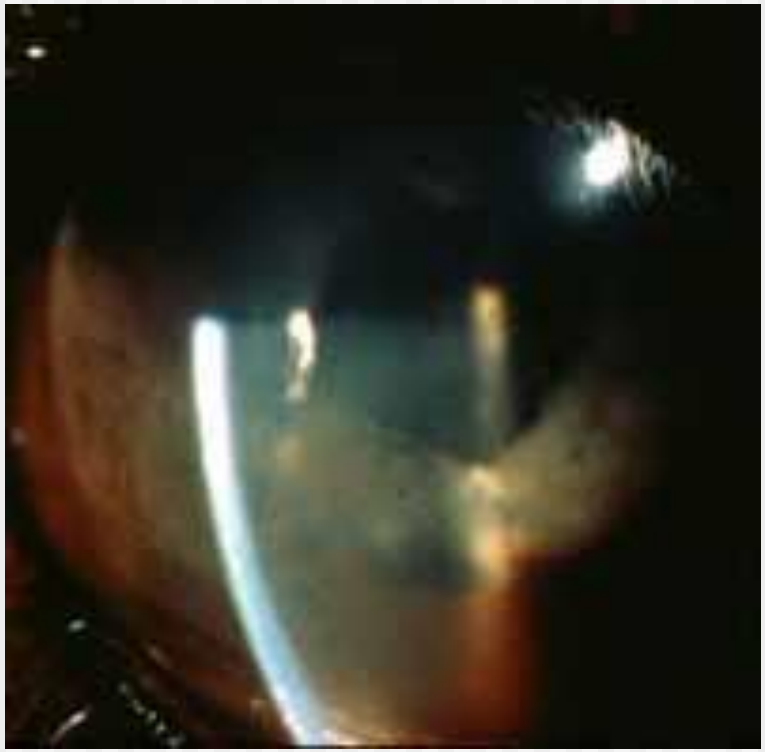
Signs of anterior UVEITIS!

Direct focal light

- Tyndall effect
  - Flare
  - Slit beam, 90°

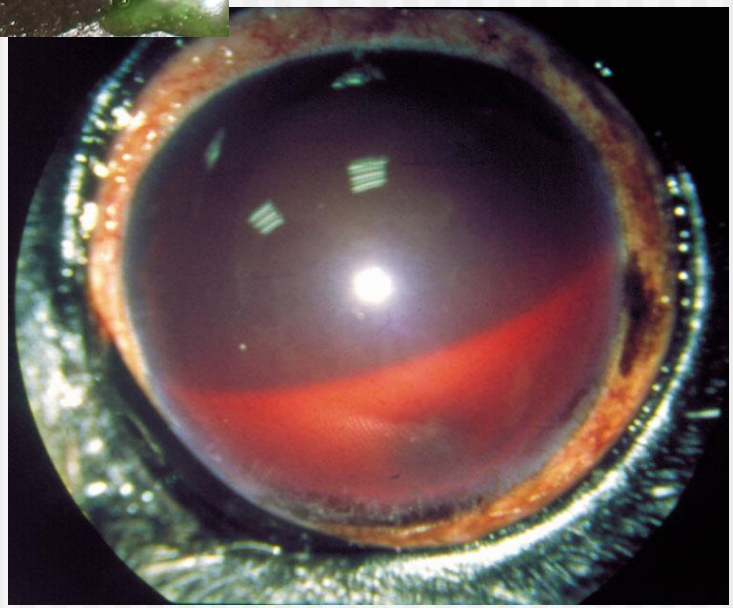
normal





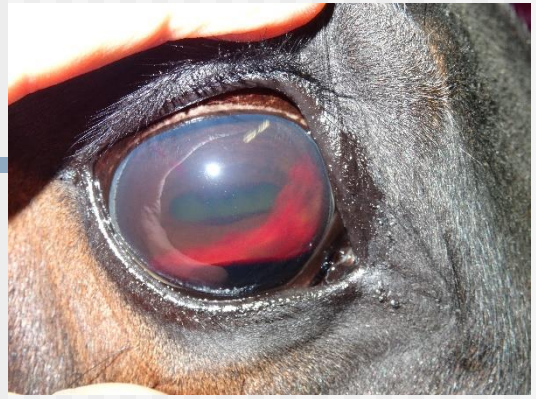
fibrin

hypopyon



hyphema

Hyphema



Blood in AC

Possible causes:

-trauma

-anterior uveitis

-bleeding disorder (thrombocytopenia)

-intraocular neoplasia

Potentially life-threatening condition!

Consider ocular ultrasonography!

Rule #1.

With unilateral or bilateral breakdown of the blood-aqueous barrier consider possible underlying

systemic disease,

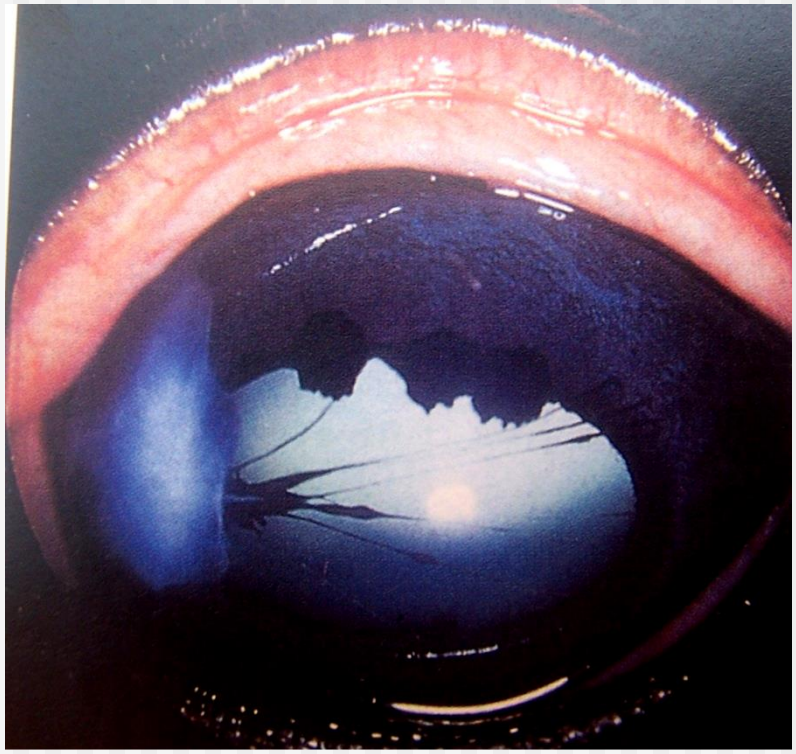
unless there is an obvious explanation such as corneal disease or ocular trauma!

Keratic precipitates (KPs)

- Accumulation of inflammatory cells on the inner surface of cornea
- Indication of ANTERIOR UVEITIS

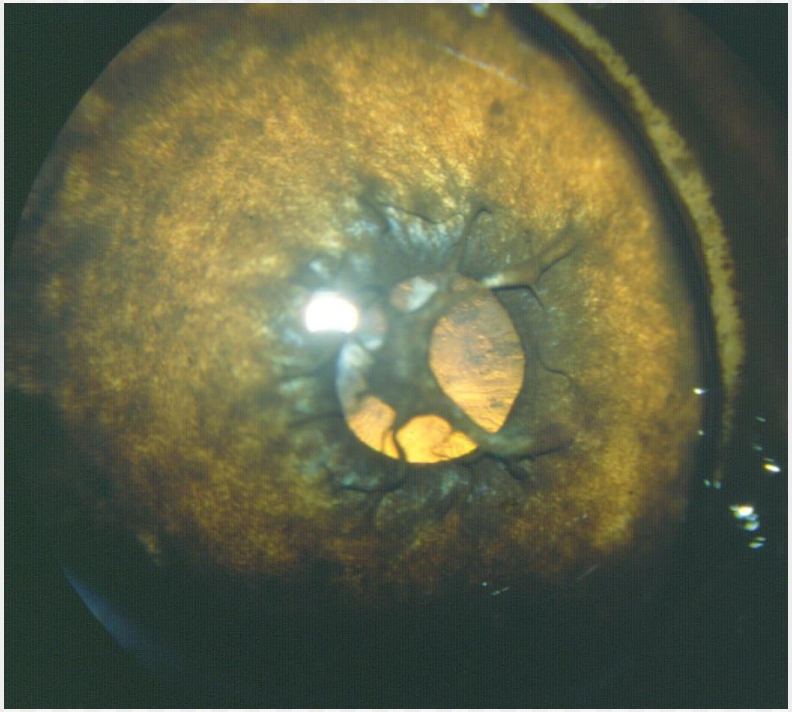
Congenital disorders

- Persistent pupillary membrane-PPM
  -remnants of the anterior tunica vasculosa lentis
  -usually regress over first 6-12 months of life

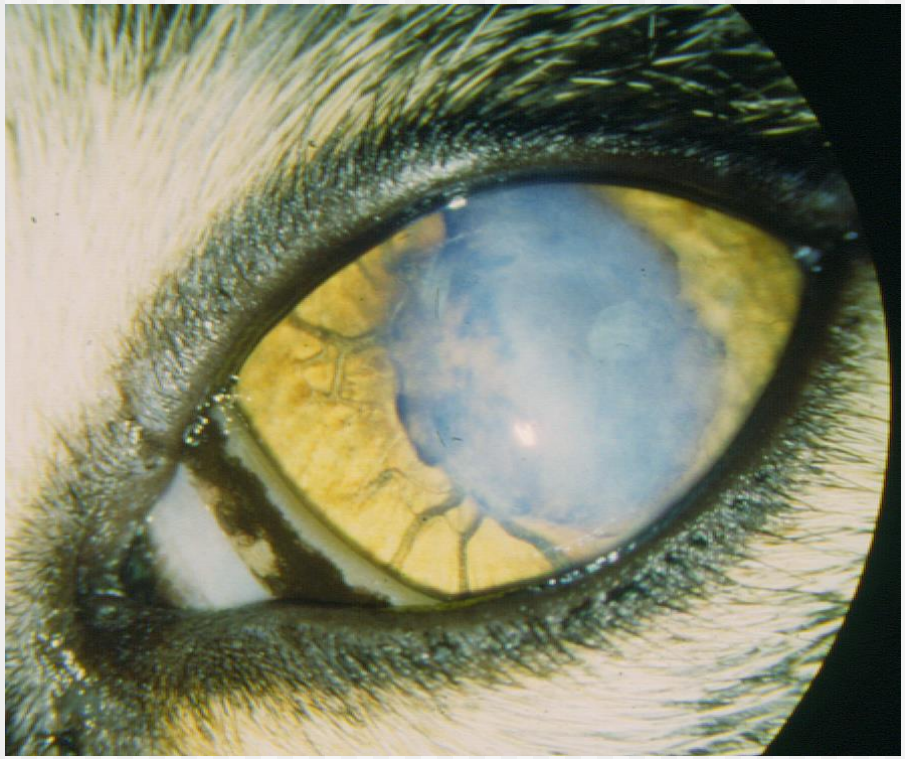


Barnett et al, 1995.

PPM

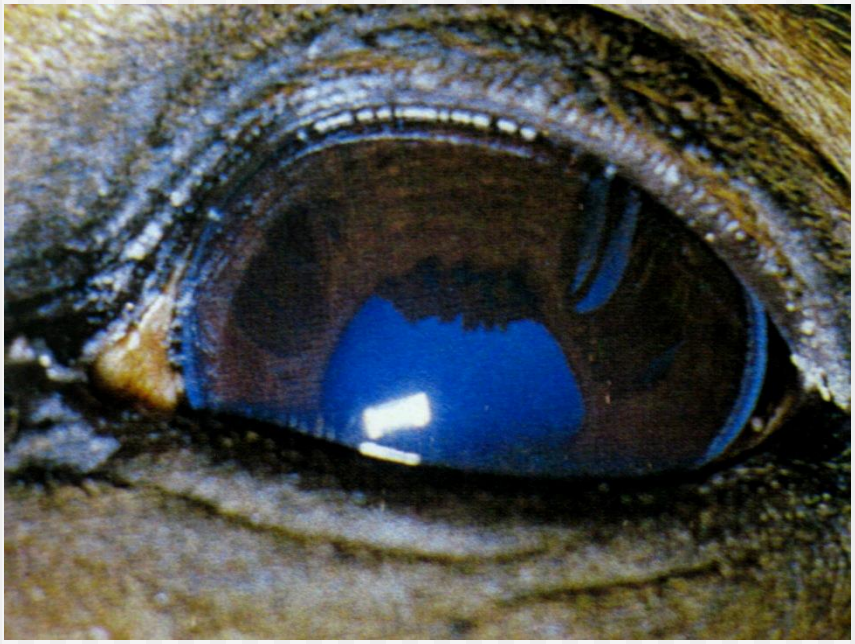


With corneal adhesion



Congenital disorders

- Iris coloboma/iris hypoplasia
  -congen. abscence of tissue, color dilute breeds
  -inferior position(6 o'clock) is typical, often with other ocular abnormalities



Congenital disorders

- Iris cysts
  - -usually attached to granula iridica:transilluminated
    ↔tumor (ultrasound)
  - -may be free floating
  - -rarely cause problems (laser-ablation)

Congenital disorders

- Anterior segment dysgenesis/aniridia (rocky mountain horses)

- Policoria, acoria, excentric pupil

Uveitis, terminology

- ***Anterior uveitis***= iridocyclitis
  (inflammation of the iris and ciliary body)

- ***Posterior uveitis***= chorioiditis
  (inflammation of the chorioid, retina often affected as well=chorioretinitis)

- **Panuveitis**= anterior+posterior uveitis

Uveitis Causes	Type	Existence
idiopathic	∗fibrinous	•acute
autoimmun	∗suppurative	•chronic
with infect. syst. disease (Strepto. Bacteremia)	∗haemorrhagic	•recurrent
with noninfect. syst. disease (endotoxemia)	∗granulomatous	
trauma		
2.reflex uveitis(corneal ulcer)		
toxic		
lens induced (phacoclastic/phacolytic)		
uveodermatological (immun.med.)		
ERU		

Uveitis – Clinical findings

Acute:

- blepharospasm, epiphora, photophobia
- conjunctival hyperemia
- aqueous flare; keratic prec. (KPs)
- **miosis**
- decreased intraocular pressure (IOP↓)
- corneal edema, ciliary injection
- swollen, dark infiltrated iris
- hyalitis, chorioiditis

Acute uveitis

Uveitis – Clinical findings II.

Acute→ chronic/complications:

- Corneal endothelial degeneration/dystrophy
- corneal vascularization/precipitates
- lens luxation/subluxation
- vitreal opacities (hyalitis)
- focal chorioretinitis, retinal detachment


SZIE-ÁOTK Nagyállat Klinika
2006-04-25 8805
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FR:8
G: 79%
Prs:2
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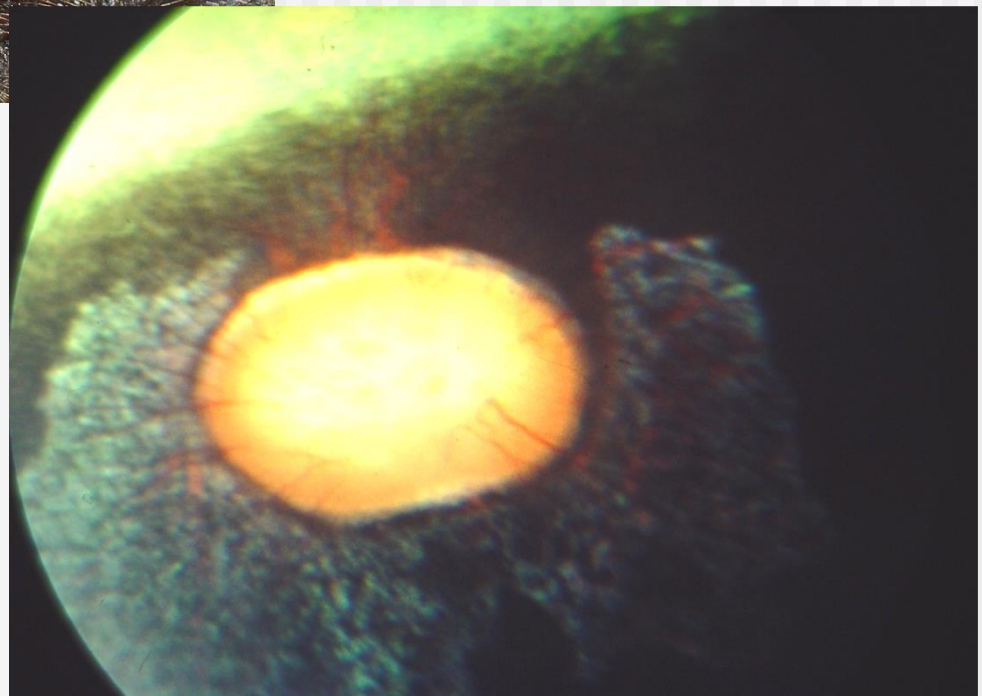
B-KMedical



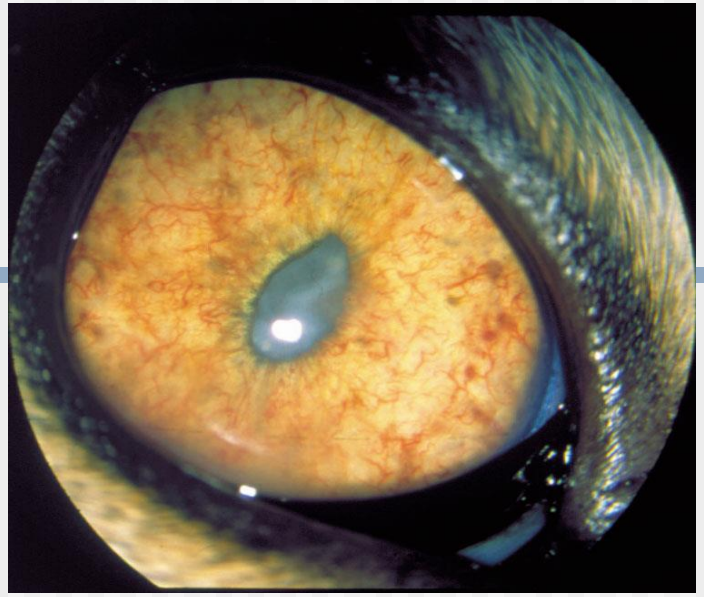
Uveitis – Clinical findings III.

Chronic:

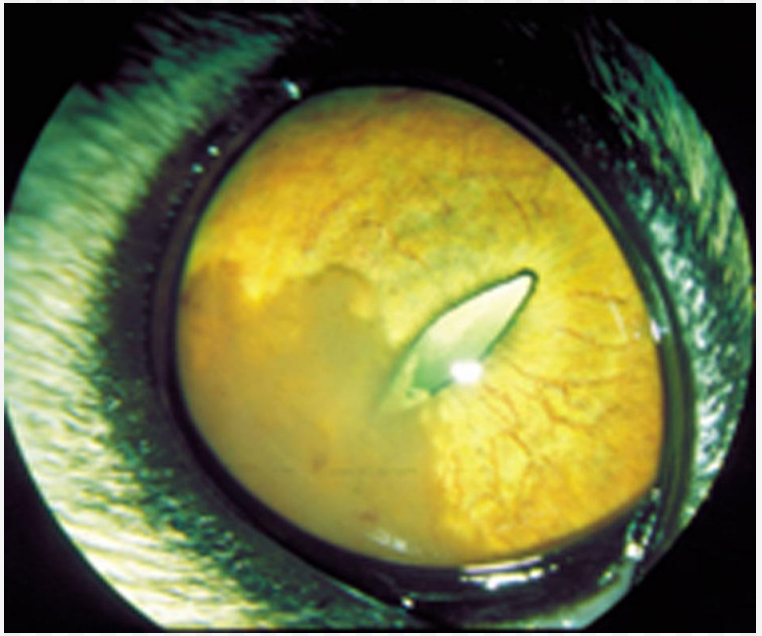
- posterior synechia
- fibropupillary membrane, dyscoria
- occlusion of pupil, iris bombe
- keratic precipitates
- iris hyperpigmentation/neovascularization
- catract
- glaucoma
- hyalitis, retina atrophia/ablatio

Endstage: phthisis bulbi

Chronic uveitis



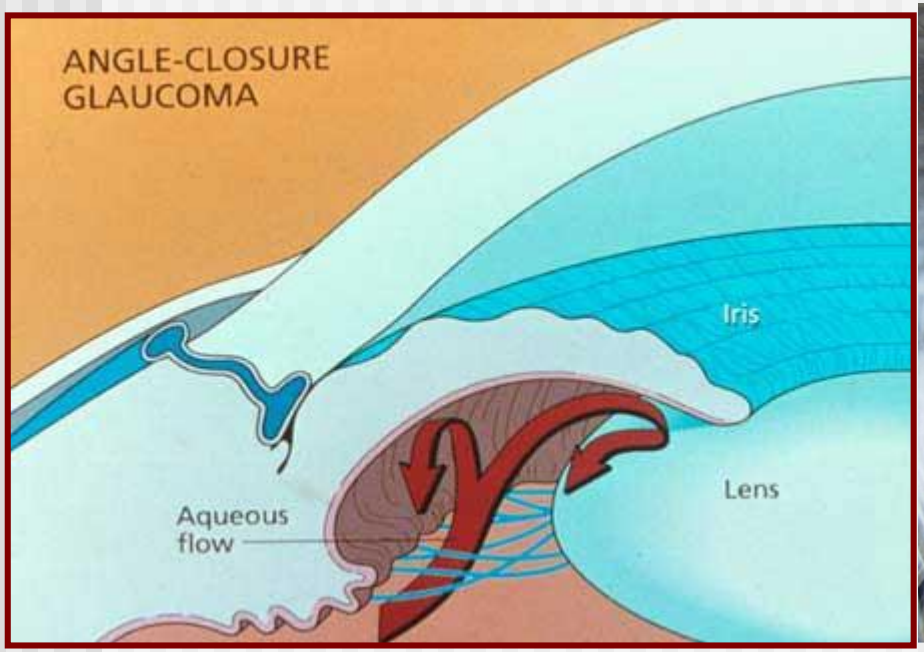
Cat uveitis+cataract



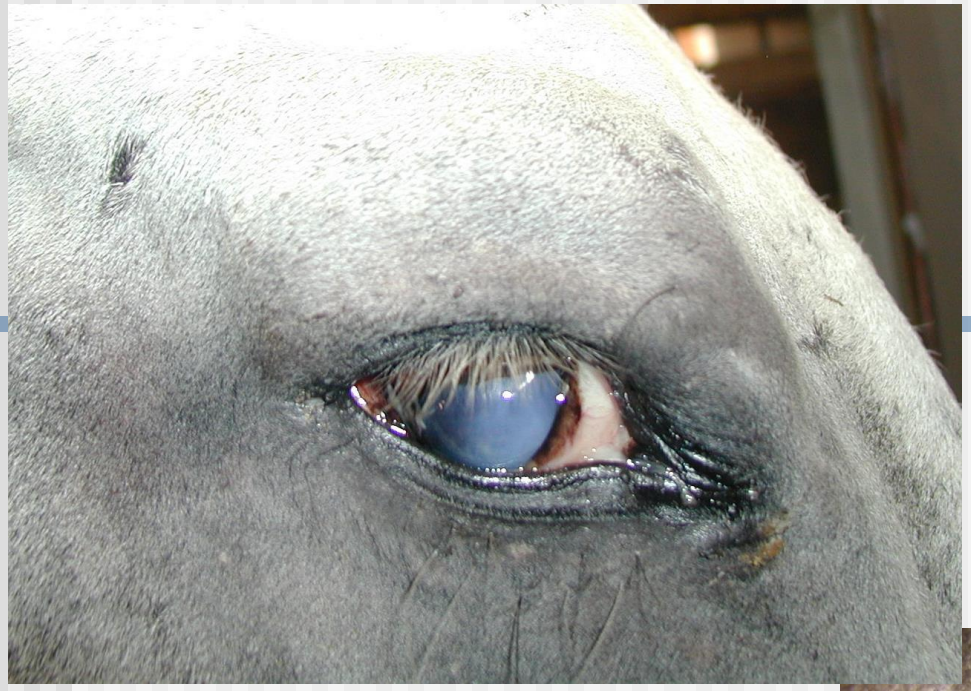
Uveitis-FIP

Uveitis+iris bombae

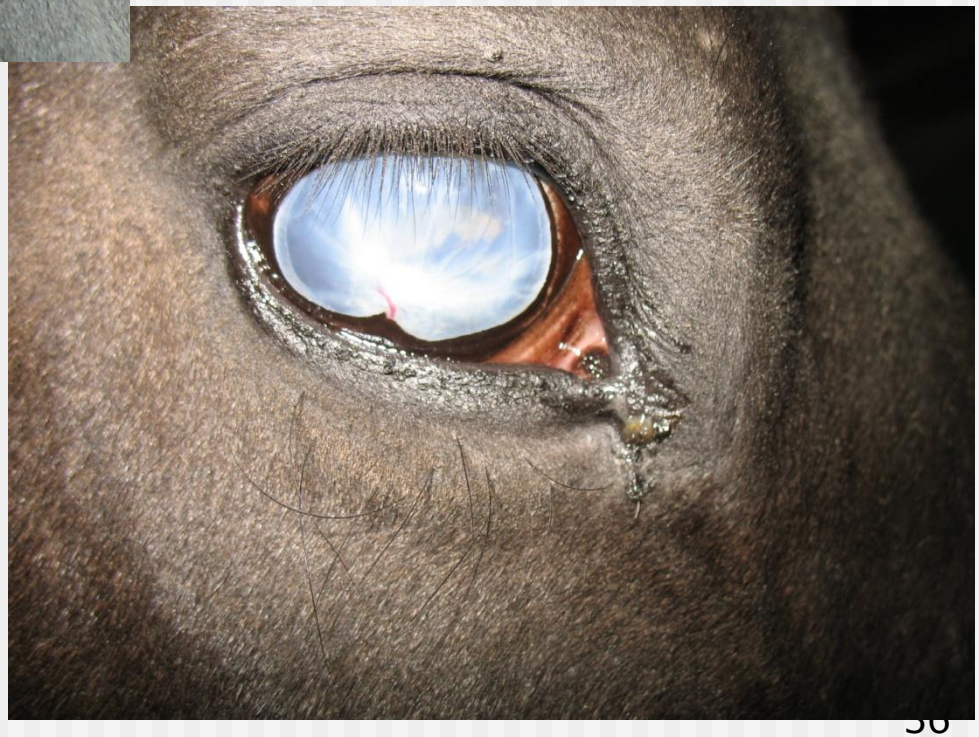
Iris bombe



owl



Phthisis bulbi



Rule # 2.

If the IOP is normal or ↑ in an eye with clinical signs of anterior uveitis,
you have to suspect the presence of **glaucoma**!

Rule # 3.

Every red eye (with or without uveitis) needs to be stained with FLUORESCEIN!

Treatment of uveitis (1.)

Aims:

- Elimination of the cause, if possible
  (treat syst. disease)
- Preserve vision
- Control discomfort and active inflammation
- Minimize permanent changes
- Client education:
  -clinical signs to look for
  -re-initiation of treatment

TREATMENT OF UVEITIS. I.

LOOK FOR SYSTEMIC CAUSE:

- History
- Systemic examination
- Bloodwork
- Urinalysis, imaging…
- Aqueous paracentesis

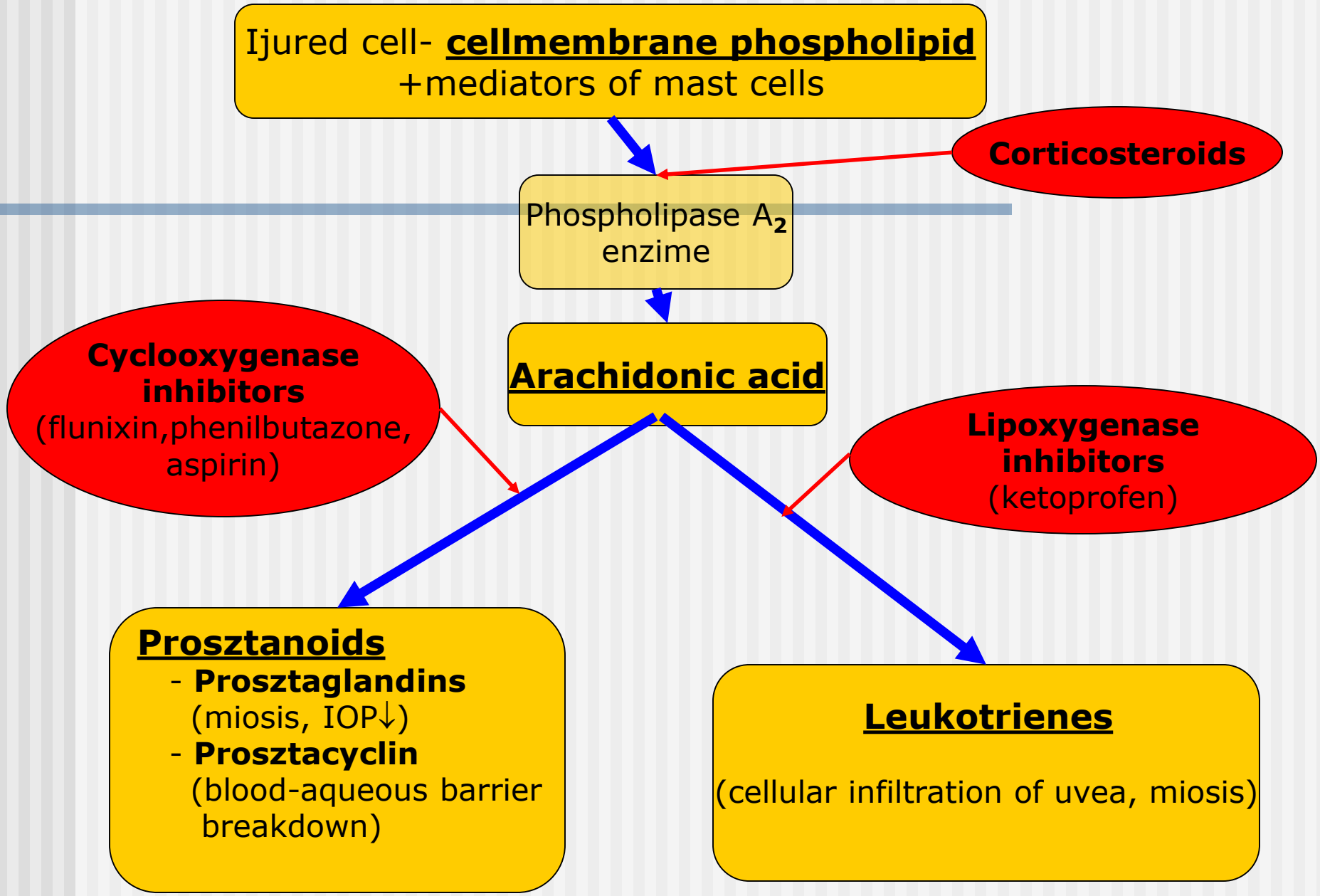
Treatment of uveitis (2.)

- Topical antiinflammatories:

-Corticosteroids 1-6x daily,
depending on severity
-Make sure that cornea is fluorescein negativ!
-Prednisolone acetate 1%
-Dexametasone 0,1%
-Triamcinolon
(subconjunctival injection)

Rule # 4.

- It is contraindicated to apply topical **corticosteroids** in an eye with corneal ulcer!


Ijured cell- **cellmembrane phospholipid**
+mediators of mast cells
Corticosteroids
Phospholipase A_2
enzime
Cyclooxygenase inhibitors
(flunixin,phenilbutazone, aspirin)
Arachidonic acid
Lipoxygenase inhibitors
(ketoprofen)
Prosztanoids
- **Prosztaglandins**
(miosis, IOP↓)
- **Prosztacyclin**
(blood-aqueous barrier breakdown)
Leukotrienes
(cellular infiltration of uvea, miosis)

Treatment of uveitis (3.)

- Topical antiinflammatories
  - non-steroidals 1-6x daily
  - can be used with fluorescein stain uptake, but be careful!
  - Diclofenac 0,1%, bromfenac
  - Flurbiprofen 0,3%
- Systemic anti-inflammatories
  - non-steroidals (NSAIDs):
  - flunixin meglumine 1,1mg/kg 2x daily
  - phenylbutazone 1-4 g/horse/day
  - aspirin/ketoprofen po.
  - Monitor for GI ulcers!

Treatment of uveitis (4.)

- Mydritics and cycloplegics
  - -Atropin 1-2% (dilate pupil)
  - -In severe cases up to q 4hours, in mild cases 1x daily
  - -Potential complication: Colic
  - -Monitor gut motility!

Effects of atropine

- Mydriatic=dilates pupil
  - -minimize adhesions (synechiae)
  - -may not be able to break down synechiae in chronic cases
- Cycloplegic=relaxes ciliary muscle
  - -relieve ciliary muscle spasm
  - -pain relief
- Stabilizes blood-aqueous barrier

Rule # 5.

- The effectiveness of **atropine** to keep the pupil dilated gives us information about the severity of uveitis.

- The longer and better the pupil stays dilated, the milder the uveitis.

Rule # 5.

- In a normal eye, one dose of **atropine** can keep the pupil dilated for up to 1-4 weeks (only for therapeutic purpose).
- Eyes with a brown iris stay longer dilated than eyes with blue iris.

atropine poisoning

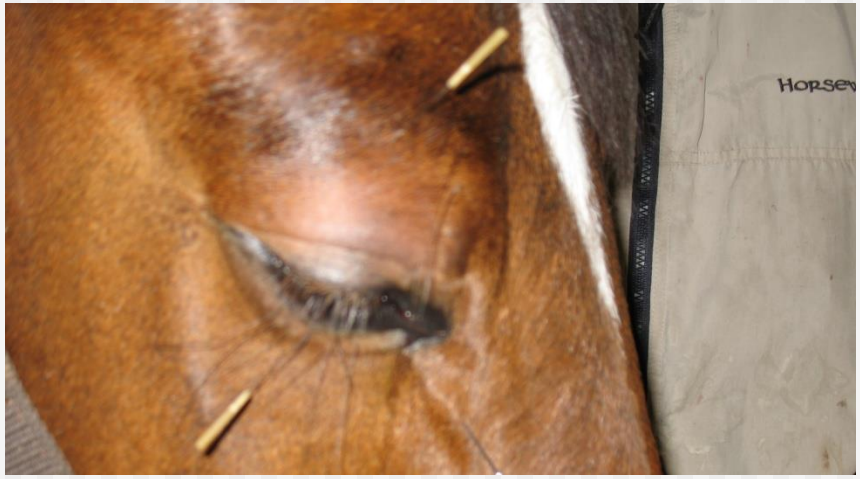
Treatment of uveitis (5.)

As the clinical signs improve, the frequency of drug application can slowly be decreased.

Tx for 14 days, than taper off for 10 days

Treatment of uveitis (6.)

Alternative methods: acupuncture
Eye hood+box rest



Endophthalmitis

- Severe uveitis with involvement of aqueous humor and vitreous, but not sclera
- Panophthalmitis: severe inflammation within sclera & orbital tissues
- Clinical signs: see uveitis, but more severe
- Treatment: see uveitis, +**systemic antibiotics**

Endophthalmitis (2.)

- Consider culturing aqueous humor and vitreous aspirate!

- Intravitreal injections (last chance before enucleation)
  - 200 μg gentamicin: Gr –
  - 2,2 μg cefazolin: Gr +
  - 0,1 mg miconazole/fluconazole: fungal

  - Should be done by specialist!

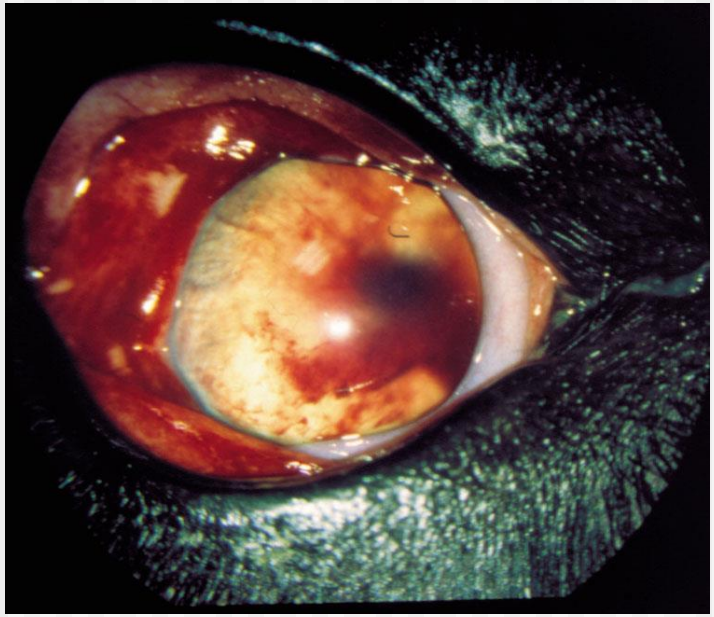
Trauma I.

- Penetrating/blunt
- Check for periorbital skull fractures
- Penetrating trauma: see corneal perforation
  -iris prolapse

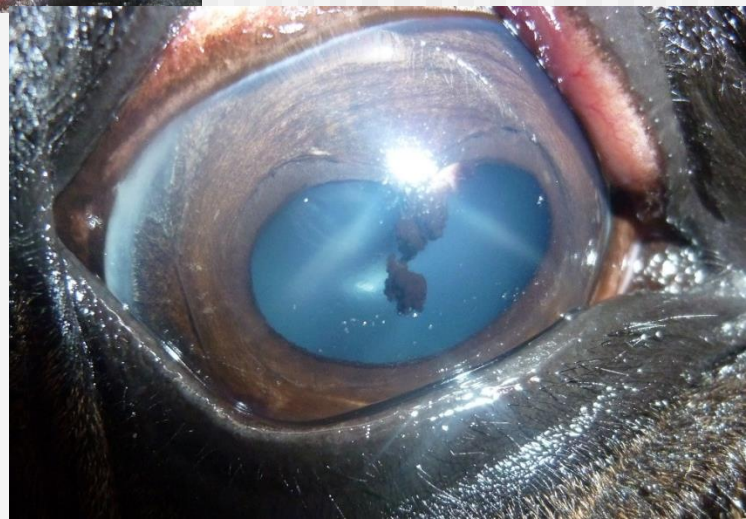
- Careful clinical examination
- Consider ultrasonography if hyphema prevents examination
- Clinical signs: see uveitis (hyphema, miosis)

Trauma II.

- Prognosis is guarded with intraocular hemorrhage
- Treatment:
  - -≈ uveitis
  - -surgery for penetrating injury



Traumatic uveitis

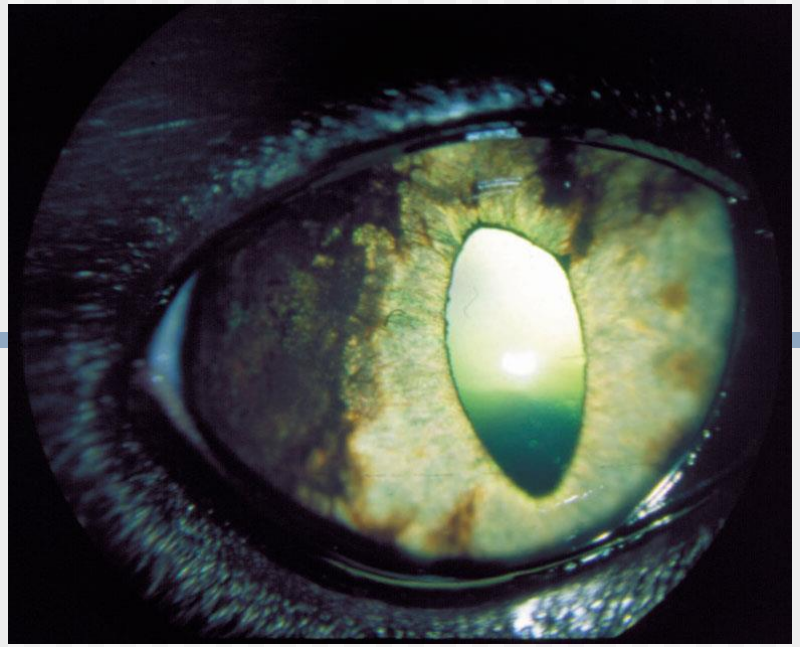


poor prognosis
consider enucleation

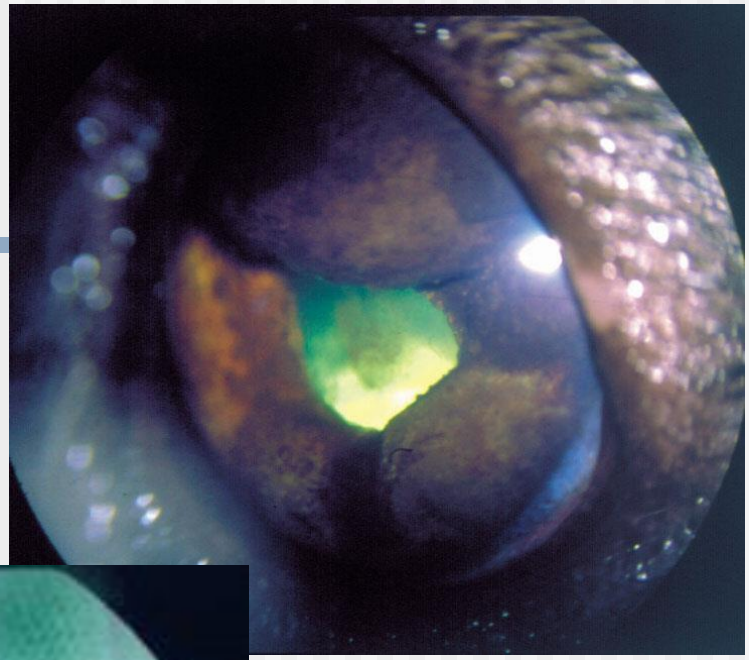
Other diseases of the anterior uvea
Iris neoplasia

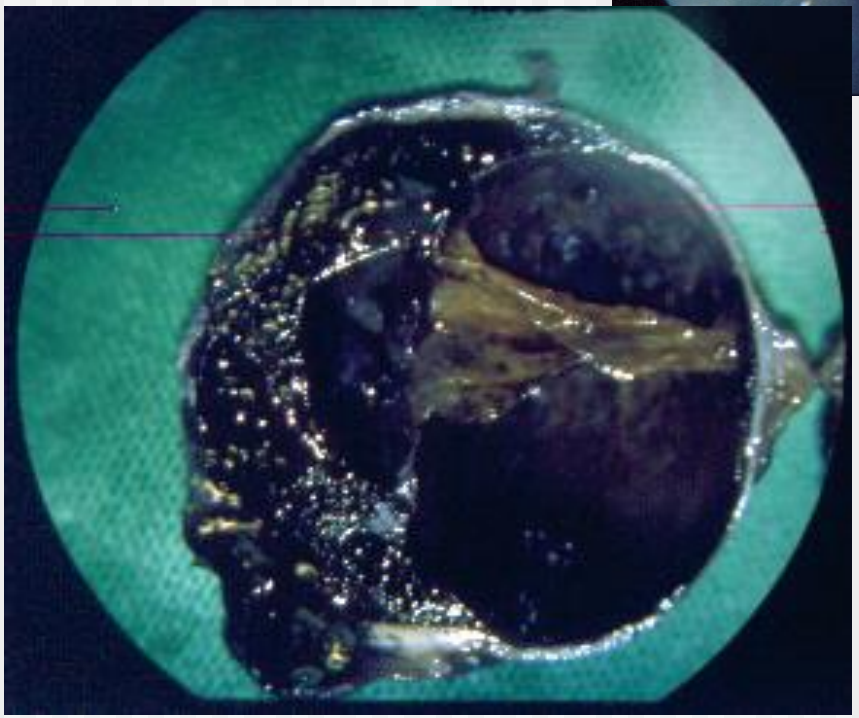
- Rare
- Melanoma most common, esp. grey horses

- Clinical signs:
  - Dark mass in AC
  - Distorsion of pupil
- Treatment:
  - enucleation or sector iridectomy-laser
- Other rare tumors: medulloepithelioma, lymphoma



melanoma





Melanoma+ glaucoma

http://creatiwittyblog.com/2012/08/creativity-of-nature- most-unique-animal-eyes-photography/

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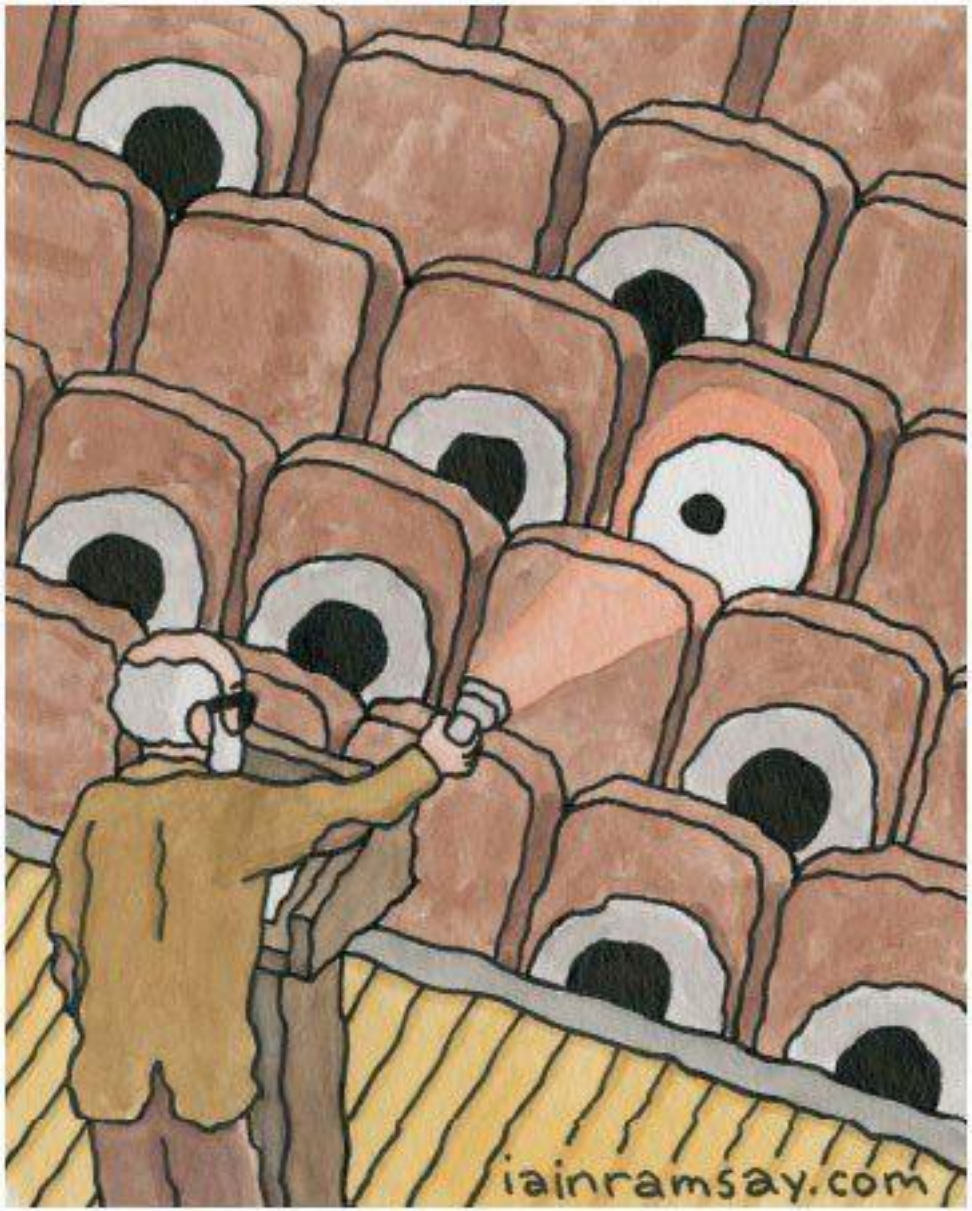
www.loklinika.hu
(pw: student)

Thank you for your attention!



Often during his lectures Professor Rey would shine a light on his pupils to see if they were responsive.