Diseases of the Vitreous, Retina and Optic Nerve

University of Florida
Normal dog fundic appearance

- tapetum- reflective area of the superior fundus
- optic disk
- retinal vessels
- nontapetum
Tapetal fundus color

- dependent on age, breed and coat color
- blue until 6 to 10 wks
4, 8, 13, 18 wks
Tapetal fundus

- cellular layer of the choroid
- variable boundary with the nontapetum
- area centralis (cone rich)
  - visual streak: RGCs
- no melanin in tapetal RPE
- nontapetal color depends on the degree of RPE and iris pigmentation
- choroidal vessels (orange) may be visible
Retinal vasculature

- usually 3 or 4 major venules
  - form a circle (not always complete) on the optic disk surface
- up to 20 arterioles
  - may be tortuous
Optic disk

- variable amount of myelin
- pale pink in color
- physiological pit
- ± pigmented ring
Normal fundic variations

Cat

- circular optic disk lacks myelin
- 3 major venules leave the disk edge with 3 major arterioles
- Tapetum is usually yellow or green in color
Normal fundic variations

horse

- 30-60 small blood vessels extend a short distance from the disk edge
- oval optic disk
- Stars of Winslow
- fibrous tapetum
Vitreal opacities

- Vitreal degeneration from inflammation, trauma, senile changes may predispose to retinal detachment
- leukocytes
- hemorrhage
  - resolution over months
- asteroid hyalosis
  - calcium-lipid complexes
Choroidal coloboma

Equatorial staphyloma: Australian Shepherds
Progressive Retinal Atrophy (PRA) in the dog

- Inherited retinal photoreceptor dysplasia or degeneration
- **PRA**: progressive loss of night vision followed by loss of day vision
- Rods affected first, then cones.
PRA

- Numerous breeds affected
- Bilateral
- Variable age of onset
  - Breed specific age ranges
  - Collies, Labs and Setters blind by 1 yr
  - Cockers blind by 2-3 yrs
  - Poodles affected at 5-7 yrs
- Usually inherited as simple autosomal recessive

Cataracts from PRA
PRA- clinical signs

- night blindness to total blindness
- reduced to absent PLRs
- tapetal hyper-reflectivity
- retinal vessel attenuation
- optic nerve atrophy, + cataracts
Canine PRA

- diagnosis
  - behavior, maze test, ophthalmoscopy, ERG

- no treatment exists at present
  - gene mapping studies
  - future blood screening
  - Night vision goggles might help!!
Feline PRA

- 2 types in Abyssinians
  - Rod-cone dysplasia:
    signs at 12 wks
    - Blind by 1 yr
    - Autosomal dominant
  - Rod-cone degeneration:
    - 1.5-2 yrs
    - Autosomal recessive
Retinal detachment

Causes
- traumatic- “knocks it off”
- vitreal traction bands- “pulls it off”
- serous effusions- “pushes it off”
- retinal/choroidal/orbital neoplasia
- retinal degeneration
Retinal detachment

- types
  - rhegmatogenous (most common)
    - hole in the retina through which the vitreous can move
  - non-rhegmatogenous
    - no retinal holes
- Steroid Responsive RD
  - Large breed dogs
  - Exudative RD
  - Systemic steroid responsive
Retinal holes allow vitreal invasion under the retina.
Chorioretinitis

- Dogs: distemper, fungi
- Cats: FIP, FeLV, Toxo, fungi
- Active: borders out of focus
- Inactive: sharp borders
Hemorrhagic retinopathy

- anemia - variety of causes
  - multifocal intra & preretinal hemorrhages
- hypertension
- Coagulopathies/hyperviscosity
- systemic infections
Hypertensive retinopathy (HR)

- **Causes**
  - **primary**: comprises <5% of all cases
  - **secondary**: renal failure, hyperthyroidism, high-salt diet, atherosclerosis
HR-clinical signs and therapy

- often presented for acute blindness
- dilated, poorly to unresponsive pupils
- retinal detachment with retinal and vitreal hemorrhages
- heart murmur: hypertrophic cardiomyopathy

Therapy:
- identify and treat underlying cause(s): very important
- systemic therapy
  - calcium channel blockers-primary therapy
  - beta blockers, ACE inhibitors-maybe
  - prednisone ± furosemide???
Baytril

- Dose related retinal drug toxicity (no more than 5 mg/kg/day!!!)
Retinal degeneration

Taurine deficiency

- cats fed dog food or “homemade” diets
- chronic deficiency can lead to severe retinal degeneration & irreversible blindness
- daily taurine requirement is 10 mg/kg
Collie Eye Anomaly (CEA)

- congenital-autosomal recessive
- OU, asymmetric anomaly of the choroid, ± optic nerve
- ~85% of the Collies affected
Clinical signs of CEA

- choroidal hypoplasia
- posterior pole colobomas
- retinal detachment
- retinal or vitreal hemorrhages
- blindness
Collie Eye optic nerve coloboma
Retinal dysplasia

- congenital
- may be inherited or acquired
- “jumbling” of the retinal layers with rosette formation
- usually nonprogressive
- confused with retinal folds
- confused with retinal degeneration
Clinical signs of RD

- retinal folds
- focal retinal degeneration
- if severe: retinal detachment, microphthalmia, cataract, nystagmus, blindness
Retinal Dysplasia (RD)

- Types
  - localized RD
  - vitreo-retinal dysplasia
  - RD and skeletal dysplasia
    - Labrador retriever
Optic nerve

- congenital diseases
  - colobomas
  - optic nerve hypoplasia/aplasia
    - decreased optic disk size and # of ganglion cells
    - normal ERG but often blind if bilateral
    - Toy and Miniature Poodles
Optic neuritis

- **blind**: pupils fixed & dilated
- disk hyperemic & elevated with hemorrhages on surface
- disk may appear normal if retrobulbar nerve is affected
Optic neuritis-causes

- viral infections
- systemic mycosis
- neoplasia
- CNS reticulosis or GME
- trauma
- idiopathic
Optic nerve atrophy

- often secondary to PRA, orbital disease, or glaucoma
- disk loses myelin and appears grey-white in color
- Normal cat ONH looks atrophic!!??
- blindness
Orbital lymphoma
Feline Ophthalmomyiasis
Sudden acquired retinal degeneration (SARD)

- **sudden** vision loss
- initial absence of ophthalmoscopic lesions
  - later see fundic changes consistent with retinal degeneration
- extinguished ERG is diagnostic
SARD

- middle aged, mildly obese female dogs are predisposed
- ± PU/PD
  - poodles, dachshunds, mixed breeds
- unknown etiology
  - toxic glutamate degeneration or metabolic disorder
  - Cushing’s type disease??
Nutritional degenerations

- taurine deficiency in cats
- vitamin E deficiency in dogs
  - retinal appearance of central PRA
  - night blind with early loss of ERG
- vitamin A deficiency