Colors and Eye Examination Techniques in Horses

Equine Ophthalmology Service
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There are really only 3 ophthalmic diseases!!

1. Corneal ulcers
2. Uveitis
3. Everything else!!
Obvious Things

- Just stand back and look at the symmetry
  - Lashes
  - Discomfort and squinting
  - Tearing
  - Colors
  - Pupil
  - Clarity of cornea and lens
  - The normal eye is “shiny”
  - Anatomy: anterior to posterior
Lashes pointing down can be an early sign of eye pain

Lashes
(ponies can look through their lashes)
Nuclear Sclerosis
Ocular Discomfort Level
Corneal “Colors”

- White cornea: abscess or necrosis
- Blue cornea: edema
- Red cornea: vessels
  - Superficial (tree-like) and deep vessels (brush).
  - Note intensity of the red
Dark is thin

Shiny is thin
Vascular Patterns

- Redness
  - Very Red
  - Pale
- Symmetry
  - Asymmetry
Asymmetrical vascularization

Callie
- Edema
  - Endothelial
  - Uveitis
- Subepithelial scar
- Corneal abrasion/ulcer
- Subepithelial infiltrate
  - Immune mediated
  - Fungal
Epithelial edema  Sunshine
Jupiter: DSA
Chronic Recurrent Deep Immune Mediated Keratitis

- Green fluid filled lacunae form in the stroma
May  SEK: fungi
Pupil Size

- **Dilated**
  - Glaucoma
  - Retinal Disease
  - Optic Nerve Disease

- **Miotic**
  - Uveitis
- Deep corneal scrapings at the edge of the ulcer to detect bacteria and fungal hyphae.

- Superficial swabbing cannot be expected to yield microbes in a high percentage of cases.

- Scrape with handle end of scalpel blade.
Fluorescein: Every eye exhibiting signs of pain should be stained!!

- Detects a corneal epithelial defect or “ulcer”.
- Cobalt blue filter aids detection of abrasions.
Use fluorescein full strength and dilute rose bengal.
Ulcers are best defined with fluorescein.
Predescemetocele
Cobalt Blue Filters

- [www.slitlamp.com](http://www.slitlamp.com): bluminator
Corneal abrasion: partial epithelial cell layer loss
- Erosion/abrasions are “ulcers” with partial epithelial cell loss.
- Weak fluorescein staining.
- Diluting the fluorescein will make it difficult to identify erosions/abrasions.
Rose bengal

- Tear film integrity

- Mucin layer blocks RB
Stain Use/Order

- Fluorescein stain first. Identifies ulcers if +.
- Rose bengal stain second.
  - Rose bengal retention indicates tear film instability.
    - Mucin tear layer blocks RB staining
    - At risk of fungal colonization/invasion
    - KCS
    - Viral keratitis
    - Edema
    - Scar tissue
  - Rose bengal stains exposed epithelial cells, mucous and stroma
    (slow absorption)
    - Not a good prognosis if FL+ and RB+
- Tear Film Breakup Time in RB+ eyes
- **Tear film breakup time (TFBUT)**
  In KCS the tear film is unstable, and “breaks” up faster.

- A strip of fluorescein is applied in the lower eyelid fornix and then removed.

- The lid is blinked and held open until the appearance of a break or dark spot.

- Normal is $21.8 \pm 10.0$ seconds.

- **TFBUT of 10 seconds or less is consistent with KCS.**
Schirmer Tear Test: 14-34 mm wetting /minute
“Aqueous flare" is a sign of uveitis.

It is protein from leaky iris blood vessels.
Heine HSL 150

Slitlamps and flare
3 mm diameter stromal abscess

Endothelium

Epithelium
- Very active region
  - cell division
  - metabolism
  - not just structural adhesion
  - anterior cell free zone
- Opacifies following ulceration and PKs
- Can mimic appearance of trace flare in AC
Oh Great! Another Problem!!

- Viral
- Fungal
- Immune Mediated Keratitis
- Post Ulceration
Subepithelial Keratomycosis: “Early Keratomycosis”

Cornea looks hazy:

Focal or generalized
Herpes Keratitis:
EHV-1, -2 and -5 in Germany, USA, Australia

Subepithelial abscesses
Chronic Superficial Immune Mediated Keratitis

- Insidious onset
- Usually unilateral
- Slight ocular discomfort
Chronic Superficial Immune Mediated Keratitis

- Prominent superficial vascularisation
- Epithelial oedema
- Lesions under upper lid
- Rarely under third eyelid
IOP

• 23.3 ± 6.9 mmHg (range in the horse is up to 37 mmHg!!)

• Manometry determined IOP = (1.38 X Tonopen IOP) + 2.3 mmHg
Head should be up when measuring IOP (87% increased when down)

Up: ~ 17.5 mmHg  
Down: ~25.7 mmHg
The Angle

Closed

Open

Stretched Angle

Closed
The lens: used for up close vision
- Cataracts are lens opacities. Most horses have them.
- nuclear sclerosis: aging change seen in older horses
- Lens position changes are a big problem in the horse

What about the pupil and cataracts?
The direct ophthalmoscope:
- lateral magnification: 7.9X
- axial magnification: 84X

Indirect ophthalmoscopy:
- 5.5 D lens: 3.86X lateral and 20.1X axial
- 14 D lens: 1.18X lateral and 1.86X axial
- 20 D lens: 0.79X and 0.84X lateral and axial respectively.

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- Examine the fundus with a bright light, indirect lens, and direct ophthalmoscope.
  - indirect technique first (low magnification)
  - direct technique last (high magnification)
- Mydriasis lasts 4-6 hours
- Do not use atropine for diagnostics!
- Prepurchase dilatation??
Dan Scott Assoc, retinal diagnostic light
Different ophthalmoscopes provide different degrees of magnification.
Ultrasonography