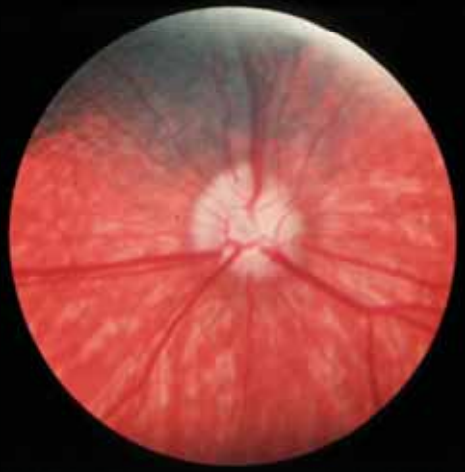
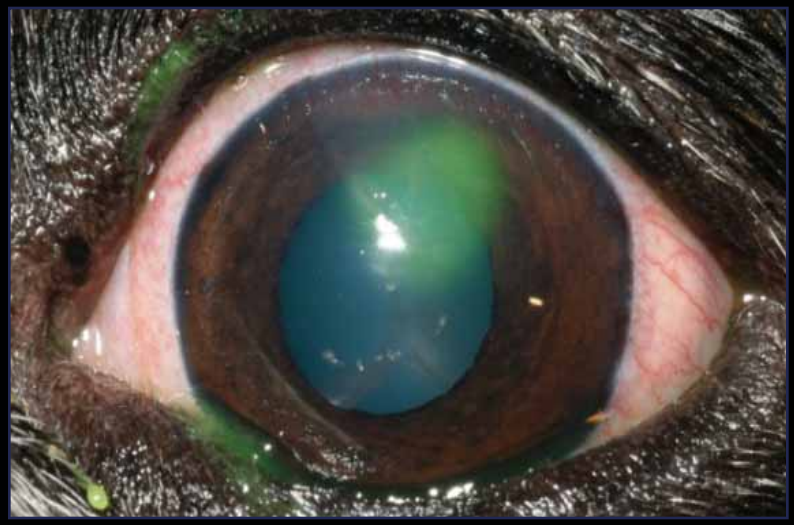
Look Into the Window to the Soul: Ophthalmic Exam Basics





Jacqueline W. Pearce, DVM, MS, DACVO

Lecture Outline

- History
- Neurophthalmic Exam
- Minimum Database
  - Schirmer Tear Test
  - Fluoroscein Stain
  - Tonometry
- Ophthalmic Exam
  - Anterior Segment
  - Posterior Segment

Diagnostic Approach to the Eye for Veterinarians

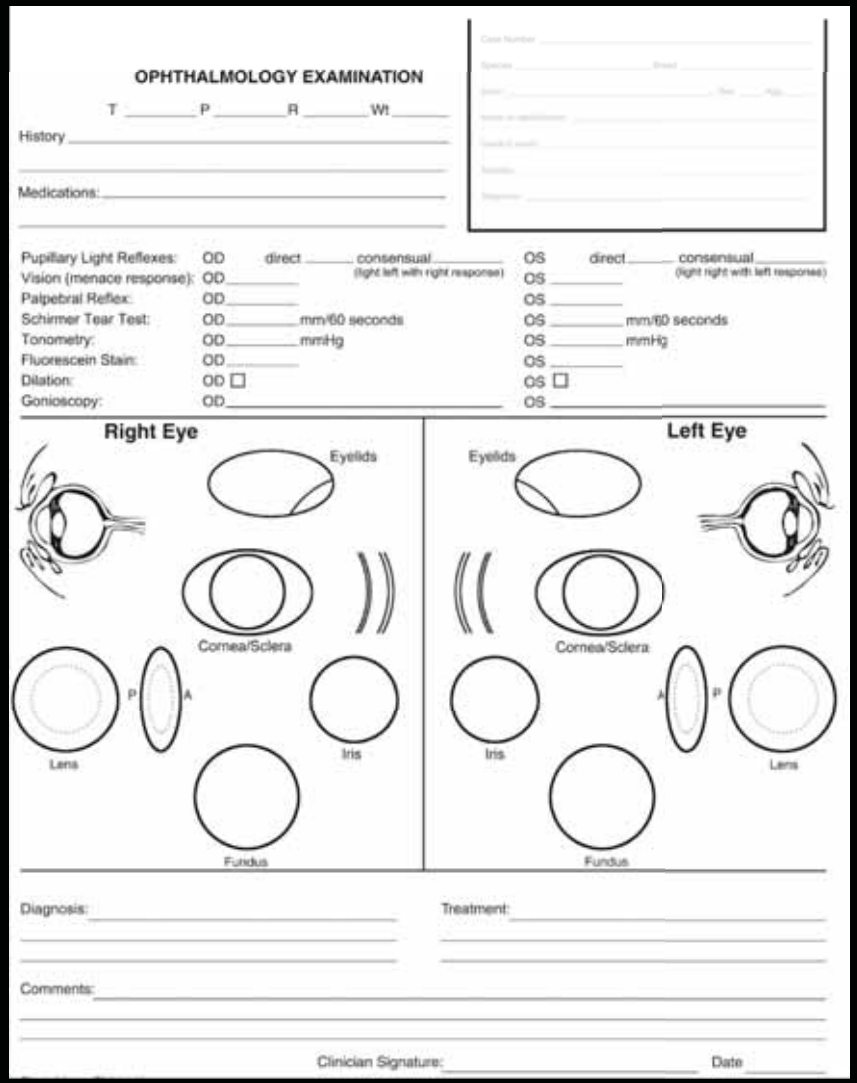
- Identify problems
- Minimum ophthalmic database
- Clinical diagnosis
- Differential diagnosis
- Diagnostic plan
- Treatment

Eye Exams: The Technicians Role

- History
  - Case
  - Medications
- Minimum ophthalmic database

Minimum Ophthalmic Database

- Neuroophthalmic assessment
- Schirmer tear test
- Tonometry
- Fluorescein stain



OPHTHALMOLOGY EXAMINATION

T _____ P _____ R _____ Wt _____

History _____

Medications: _____

Pupillary Light Reflexes:	OD	direct _____	consensual _____ (light left with right response)	OS	direct _____	consensual _____ (light right with left response)
Vision (menace response):	OD _____			OS _____		
Palpebral Reflex:	OD _____			OS _____		
Schirmer Tear Test:	OD _____ mm/60 seconds			OS _____ mm/60 seconds		
Tonometry:	OD _____ mmHg			OS _____ mmHg		
Fluorescein Stain:	OD _____			OS _____		
Dilation:	OD ☐			OS ☐		
Gonioscopy:	OD _____			OS _____		

Right Eye

Left Eye

Diagnosis: _____

Treatment: _____

Comments: _____

Clinician Signature: _____ Date _____

History: Questions to Ask

- What signs made you think eye problem?
  - Vision problem?
    - Lighting?
    - Different environments?
    - Onset and duration?
    - Relatives with ocular disease?

History: Questions to Ask

- What signs made you think eye problem?
  - Comfort problem?
    - Squinting or rubbing eye?
    - Red eye?
    - Discharge?
    - Progressive, static or improving?
    - Response to medication?

History: Questions to Ask

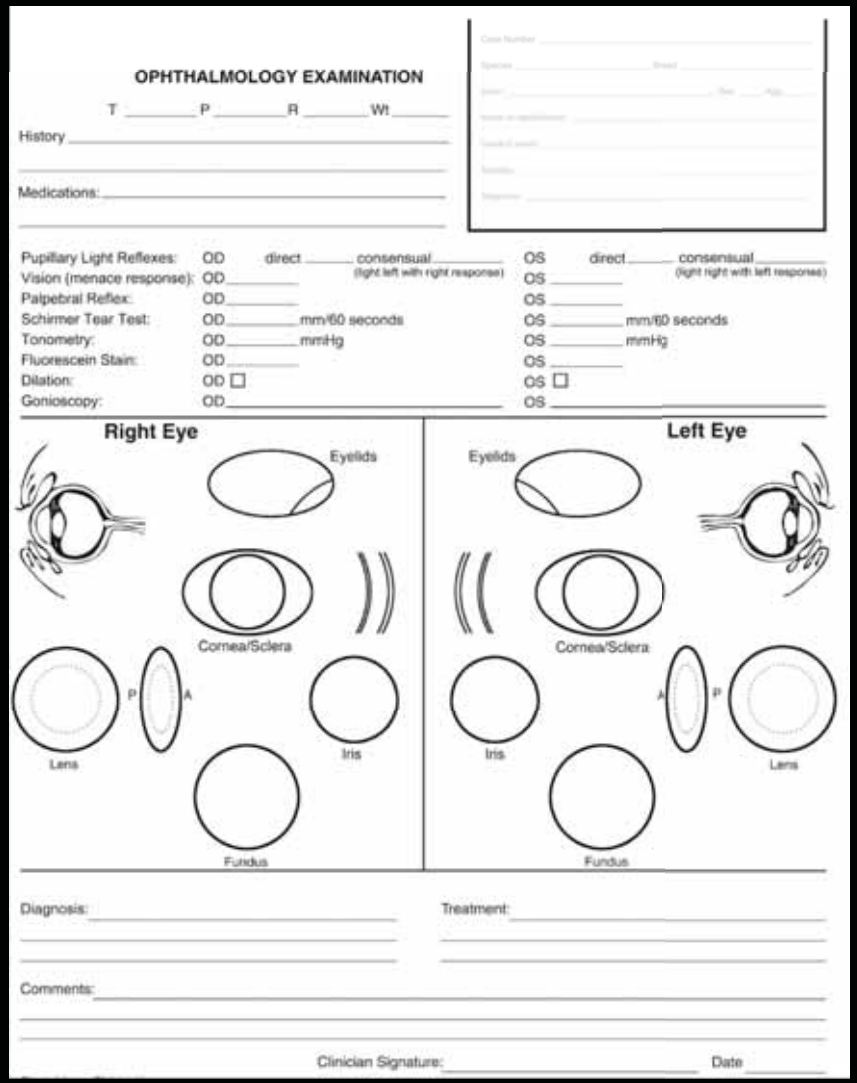
- Systemic status
  - Decreased activity?
  - Appetite changes?
  - Drinking normally?
  - Urination?
  - Defecation?

Medication History: Questions to Ask

- What medications?
  - Frequency
  - Compliance
  - When last given

Minimum Ophthalmic Database

- Neuroophthalmic assessment
- Schirmer tear test
- Tonometry
- Fluorescein stain



OPHTHALMOLOGY EXAMINATION

T _____ P _____ R _____ Wt _____

History _____

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Right Eye

Left Eye

Diagnosis: _____

Treatment: _____

Comments: _____

Clinician Signature: _____ Date _____

Neuroophthalmic Assessment

OPHTHALMOLOGY EXAMINATION

T _____ P _____ R _____ Wt _____

History _____

_____

Medications: _____

_____

Case Number _____

Species _____ Breed _____

Color _____ Sex _____ Age _____

Name or Identification _____

Owner's name _____

Address _____

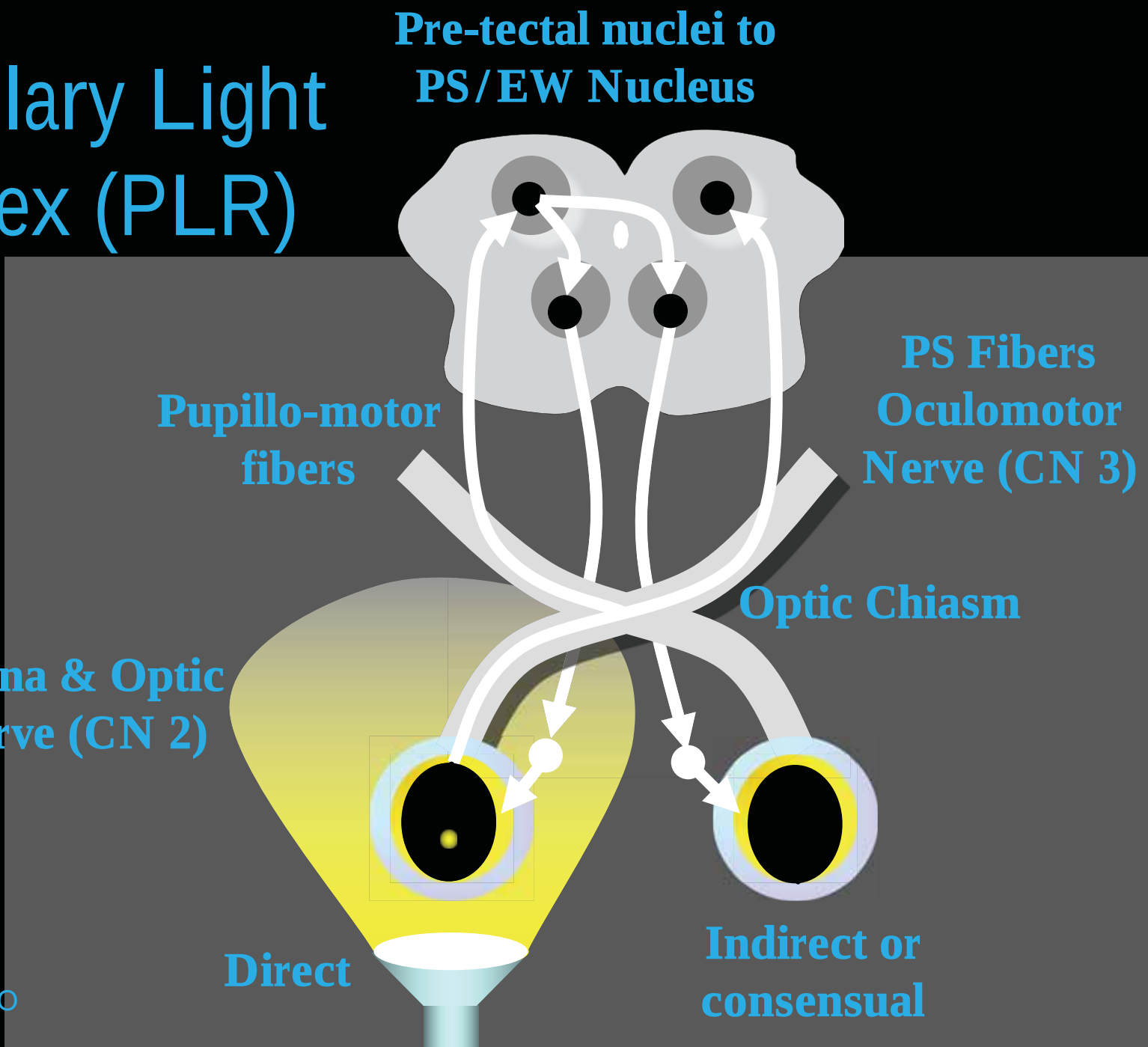
Telephone _____

Pupillary Light Reflexes:	OD direct _____ consensual _____ (light left with right response)	OS direct _____ consensual _____ (light right with left response)
Vision (menace response):	OD _____	OS _____
Palpebral Reflex:	OD _____	OS _____
Schirmer Tear Test:	OD _____ mm/60 seconds	OS _____ mm/60 seconds
Tonometry:	OD _____ mmHg	OS _____ mmHg
Fluorescein Stain:	OD _____	OS _____
Dilation:	OD ☐	OS ☐
Gonioscopy:	OD _____	OS _____

Pupillary Light Reflex (PLR)

- Reflex through midbrain
- CN 2 (afferent)
- CN 3 (efferent)
- May be present with significant retinal dysfunction
- Not a test of vision
  - PLRs still present with cortical blindness

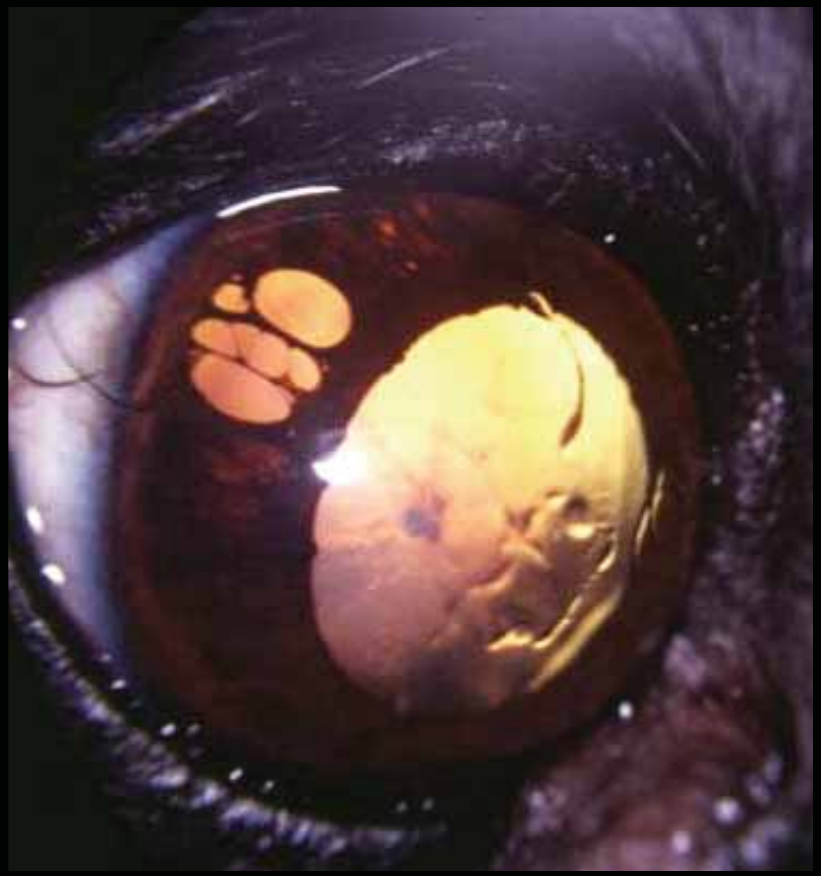
Pupillary Light Reflex (PLR)



Slide Courtesy of DO

Pupillary Light Reflex (PLR)

- Decreased in excited dog
- Iris atrophy causes decreased/absent PLR
  - Watch for this in older animals!



Dazzle Reflex

- Pathway not clearly defined
- Subcortical reflex
- Light stimulus = involuntary blink
- CN 2 (afferent)
- CN 7 (efferent)
- Present significant retinal dysfunction
- Not a test of vision

Dazzle Reflex

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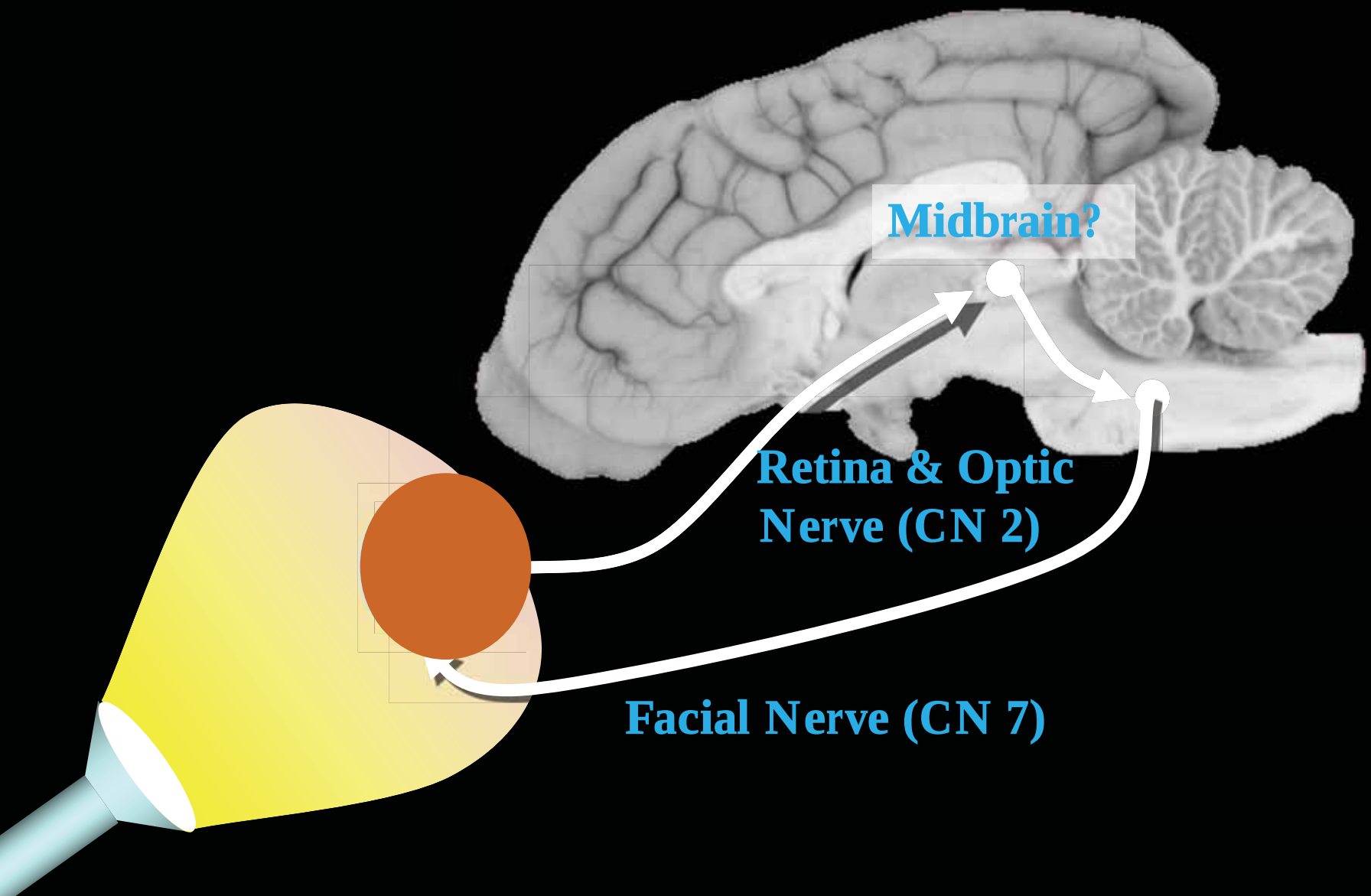
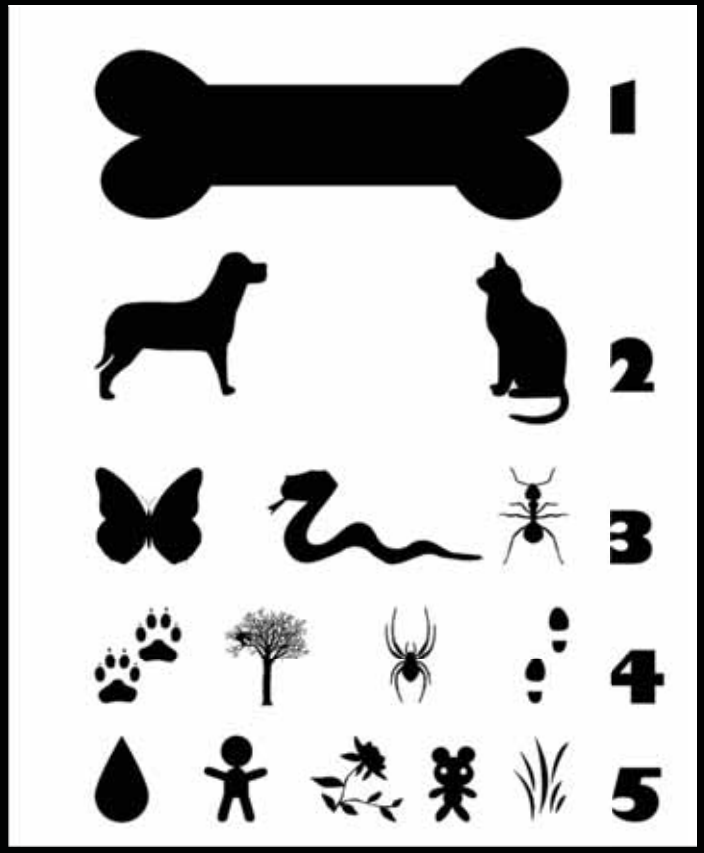


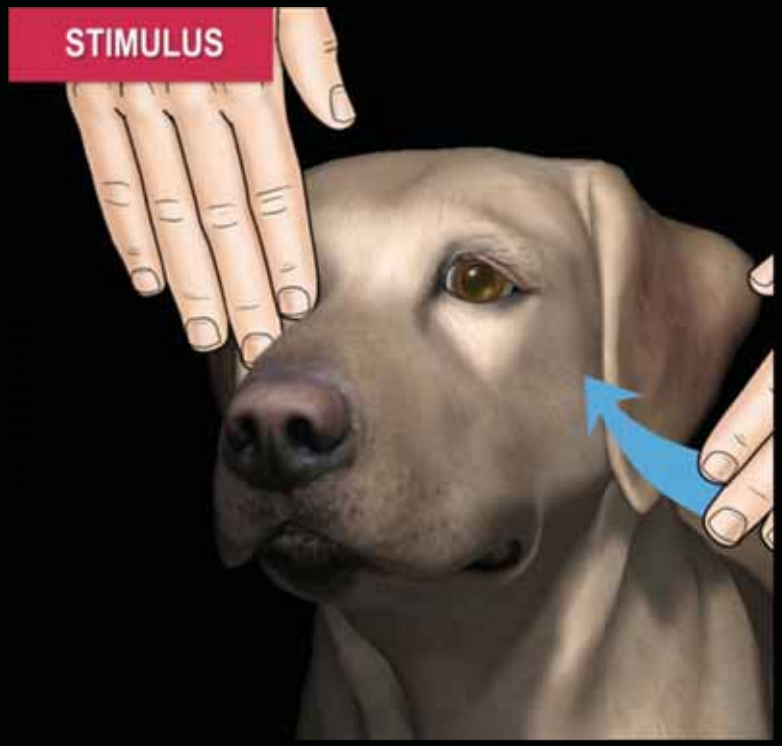
Ways to test vision in animals

- Menace response
- Tracking behavior
- Maze test
- Placing reaction
  - Cats



Vision Testing: Menace response

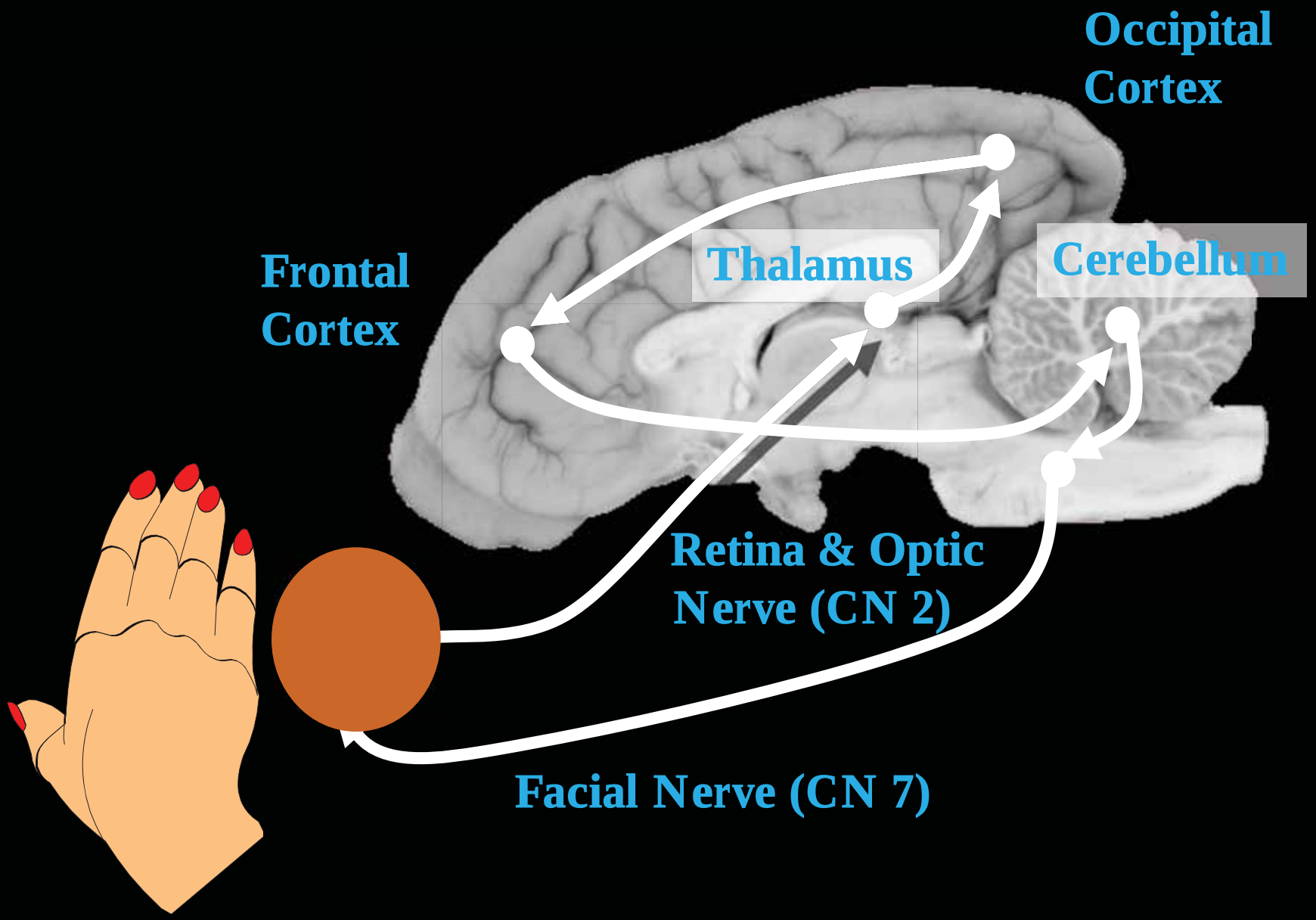
- CN 2 (afferent)
- CN 7 (efferent)
- Learned response
- Complex pathway
- Not in very young animals
- Precocial vs. altricial species
- Testing
  - No air currents
  - Test each eye separately



UGA

Menace response

Slide Courtesy of DO



Vision Testing: Tracking behavior

- Eyes follow dropped cotton ball
- May work for cats
- Some cats will not track even if visual

Vision Testing: Maze

- Place objects randomly in front of animal
- Object avoidance?
- Speed of navigation?
- Conduction in
  - Ambient light (photopic)
  - Dim light (scotopic)

Palpebral Reflex

- Touch periocular area = blink reflex
- CN 5 (afferent)
- CN 7 (efferent)

Localization of Neurophthalmic Lesions

	IN	OUT
MENACE RESPONSE	II	VII
PLR	II	III
PALPEBRAL	V	VII

Minimum Ophthalmic Database: Diagnostic Tests

- Schirmer tear test
- Tonometry
- Fluorescein stain

Pupillary Light Reflexes:	OD	direct _____ consensual _____ (light left with right response)	OS	direct _____ consensual _____ (light right with left response)
Vision (menace response):	OD _____		OS _____	
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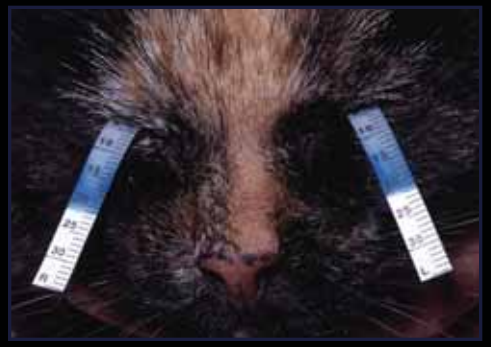
Schirmer Tear Test:	OD _____	mm/60 seconds	OS _____	mm/60 seconds
Tonometry:	OD _____	mmHg	OS _____	mmHg
Fluorescein Stain:	OD _____		OS _____	

Schirmer Tear Test

- >15 mm/min = normal dogs
- 10-15 mm/60s = suspect KCS
- < 10mm/60s = KCS
- Perform first !!!!
- Correct placement
  - Inferior fornix
  - Contacting cornea
- Cats can be lower (<10mm/min)
  - May be due to stress
  - Use clinical signs to interpret

Schirmer Tear Test (STT)



- Measures
  - Lacrimal lake
  - Basal tear production over 1 min
  - Stimulated tear production over 1 min

STT will be decreased for up to 1 week after general anesthesia or sedation!

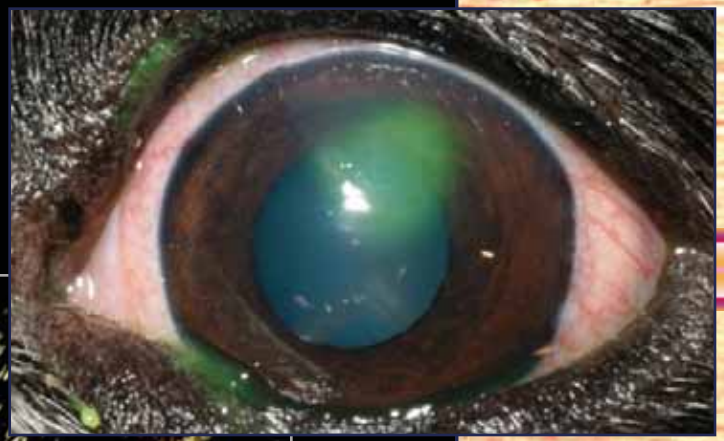
STT is NOT affected by Trazodone!

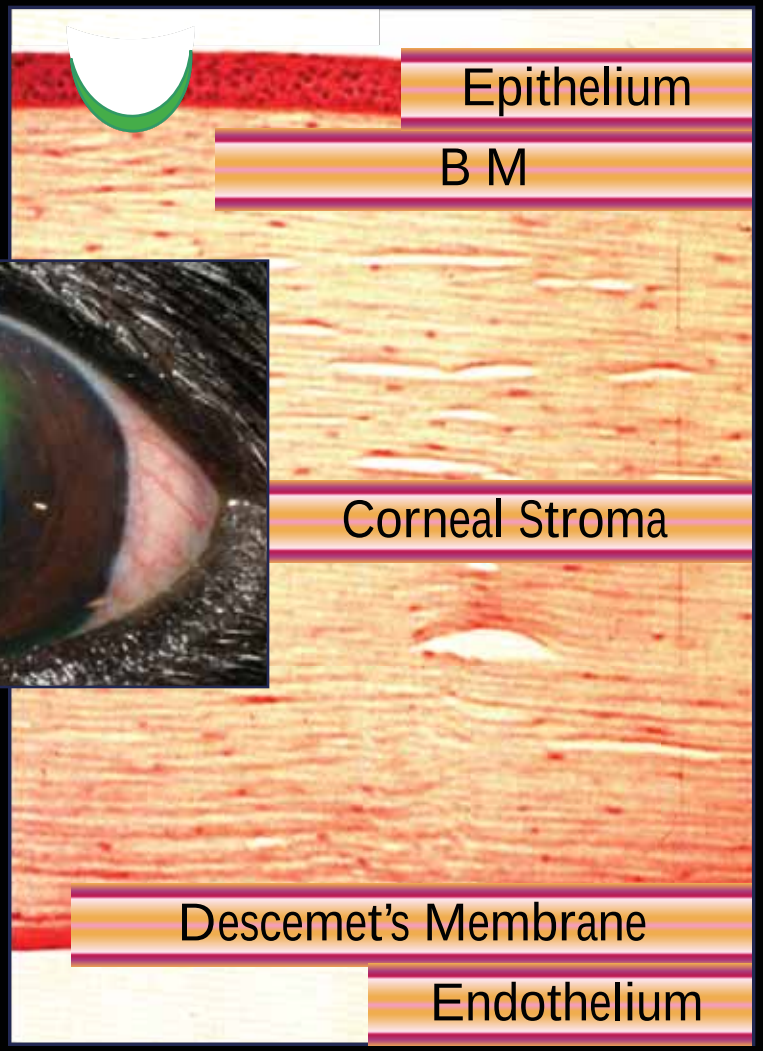
Many Ways to Mess Up STT!

- Forgot to do it!
  - Wait 20 minutes
- It fell out!
  - Put it back in
  - Hold lids closed
- Poor corneal contact!
  - Won’t stimulate tears

Fluorescein Stain

- Moisten strip with eyewash
- Apply 1 drop to eye
  - May need to rinse with eyewash
- Corneal ulceration
  - Stain positive





Tonometry

- 88% of vets (Martins *et al.*, 2018)
  - Indentation
    - Schiotz
  - Applanation
    - Tono-Pen
    - Avia® Vet
  - Rebound
    - Tonovet
    - Tonovet Plus

The #1 Reason to Measure Intraocular Pressure (IOP)?

- Red Eye!
- Determine IOP every red eye with intact cornea/sclera

Serial IOP Monitoring

- Primary glaucoma
- Genetic reasons
- Uveitis cases
- Intraocular surgery

Diagnostic Testing for Glaucoma
Rebound and Applanation Tonometry

Pros

- Digital
- Convenient for small corneas
- Simple to use
- Vertical cornea ok
- Easy to clean
- Reproducible

Cons

- More expensive
- May need servicing

Applanation Tonometry

- Tonopen, Tonopen Avia® Vet
- Force to flatten cornea
- Accurate
- Easy to artificially elevate IOP
  - Brachycephalics
- Calibrate prior to use or daily
  - Avia® Vet = no calibration

Rebound Tonometry

- Tonovet and Tonovet Plus
- Electromagnetically propelled probe
  - Bounces off cornea
- Reads slightly higher
- Settings for species
  - Dogs
  - Cats
  - Horses
  - Other

Intraocular Pressure: Getting an Accurate Measurement

- Calm animal
- Trazodone ok
- Central cornea
- Avoid lesions
- Topical anesthesia
  - Tonopen and Avia®
- Avoid pressure
  - Globe, lids, neck

IOP=29
Holding lids too close

IOP=15
Holding lids further away

Applanation Tonometry

- Easy mistakes:
  - Tip cover too tight
  - Tip cover too loose

Intraocular Pressure: When to Trust the Reading?

- Look at patient
- Take lowest measurement
- Consistent readings

Normal Canine IOPs

Tono-Pen	8-15 mmHg
Avia® Vet	6-19 mmHg
Tono-Vet	7-22 mmHg
Tono-Vet Plus	11-25 mmHg

- All instruments provide useful estimates of IOP
- Interpret IOP based on range for instrument used
- Tono-Vet Plus closer to actual IOP value
- All underestimate actual IOP at high IOPs

(Muirhead *et al.*, 2018)

Normal Feline IOPs

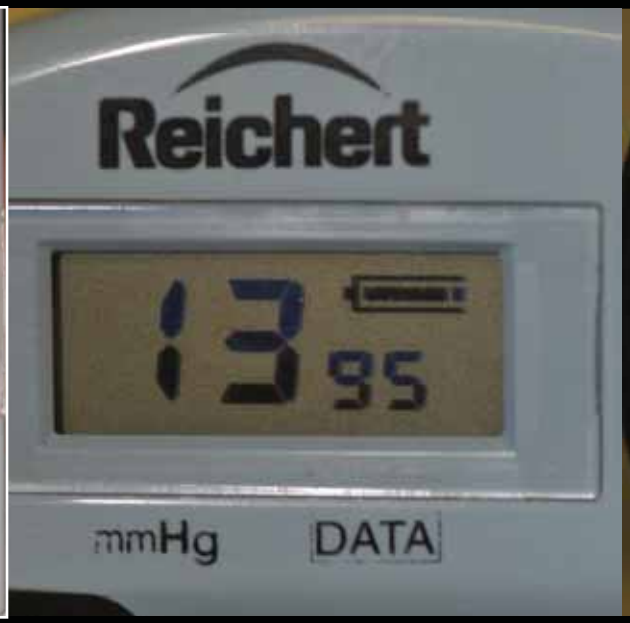
Tono-Pen	10-18 mmHg
Tono-Vet	14-20 mmHg

- All instruments provide useful estimates of IOP
- Interpret IOP based on range for instrument used
- Tono-Vet Plus closer to actual IOP value
- Tono-Vet Plus calibrated for cats
- All underestimate actual IOP at high IOPs

Tonometry Readings: Acceptable Error

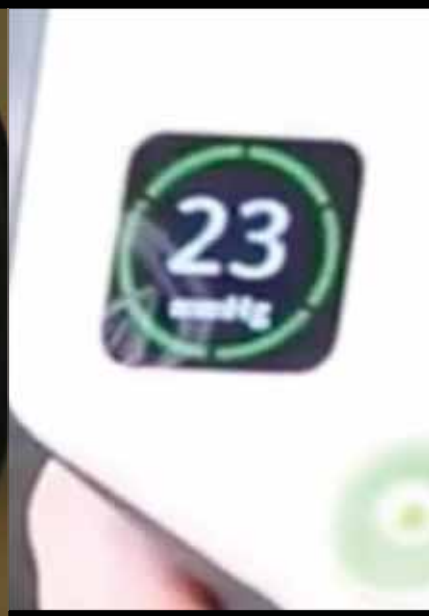
- Coefficient of variation ~5%

Tono-Pen



Avia® Vet

Tonovet

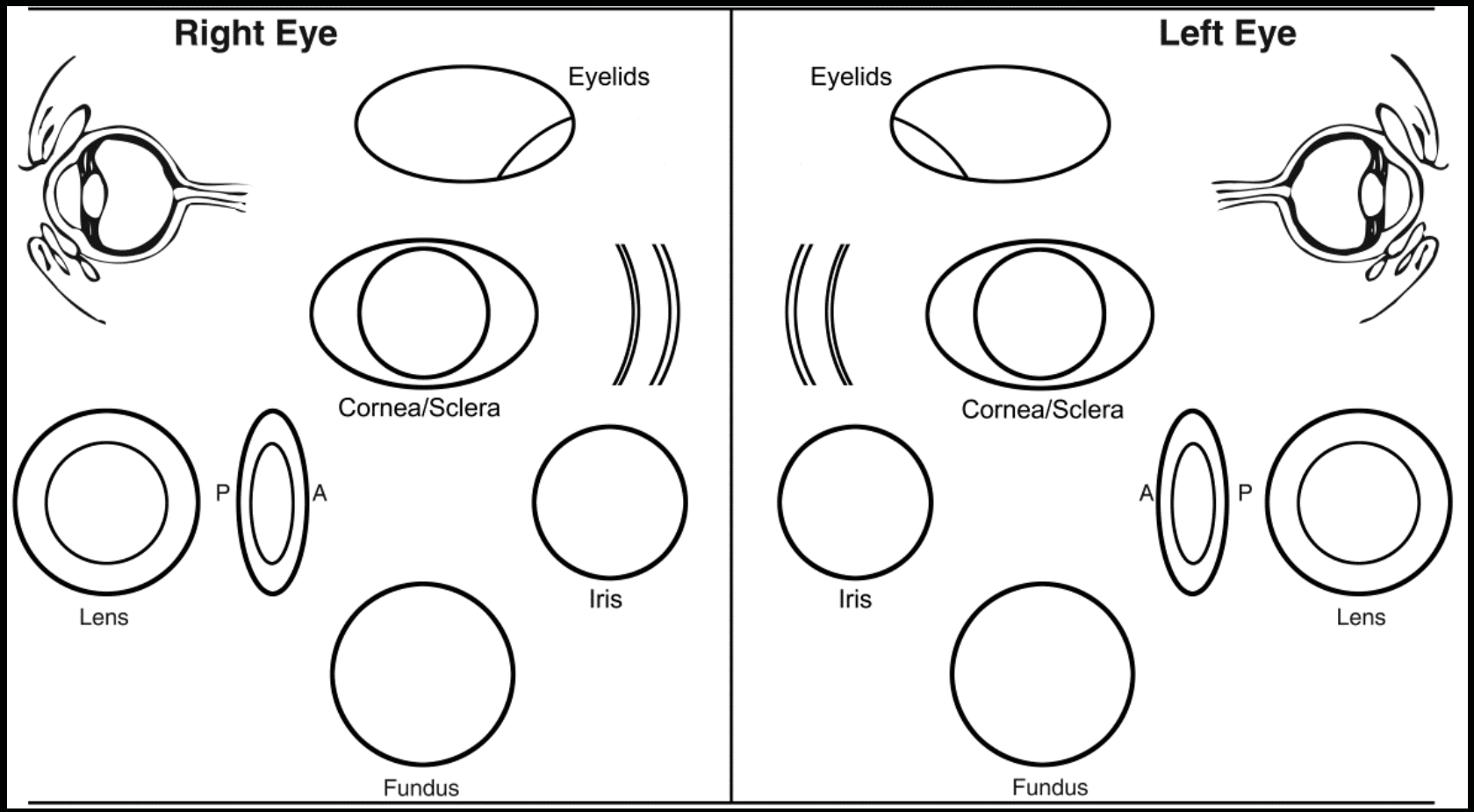


Tonovet Plus

Cleaning the Tonopen

- Perform monthly
- Remove tip cover
- Air canister against tip
- Blow air into top for 3s
- Tip to room temp
- Calibrate

Ophthalmic Examination



Proper Restraint Important!

- Handler should restrain gently
  - Especially brachycephalics
- Base of skull & under chin

Ophthalmic Exam

- Bright focal light source
- Dark environment
- Patient at eye level
- Magnification!
- Anterior segment
  - Slit lamp
  - Head loupes/transilluminator
  - Otoscope head

Distance Examination

- Watch animal in room
  - Visually guided behavior?
  - Facial symmetry?
  - Symmetry in size/shape orbit and glob?
  - Eyelid conformation
  - Discharge?
  - Opacity?

Closer examination

- Retropulse globe
  - Unless ulcer!
- Pain on opening mouth?

General Exam Principles

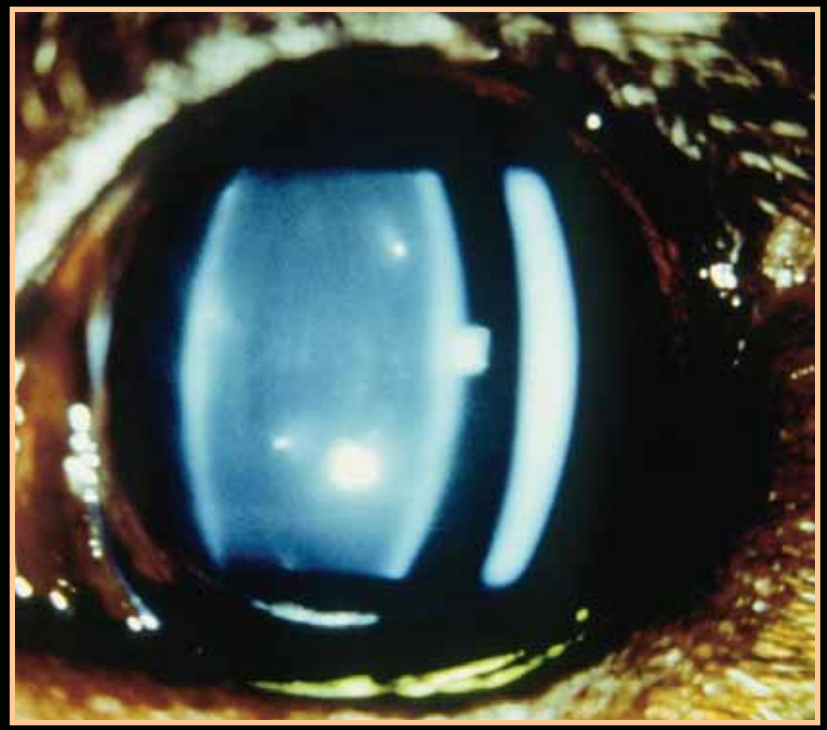
- Light source
  - Arm's distance
  - Tapetal reflexes
    - Highlight anisocoria
    - Opacities in media
- Bring light closer
  - Direct illumination
  - Retroillumination
    - Anterior lesion back-lit by light

Localization: Object Overlay

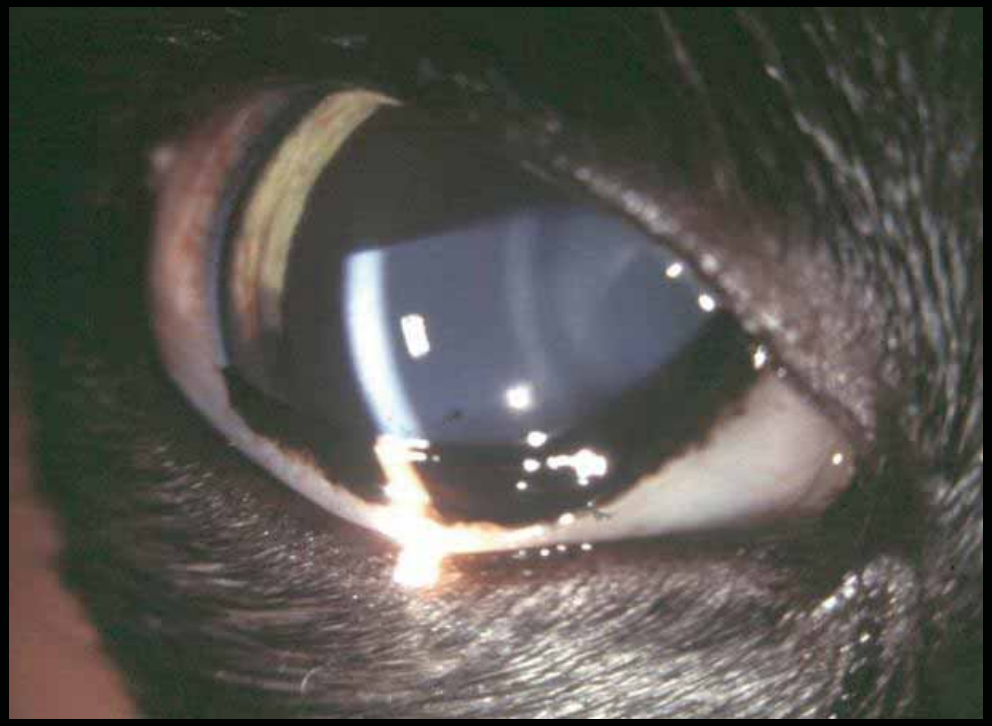
- Anterior structures cover posterior ones

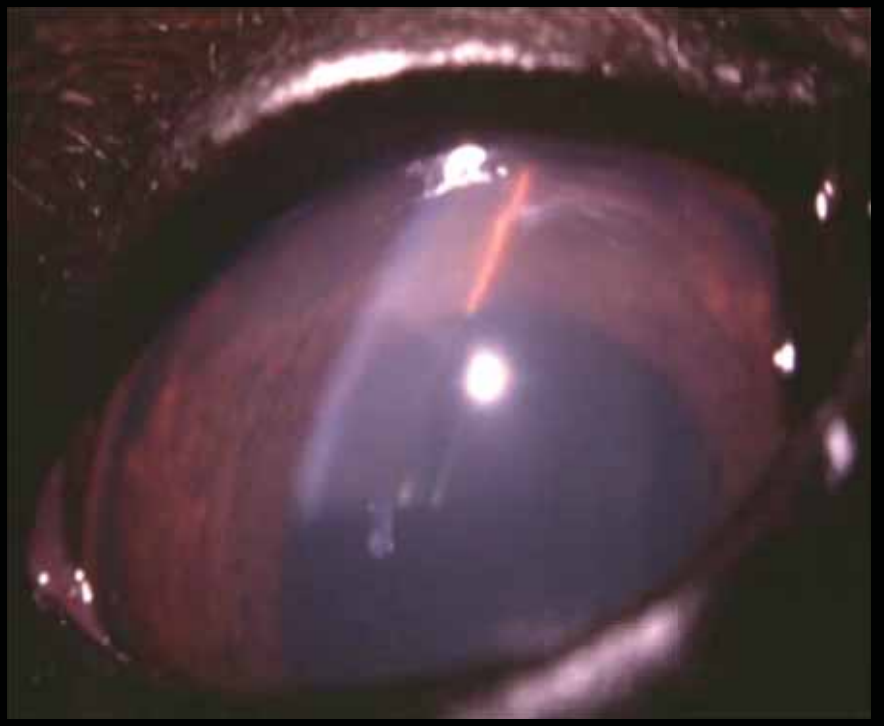
Localization: Purkinje Images

- Slit beam creates optical cross-section of eye:
  - Tear film/cornea
  - Black space (AC)
  - Anterior lens capsule
  - Lens (smokey)
  - Poster lens capsule



Anterior Chamber Flare/Cells
“Tyndall Effect”



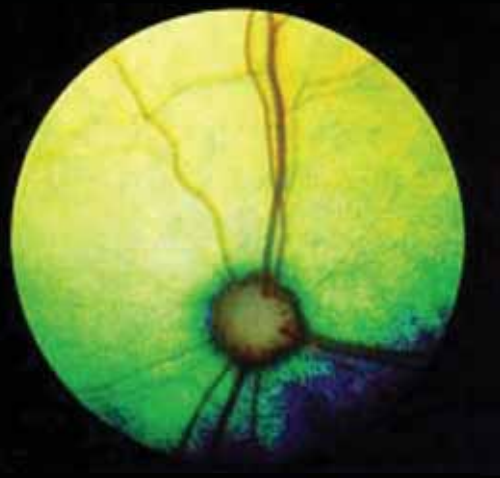


Axis of Rotation

- Center axis of rotation of eye is center of lens
  - Lesion anterior to center of lens move same direction as front of eye
  - Lesion posterior to center of lens move opposite direction as front of eye

Ophthalmoscopy (Funduscopy)

- From Greek:
  - Ophthalmos = eye
  - Skopeo = to look at



Equipment

- Dilating agent
  - 1% Tropicamide
- Dark environment
- Indirect ophthalmoscopy
  - Light source
  - Lens
- Direct ophthalmoscopy
  - Direct ophthalmoscope

Direct Ophthalmoscopy

- Upright image
- High magnification
- Easy to use
- Equipment readily available
- Shorter working distance
- Narrow field of view

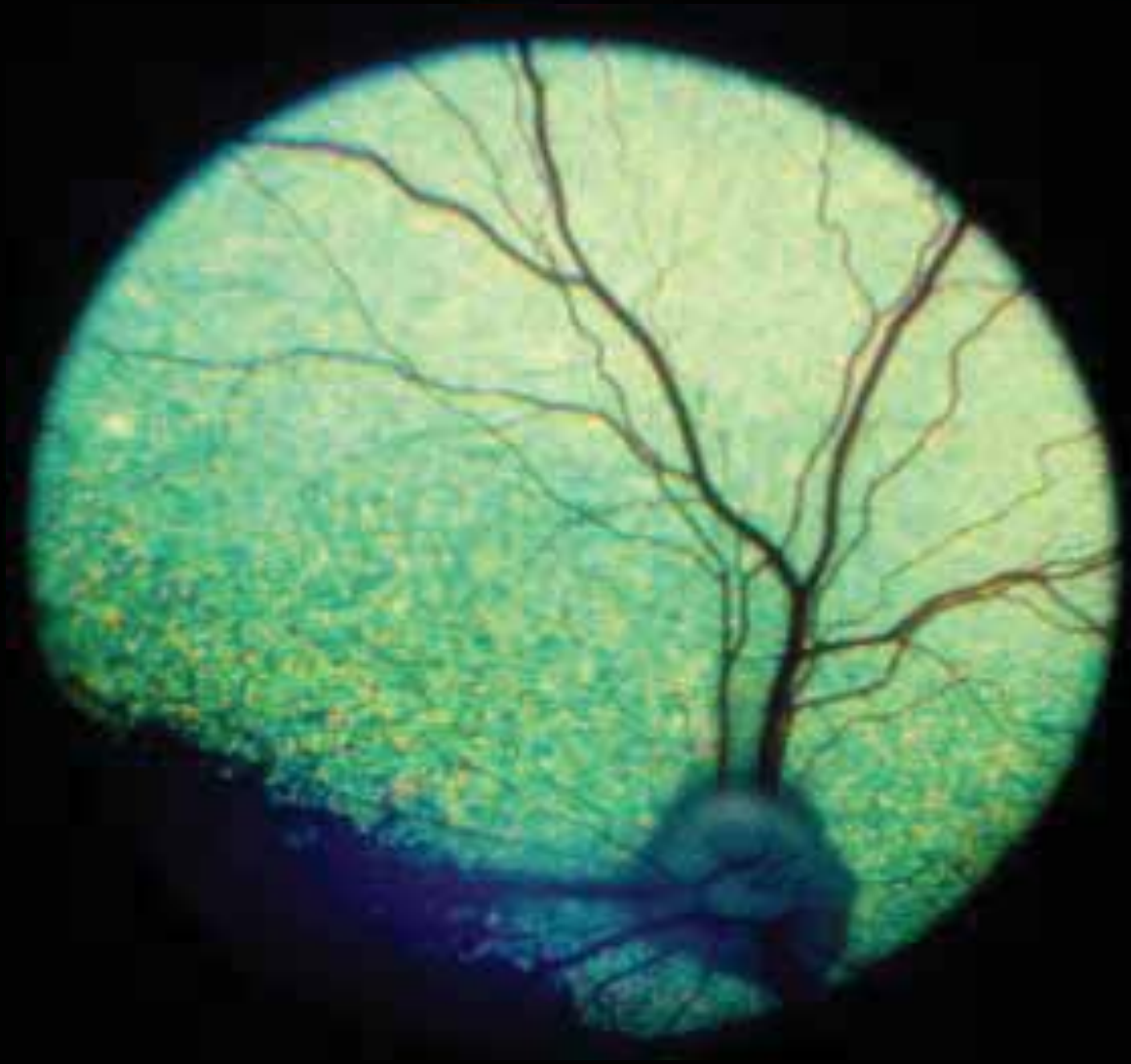
Direct Ophthalmoscopy Localization

- Focusing wheel
  - Common source confusion
- Start on “0”

Indirect Ophthalmoscopy

- Recommended
- Inverted image
- Wider field of view
- Requires practice
- Low magnification
  - View more fundus
  - Less likely to miss lesions

Indirect Ophthalmoscopy: Image Interpretation

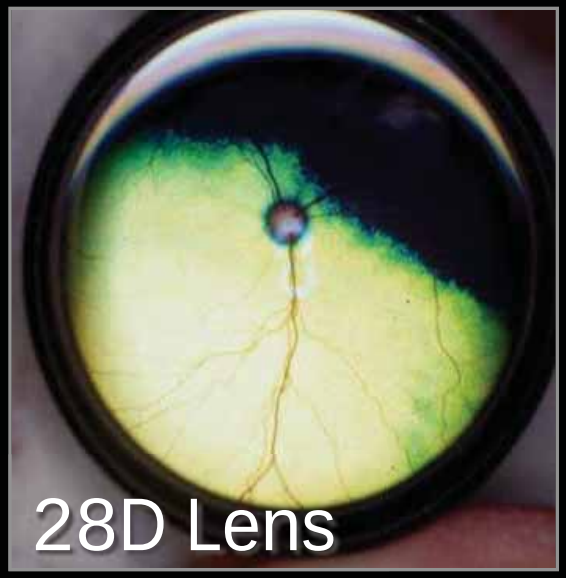


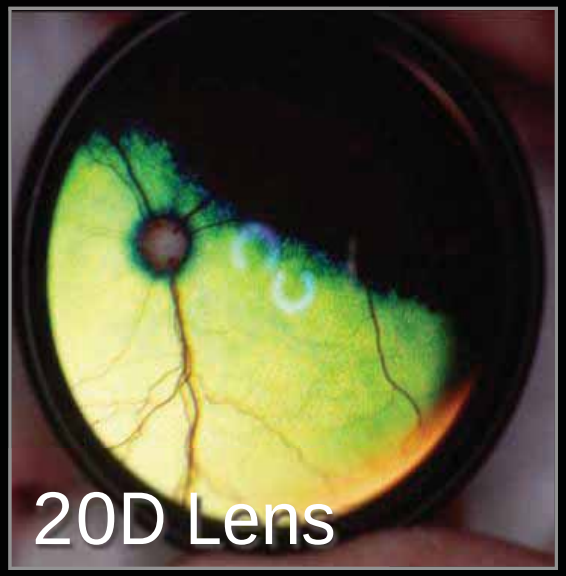
Indirect Ophthalmoscopy Tips

- Lens parallel corneal surface
- Metal lens rim towards cornea
- Pupil illumination first, then add lens
- Think “tube”

Indirect Ophthalmoscopy: Lens Selection

- 28 D
- 20D
- 2.2 Panretinal





Direct vs. Indirect Ophthalmoscopy Images

Direct Ophthalmoscope

Indirect (20D) Ophthalmoscope

THANK YOU

- Gia Klauss
- Caroline Betbeze
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- Ann Bosiack
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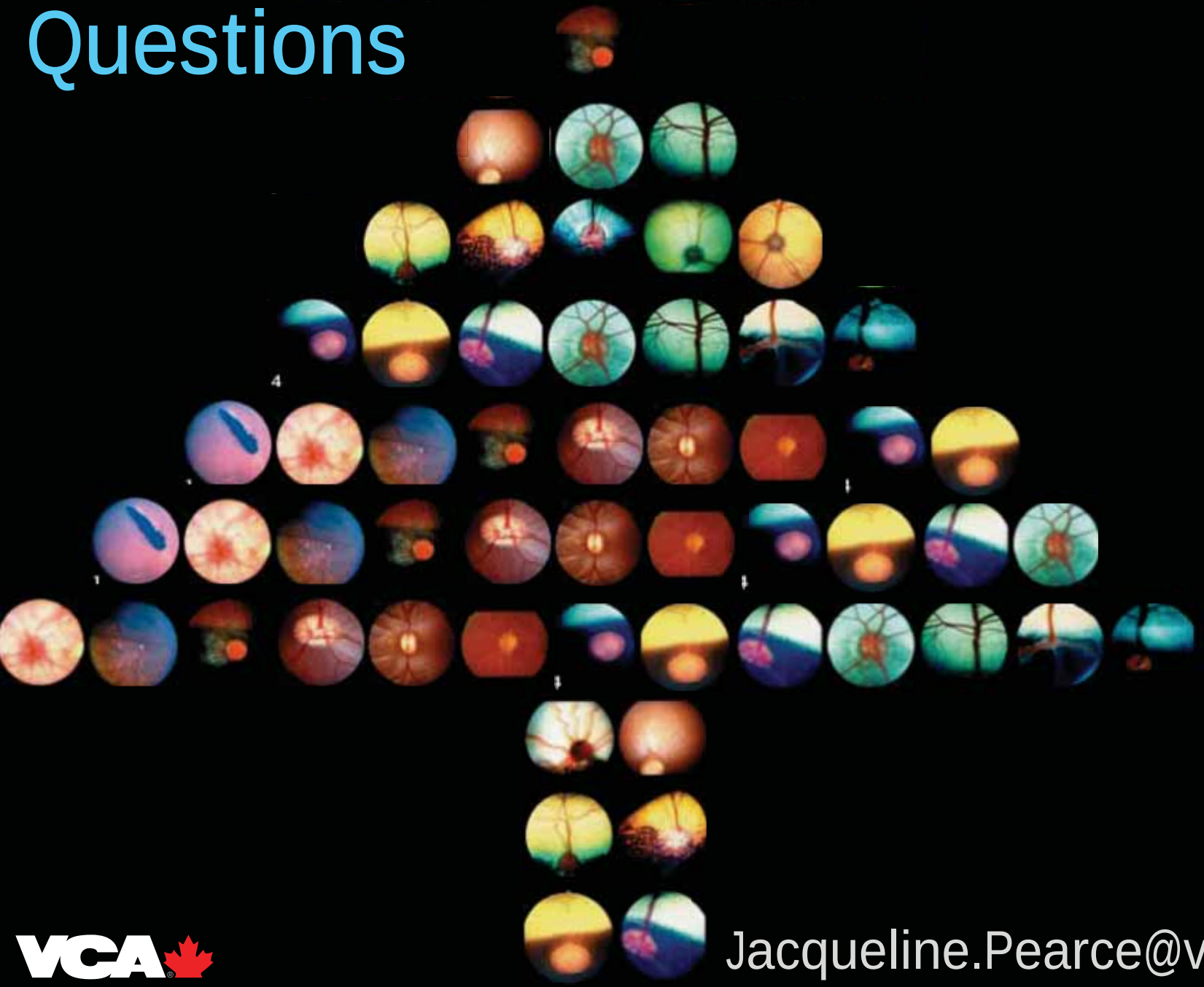
- Dylan Buss
- Cecil Moore
- Denise Lindley
- Elizabeth Giuliano
- Laurence Galle
- Juri Ota
- Samantha Bishop
- Rene Backhouse

Caring For Life's Greatest Companions

Questions



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