Jennifer Sheahan, DVM, DACVO

Dr. Sheahan was born and raised in Edmond, Oklahoma. She graduated with honors from the University of California, Irvine, with a major in Biology and Criminology in 2003. Dr. Sheahan discovered her interest in comparative ophthalmology after college when she worked as an ophthalmology nurse for four years. She attended Veterinary School at Oklahoma State University graduating in 2011. Following Veterinary School, she completed a one-year rotating small animal medicine and surgery internship at Ohio State University followed by a three-year residency in comparative ophthalmology at Animal Eye Care. She has a particular interest in ophthalmic pharmacology as well as dry eye disorders and retinal diseases.

In her free time, she enjoys photography, running, traveling, and spending time with family.

Veterinary Eye Clinic

Our Vision Is Caring For Your Pet's Vision

Jennifer Sheahan, DVM

Diplomate ACVO

Veterinary Eye Clinic
Alhambra, California

Veterinary Eye Clinic

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Corneal Disease, Ulcers, and treatments

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Family Owned/Operated

Open Mon-Saturday

Call us anytime! We are here for you!

Lunch and learns: contact Jasmine@veclinic.com

Diplomates: Dr. Chang, Dr. Goldenberg

Associate Doctors/ Residents: Drs. Erickson, Jaggers, Potnis

-consults even if $2

-same day work ins

-beat pricing

-4.9 stars

-Surgery Guarantee, Ex: Cherry eye, Entropion etc.

-pediatrician approach

- Come hang out, free

Lenses

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Corneal Disease, Ulcers, and Treatments

Key History Questions

- Do they have ocular discharge? What color?
  - Ulcerative and inflammatory diseases increase tearing
  - Mucoid discharge often first sign of dry eye
  - Yellow/green discharge common with infected/deep ulcers
- Are they squinting? Rubbing at the eyes? Or comfortable?
- Is there any change in vision?
- Has there been any change to the color or appearance of the eye?
- How long has this been going on? Does it wax and wane?

Precorneal Tear Film

(A) Outer superficial oily layer

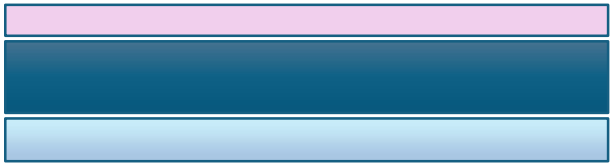
- Limits evaporation and prevents overflow of tears
- Meibomian glands

(B) Aqueous middle layer

- Lubrication, nutrition, smooth optical surface, surface immunity
- Lacrimal gland, gland of the third eyelid

(C) **Inner mucin layer**

- Binds tear film to hydrophoblic corneal surface
- Conjunctival goblet cells



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Pigmentary Keratopathy

- Corneal pigment deposition
- Often begins as focal area in ventral/medial cornea >> entire cornea pigmented
- Pug: females may be predisposed
- Migration of perilimbal melanocytes into cornea?
- Clinically, the younger the dog (<1y) the worse the pigment

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Corneal Disease in Brachycephalics: Contributing Factors

- Nasal fold trichiasis
- Ventral medial entropion
- Medial caruncular trichiasis
- Distichiasis
- Lagophthalmos
  - "Sleeps with his eyes open"
  - Important to ask this question
- Quantitative and qualitative KCS
  - If it looks like KCS but STT normal still treat
- Increased ocular surface pigment
- Decreased corneal sensitivity
- Genetic factors
  - Pugs

https://www.ufaw.org.uk/dog

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Brachycephalics – Getting A Head Start

- Brown eye looks normal!
  - _____% of "normal" Pug eyes affected by pigmentary keratopathy!

Courtesy of David Wililams

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Characteristics of, prevalence of, and risk factors for corneal pigmentation (pigmentary keratopathy) in Pugs

Amber L Labelle [1], Christine B Dresser, Ralph E Hamor, Matthew C Allender, Julia L Disney

Affiliations + expand

PMID: 23971846 DOI: 10.2460/javma.243.5.667

Free article

Abstract

Objective: To determine the characteristics of, prevalence of, and risk factors for corneal pigmentation (CP) in Pugs.

Design: Prospective cross-sectional study.

Animals: 295 Pugs > 16 weeks old.

Procedures: Ophthalmic examination of the anterior segment of each eye was performed, including determination of tear film characteristics (Schirmer tear test and tear film breakup time) and corneal sensitivity. Digital photographs of the head and each eye were obtained. Corneal pigmentation of eyes was graded as absent, very mild, mild, moderate, or severe. Signalment and medical history information and American Kennel Club registration status were recorded. Results-CP was detected in at least 1 eye of 243 of the 295 (82.4%) Pugs; CP was typically very mild or mild. Detection of CP was not significantly associated with coat color, age, eyelid conformation, or tear film characteristics but was significantly associated with sex of dogs. The severity of CP was not significantly associated with American Kennel Club registration status or age, but was significantly associated with sex, tear film characteristics, and coat color. Iris hypoplasia was detected in 72.1% of the Pugs. Iris-to-iris persistent pupillary membranes were detected in 85.3% of the Pugs.

Conclusions and clinical relevance: Prevalence of CP in Pugs in this study was high. Unexpectedly high prevalences of iris hypoplasia and persistent pupillary membranes were also identified. The condition identified in these Pugs was a pigmentary keratopathy, rather than pigmentary keratitis or corneal melanosis. This condition may have a genetic basis, and further studies are warranted to determine etiology.

Brachycephalics – Getting A Head Start

- Brown eye looks normal!
  - >80% of “normal” Pug eyes affected by pigmentary keratopathy!
  - Often present only once pigment is near complete or for ulcerative keratitis
- At routine physicals, from puppy exam onwards
  - Look for medial pigment
    - Sometimes in dogs <1y
  - Early lubrication? Puppy welcome pack
  - Client Education – I-phone record
- Breeders: OFA/CERF exams

Courtesy of David Wililams

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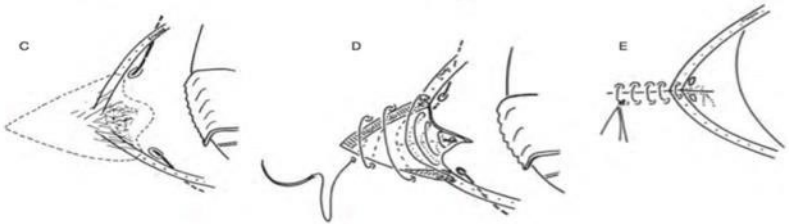
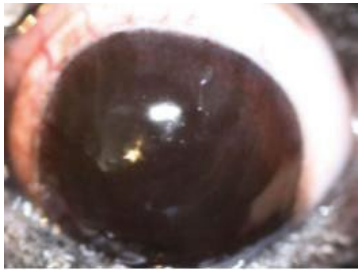
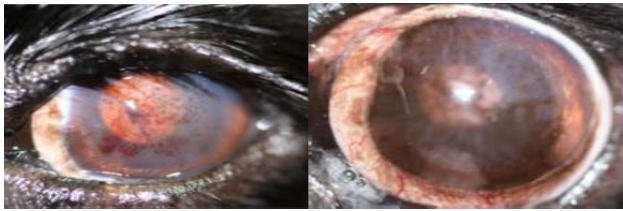
Treatment of Pigmentary Keratopathy

- Meds: cyclosporine, tacrolimus, steroids, lubricant (similar to KCS!)
  - Earlier is better
  - Stabilize and reduce pigment progression
  - Improve tear film – STT >18mm/min
- Medial canthoplasty
  - Corrects ventral medial entropion, trichiasis , exposure
- Removal of pigment: recurrence risk
  - Diamond burr keratotomy
  - Cryotherapy
  - Beta radiation
  - Superficial Keratectomy







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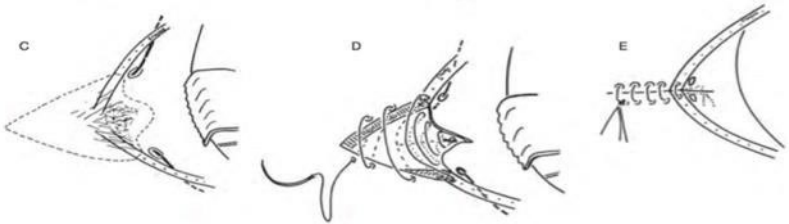

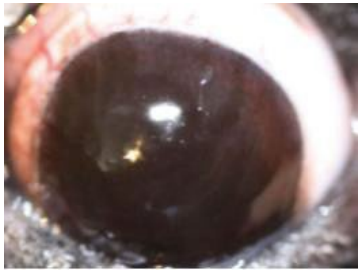

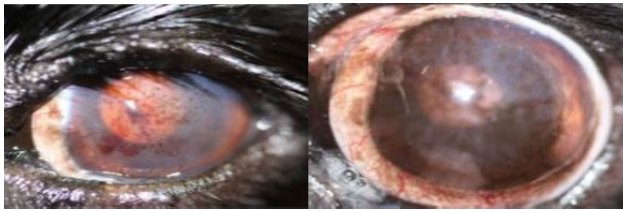

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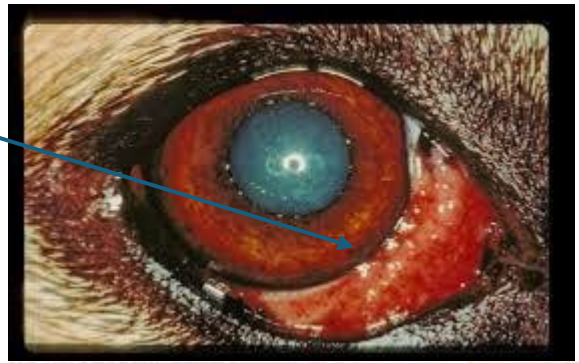
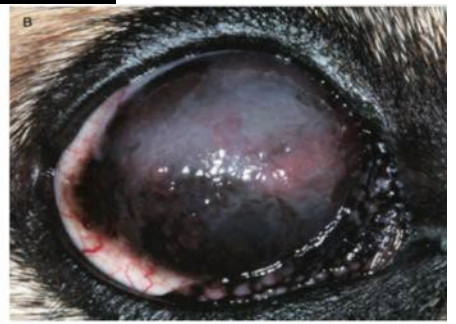
Pannus (Chronic Superficial Keratitis)

- Aka Uberreiter's Syndrome, degenerative pannus
- Temporal or inferior limbus as vascularized conjunctival lesion > moves centrally with limbal melanocytic pigment
  - +/- TEL thickening and pigmentation
- German Shepherds, Shepherd Xs, Greyhounds
- Female sex-bias
- Bimodal: Young (1-5y) at dx = progressive/severe vs. older (4-6y) = milder
- Immune-mediated disease
  - Lymphocytic plasmacytic inflammation
- ATYPICAL Pannus is when lesion only involves_____, and not the _____





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Pannus – Additional Contributing Factors

- UV light
- High Altitude
- >7000ft, 8x more likely to develop pannus, less likely to respond to therapy
- Genetics – breed and MHC Class II haplotype
- Infectious organism never identified
- Not painful

https://alaskaleather.com

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Pannus - Treatment

- Medical Therapy:
  - Cyclosporine or Tacrolimus - immunomodulatory
  - Corticosteroid (topical)
  - Author usually starts with Tacro/NPD BID-TID; taper off of NPD
    - Long-term maintenance often Tacrolimus BID FOREVER
    - WHAT I WRITE ON MED BOTTLES .. "forever' or " immunodulation=compliance
- Warn owners about seasonal flare-ups > recheck summer & winter?
- Limit UV exposure > Access to shade, limit walks during peak sunlight
- Medical therapy usually sufficient, no need for oral meds unless _____
- Therapy to remove pigment
  - Cryotherapy
  - Beta radiation (Strontium-90B)
  - Superficial keratectomy +/- radiation, medical therapy?
- Doggles? Rex Specs?

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Used like Water…
Are Cyclosporine and Tacrolimus Safe?!

- Yes! For the most part, pros outweigh cons
- Few systemic studies on systemic T-lymphocyte function – contradictory
  - Clinically no immunosuppression observed even in small breed dogs but… judicious use
    - Lowest effective dose
- Clinically – little effect on healing rates and infection clearance (especially with KCS)
- WHAT do you do with an ulcer case **and** has dry eye for example? Stop the CSA/ Tacro since may impede healing ?? Or how to handle?
- Rare case reports
  - Corneal squamous cell carcinoma
    - Cause is unclear – ie. chronic corneal inflammation vs. altered immune function
  - Ocular toxoplasmosis
    - Due to immunosuppression?
  - Think about IBD on chronic oral pred. Similar situation

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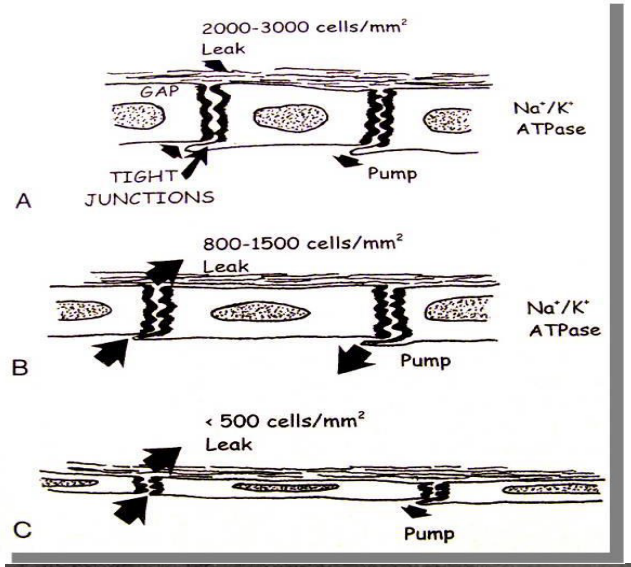
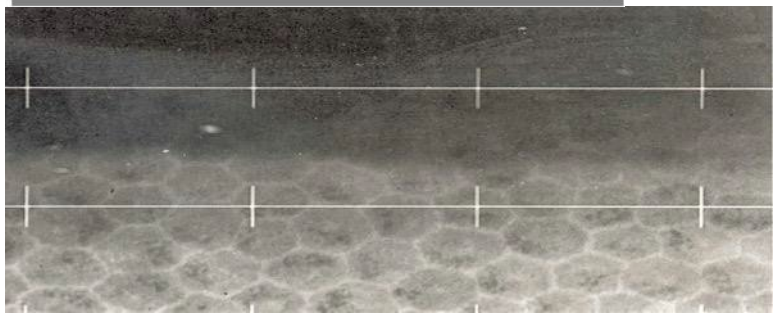
Corneal Edema

- Corneal clarity relies on relative dehydration
  - Stromal collagen must be tightly packed and lamellar organization maintained!
- Physical barriers to water uptake
  - Corneal endothelium and epithelium
- Endothelial pumping mechanisms
  - Na^+/K^+ ATPase
- Corneal edema results from loss of endothelial cells due to genetics or damage (inflammation, high IOP, etc.)
- Endothelial cells no mitosis





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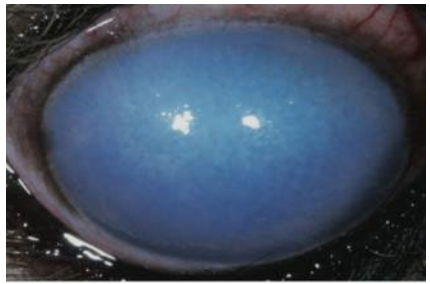
Corneal Endothelial Dystrophy: Introduction

- Inherited death of endothelial cells
  - *Rule out uveitis, ulcers and glaucoma!!!*
- Top breeds: Boston Terriers, Chihuahua, Dachshunds, Shih Tzus, Poodles
- Middle-age to older patients
- Bilateral (but often asymmetrical progression)
- Focal (often dorsal lateral) > Diffuse > Bullae > Ulcers
- Late stage concerns:
  - Mild vision loss
  - Recurrent corneal ulcers

- Client education
  - Progressive disease even with medication
  - Medications may not have visible effect but slow disease progression
  - Corneal transplant



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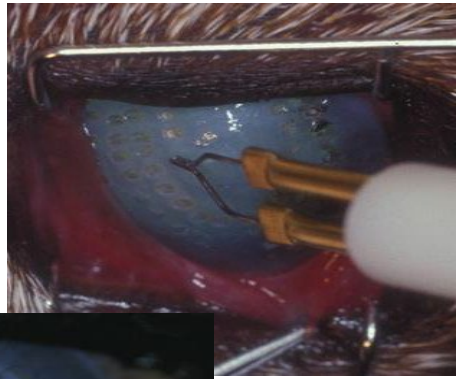
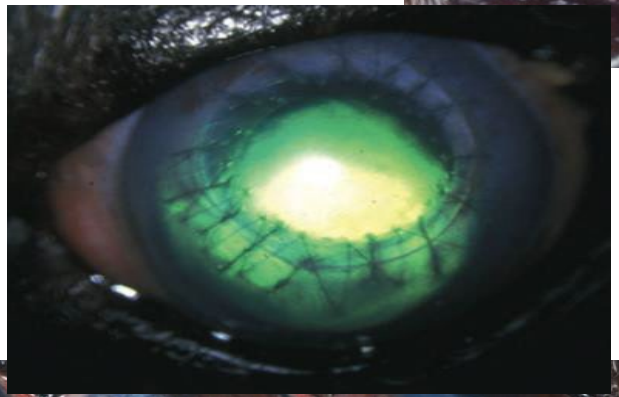
Endothelial Dystrophy: Medical Therapy

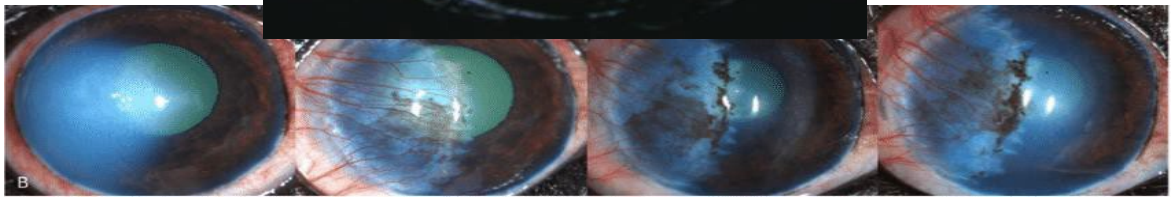
- Medical therapy:
  - 5% NaCl drops (BID)
    - May dehydrate the cornea & **slow** PROGRESSION
    - Why drops versus ointment?
  - Topical NSAIDs
    - BID
    - Decreases stress on remaining cells
    - May have conjunctival hyperemia regardless of therapy
  - Topical antibiotics with ulcers (ie. Oflox vs tobramycin)

Endothelial Dystrophy: Surgical Therapy

- Surgical therapy:
  - Thermokeratoplasty
    - Typically performed in end-stages for recurrent corneal ulcers
    - Causes multifocal areas of corneal fibrosis to decrease corneal fluid accumulations
  - Penetrating keratoplasty (corneal transplant)
    - Challenges with acquisition of donor tissue and graft rejection
    - 65% successful, but life long immune suppressive meds
  - Permanent conjunctival graft
    - Dehydrates the cornea, may help slow progression, early in DZ
  - Endothelial transplants







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Cornea 35.10 (2016): 1295-1304.

Endothelial Degeneration

- Genetic
- Age-related
  - Can happen to us over time
- Secondary to:
  - Anterior uveitis
  - Glaucoma
  - Anterior lens luxation
- Intraocular Surgery

www.vetmed.ucdavis.edu
Courtesy of Dr. N. Millichamp

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Corneal Crystalline Deposits

- Corneal Lipid Dystrophy/ keratopathy
  - 3 CAUSES
- Corneal Mineral Degeneration

1) INHERITED Corneal Lipid Dystrophy

Primary, bilateral, inherited disorder

- Usually OU – symmetrical ovoid, circular or ring lesions
- Not accompanied by inflammation or systemic dz
- Typically does not impact comfort

- Affected breeds
  - Beagle
  - Siberian Husky
  - Cavalier King Charles
  - Airdale
  - Rough Collie

- Treatment
  - No response to medical therapy
  - Keratectomy – recurrence

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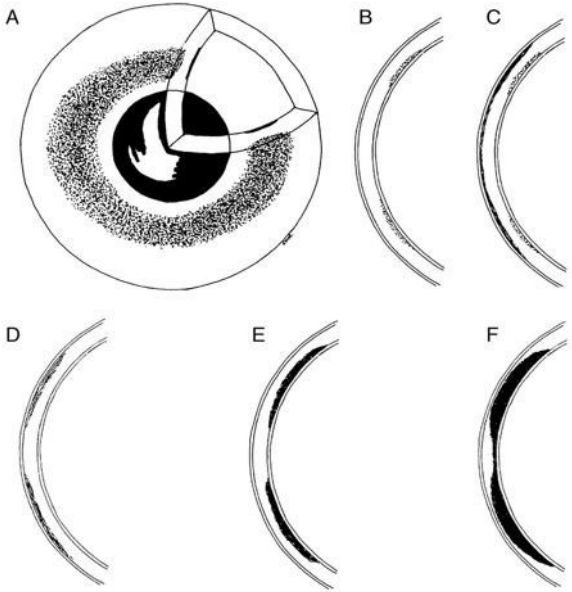
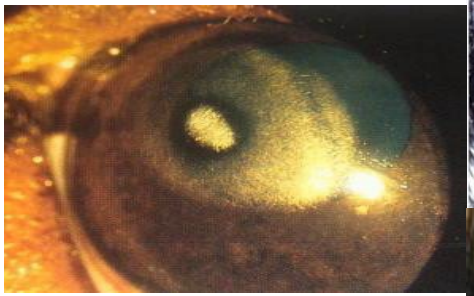
Corneal Lipid Dystrophy





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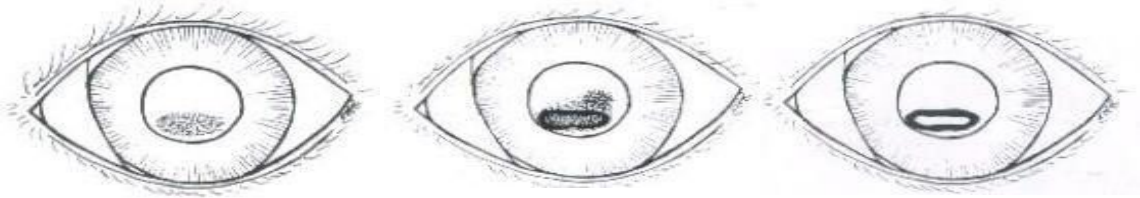

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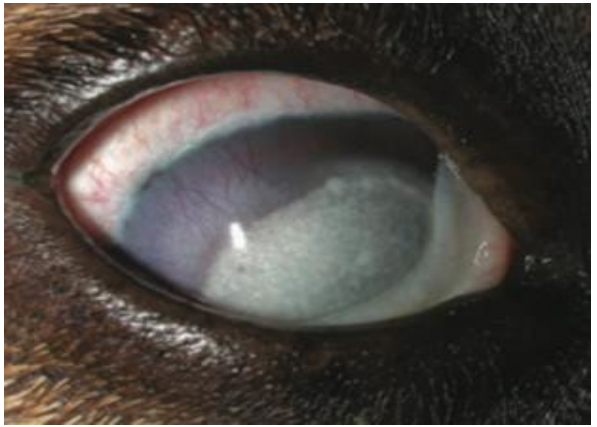
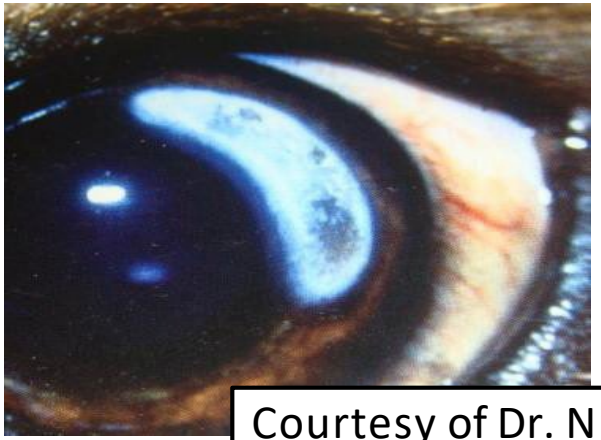
2) METABOLIC cause for Lipid Keratopathy

- Associated with systemic lipid abnormalities
  - Likely lipid deposition via limbal BVs or in situ deposition
- May be associated with
  - Hypothyroidism
  - Hyperadrenocorticism
  - Diabetes
  - Spontaneous hyperlipidemia
  - Pancreatitis
- Central and peripheral, unilateral or bilateral
- Arcus lipidosis:
  - German Shepherd Dogs
  - Thyroid abn: hyperlipoproteinemia w/ hypoT4, thyroid carcinoma
  - Classic perilimbal crescent
- Tx: low fat diet, address underlying cause
- Diagnostics: Chem, lipid serum profile, endocrine testing

Lipid Keratopathy





Courtesy of Dr. N. Millichamp

3) DIET caused lipid keratopathy

- Avoid Poultry
  - OMGA 9 fatty acids
- Avoid table scraps
- No fatty treats
  - Milk bones
  - Pupperonis

- Treatment: diet and primary cause if there is any
- Once there its difficult to rid of

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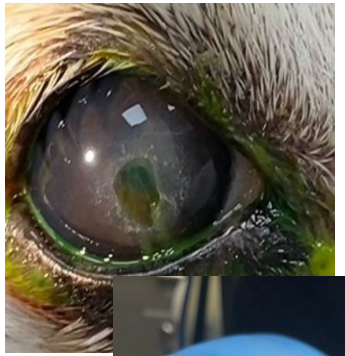
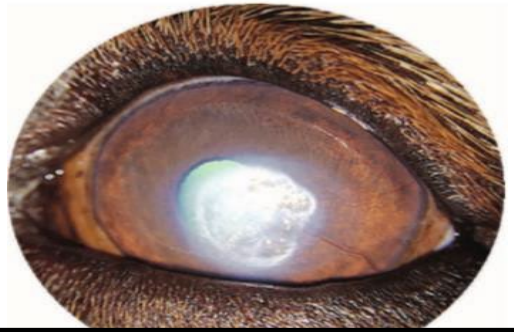
Corneal Degeneration

- Old, any breed
- “arthritis of the eye”
- Calcium Phosphorus
- Can be painful, vessels
  - Calcium liberated from dying cells
- Client education: high ulcer risk – often very deep (mineral piece “flakes” off)!!!!!
- Tx:
  - 1% EDTA bid (chelates calcium)
  - Debridement and keratotomy burr procedures
  - Keratectomy
  - Corticosteroids should be avoided as may exacerbate corneal degeneration
  - Tx of corneal ulcers – meds and sx
  - WHEN is SURGERY warranted for these



Corneal Degeneration



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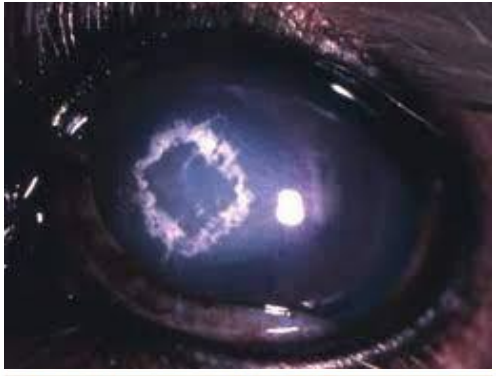
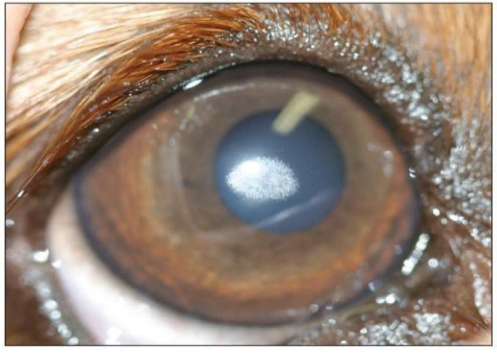
TEST YOURSELF ☺





Topical Cyclosporine and Tacrolimus for KCS

- Used for a large number of ocular surface diseases!
- Immunomodulatory – affect T-lymphocytes
- Increase aqueous tear production
- Improve tear film quality
- Reduce and stabilize pigment deposition
- Decrease corneal angiogenesis
- Formulations
  - AQ, _____, and preferences WHY? Ointment?

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Quantitative KCS

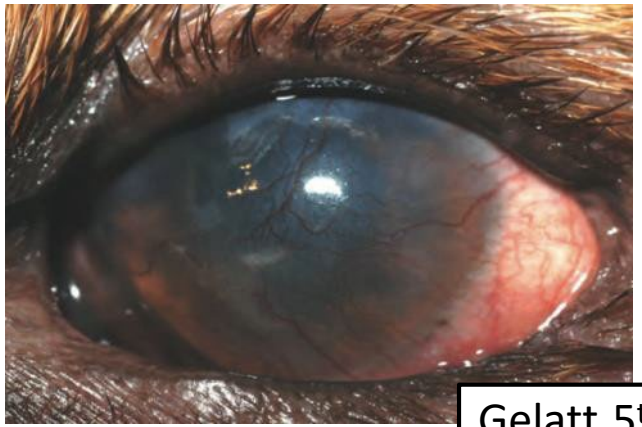
- What are the top 2 ETIOLOGIC CAUSES for KCS??
  - 1)
  - 2)

Quantitative KCS

- Normal Schirmer Tear Test 15-25mm/min
  - Ventral lateral placement, WHY?
  - Before other tests and ocular exam
  - Treat for KCS even if low normal STT
- Predisposed breeds: Westie, English Bulldog, American Cocker Spaniel, Pug, Yorkie, etc.
- Cause: mostly immune-mediated (lymphocytic plasmacytic infiltration)= makes sense why Optimmune which IS _____
  - Other: sulfa drugs, etodolac, atropine, general anesthesia, nictitans gland chronic prolapse/excision, etc.

Quantitative KCS

- History:
  - Recurrent “conjunctivitis”, recurrent (severe) corneal ulcers, mucoid discharge
- Clinical Findings
  - Increased mucoid to mucopurulent discharge
  - Keratitis (blood vessels, pigment, fibrosis); dull dessicated cornea
  - Conjunctivitis
  - Corneal ulcers
    - Often recurrent and infected



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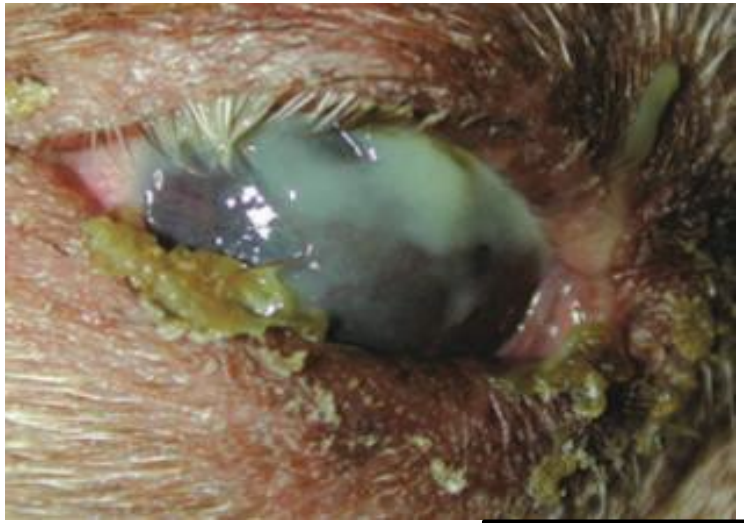
KCS Treatment – Getting Started

- Optimmune (Cyclosporine 0.02%) or CSA drops 2% BID-TID
- Tacrolimus 0.02-0.03% BID-TID (drops or ointment)
- Most dogs require BID
  - Ok to reduce dose if excessive epiphora
  - TID dosing
  - I prefer drops. Why? But ointment ok
- Topical NSAID vs steroid
  - Check Fluorescein 1st!
  - BID
  - Don't start until tears better
  - Scarring
- Acetylcysteine gentamycin drops



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KCS Treatment - Details

- Lubricate until tears increase (BID-TID at minimum, prn)
  - "Hand cream" for the eyes
    - You can't overdo this!
  - My picks: Optixcare Ophthavet, Genteal *Severe*
- Hygiene for severe cases
  - Shave matted hairs
  - Eye Wash before medications
  - My picks: 1:50 diluted betadine

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KCS – Client Communication

- It will take time to see an effect – patience!
  - 4-6 weeks to see effect
  - 3-4 months for treatment to plateau/stabilize
- Treatment will be a life-long commitment
- Dogs are at high risk for corneal ulcers
  - "Cracked skin" analogy
  - Contact DVM if there is increased blepharospasm, increased mucopurulent discharge, divot on eye

KCS – Tough Cases

- Non-responders
  - Dogs with initial STT < 2mm/min are less likely to respond to therapy
  - Even if STT never increases to normal, comfort and corneal health may benefit from therapy
    - Lubricate, lubricate, lubricate with long-acting, thick lubricant
      - Artificial Tear Ointment
      - Consider switching medications as some dogs only respond to one
    - ie. Tacrolimus to Cyclosporine
    - COMBO
    - I start with Tacro typically
  - Fortified (higher %) and combination Tacro/CSA products
  - Other reasons: neurogenic KCS, congenital alacrima, chronic damage to lacrimal gland, etc.

KCS – Surgical Therapy

- Parotid Duct Transposition
  - Saliva provides lubrication instead of tears
  - Complications: PH, mineral
  - Does not eliminate need for medications!
  - One problem for another
  - SPIT does not = TEARS
- Episcleral cyclosporine implants
  - Useful in cases of poor owner compliance, difficult patients
  - May work in dogs with good and poor response to topical therapy
  - Repeat surgeries potentially needed – clinical benefits ~1y
- Atopica

Barachetti et. al. Vet Ophthalmol. 2014; 18(3):234-4

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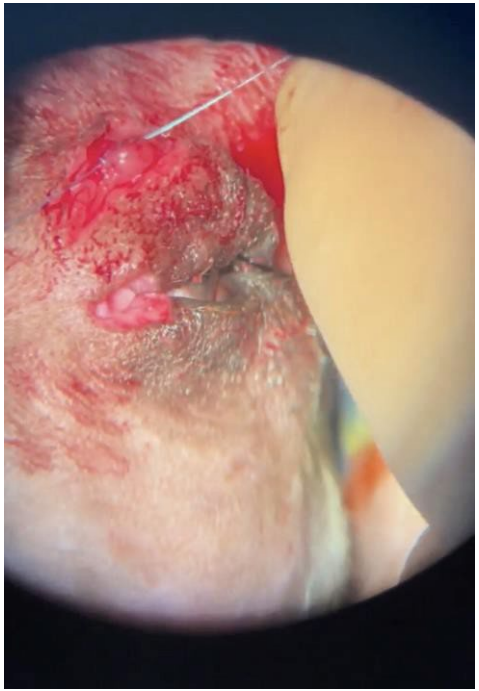
PDT



Barachetti et. al. Vet Ophthalmol. 2014; 18(3):234-4

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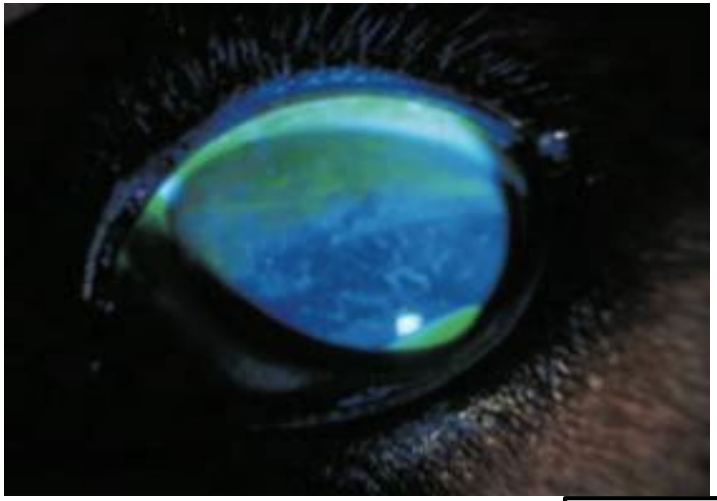
Qualitative KCS

- Mucin or lipid deficiency
  - Increased evaporation
- Normal Tear Film Break Up Time is >20s
- Normal STT
- Common in brachycephalics
- Often also have increased mucous and recurrent “conjunctivitis” and ulcers
- Keratitis – blood vessels, pigment and fibrosis
- Tacrolimus, lubricant
  - Similar to tx of quantitative KCS but less aggressive



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Thank
you!