

# THE OCULAR OUTLOOK



A Quarterly Publication for the Veterinary Community from Eye Care for Animals

## TEAR FILM DISORDERS



Nicole MacLaren, DVM, DACVO  
Eye Care for Animals

*Dr. MacLaren recently presented a talk at the Canadian Veterinary Medical Association meeting in Ottawa. Her lecture has been summarized below.*

The pre-corneal tear film is much more significant a structure than it was given credit for in the past. The tear film in dogs and cats enhances corneal clarity, cleanses and lubricates the eye, nourishes, and protects the eye. Modern imaging systems suggest that the tear film is actually about 40um rather than the previously thought 10um. Tear film disorders can be categorized as anatomic, qualitative, or quantitative.

### Anatomic Disorders

Anatomic disorders involve the distribution and functioning of the tear film and the eyelids. Possible interferences include lagophthalmos – congenital or acquired; mass occupying conditions such as severe blepharitis, third eyelid gland prolapse, or cystic, neoplastic, or inflammatory conditions, or a notching, diamond eyelid conformation.

Buphthalmic cases need control of the pressure for pain management, as well as lubrication of the eye if the globe is stretched and the eyelids are unable to close. Eyelid masses may be obvious but their effect on the tear film and corneal health is often underestimated. Phthisis bulbi may require application of lubricating ointment if associated entropion is present and surgical correction is not an option.

Macropalpebral fissure, euryblepharon, or overly large eyelid openings are conditions that can lead to lagophthalmos. This can be associated with a sometimes imperceptible, incomplete closure of the



*Cicatricial Ectropion caused by an overzealous upper eyelid entropion surgery leading to an inability of the dog to blink. She cannot distribute her tear film. STT was normal.*

eyelids and significant tear film distribution abnormalities especially in the axial interpalpebral fissure. Consequences, such as erosions, deep ulcerations, and in cats, corneal sequestrum, may result. Decreased corneal sensitivity in brachycephalic breeds, or subsequent to injury of the corneal nerves in others, may play a significant role in poor tear film distribution.

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*This dog has a combination of eyelid and tear film problems. Both eyelids are lagophthalmic so she can't completely distribute her tears. Meibomian glands are inflamed and not producing sebum so her tears evaporate quickly, she produces more (high STT), her tear film break up time is immediate, her tears are pooling on her lower eyelid (note on the right), epithelium is damaged and reacting by inflammation and pigmentation, and her periocular skin is always wet and infected.*

### Qualitative Disorders

Qualitative disorders are conditions that affect the quality of the tear film. Many factors can affect the three layers to alter the quality of the tear film. The lipid layer is responsible for preventing evaporation of the aqueous layer of the tears and the mucin layer binds the hydrophilic water to the relatively hydrophobic corneal epithelium.

Tear Film Break-Up Time (TFBUT) is used to measure the stability of the tear film. After instillation of fluorescein dye, the eyelid is closed and then opened. Breaking up of the even film typically

occurs after twenty seconds. Decreased TFBUT may indicate a qualitative disorder.

Lipid layer abnormalities are common and typically due to altered meibomian gland function. Causes may include atopy, Staphylococcus hypersensitivity, chronic blepharitis, puppy strangles, cryotherapy, and autoimmune disorders such as systemic lupus erythematosus (SLE) and pemphigus. Schirmer's tear test (STT) results in these patients are often elevated as they 'feel' dry and, as such, overproduce tears.

Patients may present with plugged or "pointed" meibomian gland openings, diffuse blepharitis, tear pooling with epiphora, or chronic keratitis. Eyelid margins may be swollen, erosive, and/or pruritic.

Treatment of qualitative tear film disorders involves lipid layer replacement using ointments, gels, or lubricant eye drops to help prevent excessive evaporation. Lipid layer modification may be achieved using systemic antibiotics such as Doxycycline or Cephalexin, and in severe cases, systemic corticosteroids. Topical broad spectrum antibiotics are also important. Warm compresses to improve sebum quality can be of benefit early in severe cases. Blephagel or i-Lid and Lash products can be soothing

and cleansing without causing further trauma in cases of erosive dermatitis.



*The meibomian glands show white 'points' where the sebum is inspissated. It should be clear like corn oil. If squeezed, this material is like toothpaste. The abnormal sebum does not then float on the tears and prevent evaporation. This dog feels dry and STT is very high.*

Systane (Alcon) and Endura (Allergan) are effective lubricant eye drops that help stabilize the tear film but they are watery and may require frequent administration. Tear Gel with Carbomer 980 (Novartis) and GenTeal tear gels are also beneficial in decreasing evaporation. i-Drop Vet (I-Med Pharma) is recommended because it is viscoadaptive, has a long contact time, is comfortable for the patient, and because the ocular tissue naturally has a hyaluronic acid binding sites. Contact time with this product is long and therefore application can be less frequent. TFBUT is dramatically prolonged with i-Drops.

Primary mucin deficiency related to congenitally absent or destroyed goblet cells has been described but appears to be uncommon. Causes



*Eyelid margin masses can not only be a concern due to neoplasia and destruction of uniquely structured eyelid margin tissue, but they also contact the cornea, rubbing against the epithelium, and not uncommonly cause inflammation or erosion of the cornea. These should be removed when small.*

of mucin deficiency may include alkali burns, chronic feline herpesvirus, chronic conjunctivitis, and autoimmune disorders such as systemic lupus erythematosus (SLE) and pemphigus. Diagnosis is by conjunctival biopsy. Dextran, polyvinylpyrrolidone, and viscoelastics are recommended supplements as these all have mucin-like properties.

### Quantitative Disorders

Quantitative disorders relate to how much tear film exists. Keratoconjunctivitis Sicca (KCS) involves a reduction in the aqueous layer that may be caused by prior use of agents such as sulfa drugs, some NSAIDs, atropine, or

anesthesia. Diabetes mellitus, hypothyroidism, Cushing's disease, systemic dehydration, neuropathies, and infections (such as canine distemper virus or feline herpesvirus) are other possible causes. In the dog there appears to be an alteration in the balance of the T-Helper cell and T-suppressor cell population of the lacrimal glands. Most cases of KCS in the dog are idiopathic.

Diagnosis of dry-eye involves taking a history of previous medications and reviewing the animal's past systemic health and bloodwork. Any sign of red eyes, ocular discharge, pain, pigment alternations, blepharitis, or periocular dermatitis should also be noted. Normal Schirmer Tear Test (STT) values are 15-25mm in dogs. STT < 10mm in dogs even without accompanying clinical signs, or STT < 15mm in dogs with clinical signs, can indicate a 'dry eye'. Cats are much more variable; STT may not be informative without clinical signs.

In dogs, treatment with Cyclosporine 1% or 0.2% (if

STT is over 10mm) generally provides a 75-82% response rate; the response rate is only about 50% when STT < 0mm. Tacrolimus 0.02% may be effective in cases that have not responded to cyclosporine and it appears to have an improved effect on pigmentary keratitis in some cases. Both of these tear stimulants may take time to reach their maximum potential and it is important to maintain tear lubricant drops, gels, and/or ointments until a 3-4 week recheck to determine whether or not the response is sufficient. Cats typically are treated for underlying Feline Herpes Virus and with tear lubricant medications.

Breeds most at risk of developing quantitative tear disorders include: the Cavalier King Charles Spaniel, English Bulldog, Lhasa Apso, Shih Tzu, West Highland White terrier, Pug, and the American Cocker Spaniel. Third eyelid gland excision should not be performed in any case, unless neoplasia is present, as it places dogs at an increased risk of developing KCS in the future.

## Editor's box

### Ocular Outlook

Editor: Sara Calvarese, DVM  
Managing Editor: Julie Gamarano

Eye Care for Animals welcomes your comments on the Ocular Outlook.  
Please e-mail your feedback to [jgamarano@eyecareforanimals.com](mailto:jgamarano@eyecareforanimals.com)  
or call Julie at (480) 424-3947 extension 111.

*Congratulations!*

*Dr. Kristina Narfstrom*

*for winning the first ever  
Outstanding Achievement Award  
in Veterinary Medicine.*

*We at Eye Care for Animals are proud of  
your ground-breaking retinal research  
and what it represents to the  
American College of Veterinary Ophthalmologists.  
The progress of your research benefits mankind  
by creating a bridge through veterinary medicine to  
human ophthalmic research.*



**2007 Vision Awards**

*Pictured from left to right back row Dr. Nicole MacLaren, Dr. Julius Brinkis,  
Dr. Douglas Esson, Dr. Reuben Merideth and Dr. Paul Barrett  
Front row Dr. Gwendolyn Lynch, Dr. Sara Calvarese,  
Dr. Kristina Narfstrom, Dr. Kelli Combs, and Dr. Allison Hoffman.*

## CERF CORNER



Sara Calvarese, DVM  
Eye Care for Animals

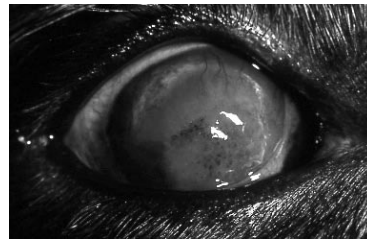
### Chronic Superficial Keratitis (Pannus)

Chronic superficial keratitis (CSK) is a bilateral inflammatory condition of the canine cornea. Although the condition can occur in any breed, German Shepherds and Greyhounds are overrepresented. The condition usually begins at the temporal limbus with local conjunctival and corneal vascularization. As the blood vessels advance into the cornea, limbal pigment migrates axially as well. Plasma cell infiltration of the third eyelid is sometimes also seen in German Shepherds. If left untreated, CSK can cause severe corneal scarring, pigmentation and vascularization that may lead to blindness. Histopathology of affected corneas reveals increased numbers of CD4+ lymphocytes, suggesting that CSK may be an immune-mediated disease. Animals that live at higher elevations, in areas of increased ultraviolet light, and those that are affected at a younger age are often more severely affected.

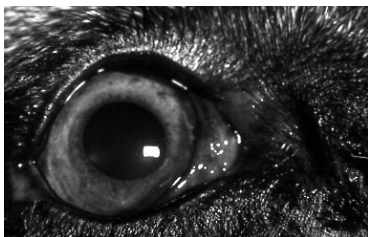
Treatment with topical steroids alone has been the mainstay of treatment for many years, but the addition of topical cyclosporine can improve control of the condition. Subconjunctival steroids can also be of benefit in controlling more severe cases. Cases that are not responsive to medical therapy may necessitate superficial keratectomy or treatment with beta radiation. Always inform owners that this disease will require lifelong treatment, and suggest consultation with an ophthalmologist in severe cases or in cases that are poorly responsive to medical therapy.



*Early pannus, note temporal corneal neovascularization.*



*Advanced pannus, note corneal pigmentation, neovascularization and granulation tissue.*



*De-pigmentation and plasmoma development on the third-eyelid in association with pannus.*



*Chronic corneal pigmentation in a controlled case of pannus.*

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MEMO TO MANAGERS

“IF WE TAKE CARE OF OUR EMPLOYEES - THEY WILL TAKE CARE OF US!”

I'm sure many have read all the business books that preach putting customers first, or profits first, or building cultures on the premise of six sigma and other excellence standards. While these are *all important*, a company cannot lose sight of the fact that if it takes care of its employees, the rest will come. Great employees are the enablers that make everything else happen - it's a key ingredient to a company's success! If we take care of employees, most will give back by going the extra mile and doing the over and above, while providing great service to referring veterinarians, clients and patients!

Building and nurturing a culture that makes employees feel like they are the most valued assets is of utmost importance. This feeling is not something created over night, nor is it something lip service can be given to - people see right through that! Employees need to see their superiors “walk the talk”. It is important to continually work at fostering this type of corporate climate and culture. Organizations have a way of reflecting attitude, personality, and even sensitivity, and a company's culture starts with owners and managers, and how they select and treat the rest of their team.

So, what exactly does taking care of employees mean? In addition to having a competitive compensation and benefits package other emphasis must be placed on the following:

- **Empowering employees** to make the best decisions for the company.
- **Creating a feeling of ownership** and responsibility among employees.
- **Investing in employees** through training and continuing education opportunities.
- **Allowing employees to share in the financial rewards** for their efforts and accomplishments.
- **Creating an environment of trust and integrity.**
- **Being committed to developing good people** by identifying, cultivating, training, rewarding and promoting those employees who are committed to moving the company forward.
- **Treating others the way you want to be treated.**
- **Fostering an “open door policy”** and making sure employees' voices are heard.
- **Creating partnerships.** Most employees think they work for the company; however, a better mindset would be working with the company's owners and managers like a partnership.

One of the best ways to meet and exceed the expectations of who is served is to hire and train great people—invest in employees. And, remember... “**if we take care of our employees, they will take care of us**”.



Karen Webster, MBA  
Chief Operations Officer  
Eye Care for Animals