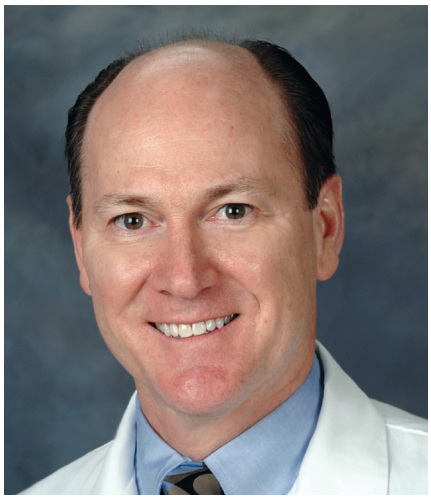
Eye Care® FOR ANIMALS
Seeing life through your pet's eyes

Volume 10, Issue 4
December 2012

OCULAR Outlook

A QUARTERLY PUBLICATION FOR THE VETERINARY COMMUNITY FROM EYE CARE FOR ANIMALS

SPECIALIZED DIAGNOSTICS



B. Keith Collins,
DVM, MS, DACVO

This year's Outlook articles have thus far focused on diagnostic tests and reagents routinely used in ophthalmology and readily available to the general practitioner. This final article reviews specialized diagnostic tests that are usually limited to use by an ophthalmologist. Familiarity with these tests may be helpful to determine if referral is appropriate for select patients.

Light that enters the eye is bent, or refracted, by the cornea and lens en route to the retina. Refractive errors are known to occur in domestic animals, especially dogs, and can contribute to visual disorders or behavioral abnormalities. The eye can be tested for refractive errors utilizing a streak retinoscope and series of lenses (Figure 1). Normal refraction of the eye is called emmetropia, whereby light entering the eye focuses on the retina. Myopia

Figure 1: Retinoscopy performed in an Owl. The lens bar used for testing is shown. Courtesy of Dr. Ellison Bentley.

(or nearsightedness) occurs when light focuses in front of the retina. This can be due to an elongated globe, changes in refractive indices of the lens (e.g., lenticular sclerosis), or changes in corneal or lens curvature. Hyperopia (or farsightedness) occurs when light focuses behind the retina due to a shortened globe or changes in corneal or lens curvature. Studies have shown that certain breeds are predisposed to myopia, and myopia often increases with age. Determining a pet's refractive status may be helpful to assess perceived visual abnormalities in otherwise normal eyes, or to determine if a particular dog is suited to its intended function (e.g., guide dogs, field trial dogs, etc.).

The electroretinogram(ERG) is an electrodiagnostic test that measures retinal function. It is not a vision test, but the ERG can be helpful to determine the cause of blindness. It is also used to assess retinal function in pets prior to cataract surgery when the fundus cannot be directly visualized. The ERG is performed by placing a recording electrode in the form of a contact lens on the cornea, a reference electrode over the zygomatic arch posterior to the globe, and a ground electrode over the occipitus.

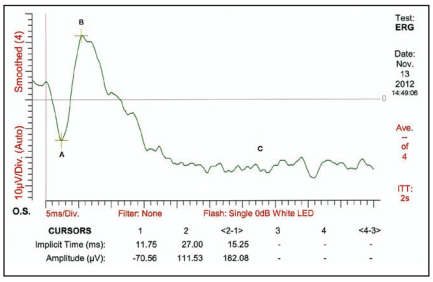


Figure 2: Normal ERG in a dog. The A, B, and C waves are identified.

A light is flashed in the eye and the response recorded and displayed on a computer screen. The waveform has several components; the major ones are designated as the A, B, and C waves, and each is generated by different layers of the retina (Figure 2). The amplitude of the B wave is of greatest importance for clinical applications, and depending on the apparatus, a normal B wave

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SPECIALIZED DIAGNOSTICS

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amplitude is 100 microvolts or higher. An eye in which a low or negative ERG amplitude is obtained suggests retinopathy or retinal degeneration. This would be expected with diseases such as sudden acquired retinal degeneration syndrome (SARDS) and progressive retinal atrophy (PRA). By contrast, pets that are blind from optic nerve or cortical disease will have a normal ERG. The ERG can be performed in both light (photopic) and dark (scotopic) conditions, or with red and blue light filters to assess cone and rod photoreceptor function, respectively. Visual evoked potential (VEP) and pattern ERG (PERG) testing are not used in clinical practice and are confined to an academic setting. The VEP is a subcomponent of the electroencephalogram (EEG) and measures function of the visual cortex in response to a flash or patterned image. The PERG also utilizes a patterned visual stimulus but measures function of the inner retinal layers (i.e., the ganglion layer) and visual resolution.

Ocular ultrasound is commonly performed in ophthalmology. Amplitude modulation (A-mode) and brightness modulation (B-mode) are most often used. Ultrasound probes for ophthalmic use do not require the same tissue penetration, and therefore, a higher megahertz (MHz) probe is used. Common probe sizes range from 7 to 50 MHz with higher frequency probes utilized for high-resolution images of the anterior segment. A-mode is one dimensional and is typically used to measure axial globe length, and the size and thickness of intraocular structures such as the lens. B-mode is two dimensional and used to assess the extent of anterior segment tumors, the posterior segment for retinal detachment when it cannot be visualized because of cataract or hyphema, and to evaluate the orbit and optic nerve. B-mode is also used to assess for pre-existing retinal detachment prior to cataract surgery (Figure 3). C-mode has not been reported in veterinary ophthalmology

Figure 3: B-mode ultrasound demonstrating retinal detachment in a dog. The arrows denote the retina. Courtesy of Dr. Dustin Dees.

but holds promise for providing noninvasive three dimensional images of the optic nerve and orbit. Computed tomography (CT) and magnetic resonance imaging (MRI) are most useful for evaluation of the optic nerve and orbital structures.

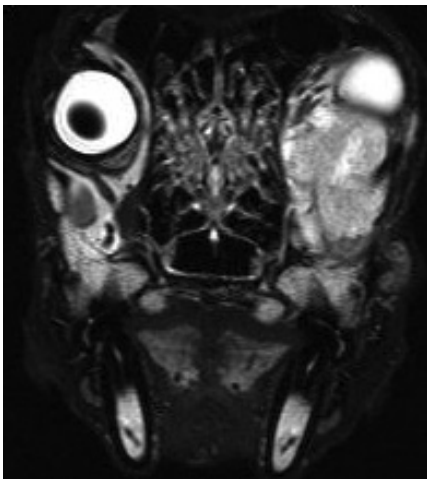

Figure 4: MRI scan of an orbital fibrosarcoma. Courtesy of Dr. Dustin Dees.

These latter tests require general anesthesia, and while expensive, may be appropriate to determine the cause of exophthalmos, the extent of orbital tumor prior to surgery, and to assess the optic nerve or brain in

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ARTICLE SPOTLIGHT

Editor's note: The spotlight is intended to provide practitioners with clinically relevant information from journals not available to most veterinarians. Old and new articles are included and are selected by the reviewer. This article was provided by Dr. Erin Gunderson.

Title: Feline entropion: a case series of 50 affected animals (2003-2008). Vet Ophthalmol 2009;412:221-226.

Summary: This retrospective study evaluated the signalment, clinical signs, etiopathogenesis and outcome of treatment with Hotz-Celsus for entropion in 50 cats. The most common cause for entropion in cats was involution of the eyelid presumably due to a reduction in orbital tissue or increased lid laxity associated with increased age in older cats (mean age 11.3 +/- 2.2 years). The other common cause was pre-existing irritative ocular surface conditions such as conjunctivitis, corneal ulceration or sequestrum in younger cats (mean age 4.1 +/- 3.6 years). The Hotz-Celsus surgical procedure was successful the first time in 43/50 cats.

Comments: Feline entropion is poorly documented in the literature. An additional etiopathogenesis for feline entropion was the brachycephalic facial anatomy of Persian cats, which has been previously reported.

Erin Gunderson, DVM, DACVO

Excessive cheek tissue in intact male Maine Coone cats was a new cause of feline entropion identified in this study. The etiopathogeneses for feline entropion appear to be different from canine entropion and particularly in younger cats, an underlying ocular condition should be identified and treated before considering permanent correction for entropion. Surgical correction using the Hotz-Celsus procedure resulted in removal of a larger amount of tissue, compared to canine counterparts, but a good surgical outcome in feline entropion cases.

Conclusion: The etiopathogenesis of feline entropion differs from canine entropion. Younger cats with entropion often have a concurrent ocular surface disease, whereas older cats often have reduced orbital tissue or increased lid laxity associated with age. A Hotz-Celsus surgical procedure appears to be effective in correcting feline entropion.

Upcoming EVENTS

January 8, 2013 - Las Vegas, NV
Wet-Lab

January 16 - Woodland Hills, CA
Open House

January 16-17, 2013 - San Diego, CA
Wet-Lab

February 5, 2013
Springfield, MO
Ophthalmology Dinner and Lecture

February 27, 2013 - N. Scottsdale, AZ
Open House - Tentative Date
Scottsdale Veterinary Specialty and Emergency Center

April 28, 2013 - Tustin, CA
Advanced Veterinary Specialty Group
Multi Specialty Wet Lab

June 2, 2013 - Culver City, CA
City of Angels
Multi Specialty Wet Lab

For more information please contact Marketing at marketing@eyecareforanimals.com

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SPECIALIZED DIAGNOSTICS

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pets with neurologic abnormalities or unexplained blindness. Optical coherence tomography (OCT) is a new diagnostic modality that is too expensive for routine clinical use. However, it is gaining popularity in veterinary ophthalmology and utilizes light to provide 3-dimensional high resolution images of the ocular structures. It is commonly used in human ophthalmology to assess the optic disc and retinal nerve fiber layer, especially in glaucoma patients.

Finally, there are a few additional instruments and techniques useful in both clinical and research settings. All available techniques cannot be discussed in the confines of this article, but two are notable. Pachymetry is the measurement of corneal thickness and can be useful to assess pathologic thinning or thickening in various disease conditions. Hand-held ultrasonic pachymeters are now available. Corneal sensitivity can be measured using a hand-held aesthesiometer. Decreased corneal sensation can be associated with certain disease states such as neurotrophic dry eye, after lensectomy, and in certain breeds (notably brachycephalic breeds). The aesthesiometer measures corneal sensation using a small diameter filament that touches the cornea; the degree of sensitivity is semi-quantitated based on the length of filament required to elicit a blink response.

"Healthcare Reform Is Just Around The Corner!"

Karen Webster, MBA
President & CEO, Eye Care for Animals

On March 23, 2010, President Obama signed the Affordable Care Act. The law puts in place comprehensive health insurance reforms with most changes taking place by 2014. As implementation of the Patient Protection and Affordability Care Act moves forward, new guidance and regulations will continue to be released—it's a work in progress!

The Patient Protection and Affordable Care Act establishes what's referred to as an "exchange". According to Healthcare.gov, the definition of an exchange is a state-based competitive health insurance marketplace where people and small businesses can shop for and buy affordable private health insurance. Beginning March 1, 2013, all employees must be informed of these exchanges. Companies will need to provide a print notice with information about the exchanges and an employee's ability to shop for coverage. This notice needs to include eligibility rules for premium credits and the differences between an exchange plan and an employer-sponsored plan. Now that President Obama has won re-election, the enactment of State based exchanges will proceed quickly. Undecided States had to notify the Department of Treasury by November 16 of their intention to operate a State based exchange. And, the Health & Human Services Department has until January 1, 2013 to certify each State based exchange in preparation for open enrollments in October 2013. It's not too early for employers to be giving thought to how they will address the notice of eligibility for health insurance exchange. As of today, it's not clearly stated as to what type of delivery method will be used to educate employees, or how much detail will be required with the formal notification. There are still a lot of unknowns, but we all realize the healthcare reform ball is rolling. It's a good idea to be working with your healthcare provider third party administrator or other counsel regarding the preparation and roll out of these regulations as part of healthcare reform.

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