

Adapting the RETeval™ ERG device into a veterinary tool (RETevet™)

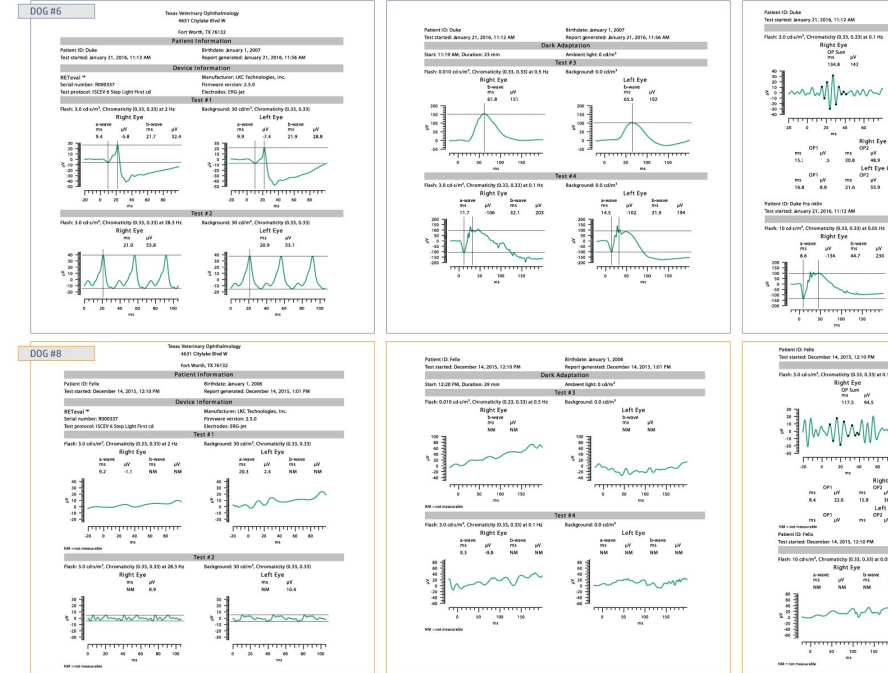
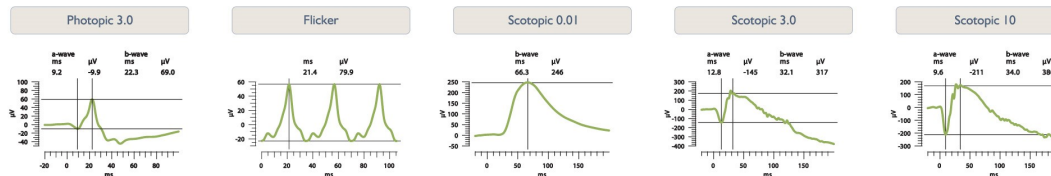
RESULTS

Table 1: Ocular findings and retinal function of cataract surgery candidates

Dog ID	Dog description	Ocular findings	ERG results and interpretation	Cataract surgery candidate?
1	Maltese, 15 y/o, spayed, F	OU: hypermature cataracts; OD: secondary glaucoma, severe anterior segment abnormalities secondary to chronic, uncontrolled phacolytic uveitis	ERG performed in OS only: flat photopic and scotopic ERGs	NO
2	Dachshund, 13 y/o, neutered, M	OD: unremarkable, funduscopically normal OS: complete cataract, suspected chronic inflammation	OS: severely decreased photopic and scotopic ERGs; OD: photopic ERG decreased suggesting a systemic component	NO
3	Pomeranian, 7 y/o, neutered, M	OD: funduscopically normal, early immature cataract; OS: retina could not be visualized, late immature cataract	OU ERGs performed: OD 30% > OS The complete set of readings was obtained from OS to compensate for the lack of fundus visualization	YES
4	Wheaten Terrier, 8 y/o, neutered, M	OD: hypermature cataract, subluxation previous glaucoma, OS: early hypermature cataract	OS: Photopic and scotopic rod ERGs decreased by around 50%	YES
5	Mixed Breed, 7 y/o, spayed, F	OD: hypermature cataract; OS: immature cataract	OU ERGs performed: Scotopic mixed OS 20% < OD	YES
6	Toy Poodle, 10 y/o, neutered, M	OD: immature cataract, ~80% of lens volume is cataractous OS: late immature cataract, scant areas of muted tapetal glow through peripheral cortex	OU ERGs performed: Scotopic, rod OS 30% < OD	YES
7	Maltese 6 y/o, spayed, F	OU: late immature cataracts, approximately 50% of lens volumes is opacified	OU ERGs performed: Photopic and Scotopic OD 30% < OS	YES
8	Chihuahua 10 y/o, neutered, M	OU: hypermature cataracts, anterior capsular pigment; mild brunescence; suspected progressive retinal atrophy	OU ERGs performed: OU residual or flat ERG	NO
9	Mixed Breed 10 y/o, spayed, F	OU: mature cataracts, mild brunescence	OU ERGs performed: OU residual or flat ERG	NO
10	Toy Poodle 13 y/o, spayed, F	OU: hypermature cataracts, OS: subluxation	OU ERGs performed: Scotopic OS 35% < OD	YES
11	Puggle (Pug/Beagle cross) 7 y/o, spayed, F	OU: mature cataracts, mild intraocular inflammation, diabetes	OU ERGs performed: OU residual or flat ERG	NO
12	Pug 10 y/o, spayed, F	OU: nuclear sclerosis, vitreous degeneration Presented for evaluation of acute amaurosis	OU ERGs performed: OU residual or flat ERG, SARDS confirmed	NO
13	Bichon Frise 12 y/o, spayed, F	OD: nuclear sclerosis; incipient cortical opacities; limited view; geographic retinal atrophy; choroidal furring; tapetal hyperreflectivity; vascular attenuation OS: hypermature cataract, fundus not visualized	OU ERGs performed: OU flicker and scotopic high flash: residual ERGs, photopic and scotopic rod and mixed: flat ERGs	NO
14	Toy Poodle 4 y/o, neutered, M	OD: hypermature cataract, OS: immature cataract	OU ERGs performed: OD, all ERGs decreased by 50%; OS, all ERGs close to normal. Partial superior retinal detachment diagnosed via B-scan	YES
15	Shih Tzu 7 y/o, spayed, F	OD: hypermature cataract; OS: immature cataract; OU: dry eye; vitreal degeneration	OU ERGs performed: ERGs decreased by 80-90 %, suspected progressive retinal atrophy	NO
16	Dachshund 13 y/o, spayed, F	OU: 1-2+ nuclear sclerosis; incipient anterior cortical cataract hemorrhage(s) ventrotemporal at tapetal-nontapetal junction (OS>OD). Presented for evaluation of acute amaurosis	OU ERGs performed: OU residual or flat ERG, SARDS confirmed	NO
17	Mixed Breed 9 y/o, neutered, M	OU: immature diabetic cataracts, no other abnormal findings	OU ERGs performed: Photopic OD 40% < OS	YES

Table 2: Normal dog ERG measurements

	PHOTOPIC			SCOTOPIC					
	a-wave	b-wave	flicker	0.01	3.0	10.0	30.0	100.0	
Amplitude (µV)	3-13	25-75	19-80	b-wave 50-250	a-wave 60-150	b-wave 150-320	a-wave 100-220	b-wave 200-400	
Implicit time (ms)	8.5-13	20-24	20-22	50-70	11-16	29-33	8.0-12	29-45	



DISCUSSION

- Due to the positive outcome of their electroretinograms 8 out of 17 dogs (47%) were deemed suitable for cataract surgery
- ERG amplitudes greater than the minimum reference range or at least half that of an unafflicted dog considered a good prognosis for sight restoration after the phacoemulsification and lens replacement
- The ERG results were also useful in:
 - Establishing the retinal status in case the retina could not be visualized due to the dense cataract
 - Establishing and/or confirming the Sudden Acquired Retinal Degeneration Syndrome (SARDS)
 - Detecting an unexpected retinal detachment and deciding on the treatment
- Normal dog ERGs confirmed the measurements obtained from the non or less affected candidates were within the normal values
- Amplitudes of the normal ERGs vary significantly more than the implicit times
- In a busy veterinary practice ERG results are evaluated for:
 - Morphology of the waveforms
 - Implicit times and amplitudes within the normal ranges
 - Consistency with other ocular findings

CONCLUSION

- ERG is an essential pre-surgical evaluation tool able to efficiently discriminate unsuitable cataract surgery candidates
- RETeval is easily adaptable to be used in veterinary settings to measure ERG recordings in dogs can be successfully obtained without any anesthesia
- Results obtained with RETeval were crucial in establishing diagnosis and planning surgery

the United States. Fully 45% of all U.S. households have at least one dog as a pet. Many pet owners are very willing to spend considerable sums of money to prolong both the life and the health of their dogs. The prevalence of dogs, veterinarians, clinics, and households with dogs is increasing in 60,000 clinics. The prevalence of dogs, veterinarians, clinics, and households with dogs is increasing in 60,000 clinics. The prevalence of dogs, veterinarians, clinics, and households with dogs is increasing in 60,000 clinics.

METHODS

All the data collected in this study were obtained in Texas Veterinary Ophthalmology, a board-certified specialty practice providing eye care to animals of the greater Fort Worth, TX area. Dr. Brian Cichocki performed all the ERGs and cataract surgeries.

Subjects

- 17 dogs (10 female) evaluated for cataract surgery
- Small, pure, and mixed breeds
- 9.5 ± 3.0 years old (mean ± SD)
- All neutered or spayed
- 4 dogs with normal vision served as controls (two 4 y/o dachshunds, F and M, 3 y/o Amstaff, M, 1 y/o standard poodle, M)

Methods

- Pupils dilated with 1% Tropicamide
- ERG-Jet corneal electrode (active), platinum subdermal needle electrodes, reference at the base of the ear and ground in the middle of the back
- 20-30 min of dark adaptation

Cataract surgery

Phacoemulsification using Centurion (Alcon) with or without lens (Cara) implantation was performed according to the TXVO standard operating procedure