IEOC/an-vision, Inc. Equine Ophthalmology Symposium

Hotel Distil
Louisville, Kentucky, USA

June 9-11, 2022

International Equine Ophthalmology Consortium
PO Box 1311 Meridian ID 83680 | 208-466-2519 | office@equineophtho.org

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The goal of this symposium is to share, with a small group of dedicated clinicians and scientists, current clinical and basic research on equine ophthalmology. Abstract and case presentations, along with social events, will facilitate the development of multi-centered collaborative research.

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2022 IEOC/an-vision, Inc. SYMPOSIUM PROGRAM

Time	Room	Event	Presenter	Title/Topic
Thursday, June 9				
6:00pm-8:00pm	Grand Ballroom C	Welcome Reception/Registration (***Attendee name badge required/guest ticket required)***		
Friday, June 10				
7:30am		Registration desk open		
7:45am-8:30am	***Grand Ballroom C***	***Breakfast with Exhibitors (Attendees only, name badge required)***		
8:30am-8:45am	Grand Ballroom AB	Welcome and Introduction	A. Dwyer	
8:45am-9:45am	Grand Ballroom AB	State of the Art Lecture	Dr. Stephen Schumacher	"How to 'See Eye to Eye' with Equine Drug & Medication Rules"
9:45am-10:00am	***Grand Ballroom C***	***Break with Exhibitors***		
10:00am-11:00am	Grand Ballroom AB	State of the Art Lecture	Dr. Catherine Nunnery	"Competition Horses with Ocular Disease"
11:00am-12:00pm	**Scientific Abstract Presentations**		**Moderator**	*15-minute presentations, 5-minute Q&A*
11:00am	Grand Ballroom AB		R. Allen	OCULAR PATHOLOGY IN WARMBLOOD HORSES (EQUUS CABALLUS) IN SOUTH AFRICA
11:20am	Grand Ballroom AB		F. Torres-Otero	ENTROPION CORRECTION USING SUBDERMAL HYALURONIC ACID IN HORSES
11:40am	Grand Ballroom AB		L. Charnock	EFFECTS OF CORNEOCONJUNCTIVAL TRANSPOSITION, POSTERIOR LAMELLAR KERATOPLASTY AND DEEP LAMELLAR ENDOTHELIAL KERATOPLASTY ON STREAK RETINOSCOPY IN EQUINE CADAVER EYES
12:00pm-1:10pm	***Grand Ballroom C***	***Lunch with Exhibitors (Attendees only, name badge required)***		
1:10pm-1:50pm	**Scientific Abstract Presentations**		**Moderator**	*15-minute presentations, 5-minute Q&A*
1:10pm	Grand Ballroom AB		H. Bostick	OPTIC NERVE HEAD MEASUREMENTS OF THE ADULT EQUINE EYE USING OPTICAL COHERENCE TOMOGRAPHY
1:30pm	Grand Ballroom AB		B. Gilger	LONGITUDINAL STUDY ON THE EFFECT OF LEPTOSPIRAL VACCINATION ON UVEITIS ON A SINGLE FARM: THE PARADOX STUDY
1:50pm-3:05pm	**Case Reports**	**Moderator**	*10-minute presentations, 5-minute discussion*	**1:50pm-3:05pm**
1:50pm	Grand Ballroom AB		L. Hudson	New Therapy for Equine Sarcoids: Interferon Alfa-2b
2:05pm	Grand Ballroom AB		A. Metzler	Clinical and Histologic Features and Long-Term Outcome of Ocular and Nasal Amyloidosis in a Quarter Horse
2:20pm	Grand Ballroom AB		K. Knickelbein	Minimally Invasive Stenting of the Equine Nasolacrimal Apparatus
2:35pm	Grand Ballroom AB		S. Armstrong	Successful Management of a Unilateral Persistent Epithelial Defect Secondary to Meibomian Gland Dysfunction in an Irish Sports Horse Using a Multi-Modal Treatment Plan
2:50pm	Grand Ballroom AB		A. Pinon-Cabrera	Dermoid Cyst in a Foal
3:05pm-3:25pm	***Grand Ballroom C***	***Break with Exhibitors***		
3:25pm-3:45pm	Grand Ballroom AB	5-Minute Vendor Presentations (Four Vendors)		
3:45pm-4:45pm	Grand Ballroom AB	"Hot Topics" Roundtable Discussion		
4:45pm-5:15pm	**Grand Ballroom AB**	**IEOC Member Business Meeting** All registered attendees are members, please attend.		
5:15pm	**Conclude**			

2022 IEOC/an-vision, Inc. SYMPOSIUM PROGRAM *continued…*

Time	Room	Event	Presenter	Title/Topic
Saturday, June 11				
7:30am		Registration Desk Open		
7:45am-8:45am	***Grand Ballroom C***	***Breakfast with Exhibitors (Attendees only, name badge required)***		
8:45am-9:00am	Grand Ballroom AB	Speaker Introduction	E. Tolar	
9:00am-10:00am	Grand Ballroom AB	State of the Art Lecture	Dr. Catherine Nunnery	"Ambulatory Equine Ophthalmology"
10:00am-10:20am	***Grand Ballroom C***	***Break with Exhibitors***		
10:20am-11:20am	Grand Ballroom AB	State of the Art Lecture	Dr. Catherine Nunnery	*continued* "Ambulatory Equine Ophthalmology"
11:20am-12:20pm	**Scientific Abstract Presentations**		**Moderator**	*15-minute presentations, 5-minute Q&A*
11:20am	Grand Ballroom AB		H. Smith	EFFECT OF GENTAMICIN ON CD3+ T-LYMPHOCYTE PROLIFERATION AND CELL VIABILITY FOR TREATMENT OF RECURRENT UVEITIS IN HORSES: A PILOT STUDY
11:40am	Grand Ballroom AB		N. Kingsley	IDENTIFICATION OF RISK LOCI FOR INSIDIOUS UVEITIS IN LP SPOTTED HORSES
12:00pm	Grand Ballroom AB		R. Bellone	ADDITIONAL EVIDENCE SUPPORTS MISSENSE MUTATION IN GRM6 AS THE CAUSE OF CONGENITAL STATIONARY NIGHT BLINDNESS IN BOTH THE TENNESSEE WALKING HORSE AND THE STANDARDBRED
12:20pm-1:30pm	***Grand Ballroom C***	***Lunch with Exhibitors (Attendees only, name badge required)***		
1:30pm-2:45pm	**Case Reports**	**Moderator**	*10-minute presentations, 5-minute discussion*	**1:30pm-2:45pm**
1:30pm	Grand Ballroom AB		E. Tolar	Cryotherapy as an Adjunctive Treatment for Fungal Keratitis
1:45pm	Grand Ballroom AB		B. Martins	Suspected Malignant Transformation of Immune Mediated Keratitis
2:00pm	Grand Ballroom AB		R. Allbaugh	Presumed Heterochromic Iridocyclitis with Secondary Keratitis (HIK) Associated with Equine Herpesvirus-1 (EHV-1) Infection
2:15pm	Grand Ballroom AB		B. Patterson	Positive Detection of Dorzolamide in a Six-Year-Old Thoroughbred Gelding, Over Six Months Following Ophthalmic Application
2:30pm	Grand Ballroom AB		R. Chalder	A Case of Bacterial, Suppurative Endophthalmitis Following Suprachoroidal Triamcinolone Injection and Placement of a Suprachoroidal Biodegradable Cyclosporine Implant in a Horse with Equine Recurrent Uveitis
2:45pm-3:05pm	***Grand Ballroom C***	***Break with Exhibitors***		
3:05pm-3:45pm	Grand Ballroom AB	"Hot Topics" Discussion		
3:45pm-4:30pm	Grand Ballroom AB	Panel Discussion		
4:30pm	**Conclude**			

IEOC/an-vision, Inc. SYMPOSIUM INDEX
LISTED IN ORDER OF PRESENTATION

Friday, June 10th

Abstracts

Case Reports

Saturday, June 11th

Abstracts

Case Reports

State of the Art Lecturer

Dr. Stephen A. Schumacher, DVM, PhD

Chief Administrator
Equine Drugs & Medications Program
United States Equestrian Federation

Dr. Schumacher has been involved with the United States Equestrian Federations Equine Drugs and Medications Program for the last 20 years serving as a testing technician and testing veterinarian, and has been the Chief Administrator of the Equine Drugs and Medications program since December of 2006. Dr. Schumacher has served as a member of the FEI Veterinary Committee, currently serves as a member of the FEI List Group, and was responsible for the Equine Drug Testing at the 2010 World Equestrian Games and assisted as the Integrity Advisor for the 2018 World Equestrian Games. Dr. Schumacher received his bachelor degree from The Citadel, The Military College of South Carolina, and his Doctor of Veterinary Medicine and PhD from The Ohio State University.

How to 'See Eye to Eye' with Equine Drug and Medications Rules

Stephen A. Schumacher, DVM, PhD
Chief Administrator, USEF Equine Drugs & Medications Program

The primary mission of all regulatory bodies is to safeguard the welfare of horse competing. However, this can present challenges for the trainers, owners, and the veterinarians tasked with diagnosing and treating injuries and illnesses in our equine partners. When caring for and medicating horses, it is essential that veterinarians be aware of the rules under which the horse will be competing.

The United States Equestrian Federation (USEF) is the National Governing Body for equestrian sport. The USEF governs 29 different breeds and disciplines and is responsible for the equine drugs and medications rules under which these horses compete. One resource for veterinarians to review is the 2022 USEF Guidelines & Rules for Drugs and Medications found at https://www.usef.org/forms-pubs/2Zp2C_YKs4s/2022-equine-drugs-medications. This document is usually published yearly and includes examples of prohibited substances, recommendations for the administration of quantitatively restricted medications, practical advice how to comply with the rules, and the actual equine drugs and medications rules (General Rule 4). The USEF also has procedures for the use of prohibited substances close to competition and include the filing of a medication report form and a 24-hour withdrawal from competition. An additional resource to understand the rules include directly contacting the Federations Equine Drugs and Medications Program at medequestrian@aol.com or 800-633-2472.

The Fédération Equestre Internationale (FEI) is the International Governing Body for equestrian sport, and is headquartered in Lausanne, Switzerland. Founded in 1921, the FEI regulates international competitions in Dressage, Jumping, Eventing, Endurance, Driving, Vaulting and Para-Equestrian Dressage. In 2010, the FEI launched Equine Clean Sport that adopted an approach similar to the World Anti-Doping Agency (WADA), and published the Equine Prohibited Substances List (EPSL) https://inside.fei.org/sites/default/files/2022%20Prohibited%20Substances%20List.pdf . Recognizing that while all substances placed on the list are prohibited from being in the horse at time of competition, there are differences between legitimate therapeutic medications used to treat horses and those drugs and substances that have no recognized use in horses. The FEI places each prohibited substance into one of two categories; Controlled Medications which are legitimate therapeutics and Banned Substances which have no therapeutic value in the horse and typically have a potential for abuse. The FEI has also developed a list of Detection Times for a number of common equine therapeutics found at https://inside.fei.org/system/files/FEI%20Detection%20Times%202018_0.pdf. It is important to remember that while these substances are core treatment medications and have published detection times, they are not permitted in the horse at the time of competition.

Ophthalmic treatments present their own complications because of the route of administration and whether there is systemic absorption or effect. Additionally, there are concerns with ophthalmic NSAIDs 'doubling up' on other NSAIDs concurrently administered systemically, as well as ophthalmic specific NSAIDs that may constitute a violation. Progress has been made in the use and acceptance of cyclosporine in horses competing under FEI rules, but more ophthalmic specific medications need to be reviewed and subjected to administration trials with the goal to provide recommendations for their appropriate use in horse actively competing.

State of the Art Lecturer

Dr. Catherine Nunnery, DVM, DACVO

Equine Veterinary Vision, Inc.
The Plains, Virginia

Dr. Nunnery runs one of the only equine ophthalmology private practices in the United States. She was trained by mentors in Lexington, KY and Gainesville, FL. Dr. Nunnery was board certified and became a Diplomate of the American College of Veterinary Ophthalmologists in 2010. She has practiced ophthalmology at two teaching hospitals, but now focuses on equine ophthalmology on the farm and in small clinics in the Washington, DC region.

Competition Horses with Ocular Disease
Catherine Nunnery, DVM, DACVO

Competition Rules on Equine Vision

Lauren Hudson,DVM and Catherine Nunnery, DVM, DACVO

United States Equestrain Federation (USEF)

	Class	Able to compete under these conditions:	Rule	
	General Rule	One visual eye (if deemed serviceably sound by the judge and/or official veterinarian)	Animals with complete loss of sight in either eye may be found serviceably sound at the Judge's discretion, except in a class over fences where a Judge may ask a rider to change horses. The official veterinarian's decision, if requested by the judge as to the serviceable soundness of a horse (i.e., whether the horse shows evidence of lameness, broken wind, or complete loss of sight in either eye), will be final for the purpose of awarding ribbons in the class for which he has been called	GR840, GR1204.4
	Andalusian/Lustiano	One visual eye (performance class only)	Horses with loss of sight in one eye may compete in performance classes only.	A101.3
	Purebread Arabian, Half-Arabian, Anglo-Arabian	Two visual eyes (breeding/gelding in-hand classes and sport horse in-hand classes) Glass eyes penalized (breeding/gelding in-hand classes) One visual eye (all other classes)	All horses must have vision in at least one eye in order to compete in any class except Breeding/Gelding In-Hand classes and Sport Horse In-Hand Classes, where horses must have vision in both eyes. The official veterinarian's decision, if requested by the judge as to the serviceable soundness of a horse (i.e., whether the horse shows evidence of lameness, broken wind, or complete loss of sight in either eye), will be final for the purpose of awarding ribbons in the class for which he has been called. Horses with loss of sight in one eye may compete in Performance Halter classes.	AR 104.1, AR105.1a&b, AR 123.1
	Dressage	No visual eyes (if individually shown) One visual eye (required if not showing individually)	Horses showing evidence of broken wind or complete loss of sight in either or both eyes are permitted to compete. Horses with complete loss of sight in both eyes may only participate in classes in which they are shown individually.	DR119.1
	English Pleasure	One visual eye (at the judge's discretion)	Animals with complete loss of sight in one eye may be found serviceably sound at the judge's discretion	EP101
	All Eventing Competitions	One visual eye	A horse is eligible for Eventing competitions even though it has complete loss of sight in one eye, provided sight in the other eye is normal and provided it meets the other requirements.	EV104.4
	Fresian and Part Bred Fresian	One visual eye (other eye can have prosthetic, or damaged, impaired by illness, injury, or due to birth defect) EXCEPTIONS: In-Hand, Western Trail, Hunter Hack, and Combination Drive, Ride, and Jump classes (two visual eyes required)	Horse must possess one eye that is not visually impaired. One eye prosthetic or an eye that is damaged/impaired either by illness, injury, or due to birth defect is permissible in all performance classes. Exceptions: In-Hand, Western Trail, Hunter Hack, and Combination Drive, Ride, and Jump classes	FR101.10
	Hackney	One visual eye	In the event an animal has lost the sight in one eye, it may still be shown.	HK102
	Morgan	One visual eye (if deemed serviceably sound by the judge) EXCEPTION: classes over fences (judge may ask a rider to change horses)	Animals with complete loss of sight in one eye may be found serviceably sound at the judge's discretion, except in a class over fences where a judge may ask a rider to change horses.	MO102.3
	Paso Fino	One visual eye (if deemed serviceably sound by the judge)	Animals with complete loss of sight in either eye may be found serviceably sound at the Judge's discretion.	PF102.13
	American Saddlebred	One visual eye (other eye must appear to have vision and may be shown with an artificial eye/prosthetic or contact lens) NOTE: Use of contact lenses or eye prosthesis for any other use than above is prohibited	All horses must be serviceably sound. In In-Hand classes for sires and dams or prospective sires and dams, transmissible unsoundness only shall be considered. Horses must not show evidence of lameness, broken wind or complete loss of sight in both eyes. In the event a horse has lost the sight in one eye, it must appear to have vision and may be shown with an artificial eye or contact lens. Use of contact lenses or eye prosthesis for any other use than stated is prohibited.	SB103.2, SB104.7
	Shetland Pony	Vision loss from traumatic injury (horse's papers must be accompanied by verification by a licenced veterinarian that the etiology of the sight loss was traumatic)	Complete or partial loss of sight in either eye will not be a disqualification if the loss of sight results from traumatic injury. A licensed veterinarian must verify the deltiology of the sight loss as traumatic and such copy must accompany the horse's papers.	SP101
	Modern Shetland	Glass eyes permitted	No discrimination should be made because of the color of eyes, such as glass, watch, hazel or blue.	SP104
	Classic Shetland	Glass eyes permitted	No discrimination shall be made because of the color of eyes, such as glass, watch, hazel or blue.	SP123.1

	Saddlery and Equipment	No blinkers, goggles, or fly masks in competition Blinkers and goggles that do not obstruct vision allowed in warmup	Blinkers or goggles (with clear or tinted full eye cups) that cover the horse's eyes but do not obstruct the horse's vision are permitted in the warmup but are prohibited in the competition arena. Fly masks are forbidden in warmup, training areas and competition.	DR121.8d
American Quarter Horse Association (AQHA)				
	Section	**Able to compete under these conditions**	**Rule**	
	Prohibited Surgical Procedure, Mechanical Device or Artificial Appliance	Prosthetic eye if written request for permission is approved the the AQHA Executive Committee	Any surgical procedure, mechanical device or artificial appliance that could affect a horse's performance or alter its natural conformation or appearance is prohibited unless it meets one of the following exceptions:...use of a pacemaker or prosthetic eye if the owner files a written request for permission and requests it be reviewed and considered by AQHA's Executive Committee (approval, if granted, will be noted on the horse's registration certificate)	VIO320.2
	Halter Classes	Small eyes (judged as a minor fault)	Minor Faults in Quality, Gender or Breed Type Characteristics...Small eyes	SHW350.5.7
Cowboy Mounted Shooting (CMSA)				
	Section	**Able to compete under these conditions**	**Rule**	
	Saftey Rules and Guidelines	Eye protection and ear protection for horse and rider	CMSA recommends the use of eye protection and ear protection for horse and rider at all CMSA matches.	7H
Driving				
	Class	**Able to compete under these conditions**	**Rule**	
FEI	Any driving class	Can use blinkers and other equipment, as long as they do not irritate the eye or impede forward vision	Blinkers, if used, and ancillary equipment must not impede forward vision or be so close to the eyes as to irritate them.	Chapter VII, Rule 3.2
American Driving Society, Inc. (ADS)	General, All ADS-Recognized Events (including Recreational Driving, Driven Dressage, Combined Driving)	One visual eye	All animals must be serviceably sound, and must not show evidence of lameness, broken wind, physical distress, or impairment of vision in both eyes. Horses must be serviceably sound and must not show evidence of lameness, broken wind or impairment of vision in BOTH eyes (see GR-4.2).	Chapter 2, GR-4.2 Chapter 6, Article 13.2 Chapter 2, Article 405.2 Chapter 3, Article 407.8
	Combined Driving	Can use blinkers and other equipment, as long as they do not irritate the eye or impede forward vision	Blinkers, if used, and ancillary equipment must not impede forward vision or be so close to the eyes as to irritate them.	Article 940.3, 3.2
Federation Equestre Internationale (FEI)				
	Section	**Able to compete under these conditions**	**Rule**	
	Vet regulations and General regulations	No specific rules about vision or eye requirements found in Jumping, Dressage, Eventing or Vaulting	Plastic shields that cover the horse's eyes (i.e. glasses or sunglasses for horses) are forbidden at any time when mounted or when exercising the Horse, including when lunging. They may be used in the stable area and grazing areas. Blinkers and fly masks that cover the Horse's eyes are forbidden.	2.1, 2.5
International Endurance				
	Section	**Interpretation of Rule**	**Rule**	
	Tack and Equipment	No eye covers or eye shields (like wire mesh racing hoods) Blinkers and visors permitted (if they do not impede forward vision)	Unless specified otherwise in the Competition Schedule, Blinkers and visors (similar to Blinkers, but with holes cut in one or both cowls permitting limited side or rear vision) are permitted, provided that they allow full forward vision without any interference. They must be removed during Horse Inspections.	825.2.8 Annex 8
National Reining Horse Association (NRHA)				
	Section	**Able to compete under these conditions**	**Rule**	
	Scoring Penalties	Head coverings that do not impair vision	Not to be considered for disqualification would include: …Slinkies or other head covering as long as they allow free movement of the jaw and the horse's vision is not impaired.	D(4)(a)3.
Pony Club (USA)	**(USEF rulebooks)**			
	Class	**Able to compete under these conditions**	**Rule**	
	Show Jumping	No blinkers of any form	Any form of blinkers, are forbidden, under penalty of disqualification.	Section II (2)
	Western Dressage	No fly hoods that cover the eyes No blinkers	Fly hoods (ear covers) should be discreet in color and design and should not cover the mount's eyes.	Section II, Article 37

	Dressage	No fly hoods that cover the eyes	The fly hoods should be discreet and should not cover the mount's eyes.	Section II (3d)
	Polocrosse	Two adequately visual eyes Hoods or goggles (must allow 365 degrees of unobstructed viewing)	The mount has, in the opinion of the discipline ground jury, adequate vision in both eyes. Eye protection for the mount is highly recommended. Protection may be in hood or goggle form and must allow the mount 365 degrees of unobstructed viewing.	Article 26 Article 37.7
	Polo (2016)	Two visual eyes No use of shadow rolls, blinders, blinker hoods, or vision obscuring devices	A mount blind in one eye may not be played. Shadow rolls, blinders, blinker hoods, or any other device which might obscure the mount's vision shall not be used. An Umpire may have a horse removed from competition at his/her discretion.	Section 1(1a) Section 1(1c)
Professional Rodeo Cowboy Association (PRCA)				
	Section	**Able to compete under these conditions**	**Rule**	
	Humane treatment of rodeo animals	Two visual eyes	Animals for all events will be inspected before the draw, and no sore, lame, sick or injured animal, or animal with defective eyesight, shall be permitted in the draw at any time.	R8.3
Steeplechase				
	Section	**Able to compete under these conditions**	**Rule**	
	Horses Ineligible	One visual eye	A horse is ineligible to start in a race when: ...it has impaired eyesight in both eyes	7.4 (A8)
Thoroughbred Racing				
	Section	**Able to compete under these conditions**	**Rule**	
	Entry Eligibility	Rules vary by racing location (state) One visual eye	Horses ineligible to be entered An owner or trainer shall not enter or start a horse that: Has impaired eyesight in both eyes.	3769-5-33
United States Trotter Association (USTA)				
	Section	**Able to compete under these conditions**	**Rule**	
	Duties of the Judges	One visual eye	No horse may race unless it has unimpaired vision in one eye	Rule 6, Section 6.11 (a)
United States Polo Association (USPA)				
	Section	**Able to compete under these conditions**	**Rule**	
	General	Two visual eyes No use of shadow rolls, blinkers, or vision obscuring devices	A mount blind in one or both eyes may not be played. inspection will include a body condition score assessment, a "menace" test to check vision, and a jog pattern to assess soundness for play. Shadow rolls, blinkers or any other device which might obscure the mount's vision shall not be used.	5b, 2b, 2d
Vision Rules NATV (rule not found)				
American Mini Horse Association		International Union of Modern Pentathlon		
American Vaulting Association (2021)		Mounted Shooting (USMS 2020)		
Liberty (ILHA)		Horse Archery USA		
Pentathalon		International Horse Archery Alliance		
United States Team Penning Association				

FRIDAY SESSION
ABSTRACTS & CASE REPORTS

OCULAR PATHOLOGY IN WARMBLOOD HORSES (*EQUUS CABALLUS*) IN SOUTH AFRICA. (R Allen[1] and AD Goodhead[1]) Companion Animal Clinics Studies, Faculty of Veterinary Science, University of Pretoria.[1]

Purpose. The presence of vision-threatening abnormalities in horses can have severe consequences. This prompted this current survey into ocular abnormalities in Warmblood horses. **Methods.** One hundred and four horses (208 eyes) underwent ophthalmic examination which included a Schirmer tear test (STT), tonometry, fluorescein stain, slit lamp biomicroscopy and direct ophthalmoscopy. Pupils were dilated in all horses for comprehensive examination of the posterior segment of the globe. **Results.** Age range was 0.4-30 years; with the gender distribution of 8 stallions (7.7%), 33 mares (31.7%) and 63 geldings (60.6%). The most common findings were cataract and chorioretinal lesions. Cataracts were seen in 19 eyes (9.1%). Chorioretinal lesions were seen in 112 eyes (53.8%), of which 88 eyes had focal ‘bullet hole ’chorioretinal lesions (42.3%), 14 eyes had non-peripapillary chorioretinal lesions (6.7%), 7 eyes had peripapillary 'butterfly' chorioretinal lesions (3.4%) and 3 eyes had linear chorioretinal scarring. The presence of both chorioretinal and cataract lesions increased with age. **Conclusions.** Chorioretinopathies and cataract formation were the most common lesions observed in Warmblood horses in South Africa. Some of these chorioretinal and lens lesions have the ability to result in visual impairment and even blindness. This reiterates the importance of ocular examination as a part of routine health checks and pre-purchase examinations, especially in horses utilized for equestrian sports. **None.**

ENTROPION CORRECTION USING SUBDERMAL HYALURONIC ACID IN HORSES (FS Torres-Otero[1], CE Monk[2], and SL *Czerwinski*[1]) Department of Small Animal Medicine and Surgery, College of Veterinary Medicine, University of Georgia[1]; Blue Pearl Specialty and Emergency Pet Hospital, Atlanta, GA[2].

Purpose. To evaluate the use of hyaluronic acid (HA) subdermal filler as a treatment for entropion and trichiasis in five adult horses. **Methods.** Complete ophthalmologic examination was performed by a board-certified veterinary ophthalmologist. HA subdermal filler, sodium hyaluronate 2.4% for lid augmentation (an-vision Inc; West Jordan, Utah, USA) was used to correct entropion and trichiasis in 5 adult horses. Subdermal injection was performed under standing sedation, 1-2 mm from the eyelid margin in the affected area until the entropion was corrected. **Results.** Five adult horses, with a mean age of 16 years (range 13-18 years), were included. In four horses, the entropion was suspected to be cicatricial, due to previous trauma in 2 horses, and due to solar changes in nonpigmented eyelids in 2 horses. In one horse, the entropion was suspected to be primary in origin, due to deep set globes. Injection volumes ranged from 0.2-1mL. Complications included only minor skin bleeding at the injection sites in all patients. The trichiasis was resolved immediately following the injection in all cases. Clinical signs including epiphora, blepharospasm, conjunctival hyperemia, and keratitis, improved in all cases, with the follow-up period ranging from 1 week to 1 year. **Conclusions.** Hyaluronic acid (HA) subdermal filler appears to be a safe, effective method for correction of entropion and associated clinical signs in horses. Further information regarding the duration of efficacy is required. **None.**

EFFECTS OF CORNEOCONJUNCTIVAL TRANSPOSITION, POSTERIOR LAMELLAR KERATOPLASTY AND DEEP LAMELLAR ENDOTHELIAL KERATOPLASTY ON STREAK RETINOSCOPY IN EQUINE CADAVER EYES (LN Charnock, SD Boveland, PA Moore, ES Groover, RJ McMullen Jr.) College of Veterinary Medicine, Auburn University.

Purpose. To evaluate the effects of corneoconjunctival transposition (CCT), posterior lamellar keratoplasty (PLK) and deep lamellar endothelial keratoplasty (DLEK) on streak retinoscopy in equine cadaver eyes. **Methods.** Intraocular pressure (IOP) was maintained at 25 +/- 3 mmHg in 35 equine cadaver eyes via intravitreal saline injections. Streak retinoscopy was performed prior to (NO VISCO) and following (VISCO) intracameral injection of 1.0 ml of viscoelastic. Streak retinoscopy was repeated postoperatively. **Results.** Postsurgical net meridional and spherical refraction for CCT [Horizontal (H): 3.4 (95% CI 2.4-4.4) diopters (D), $p < 0.001$, Vertical (V): 3.5 (95% CI 2.7-4.4) D, $p < 0.001$, spherical: 3.5 (95% CI 2.6-4.3) D, $p < 0.001$) and PLK [H: 3.2 (95% CI 2.2-4.1) D, $p < 0.001$, V: 2.8 (95% CI 2.0-3.6) D, $p < 0.001$, spherical: 3.0 (95% CI 2.2-3.8) D, $p < 0.001$] were significantly increased from presurgical (VISCO) values. No difference between presurgical (VISCO) and postsurgical values were identified for the DLEK. **Conclusions.** Net meridional and spherical refraction had a hyperopic shift following CCT and PLK, with a significantly higher value in the vertical meridian for the CCT. These values were not significantly different for the DLEK. This supports that the DLEK has less of an effect on immediate post-operative refraction than the CCT or PLK. **Support**. Auburn University Department of Clinical Sciences Resident Research Grant. **None.**

OPTIC NERVE HEAD MEASUREMENTS OF THE ADULT EQUINE EYE USING OPTICAL COHERENCE TOMOGRAPHY (HN Bostick[1], DA Keys[2], RJ McMullen Jr.[1]) College of Veterinary Medicine, Auburn University[1]; Keys Veterinary Medical Statistical Consulting.[2]

Purpose. To compare equine optic nerve head (ONH) measurements using spectral domain optical coherence tomography (SD-OCT) to evaluate ONH cupping and its correlation to pathology. **Methods.** Sixty eyes from 45 horses were evaluated and categorized as CONTROL (n=19), CUPPED (n=26) or PATHOLOGIC (n=15). The eyes were categorized by ophthalmic examination with PATHOLOGIC eyes being those with visible ONH inflammation (e,.g., uveitis and optic neuritis) or proliferation (e.g., proliferative optic neuropathy and excessive myelination). The following measurements were performed: Bruch's membrane opening (BMO), optic cup width (OC), anterior laminar depth (ALD), prelaminar thickness (PLT), and cup to disk ratio (OC:BMO) at superior, central, and inferior ONH locations. **Results.** Compared to CONTROL and CUPPED, PATHOLOGIC OC and OC:BMO were significantly decreased. PATHOLOGIC OC (mean ± SD) was 1.51 ± 0.69, 1.84 ± 0.78 and 1.35 ± 0.82, while OC:BMO (mean ± SD) was 0.40 ± 0.19, 0.45 ± 0.20, and 0.36 ± 0.22. CUPPED eyes were found to have no consistent significant change when compared to control eyes. **Conclusion.** The term "optic nerve head cupping", as defined by direct and indirect ophthalmoscopy may be misleading in the horse. Eyes defined as having cupped ONHs based on direct and indirect ophthalmoscopy had a similar degree of cupping compared with clinically normal (CONTROL) eyes using OCT. Optic nerve head changes associated with inflammation can be readily identified and characterized using OCT. Further evaluation and research may allow us to better characterize and define equine posterior segment disease and optic nerve head cupping, respectively. Supported by Boehringer-Ingelheim Veterinary Scholars Program and Auburn University Department of Clinical Sciences. **None.**

LONGITUDINAL STUDY ON THE EFFECT OF LEPTOSPIRAL VACCINATION ON UVEITIS ON A SINGLE FARM: THE PARADOX STUDY (BC Gilger,[1] G Waldman,[2] JH Salmon,[1] D Roberts[1]) [1]College of Veterinary Medicine, North Carolina State University, Raleigh, NC USA; [2]Rivendell Mobile Large Animal Veterinary Services, Mocksville, NC USA.

Purpose. To determine the effects of equine leptospiral vaccination on progression of uveitis and blindness on a single farm with endemic leptospirosis. **Methods.** With IACUC approval and owner informed consent, a placebo controlled, randomized, double blinded study design was initiated to evaluate the effect of leptospiral vaccination on a closed herd of horses in central North Carolina, USA. Approximately 18 months after an outbreak of leptospirosis and development of signs of uveitis, horses were examined, had blood collected for serum leptospiral titers, and randomly divided into two groups receiving either leptospiral vaccination (Equine Innovator Pomona, Zoetis) or saline with clinicians and horse owner masked to the treatment. Booster vaccination per original treatment was done 4 weeks later. Ophthalmic examination and serum leptospiral titers were performed every 3 months after vaccination. Adverse events were reported as they developed. Data represents the 6-month interim examination and unmasking. **Results.** 50 horses were included in the study, with 25 receiving leptospiral vaccination and 25 saline. On initial examination, 14/50 (28%) horses had signs of uveitis one or both eyes. Initial serum leptospirosis titers (one or more serovars) were negative in 11 (22%), low (≤1:800) in 21 (41%), medium (>1:800≤1:3200) in 18 (35%) and high (>1:3200) in 1 (2%) horse. 14 eyes in 9 horses were considered blind on initial examination. In masked group A, 3 months after vaccination, 3 additional eyes were noted to blind and 6 eyes in 5 horses, were observed to have disease progression, while in Group B, 1 additional eye was blind and 4 eyes in 3 horses were noted to have disease progression. Leptospiral titers were higher in both groups after 3 months, with no horse having negative titer results. **Conclusions.** Disease progression was noted in both groups, however, interim data analysis suggests group A treatment has a higher number of blind eyes and progressive disease, while group B has higher leptospiral titers. Follow up on this group of horses is planned for up to 2 years after vaccination. Supported by private donations to the NCSU Equine Uveitis Fund. **None.**

New Therapy for Equine Sarcoids: Interferon Alfa-2b (Intron A)

Author and address:
Hudson, L, Nunnery, C, Wotman, K
Equine Veterinary Vision, The Plains, VA 20198
Colorado State University, Fort Collins, CO 80523

Topic area:
Adnexa

Case summary:
Three horses presented to Equine Veterinary Vision and three horses to Colorado State University for evaluation and treatment of periocular tumors, all presumed to be sarcoids based on appearance and/or biopsy and histopathology. Injection with 10 million units of Interferon alfa-2b around, under, and into the masses was performed under light sedation and use of lidocaine gel. The injection was repeated every 3-4 weeks as needed until desired results were achieved. Currently, 4/6 horses have favorable results (two horses are approximately 2.5 years post-injection), 1/6 had its condition worsen before starting to improve, and 1/6 had no improvement.

Key words:
Sarcoid, Intron A (brand name), Interferon alfa-2b (active ingredient name), immunotherapy

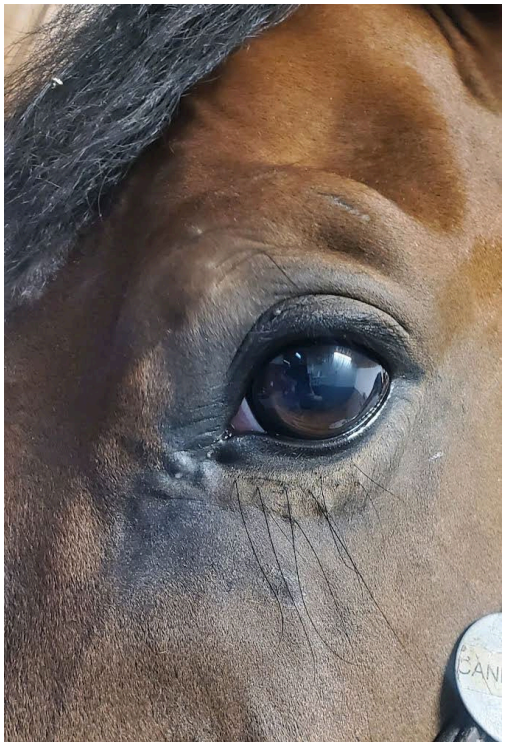
Discussion points:
Does an alternative immunotherapy exist?
Can another interferon (such interferon gamma, which is produced by fibroblasts) provide similar results?
What is the long-term success of these injections?
Difference in effects on Intron A if previous treatments had been tried?

Intron A Manufactured by: Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Whitehouse Station, NJ 08889, USA U.S. License Number 0002

Figure 1. Patient at Initial Presentation to Equine Veterinary Vision.

Figure 2. Patient after Second Injection of Intron A.

Figure 3. Patient Upon Completion of a Series of Four Treatments with Intron A.



Clinical and Histologic Features and Long-Term Outcome of Ocular and Nasal Amyloidosis in a Quarter Horse

Author and address:
Gemensky-Metzler, AJ
The Ohio State University College of Veterinary Medicine, Columbus, OH 43210

Topic area:
Cornea/Adnexa

Case summary:
A 14-year-old quarter horse gelding presented for evaluation of a mass of the ventral limbal cornea and conjunctiva of the right eye (OD) of several months' duration. Recurrent serosanguineous nasal discharge over several years was also reported. The pink-white mass was approximately 6x7mm, multinodular and variably pigmented and was tentatively diagnosed as an atypical limbal squamous cell carcinoma. The superior eyelid margin OD was irregular with variable thickening of the palpebral conjunctiva. An excisional biopsy of the mass was performed by superficial keratectomy/conjunctivectomy immediately followed by application of Strontium-90 to the limbal site and the superior eyelid margin. The eye healed uneventfully. Histology revealed moderate diffuse epithelial hyperplasia and multifocal lymphoplasmacytic, eosinophilic and granulomatous conjunctivitis, expansion of the submucosa with abundant pale eosinophilic extracellular matrix compatible with amyloid and no evidence of neoplasia. The owner called 5.5 years later to report development of similar masses in both eyes (OU) in addition to nasal masses. The case was reviewed by pathologists and a presumptive diagnosis of ocular amyloidosis was made. Eight years after presentation, moderate thickening of the palpebral and third eyelid conjunctiva OU and intermittent nasal masses, decreased air passage through the nostrils and epistaxis are reported by the owner.

Key words:
ocular amyloidosis, nasal amyloidosis

Discussion points:
Clinical and histologic features of ocular and nasal amyloidosis
Therapeutic options for ocular and nasal amyloidosis?
Prognosis for quality of life and survival for nasal and ocular amyloidosis

Clinical photos:

1a.

1b.

Figure 1a and 1b. Seven years after excisional biopsy of a limbal mass ultimately diagnosed as ocular amyloidosis: Notable abnormalities are variable thickening and hyperemia of the superior and inferior eyelid margins, the palpebral conjunctiva and the conjunctiva of the nictitans of the right eye (1a) and the left eye (1b).

Minimally Invasive Stenting of the Equine Nasolacrimal Apparatus

Authors and addresses:
Knickelbein, KE[1*]; Culp, WTN[2]; Maggs, DJ[2]; Johnson, LR[3]; Leonard, BC[2]
1 Veterinary Medical Teaching Hospital, University of California-Davis, Davis, CA, USA
2 Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA, 3 Department of Medicine and Epidemiology, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA, *Present address: Department of Clinical Sciences, Cornell University College of Veterinary Medicine, Ithaca, NY, USA

Topic area:
Nasolacrimal

Case summary:
An 11-year-old Dutch Warmblood gelding was presented for evaluation of right nasolacrimal apparatus obstruction causing chronic ocular discharge. Normograde flushing of the right nasolacrimal apparatus revealed patency from the superior to inferior lacrimal punctum but no flow through the nasal punctum. Retrograde flushing produced no flow from either lacrimal punctum. Skull radiographs and normograde contrast dacryocystorhinography revealed no bony pathology and loss of contrast dye column at the level of the first maxillary molars (109/209). Lacrimoscopy using a 2.9mm diameter endoscope performed via the nasal punctum revealed a moderate amount of mucus but no intralumenal foreign material. A 0.035mm diameter hydrophilic coated guidewire was passed under fluoroscopic and endoscopic guidance from the inferior lacrimal punctum to the nasal punctum. A 5 French tapered over-the-wire dilator was then passed retrograde and the guidewire was removed. The dilator was sutured to the facial skin ventral to the right eye and dorsal to the right nostril serving as an indwelling stent. Neomycin-polymixin B-dexamethasone ophthalmic suspension and oral phenylbutazone were instituted. The stent was dislodged prior to the recommended 6-week duration, though ocular discharge remained significantly improved. This novel, minimally invasive approach to imaging and stenting the nasolacrimal apparatus is efficient and atraumatic.

Key words:
Nasolacrimal apparatus, stent, lacrimoscopy, minimally invasive techniques

Discussion points:
Radiography vs. CT for dacryocystorhinography
Stent material
Stent maintenance

Clinical photos:

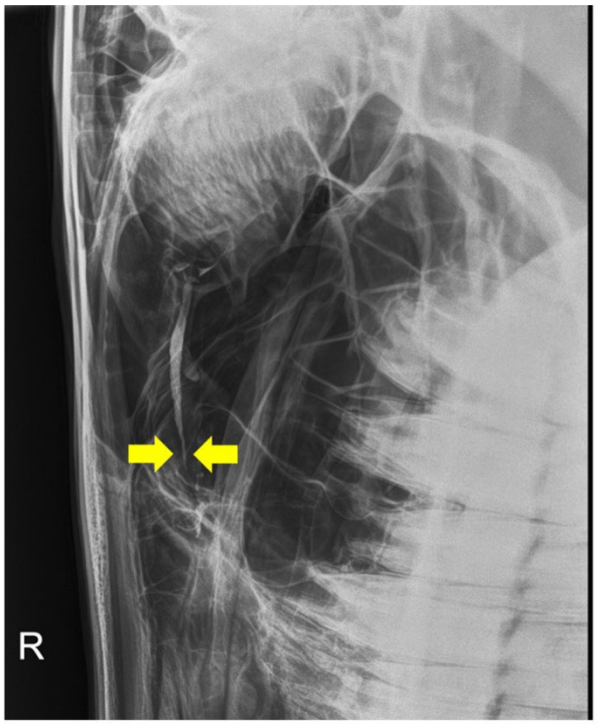


Figure 1. Lateral projection radiograph following normograde injection of contrast into the right nasolacrimal apparatus. Tapering of the contrast column occurs at the level of the maxillary first molars (109/209), indicated by the yellow arrows.

Figure 2. 5 French over-the-wire dilator successfully placed in the right nasolacrimal apparatus, prior to suturing.

Figure 3. Photograph of the patient with the indwelling nasolacrimal apparatus stent and subpalpebral lavage system in place.

Successful Management of a Unilateral Persistent Epithelial Defect Secondary to Meibomian Gland Dysfunction in an Irish Sports Horse Using a Multi-Modal Treatment Plan

Author and address:
[1]Armstrong, SK; [1]Blacklock, B; [1]Keen, J; [2]Peck, FS
[1]The Royal (Dick) School of Veterinary Studies, The University of Edinburgh, Edinburgh, EH 25 9RG, [2] Ophthalmology Dept, Kent, Surrey, and Sussex Health Education, London, WC1B 5DN

Topic area:
Meibomian glands and cornea

Case summary:
A novel equine multi-modal protocol was implemented for management of unilateral equine dry eye disease and worsening persistent epithelial defects (PED) in a clinically well Irish Sports Horse. Utilising knowledge from human ophthalmic medicine for meibomian gland dysfunction (MGD), the meibomian glands were first mechanically debrided and expressed. Then a four-point treatment protocol was instigated. The protocol comprised of hot compressing, artificial tears, autologous serum, and a topical azithromycin regimen, resulting in a significant improvement in PEDs and clinical signs twelve months post-protocol commencement. This case highlights the benefits of a treatment plan containing both non-pharmacological and pharmacological therapies targeting the lipid component of the tear film matrix in horses with evaporative dry eye disease.

Key words:
Evaporative dry eye, Meibomian gland dysfunction, Azithromycin, PEDs.

Discussion points:
Is dry eye underdiagnosed in horses or is it just uncommon?
Should Azithromycin be adopted more commonly as a topical treatment?
When is a tear film deficit diagnosed should we consider supporting the lipid component of the tear film alongside the aqueous component due to cross-over between the tear film layers?
Do we need better objective tests for the diagnosis of dry eye in horses?

Clinical photos:

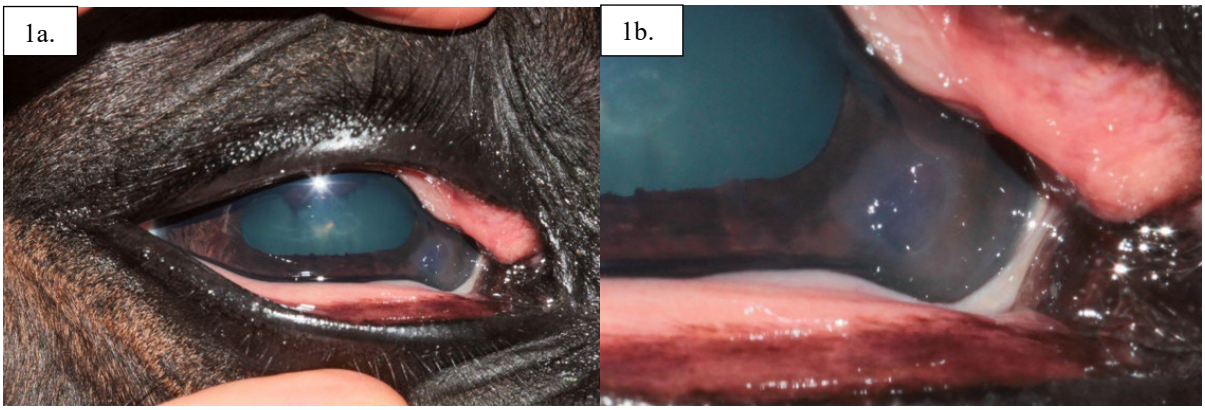


Figure 1a. and 1b. Ventromedial PED of OD

Figure 2. Capping of MBGs prior to second scraping and expression

Dermoid Cyst in a Foal

Author and address:
Piñón Cabrera, A.
Calzada de las brujas 98 Nueva Oriental Coapa 14300 CdMx México
Department of Equine Medicine and Surgery UNAM (National Autonomous University of México)

Topic area:
Cornea

Case summary:
A 6-month Spanish purebred colt was presented to the University Ophthalmology service with a history of unilateral blindness OS. Ophthalmic examination of the right eye was normal, and the left eye revealed a mass of darkly pigmented tissue covering the corneal region. The tissue was suspected to represent a dermoid cyst. The mass obstructed visualization of the interior of the left globe, but an ultrasound examination confirmed normal intraocular anatomy. The abnormal tissue covering the left cornea was removed by keratectomy under general anesthesia. After surgery the foal was treated with topical antibiotic, mydriatic, and amniotic eyedrops. The ulcer bed created by the keratectomy vascularized and went on to heal completely after 3 months of treatment. The foal became visual in the affected left eye. Histopathology confirmed the diagnosis of a dermoid cyst.

Key words:
Dermoid cyst, cornea, keratectomy

Discussion points:
Presentation, prognosis, and recurrence of dermoid cyst in horses
Options of treatments in dermoid cyst in horses
Complications of total keratectomy

Clinical photos:

Figure 1: initial presentation:

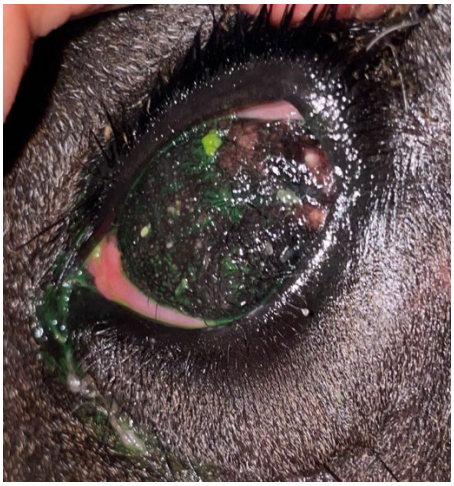
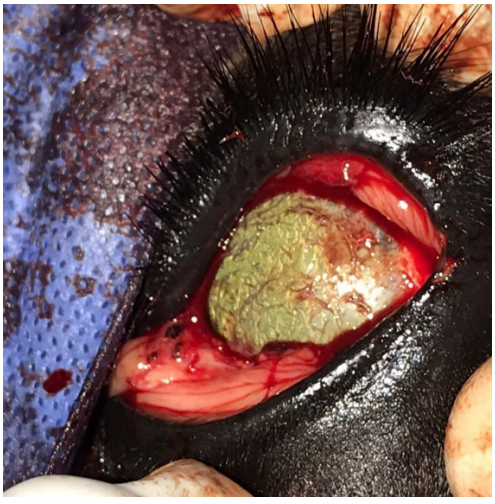


Figure 2: dermoid cyst after surgical remotion:

Figure 3: during keratectomy:



State of the Art Lecturer

Dr. Catherine Nunnery, DVM, DAVCO

Equine Veterinary Vision, Inc.
The Plains, Virginia

Dr. Nunnery runs one of the only equine ophthalmology private practices in the United States. She was trained by mentors in Lexington, KY and Gainesville, FL. Dr. Nunnery was board certified and became a Diplomate of the American College of Veterinary Ophthalmology in 2010. She has practiced ophthalmology at two teaching hospitals, but now focuses on equine ophthalmology on the farm and in small clinics in the Washington, DC region.

Equine Ambulatory Ophthalmology-Catherine Nunnery, DVM, DACVO

Examination
- Location
- Equipment
- Examination Form/Discharge Instructions

Diagnostics
- Cytology on the Farm
- Culture and PCR

Pharmacy
- Ointments, Solutions, Systemics

Treatments without SPL
- Subconjunctival Antimicrobials
- Ointment and Solution Applications

SPL Treatments
- Upper vs Lower SPL
- Suture less vs Sutured SPL
- Air Bolus vs Stacking SPL
- Low Volume vs High Volume Medications
- Setup Caretaker for Success

Infusion Pump
- Mila- Administration Pump
  - Flow rate-0.5-0.8ml/hr or 2.5ml/hr
- T-Port
- Loading and Monitoring
  - Cocktails/Single Medication/Serum

Patient Care
- Photo Monitoring
- Side Effect Monitoring

Ophthalmic Diseases

Peri-Ocular
- Eyelids-Neoplasia, Trauma and Hairs
- Orbital-Trauma, Neoplasia

Uveal
- Equine Recurrent Uveitis
  - Low Dose Intravitreal Preservative Free Gentamicin
  - Suprachoroidal Steroids
  - Systemic Steroids-Dexamethasone vs Prednisolone
  - Mineral
  - Pulse Dosing Atropine

Glaucoma
- Brinzolamide Implants
- Atropine
- Latanoprost
- Descemet Detachment
- Ahmed Shunt vs Homemade

Lens
- Cataracts

Retina

Optic Nerve

Corneal
- Standing Keratectomy
  - Retrobulbar Block or Subconjunctival Block
  - 64 Blade, BluntTtipped Westcott Scissors and Corneal/Conjunctival Forceps
  - Temporary Tarsorrhaphy
  - Post-op Fibrosis
- Indolent Ulcer
  - Diamond Burr Debridement
  - Superficial Keratectomy
    - Micro bulla
- Immune Mediated Keratitis
  - Topical Steroids
  - Viral Keratitis
  - Photodynamic Therapy
  - Superficial, Mid-Stromal to Deep Stromal Keratectomy
    - Recurrence-New Spot
  - Corneal Lymphoma
- Fungal Ulcer
  - Mid-Stromal to Deep Stromal Keratectomy
  - Cryotherapy
  - Intrastromal 5% Voriconazole
  - Voriconazole 2% and Natamycin
- Corneal Cryotherapy
  - Spray-Cool Renew
  - Light, Medium and Heavy Freeze
  - Side Effects
- Punctate Fungal Keratitis
- Bacterial Ulcer
  - Mid-Stromal to Deep Stromal Keratectomy
  - Cryotherapy
  - Subconjunctival Antibiotics
  - Infusion Pump

- Eosinophilic Keratitis
  - Cytology-Before and After 2 Weeks
  - Habronema-Deworming
  - New Horse and Turnout
  - Systemic Steroids, Cetirizine
  - Superficial Keratectomy

- Endotheliitis
  - Pigmented KP vs Non-Pigmented KP
  - Signs of Uveitis
  - Modified Gunderson Grafts
    - +/- Low Dose Intravitreal Gentamicin

- Standing Conjunctival Graft
  - Infected Deep Stromal Ulcers or Melting Ulcers
  - Retrobulbar Block
  - Surgeon Sitting with High Magnification Loops
  - 7-0 Vicryl

- Corneal/Limbal Squamous Cell Carcinoma
  - Keratectomy +/- limbal conjunctival resection
  - Cryotherapy
  - Photodynamic Therapy
  - Chemotherapy

- Epithelial Keratopathy

- Stromal Abscess
  - Cryotherapy and Intrastromal Voriconazole
  - Oral Itraconazole
  - Keratoplasty
    - Graft vs No Graft, Size and Location
    - Autogenous Graft vs Donor Graft
    - Standing Deep Lamellar Endothelial Keratoplasty
    - Saline Tissue Culture and PCR
    - Scleral Approach

- Standing Enucleation

Odd Cases

SATURDAY SESSION
ABSTRACTS & CASE REPORTS

EFFECT OF GENTAMICIN ON CD3+ T-LYMPHOCYTE PROLIFERATION AND CELL VIABILITY FOR TREATMENT OF RECURRENT UVEITIS IN HORSES: A PILOT STUDY

(HL Smith[1], AK Berglund[1], LV Schnabel[1], RJ McMullen[2], BG Gilger[1], and A Oh[1]) College of Veterinary Medicine, North Carolina State University[1]; College of Veterinary Medicine, Auburn University[2]

Purpose. Intravitreal injection of low dose gentamicin (4mg) is currently performed as a treatment for equine recurrent uveitis (ERU), although the mechanism of action is unknown. It has been hypothesized that gentamicin may suppress T-lymphocyte proliferation or decrease cellular viability. The aim of this pilot study is to test this hypothesis by determining the effect of gentamicin on proliferation and viability of peripheral blood CD3+ T-lymphocytes using an in vitro cell culture model. **Methods.** Blood collection and lymphocyte separation was performed from 3 normal horses. Lymphocytes were cultured for 5 days in media and stimulated to proliferate with ConA. Gentamicin concentrations of 37.5ug/ml, 112.5ug/ml, 187.5ug/ml, 375ug/ml, and 750ug/ml were assessed. Lymphocytes were labelled with CSFE, DAPI, and anti-equine CD3+ antibody and APC goat anti-mouse IgG secondary antibody. Lymphocyte proliferation was calculated using CSFE attenuation of live CD3+ cells compiled with FlowJo v10. Live/dead cell counts were performed using an automated cell counter pre and post culture. Results were analyzed using two-way ANOVA with Tukey's multiple comparison test. **Results.** There were multiple "hidden" cell parameters that could have been affected by gentamicin and thereby confound interpretation of whether cell proliferation was indeed changing. These include changes in cell size that could affect fluorescent signal, and in cell viability that affect the normalization of data. We carefully controlled for these parameters and found there was no statistical difference between any of the gentamicin treatments groups and controls in terms of cell size and proliferation via flow cytometry, and cell viability via automated cell counter. **Conclusions.** Gentamicin, in concentrations ranging from "safe" to "retinotoxic", has no effect on equine peripheral blood CD3+ T-lymphocyte proliferation and cell viability in a cell culture model thus indicating that intravitreal gentamicin may not suppress the Th1 and Th17 mediated response thought to be the initiating immune response in ERU. Further study is indicated to elucidate the mechanism of action of intravitreal gentamicin in equine patients with ERU. Funding sources: **None.** Conflicts of interest: **None.**

IDENTIFICATION OF RISK LOCI FOR INSIDIOUS UVEITIS IN LP SPOTTED HORSES

(NB Kingsley,[1,2] L Sandmeyer,[3] A Dwyer,[4] S. Parker,[3] M Lassaline,[5] M McCue,[6] and RR Bellone[1,2]) Veterinary Genetics Laboratory, University of California-Davis;[1] School of Veterinary Medicine, University of California-Davis;[2] Western College of Veterinary Medicine, University of Saskatchewan;[3] Genesee Valley Equine Clinic, LLC;[4] School of Veterinary Medicine, University of Pennsylvania;[5] College of Veterinary Medicine, University of Minnesota[6]

Purpose. To identify risk factors contributing to insidious uveitis among horses with leopard complex spotting (LP). Methods. A genome-wide association study (GWAS) along with stratification and interaction analyses were performed on 96 Appaloosas (APs). Risk factors and inheritance of ERU were also assessed in 105 Knabstruppers (KBs) using exact multivariable logistic regression and pedigree analysis. Finally, a combined LP breed GWAS and haplotype analysis were performed on 250 horses across three breeds. **Results.** A 9.7 Kb locus on ECA X was significantly associated in APs by GWAS (p-value = 2.11×10^{-8}) and a sex-stratified analysis (p = 1.35×10^{-8}). An interaction analysis supported epistasis between LP and the X locus (p= 1.72×10^{-6}). Similar to findings in APs, LP genotype and age significantly increased odds of ERU in KBs. In the combined GWAS, the LP region was the only significant locus across LP breeds and haplotype analysis refined this association to 76 Kb around the LP insertion site. **Conclusions.** The LP locus is a genetic risk factor shared across LP breeds and could be used to identify at risk horses to screen more frequently. The ECA X association is a second risk locus, specifically in APs, and further investigation of the region is underway. Supported by Morris Animal Foundation (D16EQ-028), KNN, and UC Davis CEH (18-17). **E.**

ADDITIONAL EVIDENCE SUPPORTS MISSENSE MUTATION IN *GRM6* AS THE CAUSE OF CONGENITAL STATIONARY NIGHT BLINDNESS IN BOTH THE TENNESSEE WALKING HORSE AND THE STANDARDBRED (RR Bellone,[1,2] E Esdaile, [1,2]
KE Knickelbein,[3] CG Donnelly,[2] M Ferneding,[4] M Hammand,[1,2] MJ Motto,[4] BD Story,[4]
F Avila,[1] B Gilger,[5,6], L. Sandmeyer[7], and S. Thomasy[4,8]) Veterinary Genetics Laboratory, School of Veterinary Medicine, University of California-Davis; [1] Population Health and Reproduction, School of Veterinary Medicine, University of California-Davis;[2] Department of Clinical Sciences, College of Veterinary Medicine, Cornell University;[3] Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California–Davis;[4] College of Veterinary Medicine, North Carolina State University;[5] Department of Ophthalmology, School of Medicine, University of North Carolina;[6] Department of Small Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan;[7] Department of Ophthalmology & Vision Science, School of Medicine, University of California-Davis.[8]

Purpose. A recessive missense variant in *glutamate metabotropic receptor 6* (*GRM6* c.533C>T, p.Thr178Met) was recently identified as a cause of congenital stationary night blindness (CSNB) in a Tennessee Walking Horse. This is the second variant to be implicated in CSNB in the horse and was thus termed CSNB2. The aim of this study was to investigate additional horses and breeds to confirm the connection of this variant with CSNB. **Methods.** To identify presence and breed-specific allele frequencies, 2,307 horses from six breeds were genotyped for *GRM6* c.533C>T. The T allele is reported as CSNB2 and the C allele is reported as N. Complete ophthalmic examinations and electroretinography (ERG) were performed on 16 horses (3 Tennessee Walking Horses and 13 Standardbreds) with varying *GRM6* genotypes. **Results.** Screening additional horses identified the CSNB2 variant in Standardbreds from the United States, specifically in pacing lines (allele frequency=0.17, n=110) but not in trotting lines (n=70). Clinical evaluation of 16 horses from 2 breeds supported *GRM6* c.533C>T p.Thr178Met as the causal variant as two *CSNB2/CSNB2* horses had “negative” ERGs consistent with night blindness while the remaining 14 horses (5 *N/CSNB2* and 9 *N/N*) had normal ERG results. **Conclusion.** Genetic screening in the Tennessee Walking Horse and Standardbred can help to limit the production of affected horses. Work is ongoing to identify if this variant impacts the performance of Standardbreds.
Supported by funding from UC Davis Center for Equine Health Grant Number: 20-18 and the United States Trotting Association. **E**

Cryotherapy as an Adjunctive Treatment for Fungal Keratitis

Author and address:
Tolar, E
Bluegrass Veterinary Vision

Topic area:
Cornea

Case summary:
An 18-year-old American Saddlebred gelding presented with a 11-day history of a corneal ulcer and blepharospasm. Initial treatment by the referring veterinarian consisted of topical neomycin polymyxin bacitracin ophthalmic ointment and after five days was changed to itraconazole 1% ointment. Five days later voriconazole 1% solution, ofloxacin solution, atropine solution, autologous serum, flunixin megulamine and gastroguard were started and a superior lavage tube was placed.

On presentation the pupil was 75% dilated with a focal 25% depth lesion (3x4mm) surrounded by a superficial corneal ulcer and white epithelial and anterior stromal infiltrate measuring 8mm x 10mm in total. The horse was sedated with 300mg of xylazine. An auriculopalpebral and frontal block were performed with 1ml of lidocaine at each location. Topical lidocaine gel was placed on the cornea. Cytology and aerobic and fungal culture was performed. A standing superficial keratotomy was performed around the entire area at 25% depth. Cryoablation was performed in a triple freeze thaw cycle. Topical miconazole 1% solution and silver sulfadiazine ointment was added to the medication plan.

Two days after the keratectomy and cryotherapy epithelium was beginning to migrate over the lesion. Ten days after the procedure there was only a 1x2mm area of stain uptake remaining and it was stain negative thirteen days post operatively. Aerobic culture was negative and fungal culture confirmed A*spergillus fumigatus*.

Key words:
Fungal keratitis, cryotherapy

Discussion points:
Use of cryotherapy as an adjunctive therapy for fungal keratitis
Does cryotherapy decrease the need for surgical therapy?
Is cryotherapy an option for fungal abscesses or only superficial fungal keratitis?
Did the cryotherapy speed healing by preventing progression of the lesion as the antifungals slowly began to work?

Suspected Malignant Transformation of Immune Mediated Keratitis

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Topic area:
Cornea

Case summary:
A 12-year-old Dutch Warmblood mare was presented to the UC Davis Ophthalmology Service for evaluation of non-ulcerative keratitis in the left eye. The patient was initially diagnosed with suspected immune-mediated keratitis in the left eye by the referring veterinarian 3 years prior to presentation. Since initial diagnosis, progression of the condition was noted despite various therapies including topical steroids, cyclosporine implants, itraconazole, ofloxacin and subconjunctival stem cell injections. At presentation, the left eye was apparently comfortable. Multifocal regions of dense tan/white raised plaque/mass in perilimbal cornea, superficial and mid-stromal corneal blood vessels, and diffuse corneal edema were noted. No fluorescein uptake was noted. Ultrasound biomicroscopy revealed the abnormal tissue extending from epithelium to midstroma (~1.5 mm thick), while the deep stroma and Descemet's membrane had a more normal ultrasonographic appearance (~0.5 mm thick). A corneal biopsy was performed. Aerobic, anaerobic, and fungal cultures from the tissue revealed no organisms. Following biopsy, topical antibiotic and antifungal therapy were instituted, along with systemic NSAID. Histopathology revealed a suspected mucosa-associated lymphoid tissue B-cell lymphoma. A malignant transformation of IMMK is presumed. Significant clearing of the corneal infiltrate and vascularization were observed 2 weeks following the biopsy, despite no antineoplastic therapy having been implemented.

Key words:
Immune-mediated keratitis, lymphoma, malignant transformation, biopsy

Discussion points:
Malignant transformation of IMMK?
Utility of UBM pre-procedure?
Therapeutic biopsy?

Clinical photos:

Fig 1: Initial presentation following corneal biopsy (star)

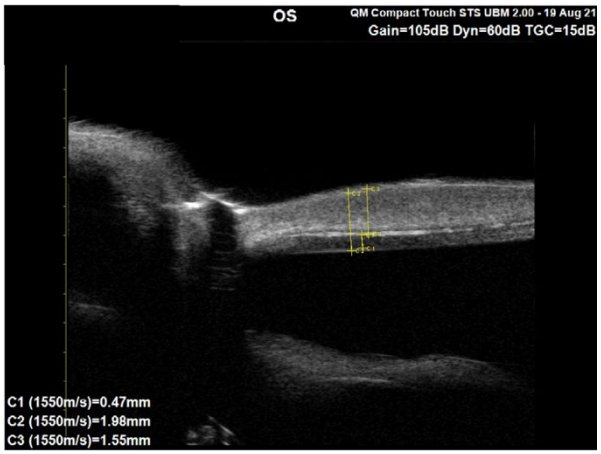

Fig 2: Ultrasound biomicroscopy of the corneal lesion

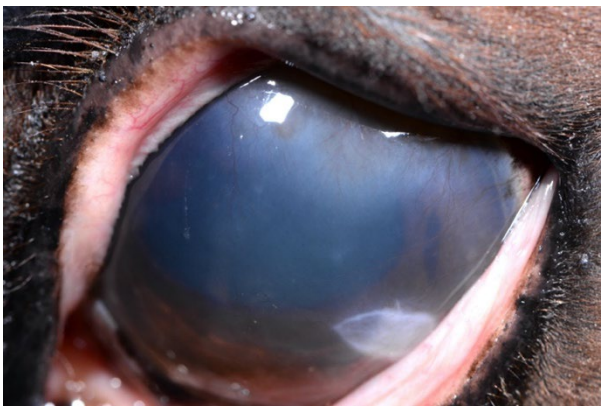

Fig 3: Affected eye 2 weeks following initial presentation and biopsy

Presumed Heterochromic Iridocyclitis with Secondary Keratitis (HIK) Associated with Equine Herpesvirus-1 (EHV-1) Infection

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Topic area:
Cornea and Uvea

Case summary:
An 11-year-old Arabian mare presented for breeding management and contracted nosocomial EHV-1 systemically while hospitalized. Within less than one week uveitis developed OS>OD. Uveitis treatment was initially successful, but when treatment was tapered signs of corneal edema and aqueous flare recurred. Subsequently pigmented keratic precipitates were noted in the more severely affected OS leading to the suspicious of HIK. Due to the owner's desire to have no persisting medication or follow-up needs a variety of treatments were attempted alone or in combination over the course of 5 months to resolve the ocular condition, including: topical steroids (neomycin/polymyxinB/dexamethasone or prednisolone acetate 1%), topical bromfenac 0.09%, topical sodium chloride 5%, systemic flunixin meglumine, systemic dexamethasone, suprachoroidal triamcinolone injection, and low-dose intravitreal gentamicin injection. Though treatments could effectively control ocular signs, cessation of therapy resulted in severe corneal edema recurrence OS so a complete keratoleptynsis and Gundersen graft was attempted OS to prevent the long-term risk of corneal bullae and ulceration. Graft dehiscence ensued despite attempts to repair and subsequent fungal corneal infection resulted in enucleation OS. Ocular histopathology showed ulcerative keratitis, chronic lymphoplasmacytic and fibrinopurulent uveitis with identification of multiple breaks in Descemet's membrane but no evidence of retrocorneal membranes. The OD remained healthy with no treatment necessary upon hospital discharge.

Key words:
Corneal edema, uveitis, heterochromic iridocyclitis with secondary keratitis (HIK), equine herpesvirus-1 (EHV-1)

Discussion points:
1. Case consistent with HIK?
2. Any treatment options to "cure" HIK signs?
3. Consideration of thermokeratoplasty to prevent bullae risk with severe edema?

Clinical photos:

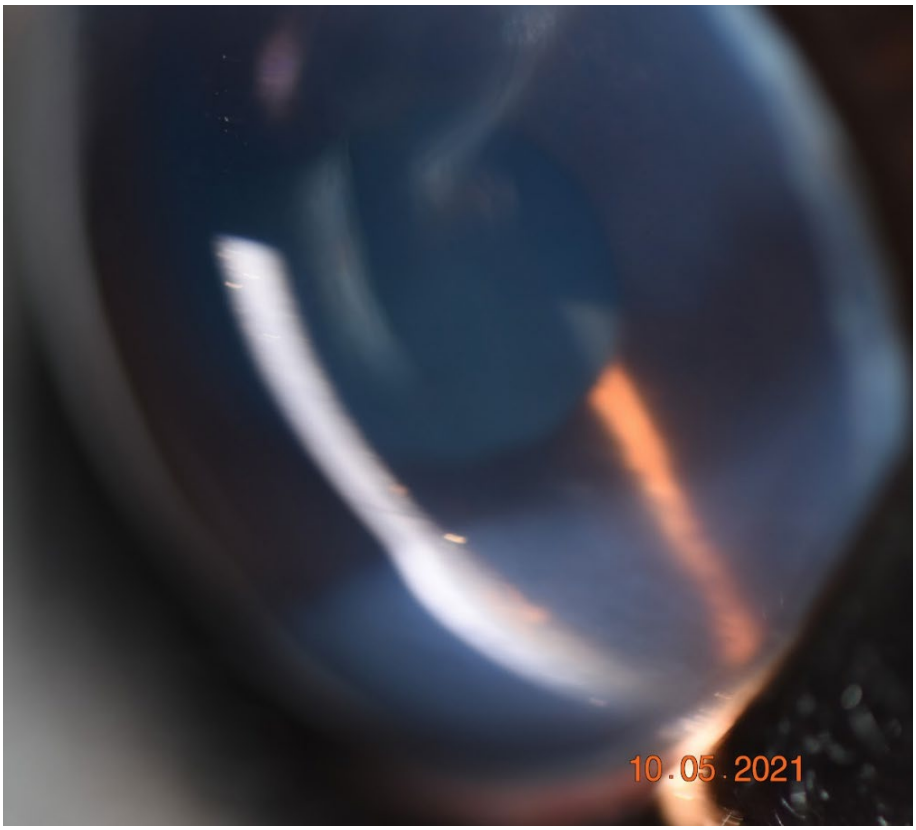

Figure 1. Left eye image showing recurrence of ventral corneal edema and pigmented keratic precipitates on the endothelial surface following cessation of multiple therapies that had the eye previously completely quiet and looking normal.

Figure 2. Image of the left eye 1 month following cessation of therapy for HIK with diffuse corneal edema. The intraocular structures are difficult to visualize but pupil size was midrange and she retained positive menace response.

Positive Detection of Dorzolamide in a Six-Year-Old Thoroughbred Gelding, Over Six Months Following Ophthalmic Application

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Topic area:
Anti-doping rule violation

Case summary:
A six-year-old Thoroughbred gelding received a three-day course of topical dorzolamide (Trusopt®), one drop three times daily left eye, January 2018, with a second comparable course administered to the same eye ending 19th February 2018, for suspected raised intraocular pressure secondary to uveitis.

The gelding was disqualified after racing in March and again in April 2018, due to the detection of dorzolamide by the French Racing Laboratory.

Monthly blood and urine tests for dorzolamide were performed on this individual for surveillance purposes by the primary clinician and it was not until 28th September 2018 that samples tested negative– a period greater than six months following last known administration of dorzolamide.

A testing laboratory verbally reported that they had tested the blood and urine of a second horse administered dorzolamide eye drops, one drop three times daily for three days, for comparative purposes. Positive test results for dorzolamide were obtained in this individual for at least six months after test application.

Dorzolamide is listed as a prohibited substance under FEI rules.

Key words:
Dorzolamide, prohibited substance detection

Discussion points:
1. Under WADA rules, dorzolamide and brinzolamide, when administered topically in the eye, are not prohibited. The rationale behind this exception is these drugs do not have a diuretic effect when topically applied. Could FEI rules be refined to adopt a similar approach
2. What advice should we give clients regarding ophthalmic dorzolamide withdrawal times

A Case of Bacterial, Suppurative Endophthalmitis Following Suprachoroidal Triamcinolone Injection and Placement of a Suprachoroidal Biodegradable Cyclosporine Implant in a Horse with Equine Recurrent Uveitis

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Topic area:
Uvea

Case summary:
A 5-year-old Warmblood stallion bred in the Netherlands presented to the Royal (Dick) School of Veterinary Studies, Edinburgh, UK, due to recurrent uveitis in the right eye. Microscopic agglutination test (MAT) performed on serum was positive for the *Leptospira* serovar *grippotyphosa*, but negative when performed on the aqueous humour.

Despite intensive medical treatment, the uveitis became increasingly refractory to treatment, and the left eye also developed signs of low-grade uveitis. The right eye subsequently received an injection of 5mg of triamcinolone acetonide into the suprachoroidal space using an 1100 µm length 30-gauge microneedle (as described by Gagnon *et al.* 2021), followed by placement of two suprachoroidal cyclosporine implants six days later. A single suprachoroidal cyclosporine implant was also placed in the left eye.

Approximately two months later, the horse presented to a different referral centre with severe uveitis and secondary glaucoma in the right eye, and the globe was enucleated. Histopathology showed a marked septic (bacterial) suppurative endophthalmitis with evidence of bacterial infection at the cyclosporine implant site. No complications have been encountered with the cyclosporine implant placed in the left eye.

Key words:
Equine recurrent uveitis, suprachoroidal triamcinolone injection, cyclosporine implant, endophthalmitis

Discussion points:

1. Complications of suprachoroidal cyclosporine implants
2. Suprachoroidal triamcinolone injections
3. Treatment of equine recurrent uveitis

Clinical photo:

(Image: Cross sectional image of globe, showing suppurative endophthalmitis, extensive posterior synechiae, iris bombe, and shallowing of the anterior chamber. The intrascleral pseudocystic cavity and cyclosporine implant had associated suppurative inflammation and bacterial infection.)