Proceedings of the 52nd Annual ACVO® Scientific Conference

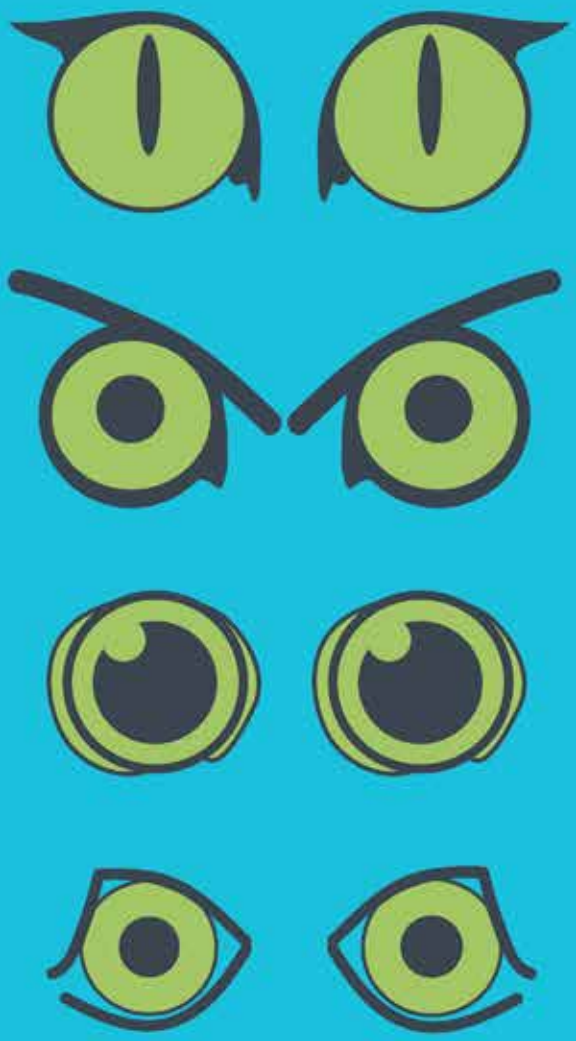
2021

American College of Veterinary Ophthalmologists®

INDIANAPOLIS
ACVO CONFERENCE
SEPT 29 – OCT 2, 2021

OFFICE@ACVO.ORG
(208) 466-7624

WHEN ALL EYES ARE ON YOU,



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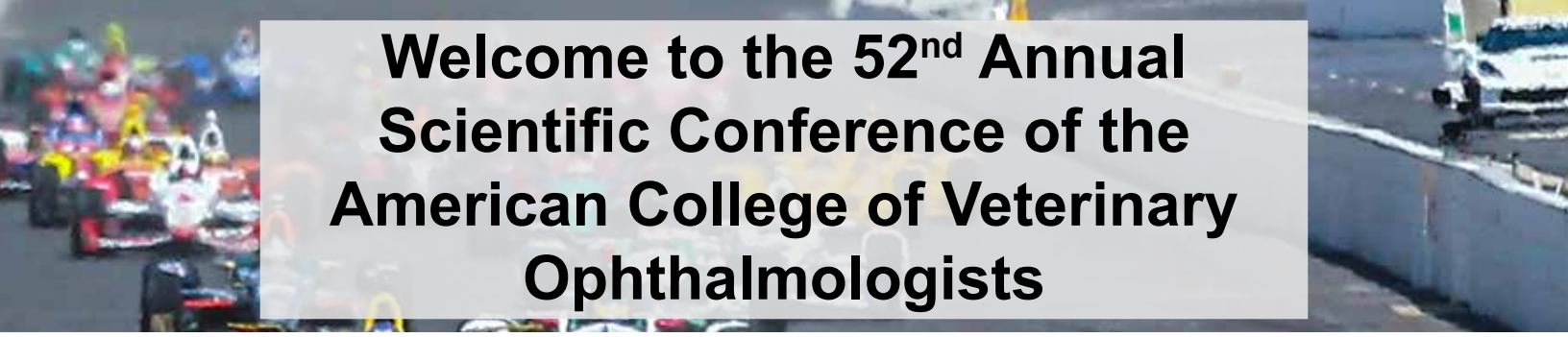
2021 Planning Committee

Dr. Anne Metzler

Dr. William Miller
Chair

Dr. David Ramsey



Welcome to the 52nd Annual Scientific Conference of the American College of Veterinary Ophthalmologists

Dear ACVO Conference Attendee,

Welcome to all who are attending in-person in Indianapolis and all who will be attending on-demand afterward. “Hindsight is 2020”, and I for one am happy to put the past year in the rear-view mirror, making strides toward normalcy in 2021 and 2022.

The 52nd Annual Conference will be a hybrid event this year**. Dr. Ann Metzler and the ACVO staff did a remarkable job of delivering a nearly seamless virtual conference last year**. It was so well done that several members requested a similar format this year and for years to come. I too enjoyed the virtual format since it allowed me to sit on the south rim of Lajarah Canyon, listen to fantastic presentations and interact with the authors, all from my iPhone. **So why could we not host a simultaneous virtual and in-person conference this year?** Namely, logistics, cost and contracts. Designing each format is planning for essentially two separate conferences, the work and cost are duplicated. ACVO simply do not have enough available trained staff to manage two conferences at once, offering on-site service and online IT support for both an in-person and virtual conference at the same time. Offering the on-demand platform adds another management element and significant cost increase to operate. Not being able to project the possible financial impact of COVID this year, and unable to negotiate out of our hotel and vendor contracts preemptively this past spring, ACVO must move forward responsibly to cover increased costs and possibly pay contractual penalties. Finally, ACVO is trying to offer additional benefit to in-person attendees to help encourage them to participate on site, if they feel comfortable attending in Indy ; the online option is considered a fallback to help those who just cannot make it, but should not replace the benefits of attending in-person.

Our solution for this year is therefore a hybrid of in-person and virtual. **Those attending in Indianapolis will hear live presentations from those authors able to attend in-person and will view some pre-recorded presentations from authors who could not come to Indianapolis. This hybrid presentation approach on-site allowed us to host out of country presenters, keeping them involved as integral participants in our program. After the conference**, those who choose to view the on-demand recordings will find new content added including the Teach & Learn session. An added benefit for both types of attendees is that you will also be able to review presentations, re-connect with vendors, and view the posters in detail through the end of the year.

The **Scientific Program consists of over sixty papers and In-Depth presentations, allowing for up to twenty-four hours of RACE approved continuing education (submitted for final approval)**. In-person and on-demand conference attendees will also have access to the **Masters’ Course on Immunosuppressive Therapy and the General Practitioners course** for additional RACE approved CE, at an additional cost. Those attending the conference on-demand will have until the end of the year to complete viewing the presentations and obtain CE credit.

The Planning Committee **solicited two In-Depth speakers this year. Dr. John Sapienza** agreed to kick off the conference with an update on surgical management of glaucoma, followed by a number of papers on the subject. “In Vivo Confocal Microscopy: Clinical and Research Applications in Veterinary Ophthalmology” by **Dr. Eric Ledbetter**, will demonstrate how advanced diagnostics can and should be part of our daily practice. Our **Keynote speaker this year is Dr. Mark Lappin**. Dr. Lappin really needs no introduction as his work has been at the vanguard of infectious disease diagnostics and therapy for many years. Dr. Lappin plans to present an insightful presentation on infectious diseases, in-person at the conference. Please see the conference schedule for times and dates of the presentations on-site.

Poster sessions will be available both in-person and on-line this year. Authors attending the conference in-person will be available with their posters Friday and Saturday, and those authors unable to attend will have the ability to receive questions through the on-demand platform. The posters are available to view in the on-demand platform during the in-

person event, and through the end of the year. Please leave questions for presenters in the on-demand format and they can respond when received or meet them in-person in Indy for discussion.

Drs. Carmen Colitz, David Wilkie, Brian Gilger and Fabiano Montiani-Ferreira will provide an exceptional and needed **Residents' Workshop**. This year's topic will involve preparing, reviewing and submitting scientific articles. The advances we make as a profession depend on good science and well written documentation of that science. This year's Residents' Workshop will aid not only residents, but all of us in contributing to our scientific literature. For speakers who cannot present in person, contact information will be available to reach out of you have questions.

We will hold the **ACVO Annual Meeting of the Voting Members** (AMVM) this year in Indy, see your schedule for details. To allow more people to vote for officers, voting this year was held on-line in August. We're excited to welcome our newest leadership at the AMVM. We are working to make virtual participation possible, minimally the ability to view the meeting. We encourage you to reach out to a member or Regent on-site, to help pose any pressing questions for discussion. Minutes will be provided to the membership soon after the AMVM. A follow-up Q&A is being discussed for later in October if the members would like.

The **General Practitioners Course** continues to set a new standard for excellence in ophthalmic education for primary veterinary care providers. ACVO Regent, **Dr. David Ramsey,** worked diligently to secure **Drs. Kathryn Good, Shannon Boveland, Elizabeth Giuliano, Kenneth Pierce, and Mary Belle Glaze**, who will provide valuable advice to our general practitioners. Special thanks to all our general practitioner course presenters. This course will only occur on-demand, but will be promoted in many areas of the country through the end of the year for purchase. ACVO Members will again have the option to provide a complimentary link to these presentations to students and residents, beginning in December. They will be able to watch the recordings for free as your member benefit.

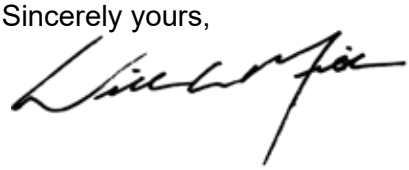
Those attending in Indianapolis will be able to gather once again for the **annual Fun Run**. Those not able to attend in person can still virtually run the event, shirts will be shipped when available to those at home. If you run virtually share pictures with the ACVO staff of your run so they can be posted in an upcoming ACVO newsletter.

A **special thanks, and welcome back, goes out to all of our sponsors and exhibitors**. So many of our vendors came through last year in support of the virtual meeting, for which we are grateful. But I know I speak for all of us when I say greeting them face to face is long overdue. **Please take time to visit them in-person in the exhibit hall, reconnect, and follow-up in their on-demand booth throughout the rest of the year.**

I was only vaguely aware of all the **effort it takes to coordinate a conference of this magnitude until I became Program Chair**. The planning, logistics, and attention to detail required are amazingly complex. This year even more trials and tribulations abound, requiring decisions to be made and then reevaluated on an almost daily basis. Without the tireless dedication and skills of Stacee Daniel, Jason O'Brien, Teresa Black and the rest of the ACVO staff, this conference would not be possible. Words alone are not adequate to express my gratitude and appreciation. I also want to thank members of this year's **Program Committee, Dr. Anne Metzler and Dr. David Ramsey**. Many hours of Zoom meetings, held after long days of work, were required on their parts to put this conference together. Lastly, I want to **thank the moderators, resident manuscript judges** and everyone else who made this conference a reality. A post-conference survey will be sent to all attendees following the conference. **Your feedback is key to making next year's conference even better**.

Those unable to attend this year in person, you will be missed! Those coming in-person thank you for your attendance. I look forward to greeting as many as possible during our time in Indianapolis.

Sincerely yours,



Dr. William Miller, DACVO, Program Chair

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WIFI INFORMATION

Complimentary WIFI available to all attendees through sponsor; Dechra Veterinary Partners

Dechra®

Network: JWMarriott_CONFERENCE
Password: DECHRA

2021 CONFERENCE SCHEDULE

Tuesday, September 28, 2021

8:00am - 5:00pm	Meeting Room 306	ABVO Board Meeting

Wednesday, September 29, 2021

8:00am - 5:00pm	Meeting Room 308	ACVO Genetics Committee Meeting
8:00am - 5:00pm	Meeting Room 306	ACVO BOR Meeting
8:00am - 5:00pm	Meeting Room 309	ABVO Residency Committee Meeting
11:00am - 4:00pm	JW 5 & Registration Desk	Exhibitor Registration and Set-Up
12:00pm - 5:00pm	Meeting Room 304	ABVO Credentials Committee Meeting
3:00pm - 8:00pm	JW Grand Ballroom Foyer	Conference Registration
3:00pm - 5:00pm	Meeting Room 305	ABVO MOC Committee Meeting
6:00pm - 8:00pm	JW 5 - Exhibit Hall	ACVO & AVOT Welcome Reception
6:00pm - 9:00pm	Meeting Room 312	Speaker Ready Room

Notice: The offering of this material is intended only as voluntary continuing education and does not in any way suggest nor guarantee its acceptance as qualifying mandatory continuing education by any individual state. ACVO has attempted to design this program to meet the strictest state guidelines, but requirements may vary between licensing boards. It is the individual veterinarian's responsibility to determine and comply with their individual state requirements. RACE Approved # 53-43881.

2021 CONFERENCE SCHEDULE

Thursday, September 30, 2021

6:00am - 6:00pm	Meeting Room 312	Speaker Ready Room (daily)
7:00am - 5:00pm	JW Grand Ballroom Foyer	Conference Registration
7:00am - 8:00am	JW 5 - Exhibit Hall	Light Breakfast with Exhibitors Sponsored by Baush + Lomb
7:00am - 5:00pm	JW 5 - Exhibit Hall	Exhibit Hall Open
7:00am - 5:00pm	JW 5 - Exhibit Hall	Poster Session Sponsored by Optomed
8:00am - 9:00am	JW 6	In-Depth Presentation, Glaucoma Dr. John S. Sapienza Sponsored by Addition Technology, Inc. (Moderator: Dr. William Miller)
9:00am - 12:00pm	JW 6	General Session Moderator: Dr. Andrew Rogen
10:00am (beginning of break)	JW 6	Resident Manuscript Awards Sponsored by Ocu-Glo by Animal Necessity
10:00am - 10:30am	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by OcuScience
12:00pm - 1:30pm		Attendees Lunch on Your Own
12:00pm - 1:00pm	Meeting Room 300	ABVO Multi-Chair Lunch (by invitation)
1:30pm - 5:00pm	JW 6	General Session Moderator: Dr. Renata Ramos
2:45pm - 3:15pm	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by OcuScience
4:00pm - 5:30pm	JW 3 & 4	ACVO Career Fair (all attendees welcome)

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2021 CONFERENCE SCHEDULE

Friday, October 1, 2021

6:00am - 6:00pm	Meeting Room 312	Speaker Ready Room (daily)
7:00am - 3:00pm	JW Grand Ballroom Foyer	Conference Registration
7:00am - 8:00am	JW 5 - Exhibit Hall	Light Breakfast with Exhibitors
7:00am - 3:30pm	JW 5 - Exhibit Hall	Exhibit Hall Open
7:00am - 5:00pm	JW 5 - Exhibit Hall	Poster Session Sponsored by Optomed
8:00am - 9:00am	JW 6	In-Depth Presentation, Advanced Ocular Imaging Dr. Eric Ledbetter Sponsored by VCA Animal Hospitals Moderator: Dr. William Miller
9:00am - 12:00pm	JW 6	General Session Moderator: Dr. Chris Nettune
10:00am - 10:30am	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by Dan Scott & Associates
12:00pm - 1:30pm		Attendees Lunch on Your Own
12:00pm - 1:30pm	JW 4	New Diplomates and Leadership Lunch (by invitation)
12:00pm - 1:30pm	See online event page	Epicur Pharma Resident Lunch (by invitation)
1:30pm - 3:00pm	JW 6	General Session Moderator: Dr. Becky Telle
1:30pm - 4:30pm	JW 7	Residents' Workshop (all attendees welcome) Moderator: Dr. Carmen Colitz
3:00pm - 3:30pm	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by Dan Scott & Associates
3:30pm - 4:30pm	JW 6	ACVO Annual Meeting of Voting Members (AMVM) (ACVO Members Only)
4:30pm - 5:00pm	JW 6	ABVO Diplomates Meeting (following AMVM)
6:00pm - 9:00pm	Victory Field	ACVO Friday Reception & Baseball Game Sponsored by MedVet

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2021 CONFERENCE SCHEDULE

Saturday, October 2, 2021

6:00am - 6:00pm	Meeting Room 312	Speaker Ready Room (daily)
6:30am - 7:30am	JW Hotel Lobby	Fun Run/Walk Sponsored by an-vison Inc. and Sontec Instruments, Inc.
7:00am - 5:00pm	JW Grand Ballroom Foyer	Conference Registration
7:00am - 8:00am	JW 5 - Exhibit Hall	Light Breakfast with Exhibitors
7:00am - 3:30pm	JW 5 - Exhibit Hall	Exhibit Hall Open
7:00am - 5:00pm	JW 5 - Exhibit Hall	Poster Session Sponsored by Optomed
7:55am - 10:15am	JW 6	General Session Moderator: Dr. Laura Mancuso
10:15am - 10:45am	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by Dan Scott & Associates
10:45am - 10:55am	JW 6	ACVO Memorial Members PPT (Silent)
11:00am - 12:00pm	JW 6	Keynote Presentation, Infectious Diseases Dr. Michael Lappin Sponsored by Eye Care for Animals Moderator: Dr. William Miller
12:00pm - 1:30pm		Attendees Lunch on your own
1:30pm - 4:30pm	JW 6	General Session Moderator: TBA
3:00pm - 3:30pm	JW 5 - Exhibit Hall	Break with Exhibitors Sponsored by Dan Scott & Associates
4:30pm		Close of General Conference

Sunday, October 3, 2021

7:00am - 8:00am	JW 6	Masters' Course - Breakfast
8:00am - 12:00pm	JW 6	Masters' Course (Additional Fee) Option to add this course for on-demend only available. See the Registraion Desk for details.

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Thank You!

Thank you to those diplomates who volunteered their time to help moderate the General Sessions, judge the Resident Manuscripts, and organize extra courses:

Manuscript Judges
Dr. Shannon Boveland
Dr. Michael Brown
Dr. Derek Chow
Dr. Simone Iwabe
Dr. Pamela Ko
Dr. Andras Komaromy
Dr. Brad Nadelstein
Dr. David Ramsey
Dr. Lionel Sebbag
Dr. Michael West

Special Course Organizers
Dr. Caroline Betbeze
Dr. Chantale Pinard
Dr. David Ramsey

Session Moderators
Dr. Carmen Colitz
Dr. Tara Czepiel
Dr. Laura Mancuso
Dr. Bill Miller
Dr. Chris Nettune
Dr. Renata Ramos
Dr. Andrew Rogen
Dr. Becky Telle

CONFERENCE INFORMATION

ONSITE INFORMATION GUIDE - Please visit the conference website for the most up to date info. The "On-Site" tab will list everything you need to know while at the conference, such as schedules, maps, digital proceedings, digital posters, digital exhibit booths, and daily announcements on our website: www.ACVOconference.org.

HEALTH & SAFETY - Please review guidelines posted on the conference website. **MASKS AND SOCIAL DISTANCING ARE STRONGLEY ENCOURAGED.**

MEETING SPACE - WIFI is available to all attendees through co-sponsors Dechra Veterinary Products and ACVO.

Network: JWMarriott_CONFERENCE
Password: DECHRA

VIN CYBER CAFE - The Veterinary Information Network (VIN) will have computer stations set up in JW Grand Ballroom Pre-Function on the 3rd floor, near the registration desk. All attendees are welcome to use this complimentary service.

SPEAKER READY ROOM - Available Wednesday evening through Saturday, in Meeting Room 312, located on the 3rd floor. Individual times are posted on the main schedule. Computers will be available with sound.

WELCOME RECEPTION - Join us on Wednesday evening from 6:00pm-8:00pm for appetizers and drinks in the Exhibit Hall, JW Grand Ballroom 5. This is an opportunity for you to catch up with colleagues before the conference gets underway. You will need to either wear your badge or bring your welcome reception ticket with you to this event.

ACVO ANNUAL MEETING OF THE VOTING MEMBERS - New Diplomates who have passed ABVO exams in 2020 and 2021 should plan to attend just prior to this meeting to be welcomed as a Diplomate and to receive their certificate; family may briefly attend. This year the meeting will be held Friday from 3:30pm-4:30pm in the JW Grand Ballroom 6. You may begin sign-in at 3:15pm.

FRIDAY EVENING AT THE BALLPARK 6:00pm-7:15pm: Social Event; 7:05 pm: First Pitch.
ACVO & MedVet will be hosting a pre-game social at Victory Field across the street from the JW Marriot Hotel. This event will be complimentary to in-person conference attendees. Tickets are required for ballpark entry, and you can sign up on the ACVO Conference website. Attendees may stay to watch the baseball game, with first pitch at 7:05pm. Thank you to MedVet for sponsoring this event and including complimentary game tickets.

MEETING ROOMS & REGISTRATION LOCATION - The main ACVO General Sessions & Posters are located on the 3rd floor conference level of the JW Marriott Hotel. Please consult the map of the facilities on page 14 or on the website at www.ACVOconference.org to determine the exact location of each meeting room. The registration desk is located on the 3rd floor level, in the JW Ballroom Pre-Function, and will remain open during posted hours.

WEAR YOUR NAME BADGE - REQUIRED FOR SECURITY/ACCESS - Always wear your name badge to attend any ACVO events. It is your ticket into the conference lectures, exhibitor hall and activities.

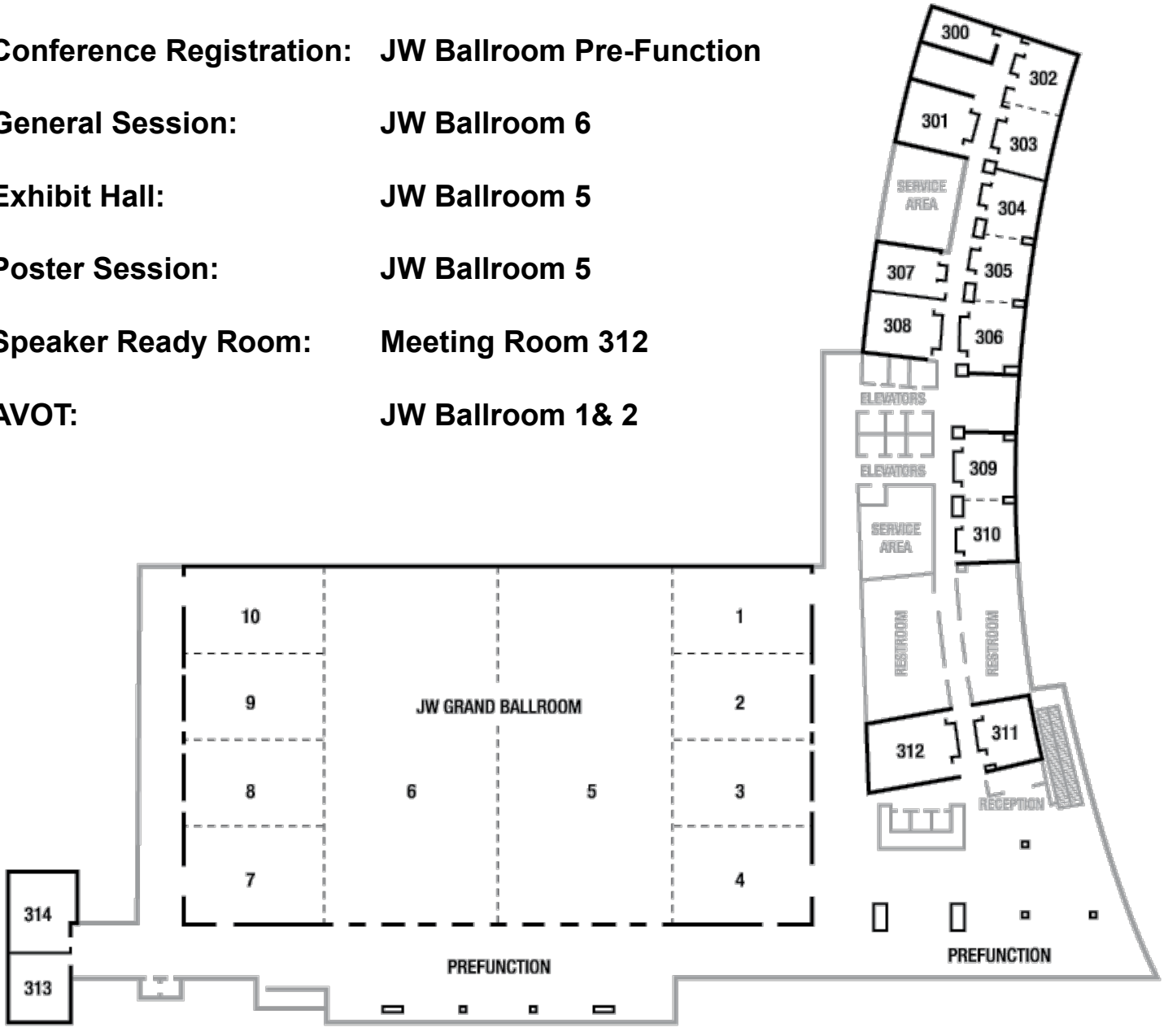
FUN RUN & WALK - The ACVO Fun Run will begin at 6:30am on Saturday. Plan to meet your fellow runners at 6:15am in the JW Marriott Hotel Lobby for a casual start. Light refreshments will be available in the JW Marriott hotel lobby after the event. Maps are in the on-site section of the conference website and will be available at the registration desk if needed. Please note that the registration desk will not be open during the Fun Run on Saturday. You may pick up your shirts anytime Thursday, Friday or Saturday at the main registration desk. Pre-registration is required to receive a shirt. If you are not registered, you may run with the group at no cost, but T-shirts will not be available. This event is being co-sponsored by an-vision, Inc., and Sontec Instruments.

HOTEL LAYOUT

QUICK REFERENCE GUIDE

3rd floor of the JW Marriott Indy

Conference Registration:	**JW Ballroom Pre-Function**
General Session:	**JW Ballroom 6**
Exhibit Hall:	**JW Ballroom 5**
Poster Session:	**JW Ballroom 5**
Speaker Ready Room:	**Meeting Room 312**
AVOT:	**JW Ballroom 1& 2**



GENERAL PRACTITIONERS' SPECIALTY COURSE

Applied Ophthalmology for General Practitioners

This course will be **online and in the on-demand portal**
October 8, 2021 - January 3, 2022

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Dr. Kathryn Good


Dr. Shannon Boveland


Dr. Elizabeth Giuliano


Dr. Mary Belle Glaze


Dr. Kenneth Pierce


Dr. John Sapienza

Speaker	Lecture/Schedule
Dr. Kathryn Good	*"This Corneal Ulcer Won't Heal! What Do I Do Now?"*
Dr. Shannon Boveland	*"Common Causes of Feline Conjunctivitis and Keratitis"*
Dr. Elizabeth Giuliano	*"Waking Up Comfortably: Use of Local Anesthesia in Ophthalmic Surgery"*
Dr. Elizabeth Giuliano	*"Enucleation Surgery: When it's Not Always as Easy as the Textbooks Claim"*
Dr. Mary Belle Glaze	*"Ophthalmic Clues to Systemic Disease, Part 1. Canine"*
Dr. Mary Belle Glaze	*"Ophthalmic Clues to Systemic Disease, Part 2. Feline"*
Dr. Kenneth Pierce	*"Ocular Therapeutics: A Case Based Approach"*
Dr. John Sapienza	*"Medical and Surgical Treatment of Glaucoma"*

TEACHING & LEARNING

This course will be **online and in the on-demand portal**
October 8, 2021 - January 3, 2022

"Fostering Holistic Learning Through Veterinary Education and Training"

Christa E. Winkler, Ph.D.

Dr. Winkler is an Assistant Professor in the Department of Educational Leadership at Mississippi State University (MSU). Her research centers on leveraging quantitative methodology and insights to promote postsecondary student success. She brings training in both educational measurement (Ph.D. Quantitative Research, Evaluation, and Measurement in Educational Studies from The Ohio State University) and college student development (M.S.Ed. in Higher Education and Student Affairs from Baylor University). Dr. Winkler approaches student learning from a holistic perspective, with particular attention to the experiences and interactions outside the classroom that foster students' personal, academic, and career success. Her work has been published in outlets such as the Review of Higher Education, Research in Higher Education, and the Journal of Student Affairs Research and Practice.

The ACVO Teaching and Learning meeting hosts topics that specifically focus on veterinary ophthalmology education. It provides a venue for ophthalmologists to share teaching and learning strategies, and to hear education presentations from outside speakers with an expertise in general and clinical education.

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IN-DEPTH SPEAKER

Thursday, September 30, 2021

8:00am

JW Grand Ballroom 6

"Glaucoma: Surgical Options. Where did we come from and where are we going..."

Glaucoma surgery in the form of a gonioimplant, laser therapy or a combined procedure with the intention of vision recuperation/retention can often be confronted with complications and ultimate loss of sight. One can often provide excellent intraocular control with modern day surgical intervention, but past experiences have been marred by surgical failures. We can certainly learn from previous studies and experiences with different surgical devices and lasers. Our collective experiences including one with a large caseload and long follow-up evaluations can help direct our future endeavors and hopefully future successes. The goal of this lecture is to provide an insight into previous studies of surgical interventions for glaucoma, their complications, and successes, and how to approach the glaucomatous patient with the maintenance of vision as our number one treatment goal.

John S. Sapienza, DVM, DACVO

Dr. Sapienza received his Bachelor of Science and veterinary degree from Cornell University. He completed a one-year internship in small animal medicine and surgery at the Animal Medical Center in New York City, and a three-year residency in comparative ophthalmology at the University of Florida, College of Veterinary Medicine.

Dr. Sapienza is a Diplomate of the American College of Veterinary Ophthalmologists, and the consultant veterinary ophthalmologist at the Bronx Zoo and the N.Y. Aquarium. Dr. Sapienza is the head and department chairman of the ophthalmology section at New York's largest private practice referral center Long Island Veterinary Specialists (LIVS) in Plainview, New York. His special interests in ophthalmology include phacoemulsification cataract surgery, glaucoma surgeries and vitreoretinal procedures for retinal re-attachments.

Sponsored by:

AJL vet

IN-DEPTH SPEAKER

Friday, October 1, 2021
8:00am
JW Grand Ballroom 6

"In Vivo Confocal Microscopy: Clinical and Research Applications in Veterinary Ophthalmology"

Ophthalmic imaging techniques available for use in veterinary medicine have rapidly expanded in recent years. Use of these newer imaging modalities has permitted observation of anatomical and physiologic changes associated with many ocular disorders in a manner that was not previously feasible or only possible with invasive sample collection techniques and laboratory analysis. Observations made with advanced imaging techniques have directly contributed to an improved understanding of many ocular conditions. When applied in the clinical setting, advanced ophthalmic imaging techniques have the potential to improve the clinical detection, diagnosis, and treatment of many ocular diseases. This discussion will review the principles, indications, and techniques for in vivo confocal microscopy. Clinical and research applications of in vivo confocal microscopy in veterinary ophthalmology will be discussed.

Eric Ledbetter, DVM, DACVO

Dr. Ledbetter is a Professor of Comparative Ophthalmology at the Cornell University College of Veterinary Medicine where he also serves as the Ophthalmology Section Chief. After graduating from the University of Missouri College of Veterinary Medicine, he completed a small animal medicine and surgery internship at Texas A&M University College of Veterinary Medicine and a comparative ophthalmology residency at Cornell University, where he joined the faculty in 2006.

Dr. Ledbetter's research interests include in vivo ocular imaging techniques, ocular infectious disease, and ocular surface disease. In addition to research and teaching endeavors, Dr. Ledbetter provides clinical ophthalmology services within Cornell University's Companion Animal and Equine & Farm Animal Hospitals. He is a frequently invited speaker at national and international conferences and has published over one hundred peer-reviewed journal articles, review articles, and book chapters.

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RESIDENTS' WORKSHOP

Friday, October 1, 2021
1:30pm - 4:30pm
JW Grand Ballroom 7

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ETHOS VETERINARY HEALTH

"Scientific Manuscript Writing and Review"

Development and composition of a scientific manuscript can be an overwhelming undertaking, even for experienced authors. Publication of evidence-based research results in a peer-reviewed journal disseminates relevant information and contemporary research discoveries and outcomes to a broad readership audience. The purpose of this workshop is to focus on some of the multiple stages required in developing valid research strategies and procedures, ethical considerations in research, data collection and evaluation, and to provide the necessary foundation for scientific writing and manuscript preparation. This course is available to all attendees.

Notes will be available as handouts at the session and digitally in the on-demand portal.


Dr. David Wilkie


Dr. Fabiano Montiani Ferreira


Dr. Brian Gilger

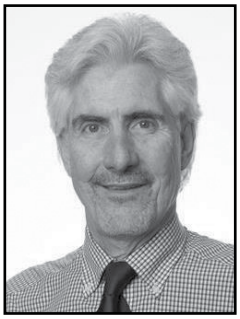

Dr. Carmen Colitz

Time	Speaker & Lecture
1:30pm-2:15pm	**Carmen Colitz, DVM, PhD, DACVO, MBA** (Course Moderator) "Team building, relationships, and communications during project planning, completion, and manuscript preparation"
2:15pm-3:00pm	**Fabiano Montiani-Ferreira, BVetMed, MSc, PhD, DBCVO** "Types of variables, data distribution, principles of experimental design, descriptive, and inferential statistics"
3:00pm-3:45pm	**Brian Gilger, DVM, MS, DACVO, Dipl. ABT** "Ethical considerations in animal research and clinical studies"
3:45pm-4:30pm	**David Wilkie, DVM, MS, DACVO** "Manuscript journal submissions - common pitfalls in journal submission and review of manuscripts"

KEYNOTE SPEAKER

Saturday, October 2, 11:00am
JW Grand Ballroom 6

Topic: Infectious Diseases



Michael R. Lappin, DVM, PhD, DACVIM

Dr. Lappin is a Professor of Infectious Disease in the Department of Clinical Sciences at Colorado State University. His laboratory studies immune responses to vaccination against respiratory viruses in cats, as well as immune responses to feline vaccines. He also oversees a large diagnostic service for feline infectious agents, including Toxoplasma gondii, Bartonella, Ehrlichia and others. Current areas of investigation include mechanisms of transmission of Hemoplasma spp, therapies for rickettsial diseases, and companion animals as carriers of drug-resistant staphylococci. Lappin is also Director of Shelter Medicine and investigates disease outbreaks and management in shelter settings.

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MASTERS' COURSE

Sunday, October 3, 2021
8:00am - Noon
JW Grand Ballroom 6

"Immunosuppressive Therapy: What an Ophthalmologist Needs to Know, from an Internist's Perspective"

This morning course series will focus on our current understanding of immunosuppressive therapy, with a review of common drugs and a practical discussion of indications, side effects and monitoring of therapy, and an emphasis on conditions relevant to ophthalmologists. Notes will be available as handouts at the session and digitally in the on-demand portal.

Andrew J. Mackin, BSc, BVMS, MVS, DVSc, DACVIM, FANZCVSc

Dr. Andrew Mackin is currently Professor and Head of the Department of Clinical Sciences at Mississippi State University. Andrew is a 1983 graduate of Murdoch University in Western Australia, and after graduation completed an internship and residency in small animal medicine at the University of Melbourne, followed by an internal medicine residency at the Ontario Veterinary College. Dr. Mackin became a Fellow of the ANZCVSc in 1993, and a Diplomate of the American College of Veterinary Internal Medicine in 1994. Andrew has a clinical and research focus on hematology, hemostasis, immunosuppressive therapy and transfusion medicine. In 2006, he received the Carl Norden-Pfizer Distinguished Teacher Award and, in 2010, the MSU-CVM Dean's Pegasus Award.

Time	Speaker & Lecture
7:00am	Breakfast & Welcome
8:00am-10:00am	Dr. Andrew J. Mackin "Immunosuppressive Therapy: What an Ophthalmologist Needs to Know, from an Internist's Perspective"
10:00am-10:30am	Coffee Break & Discussion
10:30am-11:30am	Dr. Andrew J. Mackin "Immunosuppressive Therapy: What an Ophthalmologist Needs to Know, from an Internist's Perspective" (continued)
11:30am-Noon	**Q&A**

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POSTER SESSION THURSDAY

Thursday, September 30, 2021

PRESENTING AUTHOR	TITLE	PAGE
P. Wong, DVM	A NOVEL PROTOCOL USING TRANSCERAL CYCLOPHOTOCOAGULATION FOR THE TREATMENT OF CANINE GLAUCOMA: A RETROSPECTIVE STUDY OF 112 DOGS (2008-2019)	42
B. Artemis, DVM	ULTRASOUND BIOMICROSCOPIC ANALYSIS OF THE ANTERIOR SEGMENT STRUCTURES IN DOGS WITH ADAMTS10- OPEN ANGLE GLAUCOMA: A PRELIMINARY STUDY	43
S. Coall, BVSc, MANZCVS	CLINICAL CHARACTERISTICS OF PRIMARY GLAUCOMA IN BURMESE CATS IN AUSTRALIA (2010-2021)	44
S. Desai, DVM	COMPARATIVE EFFECTS OF LATANOPROST AND LATANOPROSTENE BUNOD ON INTRAOCULAR PRESSURE AND PUPIL DIAMETER IN NORMAL BEAGLE DOGS	45
N. Himebaugh, DVM	A 10 YEAR RETROSPECTIVE STUDY ON GLAUCOMA DIAGNOSES, TREATMENT, AND VISUAL OUTCOME AT THE OHIO STATE UNIVERSITY	46
S. Kang, DVM, MS, PhD, DAiCVO	THE ASSOCIATION OF TOPICAL FLURBIPROFEN WITH THE INCIDENCE OF POSTOPERATIVE GLAUCOMA AFTER PHACOEMULSIFICATION IN DOGS	47
H. Komatsu, DVM	OPTICAL COHERENCE TOMOGRAPHY FOR EVALUATING THE MORPHOLOGICAL CHANGES IN THE RETINA AND OPTIC NERVE HEAD OF CATS WITH GLAUCOMA	48
S. Park, DVM, PhD	OCULAR MORPHOLOGIC TRAITS IN THE AMERICAN COCKER SPANIEL MAY CONFER PRIMARY ANGLE CLOSURE SUSCEPTIBILITY	49
S. Brattain, DVM, MPH	MULTIFOCAL FRONTAL AND ZYGOMATIC MULTILOBULAR OSTEOCHONDROSARCOMA CAUSING FACIAL DISTORTION AND ORBITAL CELLULITIS IN A DOG	50
T. Stonex, VMD	SCLEROTHERAPY FOR TREATMENT OF A SUPERFICIAL ORBITAL VENOUS MALFORMATION IN A HORSE	51
O. Bolus, DVM	OUTCOMES FOLLOWING PHACOEMULSIFICATION IN PENGUINS: 25 EYES FROM 14 PENGUINS (2008-2020)	52
Y. Miwa, DVM, PhD	BILATERAL CATARACT SURGERY IN A JAPANESE MACAQUE (MACACA FUSCATA): A CASE REPORT	53
S. Eaton, VMD, DACVO	CLINICAL MICRIBOLOGICAL FEATURES AND OUTCOMES OF CORNEAL FOREIGN BODIES IN DOGS	54
S. Osinchuk, BSc, DVM, MS, DACVO	BACTERIAL ISOLATES FROM COMPLEX CORNEAL ULCERS IN WESTERN CANADA	55
C. Sheridan, DVM	SURVEY OF OCULAR ABNORMALITIES AND PREVALENCE OF LINEAR KERATOPATHY IN DRAFT HORSES	56
J. Chmiel, BA	OCULAR INJURIES RELATED TO GROOMING VISITS IN CANINE PATIENTS: 161 CASES (2004-2020)	57
M. Henriksen, DVM, PhD, DACVO	OCULAR DISEASES IN THE ICELANDIC HORSE WITH FOCUS ON EQUINE RECURRENT UVEITIS: 112 ICELANDIC HORSES LIVING IN DENMARK AND 26 ICELANDIC HORSES LIVING IN UNITED STATES	58

Thursday, September 30, 2021

8:00am-5:00pm

IN-PERSON POSTER SESSION. One of three days. Different In-person posters will be available in the Exhibit Hall each day along the right-side wall.
ON-DEMAND POSTER SESSION. All posters will also be available through the On-Demand platform Thursday, September 30, 2021-Monday, January 3, 2022. Open for viewing all day, every day.

TOPIC/TIME	PRESENTING AUTHOR	TITLE
8:00am-8:05am	William Miller, DVM, MS, DACVO	**PLANNING COMMITTEE CHAIR WELCOME** Speaker introductions

GLAUCOMA

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
IN-DEPTH - Glaucoma			
8:05am-8:55am	John S. Sapienza, DVM, DACVO	GLAUCOMA: SURGICAL OPTIONS. WHERE DID WE COME FROM AND WHERE ARE WE GOING…	40
GENERAL SESSION - Glaucoma			
9:00am-9:15am	U. Dietrich, DVM, DMV, DACVO, DECVO, MRCVS, FHEA	PRIMARY GLAUCOMA IN THE FRENCH BULLDOG	60
9:15am-9:30am	B. Routh, DVM	MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION FOR THE TREATMENT OF GLAUCOMA IN 41 DOGS AND 1 CAT	61
9:30am-9:45am	K. Oikawa, BVSc, PhD	ASSOCIATION BETWEEN OCT-DERIVED OPTIC NERVE HEAD PARAMETERS AND OPTIC NERVE AXON COUNT IN FELINE CONGENITAL GLAUCOMA	62
9:45am-10:00am	H. Faghihi, DVM	EFFECT OF TOPICAL 0.0015% TAFLUPROST ON INTRAOCULAR PRESSURE IN CATS	63
10:00am-10:30am	BREAK IN EXHIBIT HALL		
10:30am-10:45am	L. Graham, DVM	EFFECT OF ORAL ADMINISTRATION OF TOPIRAMATE EXTENDED-RELEASE ON INTRAOCULAR PRESSURE IN HEALTHY CATS	64
10:45am-11:00am	K. Chan, DVM, MS	CHARACTERIZATION OF AQUEOUS OUTFLOW PATHWAY ASSOCIATED OCULAR VASCULATURE BY LIGHT SHEET FLUORESCENCE MICROSCOPY	65
11:00am-11:15am	S. Pumphrey, DVM, DACVO	RELATIVE ABILITY OF AQUEOUS HUMOR FROM DOGS WITH PRIMARY ANGLE CLOSURE GLAUCOMA TO CATALYZE OR INHIBIT COLLAGENOLYSIS	66
11:15am-11:30am	S. Sosnowik, DVM	MORPHOLOGICAL CHANGES ALONG THE CONVENTIONAL AQUEOUS OUTFLOW PATHWAY IN MONKEY EYES WITH LASER-INDUCED OCULAR HYPERTENSION	67

PHARMACOLOGY

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
11:30am-11:45am	D. Arad, BVSc MRCVS	MUCOADHESIVE POLYMERS ENHANCE OCULAR DRUG DELIVERY: PROOF OF CONCEPT STUDY WITH 0.5% TROPICAMIDE IN DOGS	68
11:45am-Noon	A. Bowden, DVM	PHARMACOKINETICS OF EXTENDED-RELEASE PARENTERAL CEFTIOFUR (EXCEDE®) IN THE CANINE TEAR FILM	69

Thursday, September 30, 2021

PHARMACOLOGY CONT...

Noon-1:30pm	**LUNCH** Attendees on their own		
TOPIC/TIME	**PRESENTING AUTHOR**	**TITLE**	**PAGE**
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1:45pm-2:00pm	K. Kline, DVM	COMPARISON OF OPHTHALMIC LOTEPREDNOL ETABONATE AND PREDNISOLONE ACETATE EFFECTS ON THE CANINE HYPOTHALAMIC-PITUITARY-ADRENAL AXIS	71
2:00pm-2:15pm	E. Ledbetter, DVM, DACVO	COMPARATIVE EFFICACY OF TOPICAL OPHTHALMIC GANCICLOVIR AND ORAL FAMCICLOVIR IN CATS WITH EXPERIMENTAL OCULAR FELINE HERPESVIRUS-1 INFECTION	72
2:15pm-2:30pm	C. Alling, DVM	EX VIVO MODELING OF BOVINE HERPESVIRUS-1 KERATITIS AND CIDOFOVIR ANTIVIRAL TREATMENT	73
2:30pm-3:00pm		BREAK IN EXHIBIT HALL	

LACRIMAL

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
3:00pm-3:15pm	G. Bercovitz,VMD	A RETROSPECTIVE INVESTIGATION OF NEUROGENIC KERATOCONJUNCTIVITIS SICCA AFTER ADMINISTRATION OF THE LONG LASTING OTIC MEDICATIONS CLARO, NEPTRA AND OSURNIA	74
3:15pm-3:30pm	B. Reynolds, BVSc	AN INVESTIGATION IN TO THE DEVELOPMENT OF QUALITATIVE TEAR FILM DISORDERS IN DOGS FOLLOWING CRYOEPILATION FOR TREATING DISTICHIASIS	75
3:30pm-3:45pm	S. Rajaei, DVM, PhD	TEAR FILM BREAKUP TIME AND TEAR PRODUCTION IN DOGS; EFFECTS OF AGE, SEX, REPRODUCTIVE STATUS, SKULL TYPE, AND NASOLACRIMAL DUCT PATENCY	76
3:45pm-4:00pm	C. Boles, DVM	THE INFLUENCE OF AN ARTIFICIAL TEAR OINTMENT ON SCHIRMER TEAR TEST-I RESULTS IN NORMAL DOGS	77

ORBIT

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
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4:15pm-4:30pm	V. Yang, DVM	RETROBULBAR LIDOCAINE INJECTION VIA THE SUPRAORBITAL FOSSA IS SAFE IN ADULT HORSES BUT PRODUCES REGIONALLY VARIABLE PERIOCULAR ANESTHESIA	79
4:30pm-4:45pm	D. Washington, MS, DVM	HOW LONG DOES IT TAKE TO BECOME PROFICIENT AND EFFECTIVELY DELIVER A RETROBULBAR NERVE BOCK? A COMPARISON OF TWO TECHNIQUES	80
4:45pm-5:00pm	E. Lenihan, MVB PgCertSAOphthal MRCVS	ESTIMATION OF THE INTRAOPERATIVE BLOOD LOSS DURING ENUCLEATION IN DOGS	81

Friday, October 1, 2021

GENERAL SCIENTIFIC SESSION

Friday, October 1, 2021

8:00am-5:00pm	**IN-PERSON POSTER SESSION.** One of three days. Different In-person posters will be available in the Exhibit Hall each day along the right-side wall. **ON-DEMAND POSTER SESSION**. All posters will also be available through the On-Demand platform Thursday, September 30, 2021-Monday, January 3, 2022. Open for viewing all day, every day.

TOPIC/TIME	PRESENTING AUTHOR	TITLE
8:00am-8:05am	William Miller, DVM, MS, DACVO	**PLANNING COMMITTEE CHAIR WELCOME** Speaker introductions

IN-DEPTH ADVANCED OCULAR IMAGING

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
8:05am-8:55am	Eric Ledbetter, DVM, DACVO	IN VIVO CONFOCAL MICROSCOPY: CLINICAL AND RESEARCH APPLICATIONS IN VETERINARY OPHTHALMOLOGY	101

DIAGNOSTIC

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
9:00am-9:15am	E. Latham, MVB	COMPARISON OF THREE METHODS OF TONOMETRY IN HORSES	106
9:15am-9:30am	K. Hodgson, DVM	COMPARISON OF THREE REBOUND TONOMETERS IN DOGS	107
9:30am-9:45am	A. Gray, BVMS	APPLICABILITY OF A HANDHELD PORTABLE ELECTRORETINOGRAPHY UNIT IN THE CHARACTERIZATION OF RPGRIP1ins44-PRA/CRD CANINE MODEL	108
9:45am-10:00am	L. Charnock, DVM	EFFECTS OF THE CORNEOCONJUNCTIVAL TRANSPOSITION AND POSTERIOR LAMELLAR KERATOPLASTY ON STREAK RETINOSCOPY IN EQUINE CADAVER EYES: PRELIMINARY RESULTS	109
10:00am-10:30am		BREAK IN EXHIBIT HALL.	
10:30am-10:45am	A. Bowden, DVM	OCULAR DIAGNOSTICS, CONJUNCTIVAL MICROBIOME, AND OPHTHALMIC FINDINGS IN THE CHILEAN FLAMINGO (PHOENICOPTERUS CHILENSIS)	110
10:45am-11:00am	A. Kuner, DVM, MS, Clove	ERG RESULTS IN MOLINOIS BELGIUM SHEPHERD DOGS SUBMITTED TO TWO DIFFERENT ANAESTHETHIC PROTOCOLS	111
11:00am-11:15am	Yu Sato, DVM	VARIATION IN DISEASE PHENOTYPE IN OUTCROSSED PRCD AFFECTED DOGS; IN VIVO OPTICAL COHERENCE TOMOGRAPHY AND ELECTRORETINOGRAPHY	112
11:15am-11:30am	A. Ripolles-Garcia, DVM	TOPOGRAPHICAL CHARACTERIZATION AND QUANTIFICATION OF THE RETINAL MICROVASCULATURE IN THE NORMAL DOG WITH OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY	113

Friday, October 1, 2021

CORNEA

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
11:30am-11:45am	L. Bedos, DVM, MRCVS	CULTURE AND CHARACTERIZATION OF CANINE AND FELINE CORNEAL ORGANOIDS: A NEW TOOL FOR THE STUDY AND TREATMENT OF CORNEAL DISEASES	114
11:45am-12:00pm	E Capistrano da Silva. DVM, MSc, PhD	EFFICACY OF THE BOVINE AMNIOTIC MEMBRANE HOMOGENATE IN THE WOUND HEALING PROCESS USING EX VIVO CORNEAL MODEL	115
Noon-1:30pm		**LUNCH.** Attendees on their own	
1:30pm-4:30pm	**Carmen Colitz,** DVM, PhD, DACVO **Fabiano Montiani-Ferreira,** BVetMed, MSc, PhD, DBCVO **Brian Gilger**, DVM, MS, DACVO, DABT **David Wilkie**, DVM, MS, DACVO	**RESIDENTS' WORKSHOP**. Scientific Manuscript Writing and Review. (All registered attendees are invited to join. (Notes will be available as handouts at the session and digitally in the on-demand portal.)	
1:30pm-1:45pm	P. Soukup, DMV. MVDr, PhD	EFFECT OF ADJUNCTIVE MATRIX REGENERATION THERAPY AGENT ON HEALING OF SPONTANEOUS CHRONIC CORNEAL EPITHELIAL DEFECTS IN FRENCH BULLDOGS	116
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DIAGNOSTICS/PHARMACY

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2:30pm-2:45pm	M. Henriksen, DVM, PhD, DACVO	CLINICAL FINDINGS IN DOGS TREATED WITH ORAL CANNABIDIOL (CBD) VERSUS PREDNISOLONE ACETATE 1% OPHTHALMIC SUSPENSION FOR EXPERIMENTALLY INDUCED UVEITIS	120
2:45pm-3:00pm	H. Jost, DVM	COMPARISON OF BACTERIAL CULTURE GROWTH IN CANINE EYES WITH PRESUMED INFECTED COMPLICATED CORNEAL ULCERATIONS USING TWO DIFFERENT CULTURE METHODS: DIRECT PLATING VERSUS CULTURETTE SUBMISSION	121
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3:30pm-4:30pm		**ACVO Annual Meeting of Voting Members** (check in begins at 3:15pm)	
4:30pm-5:00pm		ABVO Meeting	

POSTER SESSION SATURDAY

Saturday, October 2, 2021

PRESENTING AUTHOR	TITLE	PAGE
R. Wright, DVM	PERIOCULAR MELANOCYTIC TUMORS IN VIZSLA DOGS: CLINICOPATHOLOGIC FEATURES AND BREED PREVALENCE	123
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K. Bhadsavle, BVSc, MVSc	CHRONIC UVEITIS IN A CAT ASSOCIATED WITH TRYPANOSOMA EVANSI INFECTION FOUND IN CEREBROSPINAL FLUID, POSTMORTEM IN A 6YR OLD CAT	125
V. Holly, BSc, MSc, DVM	OCULAR AND PERIOCULAR COMPLICATIONS OF BITE INJURIES IN DOGS	126
G. Lavallee, DVM	LONG-TERM OUTCOME OF ENTROPION SURGERY IN JUVENILE DOGS COMPARED TO MATURE DOGS	127
K. Gunsalus, DVM	CHRONIC DYSFUNCTION, CALCIFICATION, AND OSSEOUS METAPLASIA OF THE MEIBOMIAN GLANDS OF A HORSE	128
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E. Lee, DVM	MEASUREMENTS OF TEAR GLUCOSE LEVELS IN DOGS AND COMPARISON TO BLOOD GLUCOSE LEVEL	133
C. Pinard, DVM, MSc, DACVO	VETERINARY OPHTHALMOLOGY CURRICULUM: SURVEY OF CONTACT HOURS	134
N. Violette, DVM	VISION OUTCOME AFTER LENS EXTRACTION VERSUS NONSURGICAL MANAGEMENT OF PRIMARY LENS INSTABILITY IN DOGS	135
L. Susanti, DVM, MS	SUDDEN ACQUIRED RETINAL DEGENERATION SYNDROME MANIFESTED INITIALLY AS UNILATERAL BLINDNESS IN SIX DOGS	136
J. Michel, DVM	AUTOLOGOUS LAMELLAR KERATOPLASTY FOR THE TREATMENT OF CANINE CORNEAL DEFECTS. A MULTICENTRIC RETROSPECTIVE STUDY OF 114 DOGS (2017-2020)	137

Saturday, October 2, 2021

8:00am-5:00pm	**IN-PERSON POSTER SESSION.** One of three days. Different in-person posters will be available in the Exhibit Hall each day along the right-side wall. **ON-DEMAND POSTER SESSION**. All posters will also be available through the On-Demand platform Thursday, September 30, 2021-Monday, January 3, 2022. Open for viewing all day, every day.

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
7:55am-8:00am	William Miller, DVM, MS, DACVO	**PLANNING COMMITTEE CHAIR WELCOME** Speaker introductions	

CORNEA

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
8:00am-8:15am	K. Quantz, DVM	DEVELOPMENT OF CRYSTALLINE CORNEAL OPACITIES (STEROID KERATOPATHY) IN DOGS FOLLOWING TREATMENT WITH OPHTHALMIC CORTICOSTEROIDS	139
8:15am-8:30am	A. Mauer, DVM	IMPACT OF MULTI-DRUG RESISTANCE ON CLINICAL OUTCOMES OF DOGS WITH CORNEAL ULCERS INFECTED WITH STAPHYLOCOCCUS PSEUDINTERMEDIUS	140
8:30am-8:45am	S. Michalak, DVM	TOPICAL RIPASUDIL FOR THE TREATMENT OF CANINE CORNEAL ENDOTHELIAL DYSTROPHY	141

LENS

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
8:45am-9:00am	H. Terhaar, DVM	PRO-INFLAMMATORY CYTOKINES IN AQUEOUS HUMOR FROM DOGS WITH ANTERIOR UVEITIS AND POST-OPERATIVE OCULAR HYPERTENSION FOLLOWING PHACOEMULSIFICATION	142
9:00am-9:15am	A. Allgoewer, DECVO	INCIDENCE OF POSTOPERATIVE FIBRIN WEB FORMATION IN DOGS UNDERGOING PHACOEMULSIFICATION	143
9:15am-9:30am	K. Dowler, DVM	COMMERCIALLY AVAILABLE INTRAOCULAR LENSES COMMONLY USED IN CANINE CATARACT SURGERY: A MICROBIOTA INVESTIGATION	144
9:30am-9:45am	A. Bowyer, DVM	A COMPARISON OF INTRACAPSULAR LENS EXTRACTION AND TRANS-CORNEAL REDUCTION FOR ANTERIOR LENS LUXATION IN DOGS	145
9:45am-10:00am	M. Moriyon, DVM	PHACOEMULSIFICATION IN THE BOSTON TERRIER BREED: SUCCESS RATES COMPARING INTENTIONAL APHAKIA TO PSEUDOPHAKIA	146
10:00am-10:15am	T. Chen, DVM	ASSOCIATIONS BETWEEN PRE-, INTRA-, AND POST-OPERATIVE FACTORS AND CORNEAL ADVERSE EFFECTS IN DOGS UNDERGOING CATARACT SURGERY	147
10:15am-10:45am	BREAK IN EXHIBIT HALL		
10:45am-11:00am		Rememberance of Passed Members (PowerPoint presentation, silent)	

KEYNOTE SPEAKER

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
11:00am-Noon	Michael R. Lappin, DVM, PhD, DACVIM	**TOPIC: INFECTIOUS DISEASES**	
Noon-1:30pm	**LUNCH** Attendees on their own		

Saturday, October 2, 2021

LENS

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
1:30pm-1:45pm	C. Bradley, MVB, BSAVA, PgCertSAOphthal, MRCVS	THE PROPHYLACTIC EFFICACY OF INTRAVENOUS PARACETAMOL ADMINISTRATION TO REDUCE THE INCIDENCE OF POST-OPERATIVE OCULAR HYPERTENSION IN DOGS UNDERGOING PHACOEMULSIFICATION- A PILOT STUDY	148
1:45pm-2:00pm	N. Scherrer, DVM, DACVO	NEUROMUSCULAR BLOCKADE WITH ATRACURIUM FOR OPHTHALMIC SURGERY IN HORSES – EFFECTS ON SURGICAL AND ANESTHETIC CHARACTERISTICS AND RECOVERY QUALITY	149

UVEA

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
2:00pm-2:15pm	S. Stadler, DVM, DACVO, FTA für Pferde	OUTCOME OF LOW-DOSE 4 MG INTRAVITREAL GENTAMICIN INJECTIONS IN HORSES WITH ERU: A RETROSPECTIVE STUDY WITH 40 EYES IN SWITZERLAND AND AUSTRIA	150
2:15pm-2:30pm	S. Pizzirani, DVM, PhD, DECVS-i, DACVO	THE ENTROPY OF THE ANTERIOR SEGMENT. WHY BIOPHYSICS MATTERS	151
2:30pm-2:45pm	K. Bhadsavle, BVSc, MVSc	MANAGEMENT OF OPHTHALMIC COMPLICATIONS ASSOCIATED WITH BLOOD PARASITE INFESTATION IN DOGS	152
2:45pm-3:00pm	S. Eaton, VMD, DACVO	OCULAR MELANOSIS IN CANINE BREEDS OTHER THAN THE CAIRN TERRIER – A RETROSPECTIVE ANALYSIS	153
3:00pm-3:30pm	BREAK IN EXHIBIT HALL		

RETINA

TOPIC/TIME	PRESENTING AUTHOR	TITLE	PAGE
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3:45pm-4:00pm	E. Salpeter, DVM	EVALUATION OF CHROMATIC PUPILLOMETRY AS A SCREENING TOOL FOR ACHROMATOPSIA IN RHESUS MACAQUES	155
4:00pm-4:15pm	C. Rogers, DVM	HISTOLOGIC EVALUATION OF AGE-RELATED RETINAL THINNING IN DOGS	156
4:15pm-4:30pm	A. Minella, DVM, PhD	ZFP503 DEFICIENCY CAUSES DEFECTS IN EARLY EYE FORMATION AND COLOBOMA IN MICE	157

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EXHIBIT HALL FLOOR PLAN

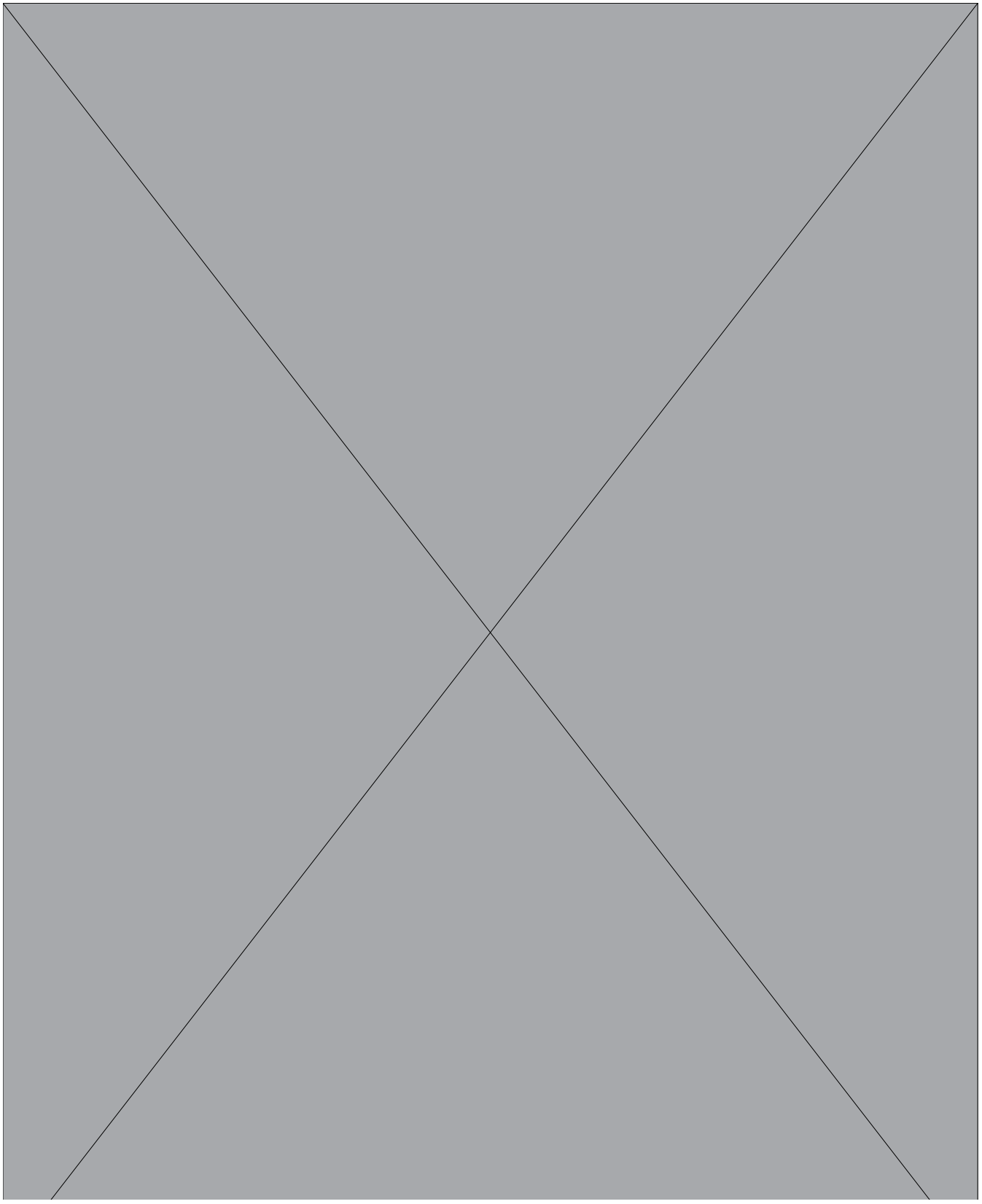

EXHIBIT HALL HOURS & EXHIBITORS

EXHIBIT HALL IS LOCATED IN JW Ballroom 5

Wednesday, September 29th			
Welcome Reception 6:00pm - 8:00pm			
Thursday, September 30th			
Exhibit Hall Hours 7:00am - 5:00pm	Break 10:00am - 10:30am	Lunch 12:00pm - 1:30pm	Break 2:30pm - 3:00pm
Friday, October 1st			
Exhibit Hall Hours 7:00am - 2:00pm	Break 10:00am - 10:30am	Lunch 12:00pm - 1:30pm	Break 3:00pm - 3:30pm
Saturday, October 2nd			
Exhibit Hall Hours 7:00am - 4:00pm	Break 10:15am - 10:45am	Lunch 12:00pm - 1:30pm	Break 3:00pm - 3:30pm

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EXHIBITOR PRODUCT & SERVICES

The products identified below were submitted by vendor companies for attendee cross reference. Vendor products are represented only if the vendor supplied the requested information to the ACVO by August 2021 or had previous records on file. Please see the complete vendor list, following this cross reference page, for a full list of participating vendors and their product descriptions. The ACVO does not endorse any product or company by publishing this listing or other.

ACVO Members can find all vendors updated in the Vendor Marketplace on DACVO.org!

PHARMACEUTICALS, SUPPLIES & DRUG DELIVERY	DIAGNOSTIC EQUIPMENT	SURGICAL SUPPLIES & INSTRUMENTS
Addition Technology Bausch + Lomb Dechra Veterinary Products Epicur Pharma Kite Vision Vet Meds for Vets Pharmacy Sentrx Spot-On Specialties, Inc. Taylors Pharmacy Vetrix Wedgewood Pharmacy	an-vision, Inc. Dan Scott & Associates, Inc. HEINE USA LTD Jorgensen Laboratories LKC Technologies OcuScience OPI, LLC/E-Technologies Optomed USA, Inc. RetinoGraphics, Inc. Spot-On Specialties, Inc.	Addition Technology an-vision, Inc. Bausch + Lomb CARA Life, Inc. Daka Medical Epsilon USA HEINE USA LTD IRIDEX Jorgensen Laboratories Kite Vision Vet OPI, LLC/E-Technologies Sontec Instruments, Inc. Vetrix
SURGICAL EQUIPMENT	**OTHER (PLEASE SEE COMPANY DESCRIPTIONS FOR DETAILS)**	**EMPLOYMENT**
an-vision, Inc. Bausch + Lomb Designs for Vision, Inc. HEINE USA LTD IRIDEX Jorgensen Laboratories Kite Vision Vet OPI, LLC/E-Technologies Sontec Instruments, Inc. Vetrix	Addition Technology an-vision, Inc. Aventix Animal Health Covetrus Designs for Vision, Inc. Eye Care for Animals Equine Eye Supply Instinct Science LKC Technologies Ocu-GLO by Animal Necessity Optomed USA, Inc. Pathway Vet Alliance VCA Animal Hospitals Vetrix Veterinary Information Network	Animal Eye Care Ethos Veterinary Health MedVet NVA Compassion-First VCA Animal Hospitals
RESEARCH PROGRAMS / TRAINING PROGRAM SPONSORSHIP	**BOOKS / PERIODICALS & EDUCATION AID**	**HOSPITAL EQUIPMENT**
an-vision, Inc. MedVet	Elsevier, Inc.	an-vision, Inc. Dan Scott & Associates LKC Technologies RetMap, Inc.

Addition Technology, Inc - Booth 34, 35
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Lombard, IL 60148
(847) 297-8419
info@ajlvet.com
www.ajlvet.com
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Fremont, CA 94539
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info@animaleyecare.com
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Dr. John Sapienza

"Glaucoma: Surgical Options. Where did we come from and where are we going..."

Please note that supplemental notes will be printed separately.

POSTER SESSION THURSDAY

A NOVEL PROTOCOL USING TRANSCERAL CYCLOPHOTOCOAGULATION FOR THE TREATMENT OF CANINE GLAUCOMA: A RETROSPECTIVE STUDY OF 112 DOGS (2008-2019) (P WONG, 1 S KIRSCHNER, 2 and PH KASS 3) Eye Care for Animals, Reno, NV; 1 The Animal Eye Doctor, Beaverton, OR; 2 University of California, Davis, Davis CA 3

Purpose. To evaluate the visual status and intraocular pressure (IOP) control of glaucomatous eyes treated with a novel protocol of transscleral cyclophotocoagulation (TSCP). **Methods.** Medical records of dogs treated with TSCP were reviewed. The protocol involved 2-4 circumferential rows of laser treatments while applying iced cold saline. Pre- and postoperative data reviewed included menace response, dazzle reflex, number of anti-glaucoma medications, IOPs, and presence of cataracts. Treatment parameters, complications, and repeat TSCP episodes were recorded. **Results.** One hundred and seventy-six eyes (112 dogs) were included with a mean follow-up of 852 days (range 90-2906). Mean preoperative IOP was 35.9 mmHg (2-87) with 34.39% of the eyes having a positive menace and/or dazzle. Buphthalmic globes had a statistically higher pre-operative IOP (42.43 mmHg) compared with non-buphthalmic globes (33.83 mmHg). At final follow-up, buphthalmic globes' mean IOP (17.82 mmHg) was not statistically different from non-buphthalmic globes' IOP (20.05 mmHg). Retention of preoperative menace response and/or dazzle reflex occurred in 19/54 eyes (35.18%) at last follow-up. Repeat therapy was needed in 24/176 eyes (13.64%). Regardless of buphthalmic status, 89/121 (73.55%) eyes had an IOP <25 mmHg at last follow-up with a reduction in anti-glaucoma medications from a mean of 2.9 medications (0-5) to 0.87 (0-4). Complications included corneal ulcerations in 28/159 (17.61%), hyphema in 12/159 (7.55%), phthisis bulbi in 56/176 (31.81%) eyes and cataracts in 46/156 (29.49%). **Conclusions.** This novel protocol of TSCP treatments resulted in effective control of IOP with decreased medications required to maintain IOP control. **None**

ULTRASOUND BIOMICROSCOPIC ANALYSIS OF THE ANTERIOR SEGMENT STRUCTURES IN DOGS WITH ADAMTS10- OPEN ANGLE GLAUCOMA: A PRELIMINARY STUDY (BH Artemis, 1 SA Park, 1 C Harman, 2 HY Weng, 3 and AM Komáromy 2) Department of Clinical Sciences, College of Veterinary Medicine, Purdue University, West Lafayette, IN, USA; 1 Department of Small Animal Clinical Sciences, Michigan State University College of Veterinary Medicine, East Lansing, MI, USA; 2 Department of Comparative Pathobiology, College of Veterinary Medicine, Purdue University; 3

Purpose. To characterize the anterior segment structures including the iridocorneal angle and ciliary cleft in Beagles with open angle glaucoma caused by ADAMTS10 gene mutation. **Methods.** The anterior segment structures of interest were examined by ultrasound biomicroscopy (UBM) using 48MHz probes and measured using image analysis software (ImageJ) in Beagles. The dogs consisted of three groups: ADAMTS10 mutants, carriers, and wild-type. UBM measurements were compared between these groups with mixed linear regression analysis and descriptively presented between different age groups (<3y, 3-5y, and >5y) of the mutants. **Results.** The area of the ciliary cleft (CCA) was significantly lower in ADAMTS10 mutants (0.15 ± 0.06 mm^2) compared to wild-type (0.49 ± 0.06 mm^2; P<0.01) and carriers (0.54 ± 0.07 mm^2; P<0.01). The distance between the cornea and lens (SLD) was significantly lower in carriers (2.04 ± 0.39 mm) compared to wild-type (2.68 ± 0.06 mm; P=0.03) and ADAMTS10 mutants (2.99 ± 0.19 mm; P=0.01). CCA for the mutants with age groups of <3y, 3-5y, and >5y were 0.23 mm^2, 0.03 mm^2, and 0.07 mm^2, respectively. **Conclusions.** These findings illustrate that dog with ADAMTS10-open angle glaucoma do have abnormalities associated with their drainage angle including a smaller ciliary cleft when compared to wild-type and carrier individuals. Additionally, carriers have a shallower anterior chamber amongst the three designated groups. Supported by NIH grants R01-EY025752 and K08EY030950. **None.**

CLINICAL CHARACTERISTICS OF PRIMARY GLAUCOMA IN BURMESE CATS IN AUSTRALIA (2010-2021) (SM Coall, 1 A Groth, 1 JE Premont, 1 & FMBillson 1) Department of Ophthalmology, Small Animal Specialist Hospital, Sydney, Australia.1

Purpose. To describe features of primary glaucoma in Burmese cats presenting to a specialist hospital in an 11-year period. **Methods.** Retrospective medical record review to identify Burmese cats with primary glaucoma. Glaucoma was diagnosed when intraocular pressure measurement was >30mmHg on rebound tonometry in conjunction with supportive clinical features and/or histopathology results and considered primary when a secondary cause could not be identified. Cats with significant intraocular disease were excluded. **Results.** 38 cats (55 eyes) were included, comprising 2.3% of the total Burmese cat hospital cohort. 24 were female-spayed, while 14 were male-neutered. Median age at diagnosis was 10 years (q1-3: 7-13 years) and was initially uniocular in 21/38 cats (55%) and bilateral in 17 (44%). Engorged episcleral vessels and buphthalmia were described in 100% and 33% of eyes, respectively. Glaucoma diagnosis was coincidental in 10/38 (26%) cats that presented for ocular surface disease. Gonioscopy was normal in all of the eyes in which it was reported. Median time from diagnosis to last re-examination was 2.5 years (range 30 days–10 years). Enucleation was performed within 3 months of diagnosis in 17/55 eyes. As a percentage of eyes with follow-up data available, 84% (22/26), 85% (17/20), 82% (9/11) and 75% (3/4) were visual at the 1-, 3-, 5- and 10-year time points. **Conclusions.** Glaucoma was often unexpectedly identified in cats presenting for corneal disease. Further investigation into its true prevalence is warranted, as it is likely underrecognized. The condition appears to be relatively slowly progressive, with many cats retaining vision. **None.**

COMPARATIVE EFFECTS OF LATANOPROST AND LATANOPROSTENE BUNOD ON INTRAOCULAR PRESSURE AND PUPIL DIAMETER IN NORMAL BEAGLE DOGS (SJ Desai 1, SA Pumphrey 1, and B Koethe 2) 1 Department of Clinical Sciences, Tufts University Cummings School of Veterinary Medicine, North Grafton, MA; 2 Biostatistics, Epidemiology, and Research Design Center, Tufts Medical Center, Boston, MA.

Purpose. To compare effects of latanoprost (Sandoz, Inc.; Princeton, NJ) and latanoprostene bunod (Vyzulta, Bausch & Lomb; Bridgewater, NJ), a novel nitric oxide-donating prostaglandin analogue, on intraocular pressure (IOP) and pupil diameter (PD). **Methods.** Ten ophthalmologically normal Beagle dogs were treated in one randomly chosen eye with either latanoprost or latanoprostene bunod twice a day for 5 days. Following a 6-week washout period dogs received the other drug. Rebound tonometry was used to measure IOP and infrared photography was used to measure PD immediately prior to each treatment and at 6 hours post-treatment on days 1 and 5, then twice a day for two days post-treatment and once a day for an additional four days. Longitudinal analysis was performed, and t-tests were used to compare drug effects on PD and IOP at theorized time of maximum effect (6 hours post-treatment on day 5). **Results.** Both latanoprost and latanoprostene bunod significantly decreased IOP and PD; effects did not significantly differ between the two drugs. Maximum IOP reduction for latanoprostene bunod was 6.8 mmHg; maximum IOP reduction for latanoprost was 4.4 mmHg. Minimum PD for latanoprostene bunod was 0.76 mm; minimum PD for latanoprost was 0.94 mm. Reduction in IOP persisted nearly to the end of the post-treatment monitoring period. Rebound mydriasis was also observed during this period in eyes treated with both drugs. **Conclusions.** Latanoprost and latanoprostene bunod appear to have similar miotic and IOP-lowering effects in normal dogs. Funding source: Tufts University Cummings School of Veterinary Medicine Companion Animal Health Fund. **None.**

A 10 YEAR RETROSPECTIVE STUDY ON GLAUCOMA DIAGNOSES, TREATMENT, AND VISION OUTCOME AT THE OHIO STATE UNIVERSITY (NE Himebaugh, AM Helmling, GM Newbold) College of Veterinary Medicine, Ohio State University

Purpose. To evaluate trends in canine glaucoma diagnoses and correlation of vision outcome to signalment, clinical findings, and treatments. **Methods.** Medical records of dogs diagnosed with glaucoma at The Ohio State University between 2010-2019 were reviewed. Signalment, ocular examination findings, treatments, and vision outcome data were collected. Statistical analyses used multivariate methods and Kaplan-Meier survival estimates. **Results.** Records of 392 dogs (490 eyes) with glaucoma were evaluated. Primary glaucoma was diagnosed in 50 dogs (12.8%)/65 eyes (13.3%), secondary glaucoma in 337 dogs (86%)/419 eyes (85.5%) and congenital glaucoma in 5 dogs (1.3%)/6 eyes (1.2%). Overall, mixed breed dogs (88/22.5%) were most common, followed by Cocker Spaniels (33/8.4%), Miniature Poodles (20/5.1%), Bichon Frise (19/4.9%), and Shih Tzu (17/4.3%). Mixed breed and Cocker Spaniel were the first and second most common breeds for both primary and secondary glaucoma. There were 189 (38.6%) sighted eyes and 301 (61.4%) blind eyes at initial presentation. Mean time to eventual vision loss was 2 (+/- 6.7) months, with 412 (84.1%) of eyes being blind at the last visit. The mean follow-up time was 346.9 (+/- 504.8) days with a range of 0 to 2,703 days. The most common associations with secondary glaucoma were phacoemulsification surgery (141/419 eyes) and cataracts (86/419 eyes). **Conclusions.** Secondary glaucoma was much more commonly diagnosed than primary glaucoma. Cocker Spaniels were the most common purebred dog to develop either primary or secondary glaucoma. Intraocular surgery and cataract formation without surgery were the most common recognized causes of secondary glaucoma. **None.**

THE ASSOCIATION OF TOPICAL FLURBIPROFEN WITH THE INCIDENCE OF POSTOPERATIVE GLAUCOMA AFTER PHACOEMULSIFICATION IN DOGS (S Kang, J Shim, K Seo) Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul, Korea

Purpose. To investigate the relationship between topical administration of flurbiprofen plus corticosteroids versus corticosteroids alone following phacoemulsification and the development of postoperative glaucoma in dogs. **Methods.** Eighty-three eyes (65 dogs) with follow-up of at least two months were included. Thirty-eight/eighty-three (45.8%) eyes were prescribed topical flurbiprofen plus corticosteroids immediately postoperatively while 45/83 (54.2%) eyes received topical corticosteroids. Glaucoma was defined as intraocular pressure >25 mmHg with a persistent increasing trend despite glaucoma treatment, accompanied by deteriorating vision and/or concurrent optic disc cupping or retinal degeneration and requiring permanent glaucoma treatments. Logistic regression models analyzed the relationship between topical flurbiprofen and development of glaucoma and predicted potential risk factors for postoperative glaucoma occurrence. **Results.** Follow-up ranged from 58-1856 days (mean=464 days). The mean age at surgery was 8.2 years, with even gender distribution. Increasing age at the time of surgery by one year significantly increased the probability of postoperative glaucoma occurrence (odds ratio [OR] = 1.344, 95% confidence interval [CI] 1.093-1.652; P = 0.005). Glaucoma occurred in 17/83 (20.5%) eyes; of these, 15/38 (39.5%) and 2/45 (4.4%) eyes were prescribed topical flurbiprofen plus corticosteroids and topical corticosteroids alone, respectively. Immediate postoperative use of topical flurbiprofen was significantly associated with an increased probability of postoperative glaucoma occurrence (OR = 19.183 [95% CI 3.367-109.286], P = 0.001). **Conclusions.** Immediate postoperative use of topical flurbiprofen was a potential predisposing factor for development of glaucoma following phacoemulsification. Restriction of postoperative use of topical flurbiprofen might decrease the possibility of postoperative glaucoma development in dogs. This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2021R1I1A1A01058695). **None.**

OPTICAL COHERENCE TOMOGRAPHY FOR EVALUATING THE MORPHOLOGICAL CHANGES IN THE RETINA AND OPTIC NERVE HEAD OF CATS WITH GLAUCOMA (H Komatsu,1, 2 Y Miwa, 1,3
M Inagaki, 1 K Usami, 1 M Akasaka, 1 and Y Kobayashi, 1) Animal Eye Care-Tokyo Animal Eye Clinic; 1 Department of Ophthalmology, Tokyo Medical University; 2 Department of Ophthalmology, Keio University School of Medicine.3

Purpose. To evaluate the morphological changes in the retina and optic nerve head (ONH) of cats with glaucoma using optical coherence tomography (OCT). **Methods.** Nine cats with primary open-angle glaucoma and 11 cats with normal intraocular pressure (IOP) were included. Multi-raster scan images were obtained using a spectral-domain OCT. Whole retinal thickness (WRT), inner retinal thickness (IRT), and the ratio of IRT to WRT (I/W) were measured in all the four positions (superior, inferior, nasal, and temporal) at 1.7 mm from the ONH center along with optic cup depth (OCD), optic cup volume (OCV), cup area, and Bruch's membrane opening height (BMOH). BMOH was calculated as the vertical height from a line connecting the position of retinal pigment epithelium. Wilcoxon rank sum test was used to compare the parameters, and the predictive accuracy of each parameter was assessed using the receiver operating characteristic (ROC) curves. **Results.** No significant difference in sex and mean age was observed between the glaucoma (6.7±3.1 years) and control group (7.5±4.7 years). The median [range] of IOP was 52 [35-95] mmHg and 18 [15-21] mmHg in the glaucoma and control group, respectively. The glaucoma group exhibited a significant decrease ($P<0.05$) in superior I/W and a significant increase ($P<0.001$) in OCV, OCD, and BMOH compared with controls. Areas observed under the ROC curve for BMOH, OCV, OCD, and superior I/W were 1, 0.98, 0.96, and 0.86, respectively. **Conclusion.** OCT-assisted detection of morphological changes in cats with glaucoma may provide an insight into progression of the disease. **None.**

OCULAR MORPHOLOGIC TRAITS IN THE AMERICAN COCKER SPANIEL MAY CONFER PRIMARY ANGLE CLOSURE SUSCEPTIBILITY (S Park[1], S Kim[1], MI Casanova[1], NL Daley[1], M Ferneding[1], M Gragg[1], F Espinheira[2], BC Leonard[1] and SM Thomasy[1,3]) Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis;[1] Department of Clinical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY, USA;[2] Department of Ophthalmology & Vision Science, School of Medicine, University of California, Davis.[3]

Purpose. Although the American Cocker Spaniel (ACS) is known to be at greater risk for primary angle closure glaucoma (PACG) in comparison to other breeds, genetic risk factors have yet to be identified. The purpose of this study was to compare ocular morphology between the ACS and a breed with low prevalence of PACG, the Beagle. **Methods.** Twenty-four ACS and 4 Beagles having normotensive eyes were included. Ultrasound biomicroscopy (UBM), A-scan ocular biometry and gonioscopy were performed. With UBM, ciliary cleft (CC) width at the entrance (CCWE), CC width at the middle (CCWM), CC length (CCL), CC area (CCA), iridolenticular contact (ILC) and iris deflection (ID) were evaluated. Anterior chamber depth (ACD), lens thickness (LT), and axial globe length (AXL) were measured with A-scan. **Results.** Mean age did not significantly differ between ACS and Beagles; focal goniodysgenesis was identified in 2/24 ACS and 0/4 Beagles. While CCL was significantly longer in ACS versus Beagles, CCWE and CCWM were significantly shorter resulting in a significantly smaller CCA. The ILC was significantly longer with a significantly greater degree of posterior ID in ACS versus Beagle. The LT was significantly thinner in ACS versus Beagle. **Conclusions.** The smaller CCA in the ACS indicates more crowding within the CC despite a thinner lens. Iris-related values suggest that the ACS may be more prone to developing reverse pupillary block, an important mechanism for PACG development in dogs. These results suggest that intrinsic morphologic traits of the ACS may elevate glaucoma risk in the ACS. Supported by AKC Canine Health Foundation, Jane Lin Fong Clinical Trial Support Fund, Center for Companion Animal Health, UC Davis and the National Institute of Health R01 EY016134 and P30 EY12576. **None.**

MULTIFOCAL FRONTAL AND ZYGOMATIC MULTILOBULAR OSTEOCHONDROSARCOMA CAUSING FACIAL DISTORTION AND ORBITAL CELLULITIS IN A DOG (SA Brattain,1 and KJ Gervais,2) Tufts Cummings School of Veterinary Medicine 1; VCA South Shore Animal Hospital 2

Case Description. A 10-year old male neutered Boston terrier was referred for evaluation of severe orbital cellulitis and corneal rupture of the left eye. Swelling around both eyes had been noted for several weeks duration and had acutely worsened in the left eye within the week prior to presentation. **Clinical findings.** Distant observation of the dog's facial structure indicated the presence of bilateral prominent areas over the zygomatic arches and frontal regions. Palpation of the orbital region identified nearly symmetrical 12-13mm firm bony masses over each zygomatic arch. Concurrent ophthalmic exam findings included severe periorbital swelling and exophthalmos OS, deep corneal ulcerative disease OD and chronic corneal rupture OS. CT imaging revealed bilateral expansile lobular bone proliferation in the zygomatic and frontal bones, causing dorsal and lateral compression of the left orbit and rostral globe displacement. The lobular to granular appearance of the lesions was considered consistent with a clinical diagnosis of multifocal multilobular osteochondrosarcoma (MLO). **Treatment Outcome.** The owner did not pursue advanced staging or RT therapy due to financial constraints and poor overall prognosis. Palliative enucleation of the left eye was discussed but ultimately not pursued. The dog was discharged for palliative care at home with plans for humane euthanasia with the referring veterinarian. **Clinical Relevance:** MLO is a rare bony tumor typically presenting as a solitary mass most commonly affecting the flat bones of the skull. To the authors' knowledge, this is the first report of multifocal involvement of MLO tumors in a dog.

SCLEROTHERAPY FOR TREATMENT OF A SUPERFICIAL ORBITAL VENOUS MALFORMATION IN A HORSE (TM Stonex,1 AE Zibura,1 M Andes,1 A Oh1) Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA;1

Case description. A 23-year-old Welsh Cobb cross gelding was examined for a vascular mass affecting the left lower eyelid. **Clinical findings.** A tortuous, distensible mass was identified. This mass had been present since birth, slowly progressed in size over time, and changed in size with alterations in the position of the horse's head. Secondary ectropion and focal corneal fibrosis were present. Color flow Doppler ultrasonography revealed non-pulsatile slow flow within the tortuous vascular network most consistent with a venous malformation (VM) appearing to involve the lateral palpebral and transverse facial veins. An intravenous catheter was placed within the lateral aspect of the VM using ultrasound guidance. Agitated saline was slowly injected into the vessel and bubbles were noted on ultrasound coursing through the medial aspect of the VM consistent with lateral to medial flow. Contrast radiography confirmed a corkscrew vessel along the ventral aspect of the left orbit, as well as an additional vessel extending ventrally from the region of the medial canthus. **Treatment and Outcome.** A sclerosing agent (1% polidocanol) was administered slowly through the intravenous catheter. Ultrasonography performed immediately after administration of polidocanol confirmed venous stasis, and the formation of a thrombus. No adverse side effects were noted. Gradual improvement in the size of the VM was noted over the month following therapy. **Clinical relevance.** Sclerotherapy, using polidocanol, for treatment of a superficial orbital VM in a horse was well tolerated, and resulted in clinical improvement. Sclerotherapy may be considered as an alternative to surgical management for VM in the horse. **None.**

OUTCOMES FOLLOWING PHACOEMULSIFICATION IN PENGUINS: 25 EYES FROM 14 PENGUINS (2008-2020) (OH Bolus[1], M Joblon[2], KA Tuxbury[2], J Flower[3], R Marrion[1]) [1] Cummings School of Veterinary Medicine at Tufts University, Grafton, MA; [2] Animal Health Department, New England Aquarium, Boston, MA; [3] Mystic Aquarium, Mystic, CT

Purpose. To assess outcomes following phacoemulsification surgery in three species of penguin. **Methods.** Records were reviewed from 14 penguins (25 eyes) housed at the New England Aquarium in Boston, MA and Mystic Aquarium in Mystic, CT that had undergone phacoemulsification surgery , including ten African penguins (*Spheniscus demersus*) (19 eyes), three Little Blue Penguins (*Eudyptes minor*) (5 eyes), and one Northern Rockhopper (*Eudyptes moseleyi)* (1 eye). All procedures were performed by a single board-certified veterinary ophthalmologist. Information was collected regarding outcomes and complications, and descriptive statistics were generated. **Results.** The most common short-term postoperative complications included mild blepharospasm (5/25, 20%), mild transient uveitis (3/25, 12%), peri-incisional edema (1/25, 4%) and hyperemia of the nictitans secondary to corneal suture placement. Follow-up time for all of the birds was over two years. Long-term postoperative complications affecting 5/14 birds (36%) included orbital abscess (1/25, 4%), chronic uveitis (1/25, 4%), corneal inclusion cyst (1/25, 4%) vitritis hyalitis (1/25, 4%), pupillary occlusion leading to iris bombe (1/25, 4%), and glaucoma (3/25, 12 %). Comfort and vision post-operatively were assessed by the aquarists working with the penguins daily. Treatment of these complications will be discussed. **Conclusions.** Postoperative complications following phacoemulsification were common in this population of penguins. Twelve of the 14 penguins were deemed functionally visual after surgery, and 1/14 was deemed to have visual deficits. Glaucoma was the most frequently documented sequela. Further studies are needed to characterize phacoemulsification outcomes in Sphenisciformes by species and age and with regards to postoperative effects on behavior. **None**.

BILATERAL CATARACT SURGERY IN A JAPANESE MACAQUE (MACACA FUSCATA): A CASE REPORT
(Y Miwa[1,2]; H Komatsu[1]; A Shinojima[2]; A Oda[3]; M Inagaki[1]: K Usami[1]; Y Kobayashi[1]) [1]Animal Eye Care-Tokyo Animal Eye Clinic, Tokyo, Japan; [2]Laboratory of Photobiology, Department of Ophthalmology, Keio University School of Medicine, Tokyo, Japan; [3]Veterinary Anesthesiology Consultant, Tokyo, Japan

Purpose. To report the technique and clinical outcomes of cataract surgery in a Japanese macaque. **Methods**. A 7.5-year-old intact male Japanese macaque, weighing 8.3 kg, was presented to the Animal Eye Care-Tokyo Animal Eye Clinic for the evaluation of gradual vision loss. Medical records and the outcomes of medical and surgical treatment were reviewed. **Results.** Ophthalmic examination revealed a negative menace response in both eyes (OU), positive dazzle reflex OU, positive direct and indirect pupillary light reflex in the right eye (OD), weak direct and indirect pupillary light reflex in the left eye (OS), and hypermature cataract OU. The cornea in both eyes remained clear. Using the axial length, anterior chamber depth, and lens position, the intraocular lens power was calculated and determined. Cataract surgery was performed OU under general anesthesia. Since the right eye had a stiff whitish capsule, continuous curvilinear capsulorhexis (CCC) could not be executed. Therefore, small capsulorhexis was performed, and the liquefied lens was aspirated. The left eye showed intraoperative floppy iris syndrome-like symptoms, but CCC and the liquefied lens aspiration were performed successfully. Subsequently, a 26D foldable intraocular lens was implanted in both eyes. Immediately after the surgery, subconjunctival dexamethasone and tobramycin were injected, and skiascopy was used to confirm that both eyes reached emmetropia. The vision has been maintained for over 6 months. **Conclusion.** To the best of our knowledge, this is the first case of cataract surgery in Japanese macaques. It can contribute to developing new treatment strategies. **None.**

CLINICAL MICRIBOLOGICAL FEATURES AND OUTCOMES OF CORNEAL FOREIGN BODIES IN DOGS
(CA Jacobson, 1 JS Eaton, 1 FA Hartmann, 1) School of Veterinary Medicine, University of Wisconsin-Madison.1

Purpose. To evaluate bacterial species and susceptibility data for isolates cultured from corneas of dogs with foreign bodies in the context of clinical findings, outcomes, and common empirical antibiotic approaches. **Methods.** Medical records of dogs presenting to UW Veterinary Care with corneal foreign bodies between 2009 and 2021 were reviewed. Cases that underwent lensectomy for associated lens capsule rupture were excluded. Data regarding signalment, clinical findings, foreign body removal technique, antibiotic therapy, and clinical outcome were collected. Bacterial isolates and susceptibilities to common ophthalmic antibiotics were characterized and compared to clinical outcomes. **Results.** Sixty eyes of 60 dogs were included. When specified, 29 foreign bodies were removed non-surgically in the examination room and 26 using an operating microscope. Follow-up data was available for 35 dogs (median follow-up = 25 days (range: 2-2133)). At last visit, 28 corneas were healed and 7 were healing or nearly healed. Long-term corneal complications were uncommon. Aerobic cultures from 26 dogs yielded 23 unique isolates (25 total). Resistance to common ophthalmic antibiotics was identified for 31.4% and 27.9% of gram positive and negative isolates, respectively. Resistance was more common in bacterial species from environmental sources. Across all isolates, resistance was most common to bacitracin and cefazolin. **Conclusions**. Prognosis for comfort and vision is good in dogs following corneal foreign body removal and empirical topical antibiotic therapy. However, resistance of gram positive and gram negative corneal isolates to cefazolin, particularly bacteria from environmental sources, may support the use of other first-line ophthalmic antibiotics. **None.**

BACTERIAL ISOLATES FROM COMPLEX CORNEAL ULCERS IN WESTERN CANADA (S Osinchuk, X Ma, L Sandmeyer, S Parker; Western College of Veterinary Medicine, University of Saskatchewan)

Purpose. To identify the genera of bacteria isolated from complex corneal ulcers in dogs in western Canada, and identify their antimicrobial susceptibility profiles. **Methods.** A retrospective medical record review was completed at the Veterinary Medical Centre at the University of Saskatchewan between January 2014 and May 2020. Dogs were included if they were diagnosed with a complex corneal ulcer by a diplomate of the American College of Veterinary Ophthalmologists or an ophthalmology resident, and corneal swab of the ulcer was submitted for aerobic and anaerobic culture and antibiotic sensitivity testing. **Results.** Three hundred and eighteen complex ulcers met the inclusion criteria, bacteria was isolated from 99 of the 318 (29%) of corneal swab samples. The most commonly isolated bacterial species was *Streptococcus canis*, followed by *Staphylococcus pseudintermedius*. There was a significant difference in bacterial isolation rates between eyes treated with antibiotics prior to referral (29%, 88/301) and those that were not (65%, 11/17) (p=0.005). Topical aminoglycosides or fluroquinolones were the most commonly prescribed antibiotics by referring veterinarians in 27% and 36% of eyes, respectively. Sensitivity to fluoroquinolones and aminoglycosides was documented in 51% and 44% of isolates, respectively. Resistance to > 3 antibiotics was documented in 29% of isolates. **Conclusions.** Sensitivity to the most commonly prescribed antibiotic classes was lower than expected, while multi-drug resistance was higher than expected. *Streptococcus canis* is the most commonly isolated corneal pathogen in western Canada.

SURVEY OF OCULAR ABNORMALITIES AND PREVALENCE OF LINEAR KERATOPATHY IN DRAFT HORSES (CK Sheridan[1], KE Myrna[1], CM Nunnery[2], SL Czerwinski[1]) College of Veterinary Medicine, University of Georgia[1]; Equine Veterinary Vision Inc.[2]

Purpose. To determine the incidence of ocular disease in draft horses. **Methods.** Draft horses of various breeds and ages were examined at several working farms, breeding barns, a large rescue organization, and a draft horse show. Ophthalmic examination was performed without mydriasis using slit lamp biomicroscopy and indirect ophthalmoscopy. Intraocular pressures were measured when possible. **Results.** One hundred sixty-five draft horses were examined. Age range: 10 days to 33 years (mean 10.8 years); 87 geldings (52.7%), 71 mares (43.0%), 7 stallions (4.2%); 64 Percherons (38.8%), 51 Belgians (30.9%), 29 Clydesdales (17.6%), 15 Shires (9%), 6 other draft breed (3.6%). Intraocular pressure: (mean 24.7mmHg OD, range 13-37mmHg; mean 25.0mmHg OS, range 11-37mmHg). Vision threatening disease was present in 9 horses (5.5%): complete cataracts 1, post-traumatic optic nerve atrophy 1, uveitis and secondary glaucoma 1, uveitis and bullous retinal detachment 1, large chorioretinal scar 3, phthisis bulbi 2. Non-vision threatening ocular disease was present in 56 horses (33.9%) involving one or more ocular structures: eyelid trauma/notch defect 14 (8.5%), SCC-type adnexal lesions 12 (7.3%), corneal scars 16 (9.7%), keratitis 6 (3.6%), corpora nigra cyst 15 (9.1%), incipient/punctate cataract 50 (30.3%), vitreous degeneration 10 (6.1%). Linear keratopathy was present in 30 horses (18.2%) with 2/30 having concurrent vision threatening ocular disease. **Conclusions.** This survey documents a greater prevalence of linear keratopathy in draft horses compared with reports in other breeds; however, it does not appear to be associated with concurrent ocular disease. The overall incidence of potential vision threatening ocular disease is low. **None.**

OCULAR INJURIES RELATED TO GROOMING VISITS IN CANINE PATIENTS: 161 CASES (2004-2020) (JR Chmiel, SA Pumphrey, and EA Rozanski) Department of Clinical Sciences, Tufts University Cummings School of Veterinary Medicine.

Purpose. To characterize ocular injuries correlated with grooming appointments in dogs, and to identify factors associated with their occurrence. **Methods.** A medical records search was performed to identify dogs presenting with ocular complaints initially noted within 24 hours of a commercial grooming appointment and presumed to be related to trauma. Data collected included age, sex, breed, type of injury, initial treatment, and notations in the record regarding behavioral issues. **Results.** One hundred sixty-one episodes involving 159 individual dogs were identified. Male dogs accounted for 57% of episodes, with a median age at presentation of 59 months. Shih Tzus were involved in 34% of incidents, and 71% of dogs were representatives of small breeds. Corneal ulceration was the most common injury documented (71% of incidents) followed by conjunctivitis (11%), eyelid lacerations (7%), and subconjunctival hemorrhage (6%). Notations regarding behavioral issues were present in records from 33% of dogs. Surgical management was required in 14% of cases, including 4 dogs who underwent enucleation. **Conclusions.** Commercial grooming appointments can lead to ocular injury via several mechanisms including blunt or sharp trauma, exposure to shampoo or other grooming products, or strangulation. Ocular injury leads to pain, economic costs for the owner, and sometimes loss of the eye. Small-breed dogs, particularly Shih Tzus, appear to be at increased risk. Behavioral complaints noted in many dogs likely contributed to the episode of ocular injury. Veterinarians can intervene to limit grooming-associated ocular injuries by recommending behavioral modification and/or by prescribing sedative medications to facilitate grooming. Funding source: None. Conflicts: **None.**

OCULAR DISEASES IN THE ICELANDIC HORSE WITH FOCUS ON EQUINE RECURRENT UVEITIS: 112 ICELANDIC HORSES LIVING IN DENMARK AND 26 ICELANDIC HORSES LIVING IN UNITED STATES

(MdL Henriksen,1 TH Pihl,2 A Dwyer,3 R Krarup,2 S Backlund,2 N Dahlmann Christensen,2) Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, USA;1 Department of Veterinary Clinical Sciences, Faculty of Health Sciences, University of Copenhagen, Denmark;2 Genesee Valley Equine Clinic, LLC, Scottsville, NY, 14546, USA.3

Purpose. To describe the most common ocular diseases in the Icelandic horse with a focus on equine recurrent uveitis (ERU). To correlate ERU with positive *Leptospira* subspecies serum titers and with summer eczema. **Methods.** A descriptive cross sectional-study. A complete ophthalmic examination and measurement of serum antibodies for *Leptospira* subspecies were performed on Icelandic horses from Denmark (DK) and the United States (US). An owner survey including information about summer eczema was conducted. **Results.** One-hundred twelve (112) Icelandic horses living in DK (mean±SD 8.9±4.6yo; range 2-32yo) and 26 Icelandic horses living in US (mean±SD 14.8±5.4yo; range 6-28yo) were included in this study (total of 138 horses). The four most common ocular diseases in the Icelandic horse were found to be follicular conjunctivitis (57.3%; 79/138), incipient anterior cortical cataracts (32.6%; 45/138), chorioretinal scars (bullet holes) (26.1%; 36/138), and corpora nigra cysts (7.2%; 10/138). The prevalence for ERU among Icelandic horses at the age of eight years and older was 7.7% (4/52) for DK-Icelandic horses, 8.7% (2/23) for US-Icelandic horses, and a total prevalence of 8% (6/75) for DK+US-Icelandic horses. No correlation between ERU and *Leptospira* subspecies or summer eczema where found (p=1.000, p=0.349, respectively). **Conclusion.** Icelandic horses aged eight years and older have a prevalence of 8% for ERU. No correlation between ERU and *Leptospira* subspecies antibodies could be found and future studies should look into a potentially genetic factor for ERU in the Icelandic horse. Follicular conjunctivitis and cataracts are the two most common ocular diseases in this breed.
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GENERAL SCIENTIFIC SESSION THURSDAY

PRIMARY GLAUCOMA IN THE FRENCH BULLDOG (UM Dietrich 1; SL Priestnall 2; E Ludwig 3 and I Allgoewer 4) 1 The London Cat Clinic, London, U.K.; 2 The Royal Veterinary College, U.K.; 3 Fachpraxis fuer Tierpathologie, Munich, Germany; 4 Animal Eye Practice, Berlin, Germany

Purpose. To describe ocular, gonioscopic and histopathologic findings in a series of French Bulldogs with glaucoma. **Methods.** Dogs underwent a complete ocular examination including slit lamp biomicroscopy, rebound tonometry and gonioscopy in the affected and/or opposite eye if possible. Histopathology was performed in enucleated, blind eyes. **Results.** A total of 27 dogs (31 eyes) with 14 female and 13 male dogs were included. Mean age at onset of glaucoma was 7.12 years. The right eye was affected in 11, the left eye in 12 and both eyes in 4 dogs. All eyes were buphthalmic and blind with variable amount of corneal oedema. Mean IOP at presentation was 61 mmHg. Gonioscopy performed in 17/27 dogs revealed goniodysgenesis characterized by a narrow/closed angle, sheets, flow holes and thickened trabeculae. Histopathological examination of 23 eyes showed a closed or collapsed iridocorneal angle (21/23) with arborized termination of Descemet's membrane in 11/23. Pigment invasion of the ICA, uvea, and sclera with melanomacrophages as predominant cell type was found in 21/23. Iridociliary cysts were detected in 10/23 eyes and neutrophilic inflammation with PIFM formation in 11/23 eyes. All 23 eyes had various degrees of retinal degeneration, optic nerve atrophy and cupping. **Conclusion.** French Bulldogs with glaucoma were found to have goniodysgenesis, with narrow or closed angles and varying degrees of pectinate ligament dysplasia suggestive of primary glaucoma. IOP spikes predominantly occurred in middle-aged to older dogs and appeared to be associated with progressive pigment invasion of the iridocorneal angle, uvea and sclera in most of dogs. **None.**

Thursday Presenting 9:00am

MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION FOR THE TREATMENT OF GLAUCOMA IN 41 DOGS AND 1 CAT (BL Routh[1], EB Belknap[1], CS Monk[1], SE Andrew[1]) 1 Blue Pearl Veterinary Partners

Purpose. Objectives of this study are to describe outcome of subjects undergoing micropulse (MP) therapy and evaluate effects of signalment on time to both vision loss (TTVL) and inability to control IOP. MP has previously been identified as a promising alternative to traditional diode laser therapy for transscleral cyclodestructive treatment for medically refractory glaucoma. We aim to expand the body of knowledge on treatment methods and post-operative outcomes for this therapy. **Methods.** Subjects included canines and one feline undergoing MP therapy for glaucoma that were presented to Blue Pearl Gwinnett location between 2017 and 2021. Age, breed, sex, affected eye(s), laser parameters, IOP (prior to starting treatment, at first re-evaluation and at last re-evaluation, and date of vision loss were recorded. Subjects were excluded if they had less than one month follow up. All subjects nderwent complete examination by a board-certified veterinary ophthalmologist. **Results.** 54 eyes of 45 dogs and 1 cat fit inclusion criteria. Average age at treatment was 9.7 yrs. The most common breed was mixed (n = 10) followed by Cocker Spaniel (n = 7). Average preoperative IOP was 22 mmHg, average postlaser IOP was 17 mmHg at the first re-evaluation approximately 1-week postlaser. Results showed 21 of 54 eyes (39%) retained vision at last reported re-evaluation and TTVL on average was 172 days. Complications included corneal ulcers, uncontrolled IOP, and repeat treatment. **Conclusions.** Micropulse therapy is an effective treatment option for medically refractory glaucoma and may help to extend time to vision loss associated with glaucoma. **None.**

Thursday Presenting 9:15am

ASSOCIATION BETWEEN OCT-DERIVED OPTIC NERVE HEAD PARAMETERS AND OPTIC NERVE AXON COUNT IN FELINE CONGENITAL GLAUCOMA (K Oikawa,1 2 JA Kiland,2 O Torne,1 2 O Coffey,2 D Sun,2 GJ McLellan,1 2) Department of Surgical Sciences, School of Veterinary Medicine;1 Ophthalmology & Visual Sciences, School of Medicine and Public Health,2

Purpose. To determine which structural alterations in the optic nerve head (ONH) measured in vivo by spectral-domain optical coherence tomography (OCT) are most representative of optic nerve damage in feline congenital glaucoma (FCG). **Methods.** Thirty adult cats with FCG (median age = 1.2 years,11 female; 19 male) and 11 normal cats (median age = 1.1 years, 4 female; 7 male) were studied. At least 3-5 separate OCT ONH scans (Cirrus [Zeiss] or Spectralis [Heidelberg Engineering]) were acquired per eye under general anesthesia. After euthanasia, optic nerve axons were counted as previously validated. OCT-derived ONH parameters including neural canal opening (NCO), cup depth (CD), prelaminar tissue thickness (PLT), posterior displacement of the lamina cribrosa (PDL) and minimum rim width (MRW) were measured using image J. Quantitative values for one eye from each cat were compared between groups (unpaired t-test or Mann-Whitney test; p-value < 0.05 considered significant). The relationship between each ONH parameter and axon count was assessed by Pearson's correlation coefficient. **Results.** ONH parameters were significantly different between groups ($p<0.05$), among which CD and PDL were increased while NCO, PLT and MRW were decreased in FCG compared to normal. Mean axon count was significantly lower in FCG compared to normal ($p<0.05$). Axon count was significantly correlated with MRW ($r=0.82$, $p=7.2x10-11$), PLT area ($r=0.79$, $p=8.0x10-10$) and mean PLT ($r=0.73$, $p=5.3x10-8$). **Conclusions.** OCT is a valuable tool to detect ONH structural changes in vivo that are reflective of optic nerve damage in cats with glaucoma. Supported by NIH grant R01 EY027396, S10 OD018221 and P30 EY0016665; Bright Focus Foundation; and an unrestricted award to the Department of Ophthalmology and Visual Sciences from Research to Prevent Blindness. **None.**

Thursday Presenting 9:30am

EFFECT OF TOPICAL 0.0015% TAFLUPROST ON INTRAOCULAR PRESSURE IN CATS (H Faghihi,1 GJ McLellan,2,3 JA Kiland, 3 SM Rajaei,1 and P Mehrabi,4) Ophthalmology section, Negah Veterinary Centre, Tehran, Iran; 1 Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin, Madison, WI, USA; 2 Department of Ophthalmology and Visual Sciences, School of Medicine and Public Health, University of Wisconsin, Madison, WI, USA; 3 Avina Veterinary Hospital, Tehran, Iran.4

Purpose. To evaluate the effects of topical 0.0015% tafluprost on intraocular pressure (IOP) in cats. **Methods.** Twelve healthy, adult, intact male cats were enrolled in this study. IOP was measured (TonoVet Plus) in both eyes daily, for 1wk prior to (acclimation phase), 2wks during (treatment phase), and 1wk following cessation of treatment (post-treatment phase) with tafluprost q8hrs to one randomly assigned eye. IOP was measured on day 1 of the treatment period prior to (T), and 30 min, 1, 2, 4, 8 and 24 hrs after the first dose of tafluprost then q24hrs thereafter. **Results.** IOP was significantly lower in subsequently treated than in untreated eyes (<2 mmHg, clinically insignificant difference) at days 1 and 4 of the pre-treatment phase. IOP was significantly lower in treated vs. untreated eyes on days 4, 9, 10, 11, 12 and 13 of the treatment phase ($P<0.05$) with a maximal IOP difference of 28% occurring on day 13 (13.25±3.25 vs 18.17±3.3mmHg respectively; $P=0.0002$). There was no significant difference in IOP in treated or untreated eyes vs. their respective baselines during the treatment period or between treated vs. untreated eyes during the post-treatment period. All treated eyes exhibited miosis during the treatment phase. **Conclusions.** Tafluprost did not have a robust IOP-lowering effect on the normal feline eye, but the magnitude of IOP lowering may be greater in individual cats (and may be dependent on the underlying cause of glaucoma) so further studies in cats with glaucoma may be warranted. **None**

Thursday Presenting 9:45am

EFFECT OF ORAL ADMINISTRATION OF TOPIRAMATE EXTENDED-RELEASE ON INTRAOCULAR PRESSURE IN HEALTHY CATS (LT Graham, KM Smith Fleming, JM Reinhart, KD Foss) Department of Veterinary Clinical Medicine, College of Veterinary Medicine, University of Illinois.

Purpose. To determine the effect of oral administration of anticonvulsant topiramate extended-release (Qudexy® XR, Upsher-Smith Laboratories, Maple Grove, MN) on intraocular pressure in cats. Acute angle closure glaucoma is reported as a rare side effect in humans despite the drug being an inhibitor of carbonic anhydrase II. **Methods.** A prospective, randomized study was performed using 8 staff-owned healthy adult cats to establish the pharmacokinetic parameters and clinical safety of multi-dose administration of topiramate extended-release (XR) in this species. All cats underwent complete ophthalmic examination including slit-lamp biomicroscopy, indirect ophthalmoscopy, gonioscopy, and intraocular pressure (IOP) measurement prior to inclusion. Following baseline examination and IOP measurement, all cats received topiramate XR at 10 mg/kg orally once daily for 30 days. During the study period, cats underwent physical examination, blood collection, and IOP measurement once weekly. IOP measurements were performed by one investigator within 2 hours of time of baseline measurement to reduce variability. **Results.** Plasma topiramate concentration remained above the target threshold value in all cats throughout the dosing interval. After 2 weeks of treatment, IOP was significantly decreased from baseline (P=0.0091) and remained significantly lower at each subsequent measurement through day 30. The average decrease in IOP was 7.5 mmHg. **Conclusions.** Oral topiramate XR administration at 10 mg/kg once daily significantly reduced IOP in healthy cats by day 15 of therapy, on average. Further research is needed to determine the utility of topiramate XR in feline glaucoma management. Supported by EveryCat Health Foundation grant W19-037. **None.**

Thursday Presenting 10:30am

CHARACTERIZATION OF AQUEOUS OUTFLOW PATHWAY ASSOCIATED OCULAR VASCULATURE BY LIGHT SHEET FLUORESCENCE MICROSCOPY (KH Chan, K Weiss, OE Torne, M Kim, J Huisken, GJ McLellan) Department of Ophthalmology & Visual Sciences, University of Wisconsin – Madison; Morgridge Institute for Research; McPherson Eye Research Institute, Madison, Wisconsin; Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin – Madison.

Purpose. Light sheet fluorescence microscopy (LSFM) facilitates rapid imaging of “large” (millimeter thickness), optically clear tissue samples, leveraging advances in tissue clearing to image whole organs and small organisms. Bleaching of melanin pigment has broadened the application of LSFM by enabling imaging of pigmented tissues, including the eye. We describe a method to clear, label and image Schlemm’s canal (SC) and vasculature in fluorescently labeled mouse eyes. **Methods.** 4-7 month old**,** pigmented mice (DBA/2J, C57BL/6J, *Ltbp2* knockout and *Angpt1* knockout) were used. Eyes were routinely enucleated and fixed. The melanin pigment was bleached using a hydrogen peroxide solution. The eyes were immunolabeled for vascular and lymphatic markers, embedded in agarose, dehydrated and cleared with ethyl cinnamate. Imaging of the whole eye was performed with LSFM and analyzed with Imaris software. **Results.** Optical transparency of the eye was achieved in each mouse strain, which permitted high-resolution imaging of vasculature and SC. Segmentation and 3D reconstruction revealed a qualitatively hypomorphic SC in *Angpt1* knockout mice, compared to wild-type and *Ltbp2* knockout in a small sample. **Conclusions.** LSFM is a relatively fast and technically simple method for assessment of SC and associated vasculature in whole pigmented mouse eyes. In contrast to known human glaucoma genes (including *Angpt1*) that impact SC vascular development, our results indicate a normal SC in *Ltbp2*-associated glaucoma. This corroborates findings in cats with *LTBP2*-associated glaucoma and suggests that the trabecular meshwork is the site of outflow resistance in animals with *LTBP2* mutations. Supported by NIH Grants P30 EY016665 and T35OD011078, The Marfan Foundation, and Research to Prevent Blindness. **None.**

Thursday Presenting 10:45am

RELATIVE ABILITY OF AQUEOUS HUMOR FROM DOGS WITH PRIMARY ANGLE CLOSURE GLAUCOMA TO CATALYZE OR INHIBIT COLLAGENOLYSIS (SA Pumphrey) Department of Clinical Sciences, Tufts University Cummings School of Veterinary Medicine, North Grafton, MA.

Purpose. To compare the ability of aqueous humor (AH) from normal dogs and dogs with primary angle closure glaucoma (PACG) to catalyze or inhibit collagenolysis. **Methods.** AH from 17 ophthalmologically normal dogs and 27 dogs with documented PACG was used. Samples were first analyzed using a fluorescein-based collagen degradation assay, and results compared with control wells loaded with clostridial collagenase. Samples were then assayed using the same collagen degradation assay, but with recombinant activated matrix metalloproteinase-2 (MMP-2) added to wells to allow for measurement of protease inhibition effects. For the second assay, results were compared with MMP-2 control wells with no AH added. **Results.** For the protease activity assay, relative fluorescence (RF) for AH from normal dogs was 13.3 +/- 2.3% compared with control collagenase while RF for AH from dogs with PACG was 17.5 +/- 4.47% that of control collagenase (P=0.0004). For the MMP-2 inhibition assay, RF for AH from normal dogs was 35.0 +/ 15.0% compared with MMP-2 controls, while RF from dogs with PACG was 16.6 +/- 8.8% that of MMP-2 controls (P=0.0001). **Conclusions.** Extracellular matrix modification in AH outflow pathways appears to be important in development of glaucoma in many species. AH from dogs with PACG is slightly more able to catalyze collagenolysis than AH from normal dogs, but also strongly inhibits MMP-2, an endogenous protease thought to be important in extracellular matrix homeostasis. Additional investigation is needed to characterize proteolytic processes in the normal and glaucomatous canine eye. Funding source: Tufts University Cummings School of Veterinary Medicine Department of Clinical Sciences startup funds. **None.**

Thursday Presenting 11:00am

MORPHOLOGICAL CHANGES ALONG THE CONVENTIONAL AQUEOUS OUTFLOW PATHWAY IN MONKEY EYES WITH LASER-INDUCED OCULAR HYPERTENSION (SB Sosnowik[1], DL Swain[1,2], S Fan[3], CB Toris[3], and H Gong[1,2]) Department of Ophthalmology, Boston University School of Medicine[1]; Department of Anatomy and Neurobiology, Boston University School of Medicine[2]; University of Nebraska Medical Center[3]

Purpose. This study investigated morphological changes along the conventional outflow pathway in cynomolgus macaques with laser-induced ocular hypertension. **Methods.** Using laser photocoagulation, burns were made to ~270 degrees of the trabecular meshwork (TM) of treated eyes (n = 8) of each monkey until intraocular pressure elevated persistently. ~90 degrees of the TM was left non-lasered. Contralateral eyes (n = 5) were used as controls. Monkeys were sacrificed ≥ 60 months after treatment and eyes were enucleated, perfused at 15 mmHg to measure outflow facility, then perfusion and immersion fixed. Anterior segments were cut into radial wedges and processed for light and electron microscopy. Width, height, and cross-sectional area (CSA) of Schlemm's canal (SC) of control eyes and non-lasered regions, and number and CSA of intra-scleral veins (ISVs) of control eyes, non-lasered and lasered regions were compared. Statistical analyses were performed using R. **Results.** Mean outflow facility was significantly reduced in laser-treated eyes compared with control eyes (P=0.02). SC was partially or completely obliterated in lasered regions. Median CSA, width, and height of SC, and median CSA of ISVs were not significantly different between groups (P > 0.05). Median number of ISVs was significantly decreased in lasered regions compared with non-lasered regions (P ≤ 0.01) and control eyes (P ≤ 0.01). Decreased collagen fibril density and more heterogeneous fibril diameter were observed in sclera of lasered-regions. **Conclusions.** Decreased outflow facility in laser-induced ocular hypertension may be attributed to partial to complete obliteration of SC and decreases in patent ISV number. Supported by NIH grant EY028674, The Rifkin Family Glaucoma Research Fund, and The Massachusetts Lions Eye Research Fund. **None.**

Thursday Presenting 11:15am

MUCOADHESIVE POLYMERS ENHANCE OCULAR DRUG DELIVERY: PROOF OF CONCEPT STUDY WITH 0.5% TROPICAMIDE IN DOGS (D Arad, O Pe'er, S Komoron, L Sebbag, R Ofri) Koret School of Veterinary Medicine, The Hebrew University of Jerusalem, Rehovot, Israel.

Purpose. To assess the efficacy of 0.5% tropicamide following administration of either 1.4% hydroxyethyl cellulose (HEC) or 1.2% hyaluronic acid (HA) at different time intervals. **Methods**. Eleven healthy Labrador dogs were enrolled in the study, consisting of 8 sessions separated by 1-week washout periods. At each session, pupillary diameter (PD) was measured using digital calipers every 30 min for 7 hours following drug administration in a randomly selected eye. In sessions 1 & 2 PD was measured without drugs (control) and following tropicamide application at time 0 (baseline), respectively. In sessions 3-8 PD was measured in eyes that received tropicamide 10 seconds, 1 min and 5 min following application of HEC or HA. Data was analyzed using repeated measures ANOVA, linear regression model and Mann-Whitney U test. **Results**. Maximal PD (mean±SD) was significantly greater ($P \leq 0.02$) in all HEC and HA sessions compared to baseline readings (11.17±0.67mm) with the highest values recorded when HEC was applied 1 minute (12.06±0.51 mm) and HA 10 seconds (12.29±0.58 mm) prior to tropicamide. PD>10mm was maintained for 2 hours in the baseline group, and 3-4.5 hours in sessions 3-8. Area Under the Curve was significantly higher than baseline measurements when tropicamide was applied 1 min after HEC (19.64±0.95 and 33.93±0.78 mm*h, respectively, $P=0.007$). **Conclusions**. Tropicamide efficacy was enhanced by prior administration of a mucoadhesive polymer. Additional studies are needed to determine if HEC & HA of varying concentrations can similarly extend and potentiate the effect of other topical ophthalmic drugs. Supported by Israel's Ministry of Aliyah and Integration grants 1001247728. **None**.

Thursday Presenting 11:30am

PHARMACOKINETICS OF EXTENDED-RELEASE PARENTERAL CEFTIOFUR (EXCEDE®) IN THE CANINE TEAR FILM (AC Bowden, 1 RA Allbaugh, 1 JP Mochel, 1 J Smith, 1 L Sebbag 1,3) Iowa State University College of Veterinary Medicine 1; University of Tennessee College of Veterinary Medicine 2; Koret School of Veterinary Medicine, The Hebrew University of Jerusalem 3.

Purpose. Describe the pharmacokinetics of extended-release parenteral ceftiofur (Excede®) in the canine tear film and compare these concentrations to minimal inhibitory concentrations (MICs) of ceftiofur against common ocular pathogens in dogs. **Methods.** Six dogs of various breeds were enrolled. Disruption of blood-tear barrier was achieved with histamine-induced conjunctivitis to render results more clinically relevant. Each dog received a single subcutaneous injection of 5 mg/kg Excede®, followed by tear collection with Schirmer strips at times 0, 0.25, 0.5, 1, 2, 4, 8, 12, 24, 36, 48, 72, 96, 120, 144, 168, 192, 216 and 240h. Drug quantification was performed with liquid chromatography-mass spectrometry. MICs were determined for *Staphylococcus pseudintermedius*, *Streptococcus canis* and *Pseudomonas aeruginosa* by assessing bacterial growth (n = 10 per bacterial species) in the presence of ceftiofur at increasing concentrations. **Results**. Blood-tear barrier breakdown provided tear film concentrations 3.2-28.9-fold higher than the contralateral healthy eye (*n* = 1 dog, pilot experiment). In all 6 dogs, ceftiofur concentrations in tears varied from 2.3 to 637.5 ng/ml and were detectable up to 10 days (240h) after the subcutaneous injection. However, tear levels remained below MICs for the common ocular isolates (≥ 640 ng/ml) assessed at all time points. **Conclusions.** Ceftiofur reached the tear compartment (for up to 10 days) after a single parenteral injection, however tear concentrations were too low to be effective against the most common bacterial pathogens in dogs. Further studies with different ceftiofur dosing or other long-acting injectable antibiotics are warranted. **None.**

Thursday Presenting 11:45am

GABAPENTIN REDUCES STRESS AND DOES NOT AFFECT OCULAR PARAMETERS IN HEALTHY CATS (YC Crowe, 1 AD Groth, 1 JE Premont, 1 J White, 1 SM Coall, 1 KL Yates, 1 and FM Billson 1) Department of Ophthalmology, Small Animal Specialist Hospital, Sydney, Australia; 1

Purpose. To describe the effects of gabapentin on ocular and behavioural parameters following oral administration in healthy cats. **Methods.** Masked, placebo-controlled, randomized crossover-design study. Ten young, healthy cats were scheduled for two veterinary visits at least six days apart and randomly assigned to receive a compounded capsule containing 100mg of gabapentin or placebo (100mg lactose powder) at the first visit and the opposite treatment at the second visit. Respiratory rate, heart rate, stress score, sedation score, compliance score, horizontal pupil diameter, intraocular pressure and Schirmer Tear Test-1 were measured prior to and 1.5, 3 and 6 hours following capsule administration, following a standardized protocol. Stress score, sedation score and compliance score were assigned based on established behavioural scales. Results were statistically compared between treatments with p-value <0.05 considered significant. **Results.** Stress score was significantly reduced at 1.5 (p=0.01) hours following gabapentin administration. Sedation score was significantly increased at 1.5 (p=0.015) and 3 (p=0.03) hours following gabapentin administration. Gabapentin had no significant effect on respiratory rate, heart rate, compliance score or ocular values measured in this study. **Conclusions.** Gabapentin reduces stress and increases sedation at 1.5 hours after treatment, with no significant effect on ocular examination results. **None.**

Thursday Presenting 1:30pm

COMPARISON OF OPHTHALMIC LOTEPREDNOL ETABONATE AND PREDNISOLONE ACETATE EFFECTS ON THE CANINE HYPOTHALAMIC-PITUITARY-ADRENAL AXIS (KE Kline1, SA Walton1, AJ Specht1, TA Opgenorth1, D Santoro1, TJ Watson1, ML Eide1, and CE Plummer1) College of Veterinary Medicine, University of Florida1.

Purpose. This study served to compare the degree of adrenocortical suppression following a two-week administration of loteprednol etabonate (LE) and prednisolone acetate (PA) ophthalmic drops. **Methods.** In this prospective, double-blinded clinical trial, 20 clinically healthy dogs were randomized to receive Loteprednol Etabonate Ophthalmic Suspension 0.5% (Akorn, Lake Forest, IL), Prednisolone Acetate Ophthalmic Suspension 1% (Sandoz, Princeton, NJ), or Artificial Tears (AT) (Geri-Care, Brooklyn, NY). Each group (LE, PA, and AT) received one drop in each eye every 12 hours for two weeks, followed by a three-week washout period between treatment blocks. ACTH stimulation tests were performed before and after each treatment block. Serum cortisol samples were drawn before and 60 minutes after administration of 1 microgram/kg cosyntropin IV (Cortrosyn®, Amphastar Pharmaceuticals, Rancho Cucamonga, CA). Kruskal-Wallis was used to compare pre- and post-treatment cortisol values between each group. A p-value of < 0.05 was considered significant. **Results.** Post-treatment, there was no significant difference in pre- and post-stimulation cortisol values between the LE and AT groups ($p > 0.9$). Pre- and post-stimulation cortisol values were significantly lower in the PA group compared to the other two groups ($p < 0.05$). **Conclusions.** Based on the reduced suppression of cortisol values, LE caused significantly less hypothalamic-pituitary-adrenal axis suppression than PA. A topical steroid with minimal adrenocortical suppression, such as LE, may be favorable in patients where systemic glucocorticoid effects should be avoided. Supported by the University of Florida 2020 CVM Faculty Fall Grant and the 2020-2021 Society of Veterinary Hospital Pharmacists Grant. **C.**

Thursday Presenting 1:45pm

COMPARATIVE EFFICACY OF TOPICAL OPHTHALMIC GANCICLOVIR AND ORAL FAMCICLOVIR IN CATS WITH EXPERIMENTAL OCULAR FELINE HERPESVIRUS-1 INFECTION (EC Ledbetter,[1] ZI Badanes,[1] RX Chan,[1] LK Donohue,[1] NL Hayot,[1] RM Harman,[2] GR Van de Walle,[2] HO Mohammed[3]). Department of Clinical Sciences;[1] Baker Institute for Animal Health;[2] and Department of Population Medicine and Diagnostic Sciences,[3] College of Veterinary Medicine, Cornell University, Ithaca NY

Purpose. To determine the comparative efficacy of ganciclovir 0.15% ophthalmic gel and famciclovir oral tables in cats with experimentally-induced ocular feline herpesvirus-1 (FHV-1) infection. **Methods.** A randomized, placebo-controlled trial was performed using 16 nonvaccinated specific-pathogen-free cats with experimental FHV-1 infection induced by topical ocular inoculation. Cats received topical ophthalmic ganciclovir (1 drop three times daily, n=6 cats), oral famciclovir (90 mg/kg twice daily, n=6), or topical artificial tear gel (1 drop three times daily, n=4) for 14 days. Cats were monitored after inoculation for 30 days. Ophthalmic examinations were performed every two days and ocular disease scores calculated. *In vivo* confocal microscopic ocular examinations were performed, and leukocyte infiltrates quantified. Ocular samples for FHV-1 qPCR and virus isolation assays were collected every 3 days. Hemograms and serum biochemistry panels were performed at intervals. **Results.** Clinical ocular disease scores were significantly lower in the ganciclovir and famciclovir groups compared to placebo. Clinical scores initially declined more rapidly in cats treated with famciclovir than ganciclovir. Viral shedding duration was longer, and ocular viral loads higher, in cats treated with famciclovir compared to the ganciclovir group. Corneal leukocyte infiltrates measured by *in vivo* confocal microscopy were significantly lower in the ganciclovir and famciclovir groups compared to placebo. Hemogram and serum biochemistry panel values were unremarkable. **Conclusions.** Topical application of ganciclovir ophthalmic gel three times daily was well tolerated and displayed similar efficacy at reducing clinical disease scores and tissue inflammation as twice daily famciclovir treatment in cats with experimental ocular FHV-1 infection. **None**.

Thursday Presenting 2:00pm

EX VIVO MODELING OF BOVINE HERPESVIRUS-1 KERATITIS AND CIDOFOVIR ANTIVIRAL TREATMENT
(CR Alling[1], CC Liu[1], IM Langohr[2], M Haque[2], RT Carter[1], RE Baker[1], AC Lewin[1]) [1]Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA; [2]Department of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA.

Purpose. Bovine herpesvirus-1 (BoHV-1) causes keratoconjunctivitis in cattle and contributes to significant economic losses worldwide. The objective of this study was to determine the most appropriate commercially available topical ophthalmic nucleoside analogue antiviral agent for BoHV-1 keratoconjunctivitis treatment in cattle and to demonstrate efficacy in a novel *ex vivo* bovine corneal model. **Methods.** *In vitro* BoHV-1 half-maximal inhibitory concentrations were determined for cidofovir (MedChemExpress, Monmouth Junction, NJ, USA), ganciclovir (Acros Organics, Fair Lawn, NJ, USA), idoxuridine (Cayman Chemical, Ann Arbor, MI, USA), and trifluridine (Acros Organics) via plaque reduction assays. *In vitro* cytotoxicity was compared amongst compounds via CellTiter-Glo® luciferase assays. Bovine cadaver corneoscleral rings (n=36) were equally divided into an uninfected/untreated control group, a BoHV-1-infected/untreated group, and a BoHV-1-infected/cidofovir-treated group for three-day culture; various parameters of BoHV-1 viral replication and corneal viability were assessed. **Results.** Cidofovir was the most potent non-cytotoxic agent *in vitro* and was therefore selected for *ex vivo* analysis. BoHV-1 titer was significantly reduced in cidofovir-treated ($1.69 \pm 0.08 \times 10^3$ PFU/mL) versus untreated ($8.25 \pm 0.25 \times 10^5$ PFU/mL, $p < 0.0001$) tissues by Day 2 of *ex vivo* culture. No significant differences in histologic criteria were observed amongst groups. BoHV-1 immunohistochemical staining was minimal in infected tissues regardless of cidofovir treatment. Apoptosis via caspase-3 immunohistochemistry was minimal for all groups. **Conclusions.** Cidofovir warrants further investigation as topical treatment of BoHV-1 keratoconjunctivitis in cattle. Bovine *ex vivo* corneal tissue is useful for modeling BoHV-1 kinetics and antiviral inhibition. Supported by USDA Grant 1433. **None.**

Thursday Presenting 2:15pm

A RETROSPECTIVE INVESTIGATION OF NEUROGENIC KERATOCONJUNCTIVITIS SICCA AFTER ADMINISTRATION OF THE LONG LASTING OTIC MEDICATIONS CLARO, NEPTRA AND OSURNIA

(GR Bercovitz[1], AM Gaerig[2], ED Conway[3], JA Huey[4], MR Telle[5], and KE Myrna[1]) [1]College of Veterinary Medicine, University of Georgia, Athens, GA; [2]Eye Care for Animals, Chicago, IL; [3]VCA Great Lakes Veterinary Specialists, Warrensville Heights, OH; [4]Memphis Veterinary Specialists and Emergency, Cordova, TN; [5]College of Veterinary Medicine, Mississippi State University, Mississippi State, MS.

Purpose. To present cases of neurogenic keratoconjunctivitis sicca (KCS) after the administration of the otic medications Claro (Elanco, KS, USA), Neptra (Elanco, Hampshire, UK), and Osurnia (Dechra, KS, USA). **Methods**. An ongoing, multicentric, retrospective review of records was performed. Cases were included if patients were diagnosed with neurogenic KCS following application of Claro (Neptra) or Osurnia topically for treatment of otitis externa in canines. **Results**. Seventeen canines were included. The average age of onset of neurogenic KCS was 8 years. All breeds included were small to medium sized dogs, and the most common breeds were the Cavalier King Charles Spaniel, Miniature Pincher, Maltese and Shih Tzu (two cases per breed). Nine cases received Claro only, three cases received Neptra only, three cases received Osurnia only, and one case received both Osurnia and Claro. The median number of days from application to presentation for ophthalmic concerns was 1 day, and the range was 0-807 days. Eight cases had the otic medication applied to both ears, and 5 of these cases had unilateral ophthalmic pathology. Average duration of time from application of the otic medication to documented return of adequate tear production (Schirmer tear test ≥15 mm/min) with typical treatment for neurogenic KCS was 116 days, range 33-280 days. At the last follow up (range 28-434 days), six cases did not have documented return of adequate tear production. **Conclusion.** Neurogenic KCS should be considered as a potential complication following application of Claro (Neptra) or Osurnia in dogs. Support/Disclosure. **None.**

Thursday Presenting 3:00pm

AN INVESTIGATION IN TO THE DEVELOPMENT OF QUALITATIVE TEAR FILM DISORDERS IN DOGS FOLLOWING CRYOEPILATION FOR TREATING DISTICHIASIS (BD REYNOLDS, 1 CJ WHITTAKER 1, KA CARUSO 1, J SMITH 1, G BOO 1, W IRVING 1, PG MCCARTHY 1, N HAMZIANPOUR 1, E HALL 2) Eye Clinic for Animals, Sydney, NSW, Australia; 1. Sydney School of Veterinary Science, The University of Sydney, Sydney, NSW, Australia. 2

Purpose: To determine if cryoepilation for distichiasis impacts tear film dynamics and meibomian gland function and topography. **Methods:** A prospective study assessing client-owned dogs with no history of ophthalmic disease were examined by a single investigator (BR). Tear film interferometry, infra-red meibography and fluorescein tear film break up time were recorded as a reference population. These results were compared with a treatment group of client-owned dogs that were recruited to the study that had previously had cryoepilation performed for distichiasis. A univariate analysis was performed to compare the two groups. **Results:** 21 dogs met the selection criteria for the reference population, and had an average age of 4.5 years old and even sex distribution, with the most common breeds assessed including Old English Sheepdog (n = 5) and Cavalier King Charles Spaniel (n = 4). Nine dogs met the inclusion criteria for the treatment group and had a mean age of 2.9 years, with 6 spayed females, 2 entire females and 1 neutered male, with the most commonly assessed breed being English Bulldogs (n = 3). The average lipid layer thickness in the reference population was 59.2+/-34.9nm, and 36.8+/-19.9nm in the treatment group. The average meibography score for the reference population was 2.4+/-0.2, and 3.0+/-0.7 in the treatment group. Tear film break-up time in the control group was >10 seconds for all included dogs, and the treatment group was 5.8+/-2.57 seconds. **Conclusions:** Cryoepilation for distichiasis is likely contributory to the development of lipid deficient qualitative dry eye disease in dogs. Tear film stability may improve with time after surgery. Conflicts of interest: **None.**

Thursday Presenting 3:15pm

TEAR FILM BREAKUP TIME AND TEAR PRODUCTION IN DOGS; EFFECTS OF AGE, SEX, REPRODUCTIVE STATUS, SKULL TYPE, AND NASOLACRIMAL DUCT PATENCY (SM Rajaei,1 H Faghihi,1 and S Salek, 2) Ophthalmology Section, Negah Veterinary Centre, Tehran, Iran; 1 Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.2

Purpose. To determine the effects of age, sex, reproductive status, skull type, and nasolacrimal duct (NLD) patency on tear production (STT) and tear film breakup time (TBUT) in dogs. **Methods.** Ophthalmic data of seventy healthy adult dogs were used in this study. Age, sex, breed, and reproductive status were recorded. Schirmer tear test and tear film breakup time were assessed in all dogs. Jones test was used to assess nasolacrimal duct patency. **Results.** Means (SD) of TBUT of right and left eyes were 6.7(2.5) sec and 6.1(2.4) sec, respectively. Minimum and maximum of TBUT in all the eyes were 2.14 sec and 16.12 sec, respectively. Means (SD) of STT of right and left eyes were 20.6(2.7) mm/min and 20.3(2.8) mm/min, respectively. The lowest and highest obtained STT values were 15 mm/min and 30 mm/min, respectively. Sex and reproductive status had no significant effect on STT and TBUT ($P>0.05$). Skull type significantly affected TBUT on both eyes ($P=0.01$, $P=0.003$), but not STT ($P>0.3$). Age had insignificant, negative correlation with STT and TBUT in both eyes ($P>0.01$). STT and TBUT had insignificant, negative correlation in both eyes ($P>0.2$). NLD patency had no significant effect on STT or TBUT ($P>0.1$). **Conclusions.** Results of this study showed lower TBUT values in brachiocephalic breeds than non-brachiocephalic breeds. Both TBUT and STT decreased with age, while sex and reproductive status had no effects on TBUT and STT. Compensatory increase in STT values was observed in dogs with low TBUT values. **None.**

Thursday Presenting 3:30pm

THE INFLUENCE OF AN ARTIFICIAL TEAR OINTMENT ON SCHIRMER TEAR TEST-I RESULTS IN NORMAL DOGS (C Boles 1, S Massarani, NT Wasserman 1) 1 Eye Care Animals Wheeling, Illinois

Purpose. Given the prolonged contact time of ointments, measurement of STT-I soon after application could affect results. The purpose of this study was to investigate the effect that an artificial tear ophthalmic ointment has on STT-I measurements at different timepoints post application. **Methods.** A two period prospective randomized contralateral crossover study was performed using 10 dogs with healthy eyes. All dogs underwent complete ophthalmic examination. A baseline STT-I was performed OU. The treatment eye was randomly selected to receive ¼ inch of an artificial tear ointment (Bausch & Lomb Soothe Lubricant Eye Ointment PM). STT-I measurements were collected at 10, 20, 30, 45, 60, 90, 120, 150, 180 minutes from both eyes post ointment application. Tests were performed on different days and the contralateral eye served as a control. The difference in STT-I measurements at each timepoint was compared to baseline and analyzed with an approximate t-test. **Results.** The average baseline STT-I measurement was 24.0 mm/min. The mean STT-I difference at each timepoint ranged from -1.8 to +0.6 mm/min and -1.9 to +1.9 mm/min in control and treated eyes respectively, with no obvious pattern. There were no statistically significant differences in STT-I measurements between ointment-treated and control eyes at any time point ($p>0.10$). **Conclusion.** Topical application of an artificial tear ointment did not result in a statistically significant difference in STT-I measurements at any time point post application. Further studies are needed to investigate whether medicated ointments affect STT-I measurements shortly following application in patients with and without active keratoconjunctivitis sicca. **None.**

Thursday Presenting 3:45pm

EFFECT OF THE ADDITION OF DEXMEDETOMIDINE TO RETROBULBAR ANESTHESIA IN DOGS UNDERGOING ENUCLEATION SURGERY (WM Irving, 1 E Hall, 2 MJ Annear, 1) Animal Referral Hospital, Sydney, NSW, Australia; 1 Sydney School of Veterinary Science, The University of Sydney, Sydney, NSW, Australia; 2

Purpose. Investigate the effect of the addition of dexmedetomidine to retrobulbar blockade of lignocaine and bupivacaine on nociception. **Methods**. A prospective randomised, masked clinical comparison study was conducted. Dogs undergoing unilateral enucleation were randomly assigned to two groups; group one received dexmedetomidine (1ug/kg) (200ug/2mL, Zoetis, Kalamazoo, MI), and a 1:2 volume ratio of lignocaine (20mg/mL, Troy Animal Health Care, Glendenning, NSW, Australia) and bupivacaine (0.5%, Aspen Pharmacare, St Leonards, NSW, Australia), group two received 0.9% saline, lignocaine and bupivacaine. The total volume of intraconal injection was calculated at 0.1mL/cm cranial length. The following intraoperative parameters were recorded: heart rate, respiratory rate, end-tidal CO2, systolic blood pressure, and isoflurane concentration. Pain scores, heart rate and respiratory rate were recorded post-operatively at one minute, one hour, four hours, ten hours and 20-24 hours after extubation. **Results.** Seventeen dogs were enrolled in the study, with eight dogs receiving dexmedetomidine. Intraoperatively, dogs receiving dexmedetomidine had lower respiratory rates (P=0.015), required lower isoflurane concentrations (P=0.037) and had lower heart rates (P=0.002) than those in group two. Post-operatively, dogs receiving dexmedetomidine had lower heart rates at one minute (P<0.001) and one hour (P<0.001). There was no significant difference in post-operative pain scores between treatment groups. Dogs receiving dexmedetomidine had a higher rate of anaesthetic events of bradycardia and hypertension (P=0.027). **Conclusions.** The addition of dexmedetomidine to retrobulbar anaesthesia significantly lowered intraoperative heart rate, respiratory rate and isoflurane requirement. Post-operatively there was no detectable difference in nociception relative to retrobulbar blockade with lignocaine and bupivacaine alone. **None**.

Thursday Presenting 4:00pm

RETROBULBAR LIDOCAINE INJECTION VIA THE SUPRAORBITAL FOSSA IS SAFE IN ADULT HORSES BUT PRODUCES REGIONALLY VARIABLE PERIOCULAR ANESTHESIA (VY Yang, 1 JS Eaton, 1 K Harmelink, 1 SJ Hetzel, 2 A Sanchez, 1 JR Lund, 1 LJ Smith 1) School of Veterinary Medicine, University of Wisconsin-Madison;1, Department of Biostatistics and Medical Informatics, Institute for Clinical and Translational Research, University of Wisconsin-Madison.2

Purpose. To characterize safety and efficacy of one technique for retrobulbar regional anesthesia in normal horses. **Methods.** Prospective, randomized, controlled study using eight adult mares. Following detomidine sedation, one eye received 10mL of 2% lidocaine using the Berge method of retrobulbar injection via the supraorbital fossa (SFRB). Parameters evaluated over 24 hours included heart rate (HR), respiratory rate (RR), intraocular pressure (IOP), vertical pupil diameter (PD), corneal esthesiometry, and periocular algometry. Changes in neurophthalmic parameters were also described. Adverse effects were recorded. Comparison of outcomes over time between groups was conducted using longitudinal data analysis with subject as random effect. **Results.** No significant change in heart and respiratory rates occurred following SFRB. Intraocular pressure in treated eyes was significantly increased from 10 minutes to 2 hours, with a mean difference between 4.0-6.0mmHg ($p \leq 0.016$). Pupil diameter was significantly larger from 1 minute to 6 hours, with a maximum mean increase of 6.5mm ($p < 0.001$). Mean corneal sensitivity decreased significantly from 1 minute to 6 hours ($p \leq 0.003$). Mean cutaneous periocular sensation decreased significantly for 2 hours at the dorsal ($p \leq 0.001$) and medial ($p \leq 0.005$) locations, but was not completely abolished. Dazzle reflex persisted in all eyes at all time points. Effect on remaining neurophthalmic parameters was variable. Chemosis was observed in 5/8 treated eyes and superficial corneal ulcer in one eye. **Conclusions.** SFRB is safe in normal adult horses, and provides reliable corneal but inconsistent periocular anesthesia. Self-limiting chemosis is common. Increase in pupil diameter indicates an effective retrobulbar block. **None.**

Thursday Presenting 4:15pm

HOW LONG DOES IT TAKE TO BECOME PROFICIENT AND EFFECTIVELY DELIVER A RETROBULBAR NERVE BLOCK? A COMPARISON OF TWO TECHNIQUES. (DR Washington, HD Westermeyer, JD Briley, LL Chiavaccini, LP Posner, NC Nelson), North Carolina College of Veterinary Medicine

Purpose. To determine the period of time necessary for novices to become proficient at administering retrobulbar nerve blocks in dogs. **Methods.** Two novice operators (DRW and JDB) who were instructed and supervised for the same amount of time by an expert (LC) using two previously published techniques: The blind inferior temporal block and the ultrasound-guided supratemporal block. An admixed solution of 75% bupivacaine : 25% iohexol was initially administered by retrobulbar injection to 3 cadavers, and subsequently to 22 client-owned dogs requiring enucleation. Computed tomography (CT) of the orbit was performed and each operator self-reported on the perceived ease of completing the block. A visual analog scale, converted to percentages, was used to quantitate this perception. Location and distribution of the injectate was evaluated by a board-certified radiologist (NCN). **Results.** Mean scores for "How difficult was this to perform?" (Very easy = 0%, Very Hard = 100%) were lower for the ITP block (28%) than the STP block (58%). Mean scores for "Would I feel comfortable teaching this now" (No = 0%, Yes = 100%) increased from 0% to 96 % at the conclusion of the study. Injectate location and outline was clearly visible using CT. There was no correlation between confidence levels of injectate placement and injectate location on CT. Optic nerve contact was achieved in the majority of cases with minimal intra-operator differences. **Conclusions.** Both novice operators perceived the STP approach was more difficult to perform. Iohexol-laced bupivacaine can be used to accurately document retrobulbar block delivery site. Supported by NCSU CVM Intramural Seed Grant **None.**

Thursday Presenting 4:30pm

ESTIMATION OF THE INTRAOPERATIVE BLOOD LOSS DURING ENUCLEATION IN DOGS (E Lenihan[1], SJ Baines[2], RN Linn Pearl[1], RA Grundon[1], N Hamzianpour[1], R Carrozza[1], EJ Stevens[1], CL Heinrich[1], KP Walsh[1]). [1]Eye Veterinary Clinic, Leominster, Herefordshire, UK; [2]Willows Veterinary Centre & Referral Service, Solihull, West Midlands, UK.

Purpose. To quantify surgical haemorrhage during canine enucleation and to investigate influence of patient, surgeon, and anaesthetic factors. **Methods.** A prospective observational analysis was conducted on 111 client-owned dogs (120 eyes) undergoing enucleation at a referral ophthalmology clinic. Estimated blood loss (EBL) was measured using the gravimetric method (weighing of used surgical materials in grams and converted to millilitres) to give absolute blood loss (ABL) and then expressed as percentage of circulating blood volume (%CBV) to provide relative blood loss (RBL), using 85ml/kg as canine CBV. Data is expressed as median and range. **Results.** Median ABL was 12ml (2 – 116ml) and median RBL was 1.10% (0.12 – 6.65%). A higher RBL was associated with the following: use of a splash block versus retrobulbar nerve block (1.50 vs 0.75%; P<0.001); transpalpebral versus subconjunctival approach (1.74 vs 0.95%; P=0.003); small versus large breeds (1.37 vs 0.76%; P=0.008) and complex corneal disease versus primary glaucoma or secondary (post-phacoemulsification) glaucoma as the reason for enucleation (1.74 vs 0.87 and 0.71% respectively; P=0.004 and 0.015). ABL and RBL were not associated with administration of meloxicam, choice of pre-medicant (acepromazine versus medetomidine), ocular hypertension or systemic disease. ABL and RBL differed significantly between surgeons. No dog required supportive intervention in response to surgical haemorrhage. **Conclusions.** This study established an EBL range for canine enucleation in a specialist referral setting and has demonstrated that use of peri-operative NSAID and retrobulbar nerve block do not increase blood loss. Subconjunctival enucleation may be preferred for patients at greater risk of haemodynamic complications.
None.

Thursday Presenting 4:45pm

POSTER SESSION FRIDAY

INHIBITION OF CORNEAL EPITHELIAL WOUND HEALING BY ENGINEERED METAL OXIDE NANOMATERIALS (S Kim, 1 BL Gates, 1 BC Leonard, 1 MM Gragg, 1 KE Pinkerton, 2 LS Van Winkle, 2,4 CJ Murphy, 1,3 G Pyrgiotakis, 5 Z Zhang, 5 P Demokritou, 5 SM Thomasy, 1,3) Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California-Davis;1 Center for Health and the Environment, University of California-Davis;2 Department of Ophthalmology and Vision Science, School of Medicine, University of California-Davis;3 Department of Anatomy, Physiology and Cell Biology, School of Veterinary Medicine, University of California-Davis;4 Center for Nanotechnology and Nanotoxicology, HSPH-NIEHS Nanosafety Center, Department of Environmental Health, Harvard T.H. Chan School of Public School, Harvard University;5

Purpose. Ocular exposure to metal oxide engineered nanomaterials (ENMs) is common as exemplified by zinc (II) oxide (ZnO), a major constituent of sunscreens and cosmetics. The ocular surface, including the cornea and its tear film, is a common site of exposure for metal ENMs. Despite the frequency of exposure of the ocular surface, there is a knowledge gap regarding the effects of metal oxide ENMs on the cornea in health and disease. Therefore, we studied the effects of metal oxide ENMs on the cornea in the presence or absence of injury. **Methods.** Cell viability of immortalized human corneal epithelial (hTCEpi) cells was assessed following treatment with 11 metal oxide ENMs with a concentration ranging from 0.5 to 250 µg/ml for 24 h. An epithelial wound healing assay was then performed with a monolayer of hTCEpi cells using 11 metal oxide ENMs at select concentrations based on data from the viability assays. Subsequently, based on the *in vitro* results, *in vivo* testing of rabbit precorneal tear film (PTF) quantity and stability as well as corneal epithelial wound healing were tested in the presence or absence ZnO or vanadium(V) oxide (V_2O_5) at a concentration of 50 µg/ml. Transcorneal penetration of ZnO or V_2O_5 was evaluated using hyperspectral images. **Results.** We found that WO_3, ZnO, V_2O_5 and copper oxide ENMs significantly reduced hTCEpi cell viability in comparison to vehicle control or the other metal oxide ENMs tested. Furthermore, ZnO and V_2O_5 ENMs also significantly decreased hTCEpi cell migration. Although ZnO and V_2O_5 did not alter PTF parameters of rabbits *in vivo*, corneal epithelial wound healing was significantly delayed by topical ZnO while V_2O_5 did not alter wound healing Finally, we confirmed penetration of ZnO and V_2O_5 through all corneal layers and into the iris stroma. **Conclusions.** Zinc oxide ENMs showed the most marked toxicity of the corneal epithelial cells *in vitro* and significantly delayed corneal epithelial wound healing in a rabbit. Considering the marked epithelial toxicity and corneal penetration of ZnO, further investigations on the impact of this ENM on the eye are warranted. Supported by the National Institutes of Health grants U01 ES027288, U24ES026946, S10 OD021789 and P30 EY12576. **None.**

RETROSPECTIVE STUDY ASSESSING THE INFLUENCE OF STRUCTURAL ABNORMALITIES ON RECURRENCE OF PROLAPSED GLAND OF THE NICTITATING MEMBRANE FOLLOWING SURGICAL FIXATION (MT Buesing, 1 E Miller 1) College of Veterinary Clinical Sciences, The Ohio State University. 1

Purpose. To investigate recurrence of prolapsed gland of the nictitating membrane (PGNM) and determine if breed, scrolled cartilage, macroblepharon, or concurrent lateral canthoplasty surgery at the time of surgical fixation influence incidence of recurrence. **Methods**. A retrospective study examined the medical records of canine patients with PGNM surgically corrected at The Ohio State University Veterinary Hospital between 2011 and 2020. Records were reviewed for recurrence and concurrent diagnoses. Fisher Exact tests were performed to determine if breed, scrolled cartilage, macroblepharon, or lateral canthoplasty at time of the PGNM surgery were associated with recurrence. **Results**. A total of 68 cases were diagnosed with PGNM and underwent initial surgical correction. Of the 68 cases, 17 had recurrence of the prolapse. Fisher Exact tests were performed using the null hypothesis to assess if breed, presence of scrolled cartilage, macroblepharon, or concurrent lateral canthoplasty influenced the rate of recurrence. Scrolled cartilage (P = 0.21), macroblepharon (P-= 0.18), and lateral canthoplasty (P = 0.15) had no significant effect on recurrence. Dog breed also had no effect on recurrence (P = 0.35). **Conclusion**. This study found that dog breed, presence of scrolled cartilage or macroblepharon, and whether or not a lateral canthoplasty was performed during surgical fixation of the PGNM had no effect on rate of recurrence. No funding or grants supported this research. **None.**

EVALUATION OF TEAR FILM AND MEIBOMIAN GLAND ATROPHY IN DOGS WITH AND WITHOUT MEIBOMIAN GLAND DYSFUNCTION (D Jeong, S Kang, J Shim, E Lee, S Park, Y Jeong, K Seo) Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University

Purpose. To compare the interferometry grades, non-invasive tear break-up time (NIBUT) grades, tear meniscus height (TMH) and meibography scores between dogs with and without meibomian gland dysfunction (MGD). **Methods.** Among 56 eyes enrolled, 26 eyes were diagnosed with MGD, and 30 eyes were classified as control group by slit-lamp biomicroscopy. Along with routine ophthalmic examinations, interferometry, NIBUT, TMH, and meibography were evaluated. Age, interferometry grades, NIBUT grades, TMH, and meibography scores were compared between the control and MGD groups via Mann-Whitney test. **Results.** There was no significant difference in age between the two groups (p=0.437). Interferometry (p=0.008) and NIBUT grades (p=0.008) were significantly lower in the MGD group than those in the control group. No significant differences in TMH values (p=0.818) and meibography scores (p=0.447) were observed between the two groups. **Conclusions.** In this study, low interferometry grade was associated with MGD, presenting the decreased secretion of meibum in MGD in dogs, which suggested the availability of interferometry as a diagnostic method for MGD. Low NIBUT grade was also associated with MGD, which suggested tear film disruption in MGD. Tear quantity, measured by TMH, did not differ in the two groups. While meibography could identify meibomian gland morphology, it would not explain the current status of meibomian gland function. **None.**

EVALUATING AQUEOUS PORTION OF TEAR FILM BY THE STANDARDIZED ENDODONTIC ABSORBENT PAPER POINT TEAR TEST IN DOGS AND CATS; EFFECTS OF AGE, SEX, AND SKULL TYPE (SM Rajaei,1 H Faghihi,1 S Salek,2 and F Asadi,3) Ophthalmology Section, Negah Veterinary Centre, Tehran, Iran; 1 Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran; 2 Faculty of Veterinary Medicine, University of Semnan, Semnan, Iran.3

Purpose. To evaluate the aqueous portion of tear film by standardized endodontic absorbent paper point tear test (EAPTT) in dogs and cats. **Methods.** Fifty-three dogs and 56 cats between 10 and 100 months were used for this study. Tear production was measured using EAPTT in two cat breeds (Persian and Domestic short hair cats) and 6 dog breeds (Pug, Chihuahua, Shih Tzu, Spitz, West Highland White Terrier, and Golden Retriever). EAPTT was performed by placing one absorbent paper point in the lateral part of the lower conjunctival fornix of a randomly selected eye. After 60 sec, paper points were removed and the wet portions of the papers were measured in mm using a stainless-steel ruler. **Results.** Mean (SD) of tear production evaluated by means of EAPTT were 21.79(6.97) mm/min and 19.82(4.99) in cats and dogs, respectively. In cats, sex had no significant effect on tear production ($p=0.4$), while breed had a significant effect on the mean EAPTT ($p<0.001$). Age had significant, positive correlation with the mean EAPTT in cats ($r=0.373$, $p=0.005$). In Dogs, age had significant, negative correlation with the mean EAPTT ($r=-0.448$, $p=0.001$). Sex and skull type significantly affected the mean EAPTT in dogs ($p=0.04$ and $p<0.001$). No sign of ocular discomfort was observed at the time of measurement and up to 24 h after EAPTT. **Conclusions.** Results of this study revealed that tear production by means of EAPTT can be affected by breed and age in cats; and age, sex, and skull type in dogs. **None.**

THIRD EYELID CARTILAGE EVERSION IN AN ANGLO-NUBIAN GOAT: A CASE REPORT (LK Donohue, ZE Mack, EC Ledbetter) Cornell University, College of Veterinary Medicine, Ithaca, NY, USA

Case Description. At the time of disbudding, the Cornell University Ambulatory Service noted that a 10-day-old female intact Anglo-Nubian goat had an anomaly of the left third eyelid cartilage and referred the goat to the Cornell University Hospital for Animals Ophthalmology Service. **Clinical Findings.** Upon presentation to the Ophthalmology Service at 2 months of age, persistent eversion of the third eyelid cartilage was diagnosed. The cartilage shape could not be manually corrected. **Treatment and Outcome.** Surgical correction of the abnormal third eyelid cartilage was completed under general anesthesia. A linear conjunctival incision parallel to the vertical aspect of the third eyelid cartilage was made on the bulbar aspect of the third eyelid. The conjunctiva was bluntly dissected to expose the abnormally bent cartilage and it was excised. The cartilage was repaired with 7-0 polyglactin 910 sutures. The conjunctival excision was closed with simple continuous 6-0 sutures with the knots placed on the anterior surface of the third eyelid. After excision, the third eyelid resumed a normal anatomic position and shape. Histopathologic evaluation of the excised cartilage found that the cartilage was within normal limits with no cellular atypia, inflammation, or neoplasia noted. The goat healed uneventfully from the surgery and the third eyelid remained in a normal position with normal morphology. **Clinical Relevance.** This is the first description of the surgical correction of third eyelid cartilage eversion in a goat and suggests that cartilage eversion should be included in differentials for third eyelid anomalies in young goats. **None.**

A RETINOSCOPIC SURVEY OF DONKEYS AND GOATS (O Pe'er[1], L Gantz[2], E Gal[2] & R Ofri[1]) Koret School of Veterinary Medicine, The Hebrew University of Jerusalem, Rehovot, Israel[1].Department of Optometry and Vision Science, Hadassah Academic College, 37 Haneviim St., Jerusalem 9101001, Israel[2].

Purpose. To assess the refractive states of donkeys and goats. **Methods**. Forty-two donkeys and 28 goats with no evidence of ophthalmic disease, were enrolled in the study. The mean ±SE (minimum–maximum, median) ages were 7.68 ±1.13 (0.3–30, 5.0) years for donkeys and 4.3 ±0.45 (0.6–9.0, 3.5) years for goats. Seven donkeys were <6 months old. Retinoscopy was performed using a handheld streak retinoscope 30 min after cycloplegia in goats, and in non-cyclopleged donkeys. The animals were alert, and manually restrained. Both meridians were refracted twice using a computer-generated randomization table. Data was analysed using repeated measures ANOVA, Shapiro–Wilk test, Spearman's correlation, Mann Whitney U- test and Bland & Altman analysis. **Results.** The mean ±SE refractive errors in both horizontal and vertical meridians of the donkey eyes were myopic, measuring -0.80 ±0.18 and -0.78 ±0.16 D, respectively (OD) and -0.47 ±0.15 and -0.23 ±0.18 D, respectively (OS), with no significant differences between eyes (P>0.05). The mean ±SE refractive errors in both horizontal and vertical meridians of the goat eyes were hyperopic measuring 1.58 ±0.25 and 1.65 ±0.23 D, respectively (OD) and 1.43 ±0.30 and 1.62 ±0.25 D, respectively (OS). There was a positive, but insignificant, correlation between the two meridians in both eyes of the two species. Age was not correlated with refractive error in donkeys (p>0.05) **Conclusions.** Unlike previously reported refractive error of horses, donkeys are myopic, even at an early age, which may have implications on their performance. Goats are hyperopic, similar to sheep.

OCULAR HEMORRHAGE AS THE INITIAL CLINICAL SIGN OF VON WILLEBRAND DISEASE IN DOGS: 2 CASES (2020) (AL Minella,1 JC Lowe,1 JJ Sevy,1 KE Knickelbein,1 SG Edwards,1 BC Martins,1) William R. Pritchard Veterinary Medical Teaching Hospital, School of Veterinary Medicine, University of California-Davis, Davis, California, United States; 1

Purpose. To describe two cases of primary ocular bleeding secondary to Von Willebrand Disease (VWD), emphasizing the importance of considering this condition in patients with ocular hemorrhage. **Methods.** Two canine patients (ages 17 months and 3 years) were presented to the University of California, Davis, Veterinary Medical Teaching Hospital for ocular hemorrhage. Thorough ophthalmic and systemic examinations were performed on both patients. Diagnostic workup for abnormal bleeding including Von Willebrand Factor Antigen test was performed in both patients. **Results.** Case 1 showed severe hyphema with glaucoma in the right eye (OD). Thorough workup for abnormal bleeding revealed VWD. No other signs of abnormal bleeding were found in other body systems. Failure to respond to medical therapy and poor prognosis for vision and comfort led to enucleation OD. The patient did well following enucleation. Case 2 showed subretinal and intraretinal hemorrhage in both eyes (OU). Similar diagnostic workup for abnormal bleeding also led to a diagnosis of VWD, with a similarly stable systemic examination and no signs of abnormal bleeding elsewhere. Case 2 responded well to medical therapy, with resolution of hemorrhage and reattachment of separated regions of retina. **Conclusions.** Decreased clotting ability secondary to VWD in dogs may predispose patients to ocular hemorrhage. Therefore, patients diagnosed with VWD should receive a thorough ophthalmic examination to screen for ocular hemorrhage that may threaten comfort or vision. Conversely, patients presenting for ocular hemorrhage should also be screened for VWD as a potential underlying etiology. **None.**

PREVALENCE AND CHARACTERISTICS OF OCULAR DISEASE IN SPHYNX CATS: A RETROSPECTIVE ASSESSMENT (2012-2020) AND COMPARISON WITH NON-SPHYNX CATS (H Sarfaty, 1 R Ezra-Elia, 1 and L Sebbag 2) EyeCare clinic, Yehud-Monosson, Israel 1; Koret School of Veterinary Medicine, The Hebrew university of Jerusalem, Rehovot, Israel 2.

Purpose. To describe the prevalence of ocular disease in Sphynx cats, and compare disease characteristics with other feline breeds. **Methods.** Medical records of Sphynx cats presented to an ophthalmology referral center between 1/2012 and 12/2020 were examined. Cats of other breeds examined during the same period served as control. **Results.** Ninety-eight Sphynx (n=102 eyes) were examined during the study period, diagnosed with corneal sequestrum (n=40), lower eyelid entropion (n=23), presumed herpetic keratoconjunctivitis (n=17), conjunctivitis (n=7), corneal ulcers (n=5), nasolacrimal duct atresia / obstruction (n=3), corneal dystrophy (n=2), eosinophilic keratitis (n=2), and non-ulcerative keratitis, uveitis, cataract (n=1 each). Corneal sequestrum was significantly more common in Sphynx (26.3%) *vs.* non-Sphynx cats (4.4%) (odds ratio = 7.7, 95% CI = 5.0-12.1, $P<0.001$), and age of diagnosis was significantly lower in Sphynx cats (1.9±1.6 years *vs.* 5.1±3.9 years, $P<0.001$). Corneal sequestrum recurrence was noted in 6/31 (19.3%) Sphynx eyes and 8/131 (6.9%) non-Sphynx eyes undergoing surgery ($P=0.045$). Lower eyelid entropion – most often bilateral (78.3%) – was significantly more common in Sphynx (12.7%) *vs.* non-Sphynx cats (3%) (odds ratio = 4.7, 95% CI = 2.6-8.5, $P<0.001$), and age of diagnosis was significantly lower in Sphynx cats (0.9±1.4 years *vs.* 3.4±3.2 years, $P<0.005$).**Conclusions.** Corneal sequestrum and entropion are overrepresented and are diagnosed at an earlier age in Sphynx cats when compared with the general feline population. Given the high prevalence, early age of onset, and relatively high recurrence of corneal sequestrum in Sphinx cats, further studies are warranted to better understand etiopathogenesis and preferred therapies. **None.**

DOES GPA PREDICT PERFORMANCE ON THE 2009-2019 ACVO/ABVO BOARD EXAM?

(K. Myrna[2], A. Labelle[1.]) [1]Veterinary Clinical Medicine, University of Illinois Urbana-Champaign; [2]Small Animal Medicine and Surgery, University of Georgia

Purpose. Veterinary school Grade Point Average (GPA) is a commonly assessed criteria in the selection of individuals for ophthalmology residency training programs. Few investigations have evaluated the relationship between GPA and obtaining diplomate status. We hypothesize that GPA does not predict a decreased number of attempts to pass the ACVO/ABVO board exam. **Methods.** Data were obtained via survey of ABVO diplomates with n=108 participants. Data collected included GPA, number of attempts to pass each exam section and the entire exam. All analyses were performed using SAS 9.4 with a significance threshold of 0.05. Histograms and Q-Q plots were examined to evaluate the assumption of normality of GPA data. Mann-Whitney U tests were used to compare GPA between students that failed or passed one or all sections of the board exam. Spearman correlation of GPA with number of times each section was taken were performed. **Results.** GPA was statistically significantly higher in students who passed the written and image recognition sections of the board exam and the whole exam, and marginally statistically significantly higher in students who passed the animal exam section than students who did not pass the animal exam section. GPA was negatively correlated with the number of times the written and image recognition were taken and marginally negatively correlated with the number of times the animal exam was taken. **Conclusion.** This data provides evidence for a discussion regarding resident selection, GPA and board exam performance.

FELINE HORNER'S SYNDROME: 18 CASES (HB Gafen, 1 A van der Woerdt, 1 NC La Croix, 2 D Isaza, 2) Animal Medical Center; 1 Veterinary Medical Center of Long Island. 2

Purpose. Records of cats diagnosed with Horner's syndrome by a veterinary ophthalmologist between 2012 and 2020 were investigated. **Methods**. Patient databases from two ophthalmology practices were searched for signalment, ophthalmic findings, presumed etiologies, and follow-up examinations of cats diagnosed with Horner's. **Results.** Patient ages ranged from 0.4 to 24 years (mean of 9.55 years). Of 18 cases there were 8 neutered males, 1 intact male, and 9 spayed females. There were 13 domestic shorthairs, 1 Maine Coon, 1 Burmese, 1 Bengal, 1 Bombay, and 1 Abyssinian. All cases were afflicted unilaterally in either the right (9) or left eye (9). Clinical signs included miosis (18/18), third eyelid protrusion (17/18), ptosis (10/18), and enophthalmos (9/18). Intraocular pressures in 9 cats ranged from 6 to 28 (median of 15) mmHg in affected eyes, and 5 to 28 (median of 19) mmHg in contralateral eyes. Instillation of 2.5% phenylephrine resolved clinical signs for 12 cases. Suspected or confirmed etiologies included otitis media (4 cases), and single cases of a left forebrain lesion, lymphoma in the left bulla, middle ear polyp, peripheral vestibular disease, dental injury, or trauma. Follow-up data for 13 cats revealed that Horner's resolved in 8, 1 continued with intermittent signs, and 4 were euthanized at diagnosis. **Conclusions.** The mean age of cats diagnosed with Horner's was 9.55 years with sexes equally represented. Right and left eyes were equally afflicted. An aural etiology for Horner's was most prevalent. More populous studies are warranted. No funding. **None.**

THE USE OF COMPUTED TOMOGRAPHY (CT) SCAN PAIRED WITH NUCLEAR SCINTIGRAPHY TO DETERMINE PRIMARY OR SECONDARY ANTERIOR UVEAL OSTEROSARCOMA IN A RABBIT (*ORYCTOLAGUS CUNICULUS*)

(H Patterson,1 MdL Henriksen,2 Z Dvornicky-Raymond,3 H Terhaar,2 D Thamm,4 C Olmo,5 L Griffin,5 LBC Teixeira,6 M Sadar,3) College of Veterinary Medicine and Biomedical Sciences, Colorado State University;1 Comparative Ophthalmology, Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University;2 Avian, Exotics, and Zoological Medicine Service, Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University;3 Flint Animal Cancer Center, Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University;4 Environmental and Radiological Health Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University;5 Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin-Madison.6

Purpose. A rabbit was diagnosed with uveal osteosarcoma on histopathology. The purpose of this study was to evaluate if computed tomography (CT) scan paired with nuclear scintigraphy could be used to determine if the uveal osteosarcoma was primary or secondary (metastatic). **Methods.** A 4-year-old female spayed angora mix rabbit (*Oryctolagus cuniculus*) was referred to Colorado State University Veterinary Teaching Hospital's (CSU-VTH's) Avian, Exotic, and Zoo Medicine Service for progressive drainage and discomfort of OS. An examination performed by CSU-VTH's ophthalmology service revealed a yellow and white vascularized mass taking up 95% of the anterior chamber causing blindness OS. The globe was enucleated and submitted to COPLOW for histopathology. **Results.** Histopathology revealed an anterior uveal osteosarcoma and chronic secondary glaucoma, but it was not able to discern between a primary intraocular (extraskeletal) and a secondary (metastatic) osteosarcoma. The rabbit underwent a pre- and post-contrast whole body CT scan paired with nuclear scintigraphy (Tc99m-HDP) to evaluate for any skeletal or soft tissue abnormalities. Results from the CT scan and nuclear scintigraphy showed no evidence of metastasis or tumor regrowth, suggesting the anterior uveal mass was a primary intraocular (extraskeletal) osteosarcoma. One hundred eighty-five days following enucleation, the rabbit was comfortable OD and had no appreciable signs of systemic abnormalities according to the owner. **Conclusion.** This case report describes primary uveal osteosarcoma in a rabbit. CT scan paired with nuclear scintigraphy has not previously been reported in a pet rabbit but was effective in staging uveal osteosarcoma in this individual. **None.**

EVALUATION OF INTRACAMERAL TISSUE PLASMINOGEN ACTIVATOR FOR TREATMENT OF EQUINE ANTERIOR UVEITIS (GR Bercovitz[1] D Stefanovski[2], and NM Scherrer[2]) [1]College of Veterinary Medicine, University of Georgia, Athens, Georgia; [2]New Bolton Center, University of Pennsylvania, Kennett Square, PA.

Purpose. To evaluate the use of intracameral tissue plasminogen activator (tPA) as adjunct management of primary or secondary equine anterior uveitis. **Methods**. Retrospective medical record review with inclusion criteria of (1) horses presented to New Bolton Center between 2012–2020 (2) clinical signs of uveitis as diagnosed by a faculty or resident in ophthalmology and (3) treatment with intracameral tPA. **Results**. Ninety-two horses (92 eyes) were included that underwent a procedure (52 eyes) or medical management (40 eyes). Procedures included low dose intravitreal gentamicin injection (IVGI, 6 eyes), keratectomy (41 eyes), and transscleral cyclophotocoagulation (TSCP, 6 eyes). Horses that underwent TSPC were less likely to be visual at follow up than horses treated with an IVGI (P = 0.034). Forty-seven horses were diagnosed with primary uveitis due to trauma (24 eyes), equine recurrent uveitis (ERU, 15 eyes), sepsis (6 eyes) and intraocular neoplasia (2 eyes). Traumatic uveitis cases were 9 times more likely to be visual at follow up as compared to cases of ERU (P value= 0.015). Reflex uveitis was diagnosed in 45 horses, secondary to stromal corneal ulcers (13 eyes), corneal perforations (12 eyes), or stromal abscesses (20 eyes). Cases of stromal abscesses were approximately 13-fold more likely to be visual at follow up than cases of corneal perforations (P = 0.031). **Conclusion.** Intracameral tPA is safe to use in cases of primary and secondary equine anterior uveitis and may be of particular benefit with reflex anterior uveitis secondary to stromal abscesses. **Support/Disclosure.** **None.**

LACK OF CLINICALLY SIGNIFICANT ANTI-MICROBIAL ACTIVITY OF TOPICAL OCULAR DIAGNOSTIC MEDICATIONS IN DOGS (MA Mironovich, MS Mitchell, C Liu, RT Carter, AC Lewin) School of Veterinary Medicine, Louisiana State University

Purpose. To determine if ocular diagnostic medications applied topically before sample collection affect bacterial quantity and bacterial species isolated via aerobic culture. **Methods.** Twelve female beagle dogs had a conjunctival swab (FLOQswab Copan, California) collected before and after the sequential application of 0.5% proparacaine (Acorn, Illinois), 1% tropicamide (Akorn, Illinois), and 1mg fluorescein (MWI, Idaho) (P/T/F) to the same eye with five minutes between medications. Paired swabs were submitted for aerobic culture. Bacterial enumeration was performed using the spread plate method. After one week, the experiment was repeated using balanced salt solution (Alcon, Texas) (negative control). One week later, the experiment was repeated using ofloxacin 0.3% solution (Apotex Corp, Florida) (positive control). Colony counts were compared using one-way ANOVA and Tukey post-hoc comparison. Bacterial species reduction was compared using Friedman Rank Test and Dunn's Method. **Results.** The bacterial colony count for P/T/F and BSS was significantly higher than the ofloxacin group ($p=0.0052$, $p=0.0022$). There was no significant difference for P/T/F versus BSS ($p=0.9295$). The bacterial species reduction for P/T/F and BSS was significantly lower than for ofloxacin ($p<0.0001$, $p=0.0160$). There was no significant difference for P/T/F versus BSS ($p=0.3749$). **Conclusions.** The application of proparacaine, tropicamide, and fluorescein did not significantly decrease the amount or alter the species of bacteria isolated from the ocular surface in normal dogs. The application of these drugs prior to ocular swab collection is unlikely to affect subsequent culture results. Supported by a 2020-2021 LSU VCS CORP Research Grant. **None.**

A GENETIC INVESTIGATION OF EQUINE RECURRENT UVEITIS IN THE ICELANDIC HORSE BREED (MdL Henriksen,1 I Hack,2,3 TH Pihl,3 A Dwyer,4 R Krarup,3 RR Bellone,2,3) Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, USA;1 Veterinary Genetics Laboratory, School of Veterinary Medicine, University of California Davis, USA;2 Department of Population Health and Reproduction, School of Veterinary Medicine, University of California Davis, USA;3 Department of Veterinary Clinical Sciences, Faculty of Health Sciences, University of Copenhagen, Denmark;3 Genesee Valley Equine Clinic, LLC, Scottsville, NY, 14546, USA.4

Purpose. To investigate the genetic component of equine recurrent uveitis (ERU) in the Icelandic horse. **Methods**. Icelandic horses living in Denmark-DK and United States-US, eight years or older, were clinically evaluated and either diagnosed with ERU or without ERU (controls). A pedigree analysis was performed to investigate potential modes of inheritance. A case-control genome-wide association study (GWAS) was performed on DNA extracted from whole blood using the GGP Equine 80K array on the Illumina Infinium HD Beadchip. The coding regions from one positional and functional candidate gene were Sanger sequenced in two ERU-affected and two controls. To assess concordance with phenotype, variants identified via Sanger sequencing were genotyped in all Icelandic horses enrolled in the study. **Results.** Fifty-six Icelandic horses (11 ERU and 45 controls) were included. Analysis of five generation pedigrees did not reveal a common ancestor among ERU-affected horses. However, 10/11 horses with ERU shared a common ancestor within 10 generations suggesting genetics plays a role. A mixed linear model analysis identified a single SNP on ECA 11 that reached genome-wide significance ($p=1.79X10^{-7}$). This variant was within an intron of tissue inhibitor of metalloproteinase 2 (*TIMP2).* Only a single coding variant was identified in this gene, however it was a synonymous mutation and was not perfectly concordant with ERU phenotype (p=0.721). **Conclusion.** This is the first genetic investigation of ERU in the Icelandic horse and an association with *TIMP2* on ECA11 was identified. Further investigation of *TIMP2* is warranted to confirm the association with ERU. Funded by KUSTOS af 1881 Foundation, Denmark.

USE OF AJL´S COLLAGEN BOVINE MEMBRANE TO REPAIR A LIMBAL MELANOCYTOMA EXCISION IN TWO DOGS (CE Aparicio,1 MA Millán,1 LY López,1) Servicio Oftalmológico Veterinario SOV; Bogotá, Colombia

Case Description. Case one, an eight-years-old female Schnauzer was presented with a right eye limbal mass that started six months ago. Case two, a ten-years-old male mestize was presented with a left eye limbal mass that started seven months ago. **Clinical Findings.** A complete ophthalmic examination revealed in both cases a dark, limited and slightly raised limbal mass that grew up in the cornea and sclera. B-mode ultrasonography showed no intraocular compromise in both patients. **Treatment and Outcome.** Under general anesthesia, a deep kerato-sclerectomy was performed with 15° and crescent knife, then two short cycles of cryotherapy were made and finally an implantation of a biomembrane graft was done, sutured with polyglicolyc acid 8-0 in both cases. In the two cases histopathology revealed an overgrowing of melanocytes with granular pigments into cytoplasm, not evidence of anisocytosis and of mitotic figures was found. **Clinical Relevance.** This report showed that this type of biomembrane of collagen bovine is successful in deep defects as a melanocytoma excision with minimum scaring. **Support.** AJL.

THERAPEUTIC EFFECTS OF A TEAR SUBSTITUTE CONTAINING POLYVINYL ALCOHOL, HYALURONIC ACID, AND DODECAHYDROSQUALENE IN DOGS WITH CORNEAL ULCERS (K Hagi, 1 T Tanaka, 1 S Hirata, 1 S Sawa, 2 and T Hasegawa 1) Osaka Prefecture University, Osaka, Japan; 1 Senju Pharmaceutical Co. Ltd., Hyogo, Japan; 2

Purpose. A tear substitute containing 0.1% polyvinyl alcohol, 0.3% sodium hyaluronate, and 5% dodecahydrosqualene was clinically evaluated for treating canine corneal ulcers (CU). **Methods**. Two clinical studies were conducted. 1) Twenty-two eyes with superficial CU (SCU; 13 eyes) or stromal/deep CU (StDCU; 9 eyes), which did not respond to conventional medical treatments (CMT) using antibiotics, hyaluronate, and autologous serum, were treated using the substitute and conventional agents. Then, the therapeutic period (TP) and recovery rate (RR) were compared before (non-application group I; NApG I) and after (additional application group; AdApG) treatment. 2) The TP and RR of 40 eyes with SCU (28 eyes) or StDCU (12 eyes) were compared between AdApG and conventional treatments, including additional surgical treatments, such as conjunctival or nictitating membrane flaps, or soft contact lens therapy (non-application group II; NApG II). **Results**. In AdApG, the RR of SCU and StDCU was significantly improved, at 92% and 67%, respectively ($p<0.01$). The median TP of SCU and StDCU in NApG I/AdApG was 9 days/10 days and 14 days/22 days, respectively. The median TP and RR of SCU and StDCU in NApG II were 18 days and 80%, and 38 days and 33%, respectively. The TP in AdApG was shorter than that in NApG II (SCU; $p<0.01$, StDCU; $p=0.055$). **Conclusions**. The substitute, 0.1% polyvinyl alcohol, 0.3% sodium hyaluronate, and 5% dodecahydrosqualene, is applicable as a therapeutic agent for canine CU, including SCU and StDCU. **None.**

DESCRIPTION OF CANINE CONJUNCTIVAL MICROBIOTA AND MICROBIOME BEFORE AND AFTER APPLICATION OF AN ANTISEPTIC PROTOCOL (LD Seyer, RW Wills, C Betbeze) College of Veterinary Medicine, Mississippi State University, Mississippi State, MS

Purpose. To evaluate canine ocular surface microbiota and microbiome before and after an antiseptic protocol using aerobic culture and DNA sequencing. **Methods.** Six, healthy dogs randomly received a 1:50 povidone-iodine solution preparation in one eye with the second eye serving as a control. Preparation included a standardized volume of solution, number of sterile cotton tip applicators, and preparation time of five minutes. The inferior conjunctival fornix was sampled for aerobic culture and DNA sequencing at baseline, 5 minutes, 24 hours, and 4 weeks following preparation. Culture dependent data were evaluated using paired t-test and linear regression. An Illumina platform was used to sequence bacterial DNA using primers to target the V4 region of bacterial 16S rRNA. Quantitative Insights Into Molecular Ecology (QIIME 2.0) was used to analyze data. **Results.** Baseline cultures consisted of *Bacillus* (35%), *Staphylococcus* (30%), *Streptococcus* (20%), *Moraxella* (5%), *Micrococcus* (5%), and *Simonsiella* spp. (5%). No significant difference was detected between the mean number of species cultured at baseline and any time point measured ($p=0.465$). Treatment, sample time, or interaction was not significant ($p>0.393$). DNA sequencing revealed the most abundant phyla at baseline were Proteobacteria (57.04%), Actinobacteria (19.89%), Firmicutes (3.25%), and Bacteroidetes (5.5%). Alpha and beta diversity matrices at baseline and over time revealed no significant change in species richness or bacterial composition. Relative abundance of bacterial taxa did not significantly differ in treated or control eyes over time. **Conclusions.** Ocular bacterial flora differed between culture dependent and independent methods. The bacterial community remained stable over time after the current antiseptic protocol. **None.**

IN-DEPTH SPEAKER FRIDAY

Dr. Eric Ledbetter

"*In Vivo Confocal Microscopy: Clinical Research Applications in Veterinary Ophthalmology*"

In Vivo Confocal Microscopy: Clinical and Research Applications in Veterinary Ophthalmology

Eric C. Ledbetter, DVM, DACVO
Department of Clinical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, New York, USA

Introduction

Ophthalmic imaging techniques available for use in veterinary medicine have rapidly expanded in recent years. The use of these newer imaging modalities has permitted observation of anatomical and physiologic changes associated with many ocular disorders in a manner that was not previously feasible or only possible with invasive sample collection techniques and laboratory analysis. Observations made with advanced imaging techniques have directly contributed to an improved understanding of many ocular conditions. When applied in the clinical setting, advanced ophthalmic imaging techniques have the potential to improve the clinical detection, diagnosis, and treatment of many ocular diseases. *In vivo* confocal microscopy (IVCM) is a relatively new imaging technique in clinical ophthalmology that permits morphological and quantitative analysis of the living cornea on the cellular level. This discussion will review the basic principles, advantages, techniques, and indications for IVCM. Clinical and research applications of IVCM in veterinary ophthalmology will be discussed.

Principles of *in vivo* confocal microscopy

With conventional light microscopy techniques, which includes slit-lamp biomicroscopy, image magnification and resolution is limited by light reflected from tissue structures adjacent to the field of observation. This light originating outside of the field of interest obscures and reduces image contrast. Confocal microscopes were originally developed to circumvent this limitation that is inherent to conventional light microscopes. The basic principles of the confocal microscope were first developed in the late 1950s, but the first published descriptions of *in vivo* ocular imaging using this technology did not appear until the 1990s.[1,2]

All *in vivo* confocal microscopes utilize small apertures and illumination and observation pathways with a common focal point. Reflected light that is not in focus, and originates from outside the field of observation, is suppressed so that only light reflected from the focal plane contributes to the final image formation. Confocal microscopy systems dramatically improve axial and lateral resolution and allow for the use of higher magnification than that achievable with conventional light microscopy.[3] Optical adjustment of the confocal microscope focal plane permits imaging at different depths of optically transparent tissues, such as the cornea. To compensate for the small field of view inherent to these instruments, the focal point is rapidly scanned repeatedly, and the image digitally reconstructed for real-time viewing.

Advantages of *in vivo* confocal microscopy as a diagnostic tool

In vivo confocal microscopy provides several advantages over standard cytologic, histopathologic, molecular, and microbiologic diagnostic techniques currently used in veterinary ophthalmology. With IVCM, microscopic corneal images can be viewed in real-time providing the clinician with immediate diagnostic information. Traumatic corneal sampling techniques such as scrapings and biopsies are avoided, averting unnecessary tissue damage and permitting the procedure to be repeated as frequently as it is clinically indicated. Both superficial and deep corneal lesions can also be evaluated by IVCM in an atraumatic, simple, and low risk manner.[4] Microorganism viability is not required for their detection with IVCM, avoiding problems that can be encountered when infectious keratitis samples for culture are collected subsequent to antimicrobial administration, fastidious microorganisms are present, or microorganism viability is lost during corneal sample transport to diagnostic laboratories.

Instrumentation and practical considerations

The three basic types of *in vivo* corneal confocal microscopes in clinical use are the tandem scanning-based confocal microscopes, scanning slit confocal microscopes, and laser scanning confocal microscopes. Of these, laser scanning confocal microscopy has been reported most frequently in clinical veterinary medicine. *In vivo* confocal microscopic examination in companion animals can generally performed with the application of topical anesthetic and manual restraint only. In large animals, examinations are performed with standing sedation or under general anesthesia. With most models, the confocal microscope lens cap is placed in light contact with gel on the ocular surface to perform the examination. This is accomplished by positioning the animal on an examination table at the level of the objective, manually holding the microscope laser housing and bringing it to the level of the subject's ocular surface, or mounting the microscope laser housing to a mobile holder such as an operating microscope stand.

Normal corneal anatomy

In most domestic animals, the cornea is described to have 10 morphologically distinct layers when evaluated by IVCM.[5,6] From anterior-to-poster, these corneal layers are the superficial epithelial cells, superficial-intermediate epithelial cells, deep-intermediate epithelial cells, basal epithelial cells, basement membrane, anterior stroma, midstroma, deep stroma, Descemet's membrane, and corneal endothelium.

The epithelial layers are distinguished by cell morphology, size, and density. The corneal stroma is composed of extracellular matrix and collagen lamellae that are nearly transparent and dark gray or black in color with scattered keratocytes. Keratocytes have highly reflective round-to-oval nuclei with variably visible grey cytoplasm and cellular borders. In general, keratocyte density decreases from anterior-to-posterior within the cornea. Descemet's membrane has an amorphous or fine granular appearance with a uniform, moderate reflectivity. The healthy corneal endothelium is a confluent monolayer of hexagonal and pentagonal cells with highly reflective cytoplasm, dark cellular borders, and no visible nuclei. Additional structures observed in the healthy cornea during IVCM examination are corneal nerves and occasional Langerhans cells and corneal stromal dendritic cells.

Clinical applications of *in vivo* confocal microscopy

Clinical applications of IVCM in veterinary ophthalmology are numerous and several examples are provided in the following text. *In vivo* confocal microscopy is a rapid and non-invasive method for diagnosing fungal keratitis in any animal species.[7-10] Ulcerative and nonulcerative keratomycosis can be evaluated by this technique and fungi can be detected in lesions at all corneal depths, including within deep stromal corneal abscesses. Serial confocal microscopic examinations can be performed to monitor the response to medical therapy and to determine when the administration of antifungal medications can be safely discontinued. *In vivo* confocal microscopy can be used for surgical planning to determine the specific depth and area of the lesion and the tissue distribution of the fungi, which permits a more complete excision and spares normal ocular tissue.

Although most bacteria are too small to be detected with the current confocal microscopes available for clinical use, IVCM is useful for the presumptive diagnosis of bacterial keratitis by excluding other corneal conditions (e.g., fungal keratitis, foreign bodies). In addition, some specific types of bacterial keratitis are associated with relatively distinct IVCM findings, such as infectious crystalline keratopathy.[11] Infectious crystalline keratopathy is a clinically-unique bacterial infection of the cornea that results from chronic colonization of the interlamellar stromal spaces by populations of bacteria depositing glycocalyx. Accumulations of reflective crystalline or amorphous structures within the stroma, without associated inflammation, are observed with this condition by IVCM.

Our knowledge of new and potentially underrecognized types of infectious keratitis in veterinary ophthalmology can be advanced by IVCM. For example, *Acanthamoeba* keratitis was recently described in domestic cats. In these descriptions, IVCM was crucial to the detection and monitoring of the cases.[12,13] Recent investigations of herpetic keratitis in dogs and cats by IVCM have improved our understanding of the microanatomical corneal changes associated with these viral infections and their effects on host tissue. These publications include both descriptions of active dendritic ulcerative keratitis and its sequelae (i.e., metaherpetic disease), including neurotrophic keratitis and limbal stem cell deficiency.[14,15]

In vivo confocal microscopy is described as a method to detect, characterize, and localize microscopic corneal foreign bodies.[16] Corneal foreign bodies appear as moderately or highly reflective linear, circular, or oval structures that do not resemble any normal corneal anatomic structures. The precise anatomic localization and depth measurements provided by in IVCM can be used to assist in the selection of the specific surgical plans for corneal foreign bodies.

Presumed autoimmune and idiopathic conditions of the cornea can be evaluated by IVCM to provide novel information regarding the nature of these disorders. For example, equine immune mediated keratitis was recently characterized by IVCM.[17] With the epithelial, superficial stromal, and midstromal forms of equine immune mediated keratitis, the confocal microscope can be used to rapidly help establish an etiological diagnosis by detection of a dense, diffuse network of dendritic cells in the epithelial basement membrane and immediate subepithelial stroma. Corneal leukocyte infiltrates and vascularization of the approximate corneal anatomic region that is clinically affected as determined by biomicroscopy is also consistently present. Other corneal pathologies that may also be observed in some cases of equine immune mediated keratitis include epithelial disorganization, corneal edema, mineral deposition, stromal fibrosis, and epithelial pigment granules. *In vivo* confocal microscopy also permits other potential causes of chronic keratitis in horses (e.g., keratomycosis, foreign bodies, etc…) to be excluded in the clinical setting. The endothelial form of equine immune mediated keratitis (i.e., endotheliitis) is distinct from the other forms of equine immune mediated keratitis and characterized by stromal edema, endothelium disorganization, endothelial cell loss, and multifocal accumulations of highly reflective material within the endothelium.

Pigmentary keratitis in dogs, a common and incompletely understood ocular disease, was investigated using IVCM.[18] In this study, pigmentary keratitis was characterized by microscopic features of chronic inflammation predominantly confined to the corneal epithelium. Morphologically, the condition was characterized by a centripetal corneal migration of microanatomic features normally confined to the perilimbal region of the cornea. These features included superficial epithelial pigment, basal epithelial pigment, Langerhans cells, anterior stromal dendritic cells, epithelial disorganization, and vascularization.
In vivo confocal microscopy is also described as a tool to assist with the diagnosis of corneal and conjunctival masses in a variety of animal species, including epithelial inclusions cysts, onchocerciasis, and various corneal neoplasms.[19-21]

In conclusion, the use of IVCM provides many advantages to the clinician and can also be used in the research setting to expand our knowledge and understanding of ocular disease in animals. The clinical and research applications of IVCM are immense and continuously expanding.

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GENERAL SCIENTIFIC SESSION FRIDAY

COMPARISON OF THREE METHODS OF TONOMETRY IN HORSES (EA Latham MVB, 1 D Stefanovski PhD, and NM Scherrer DVM DACVO, 1); New Bolton Center, University of Pennsylvania School of Veterinary Medicine, Kennett Square, PA, USA 1

Purpose. To compare the measurement of intraocular pressure using three tonometry devices. **Methods.** A total of fifty horses presented to the New Bolton Center Ophthalmology Service were used in this study. Intraocular pressure was taken on 50 client-owned horses (100 eyes) using the TonoVet, TonoVet Plus and Tono-Pen Avia tonometers. Horses included were presented to New Bolton Center for ocular disease. Auricuolpalpebral blocks were performed but horses were unsedated and minimally restrained. **Results**. All tonometers were found to have Pearson correlation coefficients greater than 0.700, indicating strong agreement. The strongest agreement was between the TonoVet and the TonoVet Plus with an average difference of -1.330 mmHg and a standard deviation of 4.388mmHg. This was followed by the TonoVet and the Tono-Pen Avia Vet which had an average difference of 2.531 mmHg with a standard deviation of 4.124 mmHg. The weakest agreement was between the TonoVet Plus and the Tono-Pen Avia with an average difference of 3.854 mmHg with a standard deviation of 4.724mmHg. In four cases the Tono-Pen Avia was unable to measure intraocular pressure in phthisical eyes. **Conclusions**. All three tonometers showed strong agreement; however, the TonoVet and the TonoVet Plus carried the strongest agreement and the TonoVet Plus had slightly higher measurements overall compared with the TonoVet. Due to small variations between devices, it is recommended that the same device be used for serial measurements of intraocular pressure. However, all three devices are appropriate to use in horses with ocular disease. **None.**

Friday Presenting 9:00am

COMPARISON OF THREE REBOUND TONOMETERS IN DOGS (KJ Hodgson,1 CD Harman,1 S Bajric,1 A Cabble,1 AL Anderson,1 H Palanivel, 2 DA Taylor, 2 AM Komáromy 1) College of Veterinary Medicine, Michigan State University;1 Reichert Technologies.2

Purpose. To compare intraocular pressure (IOP) readings across a wide range and obtained via three rebound tonometers in *ADAMTS10*-mutant Beagles with different stages of open-angle glaucoma (OAG) and normal Beagles; and to investigate the effect of central corneal thickness (CCT). **Methods.** A total of 99 eyes from 51 Beagles were used in this study with variable genetics – 15 normal and 36 affected with *ADAMTS10*-OAG. Intraocular pressure was measured in each eye using three tonometers – ICare® Tonovet (TV), ICare® Tonovet Plus® (TVP), and the novel Reichert® Tono-Vera™ (TVA) – in randomized order. Tonovet Plus® and TVA have different positioning systems to facilitate targeting of the central cornea. Central corneal thickness was measured with the Accutome® PachPen. Statistical analyses included one-way ANOVA and Tukey pairwise comparisons tonometer readings and pairwise IOP-CCT Pearson correlations (MiniTab®). **Results.** A total of 116 IOP measurements were taken with each of the tonometers. Over a range of ~7-77 mmHg, mean IOPs from the TV were significantly lower compared to TVP (-4.6 mmHg, $p<.001$) and TVA (-3.7 mmHg, $p=0.001$). We found no significant differences between TVA and TVP measurements ($p=0.695$). There was a moderate positive correlation between CCT and IOP for TVA ($r = 0.53$, $p<.001$) and TVP ($r=0.48$, $p<.001$). **Conclusions**. Tonovet Plus® has been shown previously to provide canine IOP measurements that more accurately reflect true IOP than TV (Minella et al. 2021). Our data demonstrate strong agreement between TVP and TVA, suggesting that the same is true for TVA. IOP measurements are influenced by CCT. Supported by NIH grant R01-EY025752. Conflicts: None: KJH, CDH, SB, AC, ALA. Reichert Technologies: HP (E), DAT (P, E), AMK (C).

Friday Presenting 9:15am

APPLICABILITY OF A HANDHELD PORTABLE ELECTRORETINOGRAPHY UNIT IN THE CHARACTERIZATION OF *RPGRIP1*^{ins44}-PRA/CRD CANINE MODEL (AP Gray, 1 Yu Sato, 1 GD Aguirre, 1 K Miyadera, 1) Division of Experimental Retinal Therapies, Department of Clinical Sciences & Advanced Medicine, School of Veterinary Medicine, University of Pennsylvania.1

Purpose. To test a hand-held portable ERG (RETevet) in dogs with the *RPGRIP1*^{ins44}- PRA/CRD variant recorded awake and under general anesthesia (GA). The effect of GA on ERG is assessed. Further, to examine the sensitivity of RETevet and its correlation with a research grade ERG (Espion) obtained in parallel. **Methods**. The ECVO 5-step single flash protocol using the RETevet was done awake and under GA induced/maintained by propofol/isoflurane; Espion protocol was done under GA. The three ERG trials (RETevet-awake, RETevet-GA, Espion-GA) were conducted within 10 days, under the same controlled conditions. **Results**. In the awake dogs, the RETevet findings were reproducible and retinal functional abnormalities were readily identified. The main limitation was uncooperative dogs. These limitations were eliminated by GA with results generally comparable to Espion recordings given that the recording and stimulating systems differed. The photopic single flash in 5 carrier dogs showed higher mean b-waves awake (61µV) than under GA (29µV). Similarly, photopic 28.3Hz flicker amplitudes were higher awake compared to GA. The nine affected (*RPGRIP1*$^{ins/ins}$) dogs also demonstrated low photopic single flash and photopic amplitudes awake compared to GA, although values were abnormally low due to the disease (awake 5µV; GA 2µV). **Conclusions**. The portability and single hand-held features of the device facilitated ERG recording, particularly in awake dogs. As in previous studies, GA was found to significantly depress b-wave amplitudes in both unaffected and affected dogs, demonstrating awake ERG recordings have greater sensitivity, but are limited by patient/eye movement and cooperation. Supported by grant NIH/EY006855 and Foundation Fighting Blindness. **C** (LKC technologies) **C** (compensation or support received within the past three years of product presented)

Friday Presenting 9:30am

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

Purpose. Evaluate effects of corneoconjunctival transposition (CCT) and posterior lamellar keratoplasty (PLK) on streak retinoscopy in equine cadaver eyes. **Methods.** Intraocular pressures (IOP) were maintained at 25 ± 3 mmHg via intravitreal saline injections in eleven equine cadaver eyes. The vertical and horizontal meridians were refracted without viscoelastic (NO VISCO) and then repeated following optical coherence tomography (OCT) of the axial cornea and subsequent intracameral injection of 1.0 ml viscoelastic (VISCO). Either CCT (N = 5) or PLK (N = 6) (coin toss) were performed, and gross, net and spherical refraction results were recorded. Postoperatively, IOP was returned to 25 ± 3 mmHg and streak retinoscopy and postoperative OCT of the axial cornea was repeated. **Results.** There was a significant increase in presurgical (VISCO) and postsurgical net meridional and spherical refraction for CCT [horizontal: 2.7 (95% CI 0.4-5.0) D, p = 0.022, vertical: 2.3 (95% CI 1.0-3.6) D, p = 0.001, spherical: 2.5 (95% CI 0.7-4.3) D, p = 0.005) and PLK [horizontal: 2.8 (95% CI 0.7-4.9) D, p = 0.009, vertical: 1.9 (95% CI 0.7-3.1) D, p = 0.002, spherical: 2.4 (95% CI 0.8-4.0) D, p = 0.004]. Postoperative refraction did not differ significantly between CCT and PLK. Postoperative OCT revealed a space between the anterior and posterior grafts and corneal undulation from suture placement. **Conclusions.** Net meridional and spherical refraction had a hyperopic shift following CCT and PLK, with no significant difference between CCT or PLK.**Support**. Auburn University Department of Clinical Sciences Resident Research Grant. This project has received IACUC approval (PRN #2021-3860). **None.**

Friday Presenting 9:45am

OCULAR DIAGNOSTICS, CONJUNCTIVAL MICROBIOME, AND OPHTHALMIC FINDINGS IN THE CHILEAN FLAMINGO (*PHOENICOPTERUS CHILENSIS*) (AC Bowden, 1 RA Allbaugh, 1 A Gall, 2 M Leis, 3 L Sebbag 1,4) Iowa State University College of Veterinary Medicine 1; Blank Park Zoo, Des Moines, IA 2; Western College of Veterinary Medicine 3; Koret School of Veterinary Medicine, The Hebrew University of Jerusalem 4.

Purpose. To establish normative data for selected ocular diagnostic tests and commensal conjunctival microflora, and to describe the incidence of ocular pathology in Chilean flamingos. **Methods.** Blink rate assessment was performed on 41 Chilean flamingos undisturbed in their exhibit at the Blank Park Zoo in Des Moines, Iowa. Using gentle manual restraint, the following procedures were performed in 20 of the flamingos: palpebral fissure measurement, tear production testing [phenol red thread test (PRTT) in one eye, endodontic absorbent paper point tear test (EAPPTT) in the other], intraocular pressure (IOP) with rebound tonometry, and fluorescein staining. The other 21 flamingos were brought to a darkened area for complete ophthalmic examination. A conjunctival swab for ocular microbiome assessment was collected on 7 flamingos. **Results.** Median (range) age, palpebral fissure width, blink rate, IOP, EAPPTT, and PRTT were 9.5 (0.7-40) years, 11 (9-14) mm, 3.4 (1-9) blinks/min, 13 (10-22) mmHg, 11 (9-14) mm/min, 6 (3-13) mm/15 sec, respectively. Observed ocular pathologies included cataracts (*n* = 7, 33%), corneal fibrosis (*n* = 3, 14%), endothelial pigment (*n* = 2, 9.5%), uveal cysts (*n* = 1, 4.8%), lens luxation (*n* = 1, 4.8%), and uveitis (*n* = 1, 4.8%). Ocular microbiome data is pending. **Conclusions.** Identifying commensal conjunctival flora will guide empiric medical therapy for flamingos with ocular surface disease, while understanding baseline ocular parameters and incidence of ophthalmic pathology will aid disease screening during annual exams for the Chilean flamingo. Supported by VAF grant 2020-1. **None.**

Friday Presenting 10:30am

ERG RESULTS IN MOLINOIS BELGIUM SHEPHERD DOGS SUBMITTED TO TWO DIFFERENT ANESTHETHIC PROTOCOLS (A Kuner, 1 MFM Duval, 1 RD Faleiro, 1 BG Marinho, 2 and CM Molinaro 2) Radiovet Centro de Diagnóstico; 1 Universidade Federal Rural do Rio de Janeiro.2

Purpose. To compare electroretinogram (ERG) results in Molinois Belgium Shepherd dogs belonging to the Military Police of Rio de Janeiro canine unit, using two different anesthetic protocols. **Methods.** Six healthy Molinois Belgian Shepherd dogs, between 1 and 5 years old, underwent two anesthetic protocols with an interval of two weeks: 0.02 mL/kg, intramuscularly (IM), of TDex solution (50 mg of tiletamine-zolazepam lyophilisate diluted in 25% butorphanol solution and 0.125 mg of 50% dexmedetomidine); and 0.2 mg/kg butorphanol (IM), 5 mg/kg propofol (IV) and vaporized isoflurane (ISO). All animals were intubated, dark-adapted for 20 minutes, received rocuronium (0.05 mg/kg IV) and had vital parameters monitored. A complete ERG including cone, mixed and rod responses was recorded. ERG results on each anesthetic protocol were compared for b-wave amplitude, implicit time and presence of artifacts. **Results.** There were no significant differences between the groups ISO vs Tdex except for implicit time values for cone response. B-wave implicit times (msec) and amplitudes (mv) were as follows for ISO vs Tdex: Mixed (18,3 vs 20,5 msec; p=0.5473 and 193,0 vs. 157,5 mv; p=0.1101); Rod (35,0 vs 39,7 msec; p=0.2840 and 50,0 vs. 55,3 mv; p=0.4757) and Cone (16,0 vs 13,5 msec; p=0,0217 and 39,7 vs. 33,8 mv; p=0.4305). Although graphical responses for artifacts were more depressed under Tdex, noise scores were higher but the difference was not significant. **Conclusion.** Both protocols proved to be effective for ERG examination. This study corroborates the importance of anesthetic standardization in the interpretation of the results**. None.**

Friday Presenting 10:45am

VARIATION IN DISEASE PHENOTYPE IN OUTCROSSED PRCD AFFECTED DOGS; IN VIVO OPTICAL COHERENCE TOMOGRAPHY AND ELECTRORETINOGRAPHY (Yu Sato,1 AP Gray,1 VL Dufour,1 WA Beltran,1 and GD Aguirre 1) Division of Experimental Retinal Therapies, Department of Clinical Sciences & Advanced Medicine, School of Veterinary Medicine, University of Pennsylvania. 1

Purpose. To describe phenotypic structural and functional characteristics of progressive rod-cone degeneration (*prcd*) in outbred dogs of miniature poodle (MP) origin using optical coherence tomography (OCT) and electroretinography (ERG). **Methods.** cSLO/sd-OCT (Heidelberg HRA/OCT2) was performed at 23, 45 and 80 weeks of age. Four *prcd* homozygous and one *prcd* heterozygous dogs were studied. Using a single b-scan, mean ONL thickness of OD and OS at each location was calculated and plotted as spider graphs. Full-field-ganzfeld ERG (Espion E3, Diagnosys) was performed. **Results.** No fundus abnormalities were present in affected dogs. Spider graphs showed meridian-dependent decreased ONL thickness inferiorly with faster progression. At inferior mid-peripheral retina, mean +/- SD ONL thickness of [4 affected dogs/control] in µm are: [47/43] at 23 weeks and [29/39 +/- 6.7] at 80 weeks. Previously, purebred *prcd* MP exhibited severely decreased scotopic responses by the age of 57 weeks. In contrast, in this group of *pcrd*-affected dogs, both scotopic and photopic responses were normal at 77 weeks of age, and comparable to WT dogs from the colony. **Conclusion.** Outbred *prcd* affected dogs showed normal retinal function yet meridian-dependent progressive ONL thinning (inferior>superior) at 80 weeks of age. Although the topographic pattern of disease expression was comparable, the temporal course differed from purebreds, both structurally and functionally. Our study suggests that removing the genetic pure-breed background from these *prcd* homozygous dogs modifies the breed-specific phenotypic characteristics of the disease indicating that breed specific modifier gene may play a role in modulating disease expression. Supported by NIH grants EY 06855, 017549, and Foundation Fighting Blindness. **NONE .**

Friday Presenting 11:00am

TOPOGRAPHICAL CHARACTERIZATION AND QUANTIFICATION OF THE RETINAL MICROVASCULATURE IN THE NORMAL DOG WITH OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY(A Ripolles-Garcia,[1] G Ruthel,[2] GS Ying,[3] Y Chen,[3] N Cuenca-Navarro,[4] GD Aguirre,[1] WA Beltran[1]) [1] Division of Experimental Retinal Therapies, Department of Clinical Sciences & Advanced Medicine, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, USA; [2] Department of Pathobiology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, USA; [3] Department of Ophthalmology, Scheie Eye Institute, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA; [4] Department of Physiology, Genetics and Microbiology, University of Alicante, Spain

Purpose. To describe the retinal microvasculature in the normal dog and validate the use of Optical Coherence Tomography Angiography (OCTA) for quantification of canine retinal vascular networks. **Methods**. 6 normal adult crossbred dogs underwent OCTA retinal imaging in both eyes. The images extracted from the different microvascular plexuses at 8 retinal locations (area centralis, temporal mid-peripheral, nasal central, nasal mid-peripheral, superior central, superior mid-peripheral, inferior central and inferior mid-peripheral) were analysed using the AngioTool software. Fluorescein angiography was performed in one eye and it was compared with the OCTA images. Six eyes were examined by immunohistochemistry (IHC). Three eyes were used to quantify the retinal plexuses and compare a set of parameters with the values obtained by OCTA, and three eyes were used to study the location, structure, and interconnections of the retinal vasculature and its variation with eccentricity. **Results**. Up to four retinal plexuses were identified, and their density and extension varied with eccentricity. OCTA offered a better resolution than fluorescein angiography with the added advantage of allowing segmentation of the different plexuses. IHC yielded better image quality and an improved ability to differentiate the plexuses when compared with OCTA. **Conclusions**. We provide a methodology to image and quantify non-invasively the vascular retinal networks of the canine retina and provide normative data in 8 different retinal locations. This will support analysis of retinal vascular changes associated with disease and response to therapy. Supported by NIH grants U24EY029890, RO1EY017549, RO1EY06855, P30EY001583, S10 OD021633-01, Foundation Fighting Blindness, Fighting Blindness Canada. **None**.

Friday Presenting 11:15am

CULTURE AND CHARACTERIZATION OF CANINE AND FELINE CORNEAL ORGANOIDS: A NEW TOOL FOR THE STUDY AND TREATMENT OF CORNEAL DISEASES (L Bedos[1], V Gabriel[2], C Zdyrski[2], DK Sahoo[1,2], JP Mochel[2], K Allenspach[1,2]) *[1]Department of Veterinary Clinical Sciences and [2]SMART Lab, Department of Biomedical Sciences; Iowa State University College of Veterinary Medicine, Ames, IA, USA*

Purpose. To describe methods for isolation and culture of canine and feline corneal organoids. **Methods.** Organoids were derived from limbal epithelium. Tissue samples were obtained by enucleation from patients euthanized for unrelated reasons. Cell isolation and culture was performed using a modified version of our previously published protocol. The media composition was optimized with the addition of fibroblast growth factor 2, 7 and 10. Canine and feline specific probes were designed to perform RNA *in situ* hybridization for characterizing expression of epithelial cell markers in organoids as well as tissues of origin, namely: (i) N- Cadherin (progenitor cell marker), (ii) P63 (progenitor stem cell marker), (iii) Collagen IV (corneal and limbal epithelial basement membrane component), (iv) LGR5 (stem cell marker), (v) AQP1 (marker for niche-like cells), and (vi) CK-19 (epithelial differentiation). **Results.** We were able to achieve successful culture, differentiation, and maintenance of canine and feline 3D corneal organoids. 3D canine organoids expressed mRNA for COL4A1, P63, N-Cadherin and AQP1; while feline organoids expressed P63, CK19, and N-Cadherin. In the tissue, positive markers for the dog included COL4A1, LGR5, P63, CK19, AQP1, whereas in the cat they included P63, CK19, AQP1. **Conclusions.** Our preliminary data show that corneal organoids can be isolated and maintained for more than one month *in vitro*, and could give rise to a fully stratified corneal epithelium with basal progenitor cells. This new resource could have multiple applications for the study and treatment of corneal diseases in veterinary ophthalmology.Supported by Internal Funding from Iowa State University/ PG105155 **Disclosure.** Drs. Karin Allenspach and Jonathan Mochel are co-founders of 3D health Solutions, Inc., a start-up company with the goal to commercialize applications of veterinary organoids.

Friday Presenting 11:30am

EFFICACY OF THE BOVINE AMNIOTIC MEMBRANE HOMOGENATE IN THE WOUND HEALING PROCESS USING *EX VIVO* CORNEAL MODEL (E Capistrano da Silva,1 KM Smith-Fleming,2 Mariano Carossino,3 IM Langohr,3 and BC Martins,1,2) Department of Comparative Biosciences, University of Illinois.1 Department Clinical Medicine, University of Illinois.2 Department of Pathobiological Sciences, Louisiana State University.3

Purpose. To evaluate the efficacy of bovine amniotic membrane homogenate (BAMH) on wounded ex vivo rabbit corneas. **Methods**. Eighteen corneas obtained from normal rabbit eyes were wounded equally using a 6 mm trephine and cultured into an air-liquid interface model. Corneas were treated with phosphate-buffered saline (PBS) (n=6, control group), 0.2% ethylenediaminetetraacetic acid (EDTA) (n=6), or BAMH (n=6). All treatments were applied topically 6 times/day. Each cornea was macro photographed daily with and without fluorescein stain to assess epithelialization and haziness. After 7 days, corneal transparency was evaluated, and the tissues prepared for histologic analysis of viability, total and epithelial thickness, and extent of epithelial ingrowth. **Results**. The mean epithelialization time was 6.2 ± 0.82 days for the control group, 6.2 ± 0.75 days for the EDTA treated group, and 5.1 ± 0.40 days for the BAMH treated group, demonstrating a significant difference between the BAMH and the other groups. The corneas that received EDTA had better transparency compared with the other groups. Histologically, all corneas had adequate morphology and architecture after healing. Analysis of corneal and epithelial thickness revealed no significant difference among groups, but the epithelial ingrowth was significantly reduced in depth in the BAMH group compared to the control group. **Conclusions**. BAMH is an effective and promising treatment for stromal and epithelial ulcers. Supported by Department of Veterinary Clinical Medicine Funds. **None**.

Friday Presenting 11:45am

EFFECT OF ADJUNCTIVE MATRIX REGENERATION THERAPY AGENT ON HEALING OF SPONTANEOUS CHRONIC CORNEAL EPITHELIAL DEFECTS IN FRENCH BULLDOGS (P Soukup,1 M Erhard,1 S Lettmann,1 and I Allgoewer,1) Animal Eye Practice, Berlin, Germany.1

Purpose. To prospectively evaluate the effect of matrix regeneration therapy agent (RGTA) on healing time of spontaneous chronic corneal epithelial defects (SCCEDs) in French Bulldogs. **Methods.** French bulldogs that had unilateral or bilateral SCCEDs met inclusion criteria. Dogs were treated with SCCED standard of care therapy including epithelial debridement (diamond burr or scalpel blade ± grid keratotomy) under topical anesthesia, fluoroquinolone eye drops, hyaluronic acid eye drops or dexpanthenol eye ointment, systemic nonsteroidal anti-inflammatories and e-collar. Carboxymethylglucose sulfate-polymer RGTA (Clerapliq®, Serumwerk Bernburg, Germany) was applied as recommended by the manufacturer in single instillations on days 1, 3, 5, 7, 9 post-debridement. Time to heal (fluorescein negative), number of reassessments, presence of tear film disorders and results of bacterial culture were recorded. Age-matched French bulldog control group was treated with SCCED standard of care therapy only. **Results.** Nineteen dogs (15 unilateral and 4 bilateral SCCEDs) of mean age of 7.09 years were included in the RGTA group. Mean time to heal (±SD; median) was 24.9 days (±13.86; 27), mean/median number of reassessments was 2.62/3. The control group included 20 dogs (18 unilateral, 2 bilateral) of mean age of 7.08 years, mean time to heal was 27.1 days (±13.38; 21) and mean/median number of reassessments was 2.67/2. Time to heal did not significantly vary (one-way t-test, p=0.30) between RGTA and control groups. Sex distribution, tear film disorders or bacterial burden was similar in both groups. **Conclusions.** Adjunctive RGTA therapy did not provide any significant healing benefits in French Bulldogs with SCCED. **None.**

Friday Presenting 1:30pm

EVALUATION OF A NOVEL BI-MODAL TOPICAL DROP FOR THE TREATMENT OF CORNEAL FIBROSIS
(AA Fuchs1, PK Balne1, EA Giuliano1, S Kamil1, NR Sinha1, RR Mohan1 2 3) College of Veterinary Medicine, University of Missouri, Columbia, Missouri 1; Harry S. Truman Memorial Veterans Hospital, Columbia, Missouri 2; Mason Eye Institute, School of Medicine, University of Missouri, Columbia, Missouri 3.

Purpose. To test the safety/efficacy of combination topical therapy for corneal fibrosis. **Methods**. Twelve New Zealand rabbits were used and randomly assigned into 2 groups (6 rabbits/group). *Safety*: Naïve healthy eyes were treated OD BIDx5 days with either treatment (combination TRAM-34 25μM (Tocris Biosciences, Bristol, UK) and ascorbic acid 10% (TVC)) or control (BSS). *Efficacy*: Rabbits underwent an axial corneal wound OS using an established model. Groups (treatment and control) were treated OS BIDx5 days. Degree of corneal opacity, ocular health, safety, and efficacy were determined utilizing the Fantes grading scale and modified McDonald-Shadduck (mMS) scoring system. Immunohistochemical and microscopy techniques evaluated corneal fibrotic markers at study conclusion (day 28). **Results**. *Safety*: Combination therapy was well tolerated in all eyes, with no significant differences in clinical scores, nor in expression of αSMA on qPCR between naïve eyes treated with TVC versus BSS. *Efficacy*: Significant differences in clinical scores were found between treatment and control groups. Significant differences were found between treatment and control groups in expression of αSMA (p=<0.0001), Col3 (p=0.0482), and fibronectin (p=<0.0001) via qPCR. Immunofluorescence staining for αSMA also demonstrated significant difference (p=<0.001) between treatment and control groups. **Conclusions**. Novel bi-modal TVC topical therapy was well tolerated and demonstrated improved corneal wound healing clinically and reduction in fibrotic changes in TVC treated rabbits compared to controls. Supported by ACVO Vision for Animals Foundation (VAF grant 2020-2), the MU Phi Zeta chapter, and the Ruth M Kraeuchi Missouri Endowed Professory of Ophthalmology fund. **None.**

Friday Presenting 1:45pm

CHANGES IN CORNEAL OPTICAL COHERENCE TOMOGRAPHY (OCT) IN CATS WITH MUCOPOLYSACCHARIDOSIS (MPS) VI FOLLOWING INTRASTROMAL AAV-ARSB GENE THERAPY (E Wise,1 JH Salmon,1 L Song,2,3 ML Hirsch,2,3 BC Gilger,1,2) Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, North Carolina; 1 Department of Ophthalmology, University of North Carolina, Chapel Hill, North Carolina; 2 Gene Therapy Center, University of North Carolina, Chapel Hill, North Carolina.3

Purpose. MPS VI is a lysosomal storage disease caused by deficiency in arylsulfatase B (ARSB) causing accumulation of glycosaminoglycans, resulting in corneal opacification. Adeno-associated virus (AAV) intracorneal gene therapy has been shown to eliminate the corneal opacity in a canine model of MPS I, therefore, we investigated the use of intracorneal AAV-ARSB in a feline model of MSP VI. The purpose of this study was to evaluate corneal OCT in MPS VI felines before and after AAV gene therapy. **Methods.** One eye of MPS VI felines, 2 homozygous and 2 heterozygous for a null ArsB mutation were dosed intrastromally with AAV-ArsB (1e9 vg / 50 uL) at 152 days, while the fellow eye was injected with PBS. OCT (Bioptigen) images were collected weekly from 75-204 days of age and analyzed for epithelial, stromal, and corneal thickness (μM). OCT corneal granularity was scored (increasing severity from 1 to 4) by two masked observers and mean gray value was measured on representative ROIs using ImageJ. **Results.** Significant differences in epithelial thickness were not observed, however, both corneal and stromal thickness were significantly thinner in homozygotes compared with heterozygotes ($P<0.01$). Although no significant difference was found in corneal opacity scores, the mean gray value in ROI was significantly higher in PBS-dosed vs AAV-dosed homozygotes at >196 days. **Conclusions.** We present a new method for identifying corneal abnormalities in MPS VI affected cats and a potential method to quantitatively evaluate corneal opacity with mean gray value and ImageJ analysis. North Carolina Biotechnology Center, Patent (BCG). **P.**

Friday Presenting 2:00pm

OPHTHALMIC EXAMINATION FINDINGS IN CAPTIVE RING-TAILED LEMURS (LEMUR CATTA) (A Rawicka[1], M Capasso[2], P Silvestre[3], C Giudice[4], N D'Anna[1]).Policlinico Veterinario Roma Sud, Italy; [2]Department of Veterinary Medicine and Animal Production; University of Naples, Italy; [3]The Naples Zoo, Italy; Department of Animal Pathology, Hygiene and Public Health, Faculty of Veterinary Medicine, University of Milan, Italy

Purpose. To document normal ophthalmic findings and ocular anomalies in captive Lemur catta. **Methods.** 44 healthy adult ring-tailed lemurs (28 males) of age 2-28 years, classified in 3 groups [≤5years (n=9); 5–15 years (n=25) and >15 years (n=10)], underwent ophthalmic examination. Direct illumination, Schirmer tear test (STT1), diffuse and slit-lamp biomicroscopy, fluorescein dye test, intraocular pressure (IOP) measurement and indirect ophthalmoscopy were performed on each eye. The eyes from 3 lemurs, which had died from unrelated reasons were examined histopathologically. Data were analyzed with Student's t- tests, one-way ANOVA and Tukey tests. **Results.** Mean STT was 9.011 ±2.894 mm/min. Statistically significant differences were observed among age groups (p =0.041), which showed lower values as age increased (11.11 ±3.160, 8.62 ±2.766 and 8.10 ±2.234). In the <5 years group, STT had a trend towards a significantly higher value in males than females (p=0.053). Mean IOP was 17.477 ±3.148 mmHg. There were no significant differences among age groups. However, in the >15 years group, the mean value was statistically lower in males than females (18.14±1.069 vs. 20.67±2.082; p=0.030). Ophthalmic abnormalities were noted in 14 out of 88 (~16%) eyes, including third eyelid laceration, corneal leucoma, cataract, signs of chronic uveitis and vitreous degeneration. **Conclusions.** Mean STT (9.011 ±2.894 mm/min) and IOP (17.477±3.148 mmHg) have been established in captive lemurs. These data may be used as a reference for normal expected values; taking into account that STT values get decreasingly lower with age. **None**.

Friday Presenting 2:15pm

CLINICAL FINDINGS IN DOGS TREATED WITH ORAL CANNABIDIOL (CBD) VERSUS PREDNISOLONE ACETATE 1% OPHTHALMIC SUSPENSION FOR EXPERIMENTALLY INDUCED UVEITIS (MdL Henriksen,1 HM Terhaar,1 E Davey,1 H Patterson,1 S McGrath,1 A Hess,2 MR Lappin,1) Department of Clinical Sciences, College of Veterinary Medicine & Biomedical Sciences, Colorado State University;1 Department of Statistics, College of Natural Sciences, Colorado State University.2

Purpose. To determine if cannabidiol (CBD) oil can be used as an anti-inflammatory drug for uveitis by evaluating clinical signs in dogs with experimentally induced uveitis. **Methods.** Sixteen (16) research beagles underwent a complete ophthalmic examination including measurement of intraocular pressure (IOP-mmHg), and aqueous flare (scale from 0-4+), as well as fluorescein stain for corneal ulceration (positive vs. negative). Experimentally induced uveitis was achieved by performing aqueous paracentesis. Treatment was given and clinical signs were evaluated for three days. Dogs were randomly assigned to four different treatment groups: Group 1: CBD oil 10mg/kg PO BID, Group 2: Topical prednisolone acetate 1% ophthalmic suspension OU, Group 3: CBD oil 10mg/kg PO BID + topical prednisolone acetate 1% ophthalmic suspension OU, Group 4: No treatment. Statistical analysis was performed using two-way repeated measures ANOVA. **Results.** Mean IOP Day 3: Group 1:11.25mmHg, Group 2:14.63mmHg, Group 3:14.25mmHg, Group 4:13.75mmHg. Mean aqueous flare at Day 3 was as following: Group 1:0.375, Group 2:0.25, Group 3:0.125, and Group 4:0.6875. No dogs (0%) developed corneal ulceration after aqueous paracentesis in Group 1, 50% (4/8 eyes) in Group 2, 37.5% (3/8 eyes) in Group 3, and 25% (2/8 eyes) in Group 4. **Conclusion.** CBD as an anti-inflammatory treatment for experimentally induced uveitis seems to have a positive clinical effect on clinical signs such as aqueous flare and with no effect on IOP. Additionally, dogs on topical prednisolone acetate 1% seemed predisposed to corneal ulceration following their aqueous paracentesis whereas CBD-treated dogs did not have the same predisposition. **None.**

Friday Presenting 2:30pm

COMPARISON OF BACTERIAL CULTURE GROWTH IN CANINE EYES WITH PRESUMED INFECTED COMPLICATED CORNEAL ULCERATIONS USING TWO DIFFERENT CULTURE METHODS: DIRECT PLATING VERSUS CULTURETTE SUBMISSION (H Jost,1 CC Lim,2 L Sharkey,3 K Little,4 JL Sharp,5 ML Creutzinger,5 MdL Henriksen,1) Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University;1 Eye Care for Animals, Chicago, IL;2 Department of Clinical Sciences, College of Veterinary Medicine, Tufts University;3 Department of Clinical Sciences, College of Veterinary Medicine, University of Minnesota, Saint Paul, MN;4 Department of Statistics, College of Natural Sciences, Colorado State University.5

Objective: To compare organism recovery using two different bacterial culture processing methods: culturette inoculation into growth media immediately after collection (direct plating), and transport of culturettes first with inoculation at the reference laboratory (culturette). **Methods**: Microbial samples were collected by direct sampling of the infected corneal ulceration with a culturette followed by two methods of sample processing: direct plating onto four different culture media (blood, MacConkey, chocolate, Sabouraud dextrose) and shipment to an outside laboratory (Marshfield Labs, Marshfield, WI), or sample collection by culturette followed by transport to the same outside laboratory as for the direct plating. Corneal cytology was collected from all corneal ulcerations. Samples were submitted for aerobic bacterial culture and sensitivity. **Results**: Thirteen (13) client-owned dogs diagnosed with complicated corneal ulceration from December 2015 to November 2016 were included in this study. Direct plating detected bacterial infection in 5/13 (38.5%) dogs, culturette submission in 6/13 (46.2%) dogs. When combining the two culture methods, 7/13 (53.8%) dogs had positive cultures. The most common bacteria that were cultured from the corneal ulcerations were beta-hemolytic streptococcus spp. (n=3), and gram negative bacilli (n=3). The positive bacterial culture rates were not statistically significant between the two culture methods (p=1.00). Corneal cytology detected intracellular bacteria in 4/13 (30.8%). **Conclusions**: Some laboratories recommend direct plating for better bacterial growth from corneal cultures. Direct plating is more time consuming than submitting a culturette. This study shows that submitting a culturette is just as efficient in getting positive bacterial growth as directing plating. Funded by the UMN Frances LeClaire Ophthalmology grant.

Friday Presenting 2:45pm

POSTER SESSION SATURDAY

PERIOCULAR MELANOCYTIC TUMORS IN VIZSLA DOGS: CLINICOPATHOLOGIC FEATURES AND BREED PREVALENCE. (RI Wright, RP Taylor, GC Shaw, RR Dubielzig, LBC Teixeira) Comparative Ocular Pathology Laboratory of Wisconsin (COPLOW), School of Veterinary Medicine, Department of Pathobiological Sciences, University of Wisconsin-Madison

Purpose. To characterize clinicopathologic features of periocular melanocytic tumors (PMTs) in Vizsla dogs and test the empirical hypothesis that Vizslas have a higher risk of developing PMTs, including multifocal tumors. **Methods.** COPLOW's database was mined for cases of PMTs from Vizslas and other breeds. The association of PMTs in Vizslas and other breeds was assessed with relative risk (RR) estimates, 95% CIs, and associated Wald tests. **Results.** From 57,302 canine submissions in COPLOW's collection, 1,392 PMTs were identified, encompassing 115 different breeds. Of 201 Vizsla submissions, 91 (45.2%) were PMTs. Affected Vizslas were middle-aged with no sex predisposition. Tumors were categorized by anatomic location into conjunctival, eyelid margin, and cutaneous and divided into benign (melanocytomas) or malignant (melanomas). A total of 139 tumors in the 91 submissions were identified, with 53.8% classified as multicentric where dogs presented with more than one PMT (2-7 tumors). Recurrence of excised tumors was rare and dogs with multicentric neoplasms most commonly presented *de novo* masses. There were 5 conjunctival, 54 eyelid margin, and 80 cutaneous PMTs. Melanocytomas composed 80% of tumors while 20% were melanomas. Relative risk calculation revealed Vizslas from our population have 20.3 times higher risk (95% CI [17.3-23.9], $p<0.0001$) of developing PMTs than other dogs in our database. **Conclusions.** PMTs are significantly more prevalent in Vizslas than other breeds within COPLOW's database, supporting our empirical hypothesis. These results justify further research to identify cause(s)/pathogenesis of the high prevalence and multicentric nature of PMTs in Vizslas. **None.**

A RETROSPECTIVE REVIEW OF CANINE CONJUNCTIVAL MELANOCYTIC NEOPLASMS
(AB Sommerkamp, 1 EN Katz, 1 MD Armour, 1 GC Shaw, 2 and LBC Teixeira 2) Armour Veterinary Ophthalmology;1 Comparative Ocular Pathology Laboratory of Wisconsin, University of Wisconsin-Madison.2

Purpose. To describe the clinical and histopathologic features and postoperative care of dogs diagnosed with conjunctival melanocytic neoplasia. **Methods.** Records of 251 cases with conjunctival melanocytic neoplasms from the COPLOW database were reviewed. A survey was distributed to clinicians regarding postoperative care. Demographic information, location, surgical margins, mitotic figure count, recurrence, staging, metastasis, and melanoma vaccine use was collected. **Results.** The mean age of dogs was 11 years. Of 215 dogs, there were 116 males and 99 females. Breeds with highest incidence included labrador retriever (21.8%), golden retriever (10.9%), and mixed breed dog (9.54%). Of 216 dogs 214 were unilateral (102 OS, 112 OD) and 2 were bilateral. The most affected anatomic location was the 3rd eyelid (128/225). Neoplastic cells infiltrated the epithelium in 200/249 cases. Clean surgical margins were achieved in 89/231 cases. Based on mitotic figure count (4 or more mitotic figures/10 HPFs) 182/251 cases were diagnosed as malignant melanomas and 59/251 as melanocytomas. Of the 55 survey responses, 12 reported recurrence at the same site (6/12), new lesion development (4/12) or both (2/12). Staging was reported in 9/55 dogs with 5/9 showing evidence of metastasis. 6/51 reported to have received the melanoma vaccine.**Conclusions.** Canine conjunctival melanocytic neoplasia most commonly affects the 3rd eyelid. The majority of dogs were diagnosed as malignant melanomas with 80% of cases presenting epithelial involvement. Although limited, follow-up data revealed evidence of metastasis in 55.5% of dogs. Clinicians should be aware of the biological behavior of conjunctival melanocytic tumors in dogs. **None.**

CHRONIC UVEITIS ASSOCIATED WITH TRYPANOSOMA EVANSI INFECTION FOUND IN CEREBROSPINAL FLUID, POSTMORTEM IN A 6 YR OLD CAT (KC Bhadsavle, A Deb, PS Kelkar) The Eye Vet Clinic, Mumbai, India; Wildvets Veterinary Clinic, Mumbai India.

CASE DESCRIPTION. A 3yr old strictly indoor female spayed cat was presented for chronic uveitis and blindness in the right eye in 2018. This patient was blind in the right eye since it was rescued as a 1-month-old stray kitten. The patient also had a history of recurrent episodes of mild fever, inappetence, diarrhoea and overgrooming. Various tests for infectious diseases were negative. **CLINICAL FINDINGS AND TREATMENT.** Over the next two years, the patient continued to develop further ocular pathologies like severe corneal oedema (treated with Gunderson's flap), secondary cataract in the right eye, whereas chorioretinitis developed in the left eye. The right eye was enucleated in August 2020 due to lens induced uveitis. The patient developed severe neurological signs, non-responsive to medical management two weeks after enucleation of the right eye. Patient was euthanized in October 2020. **OUTCOME.** On autopsy, numerous Trypanosoma evansi organisms were found in the CSF. **CLINICAL RELEVANCE.** Trypanosoma is known to cause chronic infections in extravascular spaces especially in CSF but clinical symptoms in this case were mainly slowly progressing uveitis without any neurological symptoms for almost 6 years. In the author's opinion, in cats, Trypanosoma should be considered as one of the differentials with chronic uveitis and corneal oedema. Extravascular fluid analysis should be suggested in case all the other tests have not yielded any success. Additionally, if Trypanosoma evansi has been detected in blood smear, it should be confirmed that the organism has not migrated to extravascular spaces.

OCULAR AND PERIOCULAR COMPLICATIONS OF BITE INJURIES IN DOGS (VL Holly, 1 ME Lassaline, 1 E Holt, 1 R Vogel, 1 and A Castejon-Gonzalez 1) Department of Clinical Sciences & Advanced Medicine, University of Pennsylvania School of Veterinary Medicine, Philadelphia, Pennsylvania; 1

Purpose. To determine the incidence and types of ocular and periocular complications of bite injuries in dogs. **Methods.** Medical records from April 2019 to March 2021 were reviewed to identify dogs who were presented with dog bite wounds to the University of Pennsylvania Ryan Veterinary Teaching Hospital. Signalment, body weight, type and location of injuries were recorded for each patient. Cases were subcategorized into dogs with ocular or periocular injuries, small dogs (≤10kg) and pediatric dogs (≤ 6 months old) for further analysis. **Results.** A total of 331 dogs were presented with bite wounds, with 36% (117/327) being small dogs and 10% (34/331) being pediatric dogs. Ocular or periocular injuries were present in 23% (75/331) of dogs with bite wounds, 34% (40/117) of small dogs and 56% (19/34) of pediatric dogs. Unilateral blindness occurred in 5% (17/331) of dogs, most commonly a result of proptosis (13/17 eyes). Blinding injuries were more common in small (13%; 15/117) but not pediatric (3%; 1/34) dogs. Orbital fractures were confirmed in 2% (8/331) of dogs. The most common ocular or periocular complications were skin wounds near the eye (36%; 27/75) without damage to the globe. **Conclusions.** Blinding injuries and orbital fractures are rare complications of bite trauma in dogs. Ocular or periocular injuries and orbital fractures are more common in pediatric and small dogs. The risk of a blinding injury is greater in small but not pediatric dogs. **None.**

LONG-TERM OUTCOME OF ENTROPION SURGERY IN JUVENILE DOGS COMPARED TO MATURE DOGS. (G Lavallée, EM Curto, AT Gratzek) Ophthalmology for Animals

Purpose. To compare long-term outcomes of entropion surgery performed in juvenile and mature dogs. **Methods.** Medical records of dogs younger than three years of age diagnosed with congenital entropion from January 2010 to December 2020 were reviewed. Dogs younger than one year old at the time of entropion surgery were classified has juvenile. A minimum of six months' follow-up was required for inclusion. Recurrence of entropion was defined as the presence of clinical signs of entropion or when the patient required additional surgery during the follow-up period Recurrence rates were compared between groups using the Fisher exact test. **Results.** Eighty-five dogs were included in the study. The most common breed was the Labrador Retriever (n=19; 22.4%), followed by the English Bulldog (n=17; 20%), and the Shar Pei (n=9; 10.6%). Forty dogs (70 eyes) had entropion surgery at maturity (at least one year old) and 45 dogs (76 eyes) were juvenile. The mean age of the juvenile group was 5.4 months (range = 3-10 months), and the mean age of the mature group was 16.2 months (range = 12-34 months). There was no statistically significant difference in the recurrence rates of entropion between mature (6/70, [8.6%]) and juvenile dogs (8/76, [10.5%], P = .5675). The most common breed requiring an additional surgery was the English Bulldog. **Conclusion.** Corrective entropion surgery in juvenile dogs is not associated with a higher risk of recurrence. These results support performing surgery in dogs with congenital entropion before one year of age. **None**.

CHRONIC DYSFUNCTION, CALCIFICATION, AND OSSEOUS METAPLASIA OF THE MEIBOMIAN GLANDS OF A HORSE (KE Gunsalus, 1 NC La Croix, 1 R Taylor 2) Department of Ophthalmology, The Veterinary Medical Center of Long Island;1 Comparative Ocular Pathology Laboratory of Wisconsin.2

Purpose. To describe the clinical history, surgical management, and histologic findings of meibomian gland calcification and osseous metaplasia in a horse. **Methods.** A 21-year-old Quarter Horse gelding presented for a 9-month history of eyelid swelling, blepharospasm, and epiphora affecting the right eye. Ophthalmic examination, hematology, serum biochemistry, a thyroid panel, and an analysis for pituitary pars intermedia dysfunction were performed. A secondary corneal ulcer was treated by burr keratectomy and an excisional biopsy of meibomian gland nodules were taken for histology. **Results.** Multiple firm concretions, palpable within the palpebral conjunctiva of all eyelids, were found. The largest nodule (5 x 4 x 10 mm) was found within the lower right eyelid. Meibomian adenitis with gland impaction and secondary calcification was suspected. Histology of the excised tissue revealed dilated meibomian ducts with mineralized inspissated secretions and surrounding areas of fibrosis and osseous metaplasia. Following excision of the nodules and treatment of the corneal ulcer, the ulcer resolved and no signs of blepharospasm or epiphora returned. **Conclusions.** Calcification and osseous metaplasia of the meibomian glands and a secondary corneal ulcer were found in a horse. Although habronemiasis is a known cause of periocular dystrophic calcification, it is considered unlikely in this case due to the presence of osseous metaplasia and the lack of nematode larvae observed histologically. While the cause of the meibomian gland mineralization was not determined, it is suspected that inspissated meibomian secretions led to a local granulomatous reaction, with secondary dystrophic calcification and osseous metaplasia. **None.**

EVALUATION OF THE UPPER AND LOWER LACRIMAL CANALICULUS BY SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN NORMAL BEAGLE DOGS (J Shim, S Kang, E Lee, D Jeong, Y Jeong, S Lee, S Kim, J Ahn, S Kim, H Kim, J Park, K Seo) Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University

Purpose. To confirm the feasibility of visualizing the upper and lower lacrimal canaliculi (LC) using spectral domain optical coherence tomography (SD-OCT). **Methods.** Eight eyes of 4 normal beagle dogs were used. To obtain the upper LC image, the head was turned toward the opposite eye to be imaged and the nasal part of the upper eyelid was everted to expose the LC. To obtain the lower LC image, the head was manipulated to face the front and slightly tilted downwards. The lower eyelid was then everted just below the punctum. Using 'angle mode', the scan line was placed on the long axis of the LC. The widest diameter of the LC (LCW) was measured before and after instillation of artificial tears (AT). **Results.** Before AT instillation, there was a significant difference between the mean upper and lower LCW, which were 86.1 ± 11.4 μm and 108.9 ± 8.5 μm, respectively. After AT instillation, the mean upper and lower LCW was 252.1 ± 27.5 μm and 238.0 ± 30.5 μm, respectively. Significant differences in LCW between pre- and post- instillation of AT in both the upper and lower LCWs were observed. However, no significant difference was shown between the upper and lower LCW after instillation of AT. **Conclusions.** SD-OCT was an effective and objective method to provide high resolution images of the upper and lower LC. In addition, it would be available to investigate changes in the LC after instillation of eyedrops in veterinary clinical practice. **None.**

CONGENITAL OCULAR ABNORMALITIES IN A COW-CALF HERD FED A NUTRIENT DEPLETE RATION (S Osinchuk, D Vogt, B Grahn, J Campbell; Western College of Veterinary Medicine, University of Saskatchewan)

Purpose. To describe a disease investigation of a cow-calf herd where calves were born unable to follow their dams, circling, stargazing, and having dull mentation. **Methods.** Affected calves and their dams were examined in clinic, on farm, or post-mortem. Herd breeding, nutritional, vaccination status and toxicity histories were collected. Blood and liver samples were analyzed for vitamin A, vitamin E, and trace minerals. Nutritional and ergot analysis of feed was completed. **Results.** Ophthalmic examination findings in 18 eyes of nine calves included retinal detachment or non-attachment (n=14 eyes), microphakia (n=7), lens subluxation (n=4), mature cataract (n=1), persistent remnant of the hyaloid artery or tunica vasculosis lentis (n=5), and superficial corneal ulcers (n=3). Five globes examined with light microscopy revealed marked retinal dysplasia (n=5), retinal detachment/non-attachment (n=4), cataract (n=2), and fibrous plaque on the posterior lens capsule (n=2). The overall prevalence of abnormal calves was 13% (24/184). The gestational ration was deplete in multiple nutrients. Trace mineral salt blocks were provided, vitamin supplement was not. Vitamin A, E, B, and selenium injections were provided at birth to some calves. Fresh liver vitamin A levels were deficient in a nonviable calf that did not receive vitamin treatment at birth. In four calves that did receive vitamin A supplementation one had marginal levels and three were within normal limits. Other deficiencies detected in blood samples included manganese, iron, copper, and cobalt. **Conclusions.** Multiple anomalies are reported in a cow-calf herd fed a nutrient deplete ration without vitamin supplementation. **None**.

RETROSPECTIVE STUDY OF CLINICAL OCULAR DISEASE IN FREE-LIVING RAPTORS OF NORTH CENTRAL FLORIDA (C King, 1 CK Boss, 1 AB Alexander, 2 JFX Wellehan, 2 D Heard, 2 CL Coalter, 2 CE Plummer 1,3) Department of Small Animal Clinical Sciences; 1 Department of Comparative Diagnostic, and Population Medicine; 2 Department of Large Animal Clinical Sciences; 3 University of Florida College of Veterinary Medicine

Purpose. To analyze presentations of free-living raptors with ocular abnormalities and evaluate differences between diurnal predators, nocturnal predators, and carrion eaters. **Methods.** Medical records from all wild raptors admitted to the University of Florida Veterinary Hospital between 2013 and 2018 were reviewed. Descriptive and inferential statistical analysis was used to evaluate species-specific incidence of disease, statistical difference among species, and dependence between variables. **Results.** Free-living raptors (n=155) with ocular signs were included. Incidence of ocular disease was significantly higher in nocturnal predators than diurnal predators and carrion eaters (38.4% vs 18.2% vs 8.2%). Trauma was the most common etiology (72.9%) for all species. More patients were affected bilaterally (52.3%) than unilaterally. Severity of ocular injuries influenced case outcomes in 45.1% patients. The most common case outcome was humane euthanasia (49.0%). **Conclusions.** Incidence of ocular disease differs among raptor species and may be influenced by anatomical differences and ecology. In North Central Florida, high prevalence of traumatic injuries to raptors may be related to the continuous growth of human population in the region. Clinical significance of ocular disease may vary among species, and overall prognosis is affected by lesion location and severity. Case outcomes indicate that most raptors with ocular disease are euthanized upon admission, however a high proportion of birds survived after multiple days of veterinary care. Complete ophthalmic examination is recommended for all raptors that present to rehabilitators and veterinary hospitals. Supported by the Florida Veterinary Scholars Program. **None.**

PREVALENCE OF OCULAR LESIONS IN A GROUP OF DRYLAND MUSHING DOGS. PRELIMINARY DATA (M Martínez-Gassent[1], EM Abarca[1], M Benito[2]) [1]Ophthalmology Department, AniCuraArsVeterinaria Veterinary Hospital Barcelona, Spain; [2]Department of Animal Medicine and Surgery, Canine Sports Medicine Service, Veterinary School, Universidad Cardenal Herrera-CEU, Valencia, Spain.

Purpose. To describe the prevalence of ocular lesions (OL) in a group of dryland mushing dogs (DMDs) and determine whether the type and degree of exercise are correlated with the presence of OL. **Methods.** Sixty-four eyes from 32 DMDs, 20 males, and 12 females of different breeds,aged 49.2±25.7 months underwent a complete physical and ophthalmologic examination. For each dog, activity type (sledding, canicross, bikejöring, and scooter), position, and years of training were obtained. Ocular examination using slit-lamp biomicroscopy, tonometry, funduscopy, and retinal photographs (OptibrandClearView®) were performed. **Results.** Ocular lesions were noted in 23 dogs (72%) in the following locations: eyelids (11%), cornea (5%), iris (39%), lens (31%), vitreous (23%), and retina (11%); 87% were bilateral and involved the anterior segment. Fundic lesions (intraretinal hemorrhages and areas of tapetal hyperreflectivity with central pigmentation) were found in five dogs (16%). According to activity, 59% were sled dogs, which encompassed 67% of OL, followed by bikejöring (22%; OL: 25%), canicross (12%; OL: 5%), and scooter (6%; OL: 3%). No OL was correlated with the breed, activity type, or position ($P > .05$). However, there was a significant positive correlation between age and the presence of OL (r= .750, $P < .001$).**Conclusions.** This study describes preliminary data of OL in DMDs. Fundic lesions similar to Working Dog Retinopathy were not related to a specific mushing activity. Further research is warranted to evaluate the progression of OL during the training season. **None.**

MEASUREMENTS OF TEAR GLUCOSE LEVELS IN DOGS AND COMPARISON TO BLOOD GLUCOSE LEVEL (E Lee, S Kang, J Shim, D Jeong, Y Jeong, S Lee, S Kim, J Ahn, S Kim, H Kim, J Park, K Seo) Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University.

Purpose. To compare quantitatively measured tear glucose (TG) levels to blood glucose (BG) levels in normal dogs. **Methods.** The study included 4 normal dogs which underwent five repeated experiments on alternating eyes. The glucose solution (1g/kg) was administered intravenously at 30-minute intervals for 2.5 hours. Tears and blood were collected at 30-minute intervals for 5 hours. Tear samples were collected via microcapillary tube. Collected tear and blood samples were analyzed for glucose concentration using a colorimetric assay and commercially available glucometer, respectively. **Results.** On basal condition, the average glucose concentrations in blood and tears were 4.84±0.53 and 0.38±0.05 mmol/L, respectively. In all experimental courses, the TG levels were measured 13.2 times lower on average than the BG values (average: 8.84% of the BG, range: 2.36-20.81%). The TG levels tended to follow the fluctuating changes in BG levels with a lag time. There was a moderate correlation between BG and TG level (rho=0.655, $p<0.001$). In the hyperglycemic stage above the renal threshold of 11.1 mmol/L, the TG level was significantly higher than that in the normoglycemic stage (4.44–6.66 mmol/L) ($p<0.001$). **Conclusions.** TG concentration measured quantitatively showed a moderate correlation with BG concentration. In addition, the significant difference in TG concentration between hyperglycemic and normoglycemic stages suggests the availability of tear as an early diagnostic factor of diabetes mellitus and an alternative to the invasive blood collection. Supported by UriVet Korea. **P.**

VETERINARY OPHTHALMOLOGY CURRICULUM: SURVEY OF CONTACT HOURS

(CL Pinard[1], M Dempster[1], J Reniers[2]) Department of Clinical Studies, University of Guelph, Canada[1]; Office of Teaching and Learning, University of Guelph, Canada[2])

Purpose. To investigate the student contact hours teaching ophthalmology in the curriculum at English-speaking veterinary schools worldwide. **Methods.** An online survey was distributed to 51 veterinary colleges in North America, the United Kingdom, Australia, New Zealand, and the Caribbean. The questions included contact hours dedicated to didactic and laboratory-based instruction, species used, final year rotations, and in-person compared to online instruction. Three open-ended questions asked to identify effective and less effective aspects of teaching ophthalmology. Descriptive statistics on the quantitative survey responses, and a thematic analysis on the open-ended responses were conducted, respectively. **Results.** A 71% response rate was recorded. The respondents were mainly faculty members (81%). The average number of ACVO or ECVO instructors per school was 2.33. Total didactic contact hours varied from 6 to 63 hours (*Mean* = 28.06, *SD* = 14.73) and total laboratory contact hours varied from 0 to 153 hours (*Mean* = 25.47, *SD* = 38.17), mainly occurring in third and fourth year, respectively. Dogs were the most commonly used species in surgical exercises. Final year rotations occurred in 88% of schools. Before the pandemic, 88% of instruction was conducted in-person across all schools. Case-based learning (72%) and hands-on practice with live animals (31%) were highlighted as effective didactic and laboratory teaching methods, respectively. Didactic “chalk and talk” (28%) was noted as the least effective teaching technique. **Conclusions.** This is the first report of veterinary ophthalmology contact hours across several schools. This report can serve as a reference guide for curricular delivery. **None.**

VISION OUTCOME AFTER LENS EXTRACTION VERSUS NONSURGICAL MANAGEMENT OF PRIMARY LENS INSTABILITY IN DOGS (NP Violette,1 AJ Gemensky-Metzler,1 G Newbold,1 and EJ Miller,1) College of Veterinary Medicine, The Ohio State University.1

Purpose. To evaluate outcome of lens extraction versus nonsurgical management of primary lens instability (LI) in dogs. **Methods.** Medical records of dogs diagnosed with LI between 2005 and 2018 were analyzed. Eyes were included if vision was present at presentation or regained, at least 14 days of follow-up was recorded, and topical latanoprost was used for eyes managed without lens extraction. **Results.** Eighty-four eyes (55 dogs) presented with posterior lens luxation in 19/84 (23%), anterior lens luxation in 18/84 (21%), lens subluxation in 42/84 (50%), signs of lens instability without lens dislocation in 3/84 (4%) and initially no signs of lens instability in 2/84 (2%) of eyes. Of the 17 eyes that had lens extraction surgery, 13 underwent endocapsular phacoemulsification and four underwent intracapsular lens extraction. Trans-corneal reduction of anterior lens luxation was performed in 12 of the 67 medically managed eyes. Median time of vision retention in eyes that had lens extraction surgery (2,216 days) was significantly (P = 0.04) longer than eyes managed without lens extraction (1,281 days). Vision loss, reported in 30/84 eyes (36%), was caused by glaucoma (26/84 eyes, 31%; 5/17, 29% of surgical and 21/67, 31% of nonsurgical eyes), retinal detachment (2/84, both nonsurgical eyes, 2%) and cataract formation (2/84 eyes, 2%). **Conclusions.** Despite a similar incidence of vision loss due to glaucoma in dogs with LI, lens extraction carries a more favorable prognosis for time of vision retention compared to LI managed without lens extraction. **None.**

SUDDEN ACQUIRED RETINAL DEGENERATION SYNDROME MANIFESTED INITIALLY AS UNILATERAL BLINDNESS IN SIX DOGS (L Susanti, 1 D Kwon, 2 J Ahn, 3 K Seo, 1 S Kang, 1) Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University;1 Ilsan Animal Medical Center;2 Nun Chorong Animal Hospital.3

Purpose. To describe sudden acquired retinal degeneration syndrome (SARDS) presented initially as unilateral blindness. **Methods.** One American Cocker Spaniel and five Maltese dogs were presented with unilateral blindness (3 OD and 3 OS) of which the results of general ophthalmic examinations were insufficient to explain the blindness. All dogs were spayed females. **Results.** Intraocular pressures were normal and optical media of the eyes were clear. Fundus appearances were normal in 5 dogs with slightly attenuated retinal blood vessels compared with the contralateral eye. One dog had tapetal hyperreflectivity and blood vessel attenuation which was slightly worse than the contralateral eye that retained vision. ERG amplitudes of the affected eyes were flat and were reduced on the contralateral sighted eyes. Two dogs that had long-term follow-up (465 and 525 days, respectively) experienced progressive bilateral blindness. One dog retained vision in the contralateral eye until the last follow-up (94 days). Two dogs were lost to follow-up after the first presentation. One dog received systemic cyclosporine and steroid medications and maintained vision in the contralateral eye but regular ERG recheck showed a trend of constant declining amplitude (last follow-up: 448 days). In this dog, retinal thickness by optical coherence tomography scan was thinner than the contralateral eye on initial presentation. **Conclusions.** Despite decreased ERG amplitudes in both eyes, SARDS presented initially as unilateral blindness in eyes with flat ERG. The contralateral eyes with vision might maintain sight or may develop progressive blindness after a substantial amount of time. **None.**

AUTOLOGOUS LAMELLAR KERATOPLASTY FOR THE TREATMENT OF CANINE CORNEAL DEFECTS. A MULTICENTRIC RETROSPECTIVE STUDY OF 114 DOGS (2017-2020) (J Michel, 1 J Anne, 2 A Cathelin, 2 T Boillot, 3 AS Augsburger, 2) 1 Clinique vétérinaire VPLUS, Saint-Germain-en-Laye, France; 2 Cabinet vétérinaire VETOOPHTALMO, Bois-Guillaume, France; 3 Clinique vétérinaire VETEA, Saintes, France

Objective. Evaluation of the results obtained using autologous lamellar keratoplasty (ALK) for the treatment of canine corneal defects. **Procedure.** The medical records of dogs that had undergone ALK between 2017 and 2020 were reviewed. Only dogs with preoperative positive consensual pupillary light and dazzle reflexes were included. **Results.** A total of 114 dogs (116 eyes) were included. The mean follow-up time was 227.4 days. French bulldog and Shih tzu were the most common breeds (26.3% and 24.5%, respectively). Concomitant eyelid and/or cilia abnormalities and keratoconjunctivitis sicca were the most common concurrent ocular diseases (53.4% and 19.8%, respectively). The defects were unilateral in 112 dogs and bilateral in two dogs, with 3 stromal foreign bodies (2.6%), 12 stromal abscesses (10.3%), 12 melting ulcers (10.3%), 27 deep stromal ulcers (23.3%), 26 descemetoceles (22.4%) and 37 perforations (31.9%). The mean graft size was 5.1 mm. Most cases occurred in the central cornea (87.8%) and the graft was most frequently harvested from the infero-nasal cornea (55.1%). Major complications consisting of the dehiscence of the graft occurred in two eyes (1.7%), but they were managed by a biomaterial grafting and recovered well. Vision was preserved in 95.7% of the eyes, with 74.5% showing transparency or faint to mild opacification. **Conclusions.** ALK is an effective surgical treatment for corneal defects in dogs. This procedure is not technically difficult or expensive, and storing the graft is not difficult. ALK provides a good tectonic support to the affected corneas and results in good visual and cosmetic outcomes. **None.**

GENERAL SCIENTIFIC SESSION SATURDAY

DEVELOPMENT OF CRYSTALLINE CORNEAL OPACITIES (STEROID KERATOPATHY) IN DOGS FOLLOWING TREATMENT WITH OPHTHALMIC CORTICOSTEROIDS (KR Quantz,1 KK Jongnarangsin,1 CD Harman,1 AL Anderson, KL Koehl,1 CG Pirie,1 AM Komáromy1) Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University.1

Purpose. To investigate and describe the relationship between use of topical corticosteroids and the development of crystalline corneal opacities (steroid keratopathy) in dogs. **Methods.** Medical records of 73 purpose-bred Beagle dogs were reviewed from June 2012 – May 2021. All dogs were treated with topical ophthalmic corticosteroids for at least 21 days. In addition to regular ophthalmic examinations some dogs also had digital color photography (n=8), anterior segment spectral-domain optical coherence tomography (SD-OCT) (n=13), and a systemic lipid profile (n=8) performed to further work up and characterize the corneal changes. **Results.** Axial stromal crystalline corneal opacities were documented in 33 eyes of 18 dogs following a median of 141 days after initiating treatment (35-395 days). Multiple corticosteroids were utilized including dexamethasone 0.1% ophthalmic suspension, neomycin-polymyxin b-dexamethasone 0.1% ophthalmic ointment, prednisolone acetate 1% ophthalmic suspension, and difluprednate 0.05% ophthalmic emulsion (Durezol ®). Resolution of corneal opacity was documented in 9/18 eyes when ophthalmic corticosteroids were discontinued after a median of 366 days (234-417 days). Treatment with dorzolamide 2%/timolol 0.5% ophthalmic solution in combination with topical corticosteroids resulted in resolution of corneal opacities in 3 eyes following a median of 34 days of treatment; however, this was not reproducible in other dogs. **Conclusion.** This case series documents the onset of steroid keratopathy in Beagles following treatment with ophthalmic corticosteroids. The use of ophthalmic corticosteroids may exacerbate the development of lesions similar to oval corneal dystrophy previously described in Beagles. Clinical resolution of steroid keratopathy lesions may be possible following discontinuation of ophthalmic corticosteroids. Supported by NIH grant R01-EY025752.
None.

Saturday Presenting 8:00am

IMPACT OF MULTI-DRUG RESISTANCE ON CLINICAL OUTCOMES OF DOGS WITH CORNEAL ULCERS INFECTED WITH STAPHYLOCOCCUS PSEUDINTERMEDIUS (AN Mauer, 1 RA Allbaugh, 1 AJ Kreuder, 1 L Sebbag 1,2) Iowa State University College of Veterinary Medicine 1; Koret School of Veterinary Medicine, The Hebrew University of Jerusalem 2

Purpose. Identify risk factors and compare clinical outcomes of canine eyes infected with Staphylococcus pseudintermedius considered multidrug-resistant (MDR) or not. **Methods.** Isolates of Staphylococcus pseudintermedius (collected from the corneas of canine patients with bacterial keratitis) were considered MDR if resistant to ≥3 classes of antibiotics. Medical records were reviewed for history, patients' characteristics, clinical appearance, therapeutic interventions, and clinical outcomes. Continuous data was analyzed with Mann-Whitney tests while categorical data was analyzed with Fisher's exact tests. Results are presented as median (range). **Results.** Recent anesthesia (≤4 weeks) was significantly more common in MDR vs. non-MDR patients (12/26 vs. 1/30, P<0.001). Further, MDR eyes received significantly more topical medications [3(0-6) vs. 1(0-10), P<0.001] and drops/day [10(0-16) vs. 2(0-53), P<0.001] prior to referral; no other risk factors were identified. Clinical appearance (ulcer size/depth, anterior chamber reaction, etc.) did not differ significantly (P≥0.055) between the groups. Time to re-epithelialization was significantly longer in MDR vs. non-MDR patients [26(7-58) days vs. 12(4-42) days, P=0.013]. However, no significant differences were noted between MDR and non-MDR eyes in regard to time for ulcer stabilization [4(1-17) days vs. 4(1-12), P=0.654], number of eyes requiring surgical stabilization (5/25 vs. 11/30, P=0.237) or enucleation (2/26 vs. 2/30, P=1.000), success in maintaining globe (23/26 vs. 27/30, P=1.000) or success in maintaining vision (18/26 vs. 19/28, P=1.000). **Conclusions.** MDR infections prolonged healing time but did not appear to affect overall clinical outcomes in dogs with bacterial keratitis. Further research is warranted in a larger canine population and other bacterial species. **None.**

Saturday Presenting 8:15am

TOPICAL RIPASUDIL FOR THE TREATMENT OF CANINE CORNEAL ENDOTHELIAL DYSTROPHY
(SR Michalak[1], S Park[1], S Kim[1], MI Casanova[1], MAW Bowman[1], M Ferneding[1], SM Thomasy[1,2]). [1]Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis; [2]Department of Ophthalmology & Vision Science, School of Medicine, University of California, Davis.

Purpose. To evaluate the efficacy and tolerability of topical rho-kinase inhibitor, ripasudil, in the treatment of canine corneal endothelial dystrophy (CED). **Methods.** Twenty-one eyes of 12 client-owned, CED-affected dogs received topical ripasudil (Natural Pharmacy**,** Osaka, Japan) four times daily. Ophthalmic examination, ultrasonic pachymetry (USP)*,* Fourier-domain optical coherence tomography (FD-OCT), and *in-vivo* confocal microscopy were performed at baseline and at 3, 6, and 12 months. The effect of treatment on corneal thickness, corneal edema extent, and endothelial cell density in each eye was evaluated by repeated-measures ANOVA or Friedman test. Due to variability in disease severity and response to therapy, individual eyes were also classified as improved, progressed, or stable at 12 months using defined clinical response criteria. **Results.** Central corneal thickness (by USP) progressed from median 719.5µm (interquartile range 640–960.25µm) at baseline to 878.5µm (interquartile range 725.5–1069µm) at 12 months ($P<0.05$). Corneal thickness (by FD-OCT), endothelial cell density, and edema extent did not differ significantly over time. During the treatment period, 5 eyes improved, 8 remained stable, and 8 progressed. Four dogs demonstrated similar responses bilaterally, while 5 had disparate responses between eyes. Twelve dogs developed conjunctival hyperemia, 4 demonstrated reticulated intraepithelial bullae, and 2 developed corneal stromal hemorrhage. No adverse event necessitated permanent cessation of ripasudil. **Conclusions.** Ripasudil was well-tolerated in CED-affected dogs. Response to therapy was variable and not consistently bilateral. While some eyes stabilized or improved, others progressed during treatment. Further investigation is needed to determine factors influencing the response to ripasudil in CED-affected dogs. Supported by UC Davis Center for Companion Animal Health, Jane Lin Fong Ophthalmic Clinical Trial Support Fund, and NIH R01EY016134 and P30EY12576. **None.**

Saturday Presenting 8:30am

PRO-INFLAMMATORY CYTOKINES IN AQUEOUS HUMOR FROM DOGS WITH ANTERIOR UVEITIS AND POST-OPERATIVE OCULAR HYPERTENSION FOLLOWING PHACOEMULSIFICATION (HM Terhaar,1 MdL Henriksen,1 LK Uhl,2 C Boeckling,3 C Mehaffy,3,4 A Hess,5 MR Lappin1) Department of Clinical Sciences, College of Veterinary Medicine, Colorado State University;1 Department of Veterinary Pathology, College of Veterinary Medicine, Iowa State University;2 Bioanalysis and Omics (ARC-BIO), Colorado State University;3 Department of Microbiology, Immunology and Pathology, College of Veterinary Medicine, Colorado State University;4 Department of Statistics, Colorado State University.5

Purpose. To detect pro-inflammatory cytokines in aqueous humor (AH) of dogs with anterior uveitis and post-operative ocular hypertension (POH) following phacoemulsification, primary glaucoma, and no ophthalmic disease. **Methods.** This is a cohort, retrospective, and descriptive study. Twenty-one samples of AH were collected from 15 dogs (21 eyes); post-phacoemulsification with anterior uveitis and POH (phaco-group, n=10), primary glaucoma (glaucoma-group, n=6), and no ophthalmic disease (normal-group, n=5). Target mass spectrometry (UPLC-Target MS/MS) and multiple reaction monitoring (MRM) with the Canine Cytokine SpikeMix™ as internal standard was used to measure cytokine concentrations. **Results.** The MRM method measured 15 pro-inflammatory cytokines. Tumor-necrosis-factor-alpha (TNFα) and Interleukin-18 (IL-18) levels in AH were different between all three groups (glaucoma> phaco> normal) (P=0.003 and P=0.001, respectively). Interferon-gamma (IFNγ) and IL-8 levels showed a similar trend between the groups (P=0.04 and P=0.04, respectively). Additionally, IL-6 and IL-4 levels were higher in phaco compared to glaucoma (P=0.04) and normal eyes (P=0.04), respectively. Intraocular pressure (IOP) was positively associated with increased AH levels of IL-18 (Spearman correlation=0.636, P=0.002). **Conclusions.** UPLC-Target MS/MS using the Canine Cytokine SpikeMix™ as the internal standard was established as a method of pro-inflammatory cytokine detection in canine AH. The study demonstrated that IL-4, IL-6, IL-8, IL-18, IFNγ, and TNFα could be important therapeutic targets for dogs with anterior uveitis following phacoemulsification. Glaucomatous eyes had the highest levels of IL-8, IL-18, IFNγ, and TNFα which may indicate that inflammation plays a role in the pathogenesis of primary glaucoma. **None.**

Saturday Presenting 8:45am

INCIDENCE OF POSTOPERATIVE FIBRIN WEB FORMATION IN DOGS UNDERGOING PHACOEMULSIFICATION (P Soukup,1 S Lettmann,1 M Erhard,1 I Allgoewer,1) Animal Eye Practice, Berlin, Germany.1

Purpose. To evaluate the incidence of fibrin web (FW) formation and possible associated factors in the early postoperative period of canine phacoemulsification surgery. **Methods.** Retrospective evaluation of medical records of dogs undergoing phacoemulsification surgery (2014-2020) with focus on FW formation, intraocular lens (IOL) and capsular tension ring (CTR) implantation, signalment, diabetes status and postoperative intraocular complications (severe uveitis, vitritis, glaucoma, retinal detachment) in an 8-week follow-up. Exclusion criteria were traumatic cataract, conversion to intracapsular extraction and no follow-up. FW was graded mild, moderate and severe (severe requiring intracameral tissue plasminogen activator, TPA). **Results.** Records of 429 operated eyes of 292 dogs were included. FW was noted in 40 eyes of 35 dogs (9.32%), 16 after unilateral, 19 after bilateral surgery. FW occurred in 9.36% (35/339) IOL implanted (p=0.949) and 8.61% (31/329) CTR implanted aphakic eyes (p=0.246). FW developed in 12.37% (12/85) diabetic eyes (p=0.240). Complications occurred in 11.66% of all cases (50/429) and in 15% of the FW cases (6/40, p=0.489). Average age of FW dogs was 8.1±3.88 years and of dogs without FW 6.9±3.90 years (p=0.083). Six types of foldable acrylic lenses were implanted with no type overrepresented in FW eyes. 60% (24/40) of the FW eyes were graded mild, 33% (13/40) moderate and 3/40 severe. **Conclusions.** Only 3/429 eyes (0.70%) showed severe FW formation postoperative requiring TPA. Implantation and type of IOL, CTR and diabetes status were not significant for FW formation. Dogs with FW were slightly older. Postoperative FW formation did not predispose to intraocular complications. **None.**

Saturday Presenting 9:00am

COMMERCIALLY AVAILABLE INTRAOCULAR LENSES COMMONLY USED IN CANINE CATARACT SURGERY: A MICROBIOTA INVESTIGATION (KK Dowler1, A Vientós-Plotts1, ZL McAdams1, EA Giuliano1, CR Reinero1, AC Ericsson1) College of Veterinary Medicine, University of Missouri, Columbia, Missouri 1

Purpose. To survey commercially available, sterile foldable intraocular lenses (IOLs) used during routine canine cataract surgery, and their packaging fluid for the presence of bacterial DNA and/or viable (cultivable) bacteria. **Methods**. Swabs from IOLs and packaging fluid from three different veterinary manufacturers and three different production lots/manufacturer were collected for 16S ribosomal ribonucleic acid (rRNA) sequencing. Packaging fluid samples were collected for aerobic/anaerobic bacterial culture. Deoxyribonucleic acid (DNA) extraction, 16S rRNA library preparation, and sequencing were performed followed by assembly and sequence annotation. Statistical analyses were performed using Sigma Plot 14.0, MetaboAnalyst, and PAST software. Differences ($p \leq 0.05$) between manufacturer and collection sites in microbial richness and composition were determined, alongside appropriate reagent controls. **Results**. Culture yielded one isolate, identified as *Staphylococcus epidermidis*. 16S rRNA sequencing revealed distinct brand-specific bacterial DNA profiles, conserved between IOL and packaging fluid of all production lots within each manufacturer. The dominant taxonomy differentiating each manufacturer was annotated as *Staphylococcus* sp., and was a 100% match to *S. epidermidis*. **Conclusions**. Distinct mixtures of bacterial DNA are present and consistent in IOLs and packaging fluid depending on the manufacturer, and *Staphylococcus* is the dominant contributor to the bacterial DNA detected. Supported by ACVO Vision for Animals Foundation (VAF grant 2021-3) and the MU Phi Zeta chapter. **None.**

Saturday Presenting 9:15am

A COMPARISON OF INTRACAPSULAR LENS EXTRACTION AND TRANS-CORNEAL REDUCTION FOR ANTERIOR LENS LUXATION IN DOGS (AN Bowyer, ME Lassaline, E Holt) School of Veterinary Medicine, University of Pennsylvania.

Purpose. The objective of this study was to evaluate the success rate, complications, and long-term outcomes in dogs with anterior lens luxation (ALL) treated with intracapsular lens extraction (ICLE) or trans-corneal reduction (TR) at the University of Pennsylvania Veterinary Hospital from 2014 to 2021. **Methods.** Medical records of dogs with complete ALL that underwent ICLE or TR were reviewed. The presenting complaint, signalment, vision status, and ophthalmic abnormalities were recorded. Success rate, postprocedural complications, and long-term outcomes were assessed. **Results.** Fifty-one diagnoses of ALL were made in 46 eyes from 44 dogs, with 20/51 treated with ICLE and 31/51 treated with TR. Successful lens extraction was achieved in 95% (19/20) of ALLs treated with ICLE. Successful lens reduction was achieved in 90.3% (28/31) of ALLs treated with TR. ALL recurred following TR in 35.7% (10/28) of eyes treated with TR; in three of these, ALL recurred within 48 hours of TR and was treated with ICLE. Short-term complications included anterior uveitis (18/19 ICLE, 5/25 TR), glaucoma (0/19 ICLE, 4/25 TR), and corneal ulceration (1/19 ICLE, 7/25 TR). Median follow-up for eyes following ICLE and TR was 256 days and 48 days respectively. Of eyes that had vision at presentation, vision was retained at last follow-up in more eyes following ICLE (10/13, 78.5%) than following TR (4/11, 36.3%), $p<0.05$. Enucleation was recommended or performed in fewer eyes following ICLE (3/19, 15.7%) than following TR (7/25, 28%). **Conclusions.** Compared to TR, ICLE provides a better prognosis for long-term vision retention. **None.**

Saturday Presenting 9:30am

PHACOEMULSIFICATION IN THE BOSTON TERRIER BREED: SUCCESS RATES COMPARING INTENTIONAL APHAKIA TO PSEUDOPHAKIA. (ME Moriyon, 1 JS Sapienza, 1 and N DiGirolamo 2) Long Island Veterinary Specialists;1 Oklahoma State University.2

Purpose. To compare vision outcomes of Boston Terriers following phacoemulsification and intraocular lens placement over a 5-year period. **Methods.** Medical records of 25 Boston Terriers that underwent phacoemulsification with or without intentional intraocular lens placement between January 2013 and December 2018 were reviewed. All surgeries were performed by the same board-certified ophthalmologist. Information collected included signalment, surgical parameters, postoperative complications, concurrent use of an endolaser and/or anterior vitrectomy, and duration of follow-up. Minimum of 6 months of ophthalmic evaluation after surgery was required for inclusion. Multivariate Firth logistic models were used to determine association between predictor surgical variables and the primary outcome (visual/blind at last follow up). **Results.** Fourteen of 14 of aphakic Boston Terrier eyes were still visual while only 12/26 (42.3%) of the pseudophakic eyes remained visual. Average follow-up time was 20.2 months. Commonly reported post-operative complications in the pseudophakic eyes included fibrin accumulation 15/26 (58%), glaucoma 12/26 (46%), and retinal detachment 2/26 (7%). At final evaluation, 7/12 (58%) of the eyes in which endolaser cycloablation was used were blind versus 5/12 (42%) of the eyes in which laser was not performed. **Conclusions.** Intraocular lens placement in Boston Terriers undergoing phacoemulsification resulted in an approximately 40x increase in odds of blindness as an outcome even after control for vitrectomy and use of endolaser. The association with laser use and blindness did not persist when taken into account in the multivariate analysis, indicating that the use of the laser is unlikely to be the main reason for failure. **None.**

Saturday Presenting 9:45am

ASSOCIATIONS BETWEEN PRE-, INTRA-, AND POST-OPERATIVE FACTORS AND CORNEAL ADVERSE EFFECTS IN DOGS UNDERGOING CATARACT SURGERY (TM Chen, 1 JS Eaton, 1 SJ Hetzel 2) Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison;1 of Biostatistics and Medical Informatics, Institute for Clinical and Translational Research (ICTR), University of Wisconsin-Madison.2

Purpose. To determine incidence and identify risk factors for corneal ulceration and other postoperative corneal adverse effects following lensectomy in dogs. **Methods.** Medical records of dogs undergoing cataract surgery at UW Veterinary Care between 2010 and 2020 were reviewed. Pre-, intra-, and postoperative clinical, laboratory, and surgical parameters were tabulated and compared to postoperative incidence of corneal ulceration and other adverse corneal effects. Outcome statistics (odds ratios [95% CI]) were calculated using linear mixed effects ANOVA or generalized estimating equations with animal as random effect. **Results.** Three-hundred and four eyes from 152 dogs were included (n=72 non-diabetics; n=80 diabetics). Median age was 8 years (range: 0.6-18). Sixty-one breeds were represented and 67 females and 85 males were included. Twenty-three brachycephalic and 127 non-brachycephalic dogs were included (if breed specified). Non-diabetic and diabetic dogs were significantly different with respect to age (p<0.0001), cataract duration (p<0.0001) and diagnosis of lens-induced uveitis prior to surgery (p=0.0052). Odds ratio for development of post-operative corneal ulceration (within 24 hours postoperatively) was not significant with respect to diabetes status (OR=0.80 [0.35-1.85],p=0.607), diabetes duration (OR=0.87 [0.69-1.10],p=0.252), skull type (OR=2.57 [0.57-11.70],p=0.221), or level of surgeon experience (OR=0.68 [0.33-1.38],p=0.284), but was significant with respect to phacoemulsification power per eye (OR=1.06 [1.02-1.10],p=0.006). Postoperative development of corneal lipid infiltrate was not significantly associated with pre-operative serum cholesterol or triglyceride levels (p=0.541 and 0.264, respectively). **Conclusions**. Neither presence of diabetes nor brachycephalic skull conformation increase risk of corneal ulceration in the immediate postoperative period following cataract surgery in dogs. **None.**

Saturday Presenting 10:00am

THE PROPHYLACTIC EFFICACY OF INTRAVENOUS PARACETAMOL ADMINISTRATION TO REDUCE THE INCIDENCE OF POST-OPERATIVE OCULAR HYPERTENSION IN DOGS UNDERGOING PHACOEMULSIFICATION- A PILOT STUDY (C Bradley[1], K Manchip[1], PG Sansom[2] and WJC Carter[1]) [1]South Devon Referrals, UK; [2]College of Engineering, Mathematics and Physical Sciences, University of Exeter

Purpose. To determine whether intravenous administration of paracetamol prevents or reduces the incidence of postoperative ocular hypertension (POH) in dogs following routine phacoemulsification. **Methods.** Diabetic and non-diabetic patients (total 54 dogs) undergoing unilateral or bilateral phacoemulsification were recruited to this placebo-controlled, randomised, prospective study. The control group received 1ml/kg saline via intravenous infusion while the treatment group received 10mg/kg paracetamol (Paracetamol 10mg/ml; Accord, North Harrow, UK) via intravenous infusion. Infusions were administered 30 minutes prior to surgery and repeated after 12 hours. Intraocular pressure (IOP) was measured before premedication (baseline), and at T+1hrs, T+3hrs, T+5hrs and T+18hrs following extubation. POH was defined as an IOP above 25mmHg (POH25). In addition, the number of patients with an IOP exceeding 20mmHg was analysed (POH20). **Results.** POH20 occurred in 35 of 54 animals (64.8%), including 19 of 25 animals (76.0%) in the control group and 16 of 29 animals (55.2%) in the treatment group. POH25 occurred in 22 of 54 animals (40.7%), including 13 of 25 animals (52.0%) in the control group and 9 of 29 animals (31.0%) in the treatment group. Paracetamol administration showed a significant positive effect on reducing the incidence of POH20 ($p=0.048$), but not POH25 ($p=0.221$). **Conclusions.** When comparing groups, the treatment group showed a statistically significant reduction in the incidence of POH20, although no differences were observed in the incidence of POH25 between groups. Further studies are warranted to explore whether alternative drug regimes or routes of administration can provide enhanced efficacy in the prevention of POH25. **None.**

Saturday Presenting 1:30pm

NEUROMUSCULAR BLOCKADE WITH ATRACURIUM FOR OPHTHALMIC SURGERY IN HORSES – EFFECTS ON SURGICAL AND ANESTHETIC CHARACTERISTICS AND RECOVERY QUALITY

(NM Scherrer 1, K Hopster 1) 1. New Bolton Center, University of Pennsylvania School of Veterinary Medicine

Purpose. To study the surgical, anesthetic and recovery qualities of horses receiving either a neuromosucular blocking agent (atracurium) or intravenous lidocaine (treatment groups A and L, respectively). **Methods.** Horses were randomly assigned to receive atracurium or a lidocaine constant rate infusion. Ocular positioning was graded on a scale from 1 (excellent)-5 (poor). While anesthetized, the heart rate, oxygen saturation as well as mean arterial blood pressure and end-expiratory carbon dioxide concentration and desflurane concentration were monitored and recorded every 5 minutes. Recovery was scored on a scale from 10 (best)-115 (worst). **Results.** Horses in treatment group A needed significantly less desflurane than horses in treatment group L ($p = 0.04$). Horses in treatment group A had a significantly better ocular positioning score of 1 (1-2) (median and range) than horses in treatment group L (2.5; 1-5) ($p = 0.02$). The quality of recovery was significantly better in horses in treatment group A compared with treatment group L and horses needed significantly less time to reach the standing position. **Conclusions.** Atracurium and lidocaine CRI are safe methods of anesthesia for equine patients undergoing ocular surgery. Horses receiving atracurium required less desflurane and had lower ocular positioning and recovery scores than horses receiving a lidocaine constant rate infusion. Funding Sources. **None.**

Saturday Presenting 1:45pm

OUTCOME OF LOW-DOSE 4 MG INTRAVITREAL GENTAMICIN INJECTIONS IN HORSES WITH ERU: A RETROSPECTIVE STUDY OF 40 EYES IN SWITZERLAND AND AUSTRIA **(**S Stadler, B Nell, V Herb,) Equine Eye Vet, Zurich, Switzerland 1, University of Veterinary Medicine, Vienna, Austria 2

Purpose. To evaluate the outcome of low-dose 4mg intravitreal gentamicin injections in horses diagnosed with equine recurrent uveitis (ERU) by correlating results to aqueous humor leptospiral testing, retention of vision and control of inflammation. **Methods.** Records of 40 eyes of 38 horses of various breeds diagnosed with ERU and treated with low-dose 4mg gentamicin injections (80mg/2ml Ratiopharm GmbH, Graf-Arco-Strasse 3, 89079 Ulm, Germany or Refobacin Merck-Serono GmbH, Frankfurter Straße 250, 64293 Darmstadt, Germany) under standing sedation and local anesthesia were evaluated. Aqueous humor leptospiral titer (microscopic agglutination test; MAT), visual outcome, inflammation score and complications were assessed. Data were analyzed using descriptive statistics. **Results.** Control of uveitis was achieved in 80% of eyes (32/40), 52.5% were showing a positive leptospiral MAT titer and 27.5% a negative titer. Vision was retained in 62.5% of eyes (25/40), 42.5% with a positive MAT and 20% with a negative MAT. Follow-up duration ranged between 7 and 1080 days (mean: 269.4 days). Complications included retinal degeneration in 12.5% (5/40), cataract development in 10% (4/40) and cataract progression in 5% of eyes (2/40). Persistent inflammation was documented in 20% (8/40) of eyes. **Conclusions.** Positive aqueous humor MAT leptospiral titers correlated with a favorable outcome compared with negative MAT results. Treatment with a low-dose 4mg gentamicin injection under standing sedation is a promising option to control ERU and may reduce the need for vitrectomy under general anesthesia. **None**.

Saturday Presenting 2:00pm

THE ENTROPY OF THE ANTERIOR SEGMENT. WHY BIOPHYSICS MATTERS (S Pizzirani) Tufts Cummings School of Veterinary Medicine, North Grafton, MA, 01536, USA

The laws and principles of classical physics and quantum mechanics can be applied to all the different levels of perception and intuition; ophthalmologists are aware of the physics of light and the limited interpretation of the electromagnetic field provided by photoreceptors. Thermodynamics studies the energy flow, heat and movement in structures among the universe and does not make exception with anatomical sites. Because of its movements, the first and second laws of thermodynamics regulate the anterior segment. The physical relationship of the iris lens system produces friction and tribology is the subclass of physics that pertains to the system. Iris movements produce work and ATP provides the energy. Kinetic, lubricated friction happens between iris and aqueous, and iris and anterior lens capsule. Traction is the dynamic result of ciliary body movements promoted by ciliary muscles and elastic components of the extracellular matrix. Because of the second law of thermodynamics, entropy must happen, which results in dissipative heat and disorganization of the system. Reorientation of collagen fibrils leads to release of active TGFb2 and subsequent hyalinization of the ciliary body. Progressive fibrosis and remodeling of the extracellular matrix due to movement and traction are the irreversible, entropic results of the second law of thermodynamics. Anatomy and physiology should be considered dynamic, and they change according to the “arrow of time”. **None**.

Saturday Presenting 2:15pm

MANAGEMENT OF OPHTHALMIC COMPLICATIONS ASSOCIATED WITH BLOOD PARASITE INFESTATION IN DOGS (KC Bhadsavle, RS Mandhwani, KN Jiddimani, AP Vedpathak) The Eye Vet Clinic, Mumbai, India

Purpose. In this paper we discuss clinical signs, diagnostics, various medical and surgical methods for the treatment of secondary ophthalmic complications caused due to vector borne diseases. **Methods.** Over the period of 2 years (2019-2021), a total of 52 dogs (95 eyes) with secondary ophthalmic complications were identified, primarily affected by various Vector-borne diseases. The diagnosis was confirmed by direct blood smear examination, IDEXX Snap 4DX and PCR. These cases were treated systemically and locally for the primary infection and ophthalmic complications respectively. **Results.** The patients were grouped as follows: Ehrlichia sp. (20), Anaplasma (10), Babesia sp. (12), Trypanosoma (3), mixed infections of Babesia sp., Ehrlichia sp., Anaplasma, Hepatozoon Sp. (7). Unilaterally affected eyes (5 patients) were observed in Ehrlichia sp. (4) and Anaplasma (1); rest of the dogs (46) were presented with bilateral involvement. Permanent vision loss was observed in 17 out of 24 eyes with Babesia sp. (70.8%), mixed infections 8 out of 14 eyes (57%), Trypanosoma evansi 3 out of 6 eyes (50%), Anaplasma platys (7 out of 19 eyes (36.8%) and Ehrlichia sp. 9 out of 34 eyes (26.4%). **Conclusion.** Vector borne diseases can result in multiple ocular manifestations like, acute retinal detachment, severe uveitis, hyphema, glaucoma, severe corneal edema, chronic uveitis, chronic corneal oedema etc. In this case series Babesia spp. was found to cause the most serious acute ocular pathologies, followed by Mixed infections and Trypanosoma spp.; Anaplasma and Ehrlichia were found to be least damaging to the eye. **None.**

Saturday Presenting 2:30pm

OCULAR MELANOSIS IN CANINE BREEDS OTHER THAN THE CAIRN TERRIER – A RETROSPECTIVE ANALYSIS (JS Eaton, 1 TM Chen, 1 GC Shaw, 2 LCB Teixeira 2) Department of Surgical Sciences, School of Veterinary Medicine, University of Wisconsin-Madison;1 Comparative Ocular Pathology Laboratory of Wisconsin, Department of Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin-Madison.2

Purpose. To characterize clinical and histologic features of ocular melanosis in non-cairn terrier canine patients from the COPLOW collection, and compare them to established features of Cairn terrier ocular melanosis. **Methods.** The COPLOW database was searched for submissions from non-Cairn terrier patients diagnosed with ocular (uveal) melanosis between 2013 and 2020. Globe submissions with a history of previous intraocular surgery or injection were excluded. Historical, clinical, and histopathological data were tabulated. Histopathology review was performed for all submissions. **Results.** Two-hundred forty-four samples from 233 dogs (130 females, 102 males, 1 unspecified) were identified. Median age was 10.25 years (range: 0.6-17.5). In comparison to COPLOW's breed database, over-represented breeds included boxers (RR=10.44;p<0.0001), French bulldogs (RR=6.03;p<0.0001), Cavalier King Charles spaniels (RR=3.74;p=0.0012), and Yorkshire terriers (RR=2.18;p=0.0148). Bilateral pigmentary abnormalities were described at the time of submission in 82 dogs (35.2%). Melanocytic invasion of the iridocorneal angle, cornea, sclera, and choroid were identified in 62.6%, 19.3%, and 47.3%, and 57.6% of globe submissions, respectively. Fibrovascular membranes were identified in 46.1% of globes, and retinal detachment was identified in 14.8% of globes. Peripapillary and orbital tissue pigmentation were observed in 16.5% and 10.3% of globes, respectively. Melanocytic neoplasms associated with uveal melanosis were identified in 49 globes. **Conclusions.** Ocular melanosis is observed in non-Cairn terrier breeds and is commonly associated with melanocytic intraocular neoplasia. Ocular melanosis in these breeds is not invariably bilateral. Some clinical and histologic features of the disease appear to differ from that of Cairn terriers. **None.**

Saturday Presenting 2:45pm

EFFECTS OF GABAPENTIN AND TRAZODONE ON ELECTRORETINOGRAMS RECORDED IN NORMAL DOGS (NP Violette,1 G Newbold,1 C Chen,1 EJ Miller,1 and AJ Gemensky-Metzler1) College of Veterinary Medicine, The Ohio State University.1

Purpose. To compare electroretinogram (ERG) responses obtained in normal dogs before and after administration of oral gabapentin, trazodone and a combination of both medications. **Methods.** A short protocol scotopic ERG with 20 minutes dark adaption was performed on both eyes of twelve normal dogs to establish individual baseline ERG recordings. Dogs then received the oral study medication, ~30 mg/kg gabapentin, and the same ERG protocol was recorded 2 hours later. Dogs were given a washout period of a least 1-week duration. This protocol was repeated three times, substituting the study medication with ~20 mg/kg trazodone, ~5 mg/kg trazodone and a combination of ~20 mg/kg gabapentin and ~5 mg/kg trazodone. Effect of study medication on signal amplitudes and implicit times were analyzed with repeated measures ANOVA. **Results.** The b-wave amplitudes were decreased after 20 mg/kg of trazodone ($P = 0.006$) and the combination of 20 mg/kg of gabapentin and 5 mg/kg of trazodone ($P = 0.002$). The a-wave amplitudes were decreased after the combination of 20 mg/kg of gabapentin and 5 mg/kg of trazodone ($P = 0.018$). Heavier dogs that received higher total doses of trazodone had additional decreases in a- and b-wave amplitudes. Differences in a- and b-wave implicit times were not significant after any study medications. **Conclusions.** High doses of trazodone and the combination of gabapentin and trazodone significantly decrease the amplitudes of both a-waves and b-waves in normal dogs. However, these effects on retinal responses have little clinical significance. Supported by OSU Canine Grant No. 2020-12. **None.**

Saturday Presenting 3:30pm

EVALUATION OF CHROMATIC PUPILLOMETRY AS A SCREENING TOOL FOR ACHROMATOPSIA IN RHESUS MACAQUES (EM Salpeter,[1] A Moshiri,[2] S Park,[1] M Ferneding,[1] M Motta,[1] C Skouritakis,[1] R Chen,[3,4] SM Thomasy[1,2]) [1]Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California Davis, Davis, CA, 95616, USA; [2]Department of Ophthalmology and Vision Science, School of Medicine, University of California Davis, Davis, CA, 95616, USA; [3]Human Genome Sequencing Center and Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, Texas 77030, USA; [4]Department of Biochemistry and Molecular Biology, Baylor College of Medicine, Houston, Texas 77030, USA.

Purpose. Non-human primates (NHP) are useful models for human retinal disease. Chromatic pupillometry has been proposed as a noninvasive method of identifying heritable retinal diseases in humans; however, standard protocols employ time-consuming dark adaptation. We utilized shortened and standard dark-adaptation protocols to compare chromatic pupillary light reflex characteristics in rhesus macaques with *PDE6C* associated achromatopsia to controls with normal retinal function. **Methods.** This study evaluated red-, blue-, and white-light chromatic pupillometry following 1-minute versus standard 20-minute dark adaptations in nine rhesus macaques homozygous for the *PDE6C* mutation and nine age-, sex-matched normal controls. The following outcomes were measured and compared between groups: pupil constriction latency, pupil constriction degree, pupil constriction time, and average constriction velocity. **Results.** Pupil constriction latency was significantly longer in *PDE6C* mutants with red- (P=0.0002), and blue-light (P=0.04) stimulation, but not with white-light stimulation (P=0.2). Degree of pupil constriction was significantly less in *PDE6C* mutants with all three light stimuli (P<0.0001). Pupil constriction time was significantly shorter in *PDE6C* mutants with red- (P=0.04), and white- light (P=0.003) stimulation, but not following blue-light stimulation (P=0.9). Pupil constriction velocity was significantly slower in *PDE6C* mutants with red- (P<0.0001), blue- (P<0.0001), and white-light (P=0.0002) stimulation. Dark adaption time was only a significant factor for degree of pupil constriction (P=0.008) and pupil constriction time (P=0.02) following blue-light stimulation. **Conclusions.** Chromatic pupillometry following 1- and 20- minute dark adaption is an effective tool for screening NHPs for achromatopsia. Funding source: Vision for Animals Foundation. **None.**

Saturday Presenting 3:45pm

HISTOLOGIC EVALUATION OF AGE-RELATED RETINAL THINNING IN DOGS (CM Rogers 1, CM Ray 1, RI Wright 2, RR Dubielzig 2, and FM Mowat 1) School of Veterinary Medicine, University of Wisconsin – Madison; 1 Department of Surgical Sciences; 2 Comparative Ocular Pathology Laboratory of Wisconsin

Purpose. Age-related visual decline is well documented in humans and is associated with retinal degeneration. We aimed to quantitatively evaluate age-related changes in thickness of the retina and supporting tissues in dogs, an important companion species to humans. **Methods.** We reviewed canine submissions to COPLOW where the globe was defined as “near normal”. We excluded eyes with retinal or choroidal pathology or processing artifact. The most represented purebred breeds were Labrador Retrievers (n = 6 eyes) and Cocker Spaniels (n = 8 eyes). Sagittal sections were imaged, and retinal layer thicknesses measured at 0.5mm increments throughout the tapetal fundus. Age was represented as a proportion of previously published breed maximum lifespan. A mixed effects model was used to evaluate the effect of age and distance from the optic nerve on retinal layer thickness. **Results.** Median age of all dogs was 10.8 years (range 2 – 14) with a median proportion of breed maximum lifespan of 0.6 (range 0.1-0.8). The thickness of the retina significantly decreased with increasing distance from the optic nerve head (mean of 253µm at optic nerve to 168µm at periphery, $P < 0.0001$). Increasing age (as a proportion of anticipated lifespan) was associated with thinning of the choroid ($P<0.0001$), tapetum ($P<0.0001$) and outer retina ($P<0.0001$) in this small cohort of dogs, but not with a change in thickness of the inner retina ($P=0.22$). **Conclusions.** In this preliminary study, we find evidence of age-related choroidal and outer retinal thinning in companion dogs, similar to findings in aging humans. **None.**

Saturday Presenting 4:00pm

ZFP503 DEFICIENCY CAUSES DEFECTS IN EARLY EYE FORMATION AND COLOBOMA IN MICE

(AL Minella, 1 AJ Lopez, 2 B Willis, 3 BC Leonard, 1 SM Thomasy, 1,2 A Moshiri, 2) Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis, Davis, CA;1 Department of Ophthalmology and Vision Science, School of Medicine, University of California, Davis, Davis, CA;2 Mouse Biology Program, University of California-Davis, Davis, California, United States.3

Purpose. Uveal colobomas represent a rare but potentially debilitating group of congenital ocular conditions in animals and people. Animal models are integral for understanding pathogenesis and for the development of treatments. Through the Knockout Mouse Program (KOMP2), optic nerve (ON) coloboma was identified in the *Zfp503+/-* mouse. We describe the phenotype here. **Methods.** Masked thorough ophthalmic examination of KOMP2 mice performed by a veterinary ophthalmology resident (ALM) discovered ON coloboma in a group of 15 mice later identified as *Zfp503+/-* mice. Multimodal ocular imaging was performed *in vivo* including fundus photography, fluorescein angiography (FA), and optical coherence tomography. Post-mortem ocular histopathology and Zfp503 immunohistochemistry was performed. Through the KOMP2, mice underwent systemic phenotyping including examination, embryological assessment, and histopathology. **Results.** KOMP2 embryologic assessment determined that *Zfp503* knockout was pre-weaning lethal with a phenotype characterized by significant systemic abnormalities including abnormal embryo size and craniofacial morphological abnormalities combined with microphthalmic and depigmented eyes. *Zfp503+/-* mice were viable but demonstrated various intermittently expressed systemic abnormalities including abnormal genitalia development, abnormal liver size, enlarged and abnormal morphological development of the kidneys and lymph nodes, and abnormal blood vessel morphology. The ocular phenotype of *Zfp503+/-* mice was characterized by an atypical superiorly oriented ON coloboma with abnormal fluorescence using FA. Zfp503 was expressed in the retinal ganglion cell and inner nuclear layers. **Conclusions.** The *Zfp503+/-* mouse presented here offers a model to study ON coloboma development. The atypical superior coloboma orientation may represent an unusual embryological origin that warrants further investigation. Support by NIH K08 EY027463, NIH U24 EY029904, Barr Foundation for Retinal Research, and the KOMP2 project. **None.**

Saturday Presenting 4:15pm

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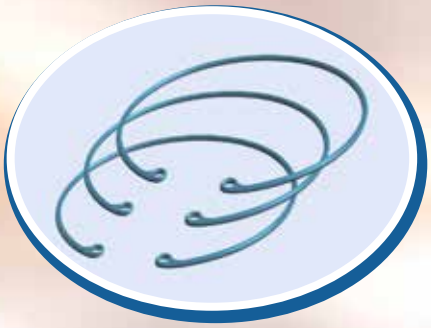

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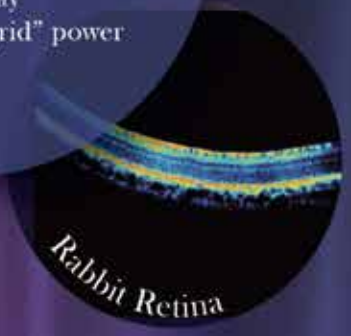

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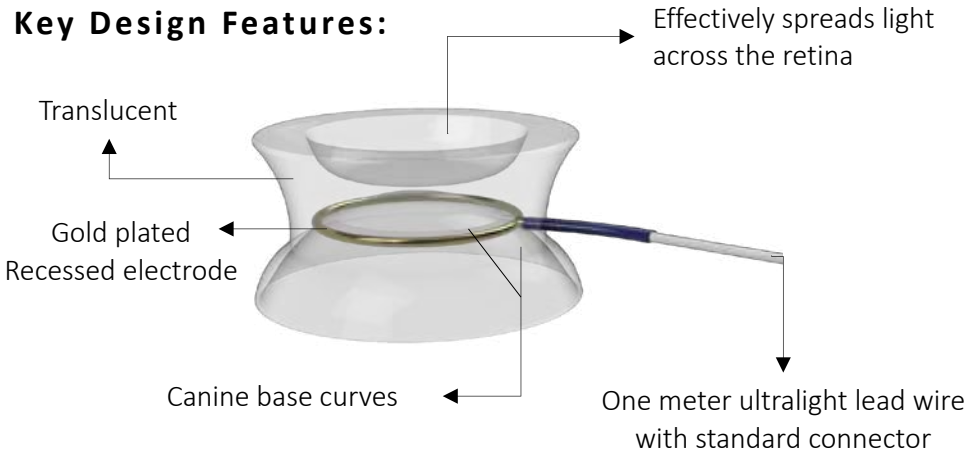

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