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   Scientific Session/Resident Competition 1-3  
   LADIS Keynote Address, Dr. Robert Magnus  
   LADIS Scientific Session 4  
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    MR/CT Focus Forum  
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    Resident Presentation/Poster Awards  
    RO: 1994 Exam Writers Presentations  
    ACVR: Image Interpretation Session  
    Introduction of New Diplomates  
    ACVR General Business Meeting (Diplomates Only)  
    SVNM Meeting  
    AIS Sponsored Reception
THE AMERICAN COLLEGE OF VETERINARY
RADIOLOGY GRATEFULLY ACKNOWLEDGES THE
SUPPORT OF THE FOLLOWING COMPANIES AND
WISHES TO THANK THEM
FOR THEIR CONTRIBUTIONS

ANIMAGE LLC
Dr. Horst Bruning, President
3825 Hopyard Road, Suite 220
Pleasanton CA 94588
Phone: 925-416-1900 ext. 111
Email: hbruning@exxim-cc.com
Website: www.animagellc.com

Animage LLC presents Fidex, a veterinary diagnostic imaging system with CT, DR, and fluoroscopy in one machine. Fidex can be CT-only, CT+DR, CT+fluoroscopy, or a three-modality system. Fidex plugs into 110 V or 220 V outlets; has dramatically lower costs of installation, operation, & maintenance; and has better spatial resolution than refurbished human CT scanners. Fidex requires no more shielding than a standard X-ray machine and no special cooling.

ANTECH IMAGING SERVICES
17672-B Cowan Avenue
Irvine, CA 92614
Phone: 877-727-6800
Website: www.antechimagingservices.com

For 14 years, AIS has been providing telemedicine and cloud storage to more veterinarians and clinics than any other service in the world. AIS has over 37 full time staff radiologists, and sponsors radiology residents at 8 Universities. We are proud to play a leading role in the advancement of telemedicine and the radiology profession.
Asteris is a leading provider of PACS, RIS, and HIS technology solutions for the veterinary community. Designed by veterinarians for veterinarians, our Keystone® software suite offers a unique, patented approach to digital image management, viewing, sharing, and reporting. Our products and services allow you to focus on premier patient care rather than the technology it requires. Founded in 2004, Asteris is an independently-owned company with offices in New York and Colorado.

In 2004, VI became a dealer to sell and service Canon brand Digital Radiography (DR) flat panel detectors together with VI’s RadPRO® X-ray modalities in the healthcare, military/government, veterinary, and industrial/security sectors. In April 2009, Canon U.S.A., Inc. acquired VI and VI became a wholly owned subsidiary of Canon U.S.A. Virtual Imaging currently sells and services RadPRO products and Canon DR detectors in the healthcare sector directly in Florida, the Mid-Atlantic, Illinois and California and resells these modules through a dealer channel in other areas of the U.S. In addition to healthcare organizations, Virtual Imaging also provides solutions to the U.S. veterinary sector and to the security industry.

Core Imaging offers only the best brands of imaging equipment like Philips, SIUI, Rayence and ServiceNet. We work with a wide range of veterinarians, veterinary facilities and experience levels, and we’ll work with you to choose an imaging solution that best fits your practice and needs.
Cuattro’s flat panel digital radiography systems improve efficiency and workflow, for increased productivity and lower costs. Cuattro digital flat panel same-day retrofits, complete rooms and mobile digital X-ray systems, and cloud-based archiving and PACS, deliver better performance, perfect images, in half the time of CR or film.

FUJIFILM MEDICAL SYSTEMS USA, INC.
419 West Avenue
Stamford, CT 06902
Website: www.fujiprivatepractice.com

FUJIFILM Medical Systems, the inventor and world leader in digital x-ray, will showcase the FDR D-EVO, a new digital flat panel detector enabling veterinary practices to transition to DR with no modification to an existing radiographic room. The digital flat panel detector was designed to deliver Fujifilm’s renowned image quality and intuitive functionality designed to address the needs of your practice. Systems for viewing, archiving and storing digital x-rays are also available. For more information: www.fujiprivatepractice.com.

HITACHI ALOKA MEDICAL
10 Fairfield Boulevard
Wallingford, CT 06942
Phone: (203) 269-5088
Toll Free: (800) 872-5652
Fax: (203) 269-6075
Email: inquiry@hitachi-aloka.com
Website: www.alokavet.com

Hitachi Aloka Medical offers small, portable, easy to use systems for every veterinary application. Known for our unparalleled image quality, superior system reliability, and incredible penetration, our systems employ innovative technologies for easier diagnosis and faster exam times.
So you can focus on productivity and quality of care at every touch point of your day, we focus on innovative products and services that create efficiencies and ensure dependability and accuracy. We’re here to help you deliver real-time care during your patients’ visits, increase client satisfaction and compliance and grow a healthier, more profitable practice. From SNAP® pet-side diagnostic tests, IDEXX VetLab® diagnostic instruments and advanced reference laboratory and consulting services to digital radiography systems, information integration solutions, dependable service and support and education—we have the tools you need to reach your practice’s potential.

Infiniti Medical serves veterinarians and pets with innovative solutions to common diseases. Through partnerships with veterinarians, physicians and engineers, we design and produce state of the art devices that are used by veterinarians throughout the world. Most notably, we are the leading provider of stents in the veterinary market. In addition to providing an innovative portfolio and pipeline of products, we further support the veterinary field by offering veterinarians unrivaled training opportunities and the necessary support to perform stenting and other advanced procedures.

OiService CT & MR, is a service division of Oxford Instruments, that specializes in providing quality after-market GE CT and MR maintenance services, equipment sales and parts to Veterinarian practitioners in imaging centers, animal hospitals and private practices across the U.S. At OiService, we focus on delivering world-class service for your CT & MR systems. Our expertly refurbished equipment and parts undergo a comprehensive quality inspection to meet or exceed OEM specifications – helping you to save a substantial amount of money without compromising quality.
PetRays Veterinary Telemedicine Consultants is a radiologist owned company that is dedicated to improving veterinary patient care around the world. We offer 24/7/365 service for all of our clients. Our web-based system is easy to use and accessible anywhere there is Internet access. We have assembled a group of top-notch board certified radiologists with extensive experience to provide the best consultations possible. If you would like more information about services or would like to inquire about being part of the PetRays team, please contact us at info@petrays.com.

SCIL Animal Care Company is a global organization dedicated to delivering the highest quality products to the animal healthcare professional. At SCIL we offer a wide range of Diagnostic Chemistry and Hematology, Digital Imaging, Ultrasound, Digital Dental, Orthopedic, and point of care testing products. We make adding more value to your business a priority, that is why we offer the highest level of customer service backed with 24/7 technical support and product warranties. Come see us at our booth to find out how SCIL can help better your practice. Or visit us online at www.scilvet.com and find us on Facebook!

Sound-Eklin is the industry’s uncontested leader in veterinary imaging including digital radiography, ultrasound, imaging data management, and viewing – as well as advanced imaging tools. Sound-Eklin is driving the industry forward with a commitment to open standards supported by strength, synergy and freedom of choice.
Summit Veterinary Referral Center is the South Puget Sound’s premiere veterinary referral center. With roots in critical care, surgery, neurology, oncology, radiology, and internal medicine, our 24-7 facility is still growing rapidly. With in-house MRI, CT, and ultrasound, we have a dedication to delivering the best clinical care to our patients and the best customer service to our clients. We are the only locally owned specialty referral center in Tacoma and are looking to add specialists who share our vision of high-level clinical care and high-level customer service.

Universal Medical Systems, Inc. (Ohio) is the only LICENSED AUTHORIZED DISTRIBUTOR serving the veterinary market selling and leasing NEW CT and MRI scanners exclusively from four of the major manufacturers designed specifically to meet your needs. New or certified systems are available with a variety of financing and service options. Visit us today.

Universal Imaging has been setting the standard for veterinary imaging for over 38 years. We offer the largest variety of ultrasound and digital radiography packages featuring all-digital technology, portability, connectivity, education and training. Visit our booth or website today.
VET RAY TECHNOLOGY BY SEDECAL
230 Lexington Drive
Buffalo Grove, IL 60089
Phone: (847) 394-6960
Toll Free: (800) 920-9525
Fax: (847) 394-6966
Email: sales@sedecalusa.com
Website: www.vetray.com

Vet Ray Technology by Sedecal is the world’s largest manufacturer of Veterinary specific x-ray equipment. Vet Ray Technology has the top selling small animal table for both digital and film applications and supplies a wide variety of large animal products.

VETROCKET
2065 Martin Ave., Ste. 106
Santa Clara, CA 95050
Phone: (800) 757-0266
877-727-8374
Email: info@vetrocket.com
Website: http://vetrocket.com

Located in the heart of Silicon Valley and founded by digital X-Ray imaging veteran Andy Fu, Vet Rocket develops high-quality digital radiography products for demanding veterinary applications. Vet Rocket dedicates its engineering efforts to designing new generations of innovative digital imaging products, which include advanced hardware, software and cloud-based solutions. The Vet Rocket X1 portable, cordless and ultra-lightweight DR system is the first entry from a new generation of Vet Rocket digital X-Ray systems. With its introduction in 2012, the X1 became the veterinary industry’s first completely battery-powered wireless DR system. Vet Rocket is proud to be at the forefront of digital imaging technology and leads the way in providing the highest quality imaging products for the veterinary industry.

VIN
Phone: (800) 700-4636
Email: VINGRAM@vin.com.
Website: www.VIN.com

The Veterinary Information Network (VIN) is the premier online community, continuing education, and information resource for veterinarians. Founded in 1991, VIN reaches over 45,000 veterinarians, veterinary students, and industry partners worldwide. VIN is the leader in unlimited access to medical, product and practice management information. For a FREE one month trial membership, join us at www.VIN.com, phone 800-700-4636, or email VINGRAM@vin.com. Let us show you why VIN is the BEST online resource for veterinarians. VIN will provide a free cyber café at the ACVR Annual Conference, so please stop by to check your Email, surf the web, and try VIN!
American College of Veterinary Radiology

Special Thanks to the following Corporate Partners:

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2014 Conference Bag Sponsor
PetRays Veterinary Telemedicine Consultants

Badge Neck Lanyard Sponsor
Toshiba - Universal Imaging

Cyber Café
Veterinary Information Network (VIN)

ACVR Welcome Reception Sponsor
Universal Medical Systems, Inc.

ACVR Platinum Event Sponsor
Antech Imaging Services
Program Overview

2014 ACVR Scientific Conference
October 21-24, 2014
Hilton St. Louis at the Ballpark
St. Louis, Missouri

Monday, October 20, 2014

Interventional Radiology Wet Lab
Stents for the Trachea and Urethra.
Dr. Jennifer Brisson
Sponsor: Infiniti Medical

Tuesday, October 21, 2014

7:00 am Registration Opens
Grand Foyer

8:00 am ACVR Forum – Academic Overview for Success
All Day- Grand Ballroom A-D
Welcome
Dr. Pete Scrivani

8:10 am Impact of Workforce Shortage in Academic Veterinary Imaging
Dr. Erik Wisner

9:00 am Academic Positions, Promotion and Tenure
Dr. Greg Daniel

10:00 am Break

10:30 am Academic Excellence
Dr. Margie McEntee

11:20 am Grantsmanship
Dr. Don Thrall

12:00 pm Lunch on Your Own

1:30 pm Answering Clinical Questions
Dr. Pete Scrivani

2:20 pm Manuscript Preparation and Peer Review
Dr. Jeryl Jones

3:00 pm Break

3:30 pm Interactions Between Private Practice and Academia
Dr. Anthony Fischetti
4:20 pm  Forum Panel Discussion – ALL

5:00 pm  Adjourn for the Day
**Wednesday, October 22, 2014**

**ACVR**

7:00 am  
*Registration Opens*  
Grand Foyer

7:15 am – 7:45 am  
LADIS Meeting  
Grand Ballroom A-D

8:00 am  
Conference Welcome  
Grand Ballroom A-D

8:10 am  
**ACVR Keynote Address**  
*K*  
Musculoskeletal Imaging: What Have We Learned from the Human Experience?  
Dr. David A. Rubin  
Professor, Radiology  
Division of Diagnostic Radiology  
Chief, Musculoskeletal Radiology Section  
Washington University School of Medicine

9:10 am  
**ACVR President’s Address**  
Dr. Anthony (Tony) Pease  
Grand Ballroom A-D

9:30 am  
Scientific Session/Resident Competition 1  
(Moderator: Dr. Matt Winter)  
Grand Ballroom A-D

10:30 am  
*Break with Exhibitors*  
Arch View Ballroom

11:00 am  
Scientific Session/Resident Competition 2  
(Moderator: Dr. Mauricio Solano)  
Grand Ballroom A-D

12:00 pm  
*Lunch on Your Own*

1:30 pm  
Scientific Session/Resident Competition 3  
(Moderator: Dr. Anthony Fischetti)  
Grand Ballroom A-D

2:30 pm  
*Break with Exhibitors*  
Arch View Ballroom

3:00 pm  
**LADIS Keynote Address**  
Equine Imaging Opportunities and Challenges in the Market Place  
Dr. Robert Magnus  
Wisconsin Equine Clinic & Hospital

4:00 pm  
**Optimizing MR Sequences for the Equine Musculoskeletal System.**  
Dr. Shannon Holmes and Dr. Selburg  
Grand Ballroom A-D

4:40 pm  
LADIS Scientific Session 4  
(Moderator: Dr. Richard Park)  
Grand Ballroom A-D
5:45 pm - 6:45 pm  Meet with Residency Directors  Grand Ballroom A-D

6:45 pm  Adjourn for the Day

6:50 pm - 8:30 pm  **ACVR Welcome Reception**  Lindbergh Room

BE SURE TO CHECK OUT THE POSTERS DURING THE BREAKS!

Arch View Foyer
### Thursday, October 23, 2014

#### ACVR and RO

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 am</td>
<td>Registration Opens</td>
<td>Grand Foyer</td>
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<td>7:15 am</td>
<td>VUS Meeting</td>
<td>Grand Ballroom A-D</td>
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<td>8:00 am</td>
<td>SVNM Keynote Address</td>
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<td></td>
<td><strong>Comparative Treatments with Thyroid Cancers in Humans</strong></td>
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<td>Dr. Amolak Singh</td>
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<td>Professor and Interim Chair</td>
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<td>Radiology, College of Medicine</td>
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<td>University of Missouri</td>
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<td>Columbia, MO</td>
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<td>9:00 am</td>
<td>MR/CT Focus Forum</td>
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<td>Dr. Silke Hecht, Pres. MR/CT Society</td>
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<td><strong>Spinal Imaging: Updates and Controversies</strong></td>
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<td>Dr. John Farrelly</td>
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<td>Dr. Shannon Holmes</td>
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<td>Dr. Jay Griffin</td>
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<td>Dr. Ketaki Karnik</td>
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<td>Dr. Deb Prescott</td>
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<td>Dr. Ian Robertson</td>
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<td>Dr. Amy Tidwell</td>
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<td>10:30 am</td>
<td>Break with Exhibitors</td>
<td>Arch View Ballroom</td>
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<td>11:00 am</td>
<td>Radiation Oncology Keynote Address</td>
<td>Grand Ballroom A-D</td>
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<td><strong>New Metabolic Targets as Novel Cancer Therapeutics</strong></td>
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<td></td>
<td>Dr. Mark Dewhirst</td>
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<tr>
<td></td>
<td>Co-Director, Radiation Oncology/Imaging Program</td>
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<td></td>
<td>Gustavo S. Montana Professor of Radiation Oncology, School of Medicine</td>
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<td></td>
<td>Professor of Pathology</td>
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<td>School of Medicine</td>
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<td>Duke University</td>
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<td>Durham, NC</td>
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<td>12:00 pm</td>
<td>Lunch on Your Own</td>
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<td>1:30 pm</td>
<td>Resident Authored Paper Award – Dr. Jeryl Jones</td>
<td>Grand Ballroom A-D</td>
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<td>Resident Presentation/Poster Awards – Dr. Mauricio Solano</td>
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#### RO

1:45 pm - 3:00 pm 1994 Exam Writers Presentations - Dr. Don Thrall  Grand Ballroom E-G

#### ACVR

1:45 pm ACVR Image Interpretation Session  Grand Ballroom A-D
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<th>Time</th>
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<tr>
<td>3:00 pm</td>
<td><em>Break with Exhibitors</em></td>
<td>Arch View Ballroom</td>
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<tr>
<td>3:30 pm</td>
<td><em>Introduction of New Diplomates</em></td>
<td>Grand Ballroom A-D</td>
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<td></td>
<td>Radiology and Radiation Oncology</td>
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<td></td>
<td>(Everyone welcome)</td>
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<tr>
<td>4:00 pm</td>
<td><em>ACVR General Business Meeting</em></td>
<td>Grand Ballroom A-D</td>
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<td>(Diplomates only)</td>
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<td>5:00 pm</td>
<td><em>SVNM Meeting</em></td>
<td>Grand Ballroom A-D</td>
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<td>6:00 pm</td>
<td><em>Adjourn for the Day</em></td>
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<td>6:00 pm - 9:00 pm</td>
<td><em>OFF SITE – AIS Sponsored Reception – Science Center</em></td>
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<td><strong>BE SURE TO CHECK OUT THE POSTERS</strong></td>
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<td><strong>DURING THE BREAKS!</strong></td>
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Friday, October 24, 2014 *(ACVR and RO simultaneous sessions all day)*

**ACVR – Diagnostic Imaging**

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<td>7:00 am</td>
<td>Registration Opens</td>
<td>Grand Foyer</td>
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<tr>
<td>7:15 am</td>
<td>CT/MRI Society Meeting</td>
<td>Grand Ballroom A-D</td>
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</table>
| 8:00 am| Ultrasound Keynote Address   **Ultrasound in Interventional Radiology:**  Ablation Procedures, and Guided Needle Aspirations and Biopsies  
   Dr. Timothy Ziemlewicz | Grand Ballroom A-D                           |
| 9:00 am| Scientific Session 5  
   (Moderator:  Dr. Gabi Seiler)                                    | Grand Ballroom A-D              |
| 10:00 am| Break with Exhibitors                                                | Arch View Ballroom              |
| 10:30 am| Scientific Session 6  
   (Moderator: Dr. Silke Hecht)                                    | Grand Ballroom A-D              |
| 12:00 pm| Lunch on Your Own                                                    |                                 |
| 1:30 pm| Scientific Session 7  
   (Moderator: Dr. Liz Watson)                                      | Grand Ballroom A-D              |
| 2:30 pm| Scientific Session 8  
   (Moderator: Dr. Matt Winter)                                      | Grand Ballroom A-D              |
| 3:30 pm| Break                                                               |                                 |
| 4:00 pm| Scientific Session 9  
   (Moderator: Dr. Kip Berry)                                      | Grand Ballroom A-D              |
| 5:00 pm| *Meeting Concludes*                                                  |                                 |
### Friday, October 24, 2014 (ACVR and RO simultaneous sessions all day)

**RO**

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<tr>
<td>7:00 am</td>
<td>Registration Opens</td>
<td>Grand Foyer</td>
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<tr>
<td>8:00 am</td>
<td>VTROG Meeting</td>
<td>Grand Ballroom E-G</td>
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<tr>
<td>9:00 am</td>
<td><strong>Outgoing RO President’s Address</strong></td>
<td>Grand Ballroom E-G</td>
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<td></td>
<td>Dr. Sheri Siegel</td>
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<tr>
<td>9:30 am</td>
<td><strong>Who Are We? How Are Things Going?</strong></td>
<td>Grand Ballroom E-G</td>
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<td></td>
<td>Dr. Donald Thrall</td>
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<td>10:00 am</td>
<td>Break with Exhibitors</td>
<td>Arch View Ballroom</td>
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<td>10:30 am</td>
<td>Scientific Session 10</td>
<td>Grand Ballroom E-G</td>
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<td>(Moderator: Dr. Sheri Siegel)</td>
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<tr>
<td>12:00 pm</td>
<td>Lunch on Your Own</td>
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<td>1:30 pm - 2:00 pm</td>
<td>Scientific Session 11</td>
<td>Grand Ballroom E-G</td>
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<td>(Moderator: Dr. Monique Mayer)</td>
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<td>3:30 pm</td>
<td>Break</td>
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<tr>
<td>5:00 pm</td>
<td>Meeting Concludes</td>
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### Monday, October 20, 2014

Interventional Radiology Wet Lab

**Stents for the Trachea and Urethra.**

Dr. Jennifer Brisson  
Sponsor: Infiniti Medical

### Tuesday, October 21, 2014

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<td>7:00 am</td>
<td>Registration Opens</td>
<td>Grand Foyer</td>
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<tr>
<td>8:00 am</td>
<td>ACVR Forum – Academic Overview for Success</td>
<td>All Day- Grand Ballroom</td>
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<td>Welcome</td>
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<td></td>
<td>Dr. Pete Scrivani</td>
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<td>8:10 am</td>
<td>Impact of Workforce Shortage in Academic Veterinary Imaging</td>
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<td>Dr. Erik Wisner</td>
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<tr>
<td>9:00 am</td>
<td>Academic Positions, Promotion and Tenure</td>
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<td>Dr. Greg Daniel</td>
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<td>10:00 am</td>
<td>Break</td>
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<td>10:30 am</td>
<td>Academic Excellence</td>
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<td>Dr. Margie McEntee</td>
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<td>11:20 am</td>
<td>Grantsmanship</td>
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<td>Dr. Don Thrall</td>
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<td>12:00 pm</td>
<td>Lunch on Your Own</td>
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<td>1:30 pm</td>
<td>Answering Clinical Questions</td>
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<td>Dr. Pete Scrivani</td>
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<tr>
<td>2:20 pm</td>
<td>Manuscript Preparation and Peer Review</td>
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<td>Dr. Jeryl Jones</td>
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<td>3:00 pm</td>
<td>Break</td>
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<td>3:30 pm</td>
<td>Interactions Between Private Practice and Academia</td>
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<td>Dr. Anthony Fischetti</td>
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<tr>
<td>4:20 pm</td>
<td>Forum Panel Discussion – ALL</td>
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<td>5:00 pm</td>
<td>Adjourn for the Day</td>
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<tr>
<td>7:00 am</td>
<td>Registration Opens</td>
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<tr>
<td>7:15 - 7:45 am</td>
<td>LADIS Society Meeting</td>
<td>Grand Ballroom A-D</td>
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<tr>
<td>8:00 am</td>
<td>2014 ACVR Meeting Opening Welcome</td>
<td>Grand Ballroom A-D</td>
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<td>Dr. Kip Berry, Program Chair</td>
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<td>8:10 am</td>
<td>ACVR Keynote Address</td>
<td>Grand Ballroom A-D</td>
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<td>Musculoskeletal Imaging: What Have We Learned from the Human Experience?</td>
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<td>Dr. David A. Rubin</td>
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<td>Professor, Radiology</td>
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<td>Division of Diagnostic Radiology</td>
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<td>Chief, Musculoskeletal Radiology Section</td>
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<td>Washington University School of Medicine</td>
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<td>9:10 am</td>
<td>ACVR President’s Address</td>
<td>Grand Ballroom A-D</td>
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<td>Dr. Anthony “Tony” Pease</td>
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<td></td>
<td><strong>Scientific Session/Resident Competition 1</strong></td>
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<td>(Moderator: Dr. Matt Winter)</td>
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<tr>
<td>9:30-9:40 am</td>
<td>Radiographic and Bronchoscopic Assessment of the Dorsal Tracheal Membrane in Large and Small Breed Dogs.</td>
<td>Grand Ballroom A-D</td>
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<td>B. J. Lindl Bylicki, L. R. Johnson, R. E. Pollard</td>
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<td>School of Veterinary Medicine, University of California, Davis, CA, 95616.</td>
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<tr>
<td>9:40-9:50 am</td>
<td>Factors Affecting Success of Ultrasound-Guided Radiofrequency Parathyroid Ablation in Dogs.</td>
<td>Grand Ballroom A-D</td>
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<td>D.S. Bucy, R.E. Pollard, R.W. Nelson</td>
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<td>University of California, Davis, CA 95616.</td>
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<td>9:50-10:00 am</td>
<td>Development of an Ultrasound Guided Thoracic Paravertebral Nerve Block in Dogs.</td>
<td>Grand Ballroom A-D</td>
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<td></td>
<td>College of Veterinary Medicine, Michigan State University, MI 48824.</td>
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<td>10:00-10:10 am</td>
<td>Elastography Characterization and Repeatability in 14 Normal Canine Spleens.</td>
<td>Grand Ballroom A-D</td>
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<td>K.A. Mulligan, W.T. Drost, D.M. Auld, J.D. Bonagura</td>
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<td>The Ohio State University, OH 43210.</td>
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<td>10:10-10:20 am</td>
<td>The Effect of Screening Abdominal Ultrasound Examination on the Decision to Pursue Advanced Diagnostic Tests and Treatment in Dogs with Neurologic Disease.</td>
<td>Grand Ballroom A-D</td>
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10:20-10:30 am  **ULTRASONOGRAPHIC MEASUREMENT OF THE OPTIC NERVE SHEATH DIAMETER IN HORSES.**  S. D. Cooley, P. V. Scrivani, N. L. Irby, M. S. Thompson, T. J. Divers, H.N. Erb. Cornell University, College of Veterinary Medicine, Ithaca, NY 14853.

10:30 am  *Break with Exhibitors*  Arch View Ballroom

**Scientific/Resident Competition 2**  Grand Ballroom A-D  (Moderator: Dr. Mauricio Solano)

11:00-11:10 am  **SUBCHONDRAL BONE ABNORMALITIES IN EQUINE STIFLE OSTEOARTHRITIS ASSESSED BY RADIOGRAPHY AND COMPUTED TOMOGRAPHY.**  J. De Lasalle, K. Alexander, J. Olive, S. Laverty. University of Montreal, Quebec, Canada, J2S 2M2.


11:40-11:50 am  **3D PRINTERS IN VETERINARY MEDICINE: AN EXPANDING FIELD.**  A.-M. Hespel, J. Hudson, R. Wilhite. Auburn University CVM, AL 36849.

12:00 pm  *Lunch on Your Own*

**Scientific/Resident Competition 3**  Grand Ballroom A-D  (Moderator: Dr. Anthony Fischetti)

1:30-1:40 pm  **MAGNETIC RESONANCE IMAGING FINDINGS OF LYMPHOMA AFFECTING THE SPINE AND PARASPINAL SOFT TISSUES.**  B. Allett, S. Hecht, Department of Small Animal Clinical Sciences, University of Tennessee College of Veterinary Medicine, Knoxville, TN 37996.

1:40-1:50 pm  **VALUE OF SINGLE SHOT FAST SPIN ECHO PULSE SEQUENCES IN ASSESSMENT OF THE CANINE SPINAL CORD FOR PROGRESSIVE MYELOMALACIA.**  Gilmour LJ, Jeffery N, Miles K, Riedesel E. Department of Veterinary Clinical Sciences, College of Veterinary Medicine, Iowa State University, Ames, IA 50011.
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<tr>
<td>1:50-2:00 pm</td>
<td><strong>COMPARISON OF COMPUTED TOMOGRAPHIC EVALUATION OF TOOTH RESORPTION IN CATS TO INTRAORAL DIGITAL DENTAL RADIOGRAPHY AND ORAL EXAM.</strong> L.G. Lang, T.E. Wilkinson, T.L. White, R.K. Farnsworth, K.A. Potter. Washington State University, Pullman, WA 99164.</td>
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<td>2:10-2:20 pm</td>
<td><strong>1H-MAGNETIC RESONANCE SPECTROSCOPY OF INFLAMMATION AND NEOPLASIA OF THE CANINE BRAIN AT 3T.</strong> K. Stadler, C. Ober, D. Feeney, C. Jessen. Department of Veterinary Clinical Sciences, University of Minnesota College of Veterinary Medicine, 1365 Gortner Avenue, St. Paul, MN 55108.</td>
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**END of RESIDENT COMPETITION**

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<tr>
<td>2:30 pm</td>
<td><strong>Break with Exhibitors</strong></td>
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<td>Arch View Ballroom</td>
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<td>3:00 pm</td>
<td><strong>LADIS Keynote Address</strong></td>
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<td><strong>Equine Imaging Opportunities and Challenges in the Market Place</strong></td>
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<td>Dr. Robert Magnus</td>
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<td>Wisconsin Equine Clinic &amp; Hospital</td>
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<td>4:00 pm</td>
<td><strong>Optimizing MR Sequences for the Equine Musculoskeletal System.</strong></td>
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<td>Dr. Shannon Holmes and Dr. Selburg</td>
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<td><strong>LADIS Scientific Session 4</strong></td>
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<td>(Moderator: Dr. Richard Park)</td>
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<td>Grand Ballroom A-D</td>
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<td>4:40-4:50 pm</td>
<td><strong>MRI T1 MAPPING OF EQUINE TENDONS AND LIGAMENTS- TECHNIQUE AND PILOT DATA.</strong> M. Spriet, T.C. Garcia, A.J. DeRouen, A.C. Young, B. Murphy. University of California, Davis, CA 95616.</td>
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<td>4:50-5:00 pm</td>
<td><strong>THE DETECTABILITY OF SOFT TISSUE INJURIES OF THE EQUINE DISTAL LIMB USING ELASTOGRAPHY COMPARED WITH MAGNETIC RESONANCE IMAGING.</strong> M. Lustgarten, W.R. Redding, G.S. Seiler North Carolina State University, NC 27607.</td>
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<td>5:00-5:10 pm</td>
<td><strong>EVALUATION OF NEOVASCULARIZATION OF EQUINE TENDINITIS USING POWER DOPPLER ULTRASOUND.</strong> M. Lustgarten, W.R. Redding, M. Morgan, L.V. Schnabel, G.S. Seiler. North Carolina State University, NC 27607.</td>
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5:20-5:30 pm  ALTERNATIVE ULTRASOUND-GUIDED APPROACH TO THE COXOFEMORAL JOINT IN HORSES WITH SEVERE JOINT PATHOLOGY.  M.B. Whitcomb¹, B. Vaughan,¹ Hersman J.² ¹Department of Surgical & Radiological Sciences, University of California, Davis, 95616. ²Animal Imaging, Irving, TX 75039.

5:45 pm - 6:45 pm  Meet with Residency Directors  Grand Ballroom A-D

6:45 pm  Adjourn for the Day

6:50 pm - 8:30 pm  ACVR Welcome Reception  Lindbergh Room
Sponsored by Universal Medical Systems, Inc.

BE SURE TO CHECK OUT THE POSTERS DURING THE BREAKS!  Arch View Foyer
RADIOGRAPHIC AND BRONCHOSCOPIC ASSESSMENT OF THE DORSAL TRACHEAL MEMBRANE IN LARGE AND SMALL BREED DOGS. B. J. Lindl Bylicki, L. R. Johnson, R. E. Pollard. School of Veterinary Medicine, University of California at Davis, CA 95616.

Introduction/Purpose: Increased opacity in the dorsal lumen of the trachea has long been attributed to a redundant dorsal tracheal membrane. We hypothesized that the etiology of this opacity would differ between dogs with and without tracheal collapse.

Methods: 33 dogs (17 small breed, 16 large breed) that underwent radiography and bronchoscopy were evaluated in a blinded, randomized, prospective fashion. Radiographs were assessed for presence and percent of luminal diameter obscured by dorsal soft tissue opacification. Bronchoscopy was used to grade tracheal collapse, describe inward rolling of the dorsal tracheal membrane and measure percentage of tracheal circumference comprised of dorsal tracheal membrane.

Results: Tracheal opacity was seen radiographically in 32/33 dogs. In dogs with tracheal collapse (8 small breed dogs), this opacity occupied 10-92% of the tracheal diameter on radiographs and comprised 22-48% of the tracheal circumference on bronchoscopy. In dogs with a rolled dorsal tracheal membrane (4 small, 7 large) tracheal opacity occupied 12-67% of the tracheal diameter on radiographs and comprised 7-16% of the tracheal circumference on bronchoscopy. In 10/11 dogs with a bronchoscopically normal trachea (5 small, 9 large) a visible tracheal opacity occupied 5-50% of the tracheal diameter on radiographs and comprised 10-26% percent of the tracheal circumference on bronchoscopy.

Discussion/Conclusion: These findings demonstrate that increased opacity along the dorsal margin of the trachea arises from different etiologies in dogs with and without tracheal collapse. Further study is needed to determine the clinical significance of radiographic and bronchoscopic findings.

Introduction/Purpose: Radiofrequency (RF) parathyroid ablation is a non-invasive treatment for hyperparathyroidism in dogs. There are no published data assessing factors associated with RF parathyroid ablation success or failure, to guide patient selection and improve patient outcome. The purpose of this retrospective study was to determine what imaging findings or concurrent diseases were associated with treatment failure.

Methods: University of California, Davis SVM database was searched for dogs that underwent RF parathyroid ablation from 2005-2013. Patients were separated into those with and without persistent or recurrent hypercalcemia following therapy within a minimum follow-up time of three months required for inclusion. Parathyroid nodule size, thyroid size, nodule location, and presence of concurrent disease were recorded.

Results: Thirty-two patients met inclusion criteria. 10/32 dogs (31%) had recurrent hypercalcemia following parathyroid ablation (mean disease free interval 7.6 months). Nodule width ($p = 0.046$), length ($p = 0.041$), and largest cross sectional area ($p = 0.028$) were significantly larger in dogs that had recurrent or persistent disease following ablation. Hypothyroidism was more common in dogs with treatment failure ($p = 0.044$). RF ablation was successful in 22/32 (69%) dogs (mean follow-up time 20.9 months). RF ablation was attempted in an additional six patients, but was aborted due to nodule mobility, small size, or proximity to the carotid artery.

Discussion/Conclusion: Larger parathyroid nodule size and/or concurrent hypothyroidism is associated with treatment failure in patients that undergo ultrasound guided RF parathyroid nodule ablation. Small nodule size, increased mobility, and positioning of vascular anatomy prohibit successful RF ablation.
DEVELOPMENT OF AN ULTRASOUND GUIDED THORACIC PARAVERTEBRAL NERVE BLOCK IN DOGS. M.J. Lemon, D.V. Wilson, L.L. Nelson, N.C. Nelson. College of Veterinary Medicine, Michigan State University, MI 48824.

Introduction/Purpose: Intercostal thoracotomy is a common surgical procedure in veterinary referral practice and is associated with a high degree of post-operative pain. None of the analgesic strategies currently employed for this procedure is completely effective nor universally accepted. Both use of a nerve stimulator to guide needle placement and "blind" landmark-guided techniques carry a risk of significant complications caused by inaccurate needle placement. In people, standard of care is performance of an ultrasound-guided paravertebral nerve block. This study aimed to develop a technique for ultrasound-guided injection into the canine thoracic paravertebral space.

Methods: Ultrasound-guided paravertebral injection of a mixture of radiographic contrast material and methylene blue dye was performed in 10 canine cadavers. A cranial (T4-T5) and a caudal (T9-T10) injection was performed in each cadaver. Immediately following injection, thoracic computed tomography was performed to evaluate injection accuracy and dispersion. Dispersion was classified as cloud-like, intercostal, or a combination thereof. The location of the needle tip in relation to the intervertebral foramen, needle angle, and presence of contrast material in any unanticipated location (e.g. pleural, mediastinal, epidural) were recorded. Dissection of the paraspinal region was performed and the length of each intercostal nerve stained with methylene blue was recorded.

Results: Anatomical landmarks of the thoracic paravertebral space were easily identified using ultrasound. The paravertebral space to be injected was located by counting cranially from the last rib. Injection of the intended paravertebral space was achieved only 60 % of the time, frequently due to an abnormal number of ribs. The injection technique produced a cloud-like, intercostal and combination of cloud-like and intercostal dispersion of injectate in 45 %, 15 % and 40 % of injections, respectively. The location of the needle tip in relation to the intervertebral foramen significantly affected the type of dispersion seen and the length of nerve stained, with a larger lateral distance more likely to produce an intercostal spread of injectate and a longer length of nerve staining. Dorsal position of the needle did not affect dispersion pattern or length of nerve staining. At least 1 cm of intercostal nerve was stained in 18/20 injections.

Discussion/Conclusion: Ultrasound-guided thoracic paravertebral injection is a plausible technique for delivering local anesthetic to the thoracic wall. However, injection of at least three adjacent spaces is recommended in order to circumvent the possibility of inaccurate injection due to an abnormal number of ribs. Positioning the needle greater than 1 cm lateral to the intervertebral foramen produces more intercostal spread of injectate rather than cloud-like. However, adequate blockade of the intercostal nerves should be achieved with either type of dispersion.

Introduction/Purpose: Ultrasound is commonly used to evaluate the canine spleen. There is poor correlation between ultrasonographic findings and cytological or histopathological diagnosis. Ultrasound elastography is a relatively new technology that can measure the elasticity of tissues and has shown usefulness in differentiating benign versus malignant conditions in people. In veterinary patients, elastography imaging is in its infancy and has mostly been investigated in musculoskeletal settings. To our knowledge, only one study has investigated elastography characteristics of normal canine spleens¹, and repeatability has not been assessed. The purpose of this study was to describe elastography characteristics of normal canine spleens and assess intra- and interobserver repeatability.

Methods: Elastography (Toshiba Aplio500, Elasto program) was performed by two observers in 14 clinically healthy, non-sedated dogs; each spleen was normal based on B-mode ultrasound. Images were made at minimum, neutral, and maximum compression. Elastography was repeated by the same observers using the same dogs approximately two weeks later. Regions of interest (ROIs) encompassing as much of the spleen as possible were drawn and pixel color percentages for each region of interest were determined. A strain score was then calculated for each spleen, using a weighted average of the percentages. Friedman’s test compared the three compression points, and Spearman’s rank-order correlation coefficients assessed intra- and interobserver repeatability.

Results: Strain scores obtained at neutral compression were significantly lower (softer) than maximum compression for both observers (P<0.05), but only observer one found a significant difference compared with minimum compression. Intraobserver correlation was moderate and statistically significant (repeatable) for observer one ($R_{s}^2 = -0.548$, $P=0.043$), but there was marked variation between individual subjects. For observer two, there was weak to moderate correlation which was not significant ($R_{s}^2 = 0.433$, $P=0.122$), indicating poor intraobserver repeatability. Interobserver correlation for the first time point was weak to moderate and not significant ($R_{s}^2 = -0.464$, $P=0.095$), and even lower correlation was found at the second time point ($R_{s}^2 = 0.301$, $P=0.122$), indicating poor interobserver repeatability.

Discussion/Conclusion: We recommend obtaining strain scores at neutral compression, which is the theoretically most accurate point and which we demonstrated to be significantly different from maximum compression. However, inter- and intraobserver repeatability is weak to moderate, and underscores the need for thorough training and additional clinical studies if elastography is to become useful in canine splenic imaging. Patient dependent factors such as variable compliance and lack of sedation likely contributed to non-ideal repeatability.


Introduction/Purpose: Abdominal ultrasound examinations are commonly performed prior to advanced neurodiagnostics to screen for disease that may affect diagnostic plans and prognosis. The objectives of our study were to describe the type and frequency of abnormalities found by abdominal ultrasound examination in dogs presenting with a neurological condition, to identify risk factors associated with ultrasound abnormalities, and to evaluate treatment decisions based on ultrasound findings.

Methods: In this retrospective study of 759 dogs from the hospital population with neurological disease, data collection included signalment, neuroanatomic localization, ultrasonographic findings, and whether or not the dog had advanced neurodiagnostics and treatment. Reasons for not proceeding were determined if applicable.

Results: Fifty-eight percent of dogs had abnormal findings on AUS examination. Risk factors for an abnormal ultrasound examination included age and breed, with highest risk seen in older animals and non-dachshund breeds. Younger dogs and dachshund breeds were more likely to have a normal abdominal ultrasound examination. Eleven percent of dogs did not go on to have advanced neurodiagnostics, and in 1.3% of cases this was due to abnormal abdominal ultrasound examination findings. Dogs with ultrasonographic abnormalities were less likely than dogs with no abnormalities to have advanced neurodiagnostics (OR = 0.3), however, the probability of performing advanced diagnostics was high regardless of a normal or abnormal ultrasound examination (0.95 and 0.85, respectively). Treatment was more often pursued in small dogs and those with C6-T2 myelopathy, and less often pursued in dogs with brain disease.

Discussion/Conclusion: Findings from screening abdominal ultrasound examinations had a small negative effect on the likelihood of pursuing advanced neurodiagnostics. Although it should be included in the extracranial workup in dogs with significant history or physical examination abnormalities, it is considered a low-yield screening test in young, apparently healthy dogs, especially dachshunds.
Introduction/Purpose: Early diagnosis of elevated intracranial pressure (ICP) and the ability to monitor treatment response is critical to preventing progressive brain injury due to ICP induced reduction in cerebral perfusion. In people, the detection of enlargement of the optic nerve sheath diameter (ONSD) by transpalpebral ultrasonography is a highly accurate test for elevated ICP. Additional benefits are noninvasiveness, ease of use, accessibility, affordability, and lack of requirement for general anesthesia. We proposed that this test also would be beneficial to horses with suspected elevated ICP due to various causes (eg, infection, trauma, space-occupying disease, hypoxic ischemic encephalopathy). Our study aims were to demonstrate the feasibility of making this measurement stall-side in live horses, and to investigate hypotheses that ONSD is positively correlated with age and with body weight, which also will help establish a reference range.

Methods: The study design was prospective, observational, and cross-sectional. Two blinded observers used ultrasonography to measure the ONSD of both eyes of horses of variable ages and body weights and without clinical signs of ocular disease or elevated ICP. Repeatability was assessed as the mean difference of duplicated measures. Agreement within and between observers was assessed using Bland-Altman plot analysis. Correlation between ONSD and age or body weight was assessed using Pearson’s correlation. Statistical significance was set at P ≤ 0.05.

Results: The sample population consisted of 31 horses of different breeds: 24 mares or fillies, 5 stallions or colts, and 2 geldings. The mean (SD) age was 12.6 (7.0) years (range, 0.0 to 23.0 years). The mean (SD) body weight was 439 (169) kg (range, 59 to 703 kg). The mean (SD) ONSD was 4.7 (0.4) mm (range, 3.2 to 5.3 mm) for the left side and 4.7 (0.5) mm (range, 3.6 to 5.8 mm) for the right side. The mean difference (absolute maximum difference) between repeated measures of ONSD by the same observer was 0.1 (0.9) mm for the left side and 0.0 (1.0) mm for the right side. The mean difference (limits of agreement) between measures of ONSD by two observers was -0.1 (-0.8 to 0.7) mm for the left side and 0.0 (-0.8 to 0.8) mm for the right side. There was a strong positive correlation between ONSD and age for both sides (left, r = 0.56, P = 0.001; right, r = 0.43, P = 0.017); and between ONSD and body weight for both sides (left, r = 0.49, P = 0.006; right, r = 0.47; P = 0.008).

Discussion/Conclusion: In all horses, the ONSD ranged between 3-6 mm for both eyes and both observers. ONSD increased with age and body weight. Ultrasound measurement of ONSD was repeatable and should be evaluated further for its ability to identify horses with high ICP.

Introduction/Purpose: Subchondral bone abnormalities are considered an integral feature of equine stifle osteoarthritis (OA) and reportedly include sclerosis, femoral condyle flattening and subchondral cysts. Assessment of bone mineral density (BMD) using quantitative CT has never been reported in equine stifle OA. The objective of this study was to assess subchondral bone abnormalities in equine stifle OA, using radiography (XR) and computed tomography (CT) and to compare these to macroscopic evaluation (ME).

Methods: Equine cadaver stifles with (n=17) and without (n=6) radiographic signs of OA were investigated. Four XR projections, CT with multiplanar and 3-dimensional reformatting and ME were performed on each stifle. Subchondral bone sclerosis and flattening of femoral condyles were evaluated on XR and CT as present/absent and sensitivity (Se) and specificity (Sp) were calculated relative to a global ME OA score (cartilage lesions and osteophytes). Subchondral bone cystic lesions were described. Subchondral BMD was assessed quantitatively with CT in 4 areas [medial (MFC) and lateral (LFC) femoral condyles and medial (MTP) and lateral tibial plateau (LTP)] at three different depths from the most distal aspect of femur [3.75, 6.25, 8.75 mm] and from the most proximal aspect of tibia [5, 7.5, 10 mm]. BMD for each depth and each anatomic site was compared with global ME OA score using linear regression analysis.

Results: Femoral condyle flattening was only observed on the MFC and had a Se of 33.3% (XR and CT) and a Sp of 58.8% (XR) and 64.7% (CT). Subchondral bone sclerosis was only observed in the MTP and had a Se of 0% (XR) and 16.7% (CT) and a Sp of 82.4% (XR) and 76.5% (CT). BMD was significantly decreased at most depths as the global ME OA score increased. A repeatable pattern of subchondral bone resorption/cyst formation was observed on CT on seven specimens, 5 of which had the most severe OA macroscopic diagnosis. The pattern of bone resorption was observed at the cranial and caudal MTP and on the axial aspect of the LFC. These lesions were challenging to identify radiographically. With CT, one specimen presented an area of mineralization adjacent to subchondral bone and presumably within the MFC articular cartilage, thought to represent a central subchondral osteophyte.

Discussion/Conclusion: Subchondral bone sclerosis and flattening of femoral condyles do not appear to be reliable radiographic or CT indicators of OA in the equine stifle. Contrary to expectations, chronic equine stifle OA is associated with a decrease in bone mineral density (BMD), possibly due to a mismatch in bone resorption/formation which may result from a chronic reduction of joint load secondary to reduced usage, weight loss and aging. Specific sites of focal subchondral bone resorption/cyst formation are apparent with CT and may correspond with widening of normal vascular channels and/or abnormal cruciate and/or meniscotibial ligament insertions.

Introduction/Purpose: The equine cervical vertebral column is commonly radiographed for evaluation of ataxia, neck pain or as part of the prepurchase examination. The sixth cervical vertebra (C6) has unique morphology due to the presence of a ventral extension from the transverse process known as the ventral lamina. Transposition of the ventral lamina from C6 to the seventh cervical vertebra (C7) has been reported but the prevalence or clinical significance has never been investigated. The purpose of the study was to report the prevalence of this finding in a clinical population of horses presented for cervical radiographs and to assess the correlation between anomalous ventral lamina and radiographic features of articular process joint osteoarthrosis and/or vertebral canal stenosis.

Methods: One hundred complete cervical radiographic exams were evaluated retrospectively for anomalous morphology of the C6 ventral lamina, radiographic signs of articular process osteoarthrosis, and static vertebral canal stenosis using the intravertebral sagittal ratio. Breed and sex were obtained from the medical record to assess for correlation.

Results: Anomalous C6 was found in 24/100 horses. This involved bilateral processes of the ventral lamina in 9 horses and a single process in 15 horses. In the cases with underdeveloped ventral lamina of C6, an abnormal prominent transverse process was commonly present on C7. Anomalous C6 was more common in Warmblood horses with 19 of the 55 Warmblood horses being affected ($P=0.006$). No association was found with sex. There was no significant difference in intravertebral sagittal ratios in horses with normal or anomalous C6 ventral lamina. There were a significantly greater proportion of horses with anomalous C6 ventral lamina that had an intravertebral sagittal ratio of less than 0.5 at C6 and C7 ($P=0.047$ and $P=0.042$). No association between the presence of anomalous C6 ventral lamina and articular process joint osteoarthrosis was observed in the study population.

Discussion/Conclusion: Anomalous C6 ventral lamina appears to be a relatively common abnormality, especially in Warmblood horses, which may suggest a genetic component to this anomaly. A greater proportion of horses with an anomalous C6 had evidence of static vertebral canal stenosis suggesting that the anomaly may be associated with other morphological abnormalities including the size of vertebral canal. Despite the potential to alter regional biomechanics, anomalous C6 ventral lamina does not appear to result in increased prevalence of articular process joint osteoarthrosis.

Introduction/Purpose: Sonoelastography allows evaluation of tissue stiffness in real time by measuring the displacement of the tissues before and after gentle compression. Sonoelastography has been investigated in the diagnosis and monitoring of human musculoskeletal conditions including Achilles tendonopathy, lateral epicondylitis and plantar fasciitis. The purpose of this study was to determine the ability of sonoelastography to detect and monitor experimentally-induced injury to the deep digital flexor tendon (DDFT) in the equine forelimb and to compare the sonoelastographic findings with those of traditional greyscale ultrasound examination.

Methods: Deep digital flexor tendinitis was induced via collagenase injection into the medial lobe of the DDFT bilaterally at the level of the pastern joint in each of 6 horses. Lesions were tracked using both grayscale ultrasound and sonoelastography with subjects imaged once prior to lesion induction and at six time points over a seven month period after lesion induction. All horses followed the same rest and rehabilitation schedule and were euthanatized at the conclusion of the study, with histopathologic analysis of the tendons following euthanasia. Grayscale and elastographic images were evaluated both quantitatively and qualitatively. Elastographic images were quantitatively analyzed using the elastographic software (MyLab 70, Biosound Esaote Inc. Indianapolis, IN). A strain ratio between each lesion and the unaffected lateral lobe of the DDFT, lesion histogram mean and the percent of pixels within the lesion that were in the hardest 15% of the color scale were calculated. Histopathologic scores were assigned in eight categories (cell shape, density, hemorrhage, neovascularization, inflammatory infiltrates and collagen fiber linearity, uniformity and crimping) and averaged for an overall ligament score.

Results: All lesions were evident sonographically and improved over the course of the study. Lesions were qualitatively visualized as softer regions on elastographic examination. Transverse and longitudinal quantitative elastographic data were at their hardest at the final examination, second only to the first (pre-lesion) examination (transverse strain ratio: day 0=1.10, day 74=1.93, day 214=1.43; transverse histogram mean: day 0=7.76, day 74=12.23, day 214=9.36; transverse percent hardness: day 0=80.7%, day 74=61.1%, day 214=73.7%; longitudinal strain ratio: day 0=1.02, day 74=1.45, day 214=1.29; longitudinal histogram mean: day 0=18.15, day 74= 26.32, day 214=19.75; longitudinal percent hardness: day 0=58.5%, day 74=32.6%, day 214=47.7%). Average qualitative elastographic tendon and lesion grades were higher/softer early in the study and also became lower/harder over time. Mean histopathology grade of all tendons at the end of the study was 1.25, where zero is normal and 4 is severely abnormal.

Discussion/Conclusion: Sonoelastography successfully documented the initial injury and healing of experimentally-induced deep digital flexor tendinitis, similarly to greyscale ultrasound. Injured regions were softer than normal tendon over the course of the study (214 days) and became harder as healing progressed.

Introduction/Purpose: The measurement of glomerular filtration rate (GFR) via gamma camera uptake of 99mTc-diethylenetriamine pentaacetic acid (DTPA) is a useful way to evaluate renal function in cats. Drawing of kidney and background region of interest (ROI) is a major source of variability when determining GFR rate. The aim of this study was to determine the intra- and interobserver variation in the calculation of GFR in cats with chronic kidney disease and to determine whether the renal insufficiency classification of each cat changed between the same or different observers.

Methods: A total of 29 GFR studies performed on 16 cats at CSUVTH between 2010 and 2013 were examined. Each study was read twice, 6 months apart with two measurements per reading by two board certified radiologists and one radiology resident. The global GFR value was calculated for each reading and the cat was classified as having: 1.) normal renal function, 2.) subclinical renal insufficiency, or 3.) clinical renal insufficiency. Intra- and interobserver reliability was evaluated using the % limit of agreement to compare between: GFR measurements performed at each reading; readings (using the average of the measurements); and observers (separately for each reading). Changes in clinical classification were determined between readings and observers.

Results: Independent of observer or reading, there is a 95% chance that the second GFR measurement falls within 10-20% of the first measurement. Based on average measurements, experienced radiologists have a 95% chance of reporting a second reading within 13% of the first reading; for non-experienced observers a learning effect may take place between readings resulting in a higher % limit of agreement (40%). For each reading, the average GFR values reported by different experienced radiologists have a 95% chance of falling within 15-20% of each other. Comparing the average GFR value reported by an experienced radiologist to that of a non-experienced observer (resident at reading 1), the % limit of agreement is higher (35%). Intra- and interobserver reliability of clinical grading is also high. Among experienced radiologists, identical clinical classifications were reported for the two readings for 28 of 29 studies; the resident’s clinical classification was identical for the two readings in only 25 studies. For reading 1, pairs of observers reported the same clinical classification in 83% to 93% of studies while for reading 2 the same clinical classification was reported by different observers 97%-100% of the time.

Discussion/Conclusion: Results show high intra- and interobserver reliability among experienced radiologists; for non-experienced observers reliability may be affected by a learning effect. Variations in GFR measurements will rarely lead to differences in patient clinical classification especially among experienced radiologists.
Introduction/Purpose: Cross-sectional imaging modalities such as multislice computed tomography (CT), magnetic resonance imaging (MRI) or 4D ultrasound, allow creation of a high resolution 3D image within minutes using acquired data. In human medicine, 3D virtual representations of volumetric data aid in surgical planning and provide a better learning experience for the surgeons and trainees involved. With 3D printing, it is possible to prototype these 3D models, creating an accurate and palpable representation of the anatomy within hours.

Methods: Patients requiring advanced spinal, facial or laryngeal surgery were prospectively recruited upon surgeons’ request. Images were acquired using a single slice CT, exported into a rapid prototyping software, Mimics Innovation Suite®. This software allows creation of accurate 3D models. Using thresholding and segmentation processes, the non-anatomical parts and non-clinically useful parts of the models were removed. Once the model rendered, they were corrected and printed using a Replicator2® 3D printer. The models were all printed using polylactic-acid-polymer, a corn based plastic at a temperature of 230 degrees celsius.

Results: Two dogs with atlanto-axial subluxation, one dog with thoracic spinal malformation, one dog with a C2 fracture, one dog with a laryngeal mass and one horse with multiple comminuted facial fractures were included. The use of 3D models allowed the surgeons to choose preoperatively the ideal surgical approach as well as the type and size of implants needed in all but one of the surgeries. In this last case, the fracture of the axis was considered stable based on the model and surgery was not performed. Teaching models of the canine and feline bronchial tree were printed for use in the endoscopy room. Furthermore, models for research projects including one involving gangliosidosis type 2 and another involving the podotrochlear apparatus of the laminitic horse were also created.

Discussion/Conclusion: Rapid prototyping is used commonly in human medicine for preoperative planning, and creation of custom made prostheses. The use of rapid prototyping is less commonly reported in the veterinary literature. 3D models are now commonly used in our institution to help the planning of complicated surgeries, subjectively reducing the surgery time and the complications associated with longer surgery. In both veterinary and human medicine the models have proven to enhance communication across clinicians, students and clients. Models have also been proven useful as a teaching tool for both undergraduate and trainees. Desktop 3D printers, which are inexpensive and user friendly, could popularize rapid prototyping in the future.

NB: 3D models will be provided to allow a hands-on approach for the audience.
MAGNETIC RESONANCE IMAGING FINDINGS OF LYMPHOMA AFFECTING THE SPINE AND PARASPINAL SOFT TISSUES.  B. Allett, S. Hecht. Department of Small Animal Clinical Sciences, University of Tennessee College of Veterinary Medicine, Knoxville, TN 37996.

**Introduction/Purpose:** Lymphoma is one of the most common neoplasms in the dog, and the multicentric form accounts for approximately 80% of cases. Lesions can involve any tissues outside of the lymphatic system including the central nervous system (CNS). Despite the prevalence of lymphoma and the increasing use of magnetic resonance (MR) imaging, reports of lymphoma affecting the spine have been limited to case reports. The purpose of this study was to describe the MR imaging findings in dogs with lymphoma affecting the spine and/or paraspinal soft tissues.

**Methods:** Medical records at our institution were searched for patients that had MR imaging of the spine and had a diagnosis of lymphoma of the spine or paraspinal tissues during the period of 2009 – 2013. The MRI studies were evaluated for the presence of focal or multifocal disease, identification of the structures involved including the spinal cord, meninges, spinal canal, vertebrae, and paraspinal soft tissues, and the signal characteristics on T2-W, T1-W, STIR, HASTE and T1-W sequences prior to and following intravenous contrast medium administration.

**Results:** Six dogs with a median age of 7 years (range of 1 - 10 years) met the inclusion criteria. Common MRI findings included multifocal disease (5/6), involvement of one (2/6) or multiple (3/6) vertebrae, a variable degree of spinal cord compression (4/6) and involvement of the paraspinal soft tissues (5/6). Vertebral changes were confined to the medullary cavity without evidence of osteolysis and were best seen on STIR and post contrast images. There was questionable involvement of the spinal cord in only one case. All spinal and paraspinal lesions identified were hyperintense on T2-W and STIR sequences and showed variable contrast enhancement.

**Discussion/Conclusion:** Imaging findings of lymphoma affecting the spine and paraspinal soft tissues typically were multifocal and involved a combination of vertebrae, spinal canal and paraspinal soft tissues. Lesions were commonly T2-W and STIR hyperintense and displayed contrast enhancement. The STIR and T1-W post-contrast sequences were subjectively the most useful in identification of the lesions.
VALUE OF SINGLE SHOT FAST SPIN ECHO PULSE SEQUENCES IN ASSESSMENT OF THE CANINE SPINAL CORD FOR PROGRESSIVE MYELOMALACIA. Gilmour LJ, Jeffery N, Miles K, Riedesel E. Department of Veterinary Clinical Sciences, College of Veterinary Medicine, Iowa State University, Ames, IA 50011.

Introduction/Purpose: Progressive myelomalacia (PM) is an uncommon type of ischemic and hemorrhagic infarction of the spinal cord that is most often associated with acute spinal cord injury. Diagnosis of PM can be difficult in the early course of disease, but prompt recognition of PM is important because it is often fatal. In this study, we wished to determine whether a single shot fast spin-echo (SSFSE) magnetic resonance (MR) pulse sequence might help predict development of PM in deep pain negative dogs prior to observation of the ascending clinical signs. The specific aim of this investigation was to compare cerebrospinal fluid (CSF) attenuation as viewed on the SSFSE pulse sequence images in deep pain negative dogs that later developed PM with those that did not.

Methods: Hospital records were reviewed for dogs presenting with acute paraplegia associated with loss of deep pain perception that underwent MR imaging from January 2011-May 2014. All MR examinations including the sagittal SSFSE pulse sequence were performed in anesthetized patients using a 1.5T unit. The SSFSE images were evaluated for areas of CSF attenuation by three reviewers that were blinded to patient outcome. Length of CSF attenuation along the spinal cord was recorded as a ratio to the length of the L2 vertebral body (CSF:L2).

Results: Twenty one cases comprised the study population, 5 of which developed PM. All cases had some CSF attenuation on the SSFSE. The CSF:L2 attenuation value was significantly higher in dogs that developed PM compared to those that did not.

Discussion/Conclusion: The SSFSE sequence provides useful images for evaluation of the cerebrospinal fluid signal in deep pain negative dogs and should be considered for inclusion in MR examinations of the canine spine. This sequence shows promise in differentiating a subset of deep pain negative dogs that are more likely to develop PM, providing earlier prognostic information, although a larger study population is required to further validate these results.

Introduction/Purpose: Although computed tomography (CT) of the skull is a commonly performed diagnostic procedure in veterinary referral institutions, the role of CT in veterinary dental evaluation has not been fully investigated. Recognition of dental disease when performing CT of the skull is important to the overall health of the patient. Tooth resorption is a common dental disease in cats that can cause severe dental pain. Clinical evaluation of tooth resorption currently involves oral exam and dental radiography. The detection of tooth resorption with CT compared to oral exam and digital dental radiographs remains to be determined. The purpose of this study is to evaluate the sensitivity and specificity of CT for diagnosis of tooth resorption in cats, compared to the current clinical gold standard of oral exam and intraoral digital dental radiography.

Methods: Cat cadavers (euthanized for reasons unrelated to this study) were evaluated for tooth resorption using oral exam, intraoral digital dental radiography, and computed tomography. The oral exam and dental radiographs were performed by a single observer (board-certified veterinary dentist). Radiographs were evaluated by the above board-certified veterinary dentist and a DVM experienced in dentistry by a consensus statement. CT images (obtained at four different slice thicknesses: 3 mm, 2mm, 1 mm, and 0.5 mm) were evaluated via a consensus by a board-certified radiologist and a 2nd year radiology resident. The sensitivity and specificity of CT for diagnosis of tooth resorption were calculated for each slice thickness using oral exam and digital dental radiography combined as the gold standard. Teeth (excluding incisors) diagnosed as having tooth resorption on either oral exam or radiography were considered positive for tooth resorption. Teeth diagnosed as not having tooth resorption on either oral exam or radiographs were considered negative for tooth resorption.

Results: Twenty-eight cat cadavers were included in the study. The sensitivity and specificity of CT for diagnosis of tooth resorption for each slice thickness was as follows: 3 mm (42%, 96%), 2 mm (49%, 93%), 1 mm (58%, 93%), and 0.5 mm (57%, 93%).

Discussion/Conclusion: Tooth resorption lesions in cats identified on CT images of the skull are highly specific and suggestive of true tooth resorption. However, the low sensitivity of CT for diagnosis of tooth resorption in cats precludes its use as a valuable screening test.
ACCURACY AND SAFETY OF IMAGE GUIDED PERCUTANEOUS INJECTION OF GELIFIED ETHANOL IN THE LUMBO SACRAL INTERVERTEBRAL DISC IN DOGS.

Introduction/Purpose: Radiopaque gelified ethanol, marketed as Discogel®, has been described as a useful agent for the treatment of human patients with disc herniations. The agent is injected into the nucleus pulposus via image guidance and is intended to cause the protruded disc material to recede. The aims of the current study are: 1) to evaluate the safety, accuracy and distribution of the injected gelified ethanol preparation in dogs 2) to evaluate the effect on intervertebral disc size.

Methods: Radiopaque gelified ethanol injections of the lumbosacral discs of research dogs were performed using CT (n=9) or fluoroscopic guidance (n=1) based on a previously described technique.¹ Pre and post injection MRI and neurological examination were performed to assess for changes related to the injected preparation over time. The accuracy of gelified ethanol placement and the presence of leakage of the injected material was documented via CT examination immediately post–injection.

Results: Percutaneous injection of the lumbosacral intervertebral disc via a dorsal approach was successful in delivering radiopaque gelified ethanol to the nucleus pulposus in all 10 dogs. Leakage of the injected material into the epidural space was present in 4 dogs. All dogs tolerated the injection well and had no clinical adverse reactions within the study period (>6 months). There were no significant changes in the neurological status or MRI findings between the pre and 2 week post injection studies. There was no significant difference between those injections with and without contamination in regards to the time of injection (p=0.738), number of times the needle was repositioned (p=1.000), resistance to injection (p=1.000), subjective score for the operator’s level of satisfaction with injection (p=0.667), Pfirrmann grade of intervertebral disc degeneration (p=0.667) and dose of injection (p=0.505).

Discussion/Conclusion: These findings indicate that injection of radiopaque gelified ethanol into the nucleus pulposus of the lumbosacral disc of dogs is well tolerated. Even in the presence of epidural contamination, no untoward effects were noted up to 6 months following the injection. The use of Discogel in dogs with chronic disc protrusions warrants further investigation.

Introduction/Purpose: Proton (hydrogen-1) magnetic resonance spectroscopy (1H-MRS) is widely used in assessment of intracranial lesions in humans. To date, there are no descriptions of the (1)HMRS findings in canine patients with intracranial pathology. The aims of this study were to 1-describe the findings of (1)HMRS in canine patients with inflammatory and neoplastic intracranial disease and 2-to determine the applicability of MRS in differentiating between inflammatory and neoplastic lesions and between meningiomas and gliomas.

Methods: Retrospective evaluation of 3-T (1)HMRS findings from 35 dogs with intracranial disease were assessed (19 neoplasia: 10 mengioma, 7 glioma, 2 other and 14 inflammatory). All neoplastic lesions were histopathologically confirmed. Inflammatory disease was confirmed by histopathology, CSF analysis and/or treatment response. The concentrations of N-acetylaspartate (NAA), choline (Cho), and creatine (Cr), and metabolite ratios (NAA/Cho, NAA/Cr, and Cho/Cr) were independently compared, between neoplastic and inflammatory lesions and meningiomas and gliomas using discriminant analysis and ANOVA.

Results: (1)HMRS was 82.4% accurate in differentiating neoplastic from inflammatory lesions using the NAA/Cho ratio. In comparison to inflammatory, neoplastic lesions demonstrated a significant reduction in NAA and increase in Cho concentrations with a significant decrease in NAA/Cho, NAA/Cr ratios and increase in Cho/Cr ratio. No significant difference was noted between meningiomas and gliomas.

Discussion/Conclusion: MR spectroscopy is effective in differentiating canine inflammatory lesions from neoplastic lesions. (1)HMRS metabolite alternations are similar to changes described in the human literature. (1)HMRS is a beneficial supplement to conventional MR images in patients with high clinical suspicion on inflammatory or neoplastic intracranial lesions.
MRI T1 MAPPING OF EQUINE TENDONS AND LIGAMENTS- TECHNIQUE AND PILOT DATA. M. Spriet, T.C. Garcia, A.J. DeRouen, A.C. Young, B. Murphy. University of California, Davis, CA 95616.

Introduction/Purpose: Calculation of the longitudinal relaxation time (T1) of equine tendons in the metacarpal region has been performed using magic angle magnetic resonance imaging. Increased T1 values were associated with tendon lesions, likely due to changes in the composition of the extracellular matrix. T1 mapping has been used in human and rabbit Achilles tendons for evaluation of regional variation of T1 values and detection of focal lesions. The goal of this study was to assess the feasibility of T1 mapping of tendons and ligaments in the equine metacarpal and foot areas, using magic angle MR imaging on a clinical MR system.

Methods: Seven isolated equine thoracic limbs were used for T1 mapping of the metacarpal region, 6 other limbs were imaged for mapping of the distal deep digital flexor tendon (DDFT) and collateral ligaments of the distal interphalangeal joint (CL DIP). For metacarpal imaging, the dorsal aspect of the metacarpus was positioned at 55° relative to the magnetic field. For foot imaging, the dorsal hoof wall was positioned at +20° relative to the magnetic field (extension) for mapping of the DDFT and at -20° (flexion) for mapping of the CL DIP. The imaging was performed on a 1.5T MR unit using a proton density and an inversion recovery sequence with a 350 ms inversion time as previously described for T1 calculation. A Matlab program was developed to generate a map based on calculation from the 2 different sequences.

Results: T1 maps could reliably be obtained in all specimens. The mapping of the distal DDFT was limited to the most distal aspect of the tendon, from the level of the middle of the navicular bone distally. All normal tendons and ligaments had a homogeneous appearance on the T1 map; except for the DDFT, at the level of the navicular bone, that presented a dorsal area with higher T1 value. Regional variations in T1 values were observed in tendons with lesions. Focal areas of increased T1 values were identified in areas where the signal remained within normal limits on conventional MR images.

Discussion/Conclusion: T1 maps of equine tendons and ligaments can be created using magic angle imaging on a clinical 1.5T MR unit. The mapping of the metacarpal area would likely be challenging on clinical patients due to the way the limb need to be positioned, however the positioning needed for mapping of the DDFT and CL DIP could easily be achieved. Increased T1 values might correlate with higher proteoglycan content, as observed at the dorsal aspect of the DDFT at the level of the navicular bone and in lesions with chondroid metaplasia. The technique might become helpful in detecting early lesions not identified with conventional MR imaging.
THE DETECTABILITY OF SOFT TISSUE INJURIES OF THE EQUINE DISTAL LIMB USING ELASTOGRAPHY COMPARED WITH MAGNETIC RESONANCE IMAGING.

Introduction/Purpose: Tendon and ligament injuries are common and costly problems in the equine industry. Compression elastography is an ultrasonographic technique that estimates tissue strain and may have utility in diagnosing and monitoring soft tissue injuries in the equine athlete. The purpose of this study was to investigate the ability of elastography to detect spontaneously occurring lesions of equine tendon and ligaments diagnosed with magnetic resonance imaging (MRI).

Methods: 21 horses with soft tissue injuries of the distal limb diagnosed with MRI were evaluated. Several horses had multiple lesions for a total of 24 lesions. These included 4 lesions of the deep digital flexor tendon (DDFT) within the distal digital sheath, 13 lesions of the suspensory branches and 7 lesions of the hindlimb proximal suspensory ligament (PSL). To determine the best method for evaluation for each specific site, each examination was performed with the limb in different weight bearing positions (off-weighted or standing) as well as with and without a standoff.

Results: Evaluation of the hindlimb PSL was considered most appropriate in transverse orientation, without a standoff and with the limb non-weight bearing such that the flexor tendons were laterally displaced. However, not all lesions of the PSL diagnosed with MRI were detectable with elastography. Those not detected (n=3) were within 5mm of the insertion and measured less than 8mm in diameter on MRI. All lesions of the PSL at least 6mm distal to the insertion (n=4) were detected. Of these, one measured 6mm in diameter while the remaining 3 were greater than 1.4cm in diameter. All lesions of the suspensory branches diagnosed with MRI were detected with elastography. These ranged from 0.2mm to 1.3cm in diameter and were detected in longitudinal orientation with the limb weight bearing. However, in transverse orientation, lesions at the insertion were most reliably detected with the limb off-weighted. Similar to lesions of the suspensory branches, lesions of the DDFT within the distal digital tendon sheath were most apparent with the limb held in a non-weight bearing position. The addition of a standoff did not alter detectability of lesions of the suspensory branches or DDFT.

Discussion/Conclusion: Using MRI as the gold standard, commonly encountered soft tissue injuries of the equine distal limb could be detected with elastography. However, elastography seems to be somewhat limited for detecting small injuries near the insertion of the hindlimb PSL. Information gained by incorporating elastography into routine examinations may provide an additional parameter useful for monitoring healing.

Introduction/Purpose: Low level laser therapy (LLLT) is becoming commonplace for the treatment of soft tissue and orthopedic injuries in the equine athlete. The combination of regenerative therapies and LLLT is routinely administered, though whether these treatments act synergistically or not is unknown. Both LLLT and platelet-rich plasma (PRP) have been shown to induce neovascularization thought beneficial to healing. However, there is limited data regarding the progression of neovascularization throughout healing of equine musculoskeletal injuries in vivo. The purpose of this ongoing study is to investigate the patterns and degree of neovascularization in horses with injuries of the superficial digital flexor tendon (SDFT) treated with PRP and LLLT. Alterations in sonographically detectable vasculature may provide information that can be utilized as a monitoring parameter to enhance rehabilitation and case management.

Methods: Vascularity within lesions of the SDFT treated with intralesional PRP and daily LLLT were evaluated using power Doppler ultrasound and standard grey scale ultrasound every 30 days for nine months. Images were obtained with the limbs both weight bearing and non-weight bearing. The contralateral normal SDFTs were imaged for comparison. Sonographically apparent vascularity was quantified by determining the area of vasculature within the area of injury using custom in-house software.

Results: Results of two horses with spontaneous lesions of the SDFT in this ongoing study are presented. Vascularization was apparent within the site of injury throughout the rehabilitation process (horse 1, mean= 65% of lesion area (19.5%-93%); horse 2, mean= 42% of lesion area (8%-61%)). 40-80% less vascularity was detected with the limbs weight bearing. Interestingly, horse 1 received more aggressive laser therapy than horse 2 and exhibited more vascularity throughout the evaluation. Reinjury occurred in both horses during the examination period, and was more severe in horse 1. The lowest levels of vascularity (horse 1- 19.5% of lesion area; horse 2- 8% of lesion area) corresponded with periods of reinjury. No vascularity was detected in the normal SDFT of the contralateral limbs.

Discussion/Conclusion: The results of this pilot study indicate that lesions of the equine SDFT can be highly vascularized during healing and this vascularization can be evaluated using power Doppler. Further investigation is required to determine if the pattern and degree of neovascularization can be used to assess the efficacy of different therapies and to optimize rehabilitation.
Introduction/Purpose: Hind limb proximal suspensory ligament desmopathy is an important cause of equine lameness. Changes in ligament size are associated with pathologic conditions; however, there are few studies looking for normal values of specific breeds and disciplines. The aim of this study is to evaluate the ultrasonographic morphometric measurements of the hind proximal suspensory ligaments and related structures of normal two-year-old Quarter Horse cutting horses, using three different techniques.

Methods: This study included 19 two-year-old Quarter Horses that had recently entered training for cutting. The ultrasound exams were performed by two experienced equine ultrasonographers (MB & GZ) using a GE Logiq E ultrasound, with a linear probe set at a frequency of 8-10 mHz. Transverse images were obtained using three different methods: weight-bearing plantaromedial, non-weight-bearing plantaromedial and directly plantar approaches. The proximal suspensory ligaments were each divided in four different regions 2 cm apart, from 12 to 18 cm distal to the point of the hock (DPH). The longitudinal approach scanned the plantar portion of the origin of the SL at multiple points from medial to lateral at 10 and 12 cm DPH. Using a DICOM image manager (Image J), the cross sectional area, the fascia thickness and the distance between the second and fourth metatarsal bones were calculated on all transverse images. The longitudinal images were used to measure the proximal accessory band of the suspensory ligament originating (PBSL) from the fourth metatarsal bone (at 10cm DPH) and dorsal plantar thickness of the suspensory ligament at the origin (at 12cm DPH). All data were statistically analyzed using a multiple linear regression.

Results: There was no significant difference found between ultrasound method and cross sectional area measurement (p=0.07). However, there was an association between cross sectional area and region along the limb (table 1). The shape of the SL changes significantly in the proximal portion, with an increase in the cross sectional area from proximal to distal. The PBSL thickness was 0.39 ± 0.08 cm.

Discussion/Conclusion: As the CSA changes in the proximal SL, it is essential to scan the same level to compare the images in following studies. The marked change in ligament shape can help to know which level is scanned. This study is the first report of average suspensory ligament size in young Quarter Horse cutting horses as well as the first study to the authors’ knowledge that reports fascia and proximal accessory band thickness in normal horses.

Table 1: Hind Limb Suspensory Ligament ultrasonographic morphometric measurements

<table>
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<tr>
<th>DPH</th>
<th>Non-weight bearing Palmaro Medial</th>
<th>Weight bearing Palmaro Medial</th>
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<tr>
<td></td>
<td>SL CSA</td>
<td>SD</td>
</tr>
<tr>
<td>12cm</td>
<td>1.04 ± 0.23</td>
<td>0.08 ± 0.02</td>
</tr>
<tr>
<td>14cm</td>
<td>1.59 ± 0.29</td>
<td>0.07 ± 0.02</td>
</tr>
<tr>
<td>16cm</td>
<td>1.81 ± 0.33</td>
<td>0.07 ± 0.02</td>
</tr>
<tr>
<td>18cm</td>
<td>1.64 ± 0.26</td>
<td>0.07 ± 0.02</td>
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</table>
Introduction/Purpose: Access to the equine coxofemoral (CF) joint for synoviocentesis or injection is inherently challenging. “Blind” techniques to the dorsal joint capsule rely upon inconsistently palpable landmarks for needle placement between the cranial and caudal eminences of the greater femoral trochanter. Ultrasound-guidance allows direct needle visualization but requires skill to accurately place the needle into the small articulation between the acetabular rim and femoral head. Aspiration of synovial fluid is recommended to ensure intra-synovial placement and to avoid anesthesia of the sciatic nerve. A large cranioventral recess of the CF joint has been described in horses with effusion due to CF pathology. This recess is readily visible with ultrasound (US) in affected horses and should facilitate intra-synovial access to the CF joint.

Methods: Horses with distention of the cranioventral recess of the CF joint were considered for this alternative injection technique. Injection was by owner request or clinician recommendation. The transducer and ultrasonographer’s hand were dressed with sterile surgical gloves. After aseptic skin preparation, a transverse view of the cranioventral recess was obtained with a low frequency (2-5 MHz) transducer by sliding the transducer ventrally to the proximal femur from a cranial view of the CF joint. With the transducer oriented parallel to the ground, an 8" 16-18g spinal needle was placed cranial to the transducer and advanced caudomedially into the cranioventral recess.

Results: Six injections into the cranioventral recess of the CF joint were performed in 5 horses from 2009-2014. All were aged horses (15-29 years) of varying breeds and uses. All were lame at the walk and had ultrasonographic evidence of severe coxofemoral pathology, including subluxation (3), luxation (1) and severe OA (1). Five injections were performed for therapeutic purposes using varying doses of hyaluronic acid, corticosteroids and amikacin. One injection was performed for diagnostic purposes and yielded significant improvement in the lameness. All required only one needle placement, and synovial fluid was readily retrieved upon removal of the stylet in all cases. An additional 7 horses had a large cranioventral recess visible during the study period but either did not undergo injection or underwent US-guided injection using traditional dorsal techniques. All but one of these horses had severe CF pathology.

Discussion/Conclusion: When distended, US-guided intra-synovial access to the cranioventral recess of the CF joint is straightforward and reduces the potential for extra-synovial placement. This recess is often distended in horses with severe pathology that may benefit from therapeutic injections. Although dorsal approaches using either blind or US-guided techniques have been indoctrinated into practitioners’ minds, the cranioventral technique should be considered in horses with severe effusion. Lone distention of this recess without ultrasonographically detectable pathology appears to be uncommon. It is therefore questionable if this technique would be useful in horses without effusion.
Thursday, October 23, 2014

ACVR and RO

7:00 am  
*Registration Opens*  
Grand Foyer

7:15 am  
VUS Meeting  
Grand Ballroom A-D

8:00 am  
SVNM Keynote Address  
Grand Ballroom A-D

Comparative Treatments with Thyroid Cancers in Humans  
Dr. Amolak Singh  
Professor and Interim Chair  
Radiology, College of Medicine  
University of Missouri  
Columbia, MO

9:00 am  
MR/CT Focus Forum  
Grand Ballroom A-D

Dr. Silke Hecht, Pres. MR/CT Society

Spinal Imaging: Updates and Controversies  
Dr. John Farrelly  
Dr. Shannon Holmes  
Dr. Jay Griffin  
Dr. Ketaki Karnik  
Dr. Deb Prescott  
Dr. Ian Robertson  
Dr. Amy Tidwell

10:30 am  
Break with Exhibitors  
Arch View Ballroom

11:00 am  
Radiation Oncology Keynote Address  
Grand Ballroom A-D

New Metabolic Targets as Novel Cancer Therapeutics  
Dr. Mark Dewhirst  
Co-Director, Radiation Oncology/Imaging Program  
Gustavo S. Montana Professor of Radiation Oncology, School of Medicine  
Professor of Pathology  
School of Medicine  
Duke University  
Durham, NC

12:00 pm  
Lunch on Your Own

1:30 pm  
Resident Authored Paper Award – Dr. Jeryl Jones  
Grand Ballroom A-D

Resident Presentation/Poster Awards – Dr. Mauricio Solano

RO

1:45 pm - 3:00 pm  
1994 Exam Writers Presentations - Dr. Don Thrall  
Grand Ballroom E-G

ACVR

1:45 pm  
ACVR Image Interpretation Session  
Grand Ballroom A-D
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tr>
<td>3:00 pm</td>
<td>Break with Exhibitors</td>
<td>Arch View Ballroom</td>
</tr>
<tr>
<td>3:30 pm</td>
<td>Introduction of New Diplomates - Radiology and Radiation Oncology</td>
<td>Grand Ballroom A-D</td>
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<tr>
<td>4:00 pm</td>
<td>ACVR General Business Meeting</td>
<td>Grand Ballroom A-D</td>
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<td>(Diplomates only)</td>
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<td>5:00 pm</td>
<td>SVNM Meeting</td>
<td>Grand Ballroom A-D</td>
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<td>6:00 pm</td>
<td>Adjourn for the Day</td>
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<td>6:00 pm - 9:00 pm</td>
<td>OFF SITE – AIS Sponsored Reception – Science Center</td>
<td>Arch View Foyer</td>
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BE SURE TO CHECK OUT THE POSTERS DURING THE BREAKS!
**ACVR Diagnostic Imaging**

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<thead>
<tr>
<th>Time</th>
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<tr>
<td>7:00 am</td>
<td>Registration Opens</td>
<td>Grand Foyer</td>
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<tr>
<td>7:15 am</td>
<td>CT/MRI Society Meeting</td>
<td>Grand Ballroom A-D</td>
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<td>8:00 am</td>
<td>Ultrasound Keynote Address</td>
<td>Grand Ballroom A-D</td>
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<td><strong>Ultrasound in Interventional Radiology:</strong></td>
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<td><strong>Ablation Procedures, and Guided Needle Aspirations and Biopsies.</strong></td>
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<td>Dr. Timothy Ziemlewicz</td>
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<td>9:00 am</td>
<td>Scientific Session 5</td>
<td>Grand Ballroom A-D</td>
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<td><em>(Moderator: Dr. Gabi Seiler)</em></td>
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<td>9:00-9:10 am</td>
<td><strong>Clinical Significance of Gallbladder Sludge in the Feline Patient.</strong></td>
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<td>R.A. Baumruck(^1), M.E. Ellison(^1), M.T. Kearney(^2).(^1) Department of Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803. (^2)Department of Pathobiological Sciences, Louisiana State University, Baton Rouge, LA 70803.</td>
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<td>9:10-9:20 am</td>
<td><strong>Sonographic Recognition of Gastric Muscularis Unorganized Hyperechoic Striations and Colonic Muscularis Hyperechoic Band Paralleling the Serosal Surface in Dogs.</strong></td>
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<td>H.G. Heng, C.K. Lim, M.M. Broman, M.A. Miller. Purdue University, West Lafayette, IN 47907.</td>
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<tr>
<td>9:20-9:30 am</td>
<td><strong>Assessment of Neoangiogenesis During Bone Fracture Healing Using Contrast Enhanced Ultrasonography in Canine Fracture Model.</strong></td>
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<td>S.H. Jeon(^1), J.Y. Jang(^2), G.H. Lee(^1), S.J. Park(^1), B.G. Cheon(^1), S.H. Moon(^1), S.K. Lee(^1), H.W. Kim(^2), J.H. Choi(^1). (^1)College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, (^2)Haemaru Referral Animal Hospital, Seongnam 463-050, South Korea.</td>
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<tr>
<td>9:30-9:40 am</td>
<td><strong>Strain Elastography for Canine Thyroid Gland:</strong> Comparison External Compression vs. Dobutamine Induced Carotid Artery Pulsation.**</td>
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<td>9:40-9:50 am</td>
<td><strong>Ultrasonographic Changes Seen in 65 Cats with Gastrointestinal Small and Large Cell Lymphoma and Mastocytosis.</strong></td>
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9:50-10:00 am  
**ULTRASONOGRAPHIC MEASUREMENTS OF ADRENAL GLANDS FOR DIFFERENTIATION OF HYPERCORTISOLISM FROM DIABETES MELLITUS IN DOGS.** P.S. Martinez, S.N. Soulsby, C. Gilor. College of Veterinary Medicine, Ohio State University, Columbus, OH 43320.

10:00 am  
*Break with Exhibitors*  
Arch View Ballroom

10:00 am  
**Scientific Session 6**  
(Moderator: Dr. Silke Hecht)

10:30-10:40 am  

10:40-10:50 am  
**18F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY EVALUATION OF CANINE BONE MARROW.** S.N. Knapp, J.N. Bryan, I. Masseau, C.R. Cook. College of Veterinary Medicine, University of Missouri, Columbia, MO 65211.

10:50-11:00 am  
**QUANTITATIVE 99mTECHNETIUM PERTECHNETATE THYROID SCINTIGRAPHY IN EUTHYROID NEW ZEALAND WHITE RABBITS (ORYCTOLAGUS CUNICULUS).** J. Brandão¹, M. Ellison¹, H. Beaufrère², J. Johnson³, M. Rick³, T. Tully³. ¹Department of Veterinary Clinical Sciences, Louisiana State University, Baton Rouge, LA 70803, ²Health Sciences Centre, Ontario Veterinary College, University of Guelph, Ontario, Canada, N1G 2W1, ³Department of Veterinary Clinical Medicine, College of Veterinary Medicine, University of Illinois, Urbana, IL 61802, and ⁴Endocrine Diagnostic Section, Diagnostic Center for Population and Animal Health, Michigan State University, East Lansing, MI 48824.

11:00-11:10 am  
**MAGNETIC RESONANCE AND COMPUTED TOPOGRAPHY IMAGING FINDINGS IN THREE DOGS WITH ABERRANT DIROFILARIA IMMITIS CERVICAL SUBARACHNOID MIGRANS.** B.A. LaFoon¹, M.J. Beasley¹, J.M. Gambino¹, C.J. Alcott², N.D. Jeffery². Mississippi State University, Mississippi State, MS 39762¹, Iowa State University, Ames, IA 50011².

11:10-11:20 am  

11:20-11:30 am  
**ATLANTOAXIAL INSTABILITY WITH INCONGRUENCE: MRI FINDINGS AND SURGICAL TREATMENT IN 5 DOGS.** M. Dolera, L. Malfassi, G. Mazza, N. Carrara, S. Finesso, M. Sala, S. Marcarini. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy, 26014.
11:30-11:40 am  MRI SENSITIVITY AND SPECIFICITY FOR NECK PAIN EXAMINATION IN DOGS AND CATS. M. Dolera, L. Malfassi, S. Finesso, G. Mazza, N. Carrara, S. Marcarini, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy, 26014.


11:50am-12:00 pm  EFFECT OF TISSUE SAMPLING ON THE MAGNETIC RESONANCE IMAGING APPEARANCE OF SKIN AND LYMPH NODES IN HEALTHY DOGS – PILOT STUDY. D. Allstadt Frazier, S. Hecht, G.D. Galyon, G.A. Conklin, M. Allett. Department of Small Animal Clinical Sciences, University of Tennessee College of Veterinary Medicine, Knoxville, TN 37996.

12:00 pm  Lunch on Your Own

Scientific Session (7)  Grand Ballroom A-D  (Moderator: Dr. Liz Watson)

1:30-1:40 pm  CT FINDINGS OF THE SKULLS OF LAGOMORPHS AND RODENTS. E Huynh, JK Reichle. Animal Specialty & Emergency Center, Los Angeles, CA 90025.

1:40-1:50 pm  CHRONOLOGICAL LOW FIELD MAGNETIC RESONANCE APPEARANCE OF CANINE CEREBRAL HEMORRHAGE MODEL. J. Jeong, S. Park, Y. Jung, E. Jeong, N. Kim, M Kim, H. Lee, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, Republic of Korea.

1:50-2:00 pm  USE OF CONTRAST-ENHANCED COMPUTED TOMOGRAPHY TO STUDY THE CRANIAL SPREAD OF A LUMBOSACRAL EPIDURAL INJECTION IN THE DOG. T. Kawalilak, R.L. Tucker, S.A. Greene. College of Veterinary Medicine, Washington State University, WA 99164.

2:00-2:10 pm  COMPUTED TOMOGRAPHIC ENTEROGRAPHY WITH LACTULOSE SOLUTION IN NORMAL DOGS. S.Y. KEH1,2, J.M. SOHN1, M.H. CHO1, N.S. LEE2, J.Y. JANG2, H.W. KIM2, J.H. YOON1. 1Seoul National University, Seoul 151-742. 2Haemaru Animal Referral Hospital, Gyeonggi 463-824, Republic of Korea.

2:10-2:20 pm  CT AND MRI FEATURES OF CAROTID BODY PARAGANGLIOMAS IN 15 DOGS. W. Mai, G. Seiler, A. Zwingenberger, B.J. Lindl-Bylicki. University of Pennsylvania (Mai), PA 19104, North Carolina State University (Seiler), NC 27607 and University of California-Davis (Zwingenberger, Lindl-Bylicki), CA 95616.

2:30 pm  Scientific Session 8  Grand Ballroom A-D
(Moderator: Dr. Matt Winter)

2:30-2:40 pm  MAGNETIC RESONANCE DIFFUSION TENSOR IMAGING IN DOGS WITH COMPRESSIVE AND NON-COMPRESSIVE SPINAL CORD INJURY. G. Middleton, K. Saile, J. Wignall, M. Kearney, L. Gaschen. Louisiana State University, LA 70803.

2:40-2:50 pm  COMPARISON OF DUAL-PHASE 64-DETECTOR CTA AND 1-TESLA MRI FOR DETECTION OF PERITUMORAL PROJECTIONS IN PRE-SURGICAL EVALUATION OF FELINE INJECTION SITE SARCOMAS. S. Nemanic, M. Milovancev, J.L. Terry, S.M. Stieger-Vanegas, C.V. Löhr. Oregon State University1, OR 97331.

2:50-3:00 pm  VERTEBRAL BONE MINERAL DENSITY MEASURED WITH QUANTITATIVE CT IN DOGS: PREVENTIVE EFFECT OF ALENDRONATE ON LOW DOSE PREDNISOLONE-INDUCED OSTEOPENIA. S.J. Park, J.Y. Oh, K.Y. Son, K.O. Cho, J.H. Choi. College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea.


3:20-3:30 pm  ACCURACY OF A COMPUTED TOMOGRAPHY BRONCHIAL WALL THICKNESS TO PULMONARY ARTERY DIAMETER RATIO FOR ASSESSING BRONCHIAL WALL THICKENING IN DOGS. D. Szabo, J. Sutherland-Smith, B. Barton, E.A. Rozanski, O. Taeymans. Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA 01536.

3:30 pm  Break

4:00 pm  Scientific Session 9  Grand Ballroom A-D
(Moderator: Dr. Kip Berry)

4:00-4:10 pm  PREVELANCE AND MAGNETIC RESONANCE IMAGING OF INTERVERTEBRAL DISC DISEASE IN PUGS WITH CAUDAL ARTICULAR FACET DYSPLASIA OF THE THORACOLUMBAR SPINE. A. Full1, C.W. Dewey1, J.L. Bouma2. 1Cornell University Ithaca, NY 14853 and 2 Veterinary Specialists of Rochester Rochester, NY 14620.
4:10-4:20 pm INVESTIGATION OF THE ASSOCIATION BETWEEN CANINE INTERVERTEBRAL DISC DEGENERATION AND SPINE MUSCLE FATTY INFILTRATION IN CHONDRODYSTROPHIC AND NON-CHONDRODYSTROPHIC DOGS. A. Lerer¹, S.G. Nykamp², A.B. Harriss³, T.G. Koch², T. Gibson², S.H.M. Brown³. Western College of Veterinary Medicine¹, University of Saskatchewan, Saskatchewan, Canada, S7N5B4. Ontario Veterinary College², Human Health and Nutritional Sciences³, University of Guelph, Ontario, Canada, N1G2W1.


4:30-4:40 pm ACCURACY OF NARROW FIELD OF VIEW 3T MRI FOR IDENTIFICATION OF ARTICULAR CARTILAGE LESIONS IN THE CANINE STIFLE: AN EX VIVO CADAVERIC STUDY. C.M. Ruoff, B.M. Eichelberger, R.R. Pool, J.F. Griffin IV, K.J. Cummings, A. Pozzi, A. Padua, W.B. Saunders. College of Veterinary Medicine Texas A&M University (Ruoff, Eichelberger, Pool, Griffin, Cummings, Saunders), College Station, TX, 77843, Siemens R&D (Padua), Houston, TX, 77095, and College of Veterinary Medicine University of Florida (Pozzi), Gainesville, FL 32610.


4:50-5:00 pm FEASIBILITY OF SMALL VOLUME SIZES IN CANINE BRAIN ¹H-MAGNETIC RESONANCE SPECTROSCOPY AT 3T. D.K. Stelmach, S.P.Holmes, D.A. Jimenez, M. Kent, H. Mao, S.R. Platt. University of Georgia - College of Veterinary Medicine, Athens, GA 30606.

5:00 pm Meeting Concludes
CLINICAL SIGNIFICANCE OF GALLBLADDER SLUDGE IN THE FELINE PATIENT.
R.A. Baumruck¹, M.E. Ellison¹, M.T. Kearney². ¹Department of Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803. ²Department of Pathobiological Sciences, Louisiana State University, Baton Rouge, LA 70803.

Introduction/Purpose: Limited studies have assessed the significance of gallbladder sludge (GBS) in feline patients with hepatobiliary disease. The purpose of this retrospective study was to assess the relationship between GBS, physical exam parameters, and biochemistry values using similarly aged control cats.

Methods: LSU radiology database was searched from November 2009 to April 2014 for ultrasound exams of cats with reported GBS; similarly aged controls without GBS were also included. Inclusion criteria for both groups included complete history, complete physical exam findings, and bloodwork including alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), total bilirubin, blood glucose, packed cell volume, and total protein within 72 hours of ultrasound exam. Parametric (Student t test) and nonparametric (Chi square, Wilcoxon Rank Sum) statistical analysis was performed, as appropriate.

Results: 30 cats with GBS and 21 control cats met the inclusion criteria. There were no significant differences (p<0.05) between the historical or biochemical profile findings between cats with and without GBS. ALP (p=0.0899), and total bilirubin (p=0.0524) approached statistical significance with the t test; only temperature (p=0.0092) was statistically significant with the Wilcoxon Rank Sum test.

Discussion/Conclusion: The results of the current study suggest that the presence of GBS on ultrasound exam cannot be used as a marker for hepatobiliary disease in cats. While statistically significant, the difference in temperature between cats with and without GBS is not considered clinically significant. Further prospective studies with cytological and/or histological correlation may provide additional information about the significance of GBS.
SONOGRAPHIC RECOGNITION OF GASTRIC MUSCULARIS UNORGANIZED HYPERECHOIC STRIATIONS AND COLONIC MUSCULARIS HYPERECHOIC BAND PARALLELING THE SEROSAL SURFACE IN DOGS. H.G. Heng, C.K. Lim, M.M. Broman, M.A. Miller. Purdue University, West Lafayette, IN 47907.

Introduction/Purpose: Canine gastric muscularis unorganized hyperechoic striations (GMUHS) are observed frequently by the authors, with no clinical signs associated with gastrointestinal disease. Similarly, canine colonic muscularis hyperechoic band paralleling the serosal surface (CMHBPPSS) is observed without gastrointestinal disease. The clinical significance of these two observations is unknown.

Methods: A combination of retrospective and prospective studies was used to investigate these two ultrasonographic findings (GMUHS and CMHBPPSS). The retrospective study aimed to correlate these two findings with the histology of stomach and colon in dogs that had complete abdominal ultrasonography. The prospective study aimed to estimate the prevalence and to characterize the ultrasonographic features of these two findings further, such as diffuse vs focal and correlation with clinical signs of gastrointestinal tract (whenever present).

Results: In the retrospective study, 167 abdominal ultrasonographic examinations were reviewed. 9/167 dogs had gastric muscularis UHS (8 had histologic examination). 8/167 dogs had colonic MHBPSS (6 had histologic examination). Histologically, 3 of the stomachs had normal muscularis; 3 had increased fibrous tissue; 1 each had atrophy, multifocal hemorrhage, or fatty infiltration. Four of 6 examined colons had normal muscularis; 1 each had mild hemorrhage or mild increased fibrous tissue along the myenteric plexus.

In the prospective study, the prevalence of GMUHS was 29/72 (40.3%) and the prevalence of CMHBPPSS was 23/72 (32%). The GMUHS in the gastric muscularis layer were mainly diffuse or observed only in the ventral stomach wall when the stomachs were filled with ingesta or gas, and they were more prominent in empty or contracted stomachs. Only 2 dogs had a history of single episode of vomiting one day prior to presentation. The CMHBPPSS could be seen as focal or diffuse. None of the dogs had diarrhea.

Discussion/Conclusion: The GMUHS and the CMHBPPSS are normal ultrasound features that should not be misinterpreted as lesions. Observation of these findings may be due to improved resolution of ultrasound machines. The GMUHS may represent fibrous tissue in the gastric muscularis and the CMHBPPSS may represent fibrous tissue or the myenteric plexus between the external and internal layers of the tunica muscularis.
ASSESSMENT OF NEOVASCULARIZATION DURING BONE FRACTURE HEALING USING CONTRAST ENHANCED ULTRASONOGRAPHY IN CANINE FRACTURE MODEL. S.H. Jeon¹, J.Y. Jang², G.H. Lee¹, S.J. Park¹, B.G. Cheon¹, S.H. Moon¹, S.K. Lee¹, H.W. Kim², J.H. Choi¹. ¹College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, ²Haemaru Referral Animal Hospital, Seongnam 463-050, Korea.

Introduction/Purpose: Fracture healing is a complex process of callus formation, fracture bridging and bone remodeling. Neovascularization is one of the most important factors for fracture healing. In this study, vascular change and callus formation were evaluated using contrast enhanced ultrasonography (CEUS) in canine fracture model to determine the applicability of CEUS for dogs with bone fracture and estimate the CEUS features in the direct and indirect fracture healing patterns.

Methods: In five healthy beagle dogs, a simple transverse fracture was induced at the proximal third of the left tibia shaft. Then, external skeletal fixation (type 1a) for direct bone healing (n=3) or splint and a fiberglass cast for indirect bone healing (n=2) were applied. Radiography, power Doppler ultrasonography and CEUS were performed every 2–7 days until fracture union completed. Numerical scores (0–3) based on signal intensity and numbers of signals were assigned on power Doppler ultrasonography. On CEUS with 0.5 ml SonoVue, vascular change was evaluated quantitatively by measuring peak intensity (PI), time to peak intensity (TPI), and inflow rate from the soft tissue and callus, and subjectively with a score (0–3) based on number of vascular signals.

Results: Vascular signals with the typical parabolic shape of the time-intensity curves (TICs) were observed from surrounding soft tissue of both two groups and the callus of indirect healing group on CEUS. In direct healing group, PI of soft tissue increased between day 4 and day 13 and reached maximum value ($P_{\text{max}}$) in the period of 13–16 days (mean $P_{\text{max}}$; 38.83 ± 8.77). Then, PI decreased gradually following 20-28 days. In indirect healing group, PI of soft tissue increased from day 2 and peaked at day 10 (mean $P_{\text{max}}$; 39.93 ± 4.94), then began to decrease between 24 and 28 days. The mean $P_{\text{max}}$ between two groups was not significantly different. The vascular signal from the callus was shown from day 13 to day 36, and the $P_{\text{max}}$ was shown between 20 and 24 days (mean $P_{\text{max}}$; 19.65 ± 0.60). In qualitative evaluation, neovascularization on CEUS (day 2) was seen earlier than power Doppler (day 7). The numbers of signals observed on CEUS were significantly higher than those of power Doppler ($P < 0.05$).

Discussion/Conclusion: Neovascularization could be detected from day 2 on CEUS and vascular signal began to decrease between 20 and 36 days. These vascular changes during fracture healing could be estimated with CEUS more sensitively than power Doppler and radiography.

*This study was supported by Basic Science Research Program through the National Research Foundation of Korea funded by the Ministry of Education, Science and Technology (2012R1A1A1040407).

Introduction/Purpose: Strain elastography evaluates tissue stiffness based on the change of strain by compression. This study evaluated the feasibility of strain elastography for canine thyroid gland and the reliability of the dobutamine induced carotid artery pulsation as the internal compression methods.

Methods: In seven mature, clinically healthy male beagle dogs, strain of the thyroid glands was induced by external compression using ultrasound probe, and also by the internal compression using carotid artery pulsation after dobutamine infusion. Strain values of thyroid parenchyma and the near-field body wall were measured by two operators three times in each compression method. Strain ratio was calculated as a ratio of the thyroid strain value to the near-field body wall strain value.

Results: Thyroid glands were softer than the near-field body wall. Thyroid showed a relatively homogeneous green and the body wall was blue. Strain values and strain ratio did not show significant difference among all dogs. No significant difference exists in these values between left and right thyroid glands, and between two operators. Intra-observer repeatability was excellent in both compression methods (ICC for strain value; 0.945, ICC for strain ratio; 0.845). The intra-reviewer repeatability of strain ratio was excellent on carotid artery pulsation method (0.933) than the external compress method (0.760). Mean strain values of the thyroid gland and the body wall were different according to the compression methods (external compress method; 142.93 ± 6.67 for thyroid gland, 18.05 ± 2.82 for body wall, internal method; 147.31 ± 8.24 for thyroid gland, 19.32 ± 3.12 for body wall) (p<0.05). No significant difference exists in strain ratios between two methods.

Discussion/Conclusion: This study provided strain value and strain ratio of the canine thyroid glands in healthy dogs. Strain elastography was feasible for estimating thyroid stiffness in dogs using external compression method as well as carotid artery pulsation. In particular, carotid artery pulsation induced by dobutamine infusion could be used as internal compression method for canine thyroid strain elastography independent of the operator without side effect.

Supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (2012R1A1A1040407).

Introduction/Purpose: Lymphoma and malignant mastocytosis are two of the most common gastrointestinal (GI) tumors in cats. Ultrasonographic features of gastrointestinal lymphoma have been reported to include: focal hypoechoic mass and/or intestinal wall thickening primarily associated with the muscularis layer. Multicentric involvement of the abdomen has also included renal infiltration and jejunal lymph node abnormalities. Few reports of the ultrasonographic appearance of gastrointestinal malignant mastocytosis have been described. The reported changes include focal hypoechoic eccentric wall thickening involving the duodenum or jejunum most commonly (9/16) and/or thickening of the ileocecolic junction or colon with loss of wall layering (3/7). In a recent pathology review, differentiation between transmural T cell, mucosal T cell and B cell lymphoma have significant differences in clinical outcomes. The purpose of this retrospective study was to determine if there were unique sonographic features related to gastrointestinal small and large cell lymphoma, and mast cell disease. The null hypothesis of this study was that there would not be significant differences between these tumor types based on ultrasound findings.

Methods: Medical records at the University of Florida College of Veterinary Medicine were searched from 2008-2013. The medical records were searched for cats with a histologic diagnosis of small cell lymphoma, large cell lymphoma, or malignant mastocytosis that also had abdominal ultrasound studies. All sonographic studies were reviewed for specific features related to the peritoneal space and changes associated with the abdominal organs. Based on the tumor type (small cell [assumed to be T cell], large cell [assumed to be B cell] and mastocytosis), the signalment and ultrasound tabulated findings were compared using chi-square analysis with a p value of less than 0.05 being considered significant.

Results: Out of the 65 cats, there were 10 small cell lymphoma, 43 large cell lymphoma and 12 mastocytosis cases. The average age was 11.6 (2 – 20) years. Of the different tumors, the most common infiltrative tumor without ultrasonographic findings was small and large cell lymphoma (7/65 cases; P = 0.04). In 25/30 solitary GI masses seen, the most common cell type was large cell lymphoma (P = 0.04). The other ultrasound findings were not significant based on the tumor type.

Discussion/Conclusion: Solitary gastrointestinal masses are more likely to be large cell lymphoma. In addition, a normal ultrasound study does not rule out lymphoma or mastocytosis.
ULTRASONOGRAPHIC MEASUREMENTS OF ADRENAL GLANDS FOR DIFFERENTIATION OF HYPERCORTISOLISM FROM DIABETES MELLITUS IN DOGS. P.S. Martinez, S.N. Soulsby, C. Gilor. College of Veterinary Medicine, Ohio State University, Columbus, OH 43320.

Introduction/Purpose: Diabetes Mellitus (DM) and Hypercortisolism (HC) are common diseases in dogs. Clinical signs caused by these two diseases overlap considerably and pose a diagnostic challenge. In the unregulated diabetic HC is commonly suspected as the cause of dysregulation. However, the chronic stress in unregulated diabetes leads to over-activity of the hypothalamus-pituitary-adrenal (HPA) axis with resulting high rate of false positives on all functional screening tests for diagnosis of HC. It is unknown whether over activity of the HPA axis in DM also results in enlargement of the adrenal glands. We hypothesized that adrenal gland thickness (AGT), measured by ultrasound as the greatest dorsoventral dimension perpendicular to the long axis, is normal in unregulated DM dogs and can be used as a diagnostic test for HC.

Methods: Cases were collected retrospectively from the OSU medical records during the years 2000-2012. Cases were included if they had a conventional clinical diagnosis of Diabetic Ketoacidosis (DKA, representing unregulated DM) or HC and if they had a full ultrasound scan (US) prior to treatment of HC and no more than 72 hrs after treatment of DKA began. Only cases that had one of the two diseases were included with verification of the exclusive diagnosis for at least 1 year after the date of the US. Dogs were divided between 2 body weight (BW) categories: <11kg and >11kgs. Using the clinical diagnosis as a gold standard and ROC curves for choosing cutoffs, the sensitivity and specificity of AGT measurements for diagnosis of an enlarged adrenal were calculated.

Results: Twenty four dogs <11 kgs (12 DKA and 12 HC) and 30 dogs >11 kgs (12 DKA and 18 HC) were identified with age and BW not significantly different between DKA and HC. The mean±SD (range) of Left and Right AGT (in mm) for each group and the respective sensitivity (Sn) and specificity (Sp) are tabulated below:

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<th>DM AGT</th>
<th>HC AGT</th>
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<td>&lt;11kg</td>
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<td>L</td>
<td>5.0±1.0 (3.9 – 7.8)</td>
<td>6.3±1.5 (4.1 – 8.7)</td>
<td>0.58</td>
<td>0.92</td>
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<tr>
<td>R</td>
<td>4.6±0.9 (3.5 – 6.5)</td>
<td>7.9±5.1(3.6 – 22.8)</td>
<td>0.67</td>
<td>0.92</td>
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<tr>
<td>&gt;11kg</td>
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<tr>
<td>L</td>
<td>6.5±1.4 (4.5 – 10.0)</td>
<td>8.5±3.5 (5.1 – 17.6)</td>
<td>0.67</td>
<td>0.92</td>
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<tr>
<td>R</td>
<td>4.7±2.4 (4.4 – 7.8)</td>
<td>7.2±2.7 (4.2 – 13.1)</td>
<td>0.72</td>
<td>0.92</td>
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Discussion/Conclusion: Adrenal gland thickness in unregulated diabetic dogs is similar the thickness previously reported in healthy dogs of similar body weights. The diagnostic utility of ultrasound in differentiating DM from HC is limited and HC cannot be ruled out in a diabetic with normal AGT. However, an increased AGT in a diabetic dog would be consistent with concurrent diagnosis of HC although other causes of gland enlargement should be considered.
Introduction/Purpose: Assessment of lymph nodes is an important step in workup and monitoring of canine and feline cancer patients. Currently fine needle aspirates are needed for diagnosis. Elastography is an ultrasound technique that allows estimation of tissue stiffness. In people, it has been shown to increase sensitivity of B-mode sonography in detection of metastatic lymph nodes. The purpose of this study was to evaluate diagnostic usefulness of elastography in differentiating reactive and neoplastic lymph nodes in cats and dogs.

Methods: Dogs and cats scheduled for fine needle aspirates (FNA) of a lymph node were included. Elastography was performed prior to tissue sampling. Patients with non-diagnostic or equivocal cytology results were excluded. Softness was scored qualitatively as 1-4 (1=hard; 4=soft) on an image where tissue hardness is depicted by a color scale (blue=hard, red=soft). Quantitative analysis was performed using custom-made software. Scores of benign and malignant lymph nodes were compared using a Mann Whitney test with the level of significance set at P<0.05.

Results: 42 lymph nodes were included, 22 (12 dogs, 10 cats) had benign cytology results and 20 (17 dogs, 3 cats) were diagnosed with neoplasia. Benign lymph nodes were softer (mean score 2.41, SD 0.66) than malignant lymph nodes (mean score 1.76, SD 0.57). Differences between groups were significant in qualitative and quantitative analysis (P<0.01). All lymph nodes with a score of < 1.5 (mostly blue or hard) were malignant (6/20), whereas all lymph nodes with a score > 2.5 (mostly yellow and red or soft) were benign (11/22).

Discussion/Conclusion: In this study elastography was able to show differences between benign and malignant lymph nodes. Even though there was overlap in the elastographic score of the two groups, the method may help determine if FNA is needed in a subpopulation of lymph nodes.
Introduction/Purpose: The effect of disease status on the appearance of bone marrow uptake of 18F-Fluorodeoxyglucose (FDG) is unknown in Positron Emission Tomography (PET) studies of dogs and can be a confounding factor in the interpretation of disease localization in a variety of conditions. Diffuse increased bone marrow uptake of FDG within the vertebral bodies has a number of documented causes in humans, including infiltration by neoplasia such as lymphoma and bone marrow activation secondary to systemic inflammation. Multiple studies in humans have concluded that determining bone marrow involvement in lymphoma is more accurate with PET than with bone marrow biopsy, although this remains controversial. Additionally, direct positive correlations have been made between degree of FDG bone marrow uptake and specific indicators of systemic inflammation such as serum C-reactive protein and leukocytosis in human subjects. The purpose of our study was to determine whether or not the bone marrow uptake of FDG PET would correlate with disease status in canine patients with evidence of systemic inflammation or bone marrow infiltration by lymphoma.

Methods: A retrospective study of FDG PET scans at the University of Missouri from 2012 through 2014 was conducted, to include 3 groups of patients: Lymphoma, fever of unknown origin, and control. Controls consisted primarily of peripheral sarcomas without suspicion of systemic inflammation. FDG PET scans were conducted with a Phillips C-PET Plus scanner using a standard protocol, with fusion to CT images when available. Documentation of body temperature, results of bone marrow biopsy, and complete blood chemistry were evaluated for evidence of bone marrow infiltration and systemic inflammation. Bone marrow maximum standardized uptake values (SUV max) within the vertebral bodies were compared between groups in relation to liver (LV/BM), blood pool (BP/BM), and epaxial musculature (EM/BM).

Results: Liver and blood pool SUV max values were variable. Epaxial musculature values were more consistent both within the same patient and across groups, and correlated well to previously published normal SUV ranges for dogs. Higher SUV max EM/BM correlated well across all groups with elevated white blood cell count and/or pyrexia. Highest SUV max EM/BM values were observed in patients with fever of unknown origin and decreased significantly with resolution of pyrexia on repeat FDG PET scans. SUV max EM/BM values did not correlate well to bone marrow biopsy in the lymphoma group.

Discussion/Conclusion: Higher SUV max EM/BM may indicate bone marrow reaction, but cannot be recommended as a replacement for bone marrow biopsy in lymphoma dogs at this time.
Introduction/Purpose: Scientifically validated methodologies for diagnosing hyperthyroidism in rabbits are not reported. Scintigraphy is a commonly used procedure for detecting hyperthyroidism in cats and dogs. The purpose of this study was to determine normal values for thyroid to salivary gland (T/S) ratios and percent uptake of injected dose in euthyroid New Zealand white rabbits.

Methods: Ten clinically healthy rabbits ranging from 6-8 months in age were sedated and thyroid depth measured sonographically. Scintigraphic images were obtained for 100,000 counts at 20, 40, 60, 120, 180, and 240 minutes following intravenous administration of 111 MBq (3.0 mCi) 99mTc pertechnetate. Mean T/S ratios and percent uptake were analyzed using a generalized least squares linear model with time as main effect. Variance at each time point was also compared.

Results: At 20 minutes, mean T/S ratio was 1.04 (95%CI 0.74-1.24) and mean percent uptake was 0.9% (95%CI 0.1-1.4%). T/S ratio (p=0.029) and percent uptake (p<0.001) as well as the variance for both of these measurements (p<0.001) increased significantly over time. 20 minutes was the least variable time point with significant increase in variance after 60 minutes for T/S ratios and after 20 minutes for percent uptake (p>0.5). Background correction for T/S ratios and depth correction for percent uptake created no significant difference for these values (p=0.19, p=0.36).

Discussion/Conclusion: Performing nuclear scintigraphy of the rabbit thyroid at 20 minutes post-injection is recommended. T/S ratios and percent uptake are least variable at this time point with values similar to those reported in normal cats.
MAGNETIC RESONANCE AND COMPUTED TOPOGRAPHY IMAGING FINDINGS IN THREE DOGS WITH ABERRANT DIROFILARIA IMMITIS CERVICAL SUBARACHNOID MIGRANS. B.A. LaFoon¹, M.J. Beasley¹, J.M. Gambino¹, C.J. Alcott², N.D. Jeffery². Mississippi State University, Mississippi State, MS 39762¹, Iowa State University, Ames, IA 50011².

Introduction/Purpose: The clinical features, magnetic resonance and computed tomographic imaging (MRI and CT), treatment and outcome of three dogs with confirmed *Dirofilaria immitis* (*D. immitis*) aberrant migrans within the cervical subarachnoid space, are described. Despite similar imaging findings, presenting clinical signs were variable, ranging from cervical pain to tetraplegia. Two of the cases had a confirmed diagnosis via surgical exploration of the subarachnoid space. Necropsy findings are described for the remaining case.

Methods: Neurologic and physical examination findings are described for each case. All cases had positive heartworm antigen tests. MRI was performed in all cases. In two cases, a multifaceted imaging approach was employed utilizing both MRI and CT. In all cases, MRI demonstrated a large, intradural-extramedullary, mixed T2-W, T1-W hyper-to isointense, heterogeneous lesion containing central, multifocal and serpentine hypointensities. In all cases, the lesion was dorsally located and caused a severe compressive myelopathy of the cranial (at C2, n=1) to mid (at C3-4, n=2) cervical spine. Contrast enhanced CT myelography was employed in one case and demonstrated ring contrast enhancement of the intradurally-extramedullary lesion. CT without contrast did not reveal a lesion in one of the dogs.

Results: In two cases, dorsal laminectomy and durotomy were performed at C3-C4. Twenty-three centimeter and 20 cm live worms were extracted from the subarachnoid space from both patients. Parasitologic identification confirmed that both worms were immature adult female *D. immitis*. Surgical excision of the worms resulted in complete resolution of clinical signs without recurrence. The third dog was humanely euthanized. Necropsy confirmed a 24cm adult heartworm in the dorsal subarachnoid space at C2.

Discussion/Conclusion: Aberrant migration of *D. immitis* within the central nervous system is infrequently reported. This is the first report describing the value of advanced imaging, (MR and CT sectional imaging), corresponding treatment interventions and outcome in patients diagnosed with subarachnoid *D. immitis* aberrant migration. To the authors’ knowledge, aberrant *D. immitis* subarachnoid migration, in the spinal canal, found at necropsy, has been reported once in the previous literature. *D. immitis* infections are prevalent throughout the United States. Reported predilection sites include the pulmonary arteries and right heart; however, aberrant migration does occur and should be considered as a differential with myelopathies having these characteristic CT and MR imaging findings.

Introduction/Purpose: Hyperthyroidism is diagnosed based on clinical signs and elevated serum total thyroxine (TT₄) levels. Imaging diagnosis is made with nuclear scintigraphy, and recently non-contrast computed tomography (CT) has been shown to be a reliable alternative in anesthetized hyperthyroid cats. Our goals were to establish a CT thyroid imaging protocol in awake cats, compare the thyroid gland CT appearance of euthyroid cats to hyperthyroid cats pre- and post-methimazole, and determine whether thyroid size or attenuation pre-treatment correlated with methimazole dose.

Methods: Six hyperthyroid cats received CT pre- and post-methimazole treatment (at least 30 days after normal TT₄ level), and were compared to seven euthyroid cats. Hyperthyroid cats were imaged awake in a Mousetrap® restraint device or cat carrier. CT imaging characteristics measured included size (maximum length, width, and height), shape, location and attenuation.

Results: Thyroid volume was significantly larger in pre-methimazole (mean = 76.35mm) and post-methimazole hyperthyroid cats (mean = 66.12mm) compared to euthyroid cats (mean = 19.4mm; p = 0.005, p = 0.03, respectively). Methimazole treatment significantly lowered attenuation (mean = 81.11 HU) compared to pre-methimazole hyperthyroid (mean = 91.53 HU; p = 0.03) and euthyroid cats (mean = 97.01 HU; p = 0.03). Dose of methimazole ranged from 2.5 mg to 7.5 mg daily. There was no significant correlation between thyroid size, attenuation and methimazole dose.

Discussion/Conclusion: Euthyroid and hyperthyroid cats are easily imaged awake with CT. Methimazole significantly lowers thyroid attenuation but not size in hyperthyroid cats. Pre-treatment CT does not predict methimazole dose in hyperthyroid cats.
ATLANTOAXIAL INSTABILITY WITH INCONGRUENCE: MRI FINDINGS AND SURGICAL TREATMENT IN 5 DOGS. M. Dolera, L. Malfassi, G. Mazza, N. Carrara, S. Finesso, M. Sala, S. Marcarini. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

Introduction/Purpose: Atlantoaxial instability is a surgical condition frequently described in toy breed’s dogs. The various correction techniques have been described in veterinary literature. The aim of this study was to describe MRI-CT imaging findings and a novel surgical technique for stabilisation of atlantoaxial instability associated with incongruence of atlantoaxial joint in dogs.

Methods: Five dogs with a body weight of 2 kg or less with atlantoaxial instability associated with articular incongruence were studied. During clinical examination all dogs showed tetraparesis and ataxia. At CT and MRI, the articular surface of the atlas was larger than the articular surface of the axis, a laxity of all atlantoaxial ligaments was evident, so during the head and neck flexion the axis was dislocated dorsally and cranially into the spinal canal. Spinal cord showed a chronic compression with focal hyperintensity in seq TSE T2W and various degrees of syringomyelia. For surgery, the anaesthetised dogs were positioned in ventral recumbency with the head extended on the neck with slight linear traction applied at maxillary canine teeth. The reduction of atlantoaxial subluxation was verified through fluoroscopy. A standard dorsal approach to the atlas and axis was applied. Two 2.7 mm self tapping cortical screws were inserted on atlas winds on each side in a dorsal-ventral direction. Three 2.0 mm self tapping cortical screws were inserted transversally in the dorsal process of the axis. All screws were fused with polymethyl methacrylate. Serial clinical and imaging controls were provided.

Results: No intra-operative complications were observed. Functional improvement occurred in all dogs. Serial CT examinations showed a stable reduction of dorsal and cranial axis dislocation with persistence of a residual mild spinal compression due to the different size of the articular surfaces of atlas and axis.

Discussion/Conclusion: Several means for stabilisation of atlantoaxial dislocation are described in veterinary literature. Standard treatment consists in ventral arthrodesis with cross pinning, transarticular lag screw fixation or vertebral plating. This technique requires atlantoaxial joint congruence. Otherwise the means of synthesis can injure the spinal cord. Dorsal techniques utilise various non-absorbable suture materials or devices such as Kishigami Tension Band. However, cranial dislocation or impingement of the axis on spinal cord are not adequately counteracted. The technique that we describe is simple and safe and can be useful in surgical treatment in dogs with atlantoaxial dislocation and articular incongruence, a condition resembling atlantoaxial invagination described in human medicine.
MRI SENSITIVITY AND SPECIFICITY FOR NECK PAIN EXAMINATION IN DOGS AND CATS. M. Dolera, L. Malfassi, S. Finesso, G. Mazza, N. Carrara, S. Marcarini, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

Introduction/Purpose: Epidemiological studies on neck pain have not been conducted. Imaging findings of canine and feline diseases that cause neck pain are not well described. The aim of this research was to define the causes of neck pain in dogs and cats and describe typical MRI patterns of pathologies which cause neck pain in order to establish the sensitivity and specificity of the method.

Methods: A retrospective clinical study considered 178 animals (9 cats and 169 dogs) with neck pain examined with MRI. The inclusion criteria were: neck pain identified at clinical examination, a MRI imaging of head, neck and chest, a confirmed diagnosis based on cytology-histopathology or surgical findings or lab work, and a complete follow up. The considered data were: localisation of lesions determining the symptomatology, type of pathology responsible for neck pain (malformation, traumatic, vascular, inflammatory, degenerative, neoplastic), primary or indirect involvement of Nervous System, any neurological or systemic signs, imaging findings.

Results: 95% of patients suffered from neurological pathology whereas 5% were non-neurological. Lesions were in the neck in 72.5% of cases, in 17.4% both head and neck were involved. In 9% of cases the lesions were only in the head, in 1.1% in the chest. 52.5% of dogs suffered from intervertebral degenerative disc disease (IVDD), 19.5% were neoplastic, 14.5% inflammatory, 8.5% malformation, 2.5% traumatic, 2.5% vascular. 66.6% of cats were neoplastic, 22.2% traumatic, 11.2% inflammatory. 78% of cases showing a cervical spinal lesion had IVDD. 77% of cases with brain and spinal lesions had an inflammatory disease, whereas in all cases of neck pain with a lesion located in the head, the pathology is neoplastic. Sensitivity and specificity of MRI were, respectively, 100/100 for malformation, 100/75 for vascular diseases, 95/90 for inflammations, 96/94 for degenerative diseases, 94/89 for neoplastic diseases.

Discussion/Conclusion: The findings of this study indicate that lesions responsible for neck pain can localise in the neck, head or chest. Pain and lesion localisation does not always correlate. MRI has a high diagnostic sensitivity and specificity for diseases that cause spinal pain. Based on the results of this study MRI can be the method of choice to investigate neck pain.
NEUROIMAGING IN DIAGNOSTIC WORKUP OF CANINE EPILEPSIES: A PROSPECTIVE OBSERVATIONAL STUDY. M. Dolera, L. Malfassi, M. Sala, S. Marcarini, G. Mazza, N. Carrara, S. Finesso. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

Introduction/Purpose: Canine epilepsy includes a group of heterogeneous pathologies that share the chronic recurrence of seizures. Historically epilepsy has been divided in symptomatic, reactive and idiopathic epilepsy. Several papers classified retrospectively canine epilepsies, taking in consideration the clinical presentation, the age of onset, laboratory works and postmortem findings. Some literature on veterinary was focused on the diagnostic workup of epilepsy and none stated neuroimaging role. The aim of this work was to examine the evidence-based and imaging-guided prevalence of canine epilepsies. Based on MRI findings a new evidence-based and imaging-guided classification is proposed.

Methods: A prospective observational single institution study was conducted on 201 dogs which had been referred for recurrent seizures. Clinical examinations, blood cell counts, complete biochemical profiles and urine analyses were performed. All the patients underwent a total body high field of 1.5T MRI (MRI Intera 1.5T, Philips Medical Systems, Eindhoven, the Netherlands). The further laboratory tests had been carried out if specific infectious diseases were suspected. On the basis of MRI findings and previous classifications, epilepsies had been divided in three groups: functional, structural and metabolic. Functional epilepsy was identified when no latent structural brain lesions were detected by MRI and no metabolic disorders were identified by laboratory work. If abnormal MRI findings which were not referable to any pre-existing brain diseases were detected, they had been assigned to a sub-group of functional epilepsy with MRI postictal discoveries. Structural epilepsy was indicated when the brain abnormalities were detected by MRI. Metabolic epilepsy was indicated when metabolic disorders with compatible MRI findings were detected.

Results: Out of the 201 dogs considered 62% of them were affected by structural epilepsies, 24% by functional and 14% metabolic. Among symptomatic patients the clinico-pathological categorization was: 35% neoplastic, 32.2% inflammatory, 14% malformative, 12.6% vascular, 4.8% traumatic, 2% degenerative. Among our population 36.6% of patients with functional epilepsy showed postictal changes (focal T2-w gray matter hyperintensity and/or thinning of the temporal cortex) on MRI examination.

Discussion/Conclusion: The systematic use of high field MRI in canine epilepsy diagnostic workup makes a substantial contribution to the classification of canine epilepsies. Findings from imaging together with complete clinical and laboratory exams provide syndromic and etiological diagnoses and lead to effective therapeutic strategies and prognosis. This is the first study conducted by the systematic use of MRI in canine epilepsies. A high field MRI proved to be the gold standard imaging technique. Further studies will be required to validate the neuroimaging-guided classification of canine epilepsies.
EFFECT OF TISSUE SAMPLING ON THE MAGNETIC RESONANCE IMAGING APPEARANCE OF SKIN AND LYMPH NODES IN HEALTHY DOGS – PILOT STUDY.

Introduction/Purpose: The effect traumatic tissue sampling on the Magnetic Resonance Imaging (MRI) appearance of superficial tissue and lymph nodes has not been investigated in dogs to date. The purpose of this pilot study was to investigate the effects of skin biopsy and lymph node aspiration on MRI appearance in healthy dogs.

Methods: Three healthy research beagles underwent MRI of their proximal hindlimbs. In a randomly chosen site, punch biopsies of the skin lateral to a femur and fine needle aspirates of a popliteal lymph node were performed. Lidocaine was administered as local pain control in the biopsy site and for control purposes the contralateral stifle was injected with the same volume of lidocaine subcutaneously/ intradermally. The MRI examination was repeated immediately, three, and seven days after tissue sampling. The appearance of the tissues was compared to the initial scan by a blinded radiologist.

Results: All three dogs had post-procedural changes in signal intensity at all three sites when compared to the pre-procedure MRI. The biopsy site was accurately identified in all three dogs based on MRI appearance and changes persisted for 7 days at the biopsy site in all dogs and at the control site in 2 dogs. The lymph nodes increased statistically in size post-aspiration in all dogs (p=0.021).

Discussion/Conclusion: This pilot study shows that sampling of tissues can affect MRI tissue architecture and signal intensity. Further study is required, however these data suggest that tissue sampling may impact the MRI appearance and size of lesions studied.
Introduction/Purpose: Lagomorphs (rabbits) and small rodents are popular pets that often present to veterinarians for dental disease, otitis, rhinitis, exophthalmos, and/or palpable masses of the jaw. Diagnosis of these disorders can be difficult; common diagnostic procedures for these patients include oral examination, radiography, and more recently, computed tomography (CT). CT is a valuable tool that overcomes several limitations of conventional radiography, provides detailed information of specific structures, and allows multi-planar reformation. Normal anatomical structures have been described in recent studies. The purpose of this study is to describe the various CT abnormalities of lagomorph and small rodent skulls.

Methods: Scans of lagomorph and rodent skulls spanning June 2011 through May 2014 performed with a 16 multi-slice CT scanner (GE BrightSpeed, General Electric Company, Milwaukee, WI) were reviewed. Fifty-four scans of 48 patients (40 rabbits, 8 guinea pigs, 5 chinchillas, and 1 rat) that underwent CT scans of the skull while in sternal recumbency were collected. Ten patients were scanned while anesthesia was maintained via face mask (9) or tracheal intubation (1) with sevoflurane and oxygen. Forty-four of these scans were performed without sedation or anesthesia (confined to a chamber and surrounded by towels to limit motion). CT acquisition parameters were 100.0 kV and 120.0-248.0 mA with 0.625mm slice thickness. Two patients were administered intravenous contrast medium after an initial scan. Images were reviewed in 0.625mm or 1.25mm axial bone and soft tissue windows, as well as sagittal and coronal reformations, by one board certified veterinary radiologist (JKR) and one veterinary radiology intern (EH).

Results: All images included in this study were deemed to be of diagnostic quality. Indications for CT scans included upper respiratory noise, sneezing, nasal and/or ocular discharge, ptyalism, exophthalmos, head tilt, inappetence, a palpable mass, and/or radiation therapy planning. CT findings included 39 cases of significant dental abnormalities (including malocclusions, caries, apical overgrowth), osteomyelitis (22), rhinitis (15), otitis externa (10) media (15) and/or interna (2), retrobulbar mass (5), and meningoencephalitis (1).

Discussion/Conclusion: CT scans of the skulls of rabbits, guinea pigs, chinchillas, and a rat yielded vital diagnostic information and were successfully performed with a multi-slice CT scanner in non-sedated patients (81% of our cases).
CHRONOLOGICAL LOW FIELD MAGNETIC RESONANCE APPEARANCE OF CANINE CEREBRAL HEMORRHAGE MODEL. J. Jeong, S. Park, Y. Jung, E. Jeong, N. Kim, M Kim, H. Lee, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, Republic of Korea.

Introduction/Purpose: Magnetic resonance (MR) evaluation of intracranial hemorrhage is often a challenge due to variable appearance of hemorrhage, which depends on multiple factors. Simplistic guidelines for interpretation of hemorrhage have been established, but reliance of the guidelines is still in question. The purpose of study is to reestablish MR appearance of canine cerebral hemorrhage in low field magnet. Additionally the efficacy of T2*-weighted gradient echo(GE) sequence in the diagnosis of intracranial hemorrhage was evaluated.

Methods: A total of 8 clinically normal beagle dogs, weighing approximately 10kg, were used. After a base-line MR examination, an intracranial hematoma was produced. MR examination was performed just after blood injection, the others at 1 to 2 day interval for 30days using low field MR (0.25 Tesla). Sagittal images were acquired to select reproducible slice position for transverse images which were used for image analysis. Sequences used were spin echo (SE) T2, fluid attenuated inversion recovery (FLAIR), short tau inversion recovery (STIR), SE T1, T2*-W GE. Images obtained were compared subjectively for signal change evaluation. Signal-to-noise ratio (SNR) was measured and compared between examinations.

Results: Significant change in signal was seen subjectively that appeared significantly hypointense in STIR and significantly hyperintense in T1W sequence at day 3 after hemorrhage creation compared with day 0. Signal intensity of hemorrhage gradually decreased in T1W from day 3 to day 20, and differentiation between hemorrhage and normal cerebral parenchyma was difficult at day 20. On T2W and FLAIR images, signal intensity of hemorrhage was hyperintense than normal cerebral parenchyma; intensity of signal was decreased gradually. At day 25, lesion detection became hard according to change of lesion size. Using quantitative analysis, statistically significant signal change was not detected. No significant hypointense signal of hemorrhage was seen on GE image during examination.

Discussion/Conclusion: This study provides that signal change of intracranial hemorrhage does not follow the guidelines for interpretation of hemorrhage in T1W, T2W image by low field magnet, except acute stage. T2*-W GE imaging is less useful in hemorrhage detection based on the result from this study.

Acknowledgement: This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF), funded by the Ministry of Education (NRF-2013R1A1A4AO1007690).
USE OF CONTRAST-ENHANCED COMPUTED TOMOGRAPHY TO STUDY THE CRANIAL SPREAD OF A LUMBOSACRAL EPIDURAL INJECTION IN THE DOG.

Introduction/Purpose: Epidural anesthesia was first administered to veterinary patients as early as 1885 and continues to be widely used in practice today. The volumes used in epidurals were established as early as 1968 and vary according to the extent of local anesthesia required: 0.14mL/kg for the tail and perineal area and 0.2mL/kg for areas up to the thoracolumbar junction. However, these volumes are based on clinician judgment and clinical responses, such as loss of weight support, flexor reflex, and response to nociceptive stimuli, rather than actual measurement of the volume of the epidural space. Studies into the migration of known epidural volumes have mainly been limited to the use of methylene blue dye in live animals that are then euthanized and necropsied. This study aims to investigate if computed tomography (CT) is an accurate modality for visualizing solutions in the epidural space. It also aims to confirm the long held belief that a 0.2mL/kg volume injected into the lumbosacral epidural space reaches the thoracolumbar junction in the majority (>80%) of dogs.

Methods: Ten clinically normal, adult, non-pregnant, mixed-breed dogs euthanized for reasons other than the current study were obtained within five minutes of euthanasia. A lumbosacral epidural was performed using a 7.5cm, 22-gauge spinal needle and an injection of iodinated contrast (iohexol, volume of 0.2mL/kg body weight) was carried out over a period of thirty seconds. Injection into the epidural space was confirmed by a loss of resistance test. A CT scan of the thoracic to the sacral vertebrae was performed using 3mm transverse, contiguous slices. The cranial extent of the contrast solution column was measured in number of vertebral bodies on multiple image reconstructs by one observer (LTK) and confirmed by a board-certified radiologist (RLT).

Results: The 0.2mL/kg dose of radio-opaque contrast travelled to the thoracolumbar junction (seven or more vertebral bodies) in eight of the ten dogs studied. In two dogs, the contrast only travelled to the junction of the first and second lumbar vertebrae, or roughly six vertebral bodies. The contrast column was well-visualized in all planes. The contrast column travelled primarily in the dorsal epidural space in all cadavers, though contrast was also visualized in the lateral and ventral epidural spaces.

Discussion/Conclusion: This study confirms that CT in combination with iodinated contrast provides an excellent modality for observing the spread of a solution injected into the lumbosacral epidural space. This study also confirms the long standing belief that a 0.2mL/kg volume injected into the epidural space reaches the thoracolumbar junction in the majority of dogs and has the potential to provide both anesthesia and analgesia to areas caudal to this landmark.
COMPUTED TOMOGRAPHIC ENTEROGRAPHY WITH LACTULOSE SOLUTION IN NORMAL DOGS. S.Y. Keh1,2, J.M. Sohn1, M.H. Choi2, N.S. Lee2, J.Y. Jang2, H.W. Kim2, J.H. Yoon1. 1Seoul National University, Seoul 151-742. 2Haemaru Animal Referral Hospital, Gyeonggi 463-824, Republic of Korea.

Introduction/Purpose: Computed tomography (CT) is a routine examination of gastrointestinal tract in human because of the features that all the gastrointestinal segments can be imaged without overlapping, providing more detailed information about extra-intestinal abnormal condition. CT enterography requires adequate luminal distension for evaluating mural alteration correctly. The purpose of this study was to describe and optimize CT enterography techniques in normal dogs, determining the appropriate scanning time of each segment of small intestine.

Methods: Fifteen healthy dogs were used. In control group (n=7), CT examination was performed without oral contrast administration. In group 1 (n=5), 60 ml/kg of 1.34 g/ml lactulose diluted with tepid water in the ratio of 1:4 was bolus administrated. In group 2 (n=8), same dose and dilution of lactulose solution was administrated for 45 minutes. CT was performed at 0, 10, 20, 30, 40, 50 and 60 minutes in both groups. CT images were evaluated by two radiologists. The luminal distension of each segment was qualitatively evaluated using a 3 point scale (0: poor, 1: good, 2: optimal). Quantitative analysis of luminal distension was performed by measuring diameter of five points randomly using electronic calipers on the monitor. Adverse effects including nausea, vomiting and diarrhea were checked throughout the CT enterography.

Results: In qualitative analysis, the control group showed poor distension at any segments. The ascending duodenum showed the highest luminal distension score (1.63 ± 0.61) at 10 and 30 minutes, jejunum showed the highest luminal distension score (1.44 ± 0.51) at 20 minute in group 2 (p < 0.05). There was no significant difference in descending duodenum and ileum between two groups (p > 0.05). In quantitative analysis, there was no significant difference between two groups in descending and ascending duodenum (p > 0.05). Data of jejunum and ileum showed low inter-observer reproducibility (ICC 0.443-0.775). There were mild gastrointestinal signs in group 2.

Discussion/Conclusion: CT enterography with administrating lactulose solution slowly provided more appropriate images for evaluating intestinal wall of ascending duodenum in 10 or 30 minutes and jejunum in 20 minute. Further studies about several factors which can affect the degree of luminal distension and image quality including the feeding method, the type, amount and dilution rate of contrast agents, the use of prokinetic agents, CT scanning time and time interval are also needed.
CT AND MRI FEATURES OF CAROTID BODY PARAGANGLIOMAS IN 15 DOGS.
W. Mai, G. Seiler, A. Zwingenberger, B.J. Lindl-Bylicki. University of Pennsylvania (Mai), PA 19104, North Carolina State University (Seiler), NC 27607 and University of California-Davis (Zwingenberger, Lindl-Bylicki), CA 95616.

Introduction/Purpose: Paragangliomas are tumors of chemoreceptor cells and arise more commonly from the aortic and carotid bodies in dogs. These tumors are usually slow growing, and cause clinical signs late in the course of the disease, due to the mass effect on surrounding structures. Carotid body tumors tend to surround the carotid bifurcation, making surgical resection difficult. There are very few reports of their imaging appearance, and misdiagnosis for thyroid tumors has been reported. This retrospective case series describes the features on CT and MR images in 15 dogs.

Methods: Medical databases of three university veterinary teaching hospitals were searched for dogs that had a pathologically confirmed final diagnosis of carotid body tumor and received either a computed tomographic (CT) or magnetic resonance imaging (MRI) examination. A board-certified radiologist reviewed images, and lesion characteristics were recorded.

Results: 15 dogs fit the inclusion criteria. Five of 15 dogs had a cervical mass palpated incidentally on routine examination, 5/15 were presented for increased respiratory noise or dyspnea, and 1/15 was imaged for Horner’s syndrome, head tilt and facial nerve paralysis. In 4/15 dogs the mass was an incidental finding while imaging for unrelated reasons. Three of 15 dogs had Horner’s syndrome. The most commonly affected breed was the Boston Terrier (n=5). Six of 15 were female spayed and 9/15 were male castrated. The median age was 9 years [range 3-14.5]. Nine of 15 masses were centered at the left carotid bifurcation, and 6/15 at the right one. Thirteen of 15 dogs received a CT examination and 2/15 received an MRI. Nine of 15 masses were rounded or oval-shaped, and 6/15 were irregularly shaped. Seven of 15 masses were poorly marginated and 6/15 were well marginated. The median length, width, and height (cm) were 5 [1-9], 3.2 [1.3-6.1] and 3.3 [1.0-5.3] respectively. At CT, most masses were slightly hypodense to muscle, with mineralization in 2/13 dogs. All but one had a strong heterogeneous pattern of enhancement; 1/13 had a rim-like enhancement pattern. At MRI, both lesions were well marginated, hyperattenuating to muscle on T1- and T2-weighted images, and strongly, heterogeneously enhancing. Lesions were invasive in 6/15 dogs. Brain invasion through the petro-occipital fissure was noted in 3/15 dogs, lysis of the medial wall of the tympanic bulla in 3/15 dogs and actual invasion into the bulla in 2/15 dogs, extending into the external ear canal in one dog. Vascular invasion was noted in 3/15 dogs. The ipsilateral medial retropharyngeal lymph node was effaced by the mass in five dogs, and enlarged in five dogs. Mandibular lymphadenopathy was present in three dogs.

Discussion/Conclusion: Carotid body paragangliomas can be recognized based on their characteristic location at the carotid bifurcation and strong heterogeneous enhancement pattern. They are typically large at presentation. Invasion into adjacent structures is common. Location and invasiveness of the tumor explains some clinical presentations such as breathing difficulties, Horner’s syndrome, head tilt, or facial nerve paralysis.
THE USE OF MAGNETIC RESONANCE SPECTROSCOPY (MRS) IN DIFFERENTIAL DIAGNOSIS OF CANINE BRAIN DISEASES. L. Malfassi, M. Dolera, G. Mazza, S. Marcarini, M. Sala, N. Carrara, S. Finesso. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

Introduction/Purpose: Single voxel proton Magnetic Resonance Spectroscopy (MRS) can be used to investigate brain diseases. Several studies have been conducted on human patients to assess MRS reliability. The aim of this study was to investigate MRS spectra of canine brain diseases of inflammatory, neoplastic or metabolic origin.

Methods: From 2008 to 2014 578 patients underwent brain MRI and MRS examinations. MRI and MRS scans of patients with intracranial lesions were grouped into inflammatory (IG), neoplastic (NG) and hepatic encephalopathy (HE) affected groups. The IG included patients that showed multiple or single well-defined lesions at MRI and Diffusion Weighted Imaging (DWI) scans; furthermore only patients with pleocytosis and high total protein concentration on CSF (cell count >5 cells/μL and proteins >30 mg/dL) were included. The NG was made of patients with strong enhancing mass lesions with surrounding discrete edema. HE group included patients diagnosed by clinical examination, blood cell count, biochemistry, ammoniemia deternination and optional hystopathology of the liver. MRS was performed twice on larger lesions, once using a short TR35 and once using a long TR144. A 1x1x1cm VOI was used. The studied metabolites were the compound of Glutamine-glutamate (Glx), the compound of N-acetylaspartate and Nacetyl aspartyl glutamate (NAA), the Choline derivatives (Cho), and the Myo-Inositol (My). The NAA/Cr, Cho/Cr and My/Cr ratios were analyzed as the presence of lipids and lactate.

Results: Out of 578 patients: 112 IG, 144 NG, 22 with HE. MRS spectra from IG showed increased Cho (mean Cho/Cr ratio: 2.23), reduced NAA (mean NAA/Cr ratio: 1.15) and the presence of the lipid peak was found in 46/112. Mean values and relative standard deviations (std.) were: Glx/Cr 0.26 std. 0.2; Cho/Cr 2.23 std. 0.9; My/Cr 0.54 std. 0.1; NAA/Cr 1.35 std. 0.59. MRS spectra from NG were characterized for high values of Cho and low or absent NAA. The presence of lipids and lactate was found in 31/144. Mean values and std. were: Glx/Cr 0.22 std. 0.32; Cho/Cr 3.27 std. 0.69; My/Cr 0.54 std. 0.11; NAA/Cr 1.14 std. 1.03. The HE displayed decreased values of My, Cho and NAA and increased Glx. Mean values and std. were: Glx/Cr 0.40 std. 0.13; Cho/Cr 1.14 std. 0.34; My/Cr 0.15 std. 0.08; NAA/Cr 1.02 std. 0.35.

Discussion/Conclusion: In vivo single-voxel proton MRS provides a sensible and non-invasive characterization of canine brain lesions. Reliable patterns of differentiation based on NAA/Cr and Cho/Cr values and on presence of lipids can be used in differential diagnosis of inflammatory, neoplastic and metabolic diseases.

Introduction/Purpose: Diffusion tensor imaging (DTI) is a MRI sequence that can be used to characterize the directional properties of the diffusion of water molecules in biological tissues. Characteristic changes in ADC and FA have been correlated to the severity of neuronal disruption and patient outcome in numerous disease processes in people. The purpose of this study is to identify the utility of DTI for assessing neuronal integrity in dogs with compressive and non-compressive spinal cord lesions.

Methods: The MRI examination of dogs that presented for clinical signs localized to the spinal cord over a three year period were included in the study. A 1.5T Hitachi Echelon magnet was used for all studies and FA and ADC values were obtained from the MRI workstation. Patient information collected included signalment, time to ambulation, type/location of surgery, duration of clinical signs, anti-inflammatory administration prior to presentation, and final presumptive/definitive diagnosis. Dogs were divided into six categories based on presenting and discharge neurologic scores. MRI lesion type was recorded and patients were divided into compressive and non-compressive groups.

Results: 102 total canine patients included in the study with 88 within the compressive group (6 mild, 26 moderate, 56 severe) and 14 within the non-compressive group. 46 total patients had intramedullary hyperintense signal (34 compressive, 12 non-compressive). Majority of patients in the compressive group had 1 surgery site (range 0-3). No non-compressive patients received surgery. 73 patients had acute presentation (64 compressive, 7 non-compressive) and 29 patients had acute on chronic presentation (22 compressive, 7 non-compressive). There was a statistically significant decrease in FA, increase in ADC, and increase in DWI in patients within the non-compressive group compared to compressive. No significant changes in DTI parameters between degrees of compression. Statistically significant increase in DWI in patients with intramedullary hyperintensity though FA and ADC values did not vary statistically between patients with and without spinal cord signal change. Neither DTI parameters nor length of spinal cord signal change differed statistically with patient outcome/neuro score.

Discussion/Conclusion: These results indicate that there is a difference in diffusion between compressive and non-compressive lesions; however, DTI does not correlate with degree of compression or presence of hyperintensity. Neither DTI nor length of intramedullary hyperintensity correlated with patient prognosis in the population examined. It remains unclear what duration or degree of compression are required for neuronal degeneration to occur and it is possible that such pathology was not even present in our study population.
COMPARISON OF DUAL-PHASE 64-DETECTOR CTA AND 1-TESLA MRI FOR DETECTION OF PERITUMORAL PROJECTIONS IN PRE-SURGICAL EVALUATION OF FELINE INJECTION SITE SARCOMAS. S. Nemanic, M. Milovancev, J.L. Terry, S.M. Stieger-Vanegas, C.V. Löhrl. Oregon State University, OR 97331.

Introduction/Purpose: Feline injection site sarcomas (FISS) grow locally aggressive neoplastic extensions with deep, unpredictable infiltration into surrounding tissues. Infiltrating tumor extensions cannot be identified during surgery. CT and MRI are used for pre-surgical planning to determine tumor extent. We evaluated the ability of dual-phase CT angiogram (CTA) and MRI to identify neoplastic extensions of FISS, verified against histopathology.

Methods: Cats with FISS received both CTA and MRI of the FISS and surrounding area immediately followed by wide surgical excision. A custom-made triangular fiducial marker suitable to both CT and MRI was sutured over the FISS as a standardized reference point. CTA included pre-contrast, post-contrast arterial and venous phases. MRI included STIR and pre- and post-contrast T1 fat-saturated pulse sequences. Histologic sampling included the mass and peritumoral lesions identified on pre-operative CTA and/or MRI.

Results: 9 cats had imaging and histopathology. Peritumoral lesions were identified in all cats (3-7 per cat) resulting in a total of 72 peritumoral lesions, 39 seen on CTA and 33 on MRI, 16 of which were seen with both modalities. Neoplastic infiltration was identified in in 10/72 peritumoral lesions (across 5 cats); 6 of these were seen on CTA and MRI, 2 only on CTA, and 2 only on MRI. The imaging characteristics of neoplastic and non-neoplastic peritumoral lesions overlapped.

Discussion/Conclusion: Less than 15% of CTA and MRI identified FISS peritumoral lesions are neoplastic. 60% of neoplastic extensions were seen on both CTA and MRI, while 20% were seen only on CTA or only on MRI.
VERTEBRAL BONE MINERAL DENSITY MEASURED WITH QUANTITATIVE CT IN DOGS: PREVENTIVE EFFECT OF ALENDRONATE ON LOW DOSE PREDNISOLONE-INDUCED OSTEOPENIA. S.J. Park, J.Y. Oh, K.Y. Son, K.O. Cho, J.H. Choi. College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea.

Introduction/Purpose: Prednisolone (PDS), one of the synthetic glucocorticoids is commonly used for various diseases including inflammatory or allergic diseases in veterinary practice, and can induce osteopenia and osteoporosis as side effects. Alendronate, a potent amino bisphosphonate, is prescribed to prevent glucocorticoid-induced osteopenia in humans. In this study, vertebral trabecular bone mineral density (BMD) was evaluated using quantitative computed tomography (QCT) to determine whether low dose of PDS induces bone loss and whether alendronate prevents glucocorticoid-induced osteopenia in dogs.

Methods: Eight healthy beagles were divided into a PDS group (n = 4) and a PDS and alendronate co-administration group (n = 4). PDS was administered to the PDS group at a dosage of 2 mg/kg for 2 weeks, 1 mg for 4 weeks, and 0.5 mg for 3 weeks daily per oral, and in the alendronate co-administration group, 2 mg/kg alendronate was administered for 9 weeks in addition to the same dosage of PDS used in the PDS group. BMD of lumbar vertebra was measured using QCT on days 0, 21, 42, 63 and 150 after drug administration.

Results: BMD in the PDS group decreased to 84.7% of the normal value on day 42, increased to 87.9% on the day 63, and recovered to 91.6% on day 150. In the alendronate co-administration group, BMD decreased to 91% of the normal value on the day 21, increased to 93.8% on the day 63, and then recovered to 96.7% on the day 150.

Discussion/Conclusion: BMD temporarily decreased after low dose PDS administration; however, it recovered during tapering of the PDS. BMD in the PDS group tended to lower than that of the alendronate group on each examination day, but no significant difference was observed between two groups. These results suggest that a low dose of PDS can be used with little concern for osteopenia.

*This study was supported in part by the Animal Medical Institute of Chonnam National University and a research grant from Chonnam National University in 2012.
Introduction/Purpose: Body fat content is a predictor or outcome of disease, metabolic processes, and therapeutic responses, and can be measured noninvasively by computed tomography (CT). CT also allows differentiation of metabolically active visceral fat from total fat. Common protocols in people whereby fat percentages are calculated from a single CT slice might be an invalid assessment of whole-body values, although time-efficient, radiation-limiting, and repeatable. Acquiring the same slice is unlikely repeatable in longitudinal studies involving animal models—especially growing animals. An alternative is to acquire whole-body volumetric data, which is easily obtained with multi-detector CT scanners but laborious to analyze. The aim of this study was to compare semi-automated computer analysis of whole-body volumetric CT data to carcass analysis (the gold standard). For this purpose we used lambs, being a valid model to study the effect of intrauterine growth retardation on excessive early visceral fat content and the late development of cardiovascular and metabolic diseases in people. We hypothesized that the two methods would produce measures that were within 10% of the mean fat weight.

Methods: A method-comparison study was performed using prospectively collected numerical data from 12 lambs with a range of body weights (8.8-40.4 kg). Whole-body volumetric data were obtained twice per lamb using a 16-slice, multidetector CT scanner, and reconstructed into 1 mm and 5 mm contiguous transverse scans. Following euthanasia, carcass analysis (ie, dissection and chemical analysis) was performed according to published protocols. These results were compared to CT measures of total-fat and visceral-fat weight (ie, fat volumes multiplied by 0.9 g/cc) obtained using a semi-automated computer algorithm previously developed in people and modified for lambs. Agreement was assessed by Bland-Altman plot analysis. The 2 CT (1 mm) acquisitions were assessed for repeatability using the mean difference of repeated measures.

Results: Compared to chemical analysis, CT (1 mm) underestimated the amount of total-fat weight (mean bias, 2414 g; limits of agreement [LOA], 268 to 4559 g) and visceral-fat weight (mean bias, 784 g; LOA, 145 to 1423 g). Compared to scale measurement of gross depots, CT (1 mm) produced similar results for visceral-fat weight (mean bias, -5 g; LOA, -304 to 294 g). The observed LOA exceeded the set range of ±10% of the mean fat weight. CT (5 mm) performed similarly to CT (1 mm). CT was repeatable for total fat (mean difference, 9 cc) and visceral fat (mean difference, 10 cc).

Discussion/Conclusion: Carcass analysis (specifically, chemical analysis) and semi-automated CT measurement are not interchangeable for quantifying body fat contents. CT has application for monitoring relative changes in total fat and visceral fat in the same lamb over time because the whole-body measures are efficient, noninvasive, and repeatable.

**Introduction/Purpose:** Three-dimensional volume imaging in MRI has the advantage of multiplanar reconstructions with a single acquisition, which makes shortened scan times a reality. Rapid volume imaging has been limited to gradient-recalled echo (GRE) sequences. Fast-spin echo (FSE) sequences are preferred for neuroimaging due to superior image contrast and fewer artifacts. New FSE sequences using variable flip angle refocusing and very long echo train lengths allow 3D volumetric scanning. The goal of this study was to optimize the 3D Sampling Perfection with Application optimized Contrasts using different flip angle Evolution (SPACE) sequence in canine spine MR and compare it to conventional T2-weighted (T2w) FSE sequences.

**Methods:** Seven young adult, healthy and neurologically normal dogs were examined post-mortem using a 1.5T Siemens Symphony with TIM® MRI unit. Conventional T2w FSE sequences in the sagittal and transverse planes and a sagittal plane T2w SPACE sequence were acquired centered on the thoracolumbar junction. The imaging protocol was set to have similar scan times for the sagittal plane series and so the resultant transverse plane pixel resolution was similar. Transverse image reconstructions were made from the sagittal 3D SPACE images to match the location of the FSE transverse images, with the following slice thickness/gap: 3mm/3mm, 2mm/2mm, 1mm/1mm, 3mm/1mm, 1mm/0.5mm. Signal (SNR - spinal cord) and contrast (CNR - spinal cord:muscle) to noise ratios were calculated and compared for all sequences using repeated measures. Transverse 3D SPACE and 2D FSE images were individually scored by 3 reviewers for overall image quality and visibility of specific neuromuscular structures using a 5-point scale. Each reviewer's preferred 3D SPACE transverse reconstruction slice thickness/gap was also evaluated with repeated measures on 3 days temporally separated by at least one week.

**Results:** 3D SPACE scan time was 6min. 40sec. The total scan time for sagittal and transverse 2D FSE scans was 10min. 46sec. SNR and CNR was higher for sagittal 2D FSE compared to 3D SPACE (p<0.0001). SNR and CNR for all 3D SPACE transverse reconstructions were higher than transverse 2D FSE (p<0.01). The SNR and CNR values of the 3mm and 2mm transverse 3D SPACE reconstructions were very similar, both being higher than the 1mm slices, but still were significantly different. 2D FSE transverse sequences were consistently less highly rated compared to 3D SPACE reconstructions (odds ratio 95% CI 0.060-0.859) for overall diagnostic quality and visibility of most anatomic structures. The 2D FSE was preferred for epidural space and grey-white matter distinction. No statistically significant preference was identified within or amongst reviewers for the SPACE transverse reconstructions.

**Discussion/Conclusion:** The 3D SPACE pulse sequence with multiplanar and thin-slice reconstructions is a viable diagnostic MR tool for the canine spine. With fast acquisition times, clinical application of SPACE will rival computed tomography (CT) exams, while providing superior soft tissue contrast that is ideal for spine imaging.
ACCURACY OF A COMPUTED TOMOGRAPHY BRONCHIAL WALL THICKNESS TO PULMONARY ARTERY DIAMETER RATIO FOR ASSESSING BRONCHIAL WALL THICKENING IN DOGS. D. Szabo, J. Sutherland-Smith, B. Barton, E.A. Rozanski, O. Taeymans. Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA 01536.

Introduction/Purpose: Computed tomography is increasingly being used in veterinary medicine as a means of investigating coughing and other pulmonary-related clinical signs. The purpose of this study was to assess the ability of a ratio comparing the bronchial wall thickness to adjacent pulmonary artery diameter to differentiate animals with bronchial wall thickening from unaffected animals, using animals with chronic bronchitis as a model for bronchial wall thickening.

Methods: Dogs with a clinical diagnosis of chronic bronchitis that had a thoracic CT were compared to animals receiving thoracic CT scans for reasons unrelated to a history of cough. Unaffected dogs with a diagnosis of pulmonary hypertension were excluded. The described ratio was measured using a second segmental bronchus in four locations (right cranial, right caudal, left cranial, and left caudal lung lobes). Statistical analyses were performed comparing the ratios in the two groups and also to determine whether there were any effects of age, weight, CT machine, bronchus location, or slice thickness.

Results: Sixteen dogs with a clinical diagnosis of chronic bronchitis were compared to 72 unaffected dogs. There was no significant difference based on age, weight, CT machine used, left vs. right side, or slice thickness.

Dogs with chronic bronchitis had significantly larger ratios than unaffected dogs (p<0.001). Affected and unaffected dogs had significantly larger ratios in the cranial lung lobes compared to the caudal lung lobes (p<0.001). When evaluated separately, the cranial and caudal lung lobe ratios remained significantly higher in affected dogs (p<0.001), however, a greater difference was noted in the cranial lung lobes.

A receiver operating characteristic curve using the results in the cranial lung lobes had an area under the curve of 0.912 indicating high accuracy in distinguishing between the two groups. A ratio of 0.6 had the best balance with a sensitivity of 77%, a specificity of 100%, a positive predictive value of 100%, and a negative predictive value of 95%.

Discussion/Conclusion: The ratio described here has high accuracy for discriminating dogs with bronchial wall thickening from unaffected dogs. We propose a cut off ratio of 0.6 in the cranial lung lobes, with higher ratios consistent with bronchial wall thickening.
PREVELANCE AND MAGNETIC RESONANCE IMAGING OF INTERVERTEBRAL DISC DISEASE IN PUGS WITH CAUDAL ARTICULAR FACET DYSPLASIA OF THE THORACOLUMBAR SPINE. A. Full\textsuperscript{1}, C.W. Dewey\textsuperscript{1}, J.L. Bouma\textsuperscript{2}. \textsuperscript{1}Cornell University Ithaca, NY 14853 and \textsuperscript{2}Veterinary Specialists of Rochester Rochester, NY 14620.

Introduction/Purpose: Congenital vertebral malformations are a common occurrence in the canine population, however according to the veterinary literature many affected dogs have no evidence of neurologic dysfunction. Although articular facet aplasia/dysplasia has been known to be a frequent occurrence, it has been poorly represented in the veterinary literature. With the increased use of advanced cross sectional imaging such as MRI, the emergence of recent publications describing the development of secondary fibrous constrictive myelopathy in pugs with articular facet anomalies have begun to challenge that notion. Furthermore the significance of IVDD in pugs with articular facet dysplasia has yet to be determined. The primary goal of this retrospective study is to determine if there is a correlation between development of IVDD in pug and pug mixes with articular facet dysplasia.

Methods: Retrospective review of the imaging databases of three referral veterinary hospitals including Cornell University, Veterinary Specialists of Rochester and Long Island Veterinary Specialists to identify pug and pug mixes who had undergone MRI examination of the thoracolumbar spine spanning time period of 7 years [2007-2014]. MRI images as well as available radiographs of the thoracolumbar spine are reviewed by a single radiologist [JLB]. The following parameters are included in this evaluation: presence or absence of articular facet anomaly; location or locations of the defect, presence or absence of extradural cord compression and finally presence or absence of extradural cord compression due to IVDD.

Results: Of the total of 53 dogs included in this study, 42 are pugs and 11 are pug mixes. Normal articular facet anatomy is identified in 19/53 dogs: 10/42 pugs and 9/11 pug mixes. The overall presence of thoracic and thoracolumbar caudal articular facet dysplasia in this population of dogs is 64%. Of the thirty-four dogs with abnormal articular facet anatomy, twenty-nine percent [10/34] have extradural cord compression due to mild IVDD.

Discussion/Conclusion: The results of the present study indicate the prevalence of caudal articular process dysplasia in pugs and pug mixes, 64%, is high. Concurrent intervertebral disc disease of the associated disc space identified in 29% of the dogs may be indicative that this congenital anomaly could lead to chronic instability and associated neurologic disease.
INVESTIGATION OF THE ASSOCIATION BETWEEN CANINE INTERVERTEBRAL DISC DEGENERATION AND SPINE MUSCLE FATTY INFILTRATION IN CHONDRODYSTROPHIC AND NON-CHONDRODYSTROPHIC DOGS. A. Lerer¹, S.G. Nykamp², A.B. Harriss³, T.G. Koch², T. Gibson², S.H.M. Brown³. Western College of Veterinary Medicine¹, University of Saskatchewan, Saskatchewan, Canada, S7N5B4. Ontario Veterinary College², Human Health and Nutritional Sciences³, University of Guelph, Ontario, Canada, N1G2W1.

Introduction/Purpose: Intervertebral disc degeneration (IVDD) is associated with chronic back pain in human patients, and in many of these patients muscle fatty infiltration has been identified. Dogs may be used as an animal model of naturally occurring back pain because they are susceptible to chronic degenerative disorders of the spine. The goals of this study were to demonstrate the magnitude and location of fat infiltration in spinal muscles of chondrodystrophic (CD) and non-chondrodystrophic (NCD) dogs suffering from IVD herniation (IVDH) and non-IVDH disorders and also to compare IVDD grade between the groups.

Methods: MRI scans from dogs with back pain localized between T13-T12 to L6-S7 were retrospectively analyzed. Dogs were divided into 4 groups: Group 1 – CD where IVDH was primary pathology, Group 2 – CD where non-IVDH pathology was diagnosed, Group 3 – NCD where IVDH was primary pathology, Group 4 – NCD where non-IVDH disorder was diagnosed. Fat infiltration was quantified in three spinal muscle groups at the level of each IVD space from T12-T13 to L6-L7. Regions of interest (ROIs) were manually traced within multifidus, remaining epaxial, and psoas muscles as well as three adjacent regions of fatty tissue. Muscle-fat indices (MFIndex) were calculated for each muscle by dividing the signal intensity (SI) of the muscle by the associated SI of the adjacent regions of fat. Midline sagittal T2w images were used to grade IVDD from T12-13 to L6-L7. Three-way ANOVA was used to test the relation between MFIndex and IVDD grade for all muscles at each spinal level and between the different groups.

Results: Inclusion criteria was met in 183 patients. Group 1: (n=104 dogs), average IVDD grade of 2.31; Group 2: (n=17), average IVDD grade of 1.62; Group 3: (n=21), average IVDD grade of 1.61; Group 4: (n=41), average IVDD grade of 0.7. CD dogs had greater IVDD grade compared to NCD (P<0.0001). Dogs with IVDH had greater IVDD grade compared to dogs with non-IVDH (P<0.0001). MFIndex was greater in the Multifidus and Psoas muscles of NCD compared to CD (P<0.0001, in both) and in non-IVDH compared to IVDH (P= 0.0054, 0.0017 respectively). No statistically significant interaction effect was found between all variables.

Discussion/Conclusion: CD dogs were found to have greater IVDD score and that is in accordance to previous publications. Our results of muscle degeneration are in agreement with what was previously described in human patients. Since CD dogs are more prone for acute onset of IVDH, NCD, like human patients, are more prone for chronic IVDH. Our results suggest that chronic pain might be the underlying cause for muscle degeneration rather than the severity of the spine pathology.

Introduction/Purpose: Medial retropharyngeal lymph node mass lesions are predominantly due to metastatic neoplasia, primary neoplasia or inflammatory lymphadenitis. The aims of this retrospective study were to evaluate the clinical and magnetic resonance imaging (MRI) features of these masses critically and to correlate them to their confirmed etiology, whether neoplastic or inflammatory.

Methods: Thirty-two cases of medial retropharyngeal lymph node mass lesions that had undergone MRI and had a confirmed cytological or histopathological diagnosis were included into the study. Fifteen cases were confirmed as inflammatory lymphadenitis and 17 were confirmed as neoplastic. The signalment and clinical history were assessed and the MRI and any ultrasound images were evaluated.

Results: Clinically, patients with inflammatory lymphadenitis were statistically more likely to present with lethargy (p=0.006), pyrexia (p=0.0002), and neck pain (p=0.006). Hematologically these cases were also statistically more likely to have a segmental neutrophilia (p=0.001) and mild anemia (0.033) Patients with neoplastic lesions were more likely to present with dysphagia (p=0.035). On MRI inflammatory masses were statistically more likely to have an irregular margination (p=0.013), marked perilesional inflammation (p=0.001) and have associated local myositis (p=0.005) whereas the neoplastic masses were statistically larger in size (p=0.0047).

Discussion/Conclusion: This study identified several clinical and MRI features that that could help discriminate between inflammatory lymphadenitis and neoplastic medial retropharyngeal lymph node masses. Although histopathological or cytological analysis is required for confirmation of diagnosis these findings may help guide the clinical management of these patients.
INTRODUCTION/PURPOSE: Magnetic resonance imaging (MRI) is the imaging modality of choice for evaluating articular cartilage injury in humans. Few reports exist documenting the accuracy of MRI for evaluation of canine articular cartilage. Moreover, much of that work utilized low field strength magnets and subjective image evaluation. The objective of this study was to determine if 3T MRI is capable of accurately identifying location and depth of articular cartilage lesions in experimentally induced cartilage and subchondral bone lesions in canine cadaveric stifles.

METHODS: 42 healthy canine cadaveric stifles from 60-90 lb (27.3-40.9 kg) dogs assessed via radiography, MRI, and surgical joint exploration were used. Stifles (n=6 per group) were treated with 0.5, 1.0, or 3.0 mm deep lesions in either the medial or lateral femoral condyle. Lesions were created via lateral parapatellar arthrotomy using a custom-designed drill bit and depth-limiter system. A sham-operated control group was also included. PD- and T1-weighted, fast low-angle shot (FLASH), and T2 maps were made in dorsal and sagittal planes. A single investigator, blinded to treatment group, evaluated each sequence independently for lesion location and size (depth and width). Data were analyzed for accuracy of lesion location and size.

RESULTS: Overall, lesions were identified correctly in 98.8% of evaluated stifle joints and sequences. 100% of lesions were correctly identified on T1 and PD-weighted sequences. 97.6% of lesions were correctly identified on FLASH and T2 maps. 91.7% of lesions in the 0.5 and 1 mm groups were correctly identified. 100% of lesions in the 3.0 mm and sham operated control groups were correctly identified.

DISCUSSION/CONCLUSION: Narrow field of view 3T MRI is accurate for the identification of articular cartilage lesions of varying depths when assessed using an ex vivo cadaveric model. Further evaluation of these sequences in clinical patients is warranted.

**Introduction/Purpose:** In veterinary medicine, indicators of lymph node metastasis on CT include enlargement, irregular margins, and heterogenous contrast enhancement. Nodal necrosis, seen as a central lucency, is considered a good indicator of metastases in humans, but this has not been described in veterinary patients. The objective was to determine mandibular lymph node characteristics including specific dimensional measurements, attenuation and contrast enhancement (heterogeneity, central lucency, rim) on CT and evaluate their relationship to cellular diagnosis of metastasis or non-metastatic status. The hypothesis was that lymph node features from CT do not reliably distinguish metastatic disease from normal or reactive lymph nodes.

**Methods:** Skull CT studies of patients that had aspirates or biopsies of mandibular lymph nodes within 8 days of CT were identified. The following lymph node characteristics were recorded: shape, short axis, long axis and length measurements; as well as pre and post contrast HUs, pattern (homogenous, heterogenous, heterogenous/hilus), central lucency, and rim. Associations between study variables and presence or absence of metastases were investigated by estimating odds ratios (ORs), 95% confidence intervals (CIs) and Wald test p-values. To determine validity and predictive ability of the categorical variables when used as tools to assess presence or absence of metastases, sensitivity, specificity, predictive values and the area under the ROC curve were calculated. To use the continuous study variables as predictive tools, they were dichotomized using cutpoints that maximized sensitivity and specificity.

**Results:** 90 lymph nodes from 77 patients were evaluated; 74 of the 90 lymph nodes were non-metastatic and 16 were metastatic. ORs were statistically significant at the 0.05 level for heterogeneous vs. heterogeneous/hilus or homogeneous post contrast pattern (OR=4.06, 95% CI: 1.27-12.95), pre central lucency (OR=5.83, 95% CI: 1.28-26.54), and post central lucency (OR=6.42, 95% CI: 1.87-21.96). However, 95% CIs for the categorical study variables tended to be very wide. Length (short axis, long axis and overall length), volume and percent change in ROI from pre to post were statistically significant at the 0.05 level. The likelihood of a metastatic outcome increased by 10-20% for each 1mm increase in length and increased by 30% for each 5mL increase in volume. For each 50% increase in ROI from pre to post, the likelihood of metastases decreased by 40%. Most study variables were better at correctly predicting non-metastatic disease than metastatic disease with negative predictive values ranging from 83% - 92% and positive predictive values ranging from 18% - 50%. The highest negative predictive values were found for post contrast pattern and the dichotomized ROI measures. Combining predictors did not improve predictive abilities.

**Discussion/Conclusion:** Results suggest that while several CT lymph node features correctly predict absence of metastases about 90% of the time, none correctly predict presence of metastases more than half the time. Our study results must be interpreted with caution due to the small sample size, especially for non-metastatic disease.

**Introduction/Purpose:** Proton magnetic resonance spectroscopy (1H-MRS) has been referred to as the “metabolic fingerprint” of tissue, providing non-invasive in vivo quantification of tissue metabolites. Initial studies in canine brain have used relatively large voxel sizes (i.e. <1 cm). This limits the diagnostic accuracy, since partial volume effects cause voxel contamination, resulting in reduced spectra specificity. We investigated 1H-MRS at smaller voxel sizes better suited for the characterization of the canine brain and lesions.

**Methods:** Multi-voxel chemical shift imaging (CSI) 1H-MRS was performed on a GE 3.0T Signa HDx MR unit. Six neurologically normal research dogs were imaged with a single-channel knee coil. CSI 1H-MRS was performed in the thalamus (Thal), ensuring the voxel was centered within tissue. Line width was maintained below 13 Hz. The following voxel sizes were assessed: 0.5, 0.4, 0.3 and 0.225 cm$^3$. The largest voxel was established by a pilot study of thalamic volume measurement from canine brain MRIs; voxels over 0.5 cm$^3$ included adjacent neuroanatomical tissues in most canine brains. The 0.225 cm$^3$ voxels were also tested in the piriform (Pirif) lobe and cerebellar white matter (CereWM). All spectra were evaluated using LCModel. Descriptive statistical analysis was performed on major metabolites (Cho, NAA, Cr) and metabolite ratios.

**Results:** The scan times for CSI 1H-MRS were 1m59s, 3m18s, 6m30s and 9m43s for 0.5, 0.4, 0.3 and 0.225 cm$^3$, respectively. These scan times were used to maintain sequence relative signal-to-noise and were considered clinical applicable. Table 1 shows the resultant metabolites and metabolite ratio means (standard deviations).

<table>
<thead>
<tr>
<th>VOXEL</th>
<th>NAA</th>
<th>Cho</th>
<th>Cr</th>
<th>NAA/Cho</th>
<th>NAA/Cr</th>
<th>Cho/Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thal 0.5</td>
<td>10379 (15408)</td>
<td>4257 (3593)</td>
<td>3427 (2176)</td>
<td>0.83 (0.16)</td>
<td>1.06 (0.52)</td>
<td>1.18 (0.51)</td>
</tr>
<tr>
<td>Thal 0.4</td>
<td>4558 (4389)</td>
<td>4794 (4907)</td>
<td>4238 (2527)</td>
<td>0.88 (0.87)</td>
<td>0.99 (0.39)</td>
<td>0.98 (0.48)</td>
</tr>
<tr>
<td>Thal 0.3</td>
<td>7282 (7335)</td>
<td>6833 (6675)</td>
<td>6710 (3561)</td>
<td>0.86 (0.32)</td>
<td>0.99 (0.62)</td>
<td>0.90 (0.57)</td>
</tr>
<tr>
<td>Thal 0.225</td>
<td>8508 (7070)</td>
<td>8049 (8002)</td>
<td>4727 (3634)</td>
<td>1.012 (0.14)</td>
<td>1.93 (0.23)</td>
<td>1.90 (0.28)</td>
</tr>
<tr>
<td>Pirif 0.225</td>
<td>10332 (6313)</td>
<td>8148 (3640)</td>
<td>6408 (4104)</td>
<td>1.22 (0.31)</td>
<td>1.44 (0.35)</td>
<td>1.20 (0.09)</td>
</tr>
<tr>
<td>CereWM 0.225</td>
<td>8340 (4078)</td>
<td>7664 (4532)</td>
<td>7332 (4286)</td>
<td>1.09 (0.15)</td>
<td>1.12 (0.43)</td>
<td>1.09 (0.15)</td>
</tr>
</tbody>
</table>

**Discussion/Conclusion:** Spectra were subjectively of good quality, with baseline noise being higher in smaller voxels. The metabolite values and metabolite ratios were similar to those reported by Warrington et al. (2013), except that most Thal ratios were lower and Pirif and CereWM metabolites were markedly higher. Therefore, smaller voxel sizes for 1H-MRI are possible. Further research is needed to establish true normal 1H-MRS values in the canine brain with care taken to avoid voxel contamination.
Friday, October 24, 2014 (ACVR and RO simultaneous sessions all day)

**RO**

7:00 am  *Registration Opens*  
Grand Foyer

7:00 am  *VRTOG Meeting*  
Grand Ballroom E-G

9:00 am  **Outgoing RO President’s Address**  
Dr. Sheri Siegel  
Grand Ballroom E-G

9:30 am  **Who Are We? How Are Things Going?**  
Dr. Donald Thrall  
Grand Ballroom E-G

10:00 am  *Break with Exhibitors*  
Arch View Ballroom

10:30 am  **Scientific Session 10**  
(Moderator: Dr. Sheri Siegel)  
Grand Ballroom E-G

10:30-10:45 am  *DEFINITIVE HIGH-DOSE HYPO-FRACTIONATED TOTAL PELVIC IRRADIATION WITH SIMULTANEOUS BOOST IN CANINE URINARY CTT: A FEASIBILITY STUDY AND FIRST CLINICAL EXPERIENCES.*  
M. Dolera, L. Malfassi, M. Sala, G. Mazza, S. Marcarini, N. Carrara, S. Finesso. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy, 26014.

10:45-11:00 am  *ADRENAL TUMOURS WITH VASCULAR INVASION: STEREOTACTIC HYPOFRACTIONATED VOLUME MODULATED ARC RADIOTHERAPY (VMAT) IN 12 DOGS.*  

11:00-11:15 am  *CANINE MENINGIOMA: COMPARISON OF PALLIATIVE THERAPY, SURGERY AND STEREOTACTIC RADIOSURGERY.*  

11:15-11:30 am  *IMPROVEMENT OF RADIOSENSITIVITY WITH TOCERANIB PHOSTATE (Palladia) ON CANINE MAST CELL TUMORS IN VITRO.*  
K. Shiomitsu, Baton Rouge, LA 70803.

11:30-11:45 am  *ELECTRONIC BRACHYTHERAPY FOR EQUINE NEOPLASIA.*  
J.T. Custis, G.A. Landolt, B.S. Leise, J.M. Seamon, S.M. LaRue. Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, CO 80523.

11:45-12:00 pm  *SURVIVAL IN DOGS WITH STAGE 4 NASAL TUMORS TREATED WITH STEREOTACTIC BODY RADIATION THERAPY.*  
K.E. Pohlmann, S. LaRue, L. Griffin, J. Custis. Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, CO 80523.
12:00 pm  Lunch on Your Own

Scientific Session 11  Grand Ballroom E-G
(Moderator: Dr. Monique Mayer)

1:30-1:45 pm  PROSPECTIVE, RANDOMIZED BLINDED PILOT STUDY OF THE EFFECT OF ORAL GLUTAMINE SUPPLEMENTATION ON THE SEVERITY OF RADIATION-INDUCED ORAL MUCOSITIS. R. A. Chetney, Jr., N. D. Lee, J. N. Pawlik. University of Tennessee, College of Veterinary Medicine, TN 37996.

1:45-2:00 pm  PATTERNS OF LESION LOCALIZATION AND SURVIVAL TIME IN DOGS WITH TRIGEMINAL NERVE SHEATH TUMORS. Swift, K.1; Nolan, M.W.2; Young, M.3; Custis, J.1; LaRue S.1 1Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins CO; 2Department of Clinical Sciences, North Carolina State University, Raleigh NC; 3Bush Veterinary Neurology Service, Springfield, VA.

3:30 pm  Break

5:00 pm  Meeting Concludes
DEFINITIVE HIGH-DOSE HYPO-FRACTIONATED TOTAL PELVIC IRRADIATION WITH SIMULTANEOUS BOOST IN CANINE URINARY CCT: A FEASIBILITY STUDY AND FIRST CLINICAL EXPERIENCES. M. Dolera, L. Malfassi, M. Sala, G. Mazza, S. Marcarini, N. Carrara, S. Finesso. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

**Introduction/Purpose:** The lower urinary tract transitional cell carcinoma (CCT) poses challenge in order to the appropriate radiotherapy (RT) regimen. Organs at risk (OARs) within the irradiation field (ureters, rectum) are the limiting factors in dose escalation. The primary aim of this study was to evaluate the technical feasibility of high-dose hypo-fractionated dynamic IMRT in non-resectable lower urinary CCT affected dogs. The secondary goal was to evaluate the toxicity and the efficacy of the RT regimens.

**Methods:** Three dogs with lower urinary tract CCT were treated with definitive high-dose hypo-fractionated RT with VMAT technique. The volume treatment definition include the gross tumor (GTV), the PTV1 (GTV+3mm), limphatics (PTV2), the entire bladder, prostate in males and uretra (PTV3), the entire pelvis except the rectal volume (PTV4). Dose prescriptions were 40 Gy to PTV1, 38 Gy to PTV2, 34 Gy to the PTV3, 30 Gy to the PTV4, in 6 fractions on alternate days. A piroxicam was subministered to all dogs. Serial clinical and CT/MRI examination were performed. Disease control and toxicity effects were evaluated according to RECIST and VRTOG criteria.

**Results:** Three T2N0M0 urinary tract CCT were treated. Prescription goals were obtained in all three cases with V95%>95% and V107%>2%. During follow-up (mean 6 months) one partial response and two complete responses were obtained. Two grade I cystitis developed. Non rectal toxicity was recognized.

**Discussion/Conclusion:** The initial experiences with the RT regimen adopted indicate a feasibility and effectiveness in lower urinary transitional cell carcinoma (CCT). Longer follow-up and larger treatment series are needed.
ADRENAL TUMOURS WITH VASCULAR INVASION: STEREOTACTIC HYPOFRACTIONATED VOLUME MODULATED ARC RADIOThERAPY (VMAT) IN 12 DOGS. L. Malfassi, M. Dolera, S. Marcarini, G. Mazza, N. Carrara, M. Sala, S. Finesso. La Cittadina Fondazione Studi e Ricerche Veterinarie, Italy 26014.

Introduction/Purpose: Adrenal tumors are very common in dogs. A surgical therapy is the standard treatment but it creates many potential complications (intracaval extension, heart rhythm disturbances in cases of pheochromocytomas). The purpose of this study was to evaluate the technical feasibility and therapeutic efficacy on both tumor control and endocrine aspects of hypofractionated Volume Modulated Arc Radiotherapy (VMAT) in canine adrenal tumors.

Methods: Twelve dogs with functional adrenal tumors diagnosed by clinical findings, laboratory works and MRI/CT imaging were treated using a LINAC equipped with micromultileaf collimator. All the patients were subjected to CT 4D simulation. The radiotherapy (RT) plans were computed using statistic algorithm Montecarlo with software Monaco CMS-Elekta by Volumetric Modulated Arc Therapy (VMAT) technique. The dose prescription was 33-42 Gy in 3 fractions. Organs at risk’s (OARs) constraints were derived from AAPM TG101. The RT plans were evaluated for quality assessment with DosimetryCheck software and ScansiDos Delta4. The follow up have been provided by biochemical exams and CT/MRI. Responses were evaluated according to RECIST criteria. The radiation toxicity was graded according to VRTOG criteria.

Results: All the patients completed the treatment plan. A mean follow up was 21 months, with 87% of overall survival. Ten volumetric partial responses and two volumetric stable diseases were obtained. Plasmatic cortisol normalization was obtained within 2 months in all the treated dogs with associated resolution of clinical complaints. In patients with severe vena cava obstruction a reduction of ascites was evident within few days. In one inmate a mild pancreatitis developed at the end of treatment.

Discussion/Conclusion: Stereotactic hypofractionated VMAT has recently been proposed in Human Medicine for treatment of adrenal metastasis and constitutes a valid alternative to traditional surgical therapy. This study assets the feasibility and efficacy of Stereotactic hypofractionated VMAT in dogs with adrenal tumors. The transition to euendocrinia has been smooth. A longer survival was obtained in this cohort compared with surgical series of literature. We believe that this radiotherapy technique deserves further investigation but it can represent the best treatment option for canine adrenal tumors with vena cava invasion.

Introduction/Purpose: Meningiomas represent about half of primary intracranial tumours in dogs. There are limited comparative studies regarding the various treatment modalities. The aim of this study was to compare palliative therapy, surgery and stereotactic radiosurgery in canine meningioma.

Methods: The data was collected retrospectively from 198 dogs referred to one institution over a 15-year period with histopathologically confirmed or MRI consistent with meningioma. Dogs were grouped by anatomical site (supratentorial - E, infratentorial - T, spinal - S) and by therapeutic option (palliation - P, surgery - S, radiosurgery - R). The surgery goal was a total resection of tumour. LINAC based VMAT radiosurgery was performed in 1 - 5 fractions. Serial clinical and MRI examinations were conducted. Signalment, clinical signs, neuroanatomical tumour location, relapse specifics, adverse events, best response and overall survival (OS) time were evaluated. The OS estimates were calculated using the Kaplan-Meier method and the differences between compared groups using log-rank analysis. Multivariate analysis was performed using Cox regression.

Results: 91 dogs (51 E, 33 T, 7 S) had been palliated, 69 dogs (33 E, 31 T, 5 S) had been treated with stereotactic radio-surgery, 38 dogs (32 E, 1 T, 5 S) with surgery. OS in PE was 190 days, in PT 38 days, in PS 89 days, in RE 781 days, in RT 654 days, in RS 813 days, in SE 567 days, in ST 3 days, in SS 210 days. The predictive variables of OS are localisation and therapy option.

Discussion/Conclusion: The dogs suffering from meningioma undergoing stereotactic radiosurgery had superior results comparing with those treated with surgery or palliation.
IMPROVEMENT OF RADIOSENSITIVITY WITH TOCERANIB PHOSTATE (Palladia) ON CANINE MAST CELL TUMORS IN VITRO. K. Shiomitsu. Baton Rouge, LA 70803.

Introduction/Purpose: C-kit is the tyrosine kinase receptor that regulates cell proliferation, survival, and differentiation. Approximately 30% of canine mast cell tumors have a mutation of c-kit. Toceranib phosphate, multi-tyrosine kinase inhibitors, have been used in a variety of tumors in veterinary medicine and favorable outcomes have been observed. In this study, we hypothesize that the Toceranib phosphate (Palladia) will enhance the radiosensitivity of canine mast cell tumors (MCT). The purposes of our study are to 1. Evaluate the protein expression level of PDGFR, VEGFR-2 and c-kit in canine MCT. 2. Evaluate the cell survival and proliferation with Palladia in canine MCT. 3. Evaluate the enhancement of radiosensitivity with Palladia in canine MCT. 4. Evaluate the protein expression differences of p53, chk2, and gamma H2A-X between radiation alone and radiation with Palladia, and finally 5. Assess the cellular death by the caspase-3 expression.

Methods: Three MCT lines (CoMS, CM-MC1, and VI-MC1) were used in this study. These cell lines were kindly donated by Tokyo University, Japan. MTT assay was performed to evaluate survival fraction, and western blots were also performed to evaluate protein expression in the cell death, DNA damage, and DNA repair process.

Results: The mRNA expression of c-kit, PDGFR-α, and VEGFR-2 were identified for the tested canine MCT. We evaluated the cytotoxicity of the Palladia, and a significant decrease in cell viability was seen in all tested cell lines. We evaluated the radiosensitizing effect, of Palladia, and observed a significant enhancement. Apoptosis was evaluated with capase-3, and showed an increased expression, post radiation exposure, and the expression kept increasing even 24 hours post irradiation. Finally, we observed an increased protein expression of p53, chk-2, gamma H2AXX, post radiation exposure.

Discussion/Conclusion: These results indicate that Palladia could enhance the radiosensitivity of canine MCT in vitro. Further clinical investigations would be warranted to use Palladia in conjunction with radiation therapy for canine MCT.
Introduction/Purpose: As a primary and an adjuvant therapy, ionizing radiation improves local tumor control. However, few veterinary facilities offer radiation therapy for equine patients. At this institution, linear accelerator based therapy is not available for horses. As an alternative, electronic brachytherapy (EBTX) administers high-dose rate, low energy, kilovoltage, x-rays to the tumor and/ or tumor bed. With EBTX the deposition and distribution of dose adjacent to the source allows for the delivery of the desired dose to the tumor while achieving relative sparing of the surrounding deep normal tissues. The skin remains a consideration given the location of maximum dose distribution at the skin surface. As a mobile treatment option, requiring minimal in-room shielding, EBTX presents a feasible means of treating cutaneous and subcutaneous tumors in horses. The purpose of this study is to evaluate the safety and efficacy of electronic brachytherapy for equine neoplasia.

Methods: All patients were presented to the Colorado State University Veterinary Teaching Hospital (CSU VTH) for spontaneously arising tumors. Pursuit of electronic brachytherapy as a primary or adjuvant therapy was based upon tumor size, type, location, and resectability. Calibration of the Axxent® Veterinary Electronic Brachytherapy System® occurred prior to each treatment administration. General anesthesia was pursued for all patients. Intraoperative EBTX was pursued following surgical excision and delivered to the tumor bed via one of the surface applicators (diameter of 10, 20, 35, and 50mm). When pursued, primary skin closure precluded subsequent EBTX delivery. Gross disease was addressed via interstitial delivery. Dose was calculated as a function of the source dwell time and prescribed to a depth of 5mm in tissue. Protocols varied. Patients were evaluated with regard to toxicity and local tumor control following EBTX.

Results: Thirty-one fractions of EBTX were delivered to 16 lesions in 12 patients (9 horses, 3 mules). The mean patient age at the time of treatment was 10.6 years. Treated tumor types include sarcoids (10), sarcomas (2), fibrosarcomas (2), squamous cell carcinomas (1), and melanoma (1). Median dose per fraction was 20Gy at a depth of 5mm. Treatments were delivered in one to four fractions, the median interval between multiple fractions was 28.5 days. Median follow-up time was 304 days. Radiation induced toxicity requiring medical intervention was not appreciated for any of the patients.

Discussion/Conclusion: EBTX is a viable therapeutic option for equine patients with superficial and readily accessible tumors. EBTX appears to be well tolerated by all patients treated to date. Evaluation of long-term local tumor control following EBTX is ongoing. Future work will focus upon optimizing tumor-specific protocols with regard to time, dose, and fractionation. A particular emphasis will be placed upon the development of EBTX delivery strategies not requiring general anesthesia.
Introduction/Purpose: Canine nasal tumors are locally aggressive and slow to metastasize to distant sites. Treatment is aimed at achieving local tumor control, as death is most often attributed to progression of local rather than metastatic disease. Definitive intent radiation therapy is the standard of care for canine nasal tumors and has provided good long-term outcomes with reported median survival times (MST) of 8-19.7 months. Patients with cribriform involvement have been reported to have a significantly lower MST of 6.7 months. Both intensity-modulated radiation therapy (IMRT) and stereotactic body radiation therapy (SBRT) are increasingly available for companion animals. The delivery of more targeted radiation affords an opportunity to maximize the tumor dose, remain within normal tissue tolerance, and shorten treatment duration. SBRT allows hypofractionation of the total radiation dose, providing an appealing treatment alternative for owners by decreasing the number of anesthetic episodes required for their geriatric companions. The purpose of this retrospective study is to evaluate the outcomes of patients with stage 4 nasal tumors treated with SBRT.

Methods: Medical records of dogs with spontaneously occurring nasal tumors treated with SBRT between August 2010 and December 2012 were reviewed. Information on patient demographics, oncological history, histopathology, computed-tomography (CT) reports, and date of death or current status were extracted. CT studies were reviewed to classify patients according to the Adams staging scheme (2009). For inclusion dogs had to have Stage 4 tumors and have undergone intent-to-cure stereotactic radiation therapy prescribed at 30 Gy delivered in three fractions. Survival parameters were determined using Kaplan-Meier analysis. Toxicity was graded according to the criteria defined by the Veterinary Radiation Therapy and Oncology group.

Results: Twenty-five dogs met the criteria for inclusion in the study. There were 16 purebred dogs including Golden Retriever (6), Standard Poodle (1), Miniature Schnauzer (1), Lhasa Apso (1), Border Collie (1), Old English sheepdog (1), Shetland Sheepdog (1), Scottish Terrier (1), Chihuahua (1), Italian Greyhound (1), and Cocker Spaniel (1) and 9 mixed-breed dogs. The median age of patients was 10 years. There were 12 spayed females, 12 castrated males and 1 intact male. Tumor types included adenocarcinoma (10), carcinoma (9), squamous cell carcinoma (1), chondrosarcoma (1), and sarcoma (1). Three patients did not have histopathologic diagnoses. Survival was defined as the interval between the first fraction of radiation therapy and the date of death. Statistical analysis is in progress and will be discussed.

Discussion/Conclusion: SBRT allows shorter treatment times and increased sparing of normal tissues by avoidance of normal tissues rather than fractionation of total dose. SBRT may provide improved outcomes in dogs with stage 4 nasal tumors. Limitations of this study include its retrospective nature, small sample size, and lack of follow-up information particularly regarding side effects of radiation therapy.

Introduction/Purpose: Previous studies in human, rat, and dog models have suggested decreased acute effects of radiation on the gastrointestinal mucosa with concurrent supplementation of oral glutamine. Currently, there is a lack of information regarding prevention or lessening of radiation-induced oral mucositis in human and animal patients with similar supplementation. The goal of this pilot study is to analyze whether orally supplemented L-glutamine decreases the severity of radiation-induced oral mucositis in head and neck tumor patients that receive radiation dose to the oral mucosa.

Methods: This study includes eight canines receiving palliative radiation therapy (32Gy), or definitive radiation therapy (48Gy) for head and neck tumors that receive radiation dose to the oral mucosa. Patients will be assigned at random to receive OraBlend ® suspension containing 40mg/kg L-glutamine, or OraBlend ® suspension without L-glutamine added. The suspensions will be administered orally every 12 hours during treatment. Radiation-induced oral mucositis will be graded weekly by two blinded clinicians (R.C. and N.L.) using the VRTOG acute radiation toxicity scheme while patients are undergoing therapy. The clinicians will be unblinded at the conclusion of the data collection for data analysis. Data will be analyzed using the repeated measures analysis of variance (ANOVA), with a P value of less than 0.05 representing a statistically significant effect.

Results: Four dogs have completed the described protocol. Of the patients that have completed the protocol, two patients received 48Gy radiation therapy, and two patients received 32Gy radiation therapy. Most adverse radiation effects occurred near the end of therapy (weeks 3 and 4). Maximal VRTOG grade for oral mucositis was 3 in a dog treated with 48Gy, 1 in another dog treated with 48Gy, 2 in a dog treated with 32Gy, and 1 in the second dog treated with 32Gy. Mean maximal VRTOG grade for oral mucositis was a calculated value of 1.75. Once data is unblinded at the end of the study, correlation between glutamine supplementation and VRTOG scores for the oral mucosa will be determined.

Discussion/Conclusion: Because of the ongoing nature of this study, the clinicians involved have not been unblinded to the data. Based on the limited amount of data available at this time, radiation side effects to the oral cavity in two patients appear to be reduced compared to historical clinical cases. Whether this is associated with L-glutamine supplementation is to be determined.
PATTERNS OF LESION LOCALIZATION AND SURVIVAL TIME IN DOGS WITH TRIGEMINAL NERVE SHEATH TUMORS. Swift, K.1; Nolan, M.W.2; Young, M.3; Custis, J.1; LaRue S.1 1Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins CO; 2Department of Clinical Sciences, North Carolina State University, Raleigh NC; 3Bush Veterinary Neurology Service, Springfield, VA.

Introduction/Purpose: Tumors of CN V are relatively uncommon, and reports describing clinical features and treatment outcomes of dogs with trigeminal nerve sheath tumors (TNST’s) are rare. Reported treatment options include medical management, surgery, and more recently, radiation therapy. The purpose of this retrospective study is to describe the presenting clinical signs of dogs with TNST’s and further describe the portions of the nerve most commonly affected. An additional intent is to describe clinical progression of disease and survival times in a control group of dogs that were medically managed, as compared with treatment outcomes in dogs treated with stereotactictic radiation therapy (SRT).

Methods: Medical records from multiple institutions were searched for dogs diagnosed with TNST between 2004 and 2014. Information on patient demographics, oncological history, neurological examination findings, MRI reports and images, and date of death or current status were extracted. The diagnosis of trigeminal tumor was based on neurological signs and imaging findings. Dogs were categorized into two groups: dogs medically managed, and dogs treated with SRT. Diagnosis of radiation-associated toxicity was based on appearance of neurologic signs following SRT, time to development of signs and if signs improved with medical treatment. Late radiation toxicities were difficult to evaluate due to the limited number of cases with follow-up imaging and/or necropsy.

Results: All fifteen dogs treated with SRT, and 10 medically managed dogs had evidence of intracalvarial tumor extension. All dogs had a least one branch affected SRT protocols were 3 fractions, with prescriptions ranging from 24 to 30 Gy. Additional data being analyzed includes patterns of lesion localization, clinical signs, medications prescribed, if patient had fluid in the middle ear on imaging, and if ocular disease was or became present. Comparison of survival times between these two treatment groups is being evaluated using Kaplan-Meier analysis and log rank tests.

Discussion/Conclusion: These data suggest that the majority of dogs with TNST have an intracranial tumor burden. This should be taken into account when considering treatment and monitoring, even in dogs presenting with just peripheral signs. Further data is still being analyzed. Limitations of this study include it’s retrospective nature, small control sample size and lack of histopathologic confirmation of tumor type.
POSTER PRESENTATIONS

3D VOLUMETRIC COMPARISONS OF LEFT-TO-RIGHT BRAIN ASYMMETRY IN EPILEPTIC VS NON-EPILEPTIC DOGS USING MRI. C. Estey¹, C.W. Dewey¹, M. Rishniw¹, D. Lin¹, J.L. Bouma², J. Sackman³ and E. Burkland¹. ¹Cornell University Hospital for Animals, Ithaca, NY 14850. ²Rochester Veterinary Specialists, Rochester, NY 14623. ³Long Island Veterinary Specialists, Plainview, NY 11803.

COMPARISON BETWEEN CT AND GROSS PATHOLOGY FOR DETECTION OF SACROILIAC LESIONS IN DOGS. M. Carnevale¹, J. Jones¹, P. Sponenberg², I. Holaskova¹.¹West Virginia University, WV 26505; ²Virginia-Maryland Regional College of Veterinary Medicine, Virginia Tech, VA 24061.

VARIATION OF CANINE VERTEBRAL BONE ARCHITECTURE IN COMPUTED TOMOGRAPHY. B.G. Cheon¹, S.J. Park¹, J.H. Yoon², J.H. Choi¹. ¹College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea, ²College of Veterinary Medicine, Seoul National University, Seoul 151-742, South Korea.


RENAL PARENCHYMAL VOLUME DETERMINED BY COMPUTED TOMOGRAPHY IN THE CLINICALLY NORMAL COMMON MARMOSET (CALLITHRIX JACCHUS). W.M. du Plessis. Ross University School of Veterinary Medicine, St. Kitts, West Indies; Faculty of Veterinary Science, University of Pretoria, Republic of South Africa.

QUANTITATIVE ANALYSIS OF 18F-FLUORODEOXYGLUCOSE STANDARDIZED UPTAKE VALUES IN PRETREATMENT PET/CT IMAGING OF CANINE OSTEOSARCOMAS. K.A. Mann, S.L. Kraft, S.M. Hauke, and E.K. Randall. Colorado State University, CO 80523.


WHOLE BODY MUSCULOSKELETAL LESIONS IN MILITARY WORKING DOGS WITH VERSUS WITHOUT LOWER BACK PAIN. C. Jula¹, J. Jones¹, I. Holaskova¹, K. Childs². ¹West Virginia University, WV 26506; ²Department of Defense Military Working Dog Veterinary Service, TX 78236.
DIAGNOSTIC IMAGING FEATURES OF NORMAL ANAL SACS IN DOGS AND CATS. Y. Jung, J. Jeong, S. Park, E. Jeong, U. Choi, M. Kim, N. Kim, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, South Korea.


EFFECTS OF LOW DOSE PREDNISOLONE ON BODY WEIGHT, BLOOD PRESSURE, LIVER, ADRENAL GLAND AND PANCREAS IN DOGS. S.K Lee, S.J. Park. J.H. Choi. College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea.

EVALUATION OF THE CANINE PANCREAS USING COMPUTED TOMOGRAPHY: FURTHER DESCRIPTION OF NORMAL IMAGING CHARACTERISTICS. M.J. Lemon, N.C. Nelson. College of Veterinary Medicine, Michigan State University, MI 48824.

INCORPORATION OF FDG-PET/CT INTO RADIATION THERAPY PLANNING TO IMPROVE TREATMENT OF CANINE NASAL TUMORS. S.J. Loeber, J.T. Custis, E.K. Randall, S.L. Kraft. Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, CO 80523.

FLUOROSCOPIC EVALUATION OF DIAPHRAGMATIC EXCURSION DURING SPONTANEOUS BREATHING IN HEALTHY BEAGLE DOGS. S.H. Moon¹, S.J. Park¹, J.H. Yoon², J.H. Choi¹. ¹College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea, ²College of Veterinary Medicine, Seoul National University, Seoul 151-742, South Korea.

A NOVEL BOARD GAME FOR TEACHING THORACIC RADIOGRAPHY TO 4TH-YEAR VETERINARY STUDENTS. C. Ober. Department of Veterinary Clinical Sciences, University of Minnesota College of Veterinary Medicine, 1365 Gortner Avenue, St. Paul, MN 55108.

LOW FIELD MAGNETIC RESONANCE IMAGING ASSESSMENT OF PARASPINAL MUSCLE ATROPHY IN CANINE PATIENTS WITH INTERVERTEBRAL DISC DISEASE. S. Park, J. Jeong, Y. Jung, E. Jeong, H. Lee, M. Kim, N. Kim, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, Republic of Korea.

A PRELIMINARY STUDY OF A CONTRAST ENHANCEMENT PATTERN IN THE LUMBER SPINAL CORD OF NORMAL DACHSHUNDS.  G. Shimbo, K. Karatsu, T. Miyabayashi. iVEAT Fukuoka Veterinary Specialty Practice (VSP), Fukuoka 812-0888, JAPAN.


TREATMENT EFFECTS OF TRANSNARE CRYOABLATION FOR INTRANASAL NEOPLASIA IN 6 DOGS.  Michele A. Steffey, Erin McKerney, Allison L. Zwingenberger. University of California Davis, CA 95616.
Introduction/Purpose: Epilepsy is the most commonly diagnosed neurologic disorder in dogs. Almost 50% of dogs with seizures are subsequently diagnosed with idiopathic epilepsy (IE). Approximately 25-30% of epileptic dogs are refractory to treatment with anticonvulsant drugs. In humans, such therapeutic refractoriness has sometimes been associated with structural changes, most commonly asymmetry in the hippocampus and temporal lobe, detectable by magnetic resonance imaging (MRI). Surgical excision of the affected region often results in amelioration of the seizures. Therefore, we used MRI-acquired 3-dimensional (3D) volumetric measurements from a large cohort of neurologically normal and epileptic dogs to determine if epileptic dogs exhibit focal or generalized brain asymmetry compared to non-epileptic dogs.

Methods: MRI databases from three institutions (Cornell University Hospital for Animals, Long Island Veterinary Specialists and Rochester Veterinary Specialists) were searched for dogs that underwent MRI of the brain and were determined to have IE and those that were considered non epileptics (normal). A total of 100 dogs with IE and 40 normal dogs were included in the study. For each dog, 3D volumes were measured comparing the right and left lateral ventricles, hippocampi, and cranial vault hemivolume using Mimics® software. Continuous data between normal and IE dogs were compared with a Mann-Whitney U test; proportions were compared with chi-square tests. Threshold asymmetry values were determined by Receiver Operating Characteristic (ROC) analysis and visual inspection of the data.

Results: We derived a ratio using maximal-to-minimal hippocampal volumes for both groups to provide a size-independent measure of hippocampal asymmetry. IE dogs had greater hippocampal asymmetry than normal dogs (p< 0.0118). A threshold value of 1.16 from the hippocampal ratio had an 85% sensitivity for identifying IE-associated asymmetry. 35% of IE dogs had a hippocampal ratio >1.16. Hippocampal asymmetry was not biased to one hemisphere. Normalized ventricular volumes and hemispherical volumes in IE dogs with increased asymmetry did not differ from those without increase asymmetry.

Discussion/Conclusion: Hippocampal asymmetry occurs in a significant subset of IE dogs, suggesting a structural etiology to the IE. Whether this subset of IE dogs would be amenable to surgical intervention remains to be determined.
COMPARISON BETWEEN CT AND GROSS PATHOLOGY FOR DETECTION OF SACROILIAC LESIONS IN DOGS. M. Carnevale¹, J. Jones¹, P. Sponenberg², I. Holaskova¹.¹West Virginia University, WV 26505; ²Virginia-Maryland Regional College of Veterinary Medicine, Virginia Tech, VA 24061.

Introduction/Purpose: Sacroiliac joint disease is increasingly being recognized as one of the causes of lower back pain in dogs. Diagnosis is currently based primarily on clinical examination and radiography, with necropsy considered to be the reference standard. Computed tomography (CT) has been established as a sensitive, non-invasive test for ante-mortem diagnosis of sacroiliac joint disease in humans with lower back pain. The purpose of this study was to test the hypothesis that CT and gross pathology will agree for detecting lesions consistent with sacroiliac joint disease in a group of dogs.

Methods: Digital CT scans and corresponding gross pathology slice photographs of the sacroiliac region were retrieved from data previously acquired for a cadaver study on ultrasound sacroiliac-guided injection in dogs. Fifteen, adult, mixed breed dogs were evaluated (30 sacroiliac joints). A pre-veterinary student (MC) and a veterinary radiologist (JJ) reviewed CT images and recorded presence or absence of the following CT lesions previously reported to be characteristics of clinically significant sacroiliac joint disease in humans: subchondral cyst, subchondral sclerosis, subchondral erosions, intra-articular ankylosis, and para-articular ankylosis. Findings were recorded in three independent review sessions separated at least a week apart, with the order of dogs randomized between reading sessions. A fourth reading session was then used to resolve any discordant interpretations. A veterinary pathologist (PS) reviewed gross pathology slice photographs using the same protocol and recorded presence or absence of the same lesions as those described above. Data recorded during the 4th reading session for each test were used for statistical comparisons. A statistician (IH) compared agreement between CT and gross pathology for sacroiliac joint lesion detection using McNemar’s test and Kappa statistics.

Results: In this sample of 15 dogs, prevalence of lesions consistent with sacroiliac joint disease was 100% based on CT and 100% based on gross pathology slices. More subchondral cyst and intra-articular ankylosis lesions were detected using CT versus gross pathology. More subchondral sclerosis and subchondral erosion lesions were detected using gross pathology versus CT. Para-articular ankylosis was detected only with CT. Proportions of detected subchondral cyst lesions differed between CT and gross pathology for left and combined right/left sacroiliac joints (p < 0.05, McNemar's). Overall agreement was poor between CT and gross pathology for detection of subchondral cyst, subchondral sclerosis, subchondral erosion, and intra-articular ankylosis lesions in combined right/left sacroiliac joints (Kappa ≤ 0.20).

Discussion/Conclusion: Findings failed to support our hypothesis that sacroiliac lesion detection for CT and gross pathology will agree. Previous human studies have proposed that CT may be a better reference standard than necropsy for some bone lesions. Future studies are needed to determine whether the same may be true for sacroiliac joint lesions in dogs.
VARIATION OF CANINE VERTEBRAL BONE ARCHITECTURE IN COMPUTED TOMOGRAPHY. B.G. Cheon¹, S.J. Park¹, J.H. Yoon², J.H. Choi¹. ¹College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea, ²College of Veterinary Medicine, Seoul National University, Seoul 151-742, South Korea.

Introduction/Purpose: CT is widely used to investigate the vertebral disorders particularly for pathologic bone changes. Vertebra consists of cortical and cancellous bones and each bone has different density and architecture. We encountered various focal lesions from vertebral CT images showing hyper- or hypoattenuation in dogs without pathologic bone disorder. In this study, vertebral bone architecture was investigated in dogs to determine the normal variation of vertebral CT morphology.

Methods: Vertebral CT images taken from Oct. 1, 2011 to May, 31, 2014 were investigated retrospectively in dogs without neoplasia and general diseases affecting on bone density. Vertebral architecture was evaluated at three parts such as the spinous process, transverse process, and body. The trabecular pattern and the location, number and attenuation of abnormal focal lesions were determined.

Results: Twenty dogs of 10 breeds (8 maltese, 2 shihtzu, 2 Yorkshire terrier, 2 mongrel, 1 pekingese, 1 Shetland sheepdog, 1 poodle, 1 beagle, 1 Jindo dog and 1 miniature schunauzer) were included in this study. Normal trabecular pattern was prominent from thoracic and lumbar vertebra. However, the cancellous bone of cervical vertebra did not show coarse architecture. Total 100 vertebral lesions were identified in 14 dogs (4 dogs from cervical, 13 dogs from thoracic, and 7 dogs from lumbar regions) from 10 regions of 63 cervical vertebrae (15.9%), 73 of 247 thoracic vertebra (29.6%) and 10 of 119 lumbar vertebra (8.4%). About 40% of the dogs had hyperattenuating lesions at the 7th or 8th thoracic vertebra. All lesions were located within the vertebral body except three lesions including multiple hypoattenuating lesions in a cervical spinous process, a single hyperattenuating lesion in a thoracic transverse process, and a single hypoattenuating lesion of lamina in a lumbar vertebra. About 87% of all lesions were hyperattenuation and 40% of them were single and 47% were multifocal lesions. Most hypoattenuating lesions were seen as single lesion (12%). Hyperattenuating lesions were not related with spondylosis deformans. The vertebral lesions did not have significant correlation with age, body weight, gender, and serum concentration of ALT, ALKP, calcium and phosphorus.

Discussion/Conclusion: CT images showed wide variation of vertebral bone architecture in dogs. Single or multifocal vertebral lesions showing hyper- or hypoattenuation were found about 70% of all dogs and 21.7% of all CT scanned vertebrae. These lesions did not have correlation with spondylosis deformans. Vertebral lesions with hyperattenuation could be confused with enostosis or metastatic lesions. Hypoattenuating lesions could be also misinterpreted as metastasis, pseudocyst, pneumatocyst, diskospondylitis, and others. Normal variation of vertebral bone architecture in CT images should be considered to prevent misdiagnosis as pathologic lesions in dogs.

Introduction/Purpose: Although radiographic descriptions of naturally occurring equine stifle OA exist, the disease has not been characterized with ultrasound, computed tomography or even macroscopically. The main objective of this study was to describe the location and severity of osteophytosis in the equine stifle with ultrasound (US), radiography (XR), computed tomography (CT) and macroscopic evaluation (ME) and compare the diagnostic performance of each imaging modality with ME.

Methods: Equine cadaver stifles with (n=17) and without (n=6) radiographic signs of OA were investigated. Four XR projections were made including a novel oblique projection (Ca10°Pr5°L-CrDiMO). CT with multiplanar and 3-dimensional reformatting, US evaluation and ME examination were also performed. Osteophytosis was assessed at specific sites and graded semi-quantitatively using XR, CT, US and ME. Osteophyte score of each site was compared using a Cochran-Mantel-Haenszel test and global osteophyte score of each stifle was compared using linear regression analysis. Interobserver correlation was assessed for global osteophytosis score on XR and CT using a Bland-Altman test.

Results: Osteophytes were predominantly located in the medial femorotibial (MFT) joint and this joint also had the most severe osteophyte scores. Two specimens with the highest ME score in the MFT joint also had osteophytes in all other joint compartments. Osteophytes were best observed on Ca10°Pr5°L-CrDiMO and Ca60°M-CrLO projections and on the dorsal CT-plane. A previously unreported pattern of osteophytes was visible as a line superimposed on the medial femoral condyle (MFC). Significant associations were found between global osteophyte score of all modalities (US, p=0.04; XR, p=0.005; CT, p<0.0001) and ME. Osteophyte grade (0-3) at each site did not significantly differ between modalities except for the medial femoral trochlear ridge where osteophyte scores were higher with US than XR (p=0.008) and CT (p=0.008) and for the MFC where scores were higher with US than XR (p=0.01), CT (p=0.046) and ME (p=0.0009). Scores were also higher with CT than ME for the MFC (p=0.02) and medial tibial plateau (p=0.01). For the medial intercondylar eminence, osteophyte scores were higher with CT (p=0.005) and XR (p=0.02) than ME. There was high correlation between observers in global osteophyte scores. However, a significant interobserver bias was present and more so for CT than for XR.

Discussion/Conclusion: The previously unreported Ca10°Pr5°L-CrDiMO was particularly helpful in the evaluation of the intercondylar region and should be included in evaluation of equine stifle OA. Multiplanar CT reformatted images were also useful for complete evaluation. Significant associations were found between global osteophyte score of all imaging modalities and ME and CT showed the highest association. This study confirms that osteophytes are predominantly found in the MFT joint in equine stifle OA and highlights a specific pattern of osteophytes associated with the insertion of the MFT joint capsule cranially on the MFC.

**Introduction/Purpose:** Articular cartilage lesions in the femorotibial (FT) joints are an important cause of equine lameness and osteoarthritis (OA) of the FT joints is poorly described in the literature. A radiographic examination that includes an evaluation of joint space width (JSW) is a mainstay in the diagnosis of FT OA. The JSW is an indirect assessment of the combined thickness of the femoral and tibial articular cartilage. Our hypothesis was that minimum JSW (mJSW) measurements vary with radiographic view angle in the equine FT joint. The aims of this study was 1) to measure mJSW in lateral and medial FT compartments on caudo-cranial (Cd-Cr) projections of normal joints 2) to compare manual mJSW measurements with a software program designed for human patients and 3) to identify the ideal angled Cd-Cr projection to measure mJSW.

**Methods:** Caudo-cranial (Cd-Cr) radiographic projections of healthy FT joints (n=22) were taken at angles in a proximo-distal (Cd5°Pr-CrDiO, 10° and 15°) and latero-medial (Cd10Pr5L-CrDiMO and Cd10Pr5M-CrDiLO) planes. Minimum JSW of the medial or lateral FT joint compartments were measured by 2 readers and also employing a digital image analysis system. Validation of JSW measurements ex vivo was performed on 6 stifles. Inter-reader reproducibility of mJSW measurements and comparison with digital measurements was assessed with an intraclass correlation coefficient [ICC]. Post hoc tests were employed to identify the view angle that provided the largest JSW measurements.

**Results:** There was excellent agreement between the 2 readers on manual measurements of mJSW in both the medial and lateral (ICC = 94% & 87% respectively) FT compartments and between the reader and the software (ICC 95% & 89% respectively). However, the agreement was consistently lower for the lateral FT measurements making them slightly less reliable. There was a significant difference (p = 0.0009) in the mean mJSW (software measure) in the medial FT with different view angles. The angle of the Cd-Cr view in the proximo-distal, but not the latero-distal plane, had a significant effect on JSW measurements. The mean mJSW measurement in the medial compartment was significantly higher in the Cd10°Pr-CrDi group when compared to 5° and 15°. There was no statistically significant difference in the mean mJSW with view angle in the lateral FT. The agreement between the software measurements in the medial FT compartment and the non-mineralized cartilage thickness on histology was good with an ICC of 78%.

**Discussion/Conclusion:** Measurements of mJSW in the medial FT joints, the most frequent site of OA, are reproducible and optimal on the Cd10°Pr-CrDiO radiographic projections.
RENAL PARENCHYMAL VOLUME DETERMINED BY COMPUTED TOMOGRAPHY IN THE CLINICALLY NORMAL COMMON MARMOSET (CALLITHRIX JACCHUS).
W.M. du Plessis. Ross University School of Veterinary Medicine, St. Kitts, West Indies; Faculty of Veterinary Science, University of Pretoria, Republic of South Africa.

Introduction/Purpose: Exotic animals are being imaged more and more regularly via computed tomography as well. Common presenting diseases in the common marmoset include renal, liver, and skeletal disease. The aim of this study was to determine the estimated individual renal parenchymal volume (RPV) as well as the calculated RPV on post-contrast computed tomography (CT) in clinically healthy common marmosets.

Methods: Post-contrast CT images of seven anesthetised clinically healthy mature common marmosets ranging from 12 to 48 months and 235 to 365 g bodyweight were acquired. On the transverse post-contrast images the contours of the individual kidneys were manually traced. Individual RPVs were estimated using the voxel count method. Additionally the prolate ellipsoid formula was used for a simplified volume calculation using three different height measurements.

Results: Using the voxel count method, the mean estimated volume of the left kidney was 0.85 cm³ +/- 0.13 cm³ with a range of 0.7 - 1.02 cm³; The mean estimated volume of the right kidney was 0.94 cm³ +/- 0.11 cm³ with a range of 0.76 - 1.11 cm. It took about 15 min to determine each individual estimated RPV for an experienced examiner. Using the prolate ellipsoid formula, the mean calculated volume of the left kidney was 0.85 cm³ +/- 0.13 cm³ with a range of 0.69-1.01 cm³; the mean calculated volume of the right kidney was 0.93 cm³ +/- 0.14 cm³ with a range of 0.77-1.09 cm³. It took less than 5 min to calculate both individual RPV.

Discussion/Conclusion: Estimated RPV using CT could easily be determined in a timely manner in the clinically normal common marmoset, and a reference range could be established. Using the prolate ellipsoid formula, the volume could be calculated even faster and the values compared very well. Based on experiences in other species, it should be considered as an important prognostic marker and index for clinical decision in common marmoset with renal disease.
QUANTITATIVE ANALYSIS OF 18F-FLUORODEOXYGLUCOSE STANDARDIZED UPTAKE VALUES IN PRETREATMENT PET/CT IMAGING OF CANINE OSTEOSARCOMAS. K.A. Mann, S.L. Kraft, S.M. Hauke, and E.K. Randall. Colorado State University, CO 80523.

Introduction/Purpose: 18F-fluorodeoxyglucose (18F-FDG) positron emission tomography-computed tomography (PET-CT) has been shown to predict tumor outcome of human osteosarcomas (OSA) and may provide valuable staging and prognostic information as well as therapeutic response assessment in veterinary patients. Our objective was to determine the baseline PET/CT characteristics of naturally occurring canine osteosarcoma and apply quantitative PET image analysis methods, as part of ongoing longitudinal studies to evaluate patient response to novel therapies and conventional treatments.

Methods: A Philips Gemini TF Big Bore PET/CT instrument was used to perform whole body 18F-FDG studies on 42 canine osteosarcoma patients admitted to the CSU Veterinary Teaching Hospital between December 2009 and June 2014. All patients were placed under general anesthesia and positioned for the exam prior to intravenous 18F-FDG injection (0.12-0.18 mCi/kg; 4.4-6.6 MBq/kg). During the 60 minute uptake time, pre- and post-contrast CT images were obtained prior to PET acquisition. Tumor maximum standardized uptake values (mSUV) and pattern of 18F-FDG uptake (FDG metabolism) were evaluated using commercial software (Extended Brilliance Workstation, Phillips Medical Systems).

Results: Thirty-seven patients were large or giant breeds and five were mixed breed (weight range=17-80 kg; mean=43.5 kg; median=39.7 kg). Patient genders were 20 spayed females, 20 castrated males and 2 intact males. Median age was 9.6 years (range=1.2-13.6 years). Pattern of 18F-FDG uptake in each tumor was nonuniform, with greatest intensity of radiopharmaceutical occurring in the regions of greatest osteolytic activity (intramedullary or extramedullary). Maximum SUV ranged from 1.8 to 24.9 (mean=9.1; median=7.8; SD=5.5).

Discussion/Conclusion: Region-of-interest analysis of mSUV was performed as it has been shown to have prognostic significance for human OSA. In future studies, our baseline PET/CT characteristics and mSUV analysis will be compared to post-therapy PET/CT exams in canine OSA patients to evaluate prognostic value. Variability in the 18F-FDG intensity pattern and mSUV reflect the heterogeneous nature of this tumor type. Osteolytic tumor regions were the most hypermetabolic and osteoblastic regions tended to have less intense radiopharmaceutical uptake.

Introduction/Purpose: Elastography is a technique for assessing the elasticity of a tissue and provides information about stiffness of tissues or local tissue strain. In strain elastography, tissue elasticity is measured under strain generated by external compression using an ultrasound transducer or internal physiologic pulsation such as heart beats or respiration. This study evaluated the feasibility, repeatability, and reproducibility of strain elastography of the liver, spleen, kidneys, and prostate in healthy dogs and described the elasticity of each organ using strain values and strain ratios.

Methods: Strain elastography of liver, spleen, kidneys and prostate was performed in eight healthy adult male beagle dogs with external compression method using the transducer. The scanning of elastographic images by two operators individually. Strain value and strain ratio were estimated by two reviewers individually. Strain values of each organ and the abdominal wall were calculated using strain histogram function in real time. Strain ratio was calculated as a ratio of organ parenchymal strain value to the near-field abdominal wall strain value within the same image.

Results: The reproducibility was excellent and intra-observer repeatability was moderate to excellent. Mean strain values and strain ratio of each organ were given in Table 1. Strain value and strain ratio of each organ was not significantly different among all dogs except the renal medulla and abdominal wall.

Table 1. Strain value and strain ratio of liver, spleen, bilateral renal cortex and medulla and prostate in Beagle dogs

<table>
<thead>
<tr>
<th></th>
<th>Liver</th>
<th>Spleen</th>
<th>Left renal cortex</th>
<th>Left renal medulla</th>
<th>Right renal cortex</th>
<th>Right renal medulla</th>
<th>Prostate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain value</td>
<td>143.38</td>
<td>141.04</td>
<td>141.26</td>
<td>51.19</td>
<td>145.80</td>
<td>51.93</td>
<td>135.46</td>
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<tr>
<td>± 7.41</td>
<td>± 9.03</td>
<td>± 7.50</td>
<td>± 4.54</td>
<td>± 7.79</td>
<td>± 5.09</td>
<td>± 5.80</td>
<td></td>
</tr>
<tr>
<td>Strain ratio</td>
<td>10.20</td>
<td>8.40</td>
<td>9.62</td>
<td>3.48</td>
<td>8.29</td>
<td>2.95</td>
<td>8.20</td>
</tr>
<tr>
<td>± 1.47</td>
<td>± 1.53</td>
<td>± 1.56</td>
<td>± 0.68</td>
<td>± 1.63</td>
<td>± 0.63</td>
<td>± 1.21</td>
<td></td>
</tr>
</tbody>
</table>

a,b Values differed significantly (P < 0.05) from all other values in each row

Discussion/Conclusion: Strain elastography was feasible in estimating tissue stiffness of canine liver, spleen, kidney and prostate. This study provided normal strain value and strain ratio of the liver, spleen, kidney and prostate in clinically healthy dogs.
WHOLE BODY MUSCULOSKELETAL LESIONS IN MILITARY WORKING DOGS WITH VERSUS WITHOUT LOWER BACK PAIN. C. Jula1, J. Jones1, I. Holaskova1, K. Childs2. 1West Virginia University, WV 26506; 2Department of Defense Military Working Dog Veterinary Service, TX 78236.

Introduction/Purpose: Lumbosacral disease is a common cause of lower back pain, disability, and early retirement for military working dogs. Because they are bred and selected for stoicism and high drive, affected dogs may initially mask their lower back pain, develop compensatory gait changes, and place additional stresses on other musculoskeletal structures. A previous study found an association between lower extremity overuse and lower back pain in human athletes (Nadler 1998). The purpose of this prospective cross sectional study was to test the hypothesis that the number of whole body musculoskeletal lesions is associated with lower back pain in military working dogs.

Methods: Whole body computed tomography (CT) scans were acquired for 10 military working dogs presented to the Department of Defense Military Working Dog Veterinary Service at Lackland, TX. Five dogs were presented for lower back pain, and five dogs were presented for other reasons and had no clinically detected lower back pain. All CT scans were acquired using the same 64-slice CT scanner. Scans were archived, stored and transferred to an image analysis workstation (Apple Inc. Cupertino, CA) for analysis using CT image analysis freeware (OsiriX DICOM Viewer, Version 4.2). A board-certified veterinary radiologist unaware of lower back pain status viewed the scans and recorded location and characteristics for all observed musculoskeletal lesions. Lesions were grouped into one of fifteen anatomic region categories (cervical spine, shoulder, carpus, thoracic spine, etc.). After all scans were read, the total number of lesions was determined for each dog and each anatomical region. A statistician performed comparisons between dogs in the lower back pain group versus dogs in the no low back pain group using one-way analysis of variance (ANOVA).

Results: Each group included 1 female and 4 male. Ages ranged from 2 to 10 years, with even distribution of ages between groups. All dogs in the lower back pain positive group were German Shepherds. Dogs in the lower back pain group included 1 German Shepherd, 1 Labrador Retriever, and 3 Belgian Malinois. On average, dogs with lower back pain had a greater number of musculoskeletal lesions (60.6) throughout their whole body than dogs without lower back pain (21) (P=0.003). A significant difference was found in the number of lesions between the two groups for all regions of the spine except the cervical: thoracic (P=0.015), lumbar (P=0.026), lumbosacral (P=0.002), caudal (P=0.010). A significance difference was also detected in the tarsus (P=0.049). No differences were identified between groups for the remaining anatomic regions.

Discussion/Conclusion: Findings supported our hypothesis that lower back pain is associated with the number of whole body musculoskeletal lesions in military working dogs. Findings were not consistent with the previous human study in that spinal regions were primarily affected rather than lower extremities. Further studies are needed to determine if whole body lesions occur in military working dogs before or after the onset of lower back pain. Studies evaluating the relationship between spinal column lesions and lower back pain in these dogs are also needed.
DIAGNOSTIC IMAGING FEATURES OF NORMAL ANAL SACS IN DOGS AND CATS.
Y. Jung, J. Jeong, S. Park, E. Jeong, U. Choi, M. Kim, N. Kim, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, South Korea.

Introduction/Purpose: Anal sac diseases are divided into two main conditions: non-neoplastic conditions (infectious or inflammatory diseases) and neoplastic conditions. Despite its commonness, no study has explored anal sacs of dogs and cats using diagnostic imaging. The authors of this study anticipate an application of diagnostic imaging for evaluating anal sac diseases because modalities such as ultrasonography and MRI are widely used for soft tissue evaluation in veterinary clinics. The objective of this study was to provide normal features of canine and feline anal sacs using ultrasound, low-field MRI and a radiograph contrast study in diagnostic imaging.

Methods: Total ten clinically normal beagle dogs and eight clinical normally cats were included. A general radiography with contrast study, ultrasonography and low-field MRI scans (T1-weighted, T2-weighted, fluid attenuated inversion recovery (FLAIR) and post contrast T1-weighted imaging sequences) were performed. Imaging features of the anal sacs and adjacent structures, anatomic location, margin, size, shape, echogenicity (ultrasonography), signal (low-field MRI) and differences between dogs and cats were described.

Results: The visualization of anal sacs, located at distinct sites in dogs and cats, is possible with a contrast study on radiography. Most surfaces of the anal sacs tissue, occasionally appearing as a hyperechoic thin line, were surrounded by hypoechoic external sphincter muscle on ultrasonography. The normal anal sac contents of dogs and cats had variable echogenicity. Signals of anal sac contents on low-field MRI varied in cats and dogs, and contrast medium using T1-weighted images enhanced the anal sacs wall more obviously than that on ultrasonography. Ultrasonography and MRI provided excellent visualization of the anal sacs and other adjacent structures.

Discussion/Conclusion: This study suggests normal features of canine and feline anal sacs for potential evaluation by diagnostic imaging modalities. Amongst, ultrasonography is expected to be applied in further anal sac evaluation studies regarding disease conditions, as it is more practical than other modalities.

Introduction/Purpose: In veterinary practice, sedation is frequently used to handle the aggressive cats, to reduce stress of cats, and to secure safety of human and cats. Alfaxalone is relatively new anesthetic drug and intramuscular injection is available in cats for sedation with minimal cardiovascular effects, but adverse effects were reported in recovery. This study investigated the effects of alfaxalone and alfaxalone-acepromazine combination on echocardiographic indices, biochemical and blood gas analysis and recovery in seven healthy cats.

Methods: Healthy seven adult cats were enrolled in this study. Baseline systolic blood pressure (SAP), body temperature, echocardiography and blood sampling were carried out. One of the three treatments (acepromazine 0.05 mg/kg, alfaxalone 5.0 mg/kg, alfaxalone 2.5 mg/kg-acepromazine 0.025 mg/kg combination) was administered intramuscularly to each cat. Echocardiography was performed, followed by SAP, body temperature measurements and blood sampling. Duration and quality of recovery was assessed.

Results: In comparison to baseline an increase in heart rate (HR) occurred after acepromazine (ACE). All group showed decrease in systolic arterial pressure (SAP). A decrease in left ventricular internal dimension in diastole (LVDd), end-diastolic volume of left ventricle (EDV), stroke volume (SV) and left atrial dimension (LA) after alfaxalone-acepromazine combination (AA) were identified. There was no statistically significant change in echocardiographic variables after alfaxalone (ALF). Treatment echocardiographic values did not differ among the treatments. Biochemical and blood gas analysis showed no clinically significant changes except hematocrit after ACE and AA.

Discussion/Conclusion: As both treatments with acepromazine, ACE and AA, produced alterations of echocardiographic variables, this fact must be considered when interpreting echocardiographic data or choosing a sedative protocol. In spite of wide individual variations in recovery, echocardiographic, biochemical and blood gas analysis variables were not statistically significant in treatment of alfaxalone alone. Alfaxalone could be one of the useful chemical restraints in echocardiography of healthy cats.
EFFECTS OF LOW DOSE PREDNISOLONE ON BODY WEIGHT, BLOOD PRESSURE, LIVER, ADRENAL GLAND AND PANCREAS IN DOGS. S.K Lee, S.J. Park, J.H. Choi. College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea.

Introduction/Purpose: Prednisolone (PDS) can cause steroid hepatopathy, hypertension, iatrogenic Cushing’s disease, impaired glucose tolerance of diabetes and pancreatitis. The side effect of low dose PDS has not widely investigated yet, although low dose PDS is mainly applied to various inflammatory and allergic diseases. The purpose of this study was to investigate the effect of low dose PDS on body weight, blood pressure, liver, adrenal gland and pancreas in dogs.

Methods: In four healthy beagles, body weight, blood pressure, liver size and echogenicity, pancreas echogenicity, adrenal size and ALT, ALKP, AST, and GGT were evaluated as a normal data. Then, PDS was administered at a dosage of 2 mg/kg for 2 weeks, 1 mg for 4 weeks, and 0.5 mg for 3 weeks daily per oral. Same parameters were evaluated once a week for 9 weeks. Liver size was measured from caudal vena cava to caudal hepatic border on a lateral radiograph. On ultrasonography, liver echogenicity and texture were evaluated subjectively and also quantitatively using histogram analysis through comparison with renal cortex (liver-kidney contrast) at the same depth. The attenuation of liver was estimated by comparing between liver echogenicity at 2 cm and that at 4 cm in depth (depth-attenuation).

Results: The 75% dogs showed hypertension (173.4 ± 10.0 mmHg) on day 14, and then blood pressure decreased to normal level (132.8 ± 4.0 mmHg) during tapering of PDS. Liver size significantly increased on day 7, and then hepatomegaly maintained during continuous administration of PDS. ALKP was significantly elevated after 7 days of administration (P=0.025) however no significant changes of ALT, AST, GLU and GGT were detected. ALKP decreased with tapering of PDS to normal level on day 56. No significant different was detected between subjective and quantitative evaluation of liver echogenicity. On 75% dogs, near-field liver echogenicity of day 63 (17.970 ± 0.716) was significantly higher than that of day 0 (21.230 ± 1.130). Depth-attenuation was temporarily decreased after 7 days of administration (2.320 ± 1.260, P=0.017) compared with before administration (4.630 ± 0.980). Body weights, pancreas echogenicity, and liver texture did not significantly change during examination. Left adrenal size significantly decreased on day 28 (P=0.283). Right adrenal size tended to decrease but it was not significant.

Discussion/Conclusion: With administration of low-dose PDS, liver size significantly increased since early phase and adrenal size decreased continuously, in particular of left side. Blood pressure and ALKP temporarily increased, but returned to normal level during tapering of PDS. Low dose PDS had no significant effect on the echogenicity of liver and pancreas, depth-attenuation, GGT, ALT, GLU and AST, and body weight in dogs. This study could be useful to determine between the pathologic changes and drug effect on body weight, blood pressure, liver, adrenal gland and pancreas in dogs.
EVALUATION OF THE CANINE PANCREAS USING COMPUTED TOMOGRAPHY: FURTHER DESCRIPTION OF NORMAL IMAGING CHARACTERISTICS. M.J. Lemon, N.C. Nelson. College of Veterinary Medicine, Michigan State University, MI 48824.

Introduction/Purpose: Acute pancreatitis is the most common disease of the canine exocrine pancreas, and has a rapidly progressive course frequently associated with high morbidity and mortality rates. Diagnosis of canine pancreatitis is challenging, as no single test is definitive and results of biochemical tests may take several days to acquire. In humans, contrast-enhanced abdominal computed tomography is the test of choice for diagnosing pancreatitis, as it has good diagnostic accuracy and the severity of CT lesions is significantly associated with prognosis. Recent descriptions of the normal canine pancreas on CT have used a small number of dogs of similar breed and body size. The aim of this study was to further characterize the normal imaging characteristics of the canine pancreas on CT in a heterogeneous population of dogs.

Methods: Canine patients scheduled to undergo CT examination of body parts other than the abdomen with no previous history or clinical signs consistent with pancreatitis were enrolled. Non breath-held, sternal recumbent abdominal CT examinations consisted of pre-contrast and early and late post-contrast phases. Measurements performed included length of each lobe, and width and height of the body and lobes. Parenchymal attenuation values were measured within regions of interest placed in each lobe and in the body for all phases. Three dimensional volume rendering of the entire organ was also performed. Serum samples were submitted for pancreatic lipase immunoreactivity in order to rule out subclinical pancreatitis. Linear regression of multiple pancreatic dimensional values and body weight was performed.

Results: Position of the right and left lobes within the peritoneal space was variable between dogs, with the right lobe occasionally located very dorsal, adjacent to the spine. Attenuation values of the pancreatic parenchyma and pancreatic dimensions were similar to those reported in previous studies. However, the dimensional ranges varied widely between dogs. Average length of the right and left lobes was 8.4 cm and 7.4 cm, respectively. The left lobe was consistently shorter than the right, and minimum left lobe length was 3.1 cm. Average height and width of the body was 1.8 cm and 4.3 cm. Average height and width of the right lobe was 17.6 cm and 15.8 cm, while that of the left lobe was 15.8 cm and 21.2 cm. Average three-dimensional volume of the pancreas was 38 cm³. Pancreatic volume was highly correlated with body weight (R²=0.726; P<0.001). Significant relationships were also identified between body weight and left lobe length, right lobe width and left lobe width, though the strength of these correlations were less.

Discussion/Conclusion: The dimensional and x-ray attenuation characteristics of the pancreas included herein may be used as normal canine reference ranges, particularly for patients being evaluated for clinical signs consistent with pancreatitis. However, some pancreatic measurements are significantly associated with body weight. Therefore, pancreatic size should be evaluated in concert with patient body size.
INCORPORATION OF FDG-PET/CT INTO RADIATION THERAPY PLANNING TO IMPROVE TREATMENT OF CANINE NASAL TUMORS. S.J. Loeber, J.T. Custis, E.K. Randall, S.L. Kraft. Flint Animal Cancer Center, Department of Environmental and Radiological Health Sciences, Colorado State University, CO 80523.

Introduction/ Purpose: Nasal tumors in dogs are often malignant with a high rate of tumor recurrence and poor long-term survival. Metabolic imaging with 18-fluorodeoxyglucose-positron emission tomography–computed tomography (FDG-PET/CT) is a non-invasive means of quantifying tumor metabolic activity in the context of anatomic location. We hypothesize that FDG-PET/CT will allow us to better identify nasal tumor extent and highly metabolic, aggressive areas of the tumor compared to CT alone.

Methods: FDG-PET/CT scans were done in place of conventional radiotherapy planning CT on 7 dogs with probable nasal cancer that were admitted to the CSU Veterinary Teaching Hospital for radiotherapy. Tumor volumes and standardized uptake values (SUV, index of glucose metabolic activity) were compared from post-contrast CT, PET and fused PET/CT scans using 3D-region-of-interest (ROI) analysis on the Philips Extended Brilliance Workstation (EBW).

Results: Nasal histopathologies included basal squamous cell carcinoma (n=3), adenocarcinoma (n=1) and chondrosarcoma (n=2). One additional dog had a nasal mass that was clinically presumed and treated as neoplastic, but histologically was lymphocytic-plasmacytic rhinitis. The carcinomas were intensely hypermetabolic (11.8, 13.5, 20.9 and 25.91 max SUV). The chondrosarcomas were moderately hypermetabolic (4.22 and 5.28 max SUV) whereas the presumed, unconfirmed neoplasm was mildly hypermetabolic (2.3 max SUV). In 5/7 dogs, the contrast-enhanced CT volume mildly or substantially exceeded the PET volume, possibly because of enhancing peritumor reaction. In 2 of the dogs with carcinoma, the PET volume was 35-56% > CT volume indicating that some hypermetabolic infiltrate detected on PET was normal on CT. In all 7 dogs, the PET scan showed additional, different hypermetabolic regions of potential tumor not detected by CT.

Discussion/Conclusion: The combination of PET/CT has the best chance of identifying potential areas of tumor to target with radiotherapy, although peritumor reaction will also be included.
FLUOROSCOPIC EVALUATION OF DIAPHRAGMATIC EXCURATION DURING SPONTANEOUS BREATHING IN HEALTHY BEAGLE DOGS. S.H. Moon¹, S.J. Park¹, J.H. Yoon², J.H. Choi¹. ¹College of Veterinary Medicine, Chonnam National University, Gwangju 500-757, South Korea, ²College of Veterinary Medicine, Seoul National University, Seoul 151-742, South Korea.

Introduction/Purpose: The diaphragm is the principal muscle of ventilation. Fluoroscopy can perform the real-time evaluation of diaphragmatic movement compared with radiography. The purpose of this study was to evaluate diaphragmatic movement quantitatively during spontaneous breathing in healthy beagle dogs with fluoroscopy.

Methods: Eight healthy beagles aged to two to three years were enrolled in this study. All dogs were in normal condition and no history of respiratory disease. Fluoroscopy was performed under stabilized respiratory condition of dogs with setting the beam center at the level of the diaphragm. Diaphragmatic motion was recorded with left lateral, right lateral, and dorsal recumbency during three respiration periods. The extent of excursion of body and both crura and length of the 8th thoracic vertebra (T8) were measured separately by two radiologists. Ratio of excursion of each diaphragmatic part to T8, difference of excursion between the left and right crus and the inter-observer reproducibility were determined.

Results: The excursion of each diaphragmatic part was shown in Table 1. The movement was asymmetric and the mean difference of excursion between the both crus was 2% in right lateral position, 6% in left lateral position, and 16% ventro-dorsal position. Extent of right crus excursion was greater in right lateral position, and that of left crus excursion was greater in left lateral and ventro-dorsal positions. The inter-observer reproducibility was excellent.

Table 1. Ratio of the excursion of each diaphragmatic part to the length of the 8th thoracic vertebra according to the dog’s position

<table>
<thead>
<tr>
<th></th>
<th>Right lateral position</th>
<th>Left lateral position</th>
<th>Ventro-dorsal position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± Range</td>
<td>Mean ± Range</td>
<td>Mean ± Range</td>
</tr>
<tr>
<td>Body</td>
<td>0.59 ± 0.12 0.36–0.82</td>
<td>0.59 ± 0.22 0.17–1.02</td>
<td>0.49 ± 0.19 0.13–0.86</td>
</tr>
<tr>
<td>Right crus</td>
<td>0.69 ± 0.17 0.36–1.02</td>
<td>0.73 ± 0.24 0.26–1.20</td>
<td>0.57 ± 0.11 0.35–0.78</td>
</tr>
<tr>
<td>Left crus</td>
<td>0.70 ± 0.17 0.36–1.04</td>
<td>0.83 ± 0.34 0.16–1.50</td>
<td>0.68 ± 0.12 0.44–0.92</td>
</tr>
</tbody>
</table>

Discussion/Conclusion: The excursion of each diaphragmatic part, determined using excursion/T8 ratio, was not significantly different in both side lateral positions. Meanwhile, the left crus showed greater movement on vendor-dorsal position. This study provides the basic reference for assessing diaphragmatic movement and monitoring of diaphragmatic function using fluoroscopy in dogs.
A NOVEL BOARD GAME FOR TEACHING THORACIC RADIOGRAPHY TO 4TH-YEAR VETERINARY STUDENTS. C. Ober. Department of Veterinary Clinical Sciences, University of Minnesota College of Veterinary Medicine, 1365 Gortner Avenue, St. Paul, MN 55108

Introduction/Purpose: When evaluating radiographs, development of appropriate lists of differential diagnoses for intrathoracic pathology is often challenging for veterinary students. The goal of this study was to determine if an educational board game could be used effectively as an adjunct means of teaching in a clinical setting.

Methods: A novel board game to help veterinary students learn the radiographic appearance of intrathoracic diseases was developed. The game entailed matching tiles with various disease states to tiles with different radiographic patterns. Seventy-seven 4th-year veterinary students played the game during their clinical rotations in radiology and were asked to complete an anonymous survey following completion of their respective game play sessions.

Results: All 77 students who participated in the game completed their surveys. When considering responses of “agree” or “strongly agree,” 100% (77/77) of students responded that they enjoyed the game, 98.7% (76/77) indicated that their knowledge of thoracic differential diagnoses improved, and 98.7% (76/77) answered that playing the game was a worthwhile activity.

Discussion/Conclusion: Use of novel approaches to teaching and learning is important to keep students engaged. Based on these results, educational board games can be used as an adjunct to more traditional methods of clinical teaching, as students find them enjoyable and feel that they gain from the experience. However, further study is necessary to determine if such games objectively improve students’ learning.
LOW FIELD MAGNETIC RESONANCE IMAGING ASSESSMENT OF PARASPINAL MUSCLE ATROPHY IN CANINE PATIENTS WITH INTERVERTEBRAL DISC DISEASE. S. Park, J. Jeong, Y. Jung, E. Jeong, H. Lee, M. Kim, N. Kim, K. Lee. College of Veterinary Medicine, Chonbuk National University, Jeonju 561-756, Republic of Korea.

Introduction/Purpose: The paraspinal muscles hyperintense signal on T2 and T1-weighted sequences of magnetic resonance image (MRI) is often seen in the canine patient with intervertebral disc disease (IVDD). In human medicine, general translation of this hyperintense signal image of paraspinal muscle indicates muscle atrophy associated with low back pain or radiculopathy with/without spinal cord disease. The paraspinal muscles of the thoracolumbar spine, however, have been relatively neglected in veterinary medicine.

The purpose of this study is to evaluate thoracolumbar paraspinal muscle atrophy by low field MRI and histopathologic examination in canine patients with IVDD.

Methods: MRI data of 29 canine patients (18 males and 11 females) with IVDD, confirmed by neurologic exam and MRI, was visually analyzed for this review from the database of Chonbuk Animal Medical Center. The Pekingese, Cocker spaniel, Maltese, Shih-tzu, Siberian husky, Pomeranian, Beagle, mixed breeds were included in this study. The mean age was 6.2 years with a median of 6 years. The T2 weighted & T1 weighted transverse image of paraspinal muscles were evaluated by visual grading at the thoracolumbar spine region. The degree of fatty atrophy was estimated using four grades: normal (<10%), mild (10~30%), moderate (30~50%) and severe (>50%). Paraspinal muscle samples from 9 patients were collected during surgery and histopathologic examination was performed.

Results: No significance between severity of IVDD and signal intensity. Visual grades of paraspinal muscle were severe 14% (4/29), moderate 21% (6/29), mild 34% (10/29) and normal 31% (9/30), respectively. Histopathological examination revealed that the hyperintense signal was myofiber degeneration and muscle atrophy in five of nine patients. T1 weighted transverse image of paraspinal muscles was more helpful to evaluate fatty atrophy than T2 weighted. Significant positive correlation was found between visual grade and age ($r = +0.3970, P = 0.033$). Females showed more prominent changes without significance. No significant correlation found between visual grades of the affected muscle and duration of neurologic deficits was observed.

Discussion/Conclusion: The paraspinal muscle with high signal is related with significant fatty atrophy in dogs. The old and female dogs have a tendency to have high signal on paraspinal muscle. Further study is required to support the age and gender issue. Measurement of visual grading of paraspinal muscle may help clinicians and radiologists reach additional information about high signal muscle.
T2-WEIGHTED BLADE AND SPACE FOR MR IMAGING OF THE CANINE SPINE.

Introduction/Purpose: Alternative k-space trajectory schemes, such as BLADE or PROPELLER, use periodically rotated overlapping parallel lines in image reconstruction. These have been used to reduce artifacts and improve image quality. 3D volume imaging with new fast spin echo (FSE) techniques with variable flip angle refocusing (Sampling Perfection with Application optimized Contrasts using different flip angle Evolution - SPACE) allows for fast imaging of the canine spine, with the ability to create multiplanar and thin-slice reconstructions. This study compared the use of T2-weighted (T2w) FSE with BLADE to SPACE in both cadaveric and client-owned canine spinal MR exams.

Methods: Neurologically normal cadaver dogs (n = 7) and client-owned dogs with spinal neurologic signs (n = 13) were examined using a 1.5T Siemens Symphony with TIM® MRI unit. Comparative 2D T2w FSE (only cadavers) and 2D T2w FSE with BLADE sagittal and transverse plane series, and a 3D T2w SPACE sagittal series were acquired. Transverse reconstructed images were made from the sagittal SPACE images with the following slice thickness/gap: 3mm/3mm, 2mm/2mm, 1mm/1mm, 3mm/1mm, 1mm/0.5mm. Signal (SNR - spinal cord) and contrast (CNR - spinal cord:muscle) to noise ratios were calculated and compared for all sequences using repeated measures. Images were evaluated subjectively by 3 reviewers for overall image quality and visibility of neuromuscular structures using a 5-point scale. The preferred SPACE transverse reconstruction slice thickness/gap was also scored.

Results: All of the cadaver spines were considered normal. The client-owned cases consisted of 11 with intervertebral disc disease, 1 with extra-axial spinal nerve neoplasia and 1 with a cranial mediastinal mass. There was 100% diagnosis agreement between FSE and SPACE studies. The summed average time of acquisition for T2w, T2w BLADE and SPACE sequences was 10min 46sec, 10min 50sec, and 6min 40sec, respectively. SNR and CNR for all 3D SPACE transverse reconstructions were higher than transverse FSE (p<0.01), regardless of SPACE slice thickness reconstruction. The BLADE 2D FSE transverse images were subjectively rated higher than 3D SPACE reconstructions for overall diagnostic quality (odds ratio 95% CI 1.405-11.091) and the visibility of all anatomic structures. SNR values for sagittal 2D BLADE FSE were not significantly different from the 3D SPACE, but CNR values were significantly lower for sagittal 2D BLADE FSE compared to sagittal 3D SPACE (p<0.05). Reviewers more commonly rated the sagittal BLADE 2D FSE images higher than the sagittal 3D SPACE for overall diagnostic quality (odds ratio 95% CI 2.406-15.025) and the visibility of all anatomic structures. No SPACE transverse reconstruction was preferred statistically.

Discussion/Conclusion: The performance of BLADE in the canine spine, with higher subjective diagnostic quality and lower objective image quality, is different than prior reports on human spinal MR. However, SPACE and BLADE are viable and appealing tools for canine spinal MR imaging because of perceived improved image quality, similar diagnostic performance and the possibility for thin slice and multiplanar reconstructions with SPACE.
A PRELIMINARY STUDY OF A CONTRAST ENHANCEMENT PATTERN IN THE LUMBER SPINAL CORD OF NORMAL DACHSHUNDS.  G. Shimbo, K. Karatsu, T. Miyabayashi.  iVEAT Fukuoka Veterinary Specialty Practice (VSP), Fukuoka 812-0888, JAPAN.

Introduction/Purpose: On magnetic resonance imaging (MRI), contrast enhancement of the spinal cord has been associated with spinal cord infarction and compressive myelomalacia, most likely due to the disruption of the blood-spinal cord barrier (BSCB). However, availability of MRI is still limited. Recently, multiple-detector computed tomography (MDCT) is widely available. Yet, a contrast enhancement pattern of the canine spinal cord on MDCT has not been well studied. The purpose of this study was to evaluate the contrast enhancement pattern of the lumber spinal cord using dynamic CT.

Methods: Five clinically normal dachshunds (4-7 years of age and weighing 4.1-6.1 kg) were used. The dogs were anesthetized and positioned in a dorsal recumbency. After imaging a thoracolumbar area using a 16-slice multiple-detector CT unit (Hitachi Medico Co Ltd., Tokyo, Japan), dynamic CT images (slice thickness of 5 mm; 0.625mmx8) were obtained for 120 seconds at the level of L1-2 intervertebral disk. Iopamidol (600 mgI/kg, injection duration of 6 sec) was injected intravenously, using a power injector. Regions of interest (ROI) were made manually centering the abdominal aorta and spinal cord, and CT numbers were recorded in each region. The contrast enhancement pattern was evaluated.

Results: The contrast enhancement of the aorta occurred at 7 to 9 sec after contrast injection. The average CT numbers of the spinal cord within the ROI increased at median of 15 (7-15) sec, and the maximal enhancement effect was seen at median of 19 (11-21) sec. The duration of mild enhancement lasted for median of 8 (4-14) sec. After the peak enhancement, the baseline CT numbers were lower than the ones measured prior to contrast enhancement. During this period, both kidneys were markedly contrast enhanced. The maximal enhancement ratio of the spinal cord was 15.7 (8.1-24.0) %.

Discussion/Conclusion: In the present study, there is one dog that did not show a clear peak of contrast enhancement. There is no clear explanation, but this dog had duplicated caudal vena cava from the level of renal vein. There may be a different arterial blood flow pattern to the spinal cord in this dog. We hypothesize that the peak enhancement rate and duration will increase in cases of spinal cord infarct and myelomalacia in association with acute intervertebral disk protrusion. Experimentally in rats, acute spinal cord trauma caused decreased blood flow and increased permeability, suggesting an abnormal contrast enhancement pattern. In the present study, although the contrast enhancement effect of the spinal cord was minimal in neurologically normal dachshunds, we have established the contrast enhancement pattern of the spinal cord. We will continue to study the usefulness of contrast MDCT in clinically affected dachshunds with acute intervertebral disk disease.
COMPUTED TOMOGRAPHIC PNEUMOCOLONOGRAPHY IN NORMAL DOGS.

Introduction/Purpose: Computed tomography (CT) is not commonly utilized to image the colorectum in veterinary patients, as fecal material and the luminal collapse when empty can make interpretation difficult. CT pneumocolonography (CTP) is utilized in awake humans, however knowledge gaps exist in translating this technique to anesthetized animals. The objectives of this study were to investigate technical components that may contribute to an optimal protocol for CTP in the dog. We hypothesized that CTP would be a safe and effective method of distension, and that an optimal protocol of insufflation pressure, position, and time that would provide large bowel distension and enhancement of image interpretation could be identified.

Methods: Eight healthy purpose-bred male hound-mix dogs underwent CTP with mechanical insufflation of CO2 via a transanal catheter. Measurements of colorectal wall thickness and cross-sectional lumen diameter and area were obtained at insufflation pressures of 0, 15, 20, and 25 mmHg, insufflation times of 1, 5, 10, and 20 minutes, and in dorsal and sternal recumbency.

Results: Computed tomographic pneumocolonography was performed without complication in all dogs. Bowel distension was well maintained at all pressures, but 3/4 dogs experienced retrograde gas distension of the small intestine at 25 mm Hg. Body position did not significantly affect any variable measured. Ascending colon diameter and area significantly increased with insufflation time (p<0.05); no other variables showed a significant change with insufflation time.

Discussion/Conclusion: CT pneumocolonography is a feasible technique to provide consistent distension for imaging of the large bowel. The optimal pressure was determined to be 20 mm Hg. Further study on application of CTP in clinical patients is warranted.
TREATMENT EFFECTS OF TRANSNARE CRYOABLATION FOR INTRANASAL NEOPLASIA IN 6 DOGS. Michele A. Steffey, Erin McKerney, Allison L. Zwingenberger. University of California Davis, CA 95616.

Introduction/Purpose: Therapy for intranasal neoplasia in the dog is generally directed at controlling effects of local disease that affect patient quality of life. Radiation therapy is the gold standard option for treatment of many tumors, but may be declined by clients due to costs or the need for multiple anesthetic events. The objectives of this study were to investigate the treatment response and short-term complications of transnare cryoablation (TC) for intranasal neoplasia in the dog. We hypothesized that TC would be an effective technique to reduce local tumor volume, and that computed tomographic (CT) volumetry would demonstrate the tumor volume reduction.

Methods: Transnare cryoablation was performed under CT guidance on six healthy client-owned dogs. Diagnostic CT imaging was performed prior to treatment and at 1-month post TC. Calculations of tumor volume were made from CT images pre- and post-treatment. Six dogs of different breeds, representing mesaticephalic (n=4), dolichocephalic (n=1), and brachycephalic (n=1) anatomy, were treated. Treated tumor types included 5 carcinomas and 1 chondrosarcoma.

Results: Procedure-related complications occurred in 3/6 dogs, and included temporary hair loss over the maxilla (n=1), oronasal fistula (n=1), and severe periocular swelling OU (n=1). Median pre- and post-treatment tumor volumes measured 25.3 cm$^3$ (range, 11.3-62.3 cm$^3$) and 4.6 cm$^3$ (range, 1-12 cm$^3$) respectively, consisting of a median 84% (range, 66-91%) reduction in tumor volume.

Discussion/Conclusion: TC is a feasible therapeutic technique for reduction of intranasal tumor volume and may offer an alternative to radiation therapy for palliation of intranasal neoplasia. CT volumetric quantification was a useful method of tumor volume assessment in the complex anatomy of the nasal cavity.
American College of Veterinary Radiology

ACVR 2014 Conference Special Activities

Wednesday, October 22, 2014

Welcome Reception
Lindbergh Room
Reception supported by
Universal Medical Systems, Inc.
6:50 – 8:30 pm

Special dedication to the memory of Dr. Myron “Mike” Bernstein

Thursday, October 23, 2014

AIS Sponsored Reception
Off Site – Science Center
6:00 – 9:00 pm
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