

ACVR | 2021

AMERICAN COLLEGE of VETERINARY RADIOLOGY

ANNUAL SCIENTIFIC MEETING



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PROCEEDINGS





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A caring message to ACVR

Trigger warning: Includes references to mental illness and suicide

Dear Colleagues,

Since their inception, Antech Imaging Services (AIS) and the ACVR have been dedicated to the wellbeing of veterinary professionals everywhere. We are honored to announce that AIS and the ACVR have joined together to bring you a day of lectures on mental health awareness and wellbeing at this year's ACVR Annual Meeting. In keeping with our commitment to the wellbeing of all, these lectures will be made available at no charge on the ACVR and meeting websites to all ACVR members, trainees, and post trainees for one year.

It has now been more than 18 months since a novel coronavirus has turned our lives upside down, bringing with it worldwide fear, illness, and death. Many of us have functioned from a state of isolation, with only our Zoom calls to keep us in connection with the outside world. The negative effects on mental health have, in many cases, been profound. The incidence of anxiety and depressive disorder has risen sharply during the pandemic, as has the incidence of substance use disorders.

As we are all acutely aware, many veterinarians are currently overworked, understaffed, and suffering from burnout and compassion fatigue. This is not just a result of the pandemic; mental health has long been at a crisis point among veterinarians, who suffer from an increased risk of depressive episodes and anxiety. A 2019 study by the CDC found that male veterinarians are twice as likely to die by suicide and female veterinarians are 3.5 times more likely to die by suicide than the general population.

The wellbeing of veterinary professionals must be viewed as one of the most important issues currently facing the profession. We believe that the best way to start addressing this issue is to open up the dialogue and work to remove the stigma surrounding mental health and substance use disorders. In the lectures of October 20, we hope to engage all of you in honest conversation about the mental health and wellbeing challenges facing the industry today, and to provide you with some valuable tools and resources.

Please take good care of yourselves and reach out to those around you.

All our best,

Lisa Ziemer, VMD, DACVR
Chief Medical Officer,
Antech Imaging Services

Paul Fisher, PhD
Senior Vice President,
Antech Imaging Services

in partnership with ACVR

Wm. Tod Drost, DVM, DACVR
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Program Chair, American College of Veterinary Radiology

The American College of Veterinary Radiology graciously thanks Antech Imaging Services for recognizing the value of wellness and wellbeing and providing this educational material for all active College members.



THE AGENDA

These sessions are approved for interactive continuing education credits. The requirements for interactive versus non-interactive credits vary from state to state. The interactive credits this year will only be available the week of the meeting. You must be logged in during the meeting in order to receive these interactive credits. Everything is being recorded and will be available for viewing after the conference.

Wednesday, OCT. 20th	ROOM 1/Wellness Forum	ROOM 2/Technicians—AVTDI
7:40 AM – 7:50 AM PDT 10:40 AM – 10:50 AM EDT	Morning Mindfulness—Yoga and Stretching	Morning Mindfulness—Yoga and Stretching
7:50 AM – 8:00 AM PDT 10:50 AM – 11:00 AM EDT	ACVR President's Welcome Address Nate Nelson, DVM, DACVR	
8:00 AM – 9:00 AM PDT 11:00 AM – 12:00 PM EDT	Getting Past The Shame Of Our Mistakes Michele Gaspar, DVM, MA, LCPC	Basic Emergency Abdominal Ultrasonography with an emphasis on AFAST Elizabeth Huyhn, DVM, MS, DACVR
9:00 AM – 10:00 AM PDT 12:00 PM – 1:00 PM EDT	Wellbeing: Identifying and Responding to Individual and Workplace Needs Stephanie Johnson, MSW	Emergency Computed Tomography of Veterinary Patients with Acute Trauma Dr. Elodie Huguet, B.S., DVM, Radiology Resident UF
10:00 AM – 11:00 AM PDT 1:00 PM – 2:00 PM EDT	Clinician Wellbeing Initiative: Intern & Resident Wellbeing Makenzie Peterson, MSc	Equine MRI: Through the Eyes of Technician Dana Duncan, RVT, VTS(DI)
11:00 AM – 12:00 PM PDT 2:00 PM – 3:00 PM EDT	The Art of Saying 'No' Makenzie Peterson, MSc	Nuclear Medicine Applications in Veterinary Medicine Dorothy Sharp, BS, LVMT, VTS (DI)
12:00 PM – 1:00 PM PDT 3:00 PM – 4:00 PM EDT	Mental Health Awareness, Suicide Risk and Prevention: How Can We Help? Stephanie Johnson, MSW	Magnetic Resonance Imaging for Emergency Patients Scarlette Donovan, MFA, RVT, VTS(Anesthesia, ECC, DI)
1:00 PM – 2:00 PM PDT 4:00 PM – 5:00 PM EDT		Emergency Computed Tomography of Veterinary Patients with Acute Trauma Elodie Huguet BS, DVM, Radiology Resident UF



THE AGENDA

Thursday, OCT. 21st	ROOM 1/General	ROOM 2/Radiation Oncology
7:50 AM – 8:00 AM PDT 10:50 AM – 11:00 AM EDT	Morning Mindfulness—Yoga and Stretching	Morning Mindfulness—Yoga and Stretching
8:00 AM – 9:00 AM PDT 11:00 AM – 12:00 PM EDT	Keynote: The Use of Imaging in Forensic Medicine Ernest Rogers, DVM, PhD	VRTOG Meeting - LIVE Moderator: Nick Rancilio, DVM, DACVR-RO
9:00 AM – 10:00 AM PDT 12:00 PM – 1:00 PM EDT	Diversity Keynote: Positioning for Advocacy Latonia Craig, EdD	Welcome from RO Program Chair Michelle Turek, DVM, DACVR-RO Keynote Sponsor: Varian RO Keynote: Abdominopelvic Radiation: Current challenges and Future Opportunities Ted Hong, MD
10:00 AM – 11:00 AM PDT 1:00 PM – 2:00 PM EDT	ZEWDIS Keynote: New Frontiers in Veterinary Imaging M. Scott Echols, DVM, Dipl ABVP	30 minute break RO SOTA: External Beam Radiation in Horses: Not an Unbeatable Challenge Alena Soukup, MVD, DACVR-RO
11:00 AM – 12:00 PM PDT 2:00 PM – 3:00 PM EDT	LADIS Keynote: Animal Farm....in Grayscale: Clinical Perspectives on Imaging Farm Animal Samantha Morello, DVM	Magnetic resonance imaging in the oncology patient Philippa Johnson, BVSc, CertVDI, DipECVDI, MSc, MRCVS
12:00 PM – 1:00 PM PDT 3:00 PM – 4:00 PM EDT	Equine Diagnostic Imaging Business Meeting— LIVE All EDI Diplomates welcome President, Myra Barrett, DVM, DACVR	Radiation Oncology Business Meeting - LIVE All RO Diplomates welcome President, Michele Keyerleber, DVM, DACVR-RO



THE AGENDA

Friday, OCT. 22nd	ROOM 1/General
7:50 AM – 8:00 AM PDT 10:50 AM – 11:00 AM EDT	Morning Mindfulness—Yoga and Stretching
8:00 AM – 10:00 AM PDT 11:00 AM – 1:00 PM EDT	Artificial Intelligence Panel: 1. Introduction of ACVR AI committee to members; moderator, Kate Alexander, DVM, DACVR 2. AI 101: Methods and application in medical imaging; panelist, Adrien-Maxence Hespel, DVM, DACVR 3. Radiation Oncology and AI: State of the Art and Implications for Veterinary Medicine; panelist, Parminder Basran, PhD 4. Evaluating AI products and upcoming VRU Supplemental on AI; panelist, Ryan Appleby, DVM, DACVR 5. Financial implications of AI in veterinary radiology; panelist, Seth Wallack, DVM, DACVR 6. Ethical implications of AI in veterinary radiology; panelist, Eli Cohen, DVM, DACVR
10:00 AM – 11:00 AM PDT 1:00 PM – 2:00 PM EDT	CT MRI Keynote: Combating Metal Artifact and Fat Suppression Techniques in MRI Ulrich Rassner, MD
11:00 AM – 12:00 PM PDT 2:00 PM – 3:00 PM EDT	Ultrasound Society Keynote: Hey Doc, Can you Scan this Snake while You're Here? A Zoo Radiologist Helps You Conquer Your Fears of Exotic Small Animal Ultrasound Marina Ivančić, DVM, DACVR
12:00 PM – 1:00 PM PDT 3:00 PM – 4:00 PM EDT	Collagen Imaging Ultra Class Sarah Pownder, DVM, DACVR
1:00 PM – 2:00 PM PDT 4:00 PM – 5:00 PM EDT	ACVR History, William Blevins, DVM, DACVR Introduction of 2020 and 2021 Diplomates, President, Nate Nelson, DVM, DACVR
2:00 PM – 3:00 PM PDT 5:00 PM – 6:00 PM EDT	ACVR Annual Business Meeting - LIVE All Diplomates welcome President, Nate Nelson, DVM, DACVR



THE AGENDA

Saturday, OCT. 23rd	ROOM 1/General
7:50 AM – 8:00 AM PDT 10:50 AM – 11:00 AM EDT	Morning Mindfulness—Yoga and Stretching
8:00 AM – 9:00 AM PDT 11:00 AM – 12:00 PM EDT	Keynote: Music of the Universe: Gravitational Waves Gabriela Gonzalez, PhD
9:00 AM – 10:00 AM PDT 12:00 PM – 1:00 PM EDT	NOMV: Anxious in America: Anxiety management from a neurobiological perspective Taylor Miller, DVM, MS
10:00 AM – 11:30 AM PDT 1:00 PM – 2:30 PM EDT	Image Interpretation Session Moderator: Alex LeRoux, DVM, MS, DACVR Speakers: Adrien-Maxence Hespel, DVM, MS, DACVR, James Karnia, DVM, DACVR, Samantha Loeber, DVM, DACVR, DACVR-EDI, Julián Daniel Rodríguez Arroyo, MVZ , Esp. Dipl.ACVR
11:30 AM – 12:30 PM PDT 2:30 PM – 3:30 PM EDT	Nuclear Medicine Keynote: Theranostics in Nuclear Medicine: New Therapies for the 21st and 22nd Centuries. Philip F. Cohen, MD, FRCP(C), ABN Keynote Sponsor: Exubrion

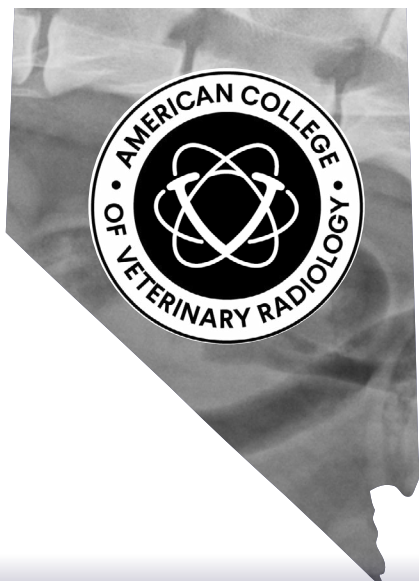
AMERICAN COLLEGE OF VETERINARY RADIOLOGY



2022 ANNUAL SCIENTIFIC MEETING

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ABSTRACTS AT A GLANCE

The abstracts will be available on demand for 60 days after the meeting and can be completed for non-interactive continuing education credit at any time. Abstracts can be found in the “Library” of the online Conference Center.

Please visit the Library to see the presentations of the following abstracts.

CT/MRI

Computed Tomographic Anatomy of Reproductively Active and Inactive Backyard Chicken Hens (*Gallus Domesticus*); Alan Bocage, DVM - NC State University College of Veterinary Medicine

Comparison of VIBE, PETRA and UTE MRI Sequences and Standard T2W, PD, and T1W MRI Sequences with CT for Evaluation of the Canine Skull; Maura Cicci, DVM - North Carolina State University

CT Scan Features of Subcutaneous, Intermuscular and Intramuscular Mast Cell Tumors in Dogs, Sometimes MRI is Needed; Rebecca JM Farmer, DVM - Animal Cancer Centre, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Computed Tomography Attenuation Value and Contrast Enhancement Analyses of Neoplastic and Non-Neoplastic Lung Lesions in Dogs and Cats; Ana Carolina Brandao Campos Fonseca Pinto, DVM, MS, PhD—Purdue University

Prediction of Pathologic Fracture May Be Possible Using Computed Tomography Rigidity Metrics in Canine Antebrachial Osteosarcoma; Angela Gorney, BS, DVM—University of California, Davis

Utility of Arterial Spin Labelling to Assess Cerebral Blood Flow in Dogs; Erin Keenihan, BSc BVMS MANZCVS MVetMed DECVDI - College of Veterinary Medicine, North Carolina State University

Computed Tomographic Hepatic Volumetry in Dogs Without Hepatic Disease; Kosuke Kinoshita, DVM - Purdue University

Computed Tomographic Characteristics of Gastrointestinal Stromal Tumor (GIST) in 12 Dogs; Keita Kitagawa, DVM - Michigan State University

Computed Tomographic Measurement of Kidney Size in Dogs with Congenital Portosystemic Shunts; Kindele Lenoir, DVM Candidate - Purdue University

Radiomic Histogram and Textural Features of Post Contrast Computed Tomography in Oral Melanoma are not Predictive of Mandibular and Medial Retropharyngeal Lymph Node Metastasis; Sarah Lumbrezer Johnson, DVM - Ohio State University College of Veterinary Medicine

Comparison of Abdominal Computed Tomography to Ultrasound in the Diagnosis of Canine Biliary Disease Manifesting as Acute Abdominal Signs; Shanna Marroquin, DVM - Mississippi State University College of Veterinary Medicine

The Effects of Slice Parameters and the Interobserver Measurement Variability in Computed Tomographic Hepatic Volumetry in Dogs; Masahiro Murakami, BVSc, PhD, DACVR - Purdue University



ABSTRACTS AT A GLANCE

How Signal Alterations on Magnetic Resonance Imaging (MRI) Correlate to Tumor Size and Margins in the Canine Brain; Benjamin C. Rivard, DVM - Cornell University College of Veterinary Medicine

Computed Tomography Features of Thymomas in Cats; David Suarez-Fuentes, DVM - University of Florida College of Veterinary Medicine

ULTRASOUND

Echocardiographic Changes in the Shape and Size of the Aortic Cusps in Cats with Confirmed Systemic Hypertension; Merrilee Holland, DACVR - Auburn University

Effects of Alfaxalone on Splenic Size in Cats Based on Computed Tomography and Ultrasound; Andrea Miranda Merly, DVM - Auburn University

Hyperechogenicity of the Pyloroduodenal Junction in Small Dogs: Population Prevalence in 175 Dogs and Histological Correlation in 15 Specimens; Jamie Balducci, DVM - Cummings School of Veterinary Medicine at Tufts University

Ultrasound is an Accurate Method as Compared to Radiography for Diagnosing the Presence of Acute Hip Luxation in Cadaver Dogs and can Identify Direction of Luxation with Variable Reliability; Amy B. Todd-Donato, DVM - Cornell University, College of Veterinary Medicine

ZEWDIS

Novel Quantitative Radiographic Measures of Keel Bone Damage in Laying Hens are Feasible and Repeatable; Cerano Harrison, BS - Clemson University Department of Animal and Veterinary Sciences

Radiographic Assessment of Appendicular Skeletal Pathology in Stranded Pinnipeds (2013-2019); Eric Hostnik, DVM, MS, DACVR-DI, DACVR-EDI - Ohio State University College of Veterinary Medicine; Chicago Zoological Society/Brookfield Zoo

LADIS

MRI Features of the Normal Manica Flexoria in Horses; Samantha Miles, BVM&S, MRCVS - LSU School of Veterinary Medicine

Comparison of 18F-Sodium Fluoride Positron Emission Tomography and Computed Tomography for Imaging of the Fetlock in 25 Sport Horses; Charlene Pige, DVM - UC Davis

Ultrasonographic Measurement of Optic Nerve Sheath Size in Normal Standardbred Foals; Rebecca Urion, DVM, MAg - The Ohio State University

Hounsfield Unit Measurements of the Navicular Bone of Quarter Horses on Standing Computed Tomography May Be A Useful Objective Measure in Horses With and Without Palmar Foot Pain; Molly Viner, DVM - University of Wisconsin

Identification of a Previously Unreported Site of Tarsal Subchondral Injury in the Thoroughbred Racehorse; Kathryn Wulster, VMD, Dipl ACVR - New Bolton Center, University of Pennsylvania



ABSTRACTS AT A GLANCE

NUCLEAR MEDICINE

Staging Canine Patients with Appendicular Osteosarcoma Utilizing Fluorine-18-Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Compared to Whole Body Computed Tomography; Ariel Brody, DVM - Colorado State University

Simulated Dose Reduction Images in Canine Positron Emission Tomography to Enable Same Day Scanning and Release; Alexandra LaPorte, DVM - UC Davis Veterinary Medical Teaching Hospital

Positive Pressure Breath-Holding to Reduce Respiratory Motion During PET/CT Improves Image Quality, Reduces Organ Misalignment, and Yields Higher Standard Uptake Values in Healthy Dogs; Ehren McLarty, DVM, DACVR - UC Davis

Dynamic 18F-FDG Positron Emission Tomography Assessment of Metastatic and Control Iliosacral Lymph Nodes; Robert Slater, BVMS - UC Davis

OTHER

In Vitro Evaluation of Visibility and Measurement Accuracy of Pure Composition Uroliths in Urinary Bladder Phantoms with Digital Radiography Reveals Radiopacity of Urate, Cystine, Struvite and Calcium Oxalate Uroliths; Patricia Debow, DVM - University of Tennessee

Quantitative Analysis of Esophageal Transit Times in Normal Cats Using Contrast Enhanced Videofluoroscopy; Kathryn Goodman, MBS - Colorado State University

Comparison of Error Rates Between 4 Artificial Intelligence and 13 Board-Certified Radiologists when Evaluating 15 Parameters of Canine Thoracic Radiographs; Adrien-Maxence Hespel, DVM, MS, DACVR—University of Tennessee

Comparison of a Deep Learning Algorithm vs Human for VHS Measurements in Cats and Dogs Shows a High Degree of Agreement Amongst Readers; Adrien-Maxence Hespel, DVM, MS, DACVR - University of Tennessee

The Dog-o-gram, a Doggone Shame: Quantification of Scatter Radiation Produced in Appropriately Collimated versus Poorly Collimated Radiographs; Daniel Lantz, VMD - The Ohio State University

Assessment of Accuracy of an Artificial Intelligence Algorithm to Detect Pleural Effusion in Thoracic Radiographs in 62 Dogs; Thiago Muller, MV, PhD - Tufts University

Radiographic Characteristics of Canine Subungual Keratoacanthoma; Atsushi Toshima, DVM - Japan Small Animal Medical Center

Association Between Feline Hyperthyroidism and Thoracic Radiographic Evaluation of Cardiomegaly and Pulmonary Hyperinflation; Victoria Young, DVM - Colorado State University



ABSTRACTS AT A GLANCE

RADIATION ONCOLOGY

Equine Radiation Therapy: Analysis of the Positioning Precision for Intensity Modulated Techniques; Sophie Burde, Veterinarian - Equinox Healthcare GmbH, Linsengericht, Germany

Do We Need Size Correction for Assessing Tumor Volume as a Prognostic Parameter in Sinonasal Tumors in Dogs? Czichon Felicitas, vet.med. - Department of Radiation Oncology, Department for Small Animals, Vetsuisse-Faculty, University of Zurich

Adding Lomustine to Temozolomide-Irradiation Reduces Clonogenic Cell Survival in Canine Glioma Cell Lines; Daniel Fuchs, vet.-med. - Dept. of Radiation Oncology, Dept. for Small Animals, Vetsuisse-Faculty, University of Zurich, Zurich, Switzerland; Center for Clinical Studies at the Vetsuisse Faculty of the University of Zurich, Zurich, Switzerland

Stereotactic Radiation Therapy (SRT) versus Full-Course, Fractionated Radiation Therapy (FRT) for Canine Pituitary Masses: A Comparison of Protocols; Tracy Gieger, DVM - NC State Veterinary Hospital

Intensity-Modulated Radiation Therapy and Chemotherapy for the Treatment of Canine Right Atrial Masses: A Retrospective Case Series of 7 Dogs; Steven Moirano, DVM - University of Wisconsin Veterinary Care

Gross Target Volume (GTV) Contouring in Canine Extra-Axial Brain Tumors: Effects of Slice Thickness and Time Between Subsequent MRI Image Sets; Valerie J Poirier, DMV, DACVR (Radiation Oncology)—Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Proposed Expansion Margins for Gross Tumor Volume in Canine Pituitary Tumor When Only Computerized Tomography is Used for Radiation Target Contouring; Valerie J. Poirier, DMV, DACVR (Radiation Oncology) - Animal Cancer Centre, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Theoretical Evaluation of the Benefits of a Six Degree of Freedom Patient Couch; Jan Kuntz, DVM, Dipl. Ing. - Equinox Healthcare GmbH, Linsengericht, Germany

Modified Nasal Exenteration Surgery After Definitive-Intent Intensity Modulated Radiation Therapy for Dogs with Nasal Tumor: A Series of 7 Cases (2011-2021); Marilia Takada, DVM, MS, PhD - University of Wisconsin

Efficacy of Stereotactic Radiation Therapy for the Treatment of Canine Glioma; Erin Trageser, DVM—Colorado State University

Initial Treatment Experience and Target Motion Characterization with Real-Time Predictive Motion Tracking Platform Synchrony During Helical Radiation Delivery; Nathaniel Van Asselt, DVM DACVR (RO) - UW Madison Veterinary School

Assessment of Optimal Positioning for Respiratory Gating in Dogs Receiving Radiation Therapy and Proposed Expansion Margins for Tumors and Organs at Risk within the Thorax and Abdomen; Jennifer Yee, DVM - University of Illinois



Computed Tomographic Anatomy of Reproductively Active and Inactive Backyard Chicken Hens (*Gallus Domesticus*)

Presenting Author: **Alan Bocage**, DVM - NC State University College of Veterinary Medicine

Co-Author: **Eli Cohen**, DVM, DACVR - NC State University College of Veterinary Medicine

Co-Author: **Olivia Petritz**, DVM, DACZM - NC State University College of Veterinary Medicine

Co-Author: **Luke Borst**, DVM, PhD, DACVP - NC State University College of Veterinary Medicine

As backyard chickens have become more popular in recent years, more comprehensive diagnostics have been used to better identify lesions of the head, neck and coelom. Computed tomography is a useful modality to evaluate internal structures, with the benefit of good spatial resolution, which is especially useful in reproductively active chickens, where many of their coelomic organs are difficult to fully evaluate on radiographs. Ten clinically normal, adult hens (five reproductively active and five inactive) had contrast enhanced CT imaging of their heads, necks and coeloms performed. A single chicken from each group was then euthanized, frozen and sectioned for cross sectional comparison. Relevant anatomic structures were correlated with CT images. Anatomic differences due to reproductive activity of the birds were also compared. This study serves as an atlas of head, neck and coelomic anatomy of adult hens. A caudoventral deviation of the gastrointestinal organs was caused secondary to a mass effect from the larger reproductive organs of the reproductively active hens.



Comparison of VIBE, PETRA and UTE MRI Sequences and Standard T2W, PD, and T1W MRI Sequences with CT for Evaluation of the Canine Skull

Presenting Author: **Maura Cicci**, DVM - North Carolina State University

Co-Author: **Eli Cohen**, DVM, DACVR - North Carolina State University

Co-Author: **Erin Keenihan**, BSc BVMS MANZCS MVetMed DipECVDI - North Carolina State University

Computed tomography (CT) often needs to be paired with magnetic resonance (MR) imaging for complete assessment of bony structures due to increased spatial resolution and discrimination of cortical bone margins. The aims of this study were to perform qualitative and quantitative comparison of standard MR sequences with three novel MR sequences using CT as the gold standard. Eight healthy research dogs of similar size had both imaging modalities of the head/skull performed. The three novel sequences, VIBE, PETRA, and UTE, alongside T2W, PD, and T1W sequences of the skull were obtained. Slice thickness of CT and novel MR sequences were matched. A qualitative scale was used to assess visibility of cortical margins and skull foramina. For the quantitative assessment, predetermined osseous structures and foramina on designated slices were measured. For both quantitative and qualitative data, summary values regarding deviation from the CT value were performed. All the measurements were individually compared for the individual sites and the differences from CT were compared. Summary values and Wilcoxon signed-rank tests were performed. The novel MR sequences were significantly better than the standard MR sequences for quantitative assessment of bone thickness of smaller structures and overall qualitative assessment. Any of the novel sequences may be viable to incorporate into a clinical setting to help further evaluate the skull, reduce anesthesia time and patient movement, and client cost. VIBE, PETRA, and UTE sequences have diagnostic image quality and provide consistent quantitative and qualitative assessment of cortical bone of the skull when compared with CT.



CT Scan Features of Subcutaneous, Intermuscular and Intramuscular Mast Cell Tumors in Dogs, Sometimes MRI is Needed

Presenting Author: **Rebecca JM Farmer**, DVM - Animal Cancer Centre, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Valerie J Poirier**, DMV DACVR-RO - Animal Cancer Centre, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Stephanie Nykamp**, DVM, MS, DACVR - Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Monica Jensen**, DVM, DVSc, DACVR - Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Robert A Foster, BVSc, PhD, DACVP** - Department of Pathobiology, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Michelle Oblak**, DVM, DVSc, DACVS-SA - Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Co-Author: **Ryan Appleby**, DVM, DACVR - Department of Clinical Studies, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

Surgical removal is the treatment of choice for subcutaneous (SQ) and intramuscular (intraM) and intermuscular (interM) MCTs. Advanced imaging (computed tomography (CT) or magnetic resonance imaging (MRI)) is frequently used for presurgical planning, but interM MCTs can be difficult to visualize on CT alone. The aim of the study is to describe the imaging features of SQ intermuscular and intramuscular canine mast cell tumors on CT scan and to assess how often MRI would benefit identification of the full local extent of the MCT. Inclusion criteria for the study were dogs with a cytological or histologically diagnosed subcutaneous, intermuscular or intramuscular mast cell tumor with a CT scan performed in the macroscopic disease setting. Two board certified radiologists reviewed CT images and assessed the mass for location, contrast enhancement pattern, signal intensity and attenuation, and delineation between the normal and abnormal tissue. Sensitivity and specificity of a CT scan to determine location (SQ/intermuscular/intramuscular) was 85.71% and 55.56% respectively when compared to consensus location based on pathology and surgery reports with CT/MRI review by a third radiologist. There was a low inter-rater agreement for delineation (kappa:0.150 (-0.070-0.370) and measurement had a low/moderate correlation (rho: 0.4667-0.5792). Upon consensus review, 8/16 of cases were determined to benefit from MRI. CT scan is an adequate imaging modality if MCT are located SQ. However, for surgical planning, MRI would be preferred especially if the MCT involves muscles.



Computed Tomography Attenuation Value and Contrast Enhancement Analyses of Neoplastic and Non-Neoplastic Lung Lesions in Dogs and Cats

Presenting Author: **Ana Carolina Brandao Campos Fonseca Pinto**, DVM, MS, PhD - Purdue University

Co-Author: **George E. Moore**, DVM, PhD, DACVIM, DACVPM - Purdue University

Co-Author: **Chee Kin Lim**, DVM, BVSc (Hons), MMedVet, FMCVS, DECVDI - Purdue University

Co-Author: **Masahiro Murakami**, BVSc, PhD, DACVR - Purdue University

Co-Author: **Caroline V. Fulkerson**, DVM, DACVR - Purdue University

Information about CT texture analysis (CTTA) and contrast enhancement quantitative analysis (CEQA) for characterization of pulmonary neoplastic or non-neoplastic lesions in companion animals is lacking. This study evaluated if the pre-contrast CT attenuation value and CEQA will allow this differentiation. A five-year retrospective study selected dogs and cats with confirmed diagnosis of pulmonary soft tissue attenuating lesion. Different CT image measurements were performed. Receiver operating characteristic curves (ROC), area-under-the-curve (AUC) and a multivariable logistic regression were used to describe the best numerical variables. Of the 44 patients, 26 (59%) had neoplasia. The higher AUC values (95% CI) were: 0.74 (0.58-0.90), 0.71 (0.55-0.87) and 0.71 (0.54-0.87) respectively for the mean CT attenuation value of the area encompassing the entire lesion pre-contrast (MCTAV), minimum CT attenuation value post-contrast of the area encompassing the entire lesion (MinCTAV) and the mean attenuation value of the small ROI at the most vascularized area in the lesion (MCTAV-ROI). The cut-point (HU), sensitivity, and specificity were respectively: 26.5, 73%, 83% for the MCTAV; -104.0, 69%, 78% for MinCTAV; and 66.1, 77%, 67% for MCTAV-ROI. Neoplastic lesions tended to present a higher MCTAV, MinCTAV and MCTAV-ROI, similarly to humans' lung neoplasia (primary or metastatic) where the CTTA and the contrast enhancement presented higher values than benign nodules. Thus, pre-contrast CT attenuation value (MCTAV), and CEQA (MinCTAV and MCTAV-ROI) were helpful discriminating neoplastic from non-neoplastic pulmonary soft tissue attenuating lesion.



Prediction of Pathologic Fracture May Be Possible Using Computed Tomography Rigidity Metrics in Canine Antebrachial Osteosarcoma

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Osteosarcoma is a common bone tumor in dogs most often affecting the radial diaphysis. Determining the risk of pathologic fracture in these patients would prove clinically useful in recommending the most appropriate treatment option. Prior research found strong relationships between in-vitro strength of canine antebrachii and CT-derived structural analyses. The purpose of this retrospective study was to determine if those CT-derived indices discriminate between cases that did or did not result in pathologic fracture of the radius secondary to osteosarcoma. The medical record database of a single institution was searched from 2006-2020 for dogs with aggressive osseous lesions of the radius and CT examination of the affected bone. CT images of each dog were used to calculate structural rigidity and failure forces. Twenty dogs met inclusion criteria, 12 of which had no known fracture of the affected radius and 8 of which fractured the affected radius more than 14 days following the CT scan. When including dog body weight (BW) into the Receiver Operating Characteristic curve model, the rigidity metrics with the largest area under the curve (sensitive and specific to predicting fracture) were bending rigidity, curved beam failure force (Fc), torsional rigidity, straight beam failure force, and axial rigidity ($.922 > R > 0.828$). The logistic regression resulted in Fc being the best predictor ($p < 0.05$). Bending and dog BW were the next best predictors ($0.05 < p < 0.10$). Further analysis of larger case numbers may allow for calculation of the probability of fracture in this population.



Utility of Arterial Spin Labelling to Assess Cerebral Blood Flow in Dogs

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Assessment of brain perfusion is an important component of neuroimaging. Commonly used techniques require administration of an exogenous tracer or contrast medium. Arterial spin labelling (ASL) is a non-invasive MRI technique which measures cerebral blood flow (CBF) with wide clinical applications in human medicine. Different anesthetic agents have known effects on CBF. We hypothesized that ASL could detect changes in CBF within the normal canine brain induced by anesthetic agents with known physiologic effects. Six healthy research dogs were each anesthetized with propofol, alfaxalone or sevoflurane, mechanically ventilated and maintained with propofol, alfaxalone or isoflurane, respectively, with one week washout between protocols. MPRAGE and ASL sequences were acquired in a 3 Tesla scanner. Relative CBF was calculated for the whole brain (WB) and grey matter (GM) in each dog under each protocol and compared between groups. Relative CBF was significantly lower in the WB and GM in dogs that received alfaxalone compared to those that received isoflurane ($p=0.016$). Relative CBF of the WB and GM in dogs that received propofol were also lower and very similar to that of alfaxalone. Alterations in CBF induced by different anesthetic protocols could be demonstrated using ASL and were consistent with expected perfusion changes based on agent mechanism of action. ASL may be a viable non-invasive technique to assess changes in CBF in a wide range of pathological states of the brain, particularly when administration of contrast medium is contraindicated or if there is limited or no disruption in the blood brain barrier.



Computed Tomographic Hepatic Volumetry in Dogs Without Hepatic Disease

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The liver volume is usually evaluated subjectively using radiography in dogs, due to wide variation in patient size and body conformations. The liver volume can be quantitatively and accurately measured by computed tomographic (CT) volumetry. However, normal hepatic volume in dogs using CT volumetry, and reliable internal control for normalization has not been established. The purpose of the study was to determine a normalized range of liver volume in dogs without hepatic disease, and the most reliable internal control to normalize liver volume in dogs. Medical records from January 1, 2017, through June 1, 2020, were retrospectively searched; and dogs with abdominal computed tomography without hepatic disease were included. Liver volume, lengths of vertebrae (T11 and L2), diameter of aorta, bodyweight and body condition scores (BCS) were recorded. Forty-one client-owned dogs without the evidence of hepatic disease had data for evaluation. Mean (\pm SD) liver volume in dogs without hepatic disease was 813.8 ± 326.5 cm³. Hepatic volume was best normalized by ratio of hepatic volume-to-bodyweight (mean; 95%CI): 22.1 cm³/kg; 12.9-31.3 cm³/kg, followed by T11 length (372.6 cm³/cm; 136.4-608.8 cm³/cm), diameter of aorta (533.2 cm³/cm; 182.7-885.9 cm³/cm), and L2 length (281.6 cm³/cm; 79.7-483.4 cm³/cm). BCS showed small negative association with hepatic volume to bodyweight ratio ($r=-0.35$). CT hepatic volumetry is feasible and accurate method to estimate liver volume in dogs without hepatic disease, with the bodyweight as valid internal control for normalization. However, lean body mass could provide better normalized range if accurately measured.



Computed Tomographic Characteristics of Gastrointestinal Stromal Tumor (GIST) in 12 Dogs

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The use of abdominal computed tomography (CT) to investigate tumors of the gastrointestinal tract has been increasing in dogs. Gastrointestinal stromal tumor (GIST) is relatively uncommon in dogs and has been challenging to distinguish from other gastrointestinal mesenchymal tumors without immunohistopathological analyses such as KIT(CD117). The CT characteristics of GIST have not been reported in dogs. The objective was to describe the CT characteristics of histologically confirmed GIST in dogs. This was a retrospective multi-institutional study. The medical records from 5 institutions were searched between 2011 and 2020 for dogs with histologically confirmed GIST and abdominal CT studies acquired before biopsy or treatment. CT images were reviewed, and the following CT characteristics were evaluated; location, size, mean Hounsfield units, homogeneity, serosal margin regularity, location, cavitation, mineralization, intestinal fluid accumulation, peritumoral change, and abdominal lymphadenomegaly. Twelve dogs for a total of 12 GIST were included. Tumors were most commonly located in cecum (9/12). The means \pm SD for the longest diameters and longest diameter-to-shortest diameter ratios were 5.8 ± 2.6 cm and 1.8 ± 0.4 , respectively. Mean pre- and post-contrast tumor attenuations (mean \pm SD) were 35.3 ± 7.1 HU and 69.5 ± 18.1 HU (delayed phase), respectively. The majority of tumors were irregular, exophytic mural masses with heterogenous parenchyma due to fluid cavitation and not causing fluid accumulation oral to the tumor. This is the first study describing the CT characteristics of GIST in dogs. These features may help increase clinical suspicion for GIST in comparison to other gastrointestinal tumors.



Computed Tomographic Measurement of Kidney Size in Dogs with Congenital Portosystemic Shunts

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Renomegaly is a common finding in dogs with congenital portosystemic shunts (PSS). However, no study to date has objectively evaluated the degree of renomegaly in dogs with different types of PSS. The purpose of this study was to determine kidney size (renal length-to-L2 vertebral body ratio; RL/L2 ratio) using CT in dogs with different types of PSS. A retrospective medical record search for dogs with a PSS diagnosed via CT between 2016 and 2020 was performed. Breed, age, sex, and body weight were recorded. Dogs were categorized based on PSS morphology into intrahepatic (IH; n = 20), extrahepatic portocaval (EHPC; n = 20), extrahepatic portoazygos (EHPA; n = 8), or extrahepatic portophrenic (EHPP, n = 7) groups. Measurements of kidney and L2 vertebral body lengths were performed using multiplanar reconstruction CT images. RL/L2 ratio (mean \pm SD) was largest in IH (3.49 ± 0.35) followed by EHPC (3.46 ± 0.35), EHPP (3.09 ± 0.27), and EHPA (2.83 ± 0.22). RL/L2 ratio was significantly larger in EHPC and IH (vs. EHPA and EHPP [$P < 0.01$]). RL/L2 ratio was significantly smaller in EHPA compared to EHPP ($P < 0.05$). Renomegaly was common (87.3%) in dogs with PSS overall but was uncommon in dogs with EHPA and was less severe in dogs with EHPP; these two groups showed clinical signs later in life as evidenced by older age at presentation. Authors propose that the shunted blood volume and severity of hepatic dysfunction may influence the development of renomegaly in dogs with PSS.



Radiomic Histogram and Textural Features of Post Contrast Computed Tomography in Oral Melanoma are not Predictive of Mandibular and Medial Retropharyngeal Lymph Node Metastasis

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Oral malignant melanoma frequently metastases to the mandibular and medial retropharyngeal lymph nodes. Lymphadenomegaly and fine needle aspiration with cytological evaluation of regional lymph nodes in melanocytic neoplasms is shown to have a poor correlation with histopathology and survival. Radiomics is a developing field that uses textural analysis of medical imaging to evaluate tumor heterogeneity in an attempt to predict biological characteristics of a tumor. In this retrospective study, 18 patients met the inclusion criteria of a head CT with intravenous contrast and lymph node histopathology within 14 days of one another. This created a population of 40 benign lymph nodes and 8 metastatic lymph nodes. Post-contrast head CT images were uploaded into LIFEx Software where segmentation was used to create a volume of interest around the sampled mandibular and medial retropharyngeal lymph nodes. Radiomic features were analyzed using various voxel sizes, with only the $1 \times 1 \times 1$ mm³ size sufficient for analysis. No statistical significance (alpha value of 0.05) was demonstrated across the various radiomics features analyzed. In cases of oral melanoma, radiomic histogram and textural analyses of the regional mandibular and medial retropharyngeal lymph nodes were not predictive of metastatic disease.



Comparison of Abdominal Computed Tomography to Ultrasound in the Diagnosis of Canine Biliary Disease Manifesting as Acute Abdominal Signs

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Biliary diseases are uncommon, potentially fatal causes of acute abdomen in dogs. Computed tomography (CT) is the current standard of care in people presenting for acute abdomen, but is used less than ultrasound in veterinary medicine. Little information is present comparing the performance of CT to ultrasound in identifying biliary pathology in dogs. The study purpose is to compare the performance of CT to abdominal ultrasound when diagnosing biliary disease in dogs. Eighteen client-owned dogs presenting for acute abdomen were enrolled. Dogs received a contrast-enhanced dual phase abdominal CT and an abdominal ultrasound. Two authors (a radiologist and radiology resident) were blinded to the case results and reviewed randomized, anonymized CT and ultrasound images and cine clips. Thirteen dogs had biliary pathology and five dogs serving as controls had no evidence of biliary disease. The final diagnoses of biliary patients included gallbladder mucoceles (n=5), cholangitis (n=4), extrahepatic biliary obstruction due to pancreatitis (n=1), cholelithiasis (n=1), gallbladder wall edema (n=1), and gallbladder wall mass (n=1, carcinoid). There was no statistical difference in the odds to identify biliary pathology between ultrasound and CT in these patients (p-value>0.2564). This study did not detect a difference in the ability of abdominal CT and ultrasound in identifying biliary pathology in patients presenting for acute abdominal signs; however, a Type II error is possible due to the small sample size. Findings from this preliminary study suggest that CT may be used in place of ultrasound in canine patients presenting for acute abdominal signs.



The Effects of Slice Parameters and the Interobserver Measurement Variability in Computed Tomographic Hepatic Volumetry in Dogs

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Manual computed tomographic (CT) hepatic volumetry is a non-invasive method for assessing liver volume. However, it is time consuming with larger numbers of slices. Reducing slice number would expedite the process but the effect of fewer slices on the accuracy of volumetric measurements in dogs has not been investigated. The primary objective of this study was to evaluate the relationship between slice interval and number of slices on hepatic volume using CT hepatic volumetry. A secondary objective was to determine the interobserver variability of CT volumetric measurements. A retrospective medical record search was performed for dogs without evidence of hepatobiliary disease which had undergone abdominal CT using either 2.5 mm or 3.75 mm slice thicknesses. Manual CT hepatic volumetry was performed in 16 dogs by three observers. First, full hepatic volumes were calculated by using all slices (i.e. no inter-slice gap) and interobserver variability was calculated using this dataset. Then, the effects of slice interval and number of slices on volumetric measurements were evaluated. Interobserver variability was low with a mean \pm SD percent difference in hepatic volume of $3.3 \pm 2.5\%$ among all observers. The percent differences in hepatic volumes generally increased when using larger slice intervals and decreased when using larger numbers of slices; percent differences was $<5\%$ when using ≥ 20 slices. Manual CT hepatic volumetry can be used in dogs to non-invasively assess liver volume with low interobserver variability and can be highly reliable if using ≥ 20 slices.



How Signal Alterations on Magnetic Resonance Imaging (MRI) Correlate to Tumor Size and Margins in the Canine Brain

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Determining how MRI signal alterations correspond to brain tumor size, location and margination is important for radiation planning and surgical intervention. Although the location and margin of brain tumors can be inferred from the signal characteristics of the lesion on MRI, no direct histopathological comparison has been performed to confirm this. This study aimed to compare in-vivo MRI images with histopathology obtained within days of imaging. 12 canines diagnosed with glioma, histiocytic sarcoma or meningioma that had undergone in-vivo MRI and histopathology within days of each other were recruited. Histopathology slide images underwent control point registration to MRI sequence images in order to counter for shrinkage and warping. Height and width measures of the tumor on the histopathology image and the signal intensity alteration on each MRI sequence (T2-weighted, FLAIR, T1-weighted, T1-weighted post contrast and ADC map) was performed by a single observer. Metrics were documented and compared using percentage difference and correlation-coefficients. We identified that height measures of T2-weighted, FLAIR, T1-weighted post contrast and ADC map signal alterations showed a moderate correlation to tumor size, but width measures showed consistently weak correlations. Within the tumor groups T2-weighted, FLAIR and ADC map signal alterations size was similar to glioma size, however was markedly higher than histiocytic sarcoma size. Post contrast signal alterations were consistently smaller than glioma and meningioma size. This is the first study to directly compare in-vivo MRI to histopathology of brain tumors and provides valuable insight into the cellular cause for signal alterations in these cases.



Computed Tomography Features of Thymomas in Cats

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Thymoma is considered the second most common mediastinal neoplasia in cats. Computed tomography (CT) characteristics of such tumors are currently lacking in the literature. The objectives of this study were to retrospectively describe the CT features of thymomas in cats and to correlate specific CT imaging features with patient outcome. Medical records from 4 academic referral hospitals were reviewed for cats that had thoracic CT and a histopathological diagnosis of thymoma. Nineteen cases met the inclusion criteria, with 18/19 (95%) cases treated surgically and 13/19 (68%) having long term survival at follow up (mean: 33 months; 24–92 months). The mass was centrally located in 14/19 (74%) cases, left-sided in 5/19 (26%), and 0/19 (0%) were right-sided. Masses were generally large with a mean size of 9.8(L) x 5.8(W) x 4.5(H) cm. All masses (100%) were heterogeneously soft tissue attenuating to cystic with heterogenous contrast enhancement. Mineralization was noted in 4/19 (21%) masses. Enveloping of the cranial vena cava was noted in 6/19 (32%) cases with two (11%) of these cases having concurrent cranial vena cava invasion, which was confirmed with surgery or necropsy and correlated with shorter survival times ($p=0.03$). Lymphadenopathy was noted in 6/19 (32%) cases and pleural effusion was noted in 5/19 (26%) cases. Tumor recurrence was seen in two (11%) cases at 11 and 53 months. Metastasis was not confirmed in any cat. Thymoma should be prioritized in cats with cranial mediastinal masses that have the CT imaging features described in the current study.



Echocardiographic Changes in the Shape and Size of the Aortic Cusps in Cats with Confirmed Systemic Hypertension

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Systemic hypertension (SH) can be seen secondary to renal disease and untreated hyperthyroidism in cats. Systemic hypertension is defined when blood pressure exceeds 150 mmHg. Our hypothesis was that there would be alterations in the size and shape of the aortic cusps in cats with systemic hypertension and not in cats with normal blood pressure.

Blood pressure was considered normal if less than 150 mmHg and hypertensive if over 150 mmHg. Each aortic cusp and aortic diameter were measured three times by a ACVR board certified radiologist. Statistical analysis was performed using IBM computer software program SPSS v26 using a 2-way unpaired t-test with significance set at $\alpha = 0.01$. Aortic cusp shape was considered altered when differences in cusp size varied ≥ 0.5 mm.

Echocardiograms were performed by the cardiology service using a GE Vivid 9 ultrasound machine with a 12-5 MHz phased array transducer. Seventy-six cats were included in each group. Significant differences were noted in blood pressure, aortic diameter, aortic cusp size, and variability of aortic cusps between groups. Aortic cusps were altered in shape in 62/76 SH cats, 12/62 with ≥ 0.50 mm and 50/62 at ≥ 1.0 mm differences.

Aortic root dilatation is recognized as target organ damage from SH in human medicine. Similar to dogs with SH, alternations in the size and shape of the aortic cusps is a reliable indicator of systemic hypertension in cats and should prompt earlier treatment.



Effects of Alfaxalone on Splenic Size in Cats Based on Computed Tomography and Ultrasound

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The aim of this prospective study were to determine whether alfaxalone causes splenomegaly in cats. Splenic measurements were acquired using two imaging modalities: ultrasound and computed tomography. In this two phase study, 8 healthy adult research cats were anesthetized with alfaxalone injected intravenously (IV) and intramuscularly (IM) at two separate time points. Sonographic and computed tomographic evaluations were performed prior to alfaxalone (baseline), 13 and 28 minutes and 15 and 30 minutes respectively after alfaxalone administration. Transverse sonographic and computed tomographic images of the splenic head were collected to measure thickness. Subjective ultrasonographic echotexture, splenic capsular margins, and computed tomographic volume of the spleen were also recorded. Objective measurements were compared across time periods using repeated measures of ANOVA and a Tukey-Kramer multiple comparison test. Based on these tests, we observed significant differences in splenic thickness following IM and IV alfaxalone administration. Normal transverse sonographic splenic thickness (mean \pm standard deviation) at baseline were similar to previous studies: 8.6 ± 1.15 mm. Normal computed tomographic splenic thickness at baseline was: 10.2 ± 1.5 mm. Splenic thickness on ultrasound and computed tomography increased approximately 21-26 % and 30-36% respectively from baseline despite route of administration. Computed tomographic volume of the spleen increased a maximum of 84% and 110% from baseline after IV and IM administration respectively. We conclude that alfaxalone increases splenic size in normal cats. This study also demonstrates the utility of CT in assessing splenic size following pharmacological intervention in cats.



Hyperechogenicity of the Pyloroduodenal Junction in Small Dogs: Population Prevalence in 175 Dogs and Histological Correlation in 15 Specimens

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At the pyloroduodenal junction (PDJ), an increase in wall echogenicity has been anecdotally observed. This prospective study assessed the PDJ sonographically in 175 mature, small dogs (> 1 year old, < 25lbs/11.4kg) over a 12-month period to evaluate the prevalence of this finding.

Additionally, changes in echogenicity were correlated with histology in 15 post-mortem samples. Gastric distention, gastric contents, age, sex, breed, and reported vomiting were recorded. A grading system of echogenicity change centered on the mucosa/submucosa of the PDJ was implemented (0: no change, 1: mild, 2: moderate to severe); hyperechogenicity of the PDJ was highly prevalent (0: 25/175 (14.3%), 1: 92/175 (52.6%), 2: 58/175 (33.1%)). No statistical association between hyperechogenicity of the PDJ and gastric distention, gastric contents, age, sex, or vomiting was identified. Based on histology, hyperechogenicity of the PDJ likely represents a variation in distribution of connective tissue and glandular dilation within the submucosa/mucosa of this transition zone. Hyperechogenicity of the PDJ is thought to represent an anatomical transition zone and we speculate that it has little or no clinical relevance, but this should be further investigated.



Ultrasound is an Accurate Method as Compared to Radiography for Diagnosing the Presence of Acute Hip Luxation in Cadaver Dogs and can Identify Direction of Luxation with Variable Reliability

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Acute hip luxation is a common musculoskeletal injury in dogs, with radiographs being the preferred imaging modality for confirming the diagnosis. In large animal and human medicine, ultrasound is more often utilized for this purpose. The objectives of this study were to utilize a canine cadaver model to establish ultrasonographic features of hip luxation and evaluate the accuracy and reliability for diagnosing hip luxation with ultrasound. A cadaver model was developed that allowed manual luxation and subsequent ultrasonography of the hip joint while in four directions of luxation. A description of the ultrasonographic features for each direction of luxation was created. Sixteen residency-trained and intern veterinarians participated in a blinded study to perform repeated ultrasound exams on cadaver hips that were randomly assigned as normal or luxated (equally distributed between the 4 directions). A total of 1140 hip ultrasounds were performed with good accuracy (median, 88.8%; range, 63.2-100%), sensitivity (89.5%), and specificity (74.2%) for diagnosing the presence of hip luxation. Accuracy for identifying the correct quadrant of luxation was significantly lower (mean, 58.6%; range, 24.6-90.8%; $p < 0.001$). Of these, identification of a dorsal versus ventral luxation and the diagnosis of craniodorsal and caudoventral luxation yielded the highest accuracies (statistical significance not reached). Intra-observer accuracy agreement varied widely from none to almost perfect agreement, and inter-observer agreement ranged from slight to moderate agreement. The results of this study support the use of ultrasound for accurately diagnosing the presence of hip luxation but should not replace radiographs for diagnosing the direction of luxation.



Novel Quantitative Radiographic Measures of Keel Bone Damage in Laying Hens are Feasible and Repeatable

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Keel bone fractures (keel bone damage, KBD) are an important cause of pain, reduced activity, and impaired respiratory function in laying hens. Previous research studies have primarily described the use of radiographic scoring methods (i.e. categorical measurement variables). Objectives of the current, retrospective, secondary analysis study were to determine whether a novel, standardized, radiographic protocol for quantifying KBD using a set of continuous measurement variables would be feasible and repeatable. Inclusion criteria were as follows: keel bone radiographs from a previously published prospective study in LSL hens, radiographs acquired at ages 21 and 36 weeks. In consultation with a board-certified veterinary radiologist and a veterinarian specializing in laying hen behavior and welfare, a graduate student developed a standardized protocol for quantifying radiographic KBD using a set of continuous measurement variables. This protocol was then applied using triplicate measurements for a sample of 470 randomized radiographs (235 hens @ 2 age periods each). Repeatability analyses were performed in consultation with a statistician. Percentages of measures within acceptable repeatability ranges were as follows: numbers of complete cranial fractures (100%), incomplete cranial fractures (98.48%), complete caudal fractures (80.09%), incomplete caudal fractures (85.28%), cranial calluses (99.78%), caudal calluses (90.71%); proportion of ventral margin deviation (87.26%); and angle of dorsal margin displacement (89.10%). These continuous variable radiographic measures of KBD in laying hens will support future research studies by allowing the use of a broader range of descriptive analyses for assessing reproducibility and stronger statistical tests for comparing effects of novel interventions among groups.



Radiographic Assessment of Appendicular Skeletal Pathology in Stranded Pinnipeds (2013-2019)

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The Marine Mammal Center (Sausalito, CA) rescues hundreds of ill and injured marine mammals throughout Northern and Central California each year. Stranded pinnipeds commonly present with trauma from human activity, predators are common and other causes. The severity of these injuries often necessitates further assessment and characterization. Radiography is an integral diagnostic tool for osseous trauma as well as monitoring response to treatment. .

Radiographic studies from 79 pinnipeds (56 California sea lions (*Zalophus californianus*), seven Pacific harbor seals (*Phoca vitulina richardii*), six Northern elephant seals (*Mirounga angustirostris*), five Northern fur seal (*Callorhinus ursinus*), and four Guadalupe fur seal (*Arctocephalus townsendi*) that stranded between 2013-19 were reviewed for this retrospective study. Radiography was included if an abnormality of the appendicular skeleton or bone involvement was suspected by attending clinician. Of the 79 individuals, 78 (99%) pinnipeds that received radiographs were immature. Seventy-four (93.7%) had some version of osseous pathology (acute fracture, joint luxation, or osteomyelitis); 5/79 (6.3%) were only soft tissue pathology. Soft tissue and/or bony injuries of multiple limbs were common, affecting 59.5% (47/79). Polyostotic lesions were identified in 74.4% of individuals (58/79). Most common sites of bony pathology were hindlimb phalanges (22.8%), forelimb phalanges (19%), radius (19%), and tibia (17.7%). Radiographic findings consistent with erosive arthropathy were identified in 43% of individuals (34/79). Seven individuals had a sequestrum (8.9%) associated with lytic bone disease. Radiography is readily incorporated in health assessments of stranded pinnipeds to identify injury severity and guide treatment/rehabilitation plans.



MRI Features of the Normal Manica Flexoria in Horses

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Manica flexoria tears are increasingly being recognized as a cause of lameness in horses resulting in a need for improved pre-operative diagnosis. The goal is to describe the gross anatomic characteristics of the manica flexoria in one healthy control horse and use this information to evaluate the manica flexoria retrospectively on MRI in unaffected limbs. Inclusion criteria included: MRI of the metacarpophalangeal/metatarsophalangeal regions, no tendon abnormalities identified, and the entire manica flexoria included on transverse proton density weighted (PD) images. The manica flexoria on MRI was measured proximally and distally, and the proximal and middle thirds, with measurements including axial and abaxial thickness and thickness at 45-degrees from the axial. The manica flexoria on gross dissection was thicker proximally in the forelimbs, and thinner proximally in the hindlimbs where it blends with the overlying fascia. Eighteen MRI series fit the inclusion criteria: 6 forelimbs, 12 hindlimbs. On PD images, the manica flexoria was hyperintense to the superficial digital flexor tendon (12/18), isointense (3/18), or hyperintense proximally and isointense distally (3/18). The proximal third axial measurements were thickest compared to the proximal margin and middle in both forelimbs and hindlimbs ($p=0.0001$, significance set at $p<0.05$). The forelimb medial aspect was thicker than the lateral aspect in the proximal and middle third ($p=0.0372$ and $p=0.0183$, respectively), and in the hindlimb the lateral aspect was thicker in these regions ($p=0.0099$ and $p=0.0394$, respectively). This study provides an anatomical and morphometric reference for future studies evaluating abnormalities of the manica flexoria on MRI.



Comparison of 18F-Sodium Fluoride Positron Emission Tomography and Computed Tomography for Imaging of the Fetlock in 25 Sport Horses

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The use of 18F-Sodium Fluoride (18F-NaF) Positron Emission Tomography (PET) has been described in Thoroughbred racehorses and shown to detect stress remodeling of the subchondral bone. The use of 18F-NaF PET in sport horse fetlocks has not been reported. The goals of this retrospective clinical study were to describe the findings of 18F-NaF imaging in the fetlocks of sport horses and compare with computed tomography (CT) findings. 36 fetlocks from 25 horses were included in the study. 32 out of the 36 fetlocks had at least one site with increased 18F-NaF uptake. The 4 fetlocks without PET abnormalities had no associated lameness. The 3 sites most commonly presenting increased 18F-NaF uptake were the medial subchondral bone of the proximal phalanx and the dorsomedial and dorsosagittal subchondral bone of the third metacarpal/metatarsal bone with 67%, 56% and 44% of the total population involved respectively. Resorption of the subchondral bone was observed in 5 cases on CT and all had marked increased 18F-NaF uptake with maximal standardized uptake values (SUVmax) ranging from 20.4 to 43.8 at the resorption site. The highest SUVmax of all sites per fetlock in group L (22.0, +/- 12.1) (mean, +/- SD) was significantly greater ($P=0.038$) than the highest SUVmax of all sites per fetlock in group C (11.9, +/- 5.2). PET identified subchondral bone abnormalities more commonly than CT, in particular in the medial subchondral bone of the proximal phalanx. 18F-NaF PET is a valuable addition to CT for assessment of the sport horse fetlock.



Ultrasonographic Measurement of Optic Nerve Sheath Size in Normal Standardbred Foals

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Diagnosis of neonatal encephalopathy in foals is based on clinical signs and as timely intervention reduces morbidity, an objective diagnostic test may aid earlier recognition. Increased intracranial pressure is a presumed component of this syndrome but direct measurement is impractical. Increased optic nerve sheath (ONS) diameter in humans and dogs correlates with intracranial pressure, serving as a non-invasive indicator, but prior investigation of this technique in foals is limited. The goals of this prospective, observational, cross-sectional study were 1) establish an expected range of ultrasonographic ONS measurements in a homogeneous population of neonatal foals and 2) determine intra- and inter-observer variation in ultrasonographic measurement of ONS size. Thirty-three clinically normal Standardbred foals <14 days of age underwent non-sedated bilateral transpalpebral ocular ultrasound exams. Optic nerve height (superior-inferior dimension) and width (nasal-temporal dimension) were measured in triplicate by two independent examiners. Average ONS width was 4.10 ± 0.05 mm on the right and 4.14 ± 0.05 mm on the left and average height was 2.63 ± 0.03 mm on the right and 2.65 ± 0.03 mm on the left. Using paired analysis, no significant differences existed between measurements of left versus right eyes. Ultrasonographic measurement of ONS size is easily and repeatably performed in clinically normal neonatal foals and expected values in the superior-inferior dimension may be smaller than previously reported. The established expected values may be applied to future studies investigating the difference in ONS size between normal foals and foals affected by neonatal encephalopathy.



Hounsfield Unit Measurements of the Navicular Bone of Quarter Horses on Standing Computed Tomography May Be A Useful Objective Measure in Horses With and Without Palmar Foot Pain

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Navicular syndrome is a common cause of palmar foot pain and lameness in Quarter Horses (QHs). Osseous remodeling of the navicular bone, specifically medullary sclerosis, can be one of the hallmark, albeit subjective, radiographic signs of navicular syndrome. The aims of this descriptive study were to measure Hounsfield Units (HU) of the navicular bone on standing computed tomography (CT) in QHs, and compare HU with CT navicular bone grade and presence of lameness localized to the palmar foot. Retrospective analysis of 38 forelimbs in 19 QHs (aged 4-18 years) was performed. Three HU measurements were taken within each navicular bone medullary cavity and averaged, and the navicular bone was graded on CT based on a previously described radiographic scale from 0-4 (0: excellent, 4: severe/bad). Fourteen limbs were clinically non-affected and 24 limbs were clinically affected based on lameness examination and perineural analgesia. Median HU of the navicular bone for clinically affected limbs (665) was 28% greater than median HU of non-affected limbs (521) [95% CI: 12-45%, $p < 0.001$]. A CT grade of 0 was associated with median HU of 446 (95% CI: 400-497), and doubled to 891 HU (95% CI: 786-1010) for a CT grade of 4. Quantitative assessment of the navicular bone using HU in QHs provides a non-invasive, objective measure of bony remodeling and radiodensity. Navicular bone medullary sclerosis, measured in HU, increased with worsening navicular bone grade, and was increased in clinically affected QHs with lameness localized to the palmar foot.



Identification of a Previously Unreported Site of Tarsal Subchondral Injury in the Thoroughbred Racehorse

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Increasing accessibility and advancements in standing tomographic imaging improve understanding of contributors to poor performance and lameness in Thoroughbred racehorses. This study characterizes a previously unreported site of dorsodistolateral calcaneal (DDLCL) subchondral bone injury in this population. We hypothesized that DDLCL lesions would be overrepresented in Thoroughbred racehorses and the lesion would be a primary cause of lameness. Retrospective analysis of 101 horses presented to a single equine referral center with tarsal lameness that underwent either standing or recumbent computed tomography (CT) was performed. Calcaneal lesion location and configuration were recorded. The likelihood of identifying DDLCL subchondral injury in horses of different breeds and disciplines was explored using logistic regression. One hundred and three tarsal CT studies of 101 horses were analyzed. DDLCL subchondral injury was identified in 6/101 (5.9%) of total cases and in 6/35 (17.1%) of racing Thoroughbreds. All lesions were found in racing Thoroughbreds, OR 29.30 (1.60-537.37 $p < 0.023$). DDLCL subchondral injury was the primary cause of lameness in 3/6 horses. Third tarsal bone fracture was the primary cause of lameness in the remaining 3/6 horses. The dorsodistolateral calcaneus is a previously unreported site of subchondral bone injury in the Thoroughbred racehorse. The lesion can be a primary source of lameness but is also found incidentally in horses with other clinically relevant osteochondral injuries. Further study is required to determine the true prevalence, clinical relevance, and prognosis in Thoroughbred racehorses with this injury. Limitations include retrospective design and limited substantive follow-up information. DDLCL subchondral injury is likely underestimated.



Staging Canine Patients with Appendicular Osteosarcoma Utilizing Fluorine-18-Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Compared to Whole Body Computed Tomography

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Few studies have investigated the diagnostic performance of fluorine-18-fluorodeoxyglucose (18F-FDG) positron emission tomography/computed tomography (PET/CT) for staging patients with appendicular osteosarcoma. The purpose of this retrospective study was to evaluate the efficacy of 18F-FDG-PET/CT compared to whole-body CT (WBCT) for staging canine patients with appendicular osteosarcoma. The 18F-FDG-PET/CT imaging studies of 66 client-owned dogs with a confirmed diagnosis of appendicular osteosarcoma were anonymized and separated into two detached studies (one with whole body pre- and post-contrast CT images and the other with the whole body pre- and post-contrast CT images with the associated 18F-FDG-PET overlay). Image assessment was performed retrospectively by five board-certified veterinary radiologists. The evaluating radiologists were instructed to assign a categorical score (1-4) to each pre-designated anatomic region based on a devised lesional scoring system. A score of 1 was normal, 2 abnormal but not neoplastic, 3 abnormal and concerning for neoplasia, and 4 abnormal, most likely neoplastic. Overall, the likelihood of detection of '3 or 4' was found to be significantly higher with 18F-FDG PET/CT when compared to WBCT after adjusting for the effect of evaluator and the subject. Most significantly, 13 osseous lesions concerning for metastasis (scored 3-4) were identified in 10/66 dogs by at least one reviewer on 18F-FDG PET/CT, none of these lesions were identified by either reviewer on WBCT. Additionally, 4 comorbid neoplastic lesions were identified with 18F-FDG PET/CT and not WBCT. The results of this study suggest that 18F-FDG PET/CT is useful for staging patients with appendicular osteosarcoma.



Simulated Dose Reduction Images in Canine Positron Emission Tomography to Enable Same Day Scanning and Release

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Positron emission tomography is an emerging clinical and research modality in veterinary medicine. Minimizing tracer dose administered is necessary to reduce hospitalization time prior to animals reaching the radiation safety threshold for release to owners. The aim of this study is to define the lowest possible radiotracer dosages without compromising image quality and enable same day discharge of dogs. ^{18}F -FDG PET CT images of dogs were retrospectively identified for reconstruction and analysis. Simulated PET images were reconstructed using decreased acquisition time to simulate dose reduction from 70-5%. Images were evaluated using subjective image quality assessment scores including noise, lesion conspicuity, sharpness/resolution, and artifact. A total of 12 studies were selected from 10 dogs with 6 scans performed using native 5.34 MBq/kg dose and 6 at 3.2 MBq/kg. Simulated images with minimal reduction were consistent in image quality with reduced image noise, improved sharpness, and little to no artifact. The median noise and sharpness scores of the 8-14 min reconstructions were not different compared to the 20 min scan ($P>0.05$), equivalent to 40% of the standard dose. Image quality was affected with further simulated decreasing radiotracer dose. Reduction in PET dosing or acquisition time is possible. A scan time as little as 8 minutes at 5.34 MBq/kg or a 40% dose 2.14 MBq/kg for 20 min may be considered equivalent. The dose reduction may be utilized to facilitate same day discharge as well as decrease patient and personnel radiation exposure and reduce time under anesthesia.



Positive Pressure Breath-Holding to Reduce Respiratory Motion During PET/CT Improves Image Quality, Reduces Organ Misalignment, and Yields Higher Standard Uptake Values in Healthy Dogs

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Positron emission tomography/computed tomography (PET/CT) is gaining importance in veterinary medicine, particularly in the field of oncology. Combined PET/CT offers many advantages; however, the identification and evaluation of lesions is hampered by respiratory motion artifact. The objective of this study was to compare PET/CT images using free-breathing (FB) and positive-pressure breath-holding (PPBH) techniques in order to evaluate the feasibility and value of PPBH PET/CT for respiration-induced artifact reduction.

Five healthy dogs were anesthetized and administered 2-([¹⁸F]fluoro)-2-deoxy-D-glucose (18FDG). Free-breathing PET/CT was performed from the head to the femurs in 8 bed positions (3 min/bed). Subsequently PPBH PET/CT centered over the diaphragm was performed in a single bed position (1.5 min/bed). PET image quality, the misalignment of organs between PET and CT images, and SUVs (standardized uptake values) of liver adjacent to diaphragm were compared between FB and PPBH.

Image quality and conspicuity of anatomical structures were superior in PPBH PET/CT images compared to FB PET/CT images. PPBH induced significantly less misalignment of liver and diaphragm in all planes and gallbladder in the transverse plane. The maximum SUV in all of the liver areas was significantly higher in PPBH. PPBH exhibited significantly higher mean SUV in liver adjacent to the left diaphragmatic dome and left lateral border and higher minimum SUV in the liver adjacent to the left diaphragmatic dome.

PPBH was demonstrated to be a feasible motion reduction technique which improved PET image quality, reduced organ misalignment on fused PET/CT images, and produced higher SUVs of liver compared to FB PET/CT.



Dynamic 18F-FDG Positron Emission Tomography Assessment of Metastatic and Control Iliosacral Lymph Nodes

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Dynamic positron emission tomography (PET) has been shown to differentiate malignant from benign lesions in human studies but has not been investigated in dogs. The goal of this study was to assess 18F-Fluorodeoxyglucose (18F-FDG) uptake in control and metastatic lymph nodes over time. Nine dogs with anal gland adenocarcinoma were prospectively enrolled in the study. Eight dogs from an orthopedic study were used as controls. A 45-minute dynamic acquisition was started at the time of injection of 6 MBq/kg of 18F-FDG and the data was reconstructed in nine 5-minute frames. The first 5 minutes were further divided in six 20-second and three 1-minute frames. Significant differences in maximal standardized uptake values (SUVmax) were observed between metastatic and control lymph nodes at each time point with the exception of the first 20 seconds. At the 40-45 minute frame, the SUVmax values were 4.9 (+/- 1.8) and 1.8 (+/- 0.6) for the metastatic and non-metastatic lymph nodes respectively. There were no significant differences over time for the normal lymph nodes ($P=0.87$). The metastatic lymph nodes showed an early SUVmax peak between 80 to 120 seconds and a significant difference was observed over time ($P=0.018$). When only the 5-minute frames were considered, there was no significant difference over time for the SUVmax of the metastatic lymph nodes ($P=0.75$). The early SUVmax peak should be further investigated for accuracy of metastatic detection. The absence of significant SUVmax differences between the 5-minute frames suggest that clinical PET protocols could be revised for earlier imaging.



In Vitro Evaluation of Visibility and Measurement Accuracy of Pure Composition Uroliths in Urinary Bladder Phantoms with Digital Radiography Reveals Radiopacity of Urate, Cystine, Struvite and Calcium Oxalate Uroliths

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Abdominal radiography is an important diagnostic to detect uroliths. Cystine and urate uroliths were historically characterized as radiolucent on survey radiographs. However, recent research and clinical observations indicate that some urate and cystine uroliths may be detected with digital radiography. The primary purpose of this prospective, in vitro study was to determine the sensitivity of digital radiography in detecting urinary uroliths of varying size and composition. Forty uroliths of pure composition (10 each of calcium oxalate, struvite, cystine, and urate), acquired from Minnesota Urolith Center and ranging from 1-10mm, were placed in the phantoms of three various sizes and radiographed. The radiographs, including a set of each urolith separately and a mixed set of uroliths, were evaluated by two blinded radiologists. Evaluation included presence or absence of urolith, number of uroliths and maximum diameter of the urolith(s). For all four types of stones and for both readers, the specificity and PPV was 100% with an associated very high sensitivity (93.3%-98.4%) and NPV (93.8%-98.4%). Calcium oxalate were the most accurately measured and struvite were the least accurately measured when compared to the gross measurement. Smaller uroliths were more accurately measured than larger uroliths. Uroliths placed in smaller bladder phantoms were more accurately measured than in larger bladder phantoms. Though accurate measurement of uroliths is complicated by and dependent on numerous variables, our results reveal that urate and cystine uroliths are visualized on digital radiography making them a relevant differential diagnosis when seen clinically.



Quantitative Analysis of Esophageal Transit Times in Normal Cats Using Contrast Enhanced Videofluoroscopy

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Esophagrams are a valuable tool when diagnosing dysphagic animals. They provide real time data that allows for more accurate evaluation than radiographs. There are no studies that provide quantitative data for esophageal transit times in healthy cats. The purpose of this study was to establish normal parameters for esophageal transit times in cats. 39 cats without a history of GI disease were enrolled. A physical exam and survey thoracic radiographs were performed to rule out esophageal dilation or aspiration pneumonia. No cats were disqualified based on physical exam or radiographic findings. 23 enrolled cats voluntarily ate while in the hospital. Cine loops that included the beginning of the swallow (closure of the cranial esophageal sphincter after the bolus passes through) at the pharyngeal region through the entrance of the bolus into the stomach (closure of the caudal esophageal sphincter after the bolus passes through) were included in the results. 59 soft food, 36 kibble, and 13 liquid boluses were captured. Soft food transit averaged 15.3 seconds (range 2.5 – 30.2, SD 6.1). Dry food transit averaged 16.3 seconds (range 7.9 – 38.3, SD 6.7). Liquid transit averaged 22.1 seconds (range 12.7 – 56.6, SD 11.3;). Esophageal transit times were found to be variable but relatively similar between bolus types. Sample size, varying bolus sizes, and patient compliance were the biggest limitations of this study. The results of this study will provide reference numbers for normal esophageal transit time in cats for veterinarians performing esophagrams in cats with suspect esophageal dysfunction.



Comparison of Error Rates Between 4 Artificial Intelligence and 13 Board-Certified Radiologists when Evaluating 15 Parameters of Canine Thoracic Radiographs

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Despite the growing use and active research on artificial intelligence, the veterinary scientific literature is sparse. Convolutional neural networks (CNN) can autonomously detect and recognize intricate patterns thanks to their training on a very large dataset of images. The purpose of this study was to compare the error rates of four CNNs to the error rate of fourteen radiologists using an independent gold standard when evaluating canine thoracic radiographs. This is a prospective study using a sample population of radiographs acquired at a tertiary referral institution to evaluate four different CNNs that share a common architecture. Fifty canine thoracic radiographs from a three-year period were selected at random, anonymized and exported. The selected studies were evaluated independently by three board-certified radiologists for the presence or absence of fifteen thoracic labels to create the gold standard through consensus. The labels included “cardiovascular”, “pulmonary”, “pleural”, “airway” and “other categories”. The error rates for each of the CNNs and of fourteen additional board-certified radiologists were calculated on those same studies. Overall, there was no statistical difference in the error rates among the four CNN for the majority of the labels. However, the CNN’s training method had an effect on the overall error rate and for three labels out of the fifteen. This study highlights the strengths and weaknesses of four CNN’s when compared to certified radiologists, using an independent ground truth. Each of the CNN’s performed differently and one was superior to the independent radiologists only in two instances.



Comparison of a Deep Learning Algorithm vs Human for VHS Measurements in Cats and Dogs Shows a High Degree of Agreement Amongst Readers

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Heart disease is a leading cause of death among cats and dogs. Vertebral Heart Score (VHS) is one tool to quantify radiographic cardiac enlargement and to predict the occurrence of congestive heart failure. The aim of this study was to decipher the performance of artificial intelligence in providing precise and transparent VHS measurements.

Ground truth consisted of the average of VHS measurements (axis vertebral length) performed by board-certified specialists. 30 canine and 30 feline thoracic lateral radiographs were annotated by the operators, using two different methods for the positioning of the cardiac short axis on dogs' radiographs: the original approach published by Buchanan and the modified approach proposed by the EPIC trial authors, and only the Buchanan's method for cats' radiographs.

Overall, the VHS calculated by the AI, radiologist and cardiologist had a high degree of agreement in both the canine and feline patients (ICC=0.998). In canine patients, when comparing the methods used to calculate the VHS by the specialists, there was also a high degree of agreement (ICC=0.999). When evaluating specifically the results of the AI VHS vs the two specialists' readings the agreement was excellent in both canine (ICC=0.998) and feline patients (ICC=0.998).

Performance of CNN trained to locate VHS reference points was demonstrated to be as accurate as manual calculation by specialists in both cats and dogs. Such computer-aided technique may consist of an important asset for veterinarians in general practice to limit interobserver variability and obtain more comparable VHS reading over time.



The Dog-o-gram, a Doggone Shame: Quantification of Scatter Radiation Produced in Appropriately Collimated versus Poorly Collimated Radiographs

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The hazards of radiation exposure are well documented. Despite this, poor compliance to safety standards persists in veterinary medicine.

The primary methods of protection from excess radiation are: reduce radiation field size with proper collimation, increase personnel distance from the primary beam, decrease exposure time, and wear protective equipment which absorbs scatter radiation. These concepts have been well-known for decades and yet, consistent application of these principles in daily practice is ignored due to perceived inconvenience, improper technique acquiring images, or lack of education about radiation safety. Multiple articles regarding radiation safety in veterinary medicine, spanning from the 1950's to the 2010's, all reveal similarly concerning themes. Namely, the recognition that radiation exposure is dangerous, that protective equipment is available, and that the risks of radiation exposure are known; yet there remains a lack of consistent application of safe practices and use of protective equipment.

Collimation is a frequently ignored safety practice in veterinary medicine. The purposes of this study are to compare the average absorbed doses of radiation received between radiographs performed with proper collimation, to those which mimic common ways radiation safety standards are disregarded. We will focus on the following unsafe practices: 1) poor collimation, 2) inclusion of the hand in the primary beam, and 3) use of a lead glove placed on top of the hand rather than properly worn. Furthermore, we will extrapolate risks to the restrainer by comparing these absorbed doses to effective doses which are known to lead to deleterious effects.



Assessment of Accuracy of an Artificial Intelligence Algorithm to Detect Pleural Effusion in Thoracic Radiographs in 62 Dogs

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The use of artificial intelligence (AI) algorithms in the field of diagnostic radiology is a developing area in veterinary medicine. A computer system to interpret thoracic radiographs as effectively as practicing radiologists may provide substantial benefit in many clinical settings. These range from providing timely image interpretation when no boarded radiologist is available and timely written documentation of imaging findings. Use of artificial intelligence imaging software in routine imaging cases such as thoracic metastatic checks could allow boarded radiologists to focus on more challenging cases that require complex medical decision making and face to face communication with other clinicians. Only a scant number of reports of validation of AI have been published. This has a sense of urgency as commercially available AI software is already being marketed to veterinary practitioners. The purpose of this study is to investigate the performance of an AI algorithm in the detection of pleural effusion in thoracic radiographs of dogs compared with practicing radiologists. In this combined retrospective and prospective, case-controlled study, 62 canine patients were recruited. A control group of 21 dogs with normal thoracic radiograph and a sample group of 41 dogs with confirmed pleural effusion were included. Thoracic radiographs were analyzed using a commercially available AI algorithm. The AI algorithm was able to determine the presence of pleural effusion with 88.7% accuracy ($p < 0.05$). The application of this technology in the diagnostic imaging of thoracic radiographs in veterinary medicine appears to be of a value and warrants further investigation and testing.



Radiographic Characteristics of Canine Subungual Keratoacanthoma

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Subungual keratoacanthoma (SKA) is a rare benign nail bed tumor in dogs. The radiographic characteristics of the SKA in dogs have not been reported. The purpose of this study is to describe the characteristic radiographic findings of canine SKA. The study was a multicenter, retrospective, and descriptive observational design. Twelve dogs (with 12 digits) with histologically confirmed canine SKA met the inclusion criteria. The radiographs of manus or pes were reviewed by two board-certified radiologists and one experienced radiologist. Six dogs showed osteolyses of both middle phalanx (P2) and distal phalanx (P3), and the other six dogs with osteolysis of only P3. Osteolysis of P2 was involving distal articular surface in all dogs with osteolysis of P2. Osteolysis of P3 was more severe in the ungual process than the ungual crest in all dogs. The margins of osteolyses of P2 and P3 were well-defined and smoothly margined in most dogs. Expansile changes of the P3 crest were observed in 83.3 % (10/12 dogs), and the nail of the affected digit was enlarged in 91.6% (11/12 dogs). The radiographic features of canine SKA include severe pressure resorption of the P3 ungual process, expansile pressure resorption of the P3 ungual crest, and nail enlargement and deformation with or without cracking. Canine SKA should be suspected with these radiographic features, and digital amputation and confirmatory diagnosis with histopathology are recommended.



Association Between Feline Hyperthyroidism and Thoracic Radiographic Evaluation of Cardiomegaly and Pulmonary Hyperinflation

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Hyperthyroidism frequently affects middle to older aged cats who can present with cardiorespiratory signs. The effects of hyperthyroidism on cardiac size and function have been previously documented. Anecdotally, pulmonary hyperinflation identified on thoracic radiographs may also be associated with hyperthyroidism; however, there is no literature to support this claim. The goal of this retrospective case control study was to determine any association between hyperthyroidism, pulmonary hyperinflation, and cardiomegaly with the following hypotheses: (1) hyperthyroid cats would not have evidence of radiographic pulmonary hyperinflation more frequently than control cats and (2) hyperthyroid cats were more likely to have evidence of radiographic cardiomegaly than control cats. Thoracic radiographs of 52 hyperthyroid cats and 51 non-hyperthyroid cats were evaluated for subjective and objective measurements of pulmonary hyperinflation and cardiomegaly. There were no statistically significant differences between hyperthyroid and non-hyperthyroid cats for any variable indicative of pulmonary hyperinflation. The presence of a valentine-shaped heart was significantly higher ($P = 0.0019$) in hyperthyroid cats than non-hyperthyroid cats. Among hyperthyroid cats, a more severe total T4 elevation was significantly associated with a greater likelihood of a valentine-shaped heart ($P = 0.0017$) and larger vertebral heart score ($P = 0.04$). This study suggests that hyperthyroidism in cats is associated with cardiomegaly, specifically a valentine-shaped heart, but is not associated with radiographic pulmonary hyperinflation.



Equine Radiation Therapy: Analysis of the Positioning Precision for Intensity Modulated Techniques

Presenting Author: **Sophie Burde**, Veterinarian - Equinox Healthcare GmbH, Linsengericht, Germany

Co-Author: **Alena Soukup**, Dr. med. vet., DipACVR (RO) - Equinox Healthcare GmbH, Linsengericht, Germany

Co-Author: **Jan Kuntz**, Dr. sc. hum. - Equinox Healthcare GmbH, Linsengericht, Germany & German Cancer Research Center, Heidelberg, Germany

Due to the shift in owner-horse-relationship in the last years, horses are getting older and the prevalence of neoplasms is increasing. Despite of this fact external beam radiation therapy still is rarely applied in equine medicine, not lastly because of demanding animal handling and positioning. Nevertheless, especially head and neck tumors in horses require high positioning accuracy to perform highly modulated techniques such as volumetric modulated arc therapy (VMAT). The aim of this study is to determine the initial positioning accuracy in equine patients that underwent VMAT radiation therapy on a daily basis. Positioning accuracy of eleven patients treated with VMAT for tumors in the head was analyzed based on the CBCT scans acquired during the 3D-3D matching with a medical linear accelerator equipped with an on-board imager. In all equines, general anesthesia was induced. For every single fraction, a current CBCT was performed and compared to the planning CT at the OBI workstation. The shift vectors as well as the rotation between initial CT and daily positioning CT were analyzed to evaluate the reproducibility of our dual couch positioning system. Sufficient patient positioning succeeded in all equine patients with a planned VMAT treatment protocol. 3D-3D matching resulted in an averaged shift vector length of $11 \text{ mm} \pm 8 \text{ mm}$. The mean absolute rotation required for the positioning was $1.1^\circ \pm 1.5^\circ$. In conclusion, accurate positioning in equine radiation therapy is demanding but possible and doesn't prevent the application of highly modulated techniques such as VMAT.



Do We Need Size Correction for Assessing Tumor Volume as a Prognostic Parameter in Sinonasal Tumors in Dogs?

Presenting Author: **Felicita Czichon**, vet.med. - Department of Radiation Oncology, Department for Small Animals, Vetsuisse-Faculty, University of Zurich

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Dog breed and nasal cavity sizes vary widely. Absolute gross tumor volume (GTV) showed prognostic significance in dogs with sinonasal tumors treated with radiotherapy in some but not all studies. Relative GTV might be better suited for different dog sizes. Hence, we hypothesized that relative rather than absolute GTV influences time to progression (TTP).

We retrospectively investigated possible correlations of relative GTV as ratio with either nasal cavity size, weight or body surface area (BSA) in 49 dogs with sinonasal tumors. Absolute and relative GTV, response and outcome after treatment were assessed in 34 dogs with available follow-up computed tomographies after definitive-intent radiotherapy with either a regular (10x4.2Gy) or a simultaneously-integrated-boost protocol (higher GTV dose).

In contrast to absolute GTV (weight: $r=0.59$, BSA: $r=0.58$, nasal cavity: $r=0.55$), the correlation between relative GTV with a dog's weight ($r=0.00-0.2$), BSA ($r=0.00-0.22$) and nasal cavity ($r=-0.03-0.26$) was not significant. Hence, on average, smaller dogs had absolutely, but not relatively smaller tumors. Univariate analysis stratified by treatment protocol showed no evidence that absolute GTV or relative GTV with weight or BSA were associated with TTP. However, relative GTV with nasal cavity had a hazard ratio of 10.97 (95%CI:1.25-96.06). Dogs treated with the boost or the regular protocol had a median best response (reduction) of -22.52% and -2.27%, respectively.

In conclusion, our results suggest that relative GTV with nasal cavity but not absolute GTV at the time of treatment could be predictive for TTP.



Adding Lomustine to Temozolomide-Irradiation Reduces Clonogenic Cell Survival in Canine Glioma Cell Lines

Presenting Author: **Daniel Fuchs**, vet.-med. - Dept. of Radiation Oncology, Dept. for Small Animals, Vetsuisse-Faculty, University of Zurich, Zurich, Switzerland; Center for Clinical Studies at the Vetsuisse Faculty of the University of Zurich, Zurich, Switzerland

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A subset of dog patients with high-grade glioma might profit from combined chemo-radiation. The alkylating agents temozolomide and lomustine penetrate the blood-brain-barrier and doses for dogs are established. Whether such combinations are clinically advantageous, remains to be explored together with tumor-specific markers. We evaluated the added benefit of lomustine to temozolomide-irradiation in control as well as chemo-resistant canine glioma cell lines.

We investigated the effect of single- and double-drug combination +/- radiotherapy in canine glioma J3T-BG cells by using clonogenic survival and proliferation assay. Cells were long-term drug exposed to generate resistant variants. Both, temozolomide alone (200µM) as well as lomustine alone (5µM) reduced the irradiated survival fraction to 41% and 28%, respectively, compared to irradiated cells (4Gy) alone. The double-drug combination reduced the irradiated survival fraction more potently to 13.2%.

The efficacy of double-drug treatment was lower in the lomustine drug-resistant cell line in comparison to control cells ($p=0.0396$, 8Gy). On the other hand, temozolomide drug resistance did not impair double-drug treatment efficacy in comparison to control cells. The double-drug combined with irradiation (4Gy) was superior to temozolomide-irradiation alone in the control cell line ($p=0.0058$), and in the lomustine ($p=0.0063$) as well as temozolomide ($p=0.0012$) drug-resistant cell lines.

Our findings indicate an advantage in tumor control when lomustine is added to temozolomide-irradiation in canine glioma cell lines. Clinically, 26%–40% of glial tumors recur or progress after single modality radiation therapy. Hence, such a combination could serve as a next treatment option, even in case of resistance to primary therapy.



Stereotactic Radiation Therapy (SRT) versus Full-Course, Fractionated Radiation Therapy (FRT) for Canine Pituitary Masses: A Comparison of Protocols

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Co-Author: **Leanne Magestro**, DVM - Michigan State University

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Radiation therapy (RT) is an important treatment option for canine pituitary masses (PM). Published data suggest that full-course fractionated RT (FRT) is associated with longer survival than stereotactic radiosurgery and RT (SRS/SRT). However, an effective and succinct RT protocol is desirable. In May 2016, we began offering 5-fraction SRT (total dose 30 or 35 Gy) as an alternative to FRT (total dose 50-54 Gy in 19-20 daily fractions).

A retrospective data analysis was performed to compare outcomes of FRT vs. SRT in dogs treated between May 2016-May 2021. The influence of potential prognostic/predictive factors was also assessed, including: pituitary:brain height ($<$ or \geq median), pituitary:brain volume ($<$ or \geq median), sex, age, and endocrine status (functional (F) versus nonfunctional (NF) PM).

Twenty-seven dogs with PM were included (17 F, 9 NF, 1 unknown). All patients completed protocols as scheduled (SRT=17, FRT=10), and no known acute toxicities were noted. Sixteen patients are known to be deceased. During the first 250 days after RT, 3/17 dogs treated with SRT (2 F, 1 NF) and 2/10 dogs treated with FRT (both F) died due to progressive neurologic signs. The overall median survival time was 820 days (95% CI, 639-1000 days). Survival time was not associated with treatment type, or any other factor assessed herein.

Our early experience indicates that 5-fraction SRT results in similar survival vs. FRT.

Further investigation into prognostic factors that could predict early death is warranted since approximately 25% of dogs died within 250 days of starting RT.



Intensity-Modulated Radiation Therapy and Chemotherapy for the Treatment of Canine Right Atrial Masses: A Retrospective Case Series of 7 Dogs

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Co-Author: **Michelle Turek**, DVM, DACVIM (Oncology), DACVR (RO) -
University of Wisconsin Veterinary Care

Co-Author: **David Vail**, DVM, MS, DACVIM (Oncology) - University of Wisconsin Veterinary Care

Most primary cardiac tumors in dogs are located in the right atrium/atrial appendage, with hemangiosarcoma (HSA) being the most common. Cardiac HSA is difficult to manage, and generally carries a poor prognosis due to recurrent pericardial effusions and high metastatic potential. Only modest outcomes have been achieved through treatment with chemotherapy and/or surgery, thus, investigation into alternative therapies is warranted. We conducted a retrospective analysis, including 7 dogs with right atrial tumors (4 confirmed hemangiosarcoma) treated with five daily fractions of 4Gy and concurrent chemotherapy. The aim was to describe the feasibility, safety and patient outcome following this multimodal treatment protocol. Seven dogs completed the radiation protocol and 6/7 dogs were treated concurrently with vinblastine and propranolol. Six dogs had imaging performed following treatment, with 5 achieving a partial response and 1 with stable disease. Pericardial effusions improved or resolved in all dogs. Three dogs were treated with further radiotherapy, and five with rescue chemotherapy, following progression. Four dogs died at 118, 258, 457 and 457 days (3 from metastasis, 1 from unrelated neoplasia). Two are alive at 621 days and 299 days and one was lost to follow-up. No acute radiation effects were noted; one patient developed 2nd degree AV block 268 days following radiation. Chemotherapy side effects were minimal. These findings suggest that a combination of hypofractionated radiation and chemotherapy is well tolerated and may provide clinical benefit in dogs with right atrial tumors.



Gross Target Volume (GTV) Contouring in Canine Extra-Axial Brain Tumors: Effects of Slice Thickness and Time Between Subsequent MRI Image Sets

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This multicentre retrospective study evaluated the effects of a short time delay and magnetic resonance imaging (MRI) slice thickness on GTV contouring in dogs. The hypothesis was that the GTV would increase in size on T1 weighted sequences with contrast between the diagnostic (MRI-1) and RT planning (MRI-2) MRIs. Inclusion required paired MRI acquisition within 3 months, with GTV contouring for each MRI registered to the RT planning CT. Forty-five dogs all received steroids between MRIs. Slice thickness were significantly different ($p < 0.001$) between MRI: MRI-1 had median 3.9mm (range: 0.8-6mm; only 2 dogs < 2 mm) and MRI-2 had median 0.9mm (range: 0.6-4.5 mm; only 2 dogs > 2 mm). The median time between both MRI was 22 days (range: 8-74 days). Overall, MRI-1 GTV was significantly different ($p < 0.0001$) but significantly correlated (Spearman's rho: 0.9464) with MRI-2 GTV. Compared to MRI-2 GTV: twenty-nine (64%) MRI-1 GTV were larger, 5 were equal size and 12 were smaller. This unlikely tumor 'shrinkage' over a short time delay is likely due to the significant slice thickness difference between MRI acquisitions, an effect seen in human neuro-oncology imaging. This finding highlights the different requirements between diagnostic and RT treatment planning MRIs. Repeat testing of our hypothesis with more homogeneous slice thickness between the diagnostic MRI and the RT planning MRI is needed. For brain tumor target contouring, an MRI at the same time as the RT planning CT with < 2 mm slice thickness (ideally < 1 mm), 3D acquisition, isotropic voxel and broad bandwidth is ideal.



Proposed Expansion Margins for Gross Tumor Volume in Canine Pituitary Tumor When Only Computerized Tomography is Used for Radiation Target Contouring

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Co-Author: **Neil I. Christensen**, BVSc, DACVR (Radiation Oncology) - Small Animal Specialist Hospital, Sydney, North Ryde, Australia

Radiation therapy (RT) is the optimal treatment for canine pituitary macroadenoma (PIT). A recent paper suggested that MRI-T1W with contrast (T1W+c) was the best sequence to contour gross tumor volume (GTV) on PIT but was deemed unnecessary in at least 50% of dogs. Another study of canine meningiomas suggest a 3mm expansion on the CT-GTV to cover the MRI-GTV. The aim of this study is to define the expansion margins required when only CT is available for GTV contouring in canine pituitary tumor. RT records were searched for imaging-diagnosed canine pituitary tumor. Minimum imaging requirements: CT with contrast (CT+c) and MRI-T1W+c. Target contouring after rigid registration was performed by three radiation oncologists (RO) using Eclipse Planning System. GTV was contoured on CT+c (CT-GTV) and T1W+c (MRI-GTV) datasets. For each patient, an isotropic expansion volume in 3D was created in 1mm increment from the CT-GTV volume to cover the MRI-GTV volume. Recommended expansion was determined. Twenty pituitary tumors representing 63 distinct paired (same dogs, same RO) CT-GTV and MRI-GTV contours were included. In 42/60 (70%) contours, the 3mm expansion on the CT-GTV was sufficient to cover the MRI-GTV while a 5mm expansion covered 57/60 (95%). The use of MRI in conjunction with CT for RT planning is ideal. However, in the absence of an MRI the expansion required to the CT-GTV would be 5mm within the brain.



Theoretical Evaluation of the Benefits of a Six Degree of Freedom Patient Couch

Presenting Author: **Jan Kuntz**, Dr. sc. hum. - Equinox Healthcare GmbH, Linsengericht, Germany and German Cancer Research Center, Heidelberg, Germany

Co-Author: **Anika Mische**, Veterinarian - Clinic of Small Animal Medicine, Centre for Clinical Veterinary Medicine, LMU Munich, Munich, Germany

Co-Author: **Alena Soukup**, Dr. med. vet., DipACVR (RO) - Equinox Healthcare GmbH, Linsengericht, Germany

Positioning accuracy is one of the key points for modern radiation therapy. Although a six degrees of freedom (DOF) table was introduced, a 4DOF couch is still standard in veterinary medicine. However, the fifth degree (roll) is automatically available as gantry rotation. The aim of this study is to quantify the impact 5DOF and 6DOF systems over a 4DOF system.

Image data was acquired of six dog cadavers with implanted markers in pelvis and vertebra. The cadavers were repeatedly positioned in a vacuum cushion as if for a radiation therapy treatment. Based on the measured positions of the implanted markers, optimal transformation matrices presuming a 4-, 5-, and 6DOF system were automatically calculated using the Nelder-Mead-method minimizing the sum of squared differences.

The analyzed scans showed small non-rigid deformations with SSD6DOF varying between 0.04 cm² and 0.33 cm². Positioning accuracy significantly ($p < 0.01$) improved from a mean SSD4DOF of 0.85 cm² to a mean SSD5DOF of 0.13 cm². The additional improvement of the sixth DOF resulted in a SSD6DOF of 0.12 cm² ($p < 0.01$). Mean improvement was 42% for the 5DOF simulation and 24% for the 6DOF simulation, respectively.

The results depict a high impact of 5th DOF while the impact of 6th DOF is much smaller. The reason may be a more likely rotation around the longitudinal compared to the transversal axis.

In conclusion, utilizing a fifth DOF can greatly improve positioning accuracy in patients with pelvic or abdominal tumors.



Modified Nasal Exenteration Surgery After Definitive-Intent Intensity Modulated Radiation Therapy for Dogs with Nasal Tumor: A Series of 7 Cases (2011-2021)

Presenting Author: Marilia Takada, DVM, MS, PhD - University of Wisconsin

Co-Author: Jonathan McAnulty, DVM, MS, PhD, - University of Wisconsin

Co-Author: Adam Townsend, DVM - University of Wisconsin

Co-Author: Michelle Turek, DVM, DACVIM, DACVR - University of Wisconsin

Dogs with nasal tumors treated with non-conformal definitive radiotherapy (RT), followed by nasal exenteration in which all intranasal tissue are removed, can experience prolonged survival according to Adams et al. However, complete nasal exenteration is often associated with clinically significant complications including chronic rhinitis and osteomyelitis/osteonecrosis. Our goal was to retrospectively evaluate the outcome of dogs with nasal tumors treated with a modified surgical technique that preserves intranasal periosteal lining distant from the tumor, after definitive-intent intensity-modulated RT (IMRT). Seven cases were reviewed. All dogs underwent daily IMRT using 10X4.2Gy. Tumors included carcinoma (n=4), chondrosarcoma (n=2), and ganglioneuroma (n=1). Tumor stage at RT included stages II (n=1), III (n=5), and IV (n=1), with no evidence of metastasis. Surgery was performed a median of 226 days (range 154-392) after RT, upon progressive local disease (n=5) or partial response (n=2) on CT. Two dogs required blood transfusions peri/postoperatively. All dogs had persistent symptoms of rhinitis after nasal exenteration, responsive to supportive therapy. None had evidence of osteomyelitis/ osteonecrosis. Disease progression was confirmed by CT in 6 dogs at a median of 175 days (range 63-819) after surgery. Kaplan-Meier median overall survival estimate was 735 days (range 359-1263) with two dogs still alive at 742 and 784 days. Our findings suggest that a more conservative nasal exenteration technique along with increased conformality from IMRT may help prevent chronic nasal complications, while still providing a survival benefit in some dogs with nasal tumors. Future studies are needed to confirm the benefits of this approach.



Efficacy of Stereotactic Radiation Therapy for the Treatment of Canine Glioma

Presenting Author: Erin Trageser, DVM - Colorado State University

Co-Author: Keara Boss, DVM, PhD, DACVR-RO - Colorado State University

Co-Author: Susan LaRue, DVM, PhD, DACVS, DACVR-RO - Colorado State University

Co-Author: Tiffany Martin, DVM, DACVR-RO - Colorado State University

Co-Author: Del Leary, PhD - Colorado State University

Radiation therapy provides local treatment for dogs with glioma. Earlier publications using non-modulated radiation therapy suggested a poor prognosis for dogs with glioma, with a median survival time around 4-6 months; the newer literature utilizing SRT demonstrates that the prognosis for canine gliomas may be more promising, with survival times closer to 12 months. A primary goal of our study is to compare a similarly sized cohort of dogs as recent studies to investigate efficacy of SRT for the treatment of canine glioma. A single institution, retrospective study was performed investigating the outcomes of dogs with glioma treated with SRT between 2010-2020. Twenty-three client owned dogs were included. The median age was 10 years (range: 4-14). Most dogs were female spayed (n=15, 65%), the remaining were male castrated (n=7, 30%), or male intact (n=1, 4%). Brachycephalic breeds were overrepresented, totaling 13 dogs (57%). Eight dogs (35%) had one or more malignancies in addition to gliomas. SRT protocols included 16 Gy single fraction (n=1, 4%), 18 Gy single fraction (n=1, 4%), 24 Gy in 3 daily fractions, (n=20, 91%), or 27 Gy in 4 daily fractions (n=1, 4%). Median survival time (MST) was 349 days (range: 3-1047). Median disease specific survival (MDSS) was 413 days (range: 22-868). Acute (13%) and late (13%) treatment-associated events were suspected in the dogs. Twenty-one dogs (91%) had improvement of their presenting clinical signs following SRT. The outcome results from our retrospective study support recent findings indicating SRT can provide durable tumor control for canine glioma.



Initial Treatment Experience and Target Motion Characterization with Real-Time Predictive Motion Tracking Platform Synchrony During Helical Radiation Delivery

Presenting Author: **Nathaniel Van Asselt**, DVM DACVR (RO) - UW Madison Veterinary School

Co-Author: **Kevin Kvasnika**, MS - UW Madison Veterinary School

Co-Author: **William Ferris**, MS - University of Wisconsin Medical Physics

Improvement in image-guided radiation therapy (IGRT) and intensity-modulated radiation therapy (IMRT) has improved the accuracy of radiation delivery to stationary targets within veterinary patients. Intrafraction movement continues to present a challenge, especially during the delivery of radiation techniques that employ tight margins and a rapid dose gradient, such as stereotactic body radiotherapy (SBRT). This study presents initial treatment data obtained with a real-time predictive motion tracking platform called Synchrony. Implementation of Synchrony makes it possible for planning tumor volume (PTV) margin reduction and it also enables characterization of target movement during the respiratory cycle. This study's objective is to provide initial treatment experience and target motion characterization of tumors in dogs. Dogs deemed suitable candidates for Synchrony assisted radiation delivery had tumors located within the chest or abdomen that were predicted to have an intrafraction motion greater than 2 millimeters. Included dogs were prescribed 3 fractions of 8 Gy to 95% of the PTV. Three targets have been successfully treated in two patients. Initial data shows that tumor movement is non-isotropic with large deviations, sometimes exceeding 1 cm, occurring frequently. The potential difference generally stayed around 2-3 mm and was supportive of a PTV expansion of 3 mm. Synchrony enables tight PTV margins while implementing SBRT for lung and liver tumors and it also enables the first detailed characterization of lung and liver tumor movement throughout the respiratory cycle in dogs.



Assessment of Optimal Positioning for Respiratory Gating in Dogs Receiving Radiation Therapy and Proposed Expansion Margins for Tumors and Organs at Risk within the Thorax and Abdomen

Presenting Author: Jennifer Yee, DVM - University of Illinois

Co-Author: Kim Selting, DVM, MS, DACVIM (Oncology), DACVR (Radiation Oncology) - University of Illinois

Co-Author: Audrey Billhymer, DVM, DACVR - University of Illinois

Physiologic movement such as respiratory motion creates radiation delivery inaccuracies which can alter the total radiation dose to the target and increase the radiation exposure to organs-at-risk (OAR). Respiratory gating can improve precision and accuracy of radiation treatments. The Varian™ Respiratory Gating for SCanners (RGSC®) camera can detect physiologic motion of ≥ 4 mm. Canine patients were prospectively recruited for respiratory gating. Two dogs (lung tumor and vertebral sarcoma) were treated with gated stereotactic body radiation therapy. Seven dogs were scanned through the thorax (n=6) and abdomen (n=4). Placement of the sensor on the abdomen in most cases provided the most reliable tracing (sternal vs other = 4 vs 6-8 mm amplitude of waveform in respiratory tracing). OAR and GTV motion, and the ability to trigger gating, were more dependent on sensor placement and patient position than on body weight, though dogs smaller than 8 kg did not generate a reliable tracing. Movement of organs (mostly in the craniocaudal direction) in the cranial thorax or caudal abdomen was less (0-3 mm) than movement of organs that were closer to the diaphragm (1-2 cm). Lungs increased in volume by 12-21% with inspiration and shifted 1-2 cm caudally but 0-3 mm cranially. GTV moved 2-4 mm and volume changed by 0-80% with respiration. The lung mass regressed after treatment and the vertebral sarcoma stabilized. Respiratory gating can improve accuracy of margin expansion and lead to precise and effective radiation therapy, allowing the possibility of dose escalation without increased risk to OARs.

SPEAKERS

Michele Gaspar, DVM, MA, LCPC

Veterinary Information Network/VIN Foundation
Vets4Vets



Speaker provided bio:

Michele Gaspar is a veterinarian and a psychotherapist. She is a 1994 graduate of the School of Veterinary Medicine at the University of Wisconsin-Madison and is a Diplomate of the American Board of Veterinary Practitioners (Feline Specialty). Michele received her MA in pastoral counseling from Loyola University/Chicago in 2012. She is a consultant in Feline Internal Medicine for the Veterinary Information Network (VIN) and a member of the VIN Foundation's Vets4Vets Program, in which she offers one-on-one support for veterinarians and veterinary students with professional or personal challenges. Michele received a certificate in Adult Psychoanalytic Psychotherapy from the Chicago Institute for Psychoanalysis in 2016 and is a fifth-year candidate at the Chicago Center for Psychoanalysis. She has a private psychoanalytic psychotherapy practice in Chicago.

Getting Past The Shame Of Our Mistakes

We all make mistakes. Some errors are of little consequence; others are matters of life and death. Health care providers, including veterinarians, have a tendency to catastrophize all mistakes and so often spiral into anxiety, self-doubt and despair. In this talk, we will examine ways in which mistakes occur (so that they can be avoided), how the perfectionism that is so common in health care providers can make us mistake-prone, consider the role of shame in dealing (and not dealing) with our errors and how to work with ourselves and our colleagues when mistakes are made.

Objectives:

After attending this talk, participants will :

- Understand common scenarios and individual mindsets that make mistakes more likely to occur.
- Understand the role of perfectionism in formulating personalities that make mistakes intolerable.
- Develop resources to allow ourselves and colleagues to deal with the shame of our mistakes and help us avoid catastrophizing and despair.

SPEAKERS

Makenzie Peterson, MSc

American Association of Veterinary Medical Colleges
Director for Wellbeing



Speaker provided bio:

As a member of their senior leadership team, Makenzie Peterson serves as the Director for Wellbeing at the Association of American Veterinary Medical Colleges (AAVMC). She works to advance AAVMC's strategic goal of fostering a culture of wellbeing throughout academic veterinary medicine by promoting preventative systems-based initiatives. Makenzie provides subject-matter expertise on the science and application of evidence-based wellbeing practices, as well as the development and implementation of strategic organizational changes to improve the overall wellbeing of academic communities. She speaks on a variety of wellbeing-related topics, and also currently serves on the Board of Directors for the Women's Veterinary Leadership Development Initiative. Born and raised in Alaska, Makenzie graduated from the University of Utah with a master's degree in Health Promotion & Health Education and will complete her Doctorate of Social Work from the University of Southern California in 2022.

Clinician Wellbeing Initiative: Intern & Resident Wellbeing

This presentation will provide participants with the current research results related to first-ever national intern and resident wellbeing study in the veterinary profession, identify potential implementation points, and provide evidence-based approaches and recommendations for consideration. Environmental factors that impact wellbeing integration in veterinary medicine will also be discussed.

Objectives:

- Understand the current research results related to intern and resident wellbeing study.
- Identify potential intervention points and environmental factors to consider.
- Provide evidence-based approaches and recommendations for consideration.

The Art of Saying No

Many of us struggle with setting professional boundaries and limits to what we can accomplish. From psychological barriers to lacking technical skills, there are many reasons why it can be difficult to say 'no' when there feels like a lot of pressure to say 'yes.' This presentation will walk participants through how to identify their personal barriers to saying 'no,' the pinch points that they may need to overcome, and phrases that they can use to help them create better boundaries and a more balanced workload that allows them to say 'yes' to life outside of work.

Objectives:

- Identify their personal barriers to saying 'no.'
- Examine the pinch points that they may need to overcome.
- Learn phrases that they can use to help them create better boundaries and a more balanced workload.

SPEAKERS

Stephanie Johnson, MSW

Louisiana State University School of Veterinary Medicine
Associate Professor



Speaker provided bio:

Stephanie W. Johnson is an Associate Professor in the Department of Veterinary Clinical Science and maintains an appointment in the Office of Veterinary Education and Academic Affairs as a counselor at the Louisiana State University School of Veterinary Medicine. She received her Master of Social Work in 1992 and became a Licensed Clinical Social Worker in 1994. She has been employed by the in the Office of Veterinary Education and Academic Affairs since 1990 where she provides counseling and referral services for veterinary students, staff and faculty.

For the last 29 years, Stephanie has specialized in the area of the Human Animal Bond and Grief, both counseling clients and lecturing to veterinarians, students and the public. She teaches grief and loss, communication skills, and personal wellbeing and facilitates group learning throughout the four years of the veterinary curriculum. She also supervises Master of Social Work interns and Graduate Social Workers working toward licensure. Stephanie is also an active member of the Academic Veterinary Wellbeing Professionals within the AAVMC.

Mental Health Awareness, Suicide Risk and Prevention: How Can We Help?

The most common mental health disorders in the workplace and what they “look like” will be presented along with information surrounding including suicide myths, risks, warning signs and how we can help.

Objectives:

- To identify most common mental health disorders
- To create and awareness of suicide risk
- To identify how we can help as a profession, employer, individual

Wellbeing: Identifying and Responding to Individual and Workplace Needs

Wellbeing assessment both individually and within the workplace will be considered. The dimensions of wellbeing along with ideas for setting expectations that can change the workplace culture will be presented. Individual self-care is vital to our own success both personal and professionally. Identification of stressors, our response to them as well as management of these and coping strategies/tools will be discussed and shared.

Objectives:

- To create self awareness of our stressors and our responses and our priorities
- To provide stress management and personal wellbeing tools
- To define wellbeing and it's importance both individually and within the workplace
- To explore the 9 dimensions of wellbeing
- To identify potential workplace wellbeing initiatives

SPEAKERS

Heidi Mast, CVT, VTS (DI)

Treasure Valley Veterinary Hospital



Speaker provided bio:

Heidi Mast is a certified veterinary technician in the State of Idaho with a technician specialty in diagnostic imaging. She has been working in veterinary medicine for over 10 years and can't imagine doing anything else. Currently she is working at a general practice and worked at an ER/Specialty hospital for over 8 years. Heidi loves doing ultrasounds and helping find the answers with all different types of imaging for animals of all species and sizes. She was born and raised in Idaho and is now raising her two kids with her husband. They currently have what they call "The Mast Family Farm" – chickens, dogs, cats, horses, and goats. Golden Retrievers are Heidi's favorite animal, and she plans on always having at least one in her family at all times!

Ultrasound and the Amazing Technician!

How to assist your doctor in getting the most out of their ultrasound.

Objectives:

- Technicians will learn new ultrasound skills to help with the imaging process and be able to help identify things to assist with diagnosing using ultrasound.
- Technicians should be able to help their doctor get the best images possible while helping maintain the patient's safety and the staff's safety.
- Technicians should be able to help show what they learned and pass along the information to other technicians and possibly even doctors.

SPEAKERS

Elizabeth Huyhn, DVM, MS, DACVR

VCA West Coast Specialty and Emergency Animal Hospital
ANTECH Imaging Services



Speaker provided bio:

Dr. Elizabeth Huynh (pronounced “H-win”) is a radiologist at a private specialty practice in Southern California and ANTECH Imaging Services. She enjoys teaching radiology, specifically ultrasonography.

Basic Emergency Abdominal Ultrasonography with an Emphasis on AFAST

This course will briefly cover the basics of abdominal anatomy in the dog and cat and basic abdominal ultrasonography in order to recognize obvious emergent abdominal ultrasonographic abnormalities.

Objectives:

- The attendee will gain knowledge of the basics of canine and feline abdominal anatomy.
- The attendee will gain knowledge of the basics of canine and feline abdominal ultrasonography on an emergency basis and be able to recognize obvious abdominal ultrasonographic abnormalities.

SPEAKERS

Dana Duncan, RVT, VTS(DI)

University of Georgia



Speaker provided bio:

Dana Duncan, graduated from Athens Technical College in 2010 with an associate degree as a Registered Veterinary Technician. I was hired by The University of Georgia shortly after graduation as a Radiology Technician. In my first 2 years, I was performing radiographies, fluoroscopy, and nuclear medicine on multiple species. I then started to learn computer tomography. CT became my favorite modality. I became lead CT tech in 2015 with the move to the newly built hospital where I mastered my CT skills. I felt like there was more to learn so I began to learn MRI in 2016. I am currently lead MRI tech and lead tech of the diagnostic imaging department. I completed my VTS-DI in 2020 and I am a current committee member of AVTDI.

Equine MRI: Through the Eyes of a Technician

This course will cover the steps taken to perform an Equine MRI. We will discuss MRI safety, patient preparation, patient positioning, and common scan sequences.

Objectives:

- You learn about MRI safety and who should be trained.
- You will see what it takes to perform an equine MRI.
- You will become familiar with common equine sequences.

SPEAKERS

Dorothy Sharp, BS, LVMT, VTS (DI)

University of Tennessee Veterinary Medical Center



Speaker provided bio:

Dorothy Sharp, B.S., LVMT, VTS (DI) graduated from Morehead State University's veterinary technology program in 1993 and has worked in the radiology department at the University of Tennessee Veterinary Medical Center since 1995 and is now the technician supervisor for the section. Dorothy is the only nuclear medicine technician at UT and her duties include acquiring all nuclear medicine studies, managing the radioiodine treatment program for hyperthyroid cats, as well as performing CT and general radiology imaging. Dorothy was a member of the Organizing Committee for the new Veterinary Technician Specialist in Diagnostic Imaging.

Nuclear Medicine Applications in Veterinary Medicine

This presentation covers the common applications of nuclear medicine in veterinary medicine. We will discuss bone, thyroid and portal scintigraphy including why the scans are requested, how they are performed and what the results mean.

Objectives:

- To know what types of nuclear scintigraphy are commonly used in veterinary medicine and why they are useful in providing diagnoses.
- To know what radioisotopes and radiopharmaceuticals are used for each type of scintigraphy discussed.
- To learn how each type of nuclear scintigraphy is performed and what regulations there are to adhere to.

SPEAKERS

Elodie Huguet, BS, DVM

Radiology Resident, University of Florida



Speaker provided bio:

Elodie is a French native and obtained her veterinary degree at the University of Georgia in 2015. She then pursued her radiology interest with a one-year internship at Virginia Equine Imaging in Middleburg, VA. Her experience was followed by a small animal rotating internship at BluePearl Veterinary Partners in Louisville, KY and a radiology internship at Veterinary Specialty Hospital of the Carolinas in NC. Elodie then accepted a radiology residency at Veterinary Specialty Hospital of the Carolinas in 2018 before joining the UF diagnostic imaging team in 2019 to complete her residency. Elodie is excited to now be working part-time as a clinical assistant professor of Diagnostic Imaging at the University of Florida and an IDEXX teleradiologist.

Emergency Computed Tomography of Veterinary Patients with Acute Trauma

This lecture will discuss the use of computed tomography (CT) for the evaluation of veterinary patients presenting with a history of acute trauma. Attendees will gain an understanding of the indication for CT and be guided through the image acquisition process. In addition, post-processing of images will be discussed to aid with the diagnosis of common traumatic injuries.

Objectives:

- Understand the use of CT for the evaluation of patients with acute trauma.
- Gain a general understanding of the image acquisition process.
- Understand the use of various post-processing methods for the evaluation of trauma.

SPEAKERS

Scarlette Donovan, MFA, RVT, VTS(Anesthesia, ECC, DI)

BluePearl Specialty + Emergency Pet Hospital



Speaker provided bio:

Scarlette Donovan, MFA, RVT, VTS (Anesthesia & Analgesia, Diagnostic Imaging, Emergency & Critical Care) is currently the Imaging Department Lead at BluePearl Specialty + Emergency Pet Hospital in Irvine, California. She attained her Registered Veterinary Technician certification in 2009, then earned her Veterinary Technician Specialist certifications in Emergency and Critical Care in 2013, Anesthesia and Analgesia in 2016, and Diagnostic Imaging in 2020. She also achieved her Masters of Fine Arts degree in Creative Writing and English from Southern New Hampshire University in 2021. She is a member of the Credentialing Committee for the Academy of Veterinary Emergency & Critical Care Technicians and Nurses, the Academy of Veterinary Technicians in Anesthesia and Analgesia, and the Academy of Veterinary Technicians in Diagnostic Imaging. She is also a mentor for all three organizations. Her interests include continuing education, ventilator patient care, anesthesia and analgesia, emergency and critical care medicine, and advanced diagnostic imaging.

Magnetic Resonance Imaging for Emergency Patients

This course provides an overview of magnetic resonance imaging in the emergent patient. It will discuss emergency patient presentations that might require magnetic resonance imaging, such as head trauma or acute spinal injury. This lecture will provide an in-depth look at how to best facilitate imaging in these patients, including recommended scan sequences, contrast administration, and suggested supplemental imaging. Nursing considerations for each patient presentation will also be briefly explored.

Objectives:

- Attendees will gain an understanding of which emergency patient presentations could benefit from magnetic resonance imaging.
- Attendees will gain an understanding of how to facilitate imaging in emergency patients.
- Attendees will gain an understanding of nursing considerations for emergency patients undergoing magnetic resonance imaging.

SPEAKERS

Ernest Rogers, DVM, PhD

Animal Forensic Investigations LLC



Speaker provided bio:

Ernest Rogers was initiated into forensic medicine in 1995 while working with the

Roanoke Co Police. Since then he was the forensic veterinarian for the NJSPCA until 2017.

He then started Animal Forensic Investigations as an investigation company. Duties include crime scene investigations, medical forensic analysis and expert witness testimony. Dr. Rogers is also a primary care general clinician.

The Use of Imaging in Forensic Medicine

A review of radiographic and imaging modalities of value in forensic medicine.

Objectives:

- Review of legal aspects related to a forensic investigation and court room testimony.

SPEAKERS

Latonia Craig, EdD

Purdue University, College of Veterinary Medicine
Assistant Dean for Inclusive Excellence



Speaker provided bio:

Dr. Latonia Craig leads the Office of Diversity, Equity, and Inclusion at Purdue University's College of Veterinary Medicine as the Assistant Dean for Inclusive Excellence. Dr. Craig has devoted most of her career to providing educational programs in social change and changing the conversation from diversity and inclusion to inclusive excellence. In her current role, she drives the development of DEI programming and initiatives, modeling innovative practices with a social justice lens and infuses a "sense of belonging" into the culture of veterinary medicine. Dr. Craig offers a unique blend of leadership, vision, and knowledge. Her proven track record for executing with excellence, driving innovative results, and championing progressive change, speaks for itself. With over a decade of experience teaching, training, and working in the diversity, equity, and inclusion space, Dr. Craig has been intentional about increasing diversity beyond the numbers by building meaningful relationships across the globe and leaving an impressionable impact in the veterinary field. As a result of her leadership, Purdue's College of Veterinary Medicine received the 2020 HEED award for being a top college for diversity in the health professions and the 2019 Insight to Diversity magazine award for "Inspiring programs in Stem" award for "Vet Up!" a nationally recognized program that targets underrepresented populations interested in pursuing a career in veterinary medicine.

Dr. Craig has been featured on the cover of Today's Woman Magazine and as a Top Forty under 40 professional in Louisville Business First's Magazine. Latonia holds a Doctor of Education degree from Spalding University, a Masters degree in Urban Educational Leadership from the University of Cincinnati, a Masters in Pan-African Studies, and a Bachelor's degree in Political Science from the University of Louisville.

Positioning for Advocacy

This session will benefit all educators of any level of experience who desire to learn more about how they can position themselves for meaningful allyship in the DEI space. Positioning for advocacy is about understanding your own needs and intentionally committing the values of meeting the needs of our times, social justice as active participants of spaces.

Objectives:

- Participants will understand how their experiences and perspectives may affect their approach and effectiveness when engaging with others.
- Participants will gain tools they can use to improve their ability to identify and mitigate bias in their quest to foster allyship and show up as their best selves on a daily basis.

SPEAKERS

Scott Echols, DVM, DABVP

Medical Center for Birds, Oakley, CA- Associate Veterinarian
Echols Veterinary Services, Salt Lake City, UT- Owner
Parrish Creek Veterinary Clinic, Centerville, UT- Medical Director
Scarlet Imaging, Murrumbidgee, UT- Owner



Speaker provided bio:

Dr Scott Echols is a practicing and researching veterinarian living in Salt Lake City, UT. His veterinary focus is avian medicine and surgery. While his research focuses on developing advanced imaging technologies that apply to all animals, humans and other fields of research. Dr Echols is the recipient of the 2005 TJ Lafeber Avian Practitioner of the Year Award, Texas Veterinary Medical Association 2007 Non-Traditional Species Practitioner of the Year Award and Texas A&M 2018 Distinguished Alumnus Award. His artwork and collaborative research have been on the cover of numerous journals. Dr Echols founded numerous businesses and is a frequent author, lecturer, visiting professor and inventor.

New frontiers in veterinary imaging

The field of imaging is rapidly advancing creating exciting opportunities to better diagnose and treat diseases in animals. Newer CT equipment, contrast agents and protocols have vastly improved resolution of all tissue types including small vessels, nerves, tendons, ligaments and more! This presentation will focus on currently available CT based technology being used in clinical and research medicine.

Objectives:

- Discuss newer imaging technology.
- Explore new contrast agents.
- Discuss novel contrast agent protocols for clinical cases.
- See how these advances are being used in research.

SPEAKERS

Samantha Morello, DVM

University of Wisconsin-Madison

Clinical Associate Professor, Large Animal Surgery



Speaker provided bio:

Sam Morello DVM, DACVS-LA, graduated with her DVM from Cornell University in 2006, and completed a residency in large animal surgery at the University of Pennsylvania in 2010. She has been on faculty at the University of Wisconsin-Madison since that time with a clinical practice that encompasses all aspects of the surgical care of both equine and farm animal species. She has particular interests in traumatic and developmental orthopedic disease, upper airway dysfunction, and antimicrobial delivery systems for the treatment of musculoskeletal infection. Dr. Morello has served as a Faculty Liaison for the UW Global Health Field School to teach about and provide care for animals in rural Ecuador, and is a member of the AOVet North America faculty. In addition to musculoskeletal topics, Dr. Morello has conducted extensive research on professional, economic, and personal issues relevant to veterinary medicine. She has been an invited speaker nationally and internationally and at a variety of veterinary schools. Projects have focused on women and ethnic minorities in human and veterinary orthopedic surgery, professional sustainability and work-life integration for specialists and faculty, demographic shifts in residency selection, economic strain, and how gender stereotypes affect perceptions.

Animal Farm....in Grayscale: clinical perspectives on imaging farm animals

This talk will provide clinical perspectives on diseases of farm animal species typically encountered in large animal diagnostic imaging, including cattle, goats, pigs, and camelids. Through the use of case studies, we will consider how imaging is best utilized by clinicians on the floor in treating disease, making surgical decisions, or monitoring patient progress.

Objectives:

- To describe common clinical progressions for various traumatic and infectious musculoskeletal in ruminants.
- To consider a simplified alternate technique for using contrast imaging in goats with urinary obstructions.
- To review common presenting complaints for potbellied pigs, and imaging modalities and findings that may be useful for evaluation.
- To consider the technical equipment available to most young bovine veterinarians and to explore various modifications in approaches to teaching ultrasonography that might allow for more widespread application.

SPEAKERS

Theodore Hong, MD

Professor, Radiation Oncology, Harvard Medical School
Director, Gastrointestinal Service, Radiation Oncology,
Massachusetts General Hospital
Associate Clinical Director, Radiation Oncology,
Massachusetts General Hospital



Speaker provided bio:

Dr. Ted Hong is the Director of Gastrointestinal Radiation Oncology at Massachusetts General Hospital and Professor of Radiation Oncology at Harvard Medical School. Dr. Hong graduated from Harvard College, then University of Connecticut School of Medicine. He completed his training in Radiation Oncology at the University of Wisconsin. Dr. Hong has served as Chair of the NCI Rectal Anal Task Force and is the current Chair of the NRG Oncology Gastrointestinal Committee. He has been awarded the NCI Cancer Clinical Investigator Team Leadership Award, the MGPO Brian A. McGovern Award for Clinical Excellence, and the Harvard Radiation Oncology Program Educator of the Year twice. His research interests are multidisciplinary therapies for gastrointestinal cancers, proton therapy, biomarkers of response, and combinations with targeted and immunotherapies.

Abdominopelvic Radiation: Current Challenges and Future Opportunities

Discuss abdominopelvic radiation in humans and how it may pertain to Veterinary Medicine.

Objectives:

- To discuss considerations in abdominopelvic radiation in humans, as well as advanced radiation technologies, hypofractionation, and drug radiation combinations.

ACVR would like to thank Keynote Speaker Sponsor

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SPEAKERS

Alena Soukup, DVM

Equinox Healthcare GmbH
Radiation Oncologist



Speaker provided bio:

Dr. Alena Soukup is a veterinary radiation oncologist. She graduated from Veterinary and Pharmaceutical University in Brno, Czech Republic. After an internship in a private practice, she started radiation oncology residency at the Small Animal Clinic in Zurich, Switzerland and became a boarded radiation oncologist. She was head of the radiation oncology service at the Small Animal Clinic, Ludwig Maximilian University, Munich. Since 2020, she is with the Equinox Healthcare GmbH, a radiation oncology centre for horses and small animals.

External Beam Irradiation in Horses:

Not an Unbeatable Challenge

External beam radiation therapy in small animals is well established, whereas managing equine patients is still a challenge. This presentation gives an overview of daily routine and pitfalls of equine radiation therapy.

Objectives:

- Management and handling of equine patients in radiation therapy.
- Radiation protocols.
- Case examples.

SPEAKERS

Philippa Johnson, BVSc, DipECVDI

Cornell University

Assistant professor in veterinary diagnostic imaging



Speaker provided bio:

Philippa Johnson has been a faculty member at the Cornell college of veterinary medicine since 2015. Her research is focused on the use of MRI to broaden our understanding of neurological disease and improve diagnosis in animals.

Magnetic resonance imaging in the oncology patient.

This talk will provide an introduction to the use of MRI for diagnosing neoplasia in small animals.

Objectives:

- Introduce the basics around the physics and instrumentation involved with MRI.
- Provide information on different sequences and what signal alterations represent.
- Advises on how to optimize your MRIs to get the most information from the study.
- Provide information on what types of tumors look like on MRI and what information we can gain from these studies about the disease.
- Introduce some of the more advanced sequences and what they may be useful for.

SPEAKERS

Kate Alexander, DMV, MS

Centre vétérinaire DMV
Veterinary Radiologist



Speaker provided bio:

Dr. Kate Alexander received her veterinary degree from the Faculté de médecine vétérinaire of the University of Montreal. Following this, she completed an internship in equine medicine and surgery at the Ontario Veterinary College of the University of Guelph. In 2004, she completed a residency in veterinary diagnostic imaging at The Ohio State University, with board certification by the American College of Veterinary Radiology. In 2012, Dr. Alexander completed a Certificate in Veterinary Education from the Royal Veterinary College, University of London.

From 2004-2014, Dr. Alexander was Assistant and Associate Professor at the University of Montreal. In addition to a 50% clinical appointment in diagnostic imaging, she developed research interests in computed tomography, in particular in the evaluation of renal function and both large and companion animal musculoskeletal diseases. In 2014, Dr. Alexander joined the team of specialists at Centre DMV veterinary referral centers in Montreal, where she still works. Dr. Alexander served on the ACVR Examination committee from 2011-2015 and was ACVR President in 2020. She is currently Co-Chair of the ACVR/ECVDI AI Education and Development Committee.

Artificial Intelligence Panel

Introduction of ACVR/ECVDI Artificial Intelligence Committee to Members

A brief introduction to the mission and mandate of the ACVR/ECVDI AI Education and Development Committee

Objectives:

- To introduce the AI-EDC to ACVR membership.

SPEAKERS

Adrien-Maxence Hespel, DVM, MS, DACVR

University of Tennessee
Assistant Professor of Radiology



Speaker provided bio:

Used to be French.
Vetschool in Liege, Belgium
Internship Dublin Ireland
Residency + Master Auburn, Alabama. WAR EAGLE !
Faculty at UT since 2015. Interest in 3D printing, AI and interventional procedures

Artificial Intelligence Panel

AI 101

Introduction to AI for the veterinary radiologist

Objectives:

- Provide the veterinary radiologist with an overview of AI. Getting familiar with some terminology and processes.

SPEAKERS

Parminder Basran, PhD

Cornell University - College of Veterinary Medicine
Department of Clinical Sciences
Associate Research Professor & Medical Physicists



Speaker provided bio:

Parminder S. Basran PhD (2002- University of Calgary), MSc/BSc (1994, 1997-University of Alberta) is an Associate Research Professor at Cornell University – College of Veterinary Medicine, NY. He is a Medical Physicist combining expertise in physics and medicine to help and people and animals. He has published in a variety of fields, including safety and quality improvement in human oncology, machine learning methods from medical images and medical image processing, and is currently exploring the use of AI with medical images in the veterinary setting, including detecting diseases in cats and dairy cows, and preventing injuries in Thoroughbred racehorses.

Artificial Intelligence Panel

Radiation Oncology and AI: State of the Art and Implications for Veterinary Medicine

We will describe some applications of supervised and unsupervised machine learning in radiation oncology and discuss the challenges in adopting these methods in veterinary radiation oncology.

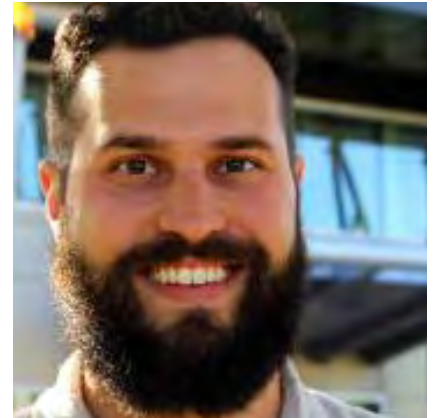
Objectives:

- Describe supervised and unsupervised machine learning.
- Provide examples of machine learning in radiation oncology.
- Describe challenges of introducing these methods in veterinary radiation oncology.

SPEAKERS

Ryan Appleby, DVM

Ontario Veterinary College, University of Guelph
Assistant Professor, Diagnostic Imaging



Speaker provided bio:

Ryan Appleby is a veterinary radiologist with an interest in the intersection between technology and medicine. He is a co-founder of the Veterinary AI lab at the University of Guelph, currently researching AI based methods to improve veterinary radiography and accelerate image labelling and dataset creation in veterinary medicine. Ryan is the guest Editor of the forthcoming special issue on Artificial Intelligence for Veterinary Radiology and Ultrasound.

Artificial Intelligence Panel

Evaluating AI products and upcoming VRU Supplemental on AI

As part of the panel on AI this section will discuss methods to evaluate AI products and give an overview of the supplemental on AI

Objectives:

As part of the panel on AI this section will discuss methods to evaluate AI products and give an overview of the supplemental on AI.

SPEAKERS

Seth Wallack, DVM

Vetology Innovations, LLC
Veterinary Imaging Center of San Diego, Inc.
DVM, DACVR, CEO



Speaker provided bio:

For his entire radiology career, his mission has been to support the veterinary radiology community. For the last 10 years, he has devoted his efforts to develop and deploy a set of technologies that will transform and streamline radiologist workflow while continuing radiologist financial success, in the profession that we all love.

With Vetology AI sitting in a leadership position to drive the next phase of veterinary teleradiology; and with veterinary radiologists in control, together we stand at the edge of improving 'the veterinary radiologist's life in the business as usual market'.

His mission going forward is to outline this path for radiologists looking to take their career to the next level in terms of financial, career and lifestyle growth by incorporating artificial intelligence.

Artificial Intelligence Panel

Financial implications of AI in veterinary radiology

How AI can positively impact veterinary radiologists.

Objectives:

To outline a model where radiologists can incorporate artificial intelligence into their existing professional work and improve efficiencies, improve outcomes and improve their financial success.

SPEAKERS

Eli Cohen, DVM

NC State College of Veterinary Medicine

Dragonfly Imaging, PLLC

Associate Clinical Professor of Diagnostic Imaging - NC State CVM

Owner/Radiologist - Dragonfly Imaging



Speaker provided bio:

Dr. Eli Cohen is an Associate Clinical Professor of Diagnostic Imaging at the NC State College of Veterinary Medicine. He is also co-owner and consulting radiologist of Dragonfly Imaging, a teleradiology company. Prior to his time at NC State he was a senior lecturer in diagnostic imaging at Massey University in New Zealand, and did his residency training at the University of Georgia. Dr. Cohen interprets all diagnostic imaging modalities, but has special interest in the imaging of exotic animal species and cross sectional imaging (CT/MRI). He is also particularly interested in how our human biology affects the way we learn and predisposes us to medical errors, and the methods we can employ to reduce those errors to better help our patients. He has also become increasingly interested in artificial intelligence, and how it can be ethically deployed in veterinary medicine.

Artificial Intelligence Panel

Ethical implications of AI in veterinary radiology

This talk will introduce an overview of ethical issues surrounding the development and implementation of artificial intelligence and machine learning in veterinary radiology and radiation oncology.

Objectives:

To provide an overview of ethical issues surrounding artificial intelligence and machine learning in veterinary radiology and radiation oncology.

SPEAKERS

CT MRI Ulrich Rassner

University of Utah Department of Radiology and Imaging Sciences
Professor of Radiology



Speaker provided bio:

Medical school: Eberhard-Karls University, Tuebingen, Germany
Internship: General Surgery, Washington Hospital Center, Washington, DC
Residency: Diagnostic Radiology, University of Utah, Salt Lake City
Fellowship: Neuroradiology, University of Utah, Salt Lake City
Medical Director of MRI
Focus on MRI-safety, MR-Safety and Physics teaching

Combating Metal Artifact and Fat Suppression Techniques in MRI

Causes and effects of susceptibility artifact from metal
Mitigation strategies for susceptibility artifact
Description of different fat suppression techniques and their advantages and drawbacks

Objectives:

- Recognition of the different effects of susceptibility from metal in MRI.
- Understanding parameter and sequence changes to mitigate those effects.
- Understanding the different techniques of fat suppression, their advantages and drawbacks.

SPEAKERS

Marina Ivančić, DVM

ZooRadOne
Founder



Speaker provided bio:

Dr. Marina Ivančić is a pioneer and leading expert in marine mammal and zoological diagnostic imaging. She was the first veterinary radiologist to work full-time at a zoo, also leading a radiology consulting service for zoos and aquaria during that time. Dr. Ivančić is the founder of ZooRadOne, providing teleradiology and on-site imaging support for facilities internationally. She loves to teach and loves to talk.

Hey Doc, can you scan this snake while you're here? A zoo radiologist helps you conquer your fears of exotic small animal ultrasound

With an extensive background in diagnostic imaging of marine mammals and several years of full-time zoo radiology experience, ACVR Diplomate Dr. Marina Ivančić of ZooRadOne gives a talk reviewing the basic anatomy, technical tips, and important differentials to consider when performing ultrasounds of small exotic animals.

Objectives:

For exotic pets such as rabbits, ferrets, small birds, lizards, tortoises, guinea pigs, snakes, et cetera, learn:

- Important anatomical differences.
- Acoustic windows to maximize diagnostic value.
- Common disease processes to help you generate a reasonable differential diagnosis, and a reasonable differential diagnosis.
- How to combine your already-outstanding ultrasonography skill set with the information presented in this talk to make a meaningful contribution to these animals' well-being.

SPEAKERS

Sarah Pownder, DVM

Cornell University
Hospital for Special Surgery
Instructor



Speaker provided bio:

Dr. Pownder received her veterinary degree at Washington State University and completed her diagnostic imaging residency at Cornell University. She spent two years post-residency training studying under the instruction of Dr. Hollis Potter as a post-doctoral fellow at the Hospital for Special Surgery, where she currently works as an instructor at the Hospital for Special Surgery in the MRI Laboratory. Her research involves quantitative and conventional imaging of cartilage, ligaments and tendons. She collaborates with surgeons, biomechanical engineers and other radiologists at Cornell University. In addition, she supplements her clinical work as a radiologist for Idexx Telemedicine.

Collagen Imaging Ultra Class

Review of qualitative and quantitative MRI techniques to evaluate cartilage, tendons, and ligaments in small animals. Emphasis will be placed on articular cartilage and assessment of collagen orientation. Collagen orientation in other periarticular structures will be introduced.

Objectives:

- Review of the available mapping techniques for assessment of articular structures.
- Understand the basic concepts of T2 and T2* mapping and how they can be applied to cartilage and articular structures in small animal patients.
- Understand the options in obtaining 3D datasets for evaluating cartilage thickness maps.
- Review specific lesions in small animal joints that may benefit from advanced techniques.

SPEAKERS

Gabriela Gonzalez, PhD

Louisiana State University
LSU Boyd Professor



Speaker provided bio:

Gabriela González is a professor of physics and astronomy at Louisiana State University searching for gravitational waves with the LIGO team. She was born in Córdoba, Argentina, where she studied before pursuing her Ph.D. in Syracuse University, obtained in 1995. She was a staff scientist in the LIGO group at MIT, joined the faculty at Penn State in 1997 and moved to LSU in 2001. She has received awards from the American Physical Society, the American Astronomical Society and the National Academy of Sciences, and is a member of the American Academy of Arts and Sciences, and the US and Argentinian National Academies of Sciences. She has been a member of the LIGO Scientific Collaboration since 1997, served as spokesperson in 2011-2017, and participated in the announcement of the discovery of gravitational waves in 2016. Her group works on LIGO instrument development, reducing noise sources, and data diagnostics.

Music of the Universe: gravitational waves

I will describe a new way to explore the Universe using gravitational waves to discover properties invisible to regular telescopes in some cases and adding another messenger from explosive phenomena.

Objectives:

Inspire curiosity in science in general.

SPEAKERS

Taylor Miller, DVM, MS

NOMV

DVM & Professional Counselor Associate

NOMV Expert Speaker



Speaker provided bio:

Dr. Miller is a 2010 graduate of the Oregon State College of Veterinary Medicine and a Professional Counselor Associate in the state of Oregon. Her interest in mental health began during her time in vet school and culminated in the pursuit of a Masters in Mental Health Counseling during her years as an associate veterinarian in the greater Portland area. After nine years exclusively in the veterinary world, she has restructured her time to focus on her mission of improving the mental health and wellbeing of veterinary professionals. Her association with NOMV is a natural extension of her personal mission. She serves on the Student Support and Mentorship Committee and is an active speaker in support of their education initiative.

Anxious in America: Anxiety management from a neurobiological perspective

Anxiety in America is on the rise, which means either directly or indirectly everyone is affected. Anxiety impacts all areas of life, and can steal joy, confidence, and even the ability to think clearly and rationally. Understanding the neurobiology of anxiety can offer insight into how anxiety develops, worsens, how it impacts cognitive, emotional, and social functioning, and most importantly, what we can do to manage it.

Objectives:

- Develop a basic understanding of the neurobiology of anxiety.
- Understand how anxiety impacts cognitive, emotional, and social functioning.
- Recognize common factors that exacerbate anxiety.
- Learn several concrete strategies for managing both acute and chronic anxiety.

SPEAKERS

Alexandre Le Roux, DVM, MS

The Animal Medical Center
Veterinary Radiologist



Speaker provided bio:

Dr. Le Roux graduated from the Veterinary School of Nantes, France, in 2006. After a rotating small animal internship in Toulouse and a radiology internship in Belgium, he completed a radiology residency program at the Veterinary School of Louisiana State University in 2013. Dr. Le Roux became a Diplomate of the European College of Veterinary Diagnostic Imaging in 2012, and a Diplomate of the American College of Veterinary Radiology in 2014.

Imaging Interpretation Session

Challenging radiology cases interpreted by 4 different ACVR board certified radiologists

Objectives:

Interpreting and discussing findings of challenging radiology cases.

SPEAKERS

Julián Daniel Rodríguez Arroyo, MVZ , Esp. Dipl.ACVR

Imagenología Veterinaria de México.

Medical Director

VETTEM Imagenología Veterinaria de México.



Speaker provided bio:

ACVR Board certification in 2019.

Veterinary Radiology Residency, UW Madison, WI 2004-2008.

Small Animal Medicine and Surgery, 1998-2000 Veterinary Teaching Hospital, UNAM, Mexico City.

Medical Director and Co-Owner (VETTEM, telemedicine Service) Since 2016 to date.

Oncura Partners Diagnostics

Part-time teleradiologist since 2015 to date.

Particular areas of interest are cross-sectional imaging (US, CT, and MRI)

Image Interpretation Session

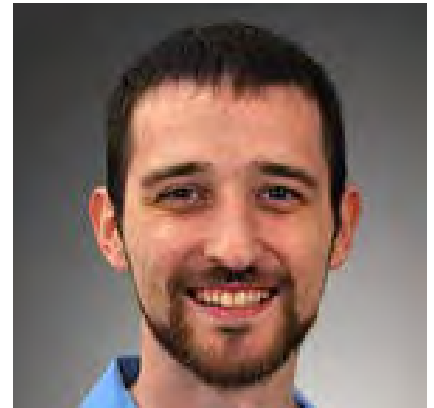
Objectives:

Reading unknown and interesting cases.

SPEAKERS

James Karnia, DVM

University of Missouri
Assistant Teaching Professor



Speaker provided bio:

James Karnia is an Assistant Teaching Professor at the University of Missouri. He received his veterinary degree from the University of Illinois at Urbana-Champaign and proceeded to complete a small animal rotating internship at a private practice in the Chicago area. He completed a residency at the University of Missouri following his internship. James has a strong interest in interventional radiology and PET CT. His current research interests include collaborating to develop a novel radioembolization product to further advance the treatment of liver tumors in animals and humans alike, as well as using cardiac-gated CT to offer an alternative assessment for pulmonary hypertension. The majority of his free time is spent with his wife and three children, a four-year-old boy and one-year-old twins (one boy and one girl), and he also enjoys running.

Image Interpretation Session

Interpret a provided set of images for an array of cases.

Objectives:

Engage in productive discussion about challenging cases.

SPEAKERS

Samantha Loeber, DVM, DACVR, DACVR-EDI

University of Wisconsin-Madison

Clinical Assistant Professor of Diagnostic Imaging



Speaker provided bio:

Sami graduated from Colorado State University College of Veterinary Medicine & Biomedical Sciences in 2015, followed by a rotating internship in small animal medicine and surgery at WestVet Specialty and Emergency Center in Boise, Idaho. She completed a Diagnostic Imaging Residency at the University of Wisconsin-Madison in 2019 and is currently a Clinical Assistant Professor of Diagnostic Imaging at the University of Wisconsin School of Veterinary Medicine. Sami earned DACVR-Equine Diagnostic Imaging (EDI) certification in 2020, is passionate about teaching and education, and has a specific interest in cross-sectional and functional imaging such as PET-CT and PET-MRI. Her very loved furry family members include 5 happy little goats: Waffles, Pancakes, Muffins, Strawberries, and Flapjack, and 3 sweet pups: Piglet, Sawyer, and Shelby.

ACVR Image Interpretation Session

Objectives:

To provide a personally humbling experience of public embarrassment during the image interpretation session :)

SPEAKERS

Philip Cohen, MD ABNM FRCP(C)

Lions Gate Hospital
University of British Columbia
Division Head, Nuclear Medicine
Lions Gate Hospital
Clinical Professor of Radiology
University of British Columbia



Speaker provided bio:

AB Dartmouth College 1972
MD University of Toronto 1976
Radiology and Nuclear Medicine
University of Western Ontario 1982
Division Head Nuclear Medicine Lions Gate Hospital
Section Head Nuclear Medicine for British Columbia 3 years
Executive Member, Canadian Association of Nuclear Medicine

Theranostics in Nuclear Medicine: New Technologies for the 21 and 22 Centuries

A description of nuclear medicine as it evolves from a diagnostic to a therapeutic specialty with emphasis on new therapies and new diagnostic detectors, focused primarily on humans, but where relevant, to veterinary applications

Objectives:

Define and explain theranostics.
History of therapeutic and diagnostic radionuclides in medicine and veterinary medicine.
New therapies with beta particles, alpha particles, and conversion electrons.
New diagnostic detectors in nuclear medicine.

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Antech

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877.727.6800

info@antechimaging services.com

Company Focus: Telemedicine

Company Description: Antech Imaging Services (AIS) was founded in early 2000. AIS employees over 123 specialists around the world and provides a variety of telemedicine and storage services to more than 4,000 clinics worldwide.

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1-800-548-6733

Laura-PetersonGervais@idexx.com

Company Focus: Telemedicine

Company Description: IDEXX Telemedicine Consultants is a proud Gold sponsor of the 2021 ACVR Scientific Meeting. Our dynamic team of specialists is enabled by best in industry technology to support the needs of our staff and clients. Explore what IDEXX Telemedicine's world class patient care, powered by IDEXX, can do for your career.

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Pathway Vets

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Company Focus: Recruiting

Company Description: Founded in 2003, Pathway Vet Alliance has grown from a single veterinary practice to over 400 general practice, specialty, and emergency veterinary hospitals throughout the US, including 100 THRIVE clinics. We are committed to creating the world's most trusted, innovative, and connected ecosystem for pet care that comprehensively serves the needs of veterinary caregivers, pets, and people who love them.

Pathway Vet Alliance has always been a company for veterinarians, by veterinarians. We lead the industry with empathy and continue to raise the bar on fundamental and holistic care of veterinary caregivers through industry-first financial, mental, and physical wellbeing programs.

Chat with us to learn about Pathway's industry-best benefits, industry-only Veterinarian Incentive Plan, and enter to win a \$500 Best Buy gift card.

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VetCT

<https://www.vet-ct.com/us/>
St. John's Innovation Centre
Cowley Rd.
Cambridge, CB4 0WS
United Kingdom
+44 (0)1223 422 251
info@vet-ct.com

Company Focus: Telemedicine

Company Description: INSTANT CLINICAL SUPPORT FOR VETS 24/7

Since 2009, VetCT has been providing vet-to-specialist teleradiology and teleconsultancy services. With the new VetCT app you can speak to a specialist in a matter of minutes, learn real-time on your cases, and earn CPD with every interaction. Visit us to find out more.

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MedVet

<https://www.medvetforpets.com/>
350 E. Wilson Bridge Rd.
Worthington, OH 43085
reviews@medvetforpets.com

Company Focus: Recruiting

Company Description: MedVet is the leading veterinarian owned and led family of specialty and emergency hospitals dedicated to delivering exceptional care and a deeply supportive experience to pets and their loving families, referring veterinarians, and most importantly our MedVet team members. Our empathetic, insightful, and driven team of expert caregivers has helped fuel strong growth, so we continue to enhance and expand our services and locations across the U.S. – meaning we have many opportunities available in communities you'll love to join the team that's Leading Specialty Healthcare for Pets. If you are an exceptional caregiver looking to collaborate with equally talented and compassionate colleagues, we'd love to speak with you. Contact Carolyn Luther, DVM at carolyn.luther@medvet.com. You can also learn more about MedVet by visiting medvet.com.

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NVA Compassion-First

<https://nvacompassionfirst.com/>
29229 Canwood St.
Suite 100
Agoura Hills, CA 91301
805-777-7722
info@nva.com

Company Focus: Recruiting

Company Description: NVA-Compassion First is one of the only dedicated Specialty and Emergency groups in the industry. NVA Compassion-First is the trusted partner of hospital teams who are looking for more - more resources to advance their medicine, a greater sense of belonging, and increased opportunities to care for their patients, client's and people.

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PetCure Oncology

<https://petcureoncology.com/>

2333 Waukegan Rd.
Suite 245
Bannockburn, IL 60015
866-461-9320

hope@petcureoncology.com

Company Focus: Services

Company Description: PetCure Oncology manages a national network of radiation therapy treatment centers that has treated over 5,000 pets since 2015. All 8 locations feature radiation oncology departments overseen by a PCO affiliated board-certified radiation oncologist with access to medical oncology and other cancer supporting services on site. PetCure Oncology's backbone is the PROS (PetCure Radiation Oncology Specialists) team, a group of 13 veterinary oncologists with additional board certifications in internal medicine and nutrition. PROS provides both in-person and remote services.

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VetRad

<https://www.vet-rad.com/>

350 East Wilson Bridge Rd.
Worthington, OH 43085
1-888-483-8723
maketheswitch@vetrad.com

Company Focus: Recruiting/Telemedicine

Company Description: VetRad is the leading veterinary owned and led provider of teleradiology services. We provide a deeply supportive environment to our board-certified radiologists who improve patient outcomes by providing concise, accurate reports and practical clinical recommendation to more than 1000 referral partners throughout the United States. Email Dr. Carolyn Luther, carolyn.luther@vetrad.com, to learn more about the benefits of joining our team. For more information about VetRad, visit VetRad.com.

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BluePearl Specialty + Emergency Pet Hospitals

<https://bluepearlvet.com/>

2950 Busch Lake Blvd.
Tampa, FL 33614
813-933-8944

info@bluepearlvet.com

Company Focus: Telemedicine

Company Description: BluePearl is one of the largest specialty and emergency veterinary practices in the country, with more than 90 hospitals in 26 states. Our compassionate team provides high-quality, advanced treatment for over one million patients each year and is committed to enriching lives through remarkable care for pets.

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Ethos Veterinary Health

<https://www.ethosvet.com/>

150 Presidential Way
Suite 200
Woburn, MA 01801
781-897-6980
info@ethosvet.com

Company Focus: Recruiting

Company Description: Ethos Veterinary Health provides advanced medical care for pets. Our approach focuses on transformative science, continuous learning and growth for team members, and collaboration.

Ethos Discovery is a 501(c)3 nonprofit organization devoted to delivering innovations that will improve the outcome for pets and humans afflicted with complex medical problems.



VCA Animal Hospitals

<https://vcahospitals.com/>

12401 West Olympic Blvd.
Los Angeles, CA 90064
1-310-571-6500

Company Focus: Recruiting

Company Description: VCA is committed to continuously improving the standard of care for our hospitals and veterinary medicine as a whole through the compassionate, high-quality primary and specialty care we provide at our nationwide family of over 1,000 hospitals- including nearly 80 hybrid + specialty hospitals, located in 46 US states and 5 Canadian provinces.

Our support teams are dedicated to pets' health and well-being. Our doctors and technicians stay on top of the latest advances in medicine through our online learning platform and live CE events. Hospital teams have the support of our state-of-the-art technology to keep their day moving efficiently with text messaging, dictation, telemedicine, and many more applications

VCAcareers.com

#lifeatvca



Vet Rocket, LLC

www.vetrocket.com

2065 Martin Ave.
Suite 106
Santa Clara, CA 95050
info@vetrocket.com

Company Focus: Services

Company Description: Located in the heart of Silicon Valley and founded by digital X-Ray imaging veteran Andy Fu, Vet Rocket develops high-quality digital radiography and software products for demanding veterinary applications. RocketPACS is a complete cloud-based solution for storing, viewing, sharing, and managing your DICOM exams. RocketPACS Radiology Information System is a workflow management system providing Modality Worklist and practice management software integration, as well as comprehensive in-house and teleradiology workflow routing and reports.

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Exubrion Therapeutics

<https://www.synovet.com/exubrion-therapeutics-0a-treatment>

5203 Bristol Way

Buford, GA 30518

833-942-1247

info@exubrion.com

Company Focus: Pharmaceutical

Company Description: Our name, Exubrion, emerged from the word "exuberance," which is the quality of being full of energy and excitement.

- Speaks to our determination to help animals live healthy, active, pain-free lives
- Defines our enthusiasm for supporting the veterinarians who care for pets with innovative new therapies, specifically in canine osteoarthritis (OA)

We understand the debilitating nature of OA and are working to help families continue to share joyful interactions with their pets with groundbreaking, science-based solutions that:

- Reduce pain and inflammation
- Break the vicious cycle of degenerative joint disease
- Help restore the active lives of companion animals

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Varian

varian.com

3100 Hansen Way

Palo Alto, CA 94304

1-888-827-4265

VetOncInfo@Varian.com

Company Focus: Equipment, Services

Company Description: At Varian, a Siemens Healthineers company, we envision a world without fear of cancer. For more than 70 years, we have developed, built and delivered innovative cancer care technologies and solutions for our clinical partners around the globe to help them treat millions of patients each year. With an Intelligent Cancer Care approach, we are harnessing advanced technologies like artificial intelligence, machine learning and data analytics to enhance cancer treatment and expand access to care. Our 10,000 employees across 70 locations keep the patient and our clinical partners at the center of our thinking as we power new victories in cancer care. Because, for cancer patients everywhere, their fight is our fight. For more information, visit Varian.com and follow @VarianMedSys on Twitter.



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Booths in the Exhibit Hall will be staffed during the Live Broadcast of the Meeting starting at 8:00 am PDT October 19—23.

Many Sponsors and Exhibitors are offering raffles in their booths!
Sign in and visit them now!



Health and Wellness Resources

Mental and Behavioral Health Resources

National behavioral health treatment services locator:

findtreatment.samhsa.gov

Call the 24/7 National Helpline at 1-800-662-HELP (4357)
for treatment referral and information

Crisis Resources

National Suicide Prevention Lifeline

suicidepreventionlifeline.org

1-800-273-TALK (8255) for free and confidential support 24/7

Crisis Text Line crisistextline.org

Text "TALK" to 741-741 for free and confidential support 24/7

Suicide Prevention Information

Suicide Risk Factors and Warning Signs: afsp.org/signs

Fact Sheet, Facts about Mental Health and Suicide Among Veterinarians:

afsp.org/veterinarianfacts

Loss and Healing Resources

After a Suicide Loss: afsp.org/afteraloss

Find a support group: afsp.org/findasupportgroup

Resources to Support Veterinary Wellbeing

avma.org/wellbeing: Includes access to QPR suicide prevention training—
free to AVMA members

myvetlife.avma.org

navta.net/wellbeing

Resources for the Media

Safe Messaging: suicidepreventionmessaging.org

Reporting Guidelines, Recommendations for Reporting on Suicide:

afsp.org/reportingonsuicide
