Canine herpesvirus disease

In adults, this is a mild infection of the respiratory and genital tracts but, in neonates, it is a severe, generalized, usually fatal infection (part of ‘fading puppy’ syndrome). Up to 80% of dogs have serum antibodies to CHV.

This topic has been updated by Autumn Davidson DVM MS DipACVIM
To view the full article, visit www.vetstream.com/treat/canis and search for ‘canine herpesvirus disease’

Histopathology: special stains

The hematoxylin and eosin (HE) stain is the routine stain used in histological sections, but further different stains may be needed.

This topic has been written by Melanie Dobromylskyj BSc Vet Path (Hons) BVSc PhD FRCPath MRCVS
To view the full article, www.vetstream.com/treat/felis and search for ‘histopathology special’

Diabetes insipidus

Although prevalence in exotic animals is not published, several case reports have been reported across the broad category of exotic pet species. Causes described include congenital factors, idiopathic, subsequent trauma or related to neoplasia.

This new topic has been written by Sarah Pellett BSc(Hons) MA VetMB Cert AVP(ZooMed) MRCVS
To view the full article, visit www.vetstream.com/treat/lapis and search for ‘diabetes insipidus’

ACTH stimulation test for PPID

Also known as an adrenocorticotropic hormone stimulation test; used in combination with the results of other diagnostic tests and clinical signs, especially hirsutism, polyuria/polydipsia, hyperhydrosis and laminitis for diagnosis of PPID.

This topic has been updated by David Rendle BVSc MVM CertEM(IntMed) DipECEIM MRCVS
To view the full article, visit www.vetstream.com/treat/equis and search for ‘PPID’

NVATA have partnered with Vetstream to offer Vetlexicon at highly preferential prices for NVATA members.
As a member of NVATA you are entitled to a no obligation FREE 30 days trial to the Vetstream Vetlexicon services, comprising of Canis, Felis, Lapis and Equus. All you need to do is register on https://www.vetstream.com/register/NVATA30 and you will then have 30 days access to more than 19,000 text articles, images, tables etc from more than 900 of the world's leading clinicians.
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In adults, this is a mild infection of the respiratory and genital tracts but, in neonates, it is a severe, generalized, usually fatal infection (part of ‘fading puppy’ syndrome). Up to 80% of dogs have serum antibodies to CHV.
NAVTA

EXECUTIVE BOARD REPORT

2017 is off to a wonderful start—a mirror image of many of the state association updates. Both North American Veterinary Conference (NAVC) and Western Veterinary Conference (WVC) have come and gone, with many wonderful events that occurred at both.

Brief Media ( VetTeam Brief and Clinician’s Brief) co-sponsored the NAVTA sessions at NAVC, hosting Dr. Andy Roark, Tasha McNerney, Mary Berg, and Ken Yagi. Attendance was phenomenal, and an overflow area had to be set up for all sessions. Case presentations occurred simultaneously with topics ranging from Self-Mutilation of Digits in Military Working Dogs, Retinopathy Secondary to Hypertension, Lungworm, Thoracotomy Management, Operating Room Fires, and the Treatment of Metastatic Mast Cell Disease in a Pediatric Patient. Congratulations from Brief Media and NAVTA to Kathryn Carmen, RVT for coming away with the 2017 Best Case Presentation— NAVC.

WVC also contained a full schedule with 3 full days of events occurring in the NAVTA lounge. Idexx sponsored Monday’s events with food, beverages, and a mini-lecture covering Radiation Safety in the Workplace. Case report presentations also occurred in the NAVTA lounge and offered topics ranging from Plasma Exchange, Hypoalbuminemia, Sepsis, Bloat, Hypoparathyroidism, Retained Maxillary Teeth, and a Ruptured Calcaneal Tendon. Congratulations to Leanne Schmitt, RVT for and NAVTA to Kathryn Carmen, RVT for coming away with the 2017 Best Case Presentation— NAVC.

In addition to the NAVC and WVC, NAVTA will be at the AVMA, held this year in Indianapolis! The NAVTA Leadership Conference will be held 1 day prior to AVMA. Look for specific details to come soon!

The National Credentialing Task Force is developing the Strategic Plan that will carry out over the next few years. Specific details will be provided in the June/July issue. Your voice has been heard, and your opinions count! We look forward to your continued support as due diligence is put into this very important initiative. As a reminder, the goals of this initiative are to:

- Establish a standardized credential title and requirements across the nation
- Nationally standardize the scope of practice
- Unite the profession to increase quality and value for veterinary patients and community

The National Association of Veterinary Technicians in America (NAVTA) is introducing the National District Representative System, a new and exciting addition to our organization’s leadership communication network. NAVTA has developed the National District...
Representative System to help facilitate a working communication network between NAVTA and its members. The National District Representative System is comprised of 11 districts which incorporate all 50 states, as well as the District of Columbia and Puerto Rico to which representatives will be seated. The initial group of district representatives will be meeting in March of 2017 for an orientation and scheduling of communication with state associations. It is NAVTA's goal for the National District Representative System to further unite the nation's veterinary technician community through communication and dialogue, and promote the mission of NAVTA to advance veterinary technology and veterinary nursing.

Watch for more exciting news in the months to come!

THE NAVTA EXECUTIVE BOARD:

Mary Berg, BS, RLATG, RVT, VTS (Dentistry), President
Kara M. Burns, MS, MEd, LVT, VTS (Nutrition), VTS-H (Internal Medicine, Dentistry), President Elect
Beckie Mossor, RVT, Secretary
Eric Zamora-Moran, MBA, RVT, VTS (Anesthesia & Analgesia), Treasurer
Stephen Cital, RVT, RLAT, SRA, VTS (Lab Animal), Member at Large and Public Relations Committee Chair
Erin A. Spencer, M.Ed., CVT, VTS (ECC), Member at Large
Julie Legred, CVT, Executive Director
Rebecca Rose, CVT, Past President

COMMITTEE FOCUS:

Committee on Veterinary Technician Specialties

The CVTS has been busy this year reviewing annual reports from all the existing Academies, which includes 3 more Academies than 2016. Each report is reviewed by no less than 3 members, making each member responsible for a minimum of 6 reports.

Final reports will be submitted to the NAVTA Executive Board with recommendations for the March meeting. Those Academies where further information or clarification is needed may not have their recommendations voted on until the April or May NAVTA Executive Board meeting.

New Academies for 2016 include:
- ALAVTN - Academy of Laboratory Animal Veterinary Technicians and Nurses
- APRVT - Academy of Physical Rehabilitation Veterinary Technicians
- AVOT - Academy of Ophthalmic Technicians

We still have a number of groups who are working on petitions:
- AVTMT - Academy of Transfusion Medicine Technicians
- AVTSE - Academy of Veterinary Technician Specialists in Education
- Diagnostic Imaging

The NAVTA Executive Board is currently reviewing the updated CVTS Guidelines, in conjunction with attorney reviews. Once the guidelines are approved, members will be notified immediately.

The CVTS has also started a mentorship program for any up and coming Organizing Committee petitions to help in the development process, with the goal to make the entire process less stressful for all! Mentors will be provided from within the CVTS and can be requested any time after the letter of intent is received.
STATE ASSOCIATION UPDATES

Veterinary Health Care Team of Arizona (VHCTAz)

The Veterinary Health Care Team of Arizona’s (VHCTAz) technicians participated in an Anesthesia Lecture and Lab in late January. The program was so well received that four separate sessions were scheduled to accommodate the demand. Each program was a sell-out. Technicians were instructed about the history, physiology, agents, pre-anesthesia, monitoring, maintenance and recovery of anesthesia prior to leading a two-hour wet lab using dogs at a local shelter that underwent spays, neuters, and dental procedures.

Working on gaining that professional edge, VHCTAz launched the Professional Veterinary Team Member Certificate Program last year. Veterinary staff professionals, including technicians from across the state, registered for this program in an effort to expand their professional skill sets and build effective and efficient practice teams. We are proud to announce that the Veterinary Medical Executives (VMAE) voted this program “Best in the Business” in 2016! The Certificate Program is designed with ALL veterinary staff members in mind and offers something unique for each member of the practice team. This is a highly interactive and hands-on program with in-person and online components designed to fit within participants’ busy work schedules. Sessions will be offered again in May, with a special “alumni” program for those who have completed the program in its entirety. We applaud Arizona’s technicians and all veterinary staff for working on their growth in both a scientific and a professional capacity.

— Angela Thorp, CVT, VTS (ECC, SAIM)
VHCTAz NAVTA State Representative

Arkansas Veterinary Technician Association

AVTA has made great strides towards achieving our goals these past few months. 2 out of 4 district positions are filled by wonderful people that are geared towards making the association great! We hosted our 2017 Winter Meeting in Hot Springs, Arkansas with some outstanding speakers, including Ryan Corrigan RVT, VTS-EVN, Liane Shaw BS, RVT, Tami Lind BS, RVT, VTS-ECC, and Charity Gottfredson DVM, MS. Thank you to each of these speakers for their contribution to the success of the meeting. During this meeting, an emergency election was held for the Vice President position. Elyse Beard was nominated and received overwhelming reviews from her peers (in which she accepted the position). She is a single mother of a beautiful 7-year-old daughter and two domestic cats. Elyse has been in the field since 2004 and obtained her credentials in March of 2014. She Currently works at Arkansas Veterinary Emergency and Specialty Clinic in Little Rock, AR. We are happy to have her on board!

A new student representative was also elected, and the Association opened a new position for Director of Marketing. Ann Thompson has been appointed Student Representative, and is a non-traditional student in her last semester at ASU-Beebe. Ashli Selke has been appointed Director of Marketing. Both of these newly appointed positions will give the Association a better opportunity to reach more members.

AVTA wishes to acknowledge all of our wonderful sponsors this year. Thank you all for your continuous support!

**Gold sponsors** - Idexx and Memphis Veterinary Specialty
**Silver sponsors** - Boehringer Ingelheim, Patterson Veterinary, SRVC
**Bronze sponsor** - Henry Schein

— Tamiko Luckie, CVT
Arkansas-NAVTA State Representative
STATE ASSOCIATION UPDATES

Colorado Association of Certified Veterinary Technicians

CACVT hosted its annual Focus CE in Denver, CO on January 28, 2017. Megan Brashear, BS, CVT, VTS (ECC) presented 4 hours of technical CE covering various Emergency and Critical Care topics to 135 attendees. CACVT would like to thank all who participated in the event, as well as the event’s title sponsor, Zoetis, for continued support of CACVT.

CACVT will be hosting 2017 Spring Conference, April 21–23, 2017, in Greenwood Village, CO. Attendance will cap at 600, so if you are interested, register soon! Don’t wait too long; we would love to see you there!

More information about the event, including speakers, topics and registration can be accessed through CACVT.org under Upcoming Events.

—Juliebeth Pelletier, CVT
CACVT Executive Director
The Florida Veterinary Technician Association

FVTA currently credentials and represents over 1,150 Certified Veterinary Technicians. Recently, the FVTA participated in the American Veterinary Medical Association (AVMA)’s Veterinary Leadership Conference, credentialed 56 new CVTs in the final 2016 Veterinary Technician National Exam testing window, awarded scholarships to veterinary technology students in Florida, recognized our CVT of the Year, held our annual general membership meeting, and continued to be actively involved with the National Association of Veterinary Technicians in America (NAVTA)’s Task Force on Credentialing.

The FVTA advocates for and works toward the realization of consumer protection and professional accountability through compulsory credentialing of veterinary technicians or nurses by a state regulatory body.

During this year’s AVMA Veterinary Leadership Conference, a past president of the American Association of Veterinary State Boards presented information related to the structure of veterinary and veterinary technician regulation throughout the nation. This presentation allowed leaders within the field of veterinary technology in Florida to appreciate the wide variety of regulatory systems that are used today as well as how one might be designed and brought to fruition in our state. The FVTA will continue to work with NAVTA as well as the American Veterinary Medical Association and the American Academy of Veterinary State Boards in an effort to construct a standardized recommendation for states implementing compulsory credentialing or transitioning to a veterinary nursing credential.

Over the next few months, the FVTA will hold Regional Meetings and CE events in Cocoa, Tallahassee, and Miami, meet with state legislators, and collaborate with the NAVTA Task Force on Credentialing. The FVTA continues to represent, credential, and advocate on behalf of veterinary technicians in Florida.

—Carrie Jo Anderson, MS, CVT
President- Florida Veterinary Technician Association

Figure 1: Trish Gorham (Certification Chair) at the VT Leadership Summit

Figure 2: FVTA holds a Urinalysis CE evening at the Jacksonville Zoo

Figure 3: FVTA table at the University of Florida’s annual veterinary technician CE day in October
Greetings from the Kansas City Registered Veterinary Technician Association (KCRVTA)!
In 2014 five Registered Veterinary Technicians in Kansas City decided a local organization was needed to support technicians in the bi-state metropolitan area. The last 2 ½ years has been quite a ride but we are so excited to be the newly established resource for networking and professional growth opportunities, continuing education, employment resources, and social events.

The mission of the KCRVTA is to empower and support registered veterinary technicians in Kansas City area by increasing public awareness about veterinary technology, providing quality continuing education, and cultivating a professional and ethical community to achieve a unified voice. Membership is open to registered veterinary technicians in the Kansas City metropolitan and surrounding areas. The KCRVTA is a 501(c)(6), non-profit association.

The KCRVTA was introduced to veterinary professionals at the Central Veterinary Conference (CVC) held in Kansas City in August 2016 with overwhelming support! After a successful membership drive coinciding with CVC, we held our first professional networking event in December 2016. Members had the opportunity to eat, socialize, and visit with other professionals and experts about resume writing and interview skills, career paths in laboratory animal and zoological medicine, veterinary technician specialties, and bachelor degree options.

Our first continuing education event is scheduled for March 30, 2017! Free CE is one of the amazing membership benefits. Members also have access to the “Members Only” section of the website which includes employment opportunities and access to KCRVTA publications, including our quarterly newsletter.

Check us out! Take a minute to visit our website at KCRVTA.org or Facebook page at Kansas City Registered Veterinary Technician Association. Feedback is always welcome!

— Joan Gorman, RVT
KCRVTA Vice-President

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**Minnesota Association of Veterinary Technicians**

Our 2017 convention was a great success, being held in downtown Minneapolis Feb. 23-25th. On the 23rd we hosted a CPR wet lab starting with a review of the basic CPR techniques, then moved into the elements that are needed for successful CPR in the practice. Participants were given the opportunity to practice what was learned and polish their skills on Rescue Rovers.

We had a great day lined up of phenomenal speakers and topics for our techs to obtain their CE to keep up with their certification. Merial Tech champion Janet McConnell gave a great lunch and learn tech talk on heart worm, and had a comedy show during our exhibitor’s reception.

We concluded our convention with our annual business meeting and recapped 2016 in addition to discussing our goals for 2017. We awarded Heather Koenig, a Veterinary Technician student, with the Molly Jean Mahowold Scholarship. Heather showed hard work as a student and dedication to volunteering at the humane society, and was awarded $2,000. Marie Bodin, CVT was awarded the veterinary technician of the year award. Marie works at the University of MN medical center.

— Meri DuRand, CVT
STATE ASSOCIATION UPDATES

North Carolina Association of Veterinary Technicians

2017 is flying by for the NCAVT! The Board of Directors have been hard at work building association involvement and momentum throughout the state. January’s board meeting focused on building committees in numbers as well as activities throughout the upcoming year. If you are in North Carolina and interested in participating or relocating to NC soon, please reach out to be more involved in your state association!

We also met with Dr. Christy Redfearn, the program director for the newest program in NC at Cape Fear Community College. This program will be the 5th of its kind in NC. The coastal NC area is in desperate need of qualified, credentialed technicians and this program is sure to help bring just that to the area. We are excited to welcome this program to our state, and looking forward to more credentialed technicians in our coastal community!

The North Carolina Association of Veterinary Technicians is excited to invite all to their Annual Spring Conference at North Carolina State University College of Veterinary Medicine April 8, 2017 with a Friday Night Tech Fest and Job Fair, Friday April 7, 2017 from 6-9pm.

Check out www.ncavt.org for more information or info@ncavt.org if you have any questions.

— Beckie Mossor, RVT

New Mexico Registered Veterinary Technician Association

It has been an exciting start to the new year for the New Mexico Registered Veterinary Technician Association. First off, our congratulations to Jolynn Chacón, past-president of NMRVTA, on being named the District 9 representative for NAVTA. Jolynn will be working with the state representatives from Arizona, Colorado, Kansas, New Mexico, Oklahoma, and Utah. We wish her the best of luck in this new adventure.

The NMRVTA has begun planning our annual CE conference to be held in October 2017. In addition to our regular conference, a smaller CE conference in the southern half of the state is in the works.

Lastly, our association has put together a short survey for our members. The survey can be found on our website at www.nm-rvta.org. We are releasing this survey with the hope that it will assist us in better serving our membership. If you have any questions or would like to contact our organization, please visit our website or our Facebook page at New Mexico Veterinary Technician Association.

— Megan Ray, RVT

The Oregon Veterinary Technician and Assistant Association

Greetings OVTAA members! It was wonderful seeing so many of you at the VCA Winterfest and Oregon Veterinary Conference! We always enjoy hearing ideas from membership, and would like to expand all board meetings online. This would allow any member to attend and share ideas, and would not have to be canceled due to weather! Once we find a system that works for us, we will invite you to attend, no matter what part of the state you live in!

We are in the process of developing some great webinars that will be available at no cost to our membership! Topics would include anesthesia, interpersonal relationships in veterinary medicine, critical thinking and navigating your way through veterinary pet insurance.

For more information on how to get involved, please visit our website www.ovtta.org and like us on Facebook. The OVTTA executive board meets the second Wednesday of every month. These meetings are open to all members and we would love to see you there!

— Tiah Schwartz, CVT,
NAVTA State Representative, Oregon
The NJVTA executive board would like to congratulate their friend and colleague, Ken Yagi, on his award of Veterinary Technician of the Year for 2016. Well deserved!

Our 26th Annual NJVTA Annual Conference is planned for Sunday, April 2nd, from 8am - 4pm at the Sheraton in Eatontown, NJ. This year we are featuring our largest program to date, including 4 tracks for VAs and VTs, a RACE approved Dental Lunch and Learn sponsored by Merial, and hands on workshops in CPR and dental in the afternoon! The conference will offer 6 hours of CE in a beautiful venue which also features a full vendor hall. The conference will offer 6 hours of CE in a beautiful venue which also features a full vendor hall. The NJVTA is also collaborating with the New Jersey Veterinary Medical Association (NJVMA) and the New Jersey Veterinary Hospital Managers Association (NJVHMA) for several events this spring! Some of the most exciting are the new Career Symposia and Job Fairs. These events, presented at colleges and universities around NJ, will feature presentations on career paths for veterinary assistants, veterinary technicians, veterinarians, and veterinary practice managers from the respective organizations. There will also be exhibitors from the veterinary community and industry that educate for these careers or are seeking these professionals to employ. The lineup includes presentations at the following locations:

- **March 19th:** College of New Jersey, Ewing, NJ: 9am–3:30pm
- **March 26th:** Montclair State University, Montclair, NJ: 3pm–6pm
- **April 1st:** Brookdale Community College, Lincroft NJ: 9am–3:30pm
- **April 9th:** Rutgers, Camden Campus, Camden, NJ: 9am–3:30pm
- **April 23rd:** Stockton University, Galloway, NJ: 9am–3:30pm

We would like to recognize John Payne from Compassion First Pet Hospitals for his vision and sponsorship of these events to draw more individuals into the veterinary profession!

May brings another collaborative event the NJVTA/ NJVMA/NJVMHA is working on; a CE meeting, at NorthStar Vets in Robbinsville, NJ, featuring information regarding online pharmacies. More info can be found on our website, www.njvta.com.

The NJVTA is also participating at the NJVMA Conference again this year, March 11 and 12th in Florham Park, NJ. We are honored to be invited back to present an update on our NJVTA activities at the NJVMA Executive Board Meeting on Friday March 10th. President Erika Ervin, MBA, CVT, will present on behalf of the NJVTA, and NAVTA Rep Janet McConnell, CVT, will present an update on behalf of NAVTA to the executive board. There will also be an NJVTA table outside of the technician lectures for members to connect with board members and get the latest updates with the NJVTA.

**Education:** Our 2 AVMA veterinary technician programs are running strong in NJ, as well as our 3 NAVTA approved Veterinary Assistant Programs. We would like to congratulate our 12th class from the Brookdale Community College NAVTA Approved Program (in collaboration with Red Bank Veterinary Hospital) on their graduation from the program on January 26th. “Class 12” students that took the exam were all successful in passing and we wish them much success in their veterinary careers!

— Janet McConnell, CVT
NAVTA Education Committee Chair
NAVTA State Representative
STATE ASSOCIATION UPDATES

Ohio Registered Veterinary Technician Association

It's a new year and a new opportunity to grow and bring veterinary technology to the forefront! Two of our board members just returned from NAVC/VMX with a renewed passion and focus for veterinary technicians and the path to the future. We have begun taking steps to keep the lines of communication open with the OH licensing board, veterinary medical board, and the many technician schools in our state. As a group, we are excited about the momentum behind the national credential and eager to put forth a united front.

We have welcomed new district representatives to our board and are thrilled with their desire to jump in with both feet. There are still a few districts in the state that could use a motivated technician to step in and be a voice for their peers. Please contact us if you have interest in moving this profession in the UP direction!

We have just wrapped up another successful year at the Midwest Veterinary Conference. There was an astounding technician presence with over 1600 dedicated individuals ready to learn and grow. ORVTA had a booth in the exhibit hall, allowing opportunities to meet and collaborate with many old friends, new members, and future hopefuls. OAVT has been provided outstanding support from distributors and manufacturers, allowing us to grow Discovery 2017! MVC was a huge success not just for us, but for all veterinary technicians in Ohio who came together to learn from the best in the field.

We cannot wait to show off our new location, wet labs and dedicated exhibit space for Discovery 2017! More information can be found on our website (www.OhioRVT.org) or facebook page (The Ohio Association of Veterinary Technicians). We would love to hear from you and welcome you to our family!

— Christie Myers RVT, VTS (Clinical Practice-Canine/Feline), Vice President of the Ohio Association of Veterinary Technicians, State Representative to NAVTA

Virginia Association of Licensed Veterinary Technicians

The VALVT, in conjunction with the Virginia Veterinary Medical Association, just concluded the annual Virginia Veterinary Conference held February 17-18, 2017 in Roanoke, Virginia. The veterinary technician track included over 10 hours of CE on topics including rehabilitation, behavior, cytology, OSHA, and animal law. There were 76 students and 117 LVTs in attendance. Our executive board was sworn into office and our incoming members began their term at the conclusion of our business meeting on Friday.

The VALVT 2017 Executive Board includes:
President: Ellen Carozza, President Elect: Jaime Hicks, Vice President: Kendall Blackwell, Secretary/Treasurer: Sarah Turner, Member Services Coordinator: Jane Naramore, Association Coordinator: Victoria Staple; Regional Directors: Blue Ridge: Kris Keane, Central: Taryn Singleton, Tidewater: Amanda Sontag, Southwest: Autumn Halsey, Jefferson: Ashley Haney, Piedmont: Valerie Tyree.

The VALVT would like to acknowledge a few outstanding members:
Technician of the Year: Malorie Kemmerer
Student Scholarship Winner: Hillery Williams, BRCC
Pat McKenzie Scholarship Recipient: Jess Williams

We would like to encourage our members to take advantage of the public comment period on the Virginia Town Hall Website and post your feedback regarding the proposed regulatory changes. The first comment period closed February 24; however, another comment period will open in the coming months.

Planning is underway for the Fall Conference to be held in Weyers Cave, Virginia. Class reunions will be hosted at the Associations social event the evening prior to the conference. Start reaching out to your classmates (no matter the school!), and we look forward to seeing everyone there!

Check out www.ncavt.org for more information or info@ncavt.org if you have any questions.

— Kendall Blackwell, LVT
VALVT Vice President
VA NAVTA Representative
SPECIALTY UPDATES

Academy of Veterinary Surgical Technicians

The Academy of Veterinary Surgical Technicians is pleased to announce the inaugural AVST Technician Case Report Presentation guidelines have been posted at www.avst-vts.org. Credentialed veterinary technicians without prior professional speaking experience should submit their resume or CV and a 1–2 page report summarizing their surgical case to AVSTcasereports@gmail.com. The top 4–5 submissions will be selected to present a 5-minute PowerPoint presentation during the 2017 American College of Veterinary Surgeon’s Summit to be held in Indianapolis, Indiana, October 12–14, 2017, and the winner will be awarded the Dr. Joel Woolfson Memorial Scholarship. Deadline for submission is May 15, 2017, at 11:59pm, EST. For full details please visit the AVST website.

The 2018 AVST Application Packet is now available on the AVST website, and contains newly updated information. Please review the application packet carefully before submitting your application to ensure you are using the most current version. Please email questions to hreusslamky@avst-vts.org.

The AVST has several members who enjoy sharing cutting edge surgical information with other passionate veterinary professionals. Please contact the AVST for more information about our experienced speakers, availability and topics.

— Heidi Reuss-Lamky, LVT, VTS
  (Anesthesia and Analgesia, Surgery)

Academy of Veterinary Clinical Pathology Technicians

The Academy of Veterinary Clinical Pathology Technicians is pleased to announce that the third credentialing exam for specialty status was administered on September 23rd, 2016, in Louisville, KY. We are happy to report that Ms. Brianne Bellwood has successfully completed the credentialing process and is the newest member of AVCPT. We are excited to have our first international member, as Brianne is from Alberta, Canada.

AVCPT is in the process of developing an e-newsletter of updates and brief articles, which will be shared on a more regular basis. It will contain details on submitting items, and we encourage future newsletter articles from you!

The mission of AVCPT is to advance the area of and promote excellence in the discipline of veterinary clinical pathology. Anyone interested in clinical pathology is welcome to visit our website at www.avcpt.net. The deadline for application submission for the next credentialing examination is January 15, 2018. Please be sure to follow updated guidelines for the 2018 testing window, which can be found on our website.

— Barb Lewis, MA, CVT, VTS (Clinical Pathology), President
  Sue Kolka, AAS, LVT, VTS (Clinical Pathology), President-elect
  Barbie Papajeski, MS, LVT, VTS (Clinical Pathology), Secretary
  Sharon Richardson, BS, LVT, VTS (Clinical Pathology), Treasurer
  Lori Baliet, BS, CVT, VTS (Clinical Pathology), Member-at-large
  Christina Benson, LVT, VTS (Clinical Pathology), Member-at-large
  Pam Schendel, BS, RVT, VTS (Clinical Pathology), Member-at-large
  Dan Walsh, MPS, RVT, VTS (Clinical Pathology), Member-at-large
The Internship and Career Fair created a unique opportunity for students and employers to connect on a neutral meeting ground. It would not have been possible without support from SCNAVTA, VCA Hospitals, and Adobe Animal Hospital. Overall, the networking event celebrated the importance of the veterinary field and helped build the support foundation for developing professionals.

The keynote speaker featured at the event was Sharon Fornes, RVT, VTS (Anesthesia/Analgesia), the Technician Training Coordinator of VCA Hospitals. She presented an overview of what is currently new and exciting in the veterinary world, such as low stress cat handling, dental care beyond yearly teeth cleanings, and developments in medicine and technology used to monitor vitals. More importantly, she ranked the ever-growing population of RVTs as the hottest topic in the veterinary profession. This served as a great reminder that veterinary medicine is a relatively small but powerful field that is constantly growing and becoming more sophisticated.

Schlote holds an Associate of Applied Science degree in Veterinary Technology and a Bachelor of Science degree in Veterinary Technology Advanced Clinic Care. His areas of interest include anesthesia/pain management, radiology, dentistry and emergency and critical care. He has six years of clinic experience.

Corinne Morris, dean of Agriculture, Math and Science, said Schlote is most deserving of the award. “Josh is an outstanding technician and an incredible teacher for future techs. On many occasions, I have had the pleasure to observe him demonstrating best practices for our students. I know that he is making a positive difference every day in the work that he does with the animals at our clinic and for the students he is training to be conscientious and competent technicians.”

Morris said students speak very highly of Schlote and often comment on how much they appreciate his teaching style. “They credit him for being very knowledgeable and able to explain difficult content to their levels of understanding,” she said. “Mr. Schlote is also well respected by his colleagues here at the College. As his dean, I am very fortunate to work with Joshua and have appreciated his positive, caring, yet challenging approach to education.”
The mechanism of action is simple but remarkably effective: Each daily chew releases delmopinol hydrochloride, a surfactant used for years in a human oral rinse, to create a barrier that prevents bacterial attachment. When bacteria can’t attach, they can’t produce plaque biofilms or the volatile sulfur compounds of halitosis. And the scrubbing action of the chew works in parallel to effectively remove plaque and calculus.

For more information, contact your Merial representative or visit OraVet.com

*Compared with dry diet alone.


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Veterinarians have long relied upon para-veterinary workers and the profession has grown into a variety of career options, including the veterinary technician. The first University to graduate veterinary technicians was the State University of New York (SUNY) in 1961. In 1965 Walter Collins, DVM, considered the Father of Veterinary Technology, received federal funding to develop a model for the training and curriculum of veterinary technicians. There are currently over 230 Veterinary Technician programs at the associate and bachelorette level.

Some states have laws limiting the tasks non-credentialed support staff, while a majority set forth requirements for credentialing technicians, including graduating from an accredited program, state and/or national exams, and maintenance of licensure through continuing education. Fourteen specialties are recognized by the North American Veterinary Technician Association (NAVTA) with stringent application requirements. Applicants, if approved, must pass an examination to be recognized as Veterinary Technician Specialist (VTS).

However, the term veterinary technician is not a protected title and can be used to describe any employee caring for patients.
regardless of experience, education, or credentials. Employees who are on-the-job trained may be performing the same duties as credentialed veterinary technicians, even when state laws prohibit or limit activates of on-the-job trained employees. Discussions about a protected title have opened the debate of Registered Veterinary Nurse (RVN).

When human nurse organizations resisted a Pennsylvania petition for an official title change to Registered Veterinary Nurse, Frances Hyde, CVT initiated a study to find out why. This small survey based study showed that much of the objection was due to a lack of understanding of educational requirements and professional standards associated with becoming a credentialed veterinary technician.4

Kenichiro Yagi, RVT, created a video where he asked people on the street if they’d rather have a veterinary technician or veterinary nurse care for their pet. Most answered “nurse”, stating they thought the nurse had more education or experience.5 Yagi’s point wasn’t for or against a change to RVN, but to encourage technicians to join the discussion and unite so that we could move forward to educate the community.

Inspired by Yagi’s video, I used Survey Monkey to ask members of the public who have never worked in veterinary medicine if they knew both non-credentialed and credentialed technicians were employed to work with their pets. 44.7% of respondents had no idea there was a difference, another 44.7% said they did know and preferred credentialed technicians while only 10.5% said they knew, but don’t mind either way. When asked if the title of Veterinary Technician should be protected, only 1 respondent (<3%) said no with the remaining respondents split between “Yes, Veterinary Technician should be a protected title” (60.5%) and Yes, but the protected title should be Veterinary Nurse (36.8%). The survey feedback included, “I thought that they were all credentialed”, “No one at the vet’s office ever explains the background of assistants”, and “Technician sounds less educated than Nurse to me.” While this was not a large enough population to be considered statistically significant, it does support the idea that clients have not been adequately informed regarding the education and skill of their pet’s care takers. It also indicates that if they were, they would prefer credentialed veterinary technicians.
This information supports the NAVTA 2016 Demographic Survey which indicated the vast majority of credentialed veterinary technicians don’t feel “the general public understands what a veterinary technician is”. The survey identified lack of professional recognition as the most significant issue facing the profession in 2012 and it placed third in 2016. This information suggests that as a profession we need to do more to educate the general public about who is caring for their pets.

A 2008 AVMA study indicated that hiring credentialed veterinary technicians increased a clinic’s gross revenue by over $93,000 per technician. Therefore, motivation for clinics to hire and use credentialed technicians is there. Veterinary clinics and hospitals that advertise they hire credentialed technicians and educate their clientele on what a credentialed technician is, could potentially reduce turnover, considering the NAVTA Demographics Survey indicated lack of recognition contributed to the high turnover rate within the profession. The expense of turnover should be motivation for veterinary clinics and hospitals to promote employment of Credentialed Veterinary Technicians their clientele.

The Ontario Veterinary Technician Association (OAVT) worked with their local veterinary clinics and hospitals to develop and post a “Registered Veterinary Technicians On-Site” Seal. Their public awareness campaigns encourage clients to look for the seal. According to Natalie Thomas, OAVT Communications Manager, there is no quantifiable data to assess the effectiveness of the campaign, however they are seeing a larger number of new graduates and less technicians leaving the field. Before the start of the campaign, they had 2,600 credentialed technicians and their numbers today are upwards of 3,200. Thomas indicated a campaign shift from the public to DVMs and clinics partly due to cost. If all of our local, state, and national associations worked together to promote the profession and create a similar seal, the financial burden of public campaigns could be more manageable.

However, passive advertisement isn’t enough. We need to physically be out in communities educating people on our profession and its importance. According to Thomas, the OAVT still provides community education through public events, radio campaigns, and talk show appearances. Involvement in professional organizations and organizations like the One Health Initiative, whose mission is to unite the human and veterinary industries, would be beneficial to the profession.

Human nurses have done amazing work raising awareness for their profession to the public and protecting their title. Given how closely related the profession of Veterinary Technology is to our human counterparts, it would make since to start with our medical allies to begin promoting our profession.

The bottom line is, we cannot continue to complain as a profession that we are un-recognized, underutilized, and un-appreciated if we continue to do nothing as individuals to change the perception and advocate for ourselves and our profession. A recent Cincinnati Veterinary Technician Association (CVTA) board meeting discussed ending the organization due to lack of involvement. With over 200 members and 50+ individuals attending the free continuing education lecture held immediately afterwards, only 5 individuals participated the board meeting that discussed the future of the organization. Contact your local and/or state professional organizations to find out how you can help educate the public to our profession.

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Abigail MK Thompson, BS, RVT

Abigail is a student completing her Master’s Degree, in which the above article was written as a portion of her research paper.
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Let me be perfectly clear: as technicians, we are strong. We can work long, hard hours with no breaks, eeking out hope for lost causes. We can stretch ourselves long into the night. We can pick up the slack. We can, in fact, do ten things at once. I’ve seen it. I’ve done it. We pour everything we have, everything we are, into caring for our patients. Being a technician means not counting on a lunch break, not getting out on time, making hard calls, and advocating for the patient no matter the cost. We are more than capable of all of that. We are in it for the long haul.

This goes double for night shift. Working night shift takes an incredible amount of determination and fortitude, for reasons both blatant and covert. Many of us also pick up overtime hours due to the nature of our profession, which is extremely detrimental to our health. In fact, studies have shown that disrupting the circadian rhythm is the most significant contributing factor to fatigue. Most emergencies come in overnight when daytime practices cannot care for them, and overnight care ranges from boarders to train wrecks with everything in-between. Night shift has less support staff available, decreased access to veterinarians, and consistently tends to the ‘hard cases’, emergency situations and ICU patients requiring intensive care. It is taxing, it is grueling, and it is incredibly rewarding.

But there is a cost, and it often goes unmentioned. The physical and psychological effects of working night shift both mimic and exacerbate the stresses technicians typically face. On its own, working night shift has been proven to cause decreased cognitive function, alertness, and attention to detail, all of which are crucial in an emergency medicine setting. In addition, shift work causes weight problems, sleep disorders, metabolic dysfunction, and mood disorders. For 20% of people, shift work simply is not possible, as the effects on their health are so severe as to disrupt their ability to function entirely. Those who work after hours in an emergency clinical setting are exposed to more high-stress cases with poor prognosis, and are thus more susceptible to compassion fatigue and burnout. The fatigue and mood disorders often experienced by those who work off hours further compound the risk, often leaving even the most steadfast staff in untenable positions, which may easily lead to decreased performance, decreased morale and increased attrition.

Though technicians are known for their endurance, resourcefulness, and durability, we cannot avoid or ignore our limitations indefinitely. Our greatest strengths, in this case, are also our greatest weaknesses. We are too willing to go the extra mile, to tax ourselves, and to set aside our own needs. This is not for the faint of heart, but on night shift, there is no place for bravado. You must be prepared, no matter how durable you are, to take care of your own needs. You must be steady and braced mentally, and willing to bear excessive physical strain. Unfortunately,
Most people may work best if they rotate shifts periodically, though the frequency is individually variable. In the majority of cases, going several months without rotating onto day shifts is not a viable option. Others may need to consult with a doctor to determine if a stimulant-sedative pattern can artificially regulate their biorhythms. A select few may be able to adjust their sleep patterns consistently enough to cope with minimal changes to their shift schedule, diet, or personal regimen. Every shift worker should be in the care of a physician who will be able to address their individual needs and concerns as they arise. Shift work also increases the risk of a variety of diseases, including diabetes, heart disease, some forms of cancer, and hormonal or reproductive malfunction in women.17, 11, 12, 5

The one consistent thing that technicians should have access to in the workplace is a “Fatigue Risk Management System”, which is internationally utilized to help prevent, detect, and treat the risks of fatigue and ill health incurred by working night shift or overtime. Though FRMSs have been adopted by air traffic personnel, factory workers, transportation companies, and
healthcare facilities worldwide, they are incredibly and ludicrously uncommon in veterinary medicine. Veterinary referral hospitals, emergency clinics, private practices, and even teaching hospitals have failed to put into place safeguards beyond policies which essentially acquiesce to the local labor laws. This is woefully inadequate. In order to ensure our own safety, as well as that of our patients, it is imperative that we recognize, evaluate, and compensate for the stressors of our profession. It is absolutely crucial that we accommodate the dangers associated with shift work, individually and within each practice. There are records, evidence, experiments, and tests enough to delight even the most demanding of skeptics. The risks are real. The consequences are real. And it is past time we remedied it.

There are so many risks and consequences to working nights that many would say it isn’t worth it. And without proper provision, without health monitoring, workplace support, and self-care, it can very well cause permanent harm. Disease, cardiovascular dysfunction, metabolic malfunction, gastrointestinal distress, exhaustion, depression, stress, compassion fatigue, burnout, and potential suicide are risks people go out of their way to avoid, and rightly so. There is no denying that. In a community that struggles to provide relief even for the more routine pressures we encounter, being willing to put yourself further in harm’s way seems at best foolhardy.

That is all true. Being a night shift technician takes what my mother might call a special kind of crazy. Nothing compares. There is nothing quite like the thrill that goes through you when you get that call. There is no challenge quite as sweet as placing that IVC in the dehydrated fractious flopper perfectly, or using force of will alone to persuade a thousand pounds of horseflesh—“Don’t go down, not yet, don’t you dare, hang on, getonUP!” Nothing matches the satisfaction of being able to help by smoothing the pain away with a sedative, refluxing a painful colic, murmuring in soothing tones, and giving them an anchor. You will never doubt why you are here; never forget your cause or your purpose. You will know it when you feel it. It’s in the avid, eager smile you get when somebody tells you an ‘interesting’ case is coming in. You will see it in the love and trust spilling out of a patient’s eyes, despite the pain and the fear. You will see it in the owner’s devotion, in the small, soothing things they do with such care. You will hear it in the whirl-hush when you tend an IV pump, the silence of a sleeping stable, the nickers that greet you as you do your hourly checks. It is the cautious victory when your worst case of the night stabilizes, the soft swell of success you feel when dawn streams through the window and every last one of your patients pulled through. It is standing by in the best moments and the worst, being a comfort to patients and clients alike. It is caring, pure and simple.

It is beautiful, and it is hard.

If you choose this path, you are a special kind of crazy. Remember, as you care for others, that you cannot pour from an empty vase; you must count yourself among your patients, and settle for no less than you would demand for them. It is challenging, it is a gauntlet, and every single moment is worth it.

Ameli is a Large Animal Veterinary Technician at the Equine and Farm Animal Veterinary Center; North Carolina State University, School of Veterinary Medicine.
Nutrition is the lifeline of our patients, yet we consistently neglect to talk about it. Why? Most veterinary technicians and assistants indicate that they do not have enough time in the exam room or other topics take priority, such as vaccines, dental care or spaying and neutering. These topics are important; however, clients feed their pets everyday, and poor nutrition can lead to nutrient deficiencies, toxicities, obesity and overall, a poor quality of life! The goal of veterinary team members is to help patients live a long, happy and healthy life! Get on board with discussions about nutrition, every time with every client.

The American Animal Hospital Association (AAHA) recommends five vital assessments of patient health at every examination to ensure the highest standard of care. Nutrition, being the newest edition, is added to temperature (T), pulse (P), respiration (R), and pain. Veterinary technicians and assistants are already responsible for TPR and pain recognition; adding nutrition to the essential task list adds a new challenge, job satisfaction and increased client compliance. Nutritional assessments and client education is a veterinary team member driven program. Grab the steering wheel, and let’s drive nutrition forward in our hospitals!

**Learning Objective:** Upon completion of this article, participants will be able to discuss the 5th vital assessment, assess patient BCS and MCS, and make specific nutritional recommendations to clients.

**Assessing Nutrition for Every Patient, Every Time**

**Screening Evaluations**

As a part of routine history taking and physical examinations, ask clients the following questions:

- What food does your pet eat?
- How much does your pet eat? (Do you measure the food, and what size is your measuring cup?)
- How often do you feed your pet?
- Does your pet receive any treats? If yes, what kind and how much?

**Next, assess the patients condition:**

- Body Condition Score (BCS)
- Muscle Condition Score (MCS)
- Hair coat quality
- Age
- Activity level
If any abnormalities arise from these screening questions or assessment, an extended evaluation should follow.

Extended Evaluations
54% of the patients we see in practice are overweight or obese. Extended evaluations are essential for these patients. The biggest concern: clients perceive their pet is an ideal weight, when in fact, their pet is overweight or obese. 22% of dog owners and 15% of cat owners (in the above mentioned study) characterized their pet as being at normal weight. Client education is essential to change this perception! They don’t know if they are not informed.

Many patients are experiencing a disease process that nutrition plays a role in (either managing or treating). Obviously, obesity falls into this category; but do not forget about patients with joint disease (especially osteoarthritis), diabetes, renal insufficiency or gastrointestinal sensitivities.

Proper nutrition throughout the various life stages is critical to disease prevention, as well as assist in disease management, should one exist. Clients do not understand the various life stages, the metabolism changes that occur, essential nutrients or the overall caloric intake that should be monitored on a daily basis. Even if clients do not ask, they are expecting a nutritional recommendation from you. You are the expert. AAHA completed a study that concluded 90% of clients want a nutritional recommendation; however only 15% perceive that they actually received one from the veterinary team.

What Clients Need to Know

Nutrient Composition

Puppies and Kittens
When compared to adult food, puppies and kittens require food with:
- Higher fat and calories (this is the most demanding time of their life)
- Higher protein (help build that muscle)
- More energy
- Controlled mineral levels (consider our large breed dogs)
- Added taurine for kittens

When puppies and kittens are spayed or neutered, their metabolism decreases3,4; hence, they do not need to excess calories that are in growth formulas. Many cases of obesity begin occurring during this time period; make a specific recommendation to clients about caloric intake when releasing patients post-operatively.

Adult Dogs and Cats
A basic adult food will have:
- Less protein and fat
- Controlled mineral levels
- Adult cats = produce a normal acid urine (6.2-6.4)

Senior Dogs and Cats
This is an ideal time to make specific recommendations based on the patient’s health and environment. A basic senior food will have:
- Higher levels of protein
- Lower levels of Phosphorus, Sodium and Calcium
- Increased fiber

Feeding Amounts
Each patient has a required caloric intake that depends on their life stage and activity level. The Daily Energy Requirement (DER) is the average daily expenditure of any animal, dependent on life stage and activity. The Resting Energy Requirement (RER) is the energy required for normal but fed animal at rest. Make specific caloric recommendations for your patients.

Treats should never equal more than 10% of the total caloric intake per day. For example, “Fluffy”, a small canine patient needs a maximum caloric intake of 350kcal per day; therefore “Fluffy” cannot have more than 35kcal of treats. Consider the calories of common treats, and compare to that of vegetables or fruits. A ¼ cup of carrots contains 17 calories, a ¼ cup of green beans contains 9 calories, and a ¼ of an apple contains 12 calories.

Advise clients to not feed people food. This can lead to obesity and build patient resistance to eat a complete and balanced diet made for their species. Many clients want to “spoil” their pet with people food; encourage the use of vegetable and fruits only, if this is the case (don’t forget to educate about overall caloric intake).

Implementation of the 5th Vital Assessment

Programs can be hard to implement within a veterinary team. Practices are busy, often short handed, and many times, team members lack the training needed to have a successful program. THIS IS A MUST HAVE program, and must be implemented if the goal is to provide the best medicine possible to clients and patients.

Team Discussion
Every team member must understand the importance of nutrition. Talk about it as a team, and determine what the strengths and weaknesses are that must be overcome to make this program work.

Take the self assessment (Figure 1) and determine how the team can optimize the role that nutrition plays in patient care.

Client Discussions and Recommendations
Clients must know:
- What to feed, how much and how often
- Why that particular recommendation is being made

This conversation is based off the initial screening assessment, +/- the extended assessment. Determine the DER for the pet, and explore the client’s ideas and beliefs about nutrition. Great questions to ask the client when determining their needs include:
- “Is the current food working for you?”
- “Do you have any concerns with this particular food?”
- “What is important to you when selecting a food for Fluffy?”

Once all of the above information is gathered, a veterinary technician or assistant may proceed with: “We both want what is best for Fluffy. Based on the information you have shared, and my experience and my research, I believe xx is best for
Fluffy. This food is important to health and longevity of Fluffy, and the levels of protein will help support her muscle mass as she ages”. Explain to clients why you are making this recommendation. Remember, it is up to us to educate the client about the health and well being of their best friend.

Be sure to address the concept of changing diets with clients. If a diet change causes the pet to have diarrhea, the client will switch back to their original diet, and dismiss all of the information you worked so hard to provide.

Following up with clients is key to implementing a successful diet change. Call owners and check in on the patient. Address any concerns the client might have.

Many team members still have concerns about having nutritional discussions with clients. The following are a few suggestions to help alleviate this concern:

- **Role play.** Develop conversations with team members that one may have with a client. Practice different scenarios and concerns that may come up. Consider, for example, addressing an obese pet. Many clients get their feelings hurt when you identify that their pet is overweight. Instead of “telling” them that their pet is overweight, consider educating them on the proper BCS, and then ask them to score their pet. You would be amazed at the number of people who are then willing to admit their pet could lose a few pounds!

- **Create written protocols/standards of care (SOC).** When SOCs are implemented into the practice, every team member knows what to say, and how to say it. The entire team is on the same page, and the client will receive the same message every time they come to the hospital. Your protocols can then be displayed on your webpage, and in the client education handouts you are going to create.

- **Client Handouts:** Clients need information to take home with them each time they leave your hospital. It is estimated that only 30% of the information you present clients in the hospital will be retained. Send home client education brochures reinforcing the importance of nutrition, and include your specific recommendation on these handouts.

**Potential Challenges to Overcome**

Many clients have turned to Dr. Google and pet stores to provide them with nutritional recommendations (historically, veterinary practices have not made specific recommendations). However, many myths have surfaced, and the team needs to be prepared to deal with them. Here some common myths and helpful concepts to overcome them.

“I only feed organic or all natural food.”

- Organic foods must be grown with only animal or vegetable fertilizers, such as manure, bone meal, compost etc.
- All natural products must be produced or exist in nature, not artificial or manufactured. According to AAFCO, the term “natural” requires a pet food to consist only of natural ingredients; no chemical alterations can be supplemented.
- These are two different categories. Natural does not mean organic.

Under new regulations, four categories were created for organic.

- **100% Organic**
- **Organic (95% of content is organic by weight)**
- **Made with Organic (At least 70% of content is organic, but cannot carry organic seal)**
- **Anything less than 70% cannot carry the USDA Organic Seal.**
“By-products are terrible, and I will not feed anything that contains them!”

- By-products are a common ingredient in both human and pet food. A by-product is simply produced in the making of something else.
- When processing soybeans, the by-product Vitamin E is produced.\(^5\)
- Vegetable oils (such as flaxseed oil, rice bran oil, corn and soy oil) are by-products extracted from the seeds that are processed for consumption purposes.\(^6\)
- Do you like Jell-O? This is a by-product!

“I will not feed a diet that contains corn!”

- Corn is an ingredient that supplies the pet with protein, antioxidants, fatty acids and carbohydrates.
- Corn is easily and highly digestible and it not common cause of allergies in pets.
- Corn is not a filler (as many people think). Fillers are defined by AAFCO as an ingredient that does not provide nutrients.

READY, SET, GO!
Educating clients is imperative to building a long lasting client/patient/veterinary bond. Ideally, we want to offer “cradle to grave service”, and this is one area that can have a severe impact on. Build loyal clients and create the trust to retain these clients for the lifetime of the pet.

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Learning Objective: After reading this article, participants will be able to describe nutritional physiology, obtain a complete nutritional history of equine patients, and make specific nutrient recommendations.
All veterinary healthcare team members must recognize that the feeding of horses is an intricate science which requires the precise amount and balance of nutrients. It is imperative that the healthcare team remember that nutrition is one area of equine veterinary medicine that affects every horse. In addition, horses have been domesticated for quite some time and are considered companion animals, and are therefore consuming a variety of feeds ranging from forage (with a high content of moisture) to cereals (with a high amount of starch) and hay. Horses are nonruminant herbivores that naturally spend 60 to 75% of their day grazing, typically ingesting approximately 2% of their body weight on a dry matter basis per day (while grazing).

As horses became domesticated, alterations in feed, feeding times, and feeding methods were instituted. These changes aligned more closely with domesticated canines and felines, where the horse is ‘meal fed’ and unfamiliar materials such as starchy cereals, protein concentrates, and dried forages have been introduced. Currently, horses are confined a majority of the time in stalls or smaller pastures, fed 1-2 times per day, and as a result, spend less time (approximately 40%) eating.

As a result of the evolution of horses eating grass and other forages, diets formulated for horses contain on average 5% fat and 7-12% protein, with carbohydrates being the major source of energy (approximately 80%). As a result, grass and hays serve a strong foundation for the feeding of horses. Protein however, is a required nutrient necessary for maintaining the structure and replacing tissues. Although protein may be considered to be a more expensive source of energy, dietary protein and dietary fat can contribute to meeting the physiological energy demands of the horse. Protein converts the carbon chain of amino acids to intermediary acids and converts some of the carbon chains to glucose. Dietary fat assists the horse in meeting energy demands following its hydrolysis to glycerol and fatty acids. Subsequently, the glycerol can be converted to glucose and the fatty acid chain can be broken down by a stepwise process. This process involves β oxidation in the mitochondria which yields adenosine triphosphate (ATP) and acetate or acetyl coenzyme A and requires tissue oxygen.

The digestion and fermentation of carbohydrates yield mostly glucose and acetic, propionic, and butyric volatile fatty acids. The portal venous system collects these nutrients and a proportion of them are removed from the blood as they pass through the liver. Both propionate and glucose contribute to glycogen (liver starch) reserves and acetate and butyrate bolster the fat pool and comprise primary energy sources for many tissues.

Taking a Nutritional History
Every horse should have a nutritional history performed by the veterinary healthcare team. The nutritional history provides background for the veterinary healthcare team and aids the healthcare team in finding information regarding the quantity and quality of the diet which the horse has been receiving. Taking a nutritional history is crucial and assists the team in determining whether the nutrient requirements for that particular horse are being met.

When taking a nutritional history, there are major differences between pasture maintained horses and stall-fed horses. With those horses maintained on pasture, the diet is not easy to control and may be much more difficult to evaluate. Additionally, horses that are free to graze are potentially at greater risk for parasitic infestation and infectious disease.

Nutritional History Questions/ Observations for Pasture Fed Horses:
- What is the composition of the pasture?
- Nutritive value:
  - Any recent changes brought about by rain or drought?
  - Is rotational grazing practiced?
  - Is a fertilizer program in use?

As part of the nutritional history, the veterinary healthcare team should document both the above (as it applies to the patient) and the following in the medical record:
- Availability of drinking water
- Movement of animals from one field to another
- Change from pasture to cereal grazing
- Periods of bad weather or transportation
- Change to new/unfamiliar feeds
- Changes occurring rapidly vs. gradually

Nutritional Physiology
The nutritional physiology of the horse differs from that of the cat or dog. Multiple compartments make up the digestive tract of the horse and each compartment has its own function in terms of utilizing ingested feed. The oral cavity is responsible for
physically processing foods into smaller particles (approximately 1.6mm), which allows for passage through the esophagus and increases the surface area for the small intestine enzymatic action. The oral cavity also breaks down structural carbohydrate for bacterial fermentation in the large intestine. On average, the horse chews 60,000 times per day. It is only in the course of chewing that the salivation process is activated. Consequently, as a result of the increased chewing in the equine species, a horse will average 5–10 liters per day of saliva. This saliva, in turn, acts as a lubricant for passage into the esophagus.

The stomach is responsible for about 8% of the total capacity of the equine GI tract, but the retention time in the stomach can range from 2–18 hours.

The fundus and the pylorus are the two main regions of the stomach. The pyloric region secretes 10 to 30 liters of gastric juice per day. The small intestine of the horse measures 50 to 70 feet long and has a volume of 40 to 50 liters. The transit time of the small intestine averages 2 to 8 hours. At the anterior end of the small intestine, pancreatic juice aids in the digestion of lipids, protein, and non-structural carbohydrates. Similarly, the small intestine is lined with microvilli which increase the surface area of the gut. As stated earlier, digestion in the small intestine is dependent upon oral processing and types of feed (forage is less digested than processed feed).

The large intestine has capacity for large volume (100 liters) and has a very slow transit time of approximately 50 hours. The large intestine is responsible for the fermentation of structural carbohydrates to volatile fatty acids, which results in 50% of the metabolizable energy. The large intestine absorbs roughly 80 liters of water per day. B vitamins are produced by the bacteria absorbed in the large intestine. It is also important to note that non-protein nitrogen is not utilized well in the large intestine.

**Equine Key Nutritional Factors**

Veterinary technicians should be reminded that the main nutrients of concern when discussing nutrition for the horse are water, protein, minerals, and vitamins. Energy, though not a nutrient, is also important to proper nutrition as its constituents are nutrients, and energy plays a large role in the nutrition of horses.

**Water**

Water is the most important nutrient in any mammalian species. In mature horses, the total body water constitutes 61–72% of the body weight. There should be fresh, abundant water available at all times. Whether a pleasure horse or a thoroughbred performance horse, water must be discussed with owners. Horses will drink an average of 25 liters per day. In conditions of extreme heat or stress on the horse, or in working horses, the number of liters a horse will drink per day can easily reach or exceed 100 liters per day. Additionally, technicians should be aware of and remind owners that the increase in grain consumed will lead to an increase in water intake needed—so the more grain their horse eats, the greater the amount of water the horse will need.

**Energy**

Energy is measured in terms of digestible energy (DE) and fed in kilocalories. The amount of DE horses need will be dependent upon a variety of factors such as physiologic state, activity level, environment, and the size of the individual horse. The majority of energy utilized by the horse is from carbohydrates that are ingested through the horses’ natural feed. The amount of kcal/kg in different carbohydrate feeds is:

- Oats = 3,000 kcal/kg
- Alfalfa (early bloom) = 2,100 kcal/kg
- Bermuda grass hay = 1,800 kcal/kg
- Corn cobs = 1,250 kcal/kg

**Fat**

Fats provide the horse with high density energy. In equines, fat should not exceed 20% of the total diet or 30% of concentrate. Exceeding these percentages will likely result in decreased palatability and loose stools.

**Protein**

Protein amounts are normally expressed as ‘crude protein’ (CP) and are conveyed as percentage (%) dry matter (DM). As mentioned earlier, the amount of protein needed by an individual horse is dependent upon a number of factors, including physiologic state, type of diet, age, quality of diet. The closer the proportions of each of the various indispensable amino acids in the dietary protein conform to the proportions in the mixture required by the tissues, the higher the quality of the protein.

**Calcium and Phosphorus**

Because of their mutually dependent role as the main elements of the crystal apatite which provides the building blocks for the skeletal system, calcium and phosphorous are considered together. The requirement of calcium and phosphorous is dependent upon the physiologic state of the horse. The average adult horse weighing approximately 500 kg will need approximately 20g of calcium and 14 g of phosphorous per day. It is important to balance the ratio of calcium to phosphorous with a mature horse needing a ratio of 1.1:1 to 6:1. The ratio for a growing horse is recommended to be 1.1:1 to 3:1.

**Sodium**

Sodium is the principal determinant of the osmolarity of extracellular fluid and thus, the volume of that fluid. Chloride concentration in the extracellular fluid is directly related to that of sodium. Rarely do companion animals have an excess or deficiency of sodium or chloride; however, equine technicians should be watchful for both of these potential conditions. The recommended daily sodium requirements are approximately 0.18 to 0.36% DM. If the requirements for sodium are met, seldom will a deficiency of chloride occur.
Good sources of sodium and chloride can be found in grains with a pre-mixture, as well as salt blocks.

**Potassium**
Potassium is the main intracellular cation. Deficiencies in equines are rare and excess potassium is rarely a problem. However, excess potassium can lead to hyperkalemic periodic paralysis, a syndrome of episodic weakness in horses accompanied by elevated serum potassium concentration. This syndrome appears to be confined to descendants of the American Quarter Horse. Forages are approximately 1 to 4% potassium with cereals being relatively poor sources of potassium.

**Trace Elements**
The trace element selenium is required to aid in antioxidant defense. Selenium forms an integral part of the GSH-Px molecule. Selenium catalyses peroxide detoxification in body tissues during which reduced glutathione (GSH) is oxidized. It is closely involved with the activity of α-tocopherol (vitamin E), which protects polyunsaturated fatty acids from peroxidation. The requirement is 1 to 2 mg/day for a 500kg horse or 0.1-2 ppm. The healthcare team must monitor for potential selenium deficiencies. In horses, selenium deficiency produces pale, weak muscles in foals and a yellowing of the depot fat, known as ‘White Muscle Disease’. It is imperative that pregnant mares receive adequate amounts of selenium in their diet. Selenium is highly toxic to animals; the minimum toxic dose through continuous intake is 2 to 5 mg/kg feed. Skin, coat, and hoof abnormalities are the result from excess selenium.

Grazing horses derive vitamin A from the carotenoid pigments present in herbage. The principal carotenoid is β-carotene with 1mg of β-carotene equating to approximately 400 IU of vitamin A. Horses that graze for 4 to 6 weeks build up a 3 to 6-month supply of vitamin A in the liver.

Requirements for vitamin A during specific life stages are:
- Mature horses: 30 IU/kg body weight
- Gestation/lactation stage: 60 IU/kg body weight
- Growth stage: approximately 50 IU/kg body weight

<table>
<thead>
<tr>
<th>Carotene levels</th>
<th>Amounts (mg/kg DM)</th>
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<tbody>
<tr>
<td>Pasture grass/alfalfa</td>
<td>300–600</td>
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<tr>
<td>Good hay</td>
<td>20–40</td>
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<tr>
<td>Poor hay</td>
<td>4–5</td>
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Vitamin E functions as a cellular antioxidant in conjunction with Vitamin A and is required for normal immune function. Fresh green forage and the germ of
Types of Feed
There are three types of feed to be considered, which include roughages, concentrates, and complete feeds. Grasses and forage legumes cut for hay are considered roughages. Many common species of grass are suitable for the equine to graze; the preferred are the more popular and productive grasses such as rye grasses, fescues, timothy, and cocksfoot. Species found in permanent pastures are satisfactory as well and include meadow grasses, brome, bent grass, and foxtails. Typically, horse owners will provide legumes such as red, white, alsike, crimson clovers and trefoils, lucerne, and sainfoin. Roughages are relatively low in energy and have > 18% crude fiber. Roughages should be viewed as the foundation to an equine feeding program. Quality hay can provide energy for the maintenance requirements of the horse. Legumes and non-legume grasses that are well managed and fertilized (proteinaceous roughages) provide > 10% CP as opposed to carbonaceous grasses (those that are not well maintained or fertilized) provide < 10% CP.

Veterinary technicians should educate horse owning clients on the quality of roughage using the following guidelines:
- Free of mold
- Soft & pliable to touch
- Leafy with fine stems
- Pleasant, fragrant aroma
- Bright green, not brown or yellow

Another crucial point to communicate to owners is the fact that excess handling of roughages may result in the loss of ¼ of the leaves, loss of ¼ to 1/3 energy and protein, and loss of 90% of α-carotene. These are key points that will make a big impact on the nutritional status of the horse.

Concentrates are customarily a cereal grain which may or may not have supplemented protein, minerals, and vitamins. They are high in energy (typically 50% greater than forage), less than 18% crude fiber, and are often used as a supplement if forage is insufficient in nutrients (especially energy and protein). Concentrates are needed more often in certain life stages such as gestation (especially later in the gestation period), lactation, growth, and in work and performance horses. A guideline would be to not exceed 50:50 (wt:wt) concentrate to roughage. Remind owners that anything new should be introduced and transitioned slowly. It is important for healthcare team members and owners alike to be cognizant of the fact that excess concentrate may lead to laminitis, rhabdomyolysis, developmental orthopedic disease, and obesity.

Typically, complete feeds are a mixture of roughage and concentrate, usually an 80% roughage to 20% concentrate mixture. Complete feeds are manufactured by completely grinding the food and formulating it into a pellet, thus making it easier (all in one) for the owner. Because the complete feed is pelleted or wafered, care must be given to the potential risks associated with inadequate particle size, including colic, choking risk, wood chewing, or coprophagy, to name a few.

Summary
Technicians have the key role of discussing nutritional management with horse owners. A nutritional assessment should be performed on every horse, regardless of whether they are pasture fed or stall fed. Veterinary team members must diligently discuss water and the proper maintenance of water troughs or automatic waterers. Fresh, clean water should be available at all times. It is important to remember that energy for maintenance can be met entirely with quality hay, but may be supplemented with concentrate if necessary; ensure the horse is not supplemented in excess of 50% by weight with concentrate. Too much energy can lead to the horse becoming overweight or obese, which increases the risk of a number of disease conditions. Good quality green roughage should supply adequate amounts of Vitamins A & E. Nutrition is one area of equine medicine that affects every horse and should be discussed on every visit, every time.

REFERENCES
Equine Nutrition Article Questions

1) On average, in normal conditions, how much water does a horse consume per day?
   a) 10L  
   b) 25L  
   c) 50L  
   d) 100L

2) All of the following contribute to the amount of energy a horse needs, except:
   a) Physiologic state  
   b) Environment  
   c) Water intake  
   d) Activity level

3) When feeding grain, which of the following factors will change?
   a) Average water intake  
   b) Average energy expenditure  
   c) Decreased intake during grazing  
   d) All of the above

4) Which of the following elements are considered an antioxidant?
   a) Potassium  
   b) Sodium  
   c) Vitamin E  
   d) Vitamin A

5) Excess handling of roughages may result in:
   a) Loss of ½ of the leaves and 1/3 loss of protein  
   b) Loss of ¼ of the leaves, and loss of ¼ protein  
   c) Loss of ¼ of the leaves and up to 50% of the β-carotene  
   d) Loss of ½ of the leaves and 50% fat

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Kara Burns is a licensed veterinary technician originally from New England, now living in Kansas. She holds a master’s degree in physiology and a master’s degree in counseling psychology. She began her career in human medicine working as an emergency psychologist in the Maine Medical Center emergency department. She also worked at Maine Poison Control as a poison specialist dealing with human and animal poisonings. She then made the move to veterinary medicine and worked in small animal private practice and a small animal and avian practice in Maine.

Kara is the Founder and President of the Academy of Veterinary Nutrition Technicians, the tenth recognized specialty for veterinary technicians and has attained her VTS (Nutrition). She teaches nutrition courses around the world on the VIN/Veterinary Support Personnel Network and on VetMedTeam. She also is a contributor to LafeberVet.com. Kara also works as an independent nutritional consultant.

She is a member of many national, international, and state associations and holds positions on many boards in the profession; AAVN executive board technician liaison; the NAVTA Journal assistant editor in chief; NAVTA Communications Director; Veterinary Team Brief Advisory Board; VSPN Nutrition Board Moderator; International Society for Sports Nutrition; and is the president of the Kansas Veterinary Technician Association, to name a few.

She has authored many articles, textbooks, and textbook chapters and is an internationally invited speaker, focusing on topics of nutrition, leadership, and technician utilization.
FEEDING TUBES

PLACEMENT, USE, AND MAINTENANCE

Ed Carlson, CVT, VTS (Nutrition)

Learning Objective: After reading this article, the participant will be able to compare and contrast the various feeding tubes that can be utilized in companion animal medicine, discuss the placement and care of such feeding tubes, and calculate the patients nutritional requirements.

This program was reviewed and approved by the AAVSB RACE program for 1 hour of continuing education in jurisdictions which recognize AAVSB RACE approval. Please contact the AAVSB RACE program if you have any comments/concerns regarding this program’s validity or relevancy to the veterinary profession.
Dogs and cats that are unable or unwilling to eat may benefit from being fed via a feeding tube. The type of feeding tube chosen is determined by a number of factors, including the length of time the patient is expected to require tube feeding, the diet type to be fed, and if the patient may safely be anesthetized. Placement of a feeding tube should be strongly considered for any patient that has not eaten at least 75% of its resting energy requirement for three days or more.

**Nasoesophageal and Nasogastric Feeding Tubes**

Nasogastric (NG) and Nasoesophageal (NE) tubes are generally tolerated well by most canine and feline patients. These two types of feeding tubes are relatively easy for the experienced veterinary technician to place. Nasogastric tubes are inserted into the nostril, through the nasal cavity, and into the esophagus, terminating in the stomach. Nasoesophageal tubes are inserted into the nostril and through the nasal cavity, terminating in the distal esophagus.

Nasogastric and nasoesophageal feeding tubes are useful for patients who are unwilling or unable to eat but have normal GI function. Placement does not require anesthesia and usually can be done without sedation by using a topical anesthetic. They are used short-term, usually less than fourteen days, and are sometimes used until the patient is stable enough to be anesthetized for a long-term feeding tube placement if necessary. NE/NG tubes are contraindicated in patients that are actively vomiting, comatose, do not have a gag reflex, or who have a nasal tumor or nasal disease. Since these tubes are generally quite small (usually 8 French or smaller) patients may be fed only liquid food. Complications associated with NE/NG tubes include epistaxis caused by nasal mucosa irritation; aspiration pneumonia should the tube become dislodged due to vomiting or regurgitation; and rarely esophageal stricture.

There are a number of types of silicone feeding tubes commercially available in a variety of lengths and diameters. Most have attached caps, some come with guide wires, some have weighted tips, and many have premeasured markings indicating the length from the tip of the tube in centimeters. Red rubber tubes may also be used in smaller patients; however, these will require an injection cap to cap the tube. Red rubber tubes are not premeasured and must be marked with a permanent marker after measuring.

**Nasogastric (NG) and Nasoesophageal (NE) Tube Place ment:**

With an assistant restraining the patient, elevate the patient’s muzzle and apply four or five drops of a topical anesthetic, such as such as proparacaine or tetracaine hydrochloride, into the nostril selected for tube placement. Keep the head elevated for a couple of minutes to ensure distribution of the drug evenly on the mucous membranes that line the nasal cavity. Allow five minutes for the drug to properly anesthetize the area before attempting to insert the tube into the nostril. While you are waiting, use 3.0 nylon suture material to place a stay suture as close to the patient’s nose as possible. The use of a stay suture will allow for easy repositioning and securing of the feeding tube if necessary. A needle driver maybe used to introduce the suture. An alternative method, which the author prefers, is to use a 22-gauge needle to introduce the suture material through the patient’s skin. To use this method, remove the attached needle from the suture material and quickly insert a 22-gauge needle through the skin at the point where the wing of the nostril meets the fur. Leaving the needle in place, insert the suture through the beveled tip of the needle and out the hub of the needle. Hold one tail of the suture material and remove the needle. With an equal length of suture on either side of the insertion point, tie a square knot closely to the skin but loosely enough to allow passing another suture under it. Next, measure and mark the tube. When placing an NE tube, measure from the nose to the eighth intercostal space, causing the tip of the tube to terminate in the distal esophagus. When placing an NG tube, measure from the nose to the last rib; the tip of the tube will terminate in the stomach. Some brands of feeding tubes are pre-marked; other brands will require manual marking with a permanent marker.

Apply sterile tube to the tip of the tube. Hold the patient’s muzzle with your non-dominant hand and press the patient’s nose upward using the thumb of the hand that is holding the muzzle as you begin inserting the tube with your other hand. This will help to guide the tube downward toward the esophagus rather than into the dorsal nasal cavity. Once you have inserted the tube about the length of the patient’s muzzle, lower the patient’s head, pointing its nose downward slightly. This motion should help guide the tube into the esophagus rather than the trachea. Use quick, short motions to insert the tube and release your hold on the tube after each inserting motion or if the patient sneezes. Continue to advance the feeding tube until you have reached the premeasured point on the tube. The patient may or may not swallow during placement as the tube passes into the esophagus. Swallowing may help the feeding tube to more easily pass down the esophagus; gently stroking the throat may encourage swallowing. If the patient begins to cough at any time during feeding tube placement, the tube is likely in the trachea. Stop, remove the tube and try again. However, lack of coughing does not ensure the tube is not in the trachea.

Attach a 6-ml syringe to the tube and check for negative pressure. If air is aspirated, the tube may be in the trachea, esophagus, or stomach. If liquid stomach contents are aspirated, the tube is in the stomach.

If negative pressure exists, flush 5–6 ml of sterile water into tube. If the patient coughs, the tube is in the trachea. If the patient does not cough, placement may or may not be correct. Radiographic confirmation is strongly recommended.

Cap the tube (an injection cap may be used for red rubber tubes or other tubes
that do not come with a cap attached) and temporarily suture the tube to the stay suture, leaving long tails to secure the tube in place once proper placement is confirmed. Pass a long piece of suture through the previously placed stay suture and secure with a square knot and secure with the finger trap pattern. The finger-trap suture is perfect for feeding tubes; it continues to tighten if the tube is tugged. The suture is wrapped around the tube, crisscrossed, and tied into a square knot. Repeat a minimum of five crosses. For red rubber tubes, each throw should be pulled tight enough to make a small indentation in the tube. For silicone tubes, pull tightly; however, indenting these tubes may cause them to become occluded. Secure the other end of the tube in a second location either on the cheek (the facial nerves run across this area of the cheek so the suture should go through the skin but be kept superficial) or on the top of the head. Tie a loose square knot near the skin, then secure the tube with a second square knot. This may also be done with the 22-gauge needle method described above. Smaller diameter tubes may also be attached in this second location with surgical staples.

Confirmation of placement for all NE and NG feeding tubes with a minimum of a single, lateral post-procedural radiograph is strongly recommended; many radiologists recommend a lateral and V/D radiograph to confirm correct placement. The patient may require an E-collar to prevent tube removal.

Assisted Feedings via Nasogastric (NG) and Nasoesophageal (NE) Tubes:

Before beginning assisted feeding, it is important to determine the patient’s Resting Energy Requirement (RER). RER represents the energy requirement for a normal animal, which has not been fasted, at rest under thermoneutral conditions. A common equation for calculating RER for patients weighing more than 2 kg and less than 45 kg is RER = 30 x (body weight in kg) + 70; however, this formula will overestimate the actual caloric needs of these patients. Equations for calculating RER for patients with a body weight of 2 kg or less and more than 45 kg, which the author recommends using for all patients, are:

\[ \text{RER} = 70 \times (\text{body weight in kg})^{\frac{3}{4}} \]
\[ \text{RER} = \sqrt[3]{\text{wt in kg} \times \text{wt in kg} \times \text{wt in kg}} \]

The general recommendation when beginning assisted feeding is to start at 25% of the patient’s total RER for the first twelve hours and, if well tolerated, to increase by 25% the total RER every twelve hours until full RER is reached. If at any time the patient vomits, discontinue feedings until vomiting has resolved, reduce volume by 25% when feeding is resumed, and increase volume more slowly.

Only liquid veterinary diets should be used for feeding through NG and NE tubes. CliniCare® Canine/Feline Liquid Diet, which contains 1 Kcal/ml, is a good option and may be fed by constant rate infusion or bolus feeding. Emeraid® Intensive Care HDN™ Feline and Emeraid® Intensive Care™ HDN Canine are powdered formulas which are mixed with water and are also a good option. The volume of water added to the powdered formula can be varied, depending on the diameter of the feeding tube; however, the caloric density is reduced as the volume of water is increased. The Emeraid® product may be used for bolus feedings, but it is not recommended for constant rate infusion. NE and NG feeding tubes may be used to administer oral liquid medications. Tablets should not be crushed and administered via these small tubes. A number of liquid diets designed for people are also available. These diets are typically less expensive than veterinary liquid diets; however, they are nutritionally inadequate and some may contain ingredients that are inappropriate for dogs and cats. These human diets are especially inappropriate for cats as they are too low in protein, taurine, and arginine.

When setting up a liquid diet CRI for trickle feeding, the volume of the liquid diet should not exceed the quantity that will be used in six hours. Equipment used to deliver the liquid diet (infusion tubing, syringe, bag) should be replaced every 24 hours to prevent bacterial growth contamination. Flushing the tube well with water after each bolus feeding, or every four hours for CRIs, will usually prevent the tube from becoming clogged with food.

Some patients may be irritated by the feeding tube and require a buster collar to prevent them from removing the tube. Some patients with NE or NG tubes may experience excessive sneezing. If this happens, gently lift the patient’s muzzle upward and apply two or three drops of a topical anesthetic into the nostril the tube is placed in. If the tube becomes dislodged, which usually causes coughing and/or discomfort and distress, stop feeding immediately. The tube should be removed. If assisted feeding is to be continued another feeding tube may be placed.
Esophageal Feeding Tubes

Esophageal feeding tubes are usually larger (often 14 Fr or larger), allowing for slightly less liquidized foods such as Purina ProPlan® Critical Nutrition™ Canine and Feline Formulas, Royal Canin Veterinary Diet® Recovery RS™, or Hill’s® Prescription Diet® a/d® with additional water added. Esophageal (E) tubes allow longer term use and clients are able to use them to administer bolus feedings and medications at home. A minimum of 5-6 ml of water should be flushed through the tube before use to ensure the tube has not become displaced and after every feeding to prevent clogging. Surgical placement under brief general anesthesia is required.

Esophageal Feeding Tube Placement

The patient is induced, intubated, and placed in right lateral recumbency. A surgical clip and surgical scrub are performed on the left side of the patient’s neck. A surgical incision is made into the neck and the esophageal feeding tube (usually 14Fr or larger) is inserted into the incision, directed toward the patient’s mouth. When the tip of tube exits the patient’s mouth, it is turned around and guided down patient’s esophagus. The end of the tube is capped; some brands of e-tubes have a built-in cap, other brands do not and will require a large Christmas tree adapter inserted into the end of the tube and an injection cap to cap the tube. The E-tube is sutured in place using the finger trap suture, as described above for NE & NG tubes. In the intubated patient, it is unlikely the feeding tube will be passed into the trachea; however, confirming proper placement with a single, lateral post-procedural radiograph is strongly recommended. A small amount of antibiotic ointment is applied on a gauze square and placed over the insertion site. A light bandage is applied around the patient’s neck; any excess tube is secured to the bandage. An E-collar should be applied to prevent the patient from removing the tube; once the incision site has healed, an E-collar is often not needed.

E-tube Feeding and Maintenance

Warm the diet to be fed to body temperature (100-102 F) by placing the can into a hot water bath for 5 minutes and mix it with a spoon for three to five minutes until very soft and smooth. Microwaving the food is not recommended as it may not heat evenly, leaving areas that are too cool or too hot. Other high calorie canned diets blended with enough water to allow for syringing through the feeding tube may also be used. However, diets requiring dilution with a large amount of water will increase the required volume fed. The patient’s total daily caloric intake is normally split into three or four feedings per day. It is advisable to start by feeding small amounts for the first three or four days, gradually increasing to the desired daily total. Slowly feed over fifteen to twenty minutes. If the patient starts to drool, lick her/his lips excessively, or vomits, stop the feeding. Wait five to ten minutes, then try again more slowly. If the above happens again, then stop the feeding and wait at least one hour before resuming. Water and liquid medications may also be administered through the tube. Flush the tube with 5 ml of water before feeding to ensure the tube is not blocked and again after food administration to help prevent residue from building up and blocking the feeding tube.

The neck wrap should be changed every three days. Unwrap the tube, being very careful not to cut the tube, and evaluate the tube entry site for discharge, swelling, or pain. Gently clean the site with a moist cotton ball or cotton tipped swab, then place antibiotic ointment on a gauze square, place the gauze over the site, and re-bandage.

Patients can eat normally with the tube in place, and an appropriate diet may be offered at any time. If the patient eats a reasonably sized meal, then do not feed through the tube. If they do not eat or only eat very little, then continue the tube feedings.

If the tube becomes clogged, fill the tube with warm water, cap, and let it sit for ten to fifteen minutes. Try flushing the tube again. If the clog has not been dislodged, fill the tube with pancrelipase (Viokase® V) powder mixed with warm water or Coca-Cola; let set for twenty to thirty minutes,
Percutaneous Endoscopic Gastrostomy (PEG) Tubes

Percutaneous Endoscopic Gastrostomy Tubes (PEG) are surgically inserted through the abdominal wall into the stomach. They may be used for long term cases and clients are able to administer bolus feedings and medications at home. General anesthesia is required and placement via an endoscope is recommended, although they may also be placed “blind”. Feeding via the PEG tube can begin as early as twelve hours post placement; however, waiting 24 hours is usually recommended. Once a PEG tube is placed, it should not be removed for ten to fourteen days to prevent leakage of gastric contents into the abdominal cavity. This type of feeding tube can remain in place for months and may be replaced with a low-profile tube for long-term use. The incision site may require superficial cleaning for a few days post insertion. Water should be flushed thru the PEG tube after every feeding to prevent clogging. After removal, the gastrocutaneous tract closes within 24 hours.

Percutaneous Endoscopic Gastrostomy Tube Placement:
The patient is induced, intubated, and placed in right lateral recumbency. A surgical clip and surgical scrub are performed on the patient’s left side, caudal to last rib. The endoscope is inserted through the patient’s esophagus, into the stomach, and the stomach is inflated with air. Pressure is applied with the index finger of a sterile gloved hand just caudal to the last rib, allowing for visualization of the potential placement site.

Once the position is selected, a 16-gauge IV catheter is forcefully inserted through the abdominal wall and into stomach, directing it under the last rib. Suture material is inserted through the catheter into the stomach, taking care not to let go of the catheter or the end of the suture. Grasping forceps are passed through the endoscope, the suture material is grasped with the forceps, and the endoscope is removed, bringing the suture out of mouth. The suture, which has been withdrawn through the mouth, is attached to the PEG tube. The catheter is held in place while pulling the suture with the PEG tube attached back into the mouth and to the stomach body wall. The catheter is then removed. The skin is tented by pulling up on the suture, and a small skin incision is made with a #11 blade. The PEG tube is pulled out through skin and the suture is removed. A hole is cut at the midpoint of the flange, which is slid onto the PEG tube until it contacts the skin to serve as external bumper. It is important this is not too tight, as it can cause pressure necrosis to skin or stomach. The endoscope is reinserted to visually confirm proper placement and a picture is taken to document correct placement. A small amount of antibiotic ointment is applied on a gauze square, which is placed over the insertion site. A light wrap is placed around the patient’s abdomen with rolled bandage material, rolled gauze, and elastic cling. The external end of the PEG tube is attached to the bandage. An E-collar is required to prevent the patient from removing the tube. Gentle cleaning of the site maybe required daily for the first few days after PEG tube placement. This may be done with a moist cotton ball or cotton tipped swab. Place antibiotic ointment on square gauze over the site and apply a bandage as above. Once the incision site has healed, many patients do well with a tee-shirt covering the area rather than bandaging.

PEG Tube Feeding and Maintenance

Before every feeding, aspirate the feeding tube by attaching a syringe to the end of the feeding tube and drawing back on the plunger. If an excessive amount of liquid is aspirated, do not feed; wait one hour and recheck. The prescribed amount of food should be fed over 20 minutes. Food should be warmed to body temperature (100–102° F) by placing the can into a hot water bath for five minutes. Do not microwave as the food may not heat evenly, leaving areas that are too hot or too cold. Mix the food with a spoon for three to five minutes until very soft and smooth. Water and liquid medications may also be administered through the tube. When warming, always check the temperature to make sure it is not too hot. Start with feeding a small amount of food every six hours, then increase to a quarter of the patient’s daily caloric requirement of food every six hours. If feedings are well tolerated over the next one to two weeks we will decrease the frequency of feedings to every eight hours and increase the amount. After feeding, flush the feeding tube with water and cap the feeding tube. If the patient is not drinking, water may also be supplemented via the feeding tube.

Patients can eat normally with the tube in place and an appropriate diet may be offered at any time. If the patient eats a reasonably sized meal, then do not feed through the tube. If they do not eat or only eat very little, then continue the tube feedings.

If the tube becomes clogged, fill the tube with warm water, cap, and let it sit for ten to fifteen minutes. Try flushing the tube again. If the clog has not been dislodged, fill the tube with pancrelipase (Viokase®V) powder mixed with warm water or Coca-Cola, let set for 20-30 minutes, and then try to flush with water again. If the PEG tube is still clogged, it may need to be replaced.

Less Common Types of Feeding Tubes

Pharyngostomy tubes, which are placed caudal to the mandible and terminating in the distal esophagus, require anesthesia for placement and care must be taken that the tube does not interfere with the laryngeal opening and epiglottis. Pharyngostomy tubes are not very commonly used, as they are generally no larger than NE or NG tubes (which do not require anesthesia to place) and thus only liquid diets may be used.
Jejunostomy tubes (J tubes), which are placed within the small intestine, ideally surgically, or via laparotomy, are normally 5-8 Fr and therefore only liquid diets may be used. The stomach is bypassed and the small intestine has limited storage space; therefore, a constant rate infusion of a liquid diet is recommended when using this type of feeding tube, although some patients tolerate frequent small bolus feedings. J tubes are not often used unless the stomach must be bypassed. Cost is usually the same or similar to gastrostomy tubes, which can be used by owners at home and can be left in much longer.

Additional information on these less common types of feeding tubes is not included in this article due to space limitations.

**Discontinuing Assisted Feedings**

When the patient is voluntarily eating 60% of its RER, assisted feedings should gradually be reduced and discontinued when voluntary consumption has reached the patient’s full RER. Long-term feeding tubes should not be removed until the patient has been eating its full RER consistently and maintaining its body weight for a minimum of one month or more.

**REFERENCES:**


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**Feeding Tube Article Questions**

1) A feeding tube should be considered for any patient that has not eaten at least 75% of its resting energy requirement for
   a) 3 days or more
   b) 4 days or more
   c) 5 days or more
   d) 6 days or more

2) When measuring for nasogastric tube placement measure from the nose to what anatomical landmark?
   a) Thoracic inlet
   b) 5th rib
   c) 8th intercostals
   d) Last rib

3) Which of the following equations is not recommended when calculating the resting energy requirement for patients weighing under 2 kg or over 45 kg?
   a) \( \text{RER} = 30 \times \text{(body weight in kg)} + 70 \)
   b) \( \text{RER} = 70 \times \text{(body weight in kg)} \frac{3}{4} \)
   c) \( \text{RER} = \sqrt[3]{x} \times \text{(wt in kg x wt in kg x wt in kg)} \)
   d) Any of these may be used

4) Percutaneous endoscopic gastrostomy tubes are inserted into the
   a) distal esophagus
   b) small intestine
   c) stomach
   d) large intestine

5) Patients generally do not require anesthesia for the placement of
   a) Esophageal feeding tubes
   b) Percutaneous endoscopic gastrostomy tubes
   c) Jejunostomy tubes
   d) Nasoesophageal feeding tubes

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FISH OILS & FATTY ACIDS IN CARDIAC PATIENTS

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Learning Objective: After reading this article, participants will be able to understand the importance of Omega-3 Fatty Acids and the role such nutrients play in managing cardiac disease.
Nutrition is an important part of managing cardiac disease, and each cardiac patient should have a nutritional assessment and specific dietary recommendation from the veterinarian and the veterinary technician as part of their overall management. The goals of nutritional management of cardiac patients include: 1) maintaining the pet’s ideal body condition, 2) maintaining appropriate balance of nutrients, and 3) receiving benefits from pharmacologic doses of certain nutrients. It is exciting to note that Omega-3 fatty acids play a role in each nutritional goal. Although cardiac cachexia is prevalent in cardiac disease, this discussion will review the role of Omega-3 fatty acids in cardiac disease with respect to arrhythmias and valvular disease. Cardiac cachexia and the role of nutrition and fatty acids specifically deserve their own presentation and discussion.

In dogs and cats, cardiovascular disease is a common disorder with an estimated 11% of canines and 20% of felines affected. Chronic valvular disease has been found to be the most common acquired heart disease in dogs, with an overall incidence greater than 40%. Specifically, chronic mitral valvular disease is the most prevalent acquired cardiac abnormality in dogs, affecting more than one-third of patients over 10 years of age. Of chronic valvular disease cases, approximately 30% involve the tricuspid valve (however, disease of the tricuspid valve is usually less severe than mitral valve disease). The prevalence of valvular disease has been found to be higher in small breed dogs, while acquired valvular disease in cats is rare. Following the discovery that taurine deficiency was the principal cause of dilated cardiomyopathy in cats in 1987, the prevalence of this disease has decreased significantly. At this time, hypertrophic and restrictive cardiomyopathies are more prevalent causes of myocardial failure in cats.

In human medicine, there is substantial evidence supporting the positive effects of Omega-3 fatty acids in primary and secondary prevention of cardiac disease. Dietary fat is important for energy, both as a carrier of fat soluble vitamins and as a source of essential fatty acids. The world today finds the term ‘fat’ to have negative connotations. However, the veterinary healthcare team must remember that dietary fat is essential for life; they must be ready to educate clients on the importance of fat and fatty acids in the diet.

This is especially true when educating a client whose pet may be afflicted with cardiac disease. Dietary fat is the most concentrated form of energy in pet foods, with fat providing 2.25 times (9 kcal/gram) the metabolizable energy of proteins and carbohydrates. Fats affect immune function, inflammation, and hemodynamics. Fat, especially Omega-3 fatty acids, has also been shown to affect the cardiovascular system.

Recent evidence in veterinary medicine has been supportive of the use of Omega-3 fatty acids in dogs with cardiac disease. The benefits of Omega-3 fatty acids include anti-inflammatory and anti-arrhythmic effects, which help in managing the patient’s lean body mass and arrhythmias, two problems associated with cardiac disease.

Fatty Acids

The structure of lipids ranges from simple to complex. Hydrocarbon molecules are basic subunits of lipids and are linked by covalent bonds in various manners to themselves and to other molecules, thus resulting in the numerous functions and structures occurring in the animal.

The Omega-3 fatty acids have the first double bond between the third and fourth carbon; Omega-6 fatty acids have the first double bond between the sixth and seventh carbon; and the Omega-9 fatty acids have the first double bond between the ninth and tenth carbon. The Omega-3 and Omega-6 fatty acid families are termed essential fatty acids (EFA), meaning they cannot be synthesized in animals. Members of the Omega-6 family include linoleic acid (18:2n-6) (Figure 1), g-linolenic acid (18:3n-6) and arachidonic acid (20:4n-6). Dogs are able to synthesize linoleic acid to form arachidonic acid. Consequently, linoleic acid is customarily listed as an EFA for dogs. However in cats, both linoleic acid and arachidonic acid cannot be synthesized and are EFAs. In the body, Omega-6 fatty acids are necessary for growth and reproduction. Omega-6 fatty acids are also precursors of eicosanoid and prostaglandin synthesis. Omega-3 fatty acids include a-linolenic (18:3n-3), eicosapentaenoic (20:5n-3) (EPA) (Figure 2) and docosahexaenoic (22:6n-3) (DHA) acids. Omega-3 fatty acids are necessary for proper brain and retinal function. Both Omega-3 and Omega-6 fatty acids are

![Figure 1](image-url)
The make-up of the diets for dogs, cats, and humans contains primarily Omega-6 fatty acids. Nevertheless, dietary adaptation or supplementation of Omega-3 fatty acids can significantly increase Omega-3 fatty acid concentrations in the blood and tissues, as Omega-3 and Omega-6 fatty acids compete with one another for enzymes required for their metabolism. As a result, the higher the amount of Omega-3 fatty acids in the diet, the more Omega-3 fatty acids will be utilized and incorporated into cells.1,7

It has been noted that, when compared to normal dogs, dogs diagnosed with heart failure had a deficiency of plasma EPA and DHA.1,8 It was also shown that plasma fatty acid abnormalities in dogs with heart failure secondary to dilated cardiomyopathy (DCM) could be stabilized with eight weeks of fish oil supplementation.1,8 Researchers are beginning to study the use of Omega-3 fatty acids as a method to help improve myocardial energy metabolism and mitochondrial function, which has produced promising results thus far. Therefore, in an attempt to correct deficiencies in cardiac patients and to benefit energy metabolism, Omega-3 fatty acids may be supplemented.1,6

Omega-3 fatty acids and the overall effect on the cardiac patient

Omega-3 fatty acids have been shown to have a significant effect on survival times when used in dogs diagnosed with DCM or chronic valvular disease (CVD).9 However, the veterinary healthcare team should also be aware of further effects of omega-3 fatty acids on the patient, including the potential to alter immune function. In addition, Omega-3 fatty acids reduce platelet aggregation resulting from the production of thromboxane B5. While reduction in platelet aggregation might be of benefit in cats with cardiac disease and those at risk for thrombus formation, it is important to be mindful of patient history when using Omega-3 fatty acids in animals with coagulopathies.

This discussion has only touched the tip of current research and the effects of fatty acids and cardiac disease. Although more studies and discussion are needed in the long term, it is strongly believed that dogs and cats with cardiac disease may benefit from Omega-3 fatty acid supplementation.

Arrhythmias

To date, studies in humans have correlated the benefits of fish consumption with the reduction in risks for developing coronary heart disease and subsequent death from myocardial infarction.1,8 Historically, human studies have looked at fatty acids and their effects on ventricular arrhythmias. However, recent studies have also examined atrial fibrillation and have suggested that supplementation of Omega-3 fatty acids reduces atrial fibrillation. Human populations that eat higher amounts of fish or have higher Omega-3 fatty acid concentrations were also more likely to have a lower incidence of atrial fibrillation.

There has only been one study reported to date that looked at the effect of Omega-3 fatty acids on naturally occurring disease in dogs. In this study, the number of ventricular arrhythmias in boxers was reduced. This reduction was noted after six (6) weeks of fish oil supplementation as compared to the control—sunflower oil. Obviously, more research will need to be done, as this is only one study that examined only one breed of dog. Therefore, although the results of omega-3 fatty acids on arrhythmias have been positive, omega-3 fatty acids should only be considered as an addition to medical therapy for dogs with significant arrhythmias until more research can be conducted.
timing, and Omega-3 fatty acid form when considering supplementation.

**Dose**

At this point in time, no optimal dose of Omega-3 fatty acids has been established for humans, cats, or dogs. The current recommendation from nutritionists studying fatty acids and cardiac disease is a dose of 40 mg/kg EPA and 25 mg/kg DHA for both dogs and cats.1

**Timing**

Timing must be taken into consideration when supplementing Omega-3 fatty acids. The healthcare team should remember (and educate owners) that the majority of Omega-3 fatty acid benefits occur after peak plasma and tissue concentrations have been achieved. Although plasma concentrations may increase significantly in the first week of Omega-3 fatty acid supplementation, typically 4 to 6 weeks are required to reach peak plasma concentrations.

**Form**

EPA and DHA can be provided via the diet or as a dietary supplement. There are a few therapeutic pet foods with high levels of EPA and DHA, but the majority of foods manufactured today do not achieve the recommended level of EPA and DHA. The recommended dose is 40 mg/kg EPA + 25 mg/kg DHA. Therefore, a manufactured food would need to contain between 80 and 150 mg/100 kcal EPA + DHA.1 Other factors that would need to be taken into consideration would be the size of the pet and the amount of food consumed. If the pet is not prescribed the high fatty acid foods, a recommendation of fish oil supplementation would be necessitated. However, caution must be given when making a supplement recommendation, as fish oil supplements vary widely in the amount of EPA and DHA they contain. The healthcare team should be familiar with various brands of fish oil supplements and plan to make a recommendation based on a specific brand with which the concentration of EPA and DHA have been researched and confirmed.

Fatty acids—especially Omega-3 fatty acids—have been shown to benefit to dogs and cats suffering with cardiac disease. Veterinary technicians should be able to understand and educate clients regarding these benefits and be able to make recommendations regarding the dose and form of supplementation that will meet the needs of individual patients.

**REFERENCES**


Kara M. Burns, MS, MEd, LVT, VTS (Nutrition), VTS-H (Internal Medicine, Dentistry)

Kara Burns is a licensed veterinary technician originally from New England, now living in Kansas. She holds a master’s degree in physiology and a master’s degree in counseling psychology. She began her career in human medicine working as an emergency psychologist in the Maine Medical Center emergency department. She also worked at Maine Poison Control as a poison specialist dealing with human and animal poisonings. She then made the move to veterinary medicine and worked in small animal private practice and a small animal and avian practice in Maine.

Kara is the Founder and President of the Academy of Veterinary Nutrition Technicians, the tenth recognized specialty for veterinary technicians and has attained her VTS (Nutrition). She teaches nutrition courses around the world on the VIN/Veterinary Support Personnel Network and on VetMedTeam. She also is a contributor to Labeledvet.com. Kara also works as an independent nutritional consultant.

She is a member of many national, international, and state associations and holds positions on many boards in the profession; AAVNV executive board technician liaison; the NAVTA Journal assistant editor in chief; NAVTA Communications Director; Veterinary Team Brief Advisory Board; VSPN Nutrition Board Moderator; International Society for Sports Nutrition; and is the president of the Kansas Veterinary Technician Association, to name a few.

She has authored many articles, textbooks, and textbook chapters and is an internationally invited speaker, focusing on topics of nutrition, leadership, and technician utilization.
Fish Oils & Fatty Acids Article Questions

1) Omega 3 fatty acids are responsible for all of the following functions except:
   a) Brain function
   b) Skin health
   c) Growth
   d) Cell membrane fluidity

2) Dietary fats:
   a) Carry water soluble vitamins
   b) Are a source of non-essential fatty acids
   c) Are the most concentrated form of energy in pet foods
   d) Are the least concentrated form of energy in pet foods

3) Recommended doses for EPA/DHA supplementation are:
   a) 40mg/kg and 25mg/kg
   b) 25mg/kg and 40mg/kg
   c) 50mg/kg or each
   d) None of the above

4) Peak plasma concentrations of Omega’s can be achieved after how many weeks of supplementation?
   a) Immediately; no wait is needed
   b) 2-4 weeks
   c) 4-6 weeks
   d) 12 weeks

5) Nutritional goals that should be considered when managing cardiac patients include:
   a) Ideal body condition
   b) Appropriate balance of nutrients
   c) Appropriate balance of nutrients
   d) All of the above
In a field of overachievers, perfectionists and driven individuals, it is easy to forget to take care of ourselves. We take care of our clients, patients, staff, and families. Quite often we leave ourselves out of that equation. Repeatedly not taking care of ourselves physically, emotionally, and spiritually can have a negative effect on our view of ourselves and the world. VSSU created “31 Days of Self Care” as a tool to give members small, daily tasks to promote self-care. We can take small steps to improving ourselves, creating lifelong habits to encourage self-care. When we feel cared for, we will provide better care for those counting on us!

Day 1: Drink water!
Day 2: Go for a 15-minute walk
Day 3: Look at old photographs
Day 4: Leave work for lunch
Day 5: Write down 3 things you are awesome at!
Day 6: Spontaneous dance party!
Day 7: Turn off your phone
Day 8: Take a bubble bath
Day 9: Draw something and share with the group
Day 10: Exercise for 20 minutes

See Veterinary Support Staff Unleashed for 21 more great tips of self-care!

“Seeing the daily posts has been a big help to me. I didn’t always do what was recommended, but seeing the reminders made me get up and do something for me. Even if it was doing the dishes before bed so that my mind felt more at ease in a cleaner house.” - Michelle Rewcastle, RVT

In 2014, Jade Velasquez, LVT, created Veterinary Support Staff Unleashed on Facebook, which has gathered over 3,800 members due to its strong focus on providing emotional and professional support.
CASE STUDY

PULMONIC STENOSIS IN A 4-YEAR-OLD LABRADOR

Jena West, BA, LVMT, Cardiology Department
University of Tennessee, College of Veterinary Medicine

Signalment: Abby is a 4-year-old, F/S Labrador retriever dog weighing 27.04 kg.

During an emergency room (ER) visit for lower lumbar pain, Abby became cyanotic while being restrained for spinal radiographs. During the physical exam, a III/VI left basilar systolic heart murmur was auscultated; no other abnormalities had been noted. The referring veterinarian (rDVM) examined the radiographs and noted a large cardiac silhouette with a rounded, right lateral margin consistent with right atrial (RA) and right ventricular (RV) enlargement. Mild enlargement of the main pulmonary artery was noted as well. Due to the right-sided cardio-megaly with enlargement of the main pulmonary artery, the rDVM believed that Abby might have a congenital defect that had gone undetected. A blood sample was obtained in which the hematocrit level was normal at 59% (reference range: 37.3%-61.7%). For the back pain, Abby was prescribed gabapentin 300 mg PO TID (11 mg/kg) and tramadol 50 mg PO (1.8 mg/kg) in the morning and 100 mg PO (3.6 mg/kg) in the evening.
Abby was referred to the University of Tennessee, College of Veterinary Medicine (UT CVM) one month later for further evaluation of the cardiomegaly, cyanosis, and the heart murmur detected during the ER visit. The owners reported that Abby had been doing well in regard to her back pain. She had not had any other cyanotic episodes, but she had developed mild exercise intolerance. Abby had been eating, drinking, urinating, and defecating normally. She did not have any vomiting or diarrhea.

Upon presentation to UTCVM, Abby was bright, alert, and very responsive. Abby’s body weight was 27.04 kg. She had a heart rate (HR) of 80 beats per minute (bpm), an irregular heart rhythm, and no pulse deficits. The technician ausculted a high pitched, grade V/VI left basilar systolic murmur closest to Abby’s sternum. A thrill was felt on both sides of the thorax. Her respiratory rate (RR) was 21 breaths per minute (bpm) with normal effort and lung sounds; no wheezes or crackles were heard. Due to the patient’s excited state, the technician could not assess Abby’s temperature. The remainder of the physical exam (PE) was unremarkable.

The problems list included a V/VI left basilar systolic murmur, right-sided cardiomegaly, an arrhythmia, and exercise intolerance/cyanosis. Abby’s initial prognosis was guarded due to the severity and unknown cause of the murmur and her cyanotic episode.

Differential diagnoses of the V/VI left basilar systolic murmur and right-sided cardiomegaly included pulmonic stenosis (PS), subaortic stenosis, ventricular septal defect, atrial septal defect, and tetralogy of Fallot. Differential diagnoses for the arrhythmia included a sinus, atrial, junctional, or ventricular arrhythmia. Differential diagnoses for Abby’s exercise intolerance/cyanosis included pulmonary hypertension, acquired heart disease (such as dilated cardiomyopathy), or a severe congenital heart defect (listed above) with right to left shunting of blood.

The RDVM radiographs were provided to UT CVM. Under the guidance of the cardiologist, the technician evaluated the radiographs. She noted that there were rounded right lateral margins of the cardiac silhouette, suggesting enlargement of the RA and the RV. There was mild enlargement of the main pulmonary artery, although the peripheral pulmonary vasculature was within normal limits (Figure 1).

The technician suggested that an echocardiogram be performed to investigate the cause of the murmur, evaluate chamber sizes, examine the functioning status of the left heart, and to look at the heart valves. It was also recommended to evaluate the direction of blood flow with a Doppler.

The cardiologist performed the echocardiogram with the assistance of the technician. The findings included severe concentric hypertrophy of the RV (Figure 2), a narrowed pulmonic valve (PV) annulus, and thickened and fused valve leaflets of the PV (diagnosed as valvular PS with a type B morphology). The pulmonic velocity was severely increased at 5.1 m/s, with a pressure gradient of 105 mmHg (severe is classified as any pressure gradient > 80 mmHg) (Figure 3). There was mild tricuspid regurgitation, a mildly dilated RA, and a patent foramen ovale (PFO) (Figure 4). The PFO was positively identified with a bubble study performed during the echocardiogram. The bubble study was conducted using a 20g, 1-inch peripheral catheter that was placed in the right cephalic vein. 0.3 ml of sterile saline was agitated between two 6 ml syringes held together with a three way stop cock and the resulting bubbles were injected through the catheter. The cardiologist held the probe over the atria and recorded the bubbles as they crossed the interatrial septum from right to left. This confirmed the diagnosis of a PFO with right to left shunting.
The foramen ovale was patent as a result of increased pressure in the right side of the heart forcing the atrial septum apart. The separation, causing a right to left shunt, was permitting the unoxygenated blood to bypass the lungs (not allowing it to be reoxygenated) and return to the body. This was the cause of Abby’s cyanosis.

The technician was asked to perform a PCV (74%; normal range 37%-55%) with total solids (TS) of 7.0 g/dl (normal ranges 5.8-7.2 g/dl), indicating that Abby was polycythemic. To address this, the cardiologist asked the technician to perform a therapeutic phlebotomy. Abby was sedated with 8.1 mg (0.3 mg/kg) of butorphanol IV. Once Abby was comfortable, the technician placed a single lumen, 18g central indwelling catheter using the Seldinger technique in the left jugular vein. The catheter was secured with 3-0 nylon suture, and the balloons used in the procedure. Abby’s owners elected not to pursue the balloon valvuloplasty procedure, but rather chose to continue the medication treatment as previously prescribed to see if a further reduction in velocity of the valve could be achieved. The PCV/TS was evaluated (72% /7.4 g/dl) and therefore could be achieved. The PCV/TS was further reduced with the following medication treatment plan outlined by the cardiologist: atenolol 12.5 mg PO BID (0.5 mg/kg) for 7 days; 25 mg PO BID (1 mg/kg) for 7 days; final dose of 37.5 mg PO BID (1.4 mg/kg). Atenolol is a selective B1 receptor antagonist, and the cardiologist chose atenolol in this case to try to decrease the pressure gradient across the PV by slowing the HR and decreasing the force of contractions. This would give the RV more time to eject blood through the narrowed valve and lessen the pressure placed on the right side of the heart by the PS.

Abby returned to her rDVM 3 months later for a PCV/TS to evaluate the effects of the right to left shunt and a renal panel to examine Abby’s kidney function since beginning atenolol. The PCV/TS was reported as 61%/6.0 g/dl. The renal panel values were within normal limits. No changes were made to Abby’s medication.

6 months post procedure, Abby returned to UT CVM for a medical progress exam. Her owners reported that she had not experienced any cyanotic episodes and seemed to be tolerating the atenolol very well. Upon presentation, she was bright, alert, and responsive. Her HR was 84 bpm with an irregular rhythm, RR was 26 breaths per minute with a normal effort, and her BW was 28 kg. A V/VI left basilar systolic murmur was present and no wheezes or crackles were auscultated. The patient’s excited state prohibited the technician from assessing pulse quality or obtaining a temperature. The remainder of the PE was unremarkable.

A limited echocardiogram was performed to reassess the velocity of the pulmonic valve since starting atenolol. The pressure gradient was 4.74 m/s and 89 mmHg (a vast improvement from her initial visit to UT CVM of 5.1m/s and 105 mmHg). Abby’s owners were advised to return to UT CVM in 6 months. If at that visit the effects of atenolol have further reduced the velocity of the PV, balloon valvuloplasty will again be placed on hold.

Discussion:
PS is one of the most commonly reported congenital defects in canines, yet it occurs infrequently in felines and even more rarely in large animals5. This obstruction to right ventricular outflow develops as a result of abnormal partitioning or development of the bolbus cordis and truncus arteriosus during embryonic development. Three forms of this stenosis have been identified, including valvular stenosis (within the valve), subvalvular stenosis (below the valve), and supravalvular stenosis (stenosis of the pulmonary artery)6. The most common form (valvular PS) involves thickened, fused leaflets of the PV itself6. Valvular PS
can further be divided into two categories: type A and type B. Type A is characterized by fusing and thickening of the valve leaflets and having an annulus with a normal diameter. Type B (also referred to as PV dysplasia) involves minimally fused leaflets and a hypoplastic annulus (Figure 6 and 7). There is severe RV thickening with type B valvular PS because the stenosis causes increased resistance to right ventricular outflow, causing the RV to generate higher pressure to keep blood moving forward. The increased RV pressure is not transmitted into the pulmonary artery. The pressure drops back to normal (or low) after the stenotic valve but the stress in the RV wall does lead to RV hypertrophy without dilation.

At the level of the stenosis and just beyond it, the velocity of blood flow increases, causing a focal dilation of the main pulmonary artery (post stenotic dilation). Dogs with severe PS can develop right-sided heart failure with ascites although this only occurs in the presence of tricuspid regurgitation.

The foramen ovale is present in all mammals prior to birth. After birth, when the pressure on the left side of the heart exceeds the pressure on the right side, the two portions of the atrial septum (septum primum and septum secundum) are pushed together and fuse. When the pressure remains higher on the right side of the heart as it does with severe PS, the two parts of the atrial septum are kept apart and cannot fuse. This allows blood to flow from the right to the left, bypassing the lungs and resulting in cyanosis. The kidneys’ response to the unoxygenated blood is to release erythropoietin. Erythropoietin in turn stimulates bone marrow to release more red blood cells into circulation, resulting in polycythemia. When the PCV/TS is over 70%, it triggers thromboembolic problems that can lead to death. Polycythemia is a common, eventual outcome of right to left shunting because of the kidneys’ response to unoxygenated blood.

Currently there is no permanent treatment for right to left shunting through the foramen ovale. The increased PCV/TS can be carefully managed by phlebotomy and attempting to decrease the PS gradient medically.

Hydroxyurea, a medication that is sometimes paired with chemotherapy, is used for its bone marrow suppressive effects and can decrease red blood cell production. In Abby’s case, if phlebotomy alone does not control her polycythemia in the future, hydroxyurea could be used as an additional therapy. The medication could help maintain a lower PCV and eliminate the need for frequent phlebotomy, but it may cause excessive bone marrow suppression, resulting in immunosuppression. Frequent blood tests would be required to monitor Abby while she is taking the hydroxyurea. Hopefully Abby will continue to respond well to the use of atenolol and periodical phlebotomy procedures because of the increased risks associated with utilizing hydroxyurea to treat the polycythemia.
CASE STUDY: CALCIUM & DAISY DEVORE

Tracey Nowers, CVT, VTS (Clinical Practice-Canine / Feline and SAIM)

Figure 4: Daisy on her final discharge.
Daisy was an 8-year-old, Australian Cattle Dog mix that presented to our internal medicine department on Tuesday, June 21, 2016 for evaluation of hypercalcemia. She had originally presented to her primary care veterinarian for shaking and limping on June 7, 2016. An initial chemistry panel revealed elevated total calcium. A malignancy panel revealed an ionized calcium (iCa) of 1.93 mmol/L (normal 1.25-1.45 mmol/L), parathyroid hormone (PTH) level of 2.40 pmol/L (normal 0.5-5.80 pmol/L), and a 0 pmol/L parathyroid hormone–related peptide (PTH-rP) level (normal 0.0-1.0 pmol/L). Thoracic radiographs were within normal limits, and pelvic and hind limb radiographs revealed arthritic changes with no obvious bone lesions. The primary care veterinarian prescribed 500 mL of Lactated Ringer’s Solution (LRS) to be administered twice daily, and 50mg tramadol (2mg/kg) every 8 hours. Daisy consumed Science Diet adult dry and was the only dog in the household.

Upon presentation, her physical exam findings were within normal limits (Figure 1). Our hospital performed an abdominal and cervical ultrasound, in which mild age-related kidney changes were noted, but the remainder of the abdominal organs were normal. On cervical ultrasound, there was a small, round, hypoechoic nodule on the right side consistent with right parathyroid.

A single ventrodorsal (VD) pelvic radiograph read by a boarded radiologist indicated the presence of severe bilateral coxofemoral joint osteoarthrosis with severe remodeling of the acetabulae and femoral heads/necks. Both acetabular fossae were shallow with evidence of hip joint laxity. The right coxofemoral joint space was collapsed. Evidence of a previous left tibial tuberosity advancement procedure was present on this VD view; left stifle joint osteoarthrosis also present. The lumbosacral spine showed mild spondylodiscosis deformans involving several lumbar intervertebral (IV) spaces. Although seven lumbar vertebrae were present, L7 was suspected to be a transitional LS vertebra; the L6-7 IV space more closely represented a normal LS IV space.

The owner was advised to allow Daisy unrestricted access to fresh drinking water at all times, since her hypercalcemia was interfering with her ability to retain water via the kidneys. The owners were also

<table>
<thead>
<tr>
<th>Figure 1: Daisy’s First Physical Exam Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight:</strong> 24 kg</td>
</tr>
<tr>
<td><strong>Temperature (Temp):</strong> 102.4° F</td>
</tr>
<tr>
<td><strong>Pulse:</strong> 120 beats per minute (bpm)</td>
</tr>
<tr>
<td><strong>Respiratory rate (RR):</strong> 38 bpm</td>
</tr>
<tr>
<td><strong>Ears, eyes, nose, teeth (EENT):</strong></td>
</tr>
<tr>
<td>Nose is clean and there is no discharge; eyes are clear and pupils are a normal size; ears are clean and dry; dental disease stage II with mild calculus.</td>
</tr>
<tr>
<td><strong>Mucous membranes (MM):</strong> Pink, moist; capillary refill time (CRT) &lt;2 sec.</td>
</tr>
<tr>
<td><strong>Cardiovascular:</strong> Cardiac auscultation is within normal limits. Pulses are strong and synchronous; normal sinus rhythm; no murmur.</td>
</tr>
<tr>
<td><strong>Pulmonary:</strong> Lung sounds are clear in all fields.</td>
</tr>
<tr>
<td><strong>Gastrointestinal:</strong> The abdomen is comfortable when palpated. No masses are appreciated on palpation and the abdomen is not distended.</td>
</tr>
<tr>
<td><strong>Musculoskeletal (M/S/I):</strong> She is ambulatory in all 4 limbs. No lameness or muscle atrophy appreciated. BCS 5/9.</td>
</tr>
<tr>
<td><strong>Integument:</strong> The hair coat is shiny and smooth and the skin is soft and unbroken. Skin turgor is normal.</td>
</tr>
<tr>
<td><strong>Urogenital:</strong> There is no discharge from the vulva.</td>
</tr>
<tr>
<td><strong>Neurological:</strong> Conscience proprioception is normal in all 4 limbs. Cranial nerves are normal.</td>
</tr>
<tr>
<td><strong>Lymph nodes:</strong> Normal in size and shape.</td>
</tr>
</tbody>
</table>
advised to continue to watch Daisy closely for any progression of clinical signs that might indicate a level of hypercalcemia requiring hospitalization for intensive care (weakness, irritability, tremors, progressive lethargy, vomiting, diarrhea, or loss of appetite). An exploratory surgery was scheduled for the following week.

On June 28, Daisy was admitted for a cervical exploration with the boarded surgeon. She was also scheduled to have an orthopedic evaluation by a boarded orthopedic surgeon prior to anesthesia for her previously diagnosed arthritis that was causing lameness. Her ionized calcium during admission was 1.71 mmol/L (normal = 1.25-1.45 mmol/L) (refer to table 1); total calcium was 13.7 mg/dL (normal = 7.9-12mg/dL) and her SAP (serum alkaline phosphatase) was 414 U/L (normal = 23-212 U/L). She had low platelets on the complete blood count (CBC), but the peripheral smear showed she had adequate platelets with clumping. She was premedicated with 0.3mg/mL buprenorphine - 0.8mL IV (0.01mg/kg) and induced with 10mg/mL alfaxalone - 5.8mLs IV (3mg/kg), to effect. She was slowly given a preoperative antibiotic of 100mg/mL cefazolin - 5.3mLs IV (22mg/kg). She was maintained on sevofluorane (figure 2). Daisy received 0.9%NaCl IV fluids at 96mL/h pre-op and LRS at 240mL/h peri-op. Since saline does not contain calcium or promote caliuresis, it was a better choice than LRS/Normasol.

Daisy was stable throughout her 30-minute procedure, and surgery confirmed a right parathyroid nodule (which was removed and submitted for biopsy). There were no anesthetic complications, and her recovery was uneventful. The orthopedic examination revealed osteoarthritis in both knees and hips. She also had lumbosacral degeneration. Her ionized calcium later that evening was 1.80 mmol/L.

The following day (Day 2), the iCa was 1.86 mmol/L in the morning and dropped to 1.82 mmol/L overnight. She was eating, drinking normally, and comfortable. Her physical examination findings included pink and moist mm, crt < 2 sec, pulse=88bpm, RR=24bpm, Temp=102.2° F, and weight of 25.6kg. Daisy was fully ambulatory with a mild, weight-bearing limp on the right hind limb. The ventral cervical incision was clean, dry, and intact. There was no heat, pain, swelling or discharge.

On June 30 (Day 3), Daisy’s iCa was 1.64 mmol/L, and ionized calcium level was decreasing as it should. Daisy was off IV fluids and had continued to do well post-operatively. The biopsy results revealed a benign adenoma, and no cancer was noted. Surgery should be curative, as it is rare for another nodule to occur in a remaining parathyroid gland (but this can happen). It was planned that, once the remaining glands were functioning normally, therapy and monitoring would only consist of checking her blood work every six months. Once her calcium level was normal, she could go back on the carprofen therapy for her osteoarthritis in conjunction with the tramadol.

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Result (Normal = 1.25-1.45 mmol/L)</th>
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<td>June 21, 2016</td>
<td>Exam</td>
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</tr>
<tr>
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<td>Admit – Day 1</td>
<td>1.71</td>
</tr>
<tr>
<td>June 28, 2016 PM</td>
<td>—</td>
<td>1.80</td>
</tr>
<tr>
<td>June 29, 2016 AM</td>
<td>Day 2</td>
<td>1.86</td>
</tr>
<tr>
<td>June 29, 2016 PM</td>
<td>—</td>
<td>1.82</td>
</tr>
<tr>
<td>June 30, 2016</td>
<td>Day 3</td>
<td>1.64</td>
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<td>1.16</td>
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Table 1
On day 4 (July 1), Daisy’s iCa was 1.72 mmol/L and on day 5 it increased further to 1.84 mmol/L. It was determined that surgery could have caused an increase in PTH release, and perhaps more time was needed for the calcium to decrease. Since she was doing well otherwise, Daisy was discharged from the hospital.

Daisy was rechecked 9 days post-surgery at which time the iCa was 1.7mmol/L. The owners noted that she had been sleeping a lot the last three days but was brighter that day. She was eating with some hesitation and was drinking water normally. Daisy seemed to be favoring her right hind limb and sometimes seemed painful in her hind end. She had resumed taking one 50 mg tramadol every 8 hours for pain. Her physical examination was normal, other than her musculoskeletal discomfort. Gabapentin 100mg (4mg/kg) PO BID was added to her regimen, as well as 10mg metoclopramide (0.4mg/kg) by mouth every 8 hours for nausea.

Daisy’s mild change in appetite may have been due to the elevated calcium level and how it affects the natural motility of the intestines (the metoclopramide medication is intended to help combat the effects of high calcium). Daisy’s arthritis and discomfort may not be fully controlled on the tramadol medication alone. It had been previously discussed to start her back on the carprofen; however, since her calcium levels were still elevated (which can affect the kidneys), the veterinarian chose to hold off. Therefore, a short course of gabapentin was prescribed to help with her comfort level.

When daisy was rechecked on Day 15, the incision had healed and her sutures were removed. The owners reported that Daisy had been lying in bed and was not comfortable getting around; the owner had to coax her outside. She was still favoring her right hind limb and sometimes could not get up or bear weight on it. However, she was drinking water normally and eating well. Her PE revealed a BAR mentation; hydrated, pink and moist mm a CRT that was < 2 sec; HR of 120 bpm; RR of 38 bpm; Temperature of 101.4° F; and BW of 24.2kg. Daisy was fully ambulatory, with a weight-bearing lameness on the right hind. Her iCa was 1.79 mmol/L.

The calcium levels had not responded as expected. It was theorized that there could be ectopic parathyroid tissue left that was still secreting excess parathyroid
hormone. A potential bone lesion (a cause of lameness) could also contribute to the increased calcium levels. It was recommended to perform a three-cavity computed tomography (CT) scan of Daisy (head to tail) to evaluate her for any ectopic parathyroid tissue and to provide an in-depth look at her bones and spinal cord.

Only day 16, Daisy was admitted for the CT scan (Figure 3), and premedicated with 10mg/mL methadone - 0.7 mL (0.3mg/kg), and 5mg/mL midazolam - 1.2 mL (0.25mg/kg). She was induced with 10mg/mL propofol - 9.7 mL IV (4mg/kg) to effect and maintained on sevoflurane. She received 0.9%NaCl at 96mL/h pre-op and LRS 240mL/h peri-op. Daisy did well anesthetically and went home after a four-hour fluid diuresis.

The CT results revealed incidental findings that included bilateral coxofemoral joint osteoarthrosis, transitional lumbosacral vertebra with spondylosis deformans, and several radiopaque cystic calculi. The CT appearance of the abdomen was otherwise unremarkable. No intrathoracic CT abnormalities were seen. The most significant CT abnormality seen was the presence of an approximately 0.32-0.36cm, round nodule associated with the cranioventral margin of the left thyroid gland. The right thyroid gland had been previously removed as noted in the history and evidenced the presence of several hemoclips. The round nodule was hypoattenuating compared to the adjacent left thyroid gland but did not exhibit contrast enhancement. No CT abnormalities were seen involving the skull, nasal sinuses, paranasal sinuses, or ear structures. Daisy was scheduled for surgery to remove the remaining ectopic tissue.

Daisy presented for a left sided cervical exploration on day 30. BW: 23.6Kg; Temp: 102.3° F; Pulse: 96bpm; RR: panting, eupneic; mm: pink, moist; CRT <2sec, EENT: WNL; M/S/I: fully ambulatory with mild lameness in the hind limbs. Her iCa was 1.74mmol/L, and she was premedicated with 10mg/mL methadone - 0.7mL (0.3mg/kg) and 5mg/mL midazolam -1.2mL (0.25mg/kg) IV. 10mg/mL alfaxalone - 2.4mL (1mg/kg) was given IV to effect for induction. Cefazolin100mg/mL-2.4mL (22mg/kg) was given pre-op, IV, slowly. She was maintained on sevoflurane. Again, she received 0.9% NaCl at 95ml/hr pre-op and LRS at 240mL/h peri-op. Daisy did well during surgery and in recovery. Ectopic tissue discovered behind the left sternothyroidius muscle was removed during surgery. A biopsy of the left nodule was submitted to an outside laboratory for testing. The next day (day 31), Daisy’s iCa was 1.44 mmol/L. Because she had been hypercalcemic for so long, both calcium carbonate and calcitriol were started. She was prescribed 1000mg calcium carbonate (42 mg/kg) by mouth every 12 hours and 0.75 mcg calcitriol (0.03mcg/kg/day) by mouth once daily. The most important aspect of this therapy was to monitor the iCa one to two times daily, which is typically done for 3 to 5 days post surgery. Later the same day, the iCa dropped to 1.38mmol/L, and the next morning (day 32) it was 1.42mmol/L. Daisy was finally responding to therapy (see chart) and doing well clinically. Daisy was discharged (figure 4) from the hospital with calcitriol, which was decreased to 0.5mcg (0.02mcg/kg/day) once daily.

Daisy’s second biopsy came back as a chief cell adenoma. The parathyroid chief cell is the primary cell of the parathyroid
gland, which produces and secretes parathyroid hormone in response to low calcium levels. PTH plays an important role in regulating blood calcium levels by raising the amount of calcium in the blood.

Daisy presented on day 38 for re-evaluation of hypercalcemia. She was doing well at home, eating well, and her discomfort and limping was minimal. Daisy’s iCa was 1.40 mmol/L (high normal). Current medications were 50 mg tramadol (2mg/kg) PO TID for pain, 100mg gabapentin (4mg/kg) PO BID for pain, 1000mg calcium carbonate (42 mg/kg) PO BID and 0.25mcg calcitriol (0.02mcg/kg/day) PO SID. Carprofen was restarted at (2mg/kg) PO BID. The owner was advised to reduce calcitriol to 0.25mcg (0.01 mcg/kg/day) PO SID, and stop the calcium carbonate tablets. Daisy was rechecked on day 45 and had her sutures removed. The iCa was 1.26 mmol/L, and her PE was normal. She was still on the medications previously listed, and was advised to return for a recheck in 4–6 weeks.

At her final recheck, Daisy was doing well with an iCa of 1.16 mmol/L and no further rechecks were needed with our department.

Discussion:

Hypercalcemia (high blood calcium) has a limited set of causes, and a systematic work-up usually reveals the underlying cause. Elevated total calcium can be a laboratory error and is usually followed with checking ionized calcium.

Differential diagnosis of hypercalcemia can include lymphosarcoma, hypoadrenocorticism, primary hyperparathyroidism, acute or chronic renal failure, apocrine gland carcinoma of the anal sac, multiple myeloma, vitamin D toxicity, granulomatous infectious carcinomas, and nutritional secondary hyperparathyroidism.1

Daisy’s lack of travel to endemic regions for systemic fungal disease made infectious causes highly unlikely. Her lack of access to any environments or products that might contain vitamin D made a toxicosis unlikely. Kidney disease had been eliminated by routine blood work. She didn’t have bony swellings to suggest a process that would raise calcium by destroying bone. Her normal electrolytes on blood work, combined with a finding of normal-sized adrenal glands on ultrasound, essentially eliminated Addison’s disease.

At the end of this analysis, only two potential causes remained: a disorder of the parathyroid gland called primary hyperparathyroidism and a set of cancers that could include lymphoma, multiple myeloma, anal gland carcinoma, or other carcinomas. The hypercalcemia panel submitted was supportive of primary hyperparathyroidism, but not definitive. Our diagnostic work-up revealed no evidence of cancer; Daisy’s chest radiographs showed no evident pulmonary nodules or enlarged lymph nodes, and her abdominal ultrasound scan showed no abnormalities. Therefore, by the process of elimination and with the results of the hypercalcaemia panel already completed, it seemed primary hyperparathyroidism (PHPTH) was Daisy’s most likely diagnosis.

PHPTH is usually diagnosed in middle-aged to older mixed breed dogs. It is less common in cats. There is no sex predilection, but the Keeshond has a hereditary genetic disposition. Some of the clinical signs of PHPTH include polyuria, polydipsia, listlessness, incontinence, weakness, inappetence, urinary tract signs, muscle wasting, vomiting, shivering, constipation, and stiff gait.1

The essential disorder in PHPTH is the excessive synthesis and secretion of PTH by abnormal, autonomously functioning parathyroid chief cells. The cause of this hormonal excess is usually a solitary parathyroid adenoma, but an adenoma of more than one gland, adenomatous hyperplasia of one or more parathyroid glands, and parathyroid carcinomas have been identified in both dogs and cats.1

The job of normal parathyroid glands is to maintain blood calcium levels within tight limits. When blood calcium decreases, the glands produce increased amounts of parathyroid hormone (PTH), and when calcium is high, PTH production drops to negligible levels. In primary hyperparathyroidism, a cluster of abnormal cells in one or more of the parathyroid glands secretes inappropriate amounts of PTH without regard for the blood calcium level, resulting in sustained hypercalcemia. In the majority of cases, the abnormal cluster of cells forms a benign nodule called an adenoma. Only in rare cases is the causative mass malignant (carcinoma).2

Once confirmed, the treatment of choice for primary hyperparathyroidism is surgical removal of the parathyroid gland(s) harboring the nodule(s). Since the unaffected parathyroid glands may have atrophied during the period of hypercalcemia preceding surgery, they may take some time after surgery to “wake up” and produce normal amounts of PTH. The consequence is that following surgery, blood calcium may drop to abnormally low levels and have to be maintained for an interval of time with medications and calcium supplements. For this reason, we often keep post-op parathyroidectomy patients in the hospital for close monitoring and appropriate supportive treatment for 3–5 days following the surgery.

REFERENCES
30 Years of Prevention.

THANK YOU FOR MAKING US A PART OF YOUR TEAM.
As veterinary technicians, we are used to putting the needs of patients first. After all, our love for animals is what drew us into this profession and what makes our work so fulfilling. However, each day veterinary technicians are exposed to risk in the practice; one that often goes unnoticed or unmentioned is the risk posed by radiography. This incredible technology enables veterinarians to detect, understand, and treat a variety of health issues. Michael Q. Bailey, DVM, DACVR, a radiologist and project manager for IDEXX Digital Telemedicine Radiology, states “Accompanying these benefits are risk factors associated with radiation exposure, which every veterinary professional should take to heart. By limiting human exposure, human risk factors are reduced and this may lower your risk of developing harm from this useful diagnostic tool.”

Introducing Lower the Dose
This need to balance benefits with risk is why NAVTA has been hard at work creating radiation safety resources and cultivating support to help veterinary technicians across the country make their job as safe as it is satisfying. This initiative, Lower the Dose, has been developed in collaboration with NAVTA, IDEXX and the American College of Veterinary Radiology. Visit lowerthedose.org to help learn about imaging safety. Take a pledge to show your commitment and prioritize the safety of all veterinary team members.

The increased demand for the use of radiography in veterinary practice increases the potential for workplace exposure. As veterinary technicians struggle to position and hold patients to capture clear images, many human hands are caught in the image too. All too often (although wearing protective gloves and an apron is protocol) it is easy to cut corners and proceed without. Hands and arms wander into the scatter field or primary beam, which is still not advised even with protective gear. Veterinary technicians MUST be mindful that every dose of radiation, regardless of the magnitude, is detrimental to living tissue. Doing everything possible to lower the exposure every time, is critical.

“Just as animal health is a top concern, the health and safety of veterinarians, veterinary technicians, and all staff must be a priority,” says Bailey. “IDEXX’s hope with Lower the Dose is to promote the importance of lowering in-house radiation and offer best practices veterinary hospitals can easily implement.” Support of this initiative is just one way IDEXX is looking to help the profession with this challenge.

What’s at lowerthedose.org?
Lowerthedose.org provides a wealth of resources to help you start improving imaging safety in your practice today:
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• Take a free online course or an archived webinar in digital radiography.
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Visit, download, display, and discuss the materials with your colleagues and the veterinarians of your practice.

Make Improving Imaging Safety a Priority
The patient is scared, the waiting room is full, and the veterinarian is looking for a patient’s results. The team is often in a hurry to get the diagnostic results to the veterinarian. Slow down, gown up, and take a great image the first time. An image taken hastily is likely to require a repeat capture. That wastes time for you, the patient, the client, and it further increases your exposure. Your safety matters. Please take a moment to visit lowerthedose.org and take the pledge to Lower the Dose where you work.

How low can you go?
Radiation safety is of the utmost importance for veterinary staff. Read about the exciting new Lower the Dose initiative that promotes imaging safety best practices and encourages us all to commit to lowering the dose in our own work environments.

Julie Legred, AAS, CVT, Executive Director, NAVTA, Senior Manager of Veterinary Technician Programs, NAVC
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‘HOW LOW CAN YOU GO?’ QUIZ

1. Name three things you can do to improve imaging safety where you work.
2. What’s the best way to position a pet to get a clear image?
3. What is the ALARA principle?

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