One of the primary clinical functions of the Canine Arthritis Rehabilitation Exercise and Sports medicine (CARES) Center for Veterinary Sports Medicine is to provide postoperative physical rehabilitation for patients to hasten recovery from surgeries such as tibial plateau leveling osteotomy (TPLO) and extracapsular stabilization of cranial cruciate ligament repair, femoral head and neck ostectomy for acetabular fractures or hip dysplasia, long bone fractures, and hemi-laminectomy for intervertebral disk herniation. Although these surgeries have been performed for years with satisfactory results, postoperative rehabilitation has been recommended following these and other procedures. Why?

The primary reason is the desire to provide optimal care by veterinarians and veterinary technicians for patients undergoing costly surgical procedures, and the desire of owners to return their pets to optimal condition as soon as possible. Many owners or their family members have had physical therapy after their own surgeries, and it seems logical that their pets should have the same opportunity.

As an example, consider a dog with a ruptured cranial cruciate ligament (ACL), a very common condition in dogs, as it is in people. Research performed by the Veterinary Orthopedic Laboratory at the University of Tennessee, as well as others, has shown many atrophic changes to muscles, bones, ligaments, and tendons after injury, surgery, or disuse. For example, one study showed that dogs may lose over one-third of their muscle mass after acute rupture of the
Carol Tuft keeps track of the CARES patient workflow at the University of Tennessee Veterinary Medical Center.

**Personal Focus: Carol Tuft**

Meet the veterinary assistant in the CARES Center for Veterinary Sports Medicine, Carol Tuft. Carol has been with the University of Tennessee College of Veterinary Medicine for 21 years, and has spent 18 of those years working in the Small Animal Physical Rehabilitation Service! For most of our regular clients, she is the first person they see when they bring their pet for rehabilitation or wellness visits.

Carol has been involved with animals her entire life. She showed horses extensively in high school and college, and was even able to pay for the first year of tuition with her winnings! She majored in horsemanship and minored in animal science, and still has two horses.

Her family has raised dogs for many years, including collies, shelties, and Airedales. She has taught showmanship to youth at a local kennel club.

Recently, her animal activities have included Feral Fixin, a program that does spays and neuters on feral cats to try to reduce the population of stray cats.

Q: Why did you become interested in rehabilitation?

A: I first became interested in rehab in high school, as a result of going through physical therapy myself for an ankle injury.

Q: What do you enjoy most about working in rehabilitation?

A: I enjoy seeing dogs that initially come in with mobility issues or injuries and leave after completing their rehabilitation program wagging their tail and walking again.

Q: Is there a particular case that you are especially proud of helping?

A: Tanker was a Dalmatian with severe intervertebral disk herniation. When he first came to rehab after surgery, he couldn’t even sit in a sternal position. With rehab, he was able to get up and begin walking. He continued to come to us for rehab for the rest of his life to treat arthritis. His two littermates also came to us for rehab, and another housemate still comes for rehab.

Q: What would you tell an owner if they were trying to decide on bringing their pet for rehabilitation or not?

A: It depends on the dog and the situation, but I would recommend rehabilitation not only for cases after injury or surgery, but for issues such as aging, wellness, and weight loss. Rehabilitation is underutilized -- all dogs need exercise!

Carol is very involved in model horse shows on all levels as a competitor and judge at local and regional events. In addition to these activities, she has held a model horse show locally with the proceeds benefiting the equine program in the Department of Large Animal Clinical Sciences. The funds from the event have been used to buy much needed equipment. As an example, a rescue sling was purchased that has already been used to help rescue horses from precarious situations!
Notes from the 2nd Annual University of Tennessee CARES Sports Medicine Conference

The UT Veterinary Medical Center hosted the 2nd CARES Sports Medicine Conference last August. Owners, trainers, veterinarians and veterinary technicians attended two days of lectures, demonstrations, and laboratories. Additionally, the conference was again webcast internationally!

The focus of the conference was canine sporting events and sporting conditions, and highlighted the sports of lure coursing, dock diving, and protection dogs. Leading experts in these fields presented the lectures and demonstrations. Additional topics included behavior issues of performance dogs, exercise physiology of the canine athlete, gait evaluation, and arthritis recognition, treatment, and prevention. Laboratories were held to allow participants to learn about behavior training aids, assessment of cardiovascular parameters for dogs in training, gait evaluation, and assessment and treatment for arthritis. Social highlight of the conference included the reception, a cornhole tournament, and silent auction to benefit sports medicine research. The following is an excerpt from one of the presentations.

Gait Evaluation
Darryl L. Millis, MS, DVM, DACVS, CCRP, DACVSMR

Gait evaluation of dogs is important to identify abnormalities so that early treatment may be implemented. The severity of gait changes depends on the severity and stage of the disease process, and the ability of the patient to compensate. One must also consider the fact that conditions of one joint or limb frequently involve other limbs, and often other joints are affected by disease, such as the hips and elbows.

Most clinical evaluations of gait involve observation of the patient while walking, trotting, standing, and performing tasks such as stair climbing. More sophisticated evaluation of gait may be performed using kinetic (force platform) or kinematic (motion) analysis techniques. Finally, some conditions may have characteristic patterns of gait that may be useful in evaluation.

Assessment of gait may be challenging. To diagnose difficult causes of lameness, a thorough physical examination, gait evaluation, and knowledge of the underlying possible conditions are necessary. The examiner should develop a systematic approach to examination to standardize the evaluation and to prevent omissions of important findings. With regard to the lameness, the following short series of questions may be useful:

- How long has the lameness been present?
- Has the lameness increased/decreased in severity?
- Is the lameness worse in the morning or evening?
- Was the limb subjected to some traumatic event?
- Does the lameness improve or worsen after a few minutes of activity, such as walking
- Does the lameness change with weather or exercise?
- Have other limbs been involved?
- Have there been any previous related diagnoses or treatment?

GAIT EVALUATION

Initial Observation
The dog should be carefully observed at rest and at several gaits before palpation or manipulation that could artificially accentuate lameness. Observe the dog as it rises from a sitting or recumbent position. Often the lameness is more severe immediately after rising and improves with ambulation.

Observe for weakness, limb trembling, limb asymmetry indicative of muscle atrophy, asymmetry of the head and neck, limb position, and conformation while the dog is standing. It is common for animals to bear less weight on a lame limb while standing. One method to assess the relative amount of weight placed on each limb is for the examiner to place the palm of each hand under the feet and compare the relative amount of weight-bearing. Also, dogs will commonly stand with the sound limb more centrally located under the body and the lame limb held more eccentrically.

Gait Evaluation
Gait is best observed at a distance of 10 to 15 feet. Gait should be evaluated first at a walk, then at a trot, because these are the most symmetrical gaits and they are at a speed that our brain can interpret what our eyes are seeing. The dog should move directly away from, and then toward the examiner. The patient should then be evaluated from the side. The handler is one of the most important parts of the lameness evaluation. The handler should look straight ahead and walk without looking down at the dog. The dog should be kept on a leash with no slack, yet not so tight that it inhibits head movement. The dog should not be allowed to stop and sniff things, and the evaluation should be carried out in an area free of distractions. Evaluation at a lope or gallop is less useful because of the speed involved and the fact that they are asymmetrical gaits. It may be helpful to film with a video camera, and then evaluate the gait in slow motion.
The degree of lameness may be subjectively evaluated by comparing videotapes over time. Because the walk is a slow four-beat gait, each limb may be separately evaluated. This is beneficial to help differentiate lameness in diagonal fore- and hind-limbs detected at a trot. In many cases, the head will nod up and down if lameness is present. In general the head will nod up when the affected leg is placed on the ground if a forelimb lameness is present, and the head will nod down when the affected limb is placed on the ground if a rear limb lameness is present. Careful observation of other features of gait may also help distinguish between fore- and hind-limb lameness at a trot. It may also be helpful to place each major joint through a full range of motion, and then reassess the lameness. This may accentuate a subtle lameness.

Stride length, limb carriage, joint motion, and side bending of the spinal column are useful in evaluating lameness. The affected limb may have a shortened stride length and reduced flexion and extension of the affected joints. Most dogs will walk with the normal limb centered under the body during the weightbearing phase of gait on that limb, while a lame limb may be carried more laterally during weightbearing. The affected limb may also circumduct during gait. Animals with hip or stifle conditions may have increased lateral flexion of the spinal column toward the affected side in an attempt to advance the limb by using the back, especially if the stride is shortened on that side. In addition, dogs may have a drop of the pelvis on the sound side, to provide additional propulsion from that limb. The combination of the pelvic drop on the sound side during weight bearing on that limb in combination with increased lateral flexion of the spine during the swing phase of gait on the affected side gives the impression of a hip hike on the affected side. In all cases, symmetry of movement should be evaluated.

When possible, the patient should be walked and trotted in a large circle. In many cases, lameness of the inside limb will be accentuated. Stairs and steps may also be helpful in observing lameness and subtle neurologic problems. Dogs may skip up steps with the affected limb rather than pushing off the limb to ascend a flight of stairs, or may knuckle over on the dorsum of the paw if a neurological condition is present.

Evaluation of the dog while it walks or trots on a treadmill is also beneficial. The speed of the treadmill should be adjusted so that the dog is walking at a comfortable, consistent gait. Evaluation while walking on a treadmill allows the examiner to focus on the same visual field and make direct comparisons of stride length, limb placement, and joint motion without having to follow the dog over a distance. It also allows easy evaluation of spinal motion.

Following gait evaluation, symmetry, relative muscle mass, and the presence of muscle atrophy are assessed. Simultaneous palpation of both forelimbs and then both rear limbs allow the detection of subtle differences. Individual regions are evaluated for swelling, abnormal shape, heat, sensitivity, and pain.

**Kinetic Evaluation**

A force platform system can provide repeatable measurements of weight bearing forces, and is the most sensitive method of assessing early lameness. The handler walks or trots the animal on a loose leash over the force plate at a constant and specific velocity. As the paw makes contact with the plate, the magnitudes of the ground reaction forces are measured within the plate. The forceplate is connected to a computer that acquires the data for analysis. A software program then converts the information obtained from the force plate to the three planes of ground reaction forces (GRFs).

**Kinematics**

Kinematic analysis is one of the oldest methods of evaluating movement of the musculoskeletal system, dating back to the late 1800s. Today, motion analysis is performed using a series of cameras and reflective targets placed on the dog's skin over specific anatomic landmarks. Each joint has a characteristic and consistent pattern of flexion and extension during walking and trotting, and more complex joint movements may be occurring.
Recruitment for New Study
The VOL Laboratory is recruiting dogs for a new study of weight loss in overweight dogs, using caloric restriction and different levels of exercise. Owners will track activity of their dogs using new technology, while providing exercise and a weight loss diet. Owners will receive all study procedures for free, as well as a commercial weight loss diet. In addition, after dogs complete the study, an honorarium will be provided. Owners will be required to bring their dog twice weekly for supervised exercise, as well as provide exercise at home. For further information, contact Tammy Moyers, LVT at 865-974-8387.

Of course, donations to the CARES Research Fund are always welcome to help provide solutions to issues of working, sporting and rehabilitation patients. If you are able to help with any of these needs, please contact:

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Save the date for the 3rd CARES Sports Medicine Conference, to be held August 29-30, 2015 at the University of Tennessee College of Veterinary Medicine. Some of the talks from conferences have been highlighted in previous issues of the CARES Newsletter. The purpose of the conference is to increase knowledge of various canine sports for veterinary professionals and dog owners, and to present topics related to the care and well-being of sporting and working dogs. Any proceeds from the conference are used for research in the areas of sports medicine and rehabilitation. As examples, the VOL laboratory is currently studying the effect of various levels of exercise in overweight dogs, and the effect of various levels of exercise on cardiovascular parameters to aid in prescribing a conditioning program for dogs.

This year, the sports of rally, obedience and agility will be highlighted. Also, a discussion of the use of nutritional supplements in performance dogs will help owners determine which nutraceuticals are right for their athlete. A topic that is sure to be popular is how to incorporate core and strengthening exercises in a conditioning program.

A highlight will be entertainment and food at the silent auction to benefit sports medicine and rehabilitation research.

Visit us soon for more details
www.utvetce.com/sportsmedicine.asp

TREATMENT SPOTLIGHT:
EXTRACORPOREAL SHOCKWAVE TREATMENT

The name extracorporeal shockwave therapy (ESWT) sounds frightening. But the treatment really involves the application of high intensity sound waves to stimulate healing and pain control. In dogs, horses, and people ESWT has been used to treat tendinitis, desmitis, osteoarthritis, delayed or nonunion fractures, and wounds. The sound waves travel through the tissues to a predetermined tissue depth and release energy that stimulates cell metabolism and tissue healing. The UT CARES service regularly uses ESWT, especially for difficult arthritis cases. Research in the VOL laboratory indicates that it is effective in increasing weight bearing and reducing pain in dogs with osteoarthritis. After two to three weekly or every other week initial treatments, dogs are typically treated every one to three months.

For more information, contact the CARES Center.

A patient receives Extracorporeal Shockwave Treatment for elbow arthritis.

The above treatment modality and more, are available at the CARES Center at UT Veterinary Medical Center
cruciate ligament and stabilization of the knee without rehabilitation. Rehabilitation started the day after surgery may almost completely stop the loss of muscle mass, which normally takes months to recover. Also, as in humans with an ACL injury, it is critical to regain knee range of motion within two weeks of surgery, or patients risk permanently decreased knee motion. Although the cause-and-effect is not completely understood, dogs with loss of some range of motion also have more lameness after recovery.

Rehabilitation initially focuses on reducing pain and inflammation with medication, cold compression therapy, transcutaneous electrical nerve stimulation and therapeutic laser. Next, the focus is on early limb use and return of range of motion to achieve normal joint motion and reduce the loss of muscle mass. Reconditioning and joint position awareness training are next, using underwater treadmill and balance exercises. Finally, dogs undergo strength and speed conditioning. Swimming, jogging, strengthening with limb weights and resistance bands, and playing ball return dogs to their winning form!

For more information, visit www.vetmed.tennessee.edu/CARES

SUBSCRIBE!

One of the educational initiatives of CARES, in addition to the annual Sports Medicine Conference, is this CARES Newsletter. Please feel free to forward this to friends and colleagues, and send an email to: UTVetCARES@utk.edu to receive future issues. If you do not wish to receive future issues, please also let us know via email.

CARES Sports Medicine Conference

Join us for the 3rd Annual CARES Center for Veterinary Sports Medicine Conference at the University of Tennessee College of Veterinary Medicine August 29-30. Call CARES at 865-974-8387 for more information.

Certified Canine Rehabilitation Practitioner Fast Track

For veterinarians, veterinary technicians, physical therapists, and physical therapist assistants.
July 9-15, 2015 at UT
Oct 17-21, 2015 at NC State University
www.utcaninerehab.com

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www.u-tenn.com

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