

RECOGNIZING SOFT TISSUE INJURIES IN THE DOG

FROM AN
INTEGRATIVE PERSPECTIVE

— *part 1*

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Applying rehab and physiotherapy techniques to an injured dog should be preceded by a proper consideration of how the injury developed and progressed, and how it affects the health and function of the entire body.

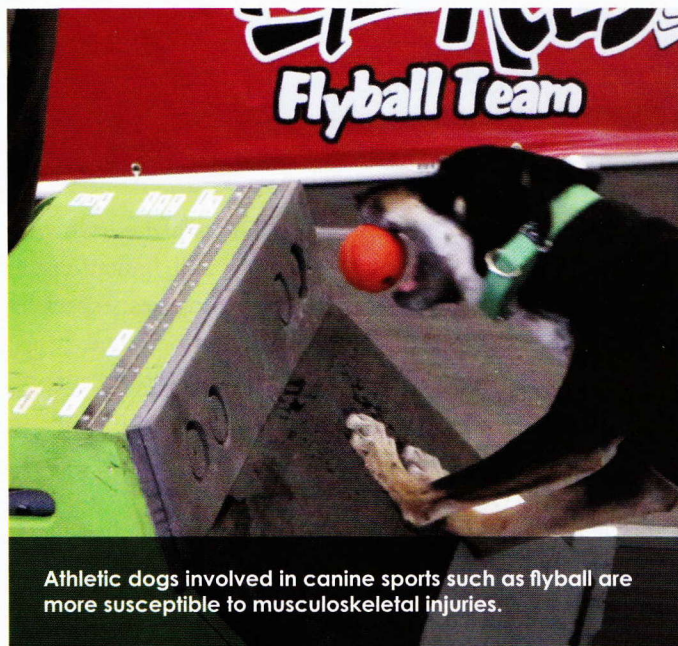
The care of the canine athlete in performance and working disciplines is finally getting much-needed attention and awareness. While this seems to be a new and rapidly-growing aspect of veterinary medicine, working dogs have needed extra care and consideration since humans first started using them over 2,000 years ago. The selective manipulation of natural canine behavior and body types to produce dogs that perform specific tasks for humans has created various problems often not recognized by current conventional orthopedics. And with the recent growth of agility, flyball, obedience, herding, snow/dry-land sled racing, and nose-work as competitive “hobbies”, more dogs than ever before are considered to “have jobs”. Additionally, due to increased public security concerns and population use of recreational venues, new demands are developing for the use of dogs in patrol/protection (Shutzhund, French Ring), detection (explosives, drugs, arson, mold, termites, bed bugs, food, poachers, wildlife management), urban/back-country search and rescue (SAR), and avalanche rescue/recovery.

With greater use and value (both monetary and emotional) comes an increased need for different ways of thinking regarding the health management of these dogs. While the number of veterinary practitioners trained in physiotherapy (or PT, rehabilitation) is growing rapidly, the techniques of applied healing after injury can't achieve their maximum value without proper consideration of the chronological progression to, and the global body health repercussions created by, any one injury. Currently, the veterinary world seems to be putting more emphasis on the sequelae of injury (surgical corrections and physiotherapy management) rather than thorough diagnosis of primary and secondary injuries. Integrative veterinary practitioners with functional biomechanical, neurologic, structural, manipulative, herbal, homeopathic, acupuncture and nutritional knowledge are uniquely positioned to play significant roles in the healthcare and management of the canine athlete.

This article will review unique considerations involving the canine athlete, as well as some of the more common injuries that an integrative veterinary sports medicine and/or rehabilitation practitioner might encounter in practice. (For additional in-depth information regarding “the working dog”, readers are referred to the author's chapter in the new edition of *Canine Sports Medicine and Rehabilitation*, Zink and Van Dyke, Editors.)

MUSCULOSKELETAL ISSUES IN PERFORMANCE AND WORKING DOGS

With the increased use of dogs in sport and work, musculoskeletal injuries similar to those seen in human and equine athletes should be thought to be inevitable – so why aren't they diagnosed more? While much is changing with the increasing awareness of performance and function-limiting



Athletic dogs involved in canine sports such as flyball are more susceptible to musculoskeletal injuries.

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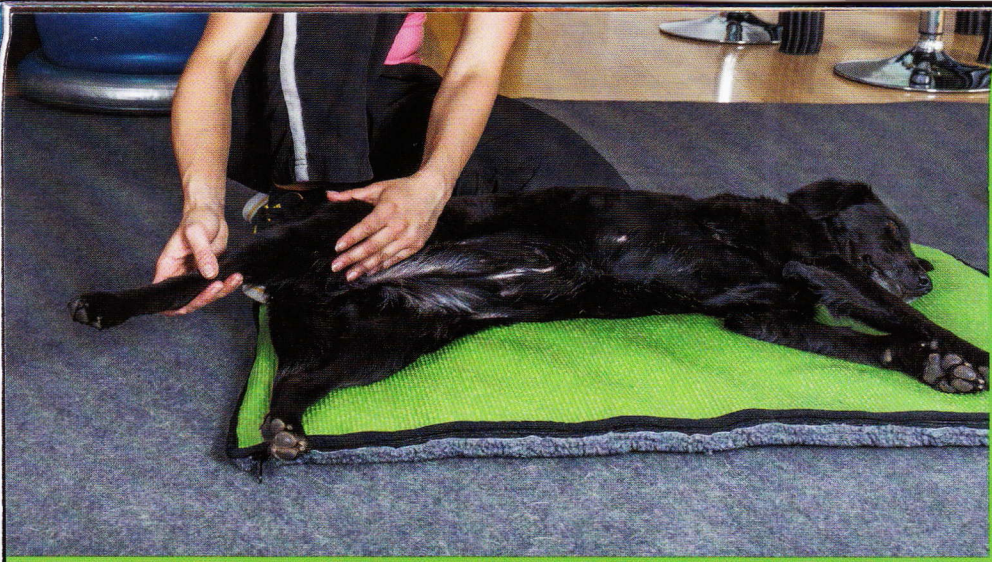
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injuries, and their importance in canine athletes (whether “pros” or weekend warriors), there are still limitations in the identification and prevention of these injuries, especially soft tissue ones. Many muscle, tendon, ligament and fascial injuries still go undetected or receive inadequate treatment. Some ligaments are so small that damage is written off as meaningless by everyone but the dog!

There is also a marked lack of knowledge about the unique emotional and physical demands placed on dogs in different disciplines, especially when it comes to the biomechanical interactions between various body parts. This affects the practitioner’s ability to make proper recommendations for future injury prevention, as well as follow-up treatment and rehabilitation when an animal finally goes back into work. Also, extra physical and mental performance demands are placed on these dogs, similar to those seen in the equine world. When a title or important event takes place, dogs that may not be 100% healthy are still expected to perform, especially if subtle symptoms of problems go unrecognized by either handler or veterinarian. Use of performance-enhancing medication is not banned in these animals, and medication use, overuse and side effects are not well worked out in the canine athlete (especially the effects of medication on the ability to scent).

Rehabilitation, PT and physiotherapy in the working and performing dog have gained in use and recognition, but sadly, it is usually limited to addressing functional loss after an injury. Veterinarians with integrative modality training and thinking are much better placed to evaluate the true cause of an injury (posture, gait biomechanics, functional neurology, human/animal interface) when an animal is presented for treatment. Veterinarians and allied professionals with training in manual and manipulative techniques usually have a deeper grasp of global body biomechanics, structural relationships, functional anatomy and neurology than colleagues without this training. Integrating this knowledge with more conventional surgical

and physiotherapy techniques can only provide better diagnosis and care for these amazing canine athletes.

Canine drive

Working and performance dogs are selectively bred and trained to have a high drive (desire to do a task). They will continue to work through all but the most severe injuries. All the sporting and working aspects that a dog is trained to manifest have their origins in either the stalking or hunting drives. Training

is meant to enhance and channel the various behavioral components of stalking, hunting and killing drives into activities that are beneficial to humans.

In the wild, dogs will rest in between hunting activities. The signs of mental fatigue are just as varied in the dog as they are in the human, and are often ignored until the animal either shuts down or suffers a physical injury. Clients and handlers may lose perspective on their animals’ rest needs due to performance and work demands, so high drive owners of high drive dogs need help and advice on how to recognize mental fatigue. There’s a joke about drive in distance sled dogs. When a sled dog realizes his leg has fallen off, he just says, “No worries! I’ll just pick it up on my way back.” This attitude isn’t found solely in Alaskan Huskies. Herding dogs, hunting dogs, police/protection and many detection dogs will continue to finish their goals of getting the “prey” despite serious musculoskeletal injuries.

Caretakers and veterinary healthcare practitioners cannot rely on obvious pain signals from the animal to alert them that something is wrong; a three-legged canine athlete usually means something serious, such as significant pain or an unstable leg. A working dog’s high pain threshold means he’ll ignore the little things that might stop a pet dog – thus turning a small injury into something more devastating. Educating handlers and caretakers about the importance of regular manual therapy maintenance for canine athletes (especially with weekend warriors) is beneficial to the owner, the veterinary practitioner, and most of all, the dog.

Trans-neural degeneration (TND)

This is a well-recognized physiotherapy issue and should always be in the forefront of any practitioner’s mind when evaluating an injured patient, especially if that patient is a little older or is otherwise compromised. TND is the death of neurons resulting from a disruption of either the input or

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DIAGNOSTIC TOOLS

– the challenges and benefits

- **Radiology:** Lameness diagnosis in the canine has been driven for so long by the use of radiology that many practitioners may actually have a “black and white” bias without realizing it. The emphasis with radiographs is to look at bones only and ignore the black void of “nothing” – the soft tissue.
- **Ultrasonography:** While the use of musculoskeletal ultrasonography is growing, it is difficult to know where to put the ultrasound probe as it has a very narrow focus. Even one limb is too big to ultrasound in its entirety, and few clients would want the entire leg to be shaved. This is where digital thermography can be a valuable tool.
- **Digital thermography:** This is a very valuable and flexible tool. It measures emitted infrared heat from a body, so any inflammatory or circulatory-restricting event will cause a deviation away from a normal pattern. Because a large surface area can be scanned quickly, localization of an affected area can be quickly performed, allowing for more focused palpation and anatomical imaging such as radiology or ultrasonography.

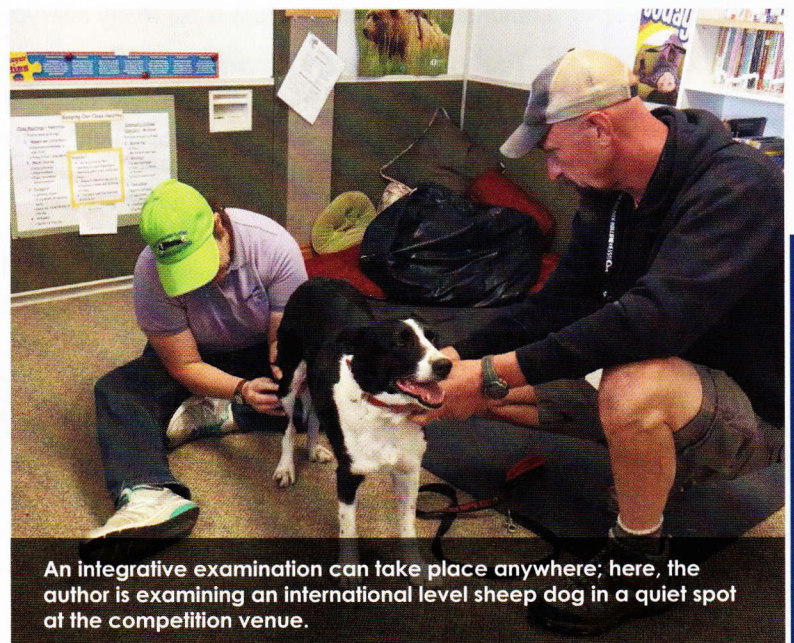
Note: While it is beyond the focus of this article to delve into the integration of thermal imaging with other modalities in the canine athlete, all cases presented in Parts 1 and 2 of this article are real, clinical cases demonstrating diagnosis of sports medicine and active dog injuries. For reader reference, the ultrasounds are done with a Fuji Fazone machine, using a linear probe usually set between 12 Hz to 15 Hz for higher resolution images. The thermal images are taken with a FLIR T620 camera with a rotating lens to assist in better positioning for hard-to-reach spots such as ventral groins and caudal forearms.

Continued from page 24.

output to other nearby neurons – a type of excitotoxic process that occurs when a neuron is overstimulated by a particular neurotransmitter. The systems particularly at risk are those that use glutamate as an excitatory neurotransmitter – the subtypes of glutamate receptors are NMDA, AMPA/kainate and mGLUR (metabotropic receptor). Glutamate is primarily an intracellular neurotransmitter kept closely in check by regulatory processes. If too much glutamate is extracellular, it over-binds to nerve cell membranes, creating toxic effects on cells via overstimulation and the production of free radicals, increased metabolic wastes, and the exhaustion of fuel needed for aerobic metabolism.

Nerve cells need oxygen, glucose and frequency-of-firing (being told what to do) in order to stay healthy. Neurons that are directly or indirectly affected by trauma may be compromised by lack of oxygen, deficient glucose, and intracellular dysfunction of oxidative mechanisms within the mitochondria. Overstimulation (frequency-of-firing) from manipulative treatment, soft tissue body work, rehab exercises, acupuncture, or too much voluntary movement on the animal’s part can lead to loss of neurons. A young animal can tolerate this with few obvious clinical signs...yet at a cost. The “credit” of the body’s functional nerve cells is depleted and losses may not be apparent for several years. In an older animal with fewer tissue reserves, TND can lead to significant compromise of the entire neurologic system. TND manifests by muscle and cognitive fatigue and slow recovery after therapy. Animals are not better after rest, and may actually worsen (which differentiates from the endorphin effect seen after a beneficial adjustment).

To avoid TND, older animals, animals immediately post-operative (with exposure to anesthesia neurotoxins), or those with significant healing needs should be carefully assessed to determine how therapy fits into the whole picture. It may be better to only work on one or



An integrative examination can take place anywhere; here, the author is examining an international level sheep dog in a quiet spot at the competition venue.



two issues with one, maybe two, therapies at a time, allowing a few days to weeks for rebalancing and healing in between sessions. Any additional therapies that the owner/caretaker may be performing must also be taken into account. For example, scheduling a chiropractic treatment on the same day as a rehab or acupuncture session may

create TND and not be in the best interest of the animal. Those trained in the manipulative and manual modalities have unique training and knowledge in functional neurology and are often more aware of the pitfalls of TND than those trained in other modalities. These practitioners should work to become an integral part of an animal's recovery and health maintenance while educating other health professionals.

Physiotherapy (rehabilitation) vs. manipulative therapies (chiropractic or spinal manipulation, osteopathy) and massage

The current mindset surrounding rehabilitation comes from the human physical therapy world, where it's all about fixing deficiencies caused by physical damage to tissue (post-surgical or caused by activity). The goal is to get the animal back to a "function" – whatever that was. However, those trained in manipulative and manual therapies understand that the function before the injury may have been deficient or unbalanced, leading to the presenting injury. Bodywork and manipulative therapies aim to restore structural equilibrium, which involves proper health and function of the complex neuromyofascial-skeletal system. Repetition of strengthening exercises eventually reaches a point of diminishing returns if there are unaddressed joint and soft tissue areas (especially spinal). Repetition of exercises using a checklist mentality will only exacerbate muscular imbalances of contraction and stretching without addressing the source problem. This is where integrative practitioners and/or structural alignment techniques should be considered integral to injury rehabilitation and body maintenance in canine athletes. Their focus is on the individual dog, and they look beyond merely the current injury.

UNDERSTANDING FUNCTIONAL ANATOMY

It is beyond the scope of this article to discuss each and every injury a working dog could end up with. Practitioners should

approach their evaluation of canine athletes with an open mind and the attitude that anything, anywhere, can tear if the right force happens to be on it, even if just for a moment. While some injuries tend to be more common, the strength of integrative training is that it is non-linear – practitioners are trained to get to the same place through many different routes. That same attitude needs to be taken with injuries and lamenesses – not all hind limb lameness issues are from cruciate ligament injuries, just as not every front leg lameness is a shoulder problem. This is where a deep knowledge of functional anatomy (fascia, tendons, ligaments, muscles) and biomechanics (functional fascial lines, muscle agonists/antagonists) is critical for the practitioner who wants to work with canine athletes.

CONCLUSION

The fields of canine sports medicine and rehabilitation are growing rapidly. Even without rehabilitation training or certification, integrative practitioners can contribute much, thanks to non-conventional training in problem-solving, structural alignment perspectives and neuromuscularfascial systems. **IVC**

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DIAGNOSTIC APPROACHES FOR SPECIFIC AREAS

In this issue, we will discuss diagnostic approaches for shoulder problems. In Part 2, in the next issue of *IVC Journal*, we will continue with diagnostic approaches for the carpus, toes, lumbosacral spine, iliopsoas, stifle, common calcaneal tendon, tarsus and metatarsals. It will also briefly cover integrative treatment approaches for the canine athlete.

Readers are encouraged to review (in detail) the functional anatomy and biomechanics of each discussed area.

Shoulder problems

The rotator cuff muscles of the canine shoulder are the supraspinatus, infraspinatus, teres minor and subscapularis muscles, with additional stability provided by the medial and lateral glenohumeral ligaments. An important fact to remember is that the accessory spinal nerve (CN XI) innervates the extrinsic muscles of the shoulder (trapezius, omotransversarius, sternocephalicus and cleidomastoideus), which are critical for scapular stabilization to the trunk as well as scapula movement. Therefore, an upper neck injury can cause problems in the proximal forelimb. The biceps tendon insertion merges with the elbow medial collateral ligament. Damage to one can affect the other and put a great deal of mechanical stress and potential bone trauma on the medial ulnar coronoid process.

Shoulder problems seem to be the “diagnosis of the month” due to recent awareness of various problems such as medial compartment (or shoulder) instability (MCI/MSI), biceps tenosynovitis, supraspinatus insertionopathy, contracture of the infraspinatus muscle, OCD (juvenile osteochondritis desiccans), and osteoarthritis from rotator cuff laxity leading to instability (especially of the teres minor). Inflammation of the supraspinatus tendon at the insertion can impinge on the biceps tendon, causing a tenosynovitis to that tendon; however, the biceps injury cannot be fully addressed until the supraspinatus muscle damage is addressed.

- Medial compartment problems are one of the most common issues reported in the canine athlete, and are thought to be caused by gradual tissue fatigue from repetitive shoulder stresses – especially at the end of abduction range-of-motion (such as weave poles in agility). One-time events such as slipping on wet or frozen surfaces, or well-placed kicks in herding dogs, are also thought to be possible causes of MSI, as well as injuries to the teres major and minor muscles.
- Biceps tenosynovitis is probably the next most common problem. The biceps tendon can be injured a couple of ways. First, damage can occur near its origin due to pressure and rubbing from an inflamed supraspinatus insertion tendon (which

often isn't checked by surgeons). Second, the biceps muscle, because it crosses over two large joints (and is intraarticular) can be injured (muscle belly and both tendons) by excessive jumping, or slipping while turning on wet ground.

- If a physical exam in a dog with shoulder lameness fails to find any pain or injury to any of the above mentioned tissues, the neck should next be examined closely for loss of lateral flexibility, scar tissue or asymmetry in muscle development. These can all be signs that the problem might be more associated with cervical spinal causes than direct trauma to the joint. Spinal fixation trouble areas are often seen at C5-C6, C6-C7, and at the atlanto-occipital joint. The author finds C4 is often cranial (anterior) and rotated left in flyball and obedience dogs.

Diagnostic tests for the above lesions

- MSI (medial shoulder instability): Significant abduction of the shoulder joint from the torso, arthroscopic verification of damage to the subscapularis tendon and medial glenohumeral ligament.
- Biceps tenosynovitis: The classic test is to flex the shoulder while extending the elbow; with the shoulder flexed, the elbow should extend to about 110° to 120° with a definite soft tissue end-feel. In torn biceps, the elbow may extend significantly more than normal, or the joint will lose its normal soft tissue end-feel, extending until the anconeal ulnar process locks in the humeral notch. Restrictions from old injuries and scarring will decrease the elbow extension to 90° or less. Ultrasound, thermal imaging and palpation can identify areas of pain and trauma. If the injury is mostly at the insertion, thermal imaging is helpful; many of these injuries are easily palpated at the medial elbow. There may be a link between fractured coronoid processes and chronic biceps insertional tendonitis. (Note to equine practitioners: the author has diagnosed biceps insertional tendinopathy injuries with thermal imaging and ultrasound; this area is not recognized as an injury in the horse but certainly can occur there.)
- Supraspinatus insertionopathy: Ultrasound is the diagnostic technique of choice. Palpation may pick up those injuries that are painful (not all are painful), and radiographs may identify chronic injuries that have progressed to the point of tendon calcification. Thermal imaging will pick up those that are inflammatory but not degenerative.
- Infraspinatus muscle or insertional tendon trauma: In these dogs, the leg is functionally abducted at the shoulder with marked resistance to adduction; ultrasound can be diagnostic for early injury where abduction has not yet

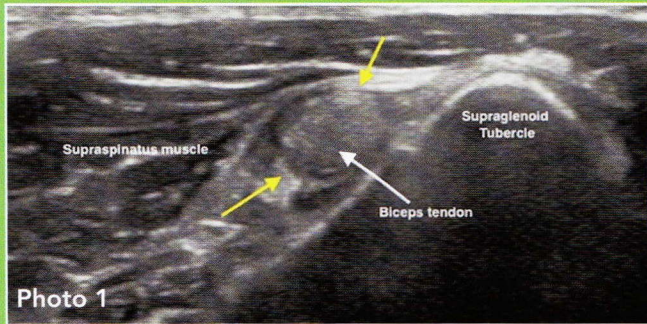


Photo 1

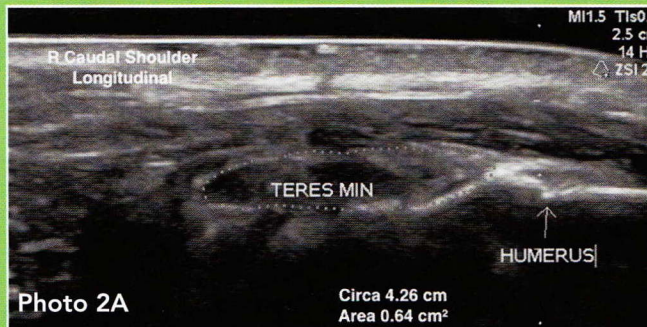


Photo 2A

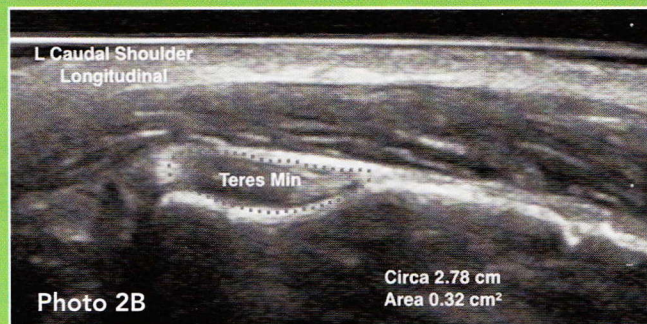


Photo 2B

Photo 1: Ultrasound showing impingement of a biceps tendon by the supraspinatus tendon (longitudinal view of medial shoulder at 14 Hz).

Photos 2A & 2B: Image 2A is an ultrasound of a very active ten-month-old MI hound. The puppy was initially diagnosed with shoulder JT OCD although no signs were present on an x-ray. Dye contrast study showed no issues and made the dog significantly lammer. Ultrasound showed normal joint margins and normal biceps tendon, but a significant tear of the teres minor muscle. Image 2A shows the affected shoulder, while 2B shows a normal shoulder for comparison. We were unable to thermal image the pup due to the clipped hair artifact from the shoulder joint injection.

occurred. Once mature or calcified scar tissue has formed, these cases are much more difficult to manage.

- Teres minor muscle injury: If there is resistance to scapular and shoulder extension, with the dog standing but unweighting the affected leg, encircle the triceps muscle both medially and laterally with thumb and forefinger until both fingers are in the dip cranial to the triceps, but behind the shoulder joint. Pinch gently both with the joint flexed and extended.

From the AAVA

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The American Academy of Veterinary Acupuncture (AAVA)'s seat within the AVMA House of Delegates (HOD) gives us multiple opportunities to represent veterinary acupuncture.

At our 2018 annual conference in Santa Fe, New Mexico, Dr. Bonnie Wright, a recognized expert in pain management, was our keynote speaker. She presented scientific principles of veterinary acupuncture along with many clinical pearls and applications of her favorite acupuncture points.

The annual Lifetime Achievement Award was presented to Dr. Mona Boudreaux, an AAVA Past President, IVAS teaching assistant and course host, and a tireless promoter of holistic veterinary medicine.

The AAVA hosts smaller, regional, hands-on meetings for equine and small animal participants. For the second consecutive year, our equine wet lab took place in June, with Dr. Chris Cahill, in South Carolina. We were again hosted by the Equine Rescue of Aiken. This group works tirelessly to rescue horses while providing community service to at-risk youth and military veterans – we are proud to partner with this organization. Keep an eye out for announcements about a small animal regional wet lab in the fall/winter.

If you have ideas, concerns, or feel the call to become more involved, we'd love to talk with you. Please connect with us through the AAVA office at office@aava.org. IVC