Ultrasound has been used to diagnose musculoskeletal injuries in dogs for at least 15 years; however we have not yet come close to realizing the full potential of ultrasound as a tool in the diagnosis and management of canine musculoskeletal disease. The purpose of this presentation is to provide information to maximize the usefulness of diagnostic ultrasound in canine sports medicine practice.

Diagnostic ultrasound is an important complement to a thorough clinical examination. Because it is time consuming to perform, it is most useful when used to confirm or deny a specific suspected lesion or lesions based on clinical impression. Ultrasound provides details about the internal architecture of soft tissues that cannot be obtained using any other imaging modality. It is relatively inexpensive, and is easily repeatable in order to follow tissue healing and to accurately direct rehabilitation protocols once the lesion has been identified. Ultrasound is optimally performed on the unsedated, standing patient for most anatomic sites as tension on the structures to be examined results in optimal fiber alignment.

We know that equine athletes’ tendon and ligament are near their elastic limit at the gallop and over fences. We also know that approximately 15% of equine athletes sustain a soft tissue injury each year that requires rehabilitation for several months to heal. Although this information is not yet available for canine patients, it is likely that a similar scenario can be expected. Therefore it is important to have a high index of suspicion for soft tissue injuries and to educate clients to bring dogs for an ultrasound examination when intermittent subtle lameness especially after hard work accompanied by (often transient) pain, heat and swelling are detected. The soft tissue injuries that are most commonly seen in my practice are psoas muscle tears, biceps tendon injuries and bicipital bursitis, injuries to the ligaments of the digits, and stifle joint injuries including collateral ligament, patellar tendon, meniscus and anterior cruciate (ACL). The ACL cannot be completely visualized, however much information can be gained about the status of the ligament and the joint response.

Maximum information using ultrasound is obtained when three parameters are evaluated for each level examined of each injured structure. The first is size or cross-sectional area of the structure in short axis view. Tendons and ligaments are irregularly shaped; therefore linear measurements are not accurate. Cross-sectional area measurements can be obtained along the length of the tendon/ligament and may be used to detect swelling or chronic enlargement either in comparison to measurements obtained proximally or distally or to the opposite limb. Over time cross sectional area measurements are useful to document resolution of initial swelling and positive response to rehabilitation and increasing exercise. Echogenicity of the entire cross-sectional view of the structure provides information about edema, fiber damage and scar formation. Discrete core lesions can be measured and typed according to their echogenicity relative to the surrounding normal tissue. Fiber pattern of the tendon or ligament evaluated in the longitudinal or long axis view provides essential information about alignment of the fibers along stress planes which is required for the structure to return to full strength.
Figure 1. The ultrasound image above is a cross-sectional view of the origin of the biceps tendon from the supraglenoid tubercle of the scapula.

Ultrasound is indicated when early radiographic changes of arthritis are found. A percentage of arthritic joints are the result of long term instability due to damaged collateral ligaments or other joint supporting soft tissues. If soft tissue injury is diagnosed, a rehabilitation program is indicated to allow the structure to completely heal and to provide normal joint stability prior to the patient’s return to full exercise. If the soft tissues are examined ultrasonographically at the time of joint trauma and found to be injured, a protocol to allow them to heal prior to return to work may prevent subsequent arthritis. Ultrasound is more sensitive at detecting developmental orthopedic disease in some locations than radiography. Joint swelling with negative radiographic findings in a young dog is an indication for ultrasonographic examination of such joints as the shoulder and the stifle.
Figure 2. The ultrasound image above is a long axis view showing developmental orthopedic disease of the proximal humerus that was confirmed by arthroscopy. The dog’s shoulder had been radiographed twice previously under anesthesia without discovering the lesion.