

PART II: FUNDAMENTALS OF MUSCULOSKELETAL ULTRASOUND COURSE

SUMMARY

Musculoskeletal Ultrasound is rapidly emerging as a cost-effective, efficient method of assessing MSK pathology and injuries. Clinical based ultrasound assessments performed by qualified professionals have proven to provide definitive, visual diagnoses. Given that the primary barrier to MSK ultrasound is the fact that the technique is highly sonographer dependent, this course was created to provide a comprehensive, yet concise, resource for those interested in learning about or refining the use of musculoskeletal ultrasound in their practice.

COURSE STRUCTURE

This MSK course is structured to provide a strong foundation of the fundamentals of musculoskeletal ultrasound from which interpretation skills are developed. Key in MSK ultrasound imaging is familiarity with the detailed anatomy of the muscles, tendons, and ligaments. Each section begins by covering normal anatomy, followed by a ScanLab (or multiple ScanLab modules depending on the area of interest) demonstrating the technique by which to evaluate the sonographic appearance of normal anatomy. The pathomechanism of acute and/or chronic injury or disease is covered in Pathology modules with case examples of abnormal sonographic appearance to aid in the recognition of musculoskeletal pathology.



Basic
Biomechanics



Soft Tissue
Characterization



Shoulder



Elbow



Wrist, Hand,
and Fingers



Knee



Hip



Lower Leg,
Ankle, and Foot



Interventional
Techniques



Peripheral
Nerves

FACULTY



Gregory E. Wilde, M.D.

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Gregory E. Wilde, M.D. is a fellowship-trained musculoskeletal radiologist who serves as Division Director of Musculoskeletal Radiology at Lenox Hill Radiology in Manhattan. Dr. Wilde specializes in the diagnosis of bone and joint disorders related to sports medicine, physiatry, orthopedics, and rheumatology with special skills in diagnostic musculoskeletal ultrasound, MRI, CT, and radiographic diagnosis of musculoskeletal disorders.

In addition to having trained several sonographers who have become registered in MSK ultrasound, Dr. Wilde serves on the Accreditation Committee for the American Institute of Ultrasound in Medicine and reviews MSK practices for Musculoskeletal Ultrasound accreditation. He is a reviewer for the American Journal of Roentgenology (AJR) and Skeletal Radiology, and is a member of the American College of Radiology, Radiological Society of North America (RSNA), the American Roentgen Ray Society (ARRS), and the American Institute of Ultrasound in Medicine (AIUM).

Dr. Wilde graduated from Tulane University with a BSE in Biomedical Engineering and received his medical degree from Georgetown University School of Medicine, District of Columbia. Following medical school, he completed his residency in Diagnostic Radiology at Christiana Care Health System, Delaware. Dr. Wilde then completed a fellowship in Musculoskeletal Radiology at the Hospital for Special Surgery in New York City.



Jamie Maloney Bie RDMS, RVT, RMSKS

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Jamie Maloney, RDMS, RVT, RMSKS has been performing a wide range of ultrasound examinations since graduating top of her class in Diagnostic Medical Sonography in 2006. Her initial clinical experience was in a hospital environment where she gained a strong background in the performance and comprehension of general and vascular sonography. In 2009, Jamie began working at Lenox Hill Radiology, a fast-paced, outpatient imaging center in New York City. She served at the Ultrasound Educator of the Lenox Hill multi-site

practice, directing the training of multiple sonographers in various areas of specialty. Jamie currently serves as the MSK Ultrasound Coordinator for the Columbia University Medical Center and was recently appointed to the AIUM Ultrasound Practice Accreditation Counsel.

Jamie was awarded the ARDMS Pioneer Musculoskeletal Ultrasound certification in 2012. In addition to holding the RMSKS credential, she is multi-registered in Vascular Technology, Abdomen, OB/GYN, and Breast ultrasound. Jamie currently reviews practices for Musculoskeletal Ultrasound accreditation for the American Institute of Ultrasound in Medicine. Together, Dr. Wilde and Jamie have developed protocols for Musculoskeletal Ultrasound and have collaborated to develop the Fundamentals of Musculoskeletal Ultrasound with Pegasus Lectures, Inc.

MODULE DESCRIPTIONS



Basic Biomechanics of Ligaments, Tendons, and Joints

Module 1: Mechanisms of Joint Injury

Module 1 of MSK Biomechanics begins by covering joint subluxation vs. dislocation and common joint valgus vs. varus stress injuries. Dr. Wilde discusses the types of joint movements including angulation, translation, rotation, external force, and internal force as well how intracapsular abnormalities can provide clues to the causes of joint injury. Knee valgus injuries in sports are demonstrated including skiing, hockey, and football injuries with demonstration of the valgus stress test to assess the integrity of the MCL. Knee posterior translation injuries, FOOSH, and dislocation injuries of the elbow are presented. The last section includes biomechanics of the foot with a demonstration of the anterior drawer test to assess the integrity of the anterior talofibular ligament and the talar tilt test to assess the integrity of the calcaneofibular ligament. In conclusion, key patient history questions are explored.

Core Concepts: 33 min

Focus Session: 25 min

Module 2: Patterns of Tendon and Ligament Failure

Beginning with tendon anatomy and microscopic structure, Dr. Wilde discusses the endotenon, epitendon, paratenon, peritendon, and tendon sheath components of the tendon structure followed by coverage of ligament morphology, composition, and differentiating features. The tendon stress strain curve emphasizes the importance of stress and strain forces and how it causes and impacts tear injuries. The terminology of full, partial, complete, incomplete, delaminated and split tears is reviewed with illustrations and sonographic images.

Core Concepts: 38 min

Focus Session: 29 min



Soft Tissue Characterization

Module 1: Soft Tissue Characterization, Part I

Part I of Soft Tissue Characterization covers imaging technologies to optimize MSK visualization, including extended field of view, tissue harmonics, spatial compound, 1.5 D transducer arrays, and multiple frequency transducers. Optimal transducer frequencies is introduced followed by a discussion of artifacts specific to MSK imaging such as anisotropy, speed of sound artifact, refraction, edge shadowing, comet tail, acoustic enhancements, and acoustic shadowing. Techniques are presented to recognize and minimize these artifacts. The sonographic appearance of soft tissue, edema, and muscle types including fusiform, unipennate, and bipennate, and synovial sheath images, tenosynovitis, and ganglia are demonstrated. The module concludes with a section on nerve anatomy, entrapment, injuries, and masses.

Core Concepts: 49 min

Focus Session: 37 min

Module 2: Soft Tissue Characterization, Part II

The second part of the MSK Soft Tissue Characterization, begins by demonstrating the normal soft tissue and bone interface with sonographic depictions of abnormalities. Limitations of ultrasound in viewing bone erosions is discussed followed by a discussion of the pathomechanism of stress fractures. The sonographic appearance of cartilage is demonstrated, showing normal and abnormal structures. This module continues with a review of soft tissue findings, including edema, cellulitis, soft tissue trauma, foreign bodies, air within wounds, hyperemia, scar formation, and the mechanism of a Morel-Lavallee lesion. Soft tissue topics include lymphadenopathy, sebaceous cysts, lipomas, abscesses, adventitial bursitis, and non-specific solid masses. Part II concludes with vascular masses such as vascular malformation, hemangioma, pseudoaneurysm, and superficial thrombophlebitis.

Core Concepts: 49 min

Focus Session: 37 min



Shoulder

Module 1: Anatomy of the Shoulder

Beginning with an overview of bony anatomy, Module 1 discusses muscular attachments of the rotator cuff with an emphasis on the glenohumeral joint cavity. Transducer positioning is demonstrated with side by side display of sonographic appearance of the biceps tendon, subscapularis, infraspinatus, supraspinatus and teres minor tendons, and acromion and coracoacromial ligaments in various views. The module concludes with a discussion of rotator interval and rotator cuff muscles.

Core Concepts: 45 min

Focus Session: 34 min

Module 2: ScanLab Shoulder

The Shoulder ScanLab module begins with a review of pertinent shoulder anatomy and the importance of the patient history and clinical exam. Transducer selection and patient positioning is shown for evaluation of the subscapularis, supraspinatus, infraspinatus and teres minor muscles and tendons, and the glenohumeral joint. Dynamic maneuvers to aid in diagnosis of the suspected pathology are demonstrated. Synchronous capture of the scanning technique and real-time ultrasound imaging provide a unique method of teaching MSK scanning techniques of the shoulder. Technical tips are offered throughout to improve structure identification and image optimization.

Core Concepts: 38 min

Focus Session: 29 min

Module 3: Shoulder Pathology, Part I

Module 3 focuses on rotator cuff pathologies, beginning with the clinical manifestation, causes, and sonographic appearance of subacromial impingement, followed by discussion of os acromiale and tendinosis. Rotator cuff tears are covered in detail, beginning with a review of terminology and cuff tear types, followed by the ultrasound diagnosis of cuff tears, important measurements, and the progression of tears. Sonographic images and MRI correlation demonstrate full and partial-thickness tears, differential retraction, bursal herniation, and the cartilage interface sign and articular surface and interstitial tears. The module concludes with a review of the sonographic appearance post-surgical and arthroscopic intervention.

Core Concepts: 54 min

Focus Session: 41 min

Module 4: Shoulder Pathology, Part II

Module 4, Part II of the Shoulder Pathology lecture, begins with a discussion of biceps pathology, including osteoarthritis, biceps tendon instability, displacement types, subluxation, and dislocation. Also covered are tendinosis, tenosynovitis and biceps rupture, refraction, and chronic avulsion. Dr. Wilde continues with a review of acromioclavicular joint pathology, separation, cysts, and sonographic appearance of the Geyser sign. Additional topics include the causes and ultrasonic appearance of calcium hydroxyapatite deposition, subacromial subdeltoid bursitis, paralabral cysts, pectoralis and deltoid lesions, and adhesive capsulitis. The module concludes with a discussion of shoulder masses, fatty tumors, and chondrocalcinosis.

Core Concepts: 52 min

Focus Session: 39 min



Module 1: Elbow Anatomy

The first module in the MSK Elbow series covers bony anatomy and the muscular anatomy of the lateral, medial, anterior, and posterior forearm groups. Topics also include capsular anatomy, tendinous attachments, and elbow joint spaces and recesses. A section on ligaments covers the medial collateral ligament and the lateral collateral ligament complex. The scanning technique for the lateral, medial, anterior, and posterior elbow is shown with attention to anatomic correlation.

Core Concepts: 35 min

Focus Session: 27 min

Module 2: ScanLab: Lateral Elbow

The patient position and transducer selection are discussed followed by a demonstration of the components of the lateral collateral ligament complex. Dynamic assessment of the radial collateral ligament and the lateral ulnar collateral ligament is demonstrated with varus stress. Includes evaluation of the common extensor tendon.

Core Concepts: 40 min

Focus Session: 30 min

Module 3: ScanLab: Medial Elbow

In this ScanLab of the medial elbow, Jamie Maloney demonstrates the protocol to evaluate the common flexor tendon. Common areas of injury are noted by a dynamic evaluation of the anterior bundle of the medial collateral ligament with valgus stress.

Core Concepts: 10 min

Focus Session: 8 min

Module 4: ScanLab: Anterior Elbow

After a brief review of the bony anatomy of the elbow, transducer selection is noted and the protocol for evaluation of the anterior elbow begins. Important structures are identified with commentary on common pathologies and the changes that would occur if pathology exists. Common areas of injury are identified and techniques are shared for image optimization.

Core Concepts: 17 min

Focus Session: 13 min

Module 5: ScanLab: Posterior Elbow

Beginning with the patient sitting on the exam table with their elbow flexed 90 degrees, the landmarks for evaluation of the posterior elbow are demonstrated. The use of power Doppler to assess for hyperemia is discussed and potential sites for intra-articular bodies is noted. Imaging of the triceps brachii medial, lateral, and long muscle heads are demonstrated.

Core Concepts: 10 min

Focus Session: 8 min

Module 6: Elbow Pathology, Part I

Part I of Elbow Pathology begins with the causes and clinical findings of lateral epicondylitis (tennis elbow), visualized with ultrasound images. Other pathologies discussed include common extensor tendinosis, calcific enthesopathy, partial and full thickness tears, medial epicondylitis, lateral collateral ligament tears, synovitis, osteoarthritis, and elbow joint loose bodies. Intraarticular and ossific bodies are demonstrated on ultrasound and X-ray.

Core Concepts: 26 min

Focus Session: 20 min

Module 7: Elbow Pathology, Part II

In Part II of Elbow Pathology, the discussion begins with distal biceps tendinosis and tears, bicipitoradialis and olecranon bursitis. Additional topics include forearm flexor muscle hernia, accessory muscle identification, cubital tunnel syndrome, and ulnar nerve instability and dislocation. The module concludes by covering the mechanism of snapping triceps syndrome with sonographic correlation.

Core Concepts: 34 min

Focus Session: 26 min



Forearm, Wrist, Hand, and Fingers

Module 1: Forearm, Wrist, and Hand Anatomy

Following a review of the bony anatomy of the forearm, Dr. Wilde covers the lateral and medial forearm muscle groups. Using a mnemonic to aid in recollection of the carpal bones, the wrist bony anatomy is explored in detail through graphics and sonographic images. The pathophysiology of the proximal and distal carpal tunnel is introduced with a review of Guyon's canal. The flexor tendons and extensor compartments are shown through ultrasound images. The three spaces of the palm: radial, ulnar, and central, as well as intrinsic ligaments are explained with illustrations and sonographic images.

Core Concepts: 37 min

Focus Session: 28 min

Module 2: Finger Anatomy

Module 2 begins with a review of the normal anatomy and capsular ligaments of the MCP joint. The main stabilizers of the interphalangeal joint are identified sonographically as is the volar plate of the PIP joint. Sonographic identification of the flexor tendons is shown as is the annular and cruciform pulley systems and extensor tendons. Techniques for ultrasound of the thumb are also demonstrated.

Core Concepts: 20 min

Focus Session: 15 min

Module 3: ScanLab: Dorsal Wrist and Hand

The module begins by noting patient position and transducer selection, followed by protocols for assessment of the dorsal wrist and hand. Sonographic characteristics of the ligaments are discussed with note of common sites for ganglion cyst occurrence. The technique for assessing all of the tendons of the wrist for tendinopathy, tenosynovitis, and partial or full thickness tears is explained. Analysis of each compartment is reviewed.

Core Concepts: 35 min

Focus Session: 27 min

Module 4: ScanLab: Volar Wrist and Hand

Module 4 of the Forearm, Wrist, Hand, and Fingers series describes the structures that can result in the compression of the median nerve, resulting in carpal tunnel syndrome. The flexor tendons entering the carpal tunnel are identified with note of the synovial sheath, when present. The protocol for documentation of the presence or absence of carpal tunnel syndrome is reviewed.

Core Concepts: 17 min

Focus Session: 13 min

Module 5: ScanLab: Fingers

Following a review of the bony anatomy of the hand, the five rays comprised of the metacarpal bones and phalanges, three articulations within each ray are identified. Joints are assessed for the presence of effusion, synovitis, or bony erosions. The technique for a dynamic evaluation by flexing the fingers to better visualize the hypoechoic hyaline articular cartilage and the underlying bony cortex is demonstrated. Techniques to evaluate for gamekeeper's thumb, Stener lesion, and Dupuytren's contracture are covered. The five annular pulleys and three cruciate pulleys which constrain the flexor tendons to the bones of the second through fifth fingers are identified.

Core Concepts: 36 min

Focus Session: 27 min

Module 6: Wrist Pathology

In the sixth module on wrist pathology, Dr. Wilde begins with a discussion of extensor tenosynovitis, tendinopathies, de Quervain's disease, Lister's tubercle, and retinaculum tears. Extensor carpi ulnaris instability, dislocation, partial tear, and longitudinal split are demonstrated sonographically. Carpal tunnel causes, clinical findings, sonographic signs, and treatment options are covered in depth through illustrations and ultrasound images. Additional wrist pathologies discussed include vessel trauma, pseudoaneurysms, synovitis, lunate erosion, and flexor tenosynovitis. The identification and progression of rheumatoid arthritis and osteomyelitis concludes this module.

Core Concepts: 78 min

Focus Session: 59 min

Module 7: Hand Pathology

Focusing on pathology of the hand, this module begins with a discussion of ganglion cysts, giant cell tumors of the tendon sheath, lipomas, Dupuytren's contractures, neural based tumors, and glomus tumors. Clinical and sonographic findings with trigger finger, mallet finger, Boutonniere deformity, and chronic terminal tendon injuries are demonstrated. The module concludes with flexor tendon tears, injuries, and lacerations, volar plate tears, foreign bodies, "gamekeeper's" thumb, and Stener lesions.

Core Concepts: 40 min

Focus Session: 30 min



Module 1: Knee Anatomy

Greg Wilde, MD begins this lecture by discussing the bony anatomy and relevant tendons, muscles, and ligaments. Following a review of the bursae of the knee, Dr. Wilde covers the focused knee exam, patient positions, and optimal transducer selection. Ultrasound evaluation of the lower leg compartments is reviewed. The anterior evaluation is discussed with a focus on the quadriceps femoris complex, the extensor mechanism, patellar tendon, and trochlear cartilage. The lateral evaluation focuses on the iliotibial band, fibular collateral ligament, lateral meniscus, and biceps femoris and popliteus tendon. Next covered is the medial evaluation with a review of the assessment of the medial collateral ligament, medial meniscus, and pes anserinus. The last section covers the evaluation of the posterior knee evaluation including Baker's cysts, menisci, posterior cruciate ligament, posterior condyles, and neurovascular structures.

Core Concepts: 46 min

Focus Session: 35 min

Module 2: ScanLab: Knee

Following a review of pertinent knee anatomy, the sonographic appearance of the musculoskeletal structures surrounding the knee are identified. Jamie Maloney details the patient positioning, transducer selection, and protocols for evaluation of the anterior, medial, lateral, and posterior knee. Attention is given to provide technical tips to aid in imaging optimizations as well as noting diagnostic parameters that should be included and/or measured if pathology is encountered.

Core Concepts: 38 min

Focus Session: 29 min

Module 3: Knee Pathology, Part I

Part I of the Knee Pathology series begins with the assessment of knee joint effusions, joint recesses, and the differentiation of synovitis from effusion. Pathologies include synovial proliferation in suprapatellar recess, rheumatoid arthritis knee with erosions and hypervascularity, and inflammatory synovitis. The module progresses to the sonographic appearance of early meniscal degeneration, tears, degeneration and extrusion with case examples. Additional topics include parameniscal cysts, knee joint and femorotibial osteoarthritis, trochlear cartilage, medial collateral ligament tears, and the ultrasound appearance of proximal tibial/fibula joint ganglia. The module concludes with a discussion of patellar tendinosis, tears, tendon rupture, and Osgood Schlatter disease.

Core Concepts: 66 min

Focus Session: 50 min

Module 4: Knee Pathology, Part 2

The second part of Knee Pathology discusses the clinical presentation, pathomechanism, and ultrasound appearance of bursitis with examples of ruptured, partially ruptured, and dissecting popliteal cysts. Cases of pes anserine bursitis with and without injection are presented. Additional types of bursitis include semimembranosus-MCL, prepatellar, and deep infrapatellar. The pathomechanism and US appearance of runner's knee and clergyman's knee is shown. The module concludes by covering quadriceps tendinosis, tendon tear, and osteochondroma.

Core Concepts: 44 min

Focus Session: 33 min



Module 1: Hip Anatomy, Part I

Part I of Hip Anatomy discusses the shifting mechanical load of the hip and details the anterior and posterior bony anatomy, ligamentous anatomy, and the ball and socket joint. Muscle anatomy includes the: iliopsoas, adductor, gluteus, hamstring, and external rotator muscles. Origin and insertion points are noted for each muscle. The module concludes with a review of sports hernias, greater trochanter anatomy, and bursae.

Core Concepts: 34 min

Focus Session: 26 min

Module 2: Hip Anatomy, Part II

Part II of Hip Anatomy focuses on the scanning technique used to evaluate tendons, muscles, fascia, bursae, nerves, vessels, and the joint of the hip by a systematic interrogation of the anterior, lateral, medial, and posterior compartments. Transducer selection and patient positioning are discussed with sonographic images detailing proper probe placement and protocol. In conclusion, hamstring anatomy and sciatic nerve identification are covered.

Core Concepts: 26 min

Focus Session: 20 min

Module 3: ScanLab: Anterior Hip and Thigh

This ScanLab commences with Dr. Wilde providing a review of normal anatomy and then proceeds to Jamie demonstrating sonographic identification of the superficial and deep layers of the anterior thigh. Attention is paid to the origination and insertion points of the muscles, tendons, and ligaments. This evaluation also includes assessment of the hip joint and the iliopsoas bursa with notation of signs of pathology and description of maneuvers to be performed should pathologic changes be suspected.

Core Concepts: 18 min

Focus Session: 14 min

Module 4: ScanLab: Lateral Hip and Thigh

Pertinent anatomy is reviewed at the onset of this module before progressing to the details of structure identification and lateral hip and thigh assessment protocols. Structures evaluated include, but are not limited to, the proximal femur, greater trochanter, abductor muscles, and the iliotibial band. For patients with an audible snap or palpable click during certain hip maneuvers, dynamic evaluations are recommended.

Core Concepts: 9 min

Focus Session: 7 min

Module 5: Posterior Hip and Thigh

As part of the evaluation of the posterior hip and thigh, Dr. Wilde reviews pertinent anatomy prior to Jamie demonstrating the MSK protocols for this segment of the hip. Changes in transducer selection, depending on the area of interest being imaged, is discussed. Attention is given to identifying key landmarks and origination/insertion points which aid in identification of the musculoskeletal structures of the posterior hip and thigh.

Core Concepts: 9 min

Focus Session: 7 min

Module 6: ScanLab: Sports Hernia (Medial Hip and Thigh)

Suspicion of the occurrence of athletic pubalgia or a sports hernia is the most common indication for evaluation of the medial hip and thigh. Assessment of the gracilis, adductor longus, adductor brevis, and adductor magnus tendons is demonstrated with care given to identify common sites of injury. The protocol for evaluation of the medial hip and thigh, including documentation, is discussed by Jamie Maloney.

Core Concepts: 6 min

Focus Session: 5 min

Module 7: Hip Pathology, Part I

Part I of Hip Pathology begins with a discussion of the variable echogenicity of joint effusion, identification of marginal erosions with hip synovitis, and cartilage changes with hip osteoarthritis. MRI and ultrasound images demonstrate the pathology associated with hip osteoarthritis. Other topics include septic hip joint, paralabral cyst, iliopsoas bursitis, thigh muscle tears, and the clinical and ultrasound findings with snapping hip and snapping IT band.

Core Concepts: 35 min

Focus Session: 27 min

Module 8: Hip Pathology, Part II

Hip Pathology, Part II topics include calcium hydroxyapatite deposition, cam type femoroacetabular impingement, trochanteric pain syndrome, and trochanteric bursitis. This module also covers the “rotator cuff tear of the hip”, the abductor tendon tear, with differentiation of complete and partial tears. MRI and ultrasound correlation of the iliotibial band tear at the iliac crest is presented with additional discussions of the Morel-Lavallee lesion post aspiration, hamstring tendon tear, and semimembranosus muscle tears.

Core Concepts: 26 min

Focus Session: 20 min

Module 9: Neonatal Hip Ultrasound

This module covers the anatomy, technique, and pathology associated with neonatal hip ultrasound. Beginning with the clinical presentation and physical signs of congenital dislocation, Dr. Wilde reviews the coronal and transverse protocols and the Graf, Harcke, and Terjesen methods of assessment. The AIUM Practice Guidelines are discussed with sonographic images to demonstrate the protocols. Pathology demonstrated includes dislocation, degrees of hip subluxation, low alpha angle, and capsular laxity.

Core Concepts: 40 min

Focus Session: 30 min



Lower Leg, Ankle, and Foot

Module 1: Lower Leg, Ankle, and Foot Anatomy, Part 1

Beginning with an anatomy review, Dr. Wilde discusses the ankle motions of dorsiflexion and plantar flexion, abduction and adduction, and inversion and eversion are presented. The techniques by which to evaluate the structures of the extensor tendons, retinacula, tibiotalar joint, lateral collateral ligaments, and peroneal tendons. Evaluation of the posterior lower leg, including the Achilles tendon and gastrocnemius and soleus structures is included. Additional topics covered are flexor tendons, deltoid, ligament, and the anterior syndesmosis ligament.

Core Concepts: 46 min

Focus Session: 35 min

Module 2: Lower Leg, Ankle, and Foot Anatomy, Part II

Part II of the Lower Leg, Ankle, and Foot Anatomy focuses on the anatomy of the foot. After a review of illustrations of the bony anatomy, sonographic correlations are introduced. The intrinsic muscle anatomy is discussed and includes the plantar muscles, forefoot muscles, plantar plate, the medial and lateral metatarsosesamoid and phalangeosesamoid ligaments and intersesamoid ligament. The module concludes by covering lesser metatarsophalangeal joints, and the anatomy of plantar fascia components.

Core Concepts: 15 min

Focus Session: 12 min

Module 3: ScanLab: Calf

The muscles of the calf are identified with attention to the origination and attachment points. The sonographic appearance of tendons, with attention to the Achilles tendon, is demonstrated with tips provided to aid in visualization. The protocol for evaluation of calf structures is reviewed with note of sonographic characteristics that would indicate the presence of pathology.

Core Concepts: 22 min

Focus Session: 17 min

Module 4: ScanLab: Lateral Ankle

In this module covering the lateral ankle, the technique to evaluate the three ligaments comprising the lateral collateral ligamentous complex is covered. Also included are scanning tips on how to maneuver the probe to eliminate anisotropy of the tendons. The need to change transducer frequencies when assessing deeper structures is explained. Jamie also demonstrates how important the dynamic evaluation is in assessing the stability of the peroneal tendons, checking for subluxation or dislocation of the tendons anterior to the fibula.

Core Concepts: 22 min

Focus Session: 17 min

Module 5: ScanLab: Medial Ankle

In this module, Jamie demonstrates the assessment of the medial collateral ligament complex and the flexor tendons. Characteristics of the tendons of the medial ankle are noted to aid in identification with attention to patient positioning. Common findings such as tenosynovitis or injury are noted.

Core Concepts: 20 min

Focus Session: 15 min

Module 6: ScanLab: Posterior Ankle

During evaluation of the posterior ankle, attention is paid to the Achilles and plantaris tendons. The description of the clinical evaluation specific to areas of tenderness and/or fullness includes the Thompson test. Measurement protocols are explained with diagnostic criteria noted. Indications for the use of power Doppler are identified and dynamic maneuvers which are helpful in assessing the ankle are explained.

Core Concepts: 16 min

Focus Session: 12 min

Module 7: ScanLab: Anterior Ankle

This module includes the assessment of the ankle joint which should be included in the evaluation of any compartment of the ankle. The module begins with a review of transducer selection and patient positioning. Common sites for ganglion cysts are explored. Specific clinical tests for ankle injuries, such as the anterior drawer and talar tilt test are covered. Technical tips to aid in image optimization are included throughout this module.

Core Concepts: 18 min

Focus Session: 14 min

Module 8: ScanLab: Plantar Fascia

This module covers the evaluation for plantar fascia beginning with the clinical exam to evaluate the heel and plantar side of the foot for any focal pain or nodules along the medial longitudinal arch. Sonographic assessment of the central, lateral and medial cords for any tears, plantar fasciopathy, or fibromas is covered.

Core Concepts: 16 min

Focus Session: 12 min

Module 9: ScanLab: Forefoot

The clinical evaluation specific to the forefoot exam is to try to reproduce neuroma symptoms. Mulder's technique is used to elicit a palpable click and pain as the forefoot is squeezed with both hands. Following a review of pertinent anatomy by Dr. Wilde, Jamie demonstrates the technique to evaluate the plantar plates of the forefoot. She also demonstrates the technique to image and assess the interspaces. The metatarsophalangeal joint is assessed for any effusions, synovitis, osteophytes, or ganglion cysts.

Core Concepts: 26 min

Focus Session: 20 min

Module 10: ScanLab: Dorsal Foot

Evaluation of the dorsal foot, depending on the area in which the patient is symptomatic is demonstrated. During examination, the three parts of the foot: the hindfoot which includes the talus and calcaneus, the midfoot which contains the navicular, cuboid, and cuneiforms, and the forefoot which contains the metatarsals and phalanges are evaluated. The technique to scan the joints and any joint of interest for effusion, synovitis, ganglion cysts, or any bony proliferations or erosions is demonstrated.

Core Concepts: 14 min

Focus Session: 11 min

Module 11: Lower Leg, Ankle, and Foot Pathology, Part I

Beginning with a discussion of the sonographic appearance of Achilles tendinosis, peritendinitis, and tenosynovitis, images are presented demonstrating the pathology. The progression of Achilles tendon tears is revealed through ultrasound images. To aid in assessing the integrity of the Achilles tendon, the Thompson calf squeeze test is demonstrated. Dr. Wilde also covers the method by which to assess the pathology associated with peroneal tendon tears. Other topics include hypertrophic peroneal tuberosity, peroneus brevis split syndrome, peroneal tendon instability, subluxation and dislocation, intrasheath subluxation, and tibialis anterior tears and tendinosis.

A section on ligament tears is included with demonstrations of dynamic maneuvers such as the anterior drawer test and talar tilt test with varus and valgus stress. This pathology section also covers medial gastrocnemius tears and muscle hernias.

Core Concepts: 39 min

Focus Session: 30 min

Module 12: Lower Leg, Ankle, and Foot Pathology, Part II

The second module relating the Pathology of the Lower Leg, Ankle, and Foot begins by discussing accessory ossicles and the diagnosis with ultrasound and MRI correlation. The discussion continues by covering pathology associated with bursae, joint effusion, synovitis, and gout. Dr. Wilde also presents the sonographic and X-ray appearance of bony fractures. Other topics include ganglion cysts, neuromas, plantar plate tears, foreign bodies, plantar fasciopathy, and the mechanism of turf toe.

Core Concepts: 49 min

Focus Session: 37 min



Interventional

Module 1: Interventional Techniques, Part I

The first part of Interventional Techniques focuses on the practical aspect of room set up, informed consent, one person vs. two person and in plane vs. out of plane techniques. The concept of needle anisotropy is demonstrated. Commonly used medications are presented, highlighting benefits vs. side effects. Sample injection needle and transducer placement is shown for AC joint, hip joint, iliopsoas bursa, glenohumeral joint, subacromial/subdeltoid bursa, metatarsophalangeal joint, radiocarpal joint, biceps tendon, ganglion cyst aspiration, retrocalcaneal bursa, metatarsosesamoid joint, knee joint, and proximal tibiofibular joint ganglion cyst injections.

Core Concepts: 54 min

Focus Session: 41 min

Module 2: Interventional Techniques, Part II

Part II of Interventional Techniques begins with a discussion of de Quervain's injection technique. Hydrodissection of carpal tunnel syndrome is shown sonographically as is volar ganglion cyst aspiration. Needle and transducer placement for other injection procedures includes trigger finger, peroneal tendon sheath, MP joint, neuroma, Baxter's nerve, and plantar fasciopathy. Common sites for calcium hydroxyapatite deposition are covered as well as the technique of pulse lavage, aspiration, and steroid injection for relief of pain. Additional topics include tendon fenestration and platelet rich plasma (PRP) growth factors. Case examples complement the discussions.

Core Concepts: 33 min

Focus Session: 25 min

Module 3: ScanLab: Shoulder Injection

This ScanLab demonstrates the procedure for cortisone injection of the shoulder. Beginning with a review of sterile technique, Dr. Wilde demonstrates the injection procedure under ultrasound guidance. Jamie Maloney provides technical tips to aid in the visualization of the needle tip and the target area for injection. Dr. Wilde provides a detailed narrative of the procedure, including tips to ensure proper delivery of the medication being injected.

Core Concepts: 26 min

Focus Session: 20 min



Peripheral Nerves

Module 1: Upper Limb Nerve Anatomy and Pathology

This module begins with a review of normal nerve structure and a presentation of a table of normative values. The anatomy section covers the suprascapular, axillary, median, radial, ulnar, and radial nerves. Causes and potential sites of compression are discussed as well as common pathologies. Additional topics include the clinical presentation and proposed causes of snapping triceps syndrome, carpal tunnel syndrome, and superficial radial nerve syndrome.

Core Concepts: 43 min

Focus Session: 33 min

Module 2: Lower Limb Nerve Anatomy and Pathology

This module covering lower limb nerve anatomy and pathology begins with a review of the sensory innervation of the lower extremity nerves, the anatomy of the femoral nerve and its branches, and the anatomy of the sciatic, tibial, common, superficial, and deep peroneal, sural nerves, and plantar digital nerves. Pathology associated with each specific nerve is discussed. The module concludes with the diagnosis and treatment of Baxter's neuropathy and a summary of the sensory innervation of the foot.

Core Concepts: 37 min

Focus Session: 28 min

Module 3: ScanLab: Upper Extremity

Beginning with a review of transducer selection and patient positioning, Jamie Maloney proceeds to demonstrate how to scan the ulnar nerve in the cubital tunnel, checking for anterior subluxation of the ulnar nerve over the medial epicondyle. In the cubital tunnel, she demonstrates how to assess the median nerve for potential sites of nerve compression. Next, Jamie demonstrates, at the level of the proximal elbow, how to assess the radial nerve at its origin and as it branches into the superficial branch and posterior interosseous nerve at the radiocapitellar joint. Other scanning techniques presented include evaluation of the median nerve at the wrist and the ulnar and radial nerves in the distal forearm and wrist.

Core Concepts: 33 min

Focus Session: 25 min

Module 4: ScanLab: Lower Extremity

Assessment of the nerves of the hip and thigh are noted in this module, including the femoral nerve, and lateral femoral cutaneous nerve, which when compressed may produce meralgia paresthetica. Jamie also demonstrates how to evaluate the sciatic nerve, proximal tibial nerve, and common, superficial, and deep peroneal nerves with note of documentation tips. The module concludes with evaluation of the tibial nerve and its branches in the tarsal tunnel.

Core Concepts: 52 min

Focus Session: 39 min

MSK ECOURSE SUMMARY

Viewing Time

Core Concepts: 29 hours

Focus Sessions: 22 hours

CME by Section

Basic Biomechanics of Ligaments, Tendons, and Joints: 2.00 CME

Soft Tissue Characterization: 2.75 CME

Shoulder: 5.00 CME

Elbow: 4.75 CME

Forearm, Wrist, Hand, and Fingers: 7.00 CME

Knee: 4.75 CME

Hip: 5.75 CME

Lower Leg, Ankle, and Foot: 8.00 CME

Interventional: 2.75 CME

Peripheral Nerves: 4.25 CME

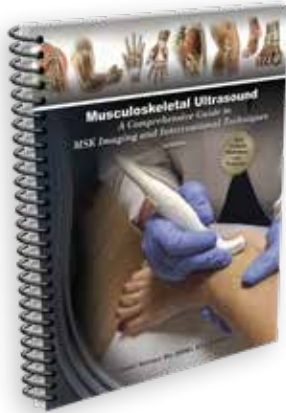
Total: 47 CME

MSK ECOURSE FEATURES



- Flexible viewing
- Dual Video Streaming
- Scan Labs
- Interactive Questions
- Bookmarking Capability
- Modular Delivery
- Customized Review
- Integrated Note-Taking
- Printable PowerPoints

MSK TEXTBOOK



Prompted by a void of educational material that covered MSK ultrasound in enough depth for a neophyte to become proficient in musculoskeletal ultrasound, Jamie Maloney Bie, RDMS, RVT, RMSKS, created a text that provides a comprehensive, step-by-step guide to MSK Ultrasound.

Divided into five major sections, each section contains multiple chapters with anatomy reviews and in-depth, fully illustrated protocols. The organization of this text facilitates a quick reference to the specific anatomy and protocol desired.

- Part I: Upper Extremities
- Part II: Lower Extremities
- Part III: Soft Tissue & Pathology
- Part IV: Peripheral Nerves
- Part V: Ultrasound Guided Procedures

MSK HANDS-ON TRAINING

Leading experts in the field of musculoskeletal ultrasound can tailor the hands-on scanning experience to your specific needs. In association with Learn MSK Sono, group workshops are offered several times a year in the New York City area or can be scheduled on-site at your own facility. These live seminars are a great way to prepare a group for a credentialing exam.



FOR MORE INFORMATION

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