UC San Diego
SCHOOL OF MEDICINE

IMAGING FOR MUSCULOSKELETAL PATHOLOGIES-NEW

-October 09, 2026

Location

The course will be held at the UC San Diego Center for Bleeding and Clotting Disorders, which is near the UC San Diego campus.

UC San Diego Health Center for Bleeding and Clotting Disorders

9333 Genesee Ave., Suite 310 A/B

San Diego, CA 92121

P. (858) 657-5929

E. mxzepeda@ucsd.edu

Course Description

The UC San Diego Musculoskeletal Ultrasound and Joint Injection Education Activities have been created to provide a comprehensive modular curriculum to teach point-of-care musculoskeletal ultrasound for the evaluation of ankles, knees, elbows, hips and spine, and to guide intra-articular needle placement for injections and aspirations. Small groups with a high faculty to participant ratio provide highly interactive learning environment with ample opportunity for hands-on practice with each other and patient volunteers. Course participants will learn basic ultrasound physics, how to operate ultrasound machines (including the use of small emerging small hand-held devices), sono-anatomy and sono-pathology of important arthritic conditions as well as ultrasound-guided joint injection techniques. The curriculum will also teach how to recognize joint bleeds and distinguish between simple and complex effusions, as well as the Joint Activity and Damage Exam (JADE), a validated joint ultrasound protocol for evaluation of hemophilic joints.

Our live courses Musculoskeletal Ultrasound and Guided Joint Injections Educational Activities

Learning Objectives

Musculoskeletal Ultrasound Training: Elbow, Knee, Ankle, and JADE Protocol

- Describe MSKUS basics, basic physics and knobology
- Discuss the basic operations of an ultrasound machine
- Interpret and apply sono-anatomy of ankles, knees, elbows, hip (including sacro-iliac joints), facette joints and shoulders
- Interpret basic structural abnormalities by sono-pathological findings
- Apply standard MSKUS transducer positions for ankles, knees, elbows hip (including sacro-iliac joints), facette joints and shoulders

- Describe the Joint Tissue Activity and Damage Exam (JADE) Hemophilia joint ultrasound protocol
- Describe the diagnosis of effusions
- Distinguish bloody from non-bloody effusions
- Perform a diagnostic musculoskeletal ultrasound recognizing hemarthrosis, synovitis and structural abnormalities (such as meniscus, tendons, ligaments)
- Quantify synovitis by Power Doppler
- Quantify cartilage health, soft tissue and synovial hypertrophy, and osteochondral lesions

Musculoskeletal Ultrasound Training: Shoulder, Hip and Spine

- Describe the normal sonoanatomy of the hip and shoulder
- Perform systematic and comprehensive diagnostic scan protocols of the hip and shoulder
- Identify abnormal sonographic findings of common musculoskeletal disorders of the hip and shoulder (tenosynovitis, tendinosis as precursor to tendon failure, rotator cuff disease, hip effusion vs psoas bleed, trochanteric pain, Piriformis imaging)
- Describe the benefit of ultrasound-guided injections of the hip and shoulder

The Joint Tissue Activity and Damage Exam (J.A.D.E.)

- Describe the Joint Tissue Activity and Damage Exam (JADE) Hemophilia joint ultrasound protocol
- Interpret basic structural abnormalities by sono-pathological findings
- Interpret and apply sono-anatomy of ankles, knees, and elbows
- Distinguish bloody from non-bloody effusions
- Perform a diagnostic musculoskeletal ultrasound recognizing hemarthrosis, synovitis and structural abnormalities (such as meniscus, tendons, ligaments)
- Describe the diagnosis of effusions
- Quantify synovitis by Power Doppler
- Quantify cartilage health, soft tissue and synovial hypertrophy, and osteochondral lesions
- Develop skills to perform J.A.D.E. protocol with all necessary views, interpretation, and measurements

Needs Assessment with Identified Practice Gap(s)

Musculoskeletal Ultrasound Training for Hemophilia and Other Arthritic Conditions

Arthritic conditions are frequent, and benefit from symptomatic relief measures as a bridge to joint replacement. Especially hemophilic arthropathy is a debilitating condition, caused by frequent joint bleeding. The clinical exam to diagnose and treat arthritic conditions, joint problems and musculoskeletal abnormalities, including hemarthrosis is unreliable, since range of motion deficits, warmth, swelling and pain are non-specific and don't permit the distinction between conditions. Therefore, point-of-care imaging is rapidly advancing and has become critical to practice state-of-the-art musculoskeletal medicine. High resolution Musculoskeletal Ultrasound (MSKUS) with Power Doppler capacity is an imaging technique, increasingly available due to technological advances, that permits point-of-care hand-held ultrasound scanning. Therefore, MSKUS is now introduced into many musculoskeletal disciplines, including orthopedics, rheumatology, sports medicine, primary care, and hemophilia

treatment centers. MSKUS permits ultrasound-guided interventions on multiple levels. MSKUS is a rapid, convenient, highly sensitive and a non-invasive imaging method for the diagnosis of cartilage abnormalities, joint effusions, joint bleeds, muscle tears, tendon tears and inflammation, soft tissue masses, and peripheral nerve conditions. It is also a valuable tool to follow joint health long-term by individual assessment of synovial hypertrophy, inflammation and cartilage health. However, training to diagnose and manage arthritic conditions, including hemophilic arthropathy is required. This CME course will provide training in MSKUS, and also provide specific knowledge regarding hemophilic arthropathy, enabling hemophilia providers to use MSKUS as point-of care imaging tool to assist with diagnosis and treatment of musculoskeletal pains similar to other disciplines.

Musculoskeletal Ultrasound of the Shoulder, Hip and Spine Training Course

Musculoskeletal disease is common in hemophilia. Hemophilic arthropathy is a frequent and debilitating comorbidity. The clinical exam to diagnose and treat hemarthrosis, joint problems and musculoskeletal abnormalities is highly subjective. Musculoskeletal Ultrasound (MSKUS employment in hemophilia has positively altered the assessment and treatment paradigm in hemophilia and other musculoskeletal disorders. The continued growth and development Point-of-care imaging in hemophilia and other musculoskeletal disorders has indicated the need to provide the much needed training to allow providers to evaluate the shoulder and hip. MSKUS permits ultrasound-guided interventions on multiple levels. MSKUS is a rapid, convenient, highly sensitive, and non-invasive imaging method for the diagnosis of soft tissue injury and joint bleeds. It is also a valuable tool to follow joint health long-term by individual assessment of synovial hypertrophy, inflammation and cartilage health.

Specific to hemophilia, intra-articular injections are an emerging area. Hemophilic arthropathy is a frequent and debilitating comorbidity caused by frequent joint bleeding. The hallmark of hemophilic arthopathy is osteochondral destruction and soft tissue proliferation, causing pain. Treatment options are limited and historically comprised conservative measures only, such as the administration of clotting factor concentrates, physical therapy, and oral analgesics or anti-inflammatory medications. Recently, it has been shown that ultrasound-guided needle placement for injections and aspirations in hemophilic arthropathy is safe and effective to reduce pain. This spurred interest amongst hemophilia providers to utilize intra-articular injections and joint aspirations for the management of hemophilic arthropathy. The availability to obtain training in ultrasound-guided needle placement should alleviate the fear to cause injury and bleeding in complicated hemophilic joints, which has been a barrier to use this modality.

This CME course will provide training in ultrasound-guided needle placement into joints to perform injections and aspirations. Many practices caring for patients with arthritic conditions, such as primary care, orthopaedics, rheumatology, sports medicine and hemophilia treatment centers have introduced musculoskeletal ultrasound for diagnostic purposes and the management of painful joints. Adding training to perform needle placement into joints using ultrasound guidance will greatly enhance providers' ability to manage joint pains of many arthritic conditions including hemophilic arthropathy.

The Joint Tissue Activity and Damage Exam (J.A.D.E.) is a quantitative and concise MSKUS protocol evaluating soft tissue proliferation (joint activity) and alterations to bone and cartilage (joint damage) in hemophilic joints.

Patients with hemophilia often experience repetitive joint bleeding episodes leading to hemophilic arthropathy, which is most commonly seen in the elbow, knee, and ankle. There is a need to detect formation and progression of hemophilic arthropathy in a fast and convenient fashion to afford targeted management of joint abnormalities.

Traditionally, radiographic (Pettersson score), magnet resonance imaging (MRI; International Prophylaxis Study Group Score) and clinical (Hemophilia Joint Health Score) scoring algorithms are used to monitor joint health. However, radiographs are insensitive to soft tissue changes, MRIs are lengthy, often requiring contrast or sedation, and cannot be performed repeatedly for all joints, and, clinical scoring does not provide information on a tissue level. Musculoskeletal ultrasound (MSKUS) has emerged as a rapid, point of- care (POC) imaging modality to detect bleeding episodes and to follow joint health longitudinally.

MSKUS is highly sensitive to soft tissue and osteochondral changes and can be performed frequently. The Joint Tissue Activity and Damage Exam (J.A.D.E.) is a quantitative and concise MSKUS protocol evaluating soft tissue proliferation (joint activity) and alterations to bone and cartilage (joint damage) in hemophilic joints. It has been validated by OMERACT guidelines (omeract.org), and is continuously improved in an iterative process.

The principle of J.A.D.E. is inherent to precise measurements of intraarticular soft tissue expansion, cartilage thickness and osteochondral interface irregularities in elbows, knees, and ankles. Furthermore, the J.A.D.E. protocol employs sonopalpation to differentiate between effusions and soft tissue and permits charting of descriptive

findings. Additionally, the J.A.D.E. protocol captures abnormal soft tissue microcirculation and vascularity changes by Power Doppler (PD) signals, altogether providing a versatile tool to dynamically follow the overall joint health status.

This CME course will provide hands-on training on how to conduct the J.A.D.E protocol in its entirety including acquiring measuring, and interpreting the images.

MSKUS: Why does the Practice Gap exist?

- *Lack of Knowledge:* There is an increasing demand to diagnose and manage arthritic conditions with point-of-care ultrasound, supplementing the physical exam. This is because ultrasound is an imaging technology, which is rapid and convenient, and permits to answer easily specific questions due to high tissue resolution and sensitivity. With the advent of new coagulation products, the hemophilia population is aging, and hemophilic arthropathy, requiring pain management, is coming rapidly into focus, similar to other arthritic conditions. These factors trigger the need for point-of-care MSKUS to adequately address joint disease in a variety of musculoskeletal disciplines, and also in hemophilia. In addition, objectivity in interpretation and measurements of MSKUS findings is of the upmost importance for reasons including but not limited to tracking tissue healing, longitudinal monitoring of tissue health, and precise data collection for research studies. For these reasons, training participants in the J.A.D.E. protocol is imperative
- *Lack of Competence:* Physicians and providers treating arthritic conditions, including hemophilia, and/or participating in research studies are not sufficiently trained in the J.A.D.E. protocol

Target Audience

This educational program is designed for any health care provider, but in particular for physicians, physician assistants, nurse practitioners, nurses, and physical therapists involved and/or interested in MSKUS as point-of care imaging tool to assist with diagnosis and treatment of joint and muscle pains in patients or people with and without hemophilia. Athletic trainers may also benefit from this course. Pediatric practitioners are welcomed. While ultrasound techniques for adults and children are similar, readings mainly apply to adolescents and adults with a mature skeleton. To complete pediatric training, we refer to the online module **Pediatric Considerations for the Use of Musculoskeletal Ultrasound in Hemophilia**

Accreditation

The University of California San Diego School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The University of California San Diego School of Medicine designates this live activity for a maximum **22.25** *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Maximum credit available per day as follows:

TBD

AAPA: AAPA accepts certificates of participation for educational activities certified for *AMA PRA Category 1 Credit™* from organizations accredited by ACCME or a recognized state medical society. Physician assistants may receive a maximum of 22.25 hours of Category 1 credit for completing this program.

Nurses: For the purpose of recertification, the American Nurses Credentialing Center accepts *AMA PRA Category 1 Credits™* issued by organizations accredited by the ACCME. For the purpose of licensure, the California Board of Registered Nursing accepts *AMA PRA Category 1 Credits™*. (report up to 22.25 hours of credit and list "CME Category 1" as the provider number).

Surgeons: Successful completion of this CME activity, which includes participation in the evaluation component, enables the learner to earn credit toward the CME requirement of the American Board of Surgery's Continuous Certification program. It is the CME activity provider's responsibility to submit learner completion information to ACCME for the purpose of granting ABS credit.

Cultural & Linguistic Competency and Implicit Bias:

Continuing medical education (CME) providers are required by state Assembly Bills 1195 and 241, and the **standards** created by the California Medical Association (CMA), to include components that address cultural and linguistic competency and implicit bias in CME activities. The planners and presenters of this activity has been asked to provide meaningful consideration of these standards in the selection and presentation of content. Additional information and resources are available on the **UC San Diego CME website**.

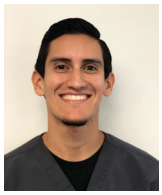
Course Agendas

DAY ONE - **Musculoskeletal Ultrasound Training: Elbow, Knee, Ankle, and JADE Protocol**		
TIME	**AGENDA ITEM**	**PRESENTOR**
08:30 AM	Welcome	Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK
09:30 AM		Randy E Moore, DC, RDMS, RMSK
11:00 AM		Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK Peter Aguero, PT, DPT, RMSK Bruno Steiner, PT, DPT, RMSK Cindy Bailey PT, DPT, OCS, SCS, ATC Grace Hernandez, PT, DPT Mark Krimmel, PT, DPT, RMSK
12:30 PM	Lunch	
01:30 PM		Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK Peter Aguero, PT, DPT, RMSK Bruno Steiner, PT, DPT, RMSK Cindy Bailey PT, DPT, OCS, SCS, ATC Grace Hernandez, PT, DPT Mark Krimmel, PT, DPT, RMSK
02:30 PM		Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK Peter Aguero, PT, DPT, RMSK Bruno Steiner, PT, DPT, RMSK Cindy Bailey PT, DPT, OCS, SCS, ATC Grace Hernandez, PT, DPT Mark Krimmel, PT, DPT, RMSK
04:00 PM	Break	
04:30 PM		Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK Peter Aguero, PT, DPT, RMSK Bruno Steiner, PT, DPT, RMSK Cindy Bailey PT, DPT, OCS, SCS, ATC Grace Hernandez, PT, DPT Mark Krimmel, PT, DPT, RMSK
6:00 PM	Q&A	Randy E Moore, DC, RDMS, RMSK Annette von Drygalski, MD, PharmD, RMSK Peter Aguero, PT, DPT, RMSK Bruno Steiner, PT, DPT, RMSK Cindy Bailey PT, DPT, OCS, SCS, ATC Grace Hernandez, PT, DPT Mark Krimmel, PT, DPT, RMSK
6:30 PM	Adjourn	

Course Faculty

Day 4B – *Imaging for Musculoskeletal Pathologies*

Annette von Drygalski, MD, PharmD, RMSK
Course Director
Annette von Drygalski, MD, PharmD, RMSK
Professor of Clinical Medicine
Director, Center for Bleeding and Clotting Disorders
Associate Director, Center of Excellence for Hereditary Hemorrhagic Teleangiectasia
Program Director, Coagulation Medicine Fellowship
Associate Program Director, Hematology Fellowship
University of California, San Diego



Peter Aguero, PT, DPT, RMSK
Co-Director
Physical Therapist
UC San Diego Health Center for Bleeding and Clotting Disorders
University of California, San Diego
San Diego, California

Faculty

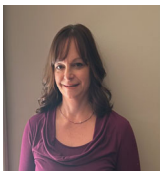
Randy Moore, DC, RDMS, RMSK
General Musculoskeletal Imaging, Inc.
MSKMasters
Cincinnati, OH

Cindy Bailey, PT, DPT, OCS, SCS, ATC, EMT
Orthopaedic Institute for Children & Ortho HTC Physical Therapy (in alliance with UCLA Health)
UCLA
Los Angeles, California

Bruno Steiner, PT, DPT, LMT, RMSK
Physical Therapy and MSKUS Program Manager,
Registered Diagnostic Musculoskeletal Ultrasonographer,
Washington Center for Bleeding Disorders,
Washington Institute for Coagulation

Cris Cazares-Machado, MSN, RN, BS
Clinical Nurse II
UC San Diego Center for Bleeding and Clotting Disorders
University of California, San Diego

Mark Krimmel, PT, DPT, RMSK
Washington Center for Bleeding Disorders
Washington Institute for Coagulation



Grace Hernandez, PT, DPT
Center for Inherited Bleeding Disorders
Orange County, CA

Disclosure Summary

It is the policy of University of California San Diego Continuing Medical Education to ensure that the content of accredited continuing education and related materials is accurate, balanced, objective, and scientifically justified. Education must be free of the influence or control of ineligible companies, and protect learners from promotion, marketing, and commercial bias. All persons in a position to control the content of accredited continuing education must disclose all financial relationships held with ineligible companies, prior to assuming a role in the activity. Those relationships deemed relevant to the education are mitigated prior to the activity through one of the following strategies, depending on the nature of relationship and the role of the person: 1) divesting the financial relationship, 2) altering the individual's control over content, and/or 3) validating the planning decisions and/or content through independent peer review. All relevant financial relationships are mitigated prior to the activity and mitigation strategies and necessary steps for implementation are communicated to individuals prior to them assuming their role in the activity. Persons who refuse or fail to disclose are disqualified from participating in the activity. Activities are evaluated by participants and peer reviewers to determine if the content was free of bias and met acceptable scientific standards. This information is considered in future activity planning. **All relevant financial relationships and the nature of those relationships are noted below. All relevant financial relationships have been mitigated.**

Name	Role in Activity	Name of Ineligible Company(ies)/Nature of Relationship(s)
Annette von Drygalski	Course Director, Faculty	Advisor for Pfizer, CSL Behring, LLC, Biomarin, Novo Nordisk, Regeneron Pharmaceuticals, Inc., ASC Therapeutics, Takeda Pharmaceuticals, Sanofi S.A., Genentech, Sparxs
Peter Aguero	Co-Director, Faculty	Honoraria from Sanofi S.A. Consulting Fee-CSL Behring, LLC
Cindy Bailey	Faculty	Honoraria-Sanofi
Grace Hernandez	Faculty	Speakers Bureau-Sanofi S.A.|Speakers Bureau-Takeda Pharmaceuticals (Any division)
Mark A. Krimmel	Faculty	Speakers Bureau-Sanofi S.A.|Advisor-Sanofi S.A.
Bruno UK Steiner	Faculty	Consulting Fee-CSL Behring, LLC|Grant or research support-Roche (Any division)|Grant or research support-Bioverativ|Grant or research support-Pfizer (Any division)

Persons in control of content of this educational activity who are not specifically identified by name above, such as (but not limited to) course directors, faculty, CME staff, planners, editorial staff, peer reviewers, and CME committee reviewers do not have any relevant financial relationships.

This educational activity may contain discussion of unlabeled and/or investigational uses of agents that are not approved by the FDA. Please consult the prescribing information for each product. The views and opinions expressed in this activity are those of the faculty and do not necessarily reflect the views of the University of California San Diego School of Medicine.

CLAIMING CREDITS & COURSE EVALUATION

After checking into the conference please visit https://ucsd.cloud-cme.com/default.aspx to complete the evaluation. Once sign into your account click on MyCME on the top right, click on Evaluations & Certificates, then click on Complete Evaluation for the Nephrology Conference. If you would like a step-by-step guide please use the following link https://ucsd.cloud-cme.com/assets/ucsd/pdf/Claim_Credit_and_Evaluation_Completion_Instructions%20(v.1%2003.09.23).pdf. The claim credit code for this activity will be 4372.

Once you complete and submit your evaluation, your certificate will be available immediately for download. The last day to claim credit online is July 26th.

**Only registered participants can claim credit for this conference.*

Practice Gap Resources

Musculoskeletal Ultrasound Training for Hemophilia and Other Arthritic Conditions

Literature: Hemophilia

Aguero P, Barnes RF, Flores A, von Drygalski A. **Teleguidance for Patient Self-Imaging of Hemophilic Joints Using Mobile Ultrasound Devices: A Pilot Study**. J Ultrasound Med. 2023;42(3):701-712.

Barnes RFW, Aguero P, Hanacek C, et al. **Consistency of serial ultrasonographic joint tissue measurements by the Joint tissueActivity and Damage Exam (JADE) protocol in relation to hemophilic joint health parameters.** BMC Musculoskelet Disord. 2023;24(1):299. Published 2023 Apr 15.

Bakeer N, Dover S, Babyn P, Feldman BM, von Drygalski A, Doria AS, Ignas DM, Abad A, Bailey C, Beggs I, Chang EY, Dunn A, Funk S, Gibikote S, Goddard N, Hilliard P, Keshava SN, Kruse-Jarres R, Li Y, Lobet S, Manco-Johnson M, Martinoli C, O'Donnell JS, Papakonstantinou O, Pergantou H, Poonnoose P, Querol F, Srivastava A, Steiner B, Strike K, Timmer M, Tyrrell PN, Vidarsson L, Blanchette VS. **Musculoskeletal ultrasound in hemophilia: Results and recommendations from a global survey and consensus meeting**. Res Pract Thromb Haemost. 2021 Jul 10;5(5):e12531.

Mesleh Shayeb A, Barnes RFW, Hanacek C, et al. **Quantitative measurements of haemophilic joint tissues by point-of-care musculoskeletal ultrasound: Associations with clinical and functional joint outcome parameters.** Haemophilia. 2021;27(5):866-875.

Volland LM, Zhou JY, Barnes RFW, Kruse-Jarres R, Steiner B, Quon DV, Bailey C, Hughes TH, Moore RE, Chang EY6, von Drygalski A. **Development and Reliability of the "Joint Activity and Damage Exam" (J.A.D.E.) for Quantitation of Structural Abnormalities by Musculoskeletal Ultrasound in Hemophilic Joints.** J Ultrasound Med. 2018 Oct 29.

Ceponis A, Wong-Sefidan I, Glass CS, von Drygalski A. **Rapid musculoskeletal ultrasound for painful episodes in adult hemophilia patients**. Haemophilia. 2013; 19:790-8.

W Kidder, S Ngugen, J Larios, J Bergstrom, A Ceponis, A von Drygalski. **Point-of-care musculoskeletal ultrasound is critical for the diagnosis of hemarthroses, inflammation and soft tissue abnormalities in adult patients with painful hemophilic arthropathy.** Haemophilia. 2015; 21:530-7.

A von Drygalski, RE Moore, S Nguyen, LM Volland, TJ Cramer, TH Hughes, J Du, EY Chang. **Advanced Hemophilic Arthropathy: Sensitivity of Soft Tissue Discrimination with Musculoskeletal Ultrasound**.
J Ultrasound Med. 2018; 37:1945-1956.

Kidder W, Nguyen S, Larios J, Bergstrom J, Ceponis A, von Drygalski A. **Point-of-care musculoskeletal ultrasound is critical for the diagnosis of hemarthroses, inflammation and soft tissue abnormalities in adult patients with painful hemophilic arthropathy**. Haemophilia. 2015; 21:530-7.

World Federation of Hemophilia International Musculoskeletal Congress is recognizing the use of ultrasound as a diagnostic tool at the 2015 annual conference. (http://www.wfh.org/en/page.aspx?pid=771)

Literature: Other Musculoskeletal Conditions

The **American Institute of Ultrasound in Medicine (AIUM)** offers webinars to learn MSK ultrasound with specific case reports for providers registered with the institute. https://www.aium.org/practice-topics/musculoskeletal-ultrasound

European League against Rheumatism (EULAR) offers online classes to learn MSKUS technology specific to rheumatology. http://www.eular.org/index.cfm?framePage=/edu_online_course_msus.cfm

American College of Rheumatology (ACR) recommends MSKUS for point-of care diagnosis and treatment of joint disease.

Koppikar S, Diaz P, Kaeley GS, Eder L. Seeing is believing: **Smart use of musculoskeletal ultrasound in rheumatology practice.** Best Pract Res Clin Rheumatol. 2023;37(1):101850. doi:10.1016/j.berh.2023.101850

Gitto S, Messina C, Vitale N, Albano D, Sconfienza LM. **Quantitative Musculoskeletal Ultrasound**. Semin Musculoskelet Radiol. 2020;24(4):367-374.

McAlindon T, Kissin E, Nazarian L, Ranganath V, Prakash S, Taylor M, Bannuru RR, Srinivasan S, Gogia M, McMahon MA, Grossman J, Kafaja S, FitzGerald J, et al. **American College of Rheumatology Report on Reasonable Use of Musculoskeletal Ultrasonography in Rheumatology Clinical Practice.** Arthritis Care Res (Hoboken). 2012; 64:1625-40.

Naredo E, Iagnocco A, et al. **One year in review 2017: ultrasound in crystal arthritis.** Clin Exp Rheumatol. 2017 May-Jun; 35:362-367.

Amoo-Achampong K, Nwachukwu BU, McCormick F, et al. **An orthopedist's guide to shoulder ultrasound: a systematic review of examination protocols.** Phys Sportsmed. 2016 Nov; 44:407-416.

Situ-LaCasse E, Grieger RW, Crabbe S, Waterbrook AL, Friedman L, Adhikari S, et al. **Utility of point-of-care musculoskeletal ultrasound in the evaluation of emergency department musculoskeletal pathology.** World J Emerg Med. 2018; 9:262-266.

Chen KC, Lin AC, Chong CF, Wang TL, et al. **An overview of point-of-care ultrasound for soft tissue and musculoskeletal applications in the emergency department**. J Intensive Care. 2016; 4:55.

Roll SC, Asai C, Tsai J, et al. **Clinical utilization of musculoskeletal sonography involving non-physician rehabilitation providers: a scoping review.** Eur J Phys Rehabil Med. 2016; 52:253-62.

Yim ES, Corrado G, et al. **Ultrasound in sports medicine: relevance of emerging techniques to clinical care of athletes.** Sports Med. 2012; 42:665-80.

Patil P, Dasgupta B. **Role of diagnostic ultrasound in the assessment of musculoskeletal diseases.** Ther Adv Musculoskelet Dis. 2012 Oct;4(5):341-55. doi: 10.1177/1759720X12442112. PMID: 23024711; PMCID: PMC3458614.

Literature: Hemophilia

E Martin, RFW Barnes, CM Moran, S Holle, TH Hughes, RE Moore, and A von Drygalski, et al. **Efficacy and safety of point-of-care ultrasound-guided intra-articular corticosteroid joint injections in patients with hemophilic arthropathy.** Haemophilia, 2016 Aug 3. doi: 10.1111/hae.13057. [Epub ahead of print]

A Ceponis, I Wong-Sefidan, CS Glass, A von Drygalski, et al. **Rapid musculoskeletal ultrasound for painful episodes in adult hemophilia patients**. Haemophilia 2013; 19:790-798 [Epub Epub 2013 May 15]

W Kidder, S Ngugen, J Larios, J Bergstrom, A Ceponis, A von Drygalski, et al. **Point-of-care musculoskeletal ultrasound is critical for the diagnosis of hemarthroses, inflammation and soft tissue abnormalities in adult patients with painful hemophilic arthropathy.** Haemophilia; in press

Fernandez-Palazzi F, Caviglia HA, Salazar JR, Lopez J, Aoun R, et al. **Intra-articular dexamethasone in advanced chronic synovitis in hemophilia.** Clin Orthop Relat Res. 1997; 343: 25–9.

Rodriguez-Merchan EC, Villar A, Orbe A, Magallon M, et al. **Intra-articular methylprednisolone therapy in chronic hemophilic synovitis of the knee**. Rev Clin Esp 1994; 194: 480–2.

Shupak R, Teitel J, Garvey MB, Freedman J, et al. **Intra-articular methylprednisolone therapy in hemophilic arthropathy.** Am J Hematol 1988; 27: 26–9.

Other

Using ultrasound to treat and diagnose more accurately. http://www.hemaware.org/story/scans-demand 12/2015 Featured in HEMAWARE (The Bleeding Disorders Magazine). Scans in Demand.

European League against Rheumatism (EULAR) offers online classes to learn MSKUS technology specific to rheumatology. http://www.eular.org/index.cfm?framePage=/edu_online_course_msus.cfm

American College of Rheumatology (ACR) recommends MSKUS for point-of care diagnosis and treatment of joint disease. American College of Rheumatology Report on Reasonable Use of Musculoskeletal

Ultrasonography in Rheumatology Clinical Practice. T MCALINDON, E KISSIN, L NAZARIAN, V RANGANATH, S PRAKASH, M TAYLOR, RR BANNURU, S SRINIVASAN, M GOGIA, MA MCMAHON, J GROSSMAN, S KAFAJA, AND J FITZGERALD. Arthritis Care&Research 2012. 64: 1625-1640