Musculoskeletal MR

MSK-I *Muscle Imaging/ Cartilage Imaging*
(5 speakers, 90 min)

MSK-II *Bone Marrow Imaging*
(5 speakers, 90 min)

Wing P. Chan, MD
陳榮邦 教授

Time Table

Saturday, May 21, 2022
Room 205

Time	Topics	Speakers	Moderators
08:30-08:45 (15mins)	Imaging of Muscle disorders with Phosphorus MR Spectroscopy	Jim Wu	Wing P. Chan Yu-Ching Lin
08:45-09:15 (30mins)	Muscle Injury MRI and Differential Diagnosis	Robert Downey Boutin	Wing P. Chan Yu-Ching Lin
09:15-09:25 (10mins)	The Novel MR Imaging in Quantifying Skeletal Muscle Fibrosis	Yu-Ching Lin	Wing P. Chan Yu-Ching Lin
09:25-09:30 (5mins)	Q&A		Wing P. Chan Yu-Ching Lin
09:30-09:45 (15mins)	AI in Osteoarthritis	Sharmila Majumdar	Guo-Shu Huang
09:45-09:55 (10mins)	Radial T2* mapping of human meniscus	Ping-Huei Tsai	Guo-Shu Huang
09:55-10:00 (5mins)	Q&A		Guo-Shu Huang

Muscle Imaging/Cartilage Imaging

Organizer: Wing P. Chan, MD

Overview:

MRI provides excellent contrast resolution for the evaluation of muscles, tendons, and musculotendinous units. Advanced MRI technologies can evaluate and monitor a wide spectrum of muscle pathologies including muscle injury, muscle response to injury, soft-tissue neoplasms, and neuromuscular diseases. MRI may also help clinicians to choose optimal sites for muscle biopsy. This session will introduce MRS in evaluation of selective muscle disorders, systematic approach of muscle injuries, and quantitative assessment of muscle fibrosis.

The advancements of quantitative MRI for cartilage and meniscal applications have been rapid in recent years. The second part of this session will focus on artificial intelligence in osteoarthritis research and cartilage/meniscal imaging for optimizing imaging protocols, quantitative assessment, and automated analysis of diseases.

Imaging of Muscle Disorders with 31-Phosphorus MR Spectroscopy

Dr. Jim S. Wu, MD

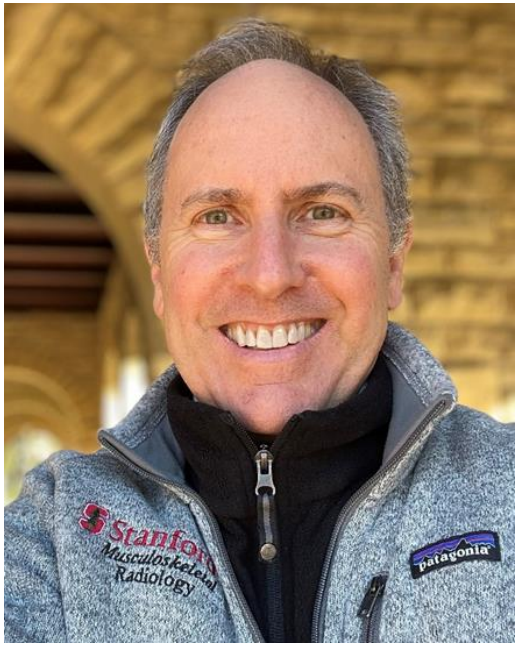
- Division Chief, MSK Imaging and Intervention, BIDMC
- Vice Chair of Education and Lifelong Learning, BIDMC
- Associate Professor in Radiology, Harvard Medical School
- Dr. Wu received his BS in Biology from the Massachusetts Institute of Technology (MIT) and MD degree from Baylor College of Medicine. He completed his Diagnostic Radiology Residency and MSK Fellowship at Yale New Haven Hospital where he was a Chief Resident
- Dr. Wu has been at Beth Israel Deaconess Medical Center (BIDMC), Harvard Medical School, since 2005
- He has delivered over 200 regional, national, or international talks and has over 100 peer reviewed publications, 30 book chapters, and 2 books
- Dr. Wu has held leaderships roles in RSNA, SSR, ISS, NERRS, CORR and AUR
- His research interests are in musculoskeletal tumors, image guided intervention, and developing new biomarkers to assess muscle disorders
- He is passionate about medical education and has served as the BIDMC Residency Program Director, MSK fellowship director, and Vice Chair of Education and Lifelong Learning
- You can follow his tweets at @JimWuMSK and @BIDMC_MSKimg

Imaging of Muscle Disorders with 31-Phosphorus MR Spectroscopy

- **Synopsis:**

31-Phosphorus magnetic resonance spectroscopy (31P-MRS) is unique in its ability to study, non-invasively, the biochemical pathways for the supply and utilization of energy in muscle tissue. The post-exercise metabolic recovery rate of skeletal muscle phosphocreatine (PCr) can be used as an index of mitochondrial oxidative capacity in vivo. This talk will describe its use in the clinical assessment of various muscle disorders.

Muscle Injury MRI and Differential Diagnosis



Robert Downey Boutin, MD, USA

- Clinical Professor and Director, Musculoskeletal Imaging Fellowship, Department of Radiology, Stanford University School of Medicine
- Clinical Professor, Stanford University
- Chair, RSNA Msk Meeting Program Committee
- Executive Committee, Society of Academic Bone Radiologists

Muscle Injury MRI and Differential Diagnosis

- **Synopsis:**
- The pace of muscle injury research has accelerated in recent years, with new insights on diagnosis, treatment, and prognosis. This talk reviews muscle derangements diagnosed by MRI, including: (1) direct injuries and their sequelae (e.g., contusion, hematoma, heterotopic ossification, muscle herniation, and chronic exertional compartment syndrome) and (2) indirect "strain" injuries commonly encountered in the thigh (e.g., hamstrings and rectus femoris), calf (e.g., gastrocnemius), and chest wall region (e.g., pectoralis major, latissimus dorsi, and teres major). Finally, we review the differential diagnostic considerations for abnormal signal intensity seen on MRI.

The Novel MR Imaging in Quantifying Skeletal Muscle Fibrosis

- Staff physician in Department of Radiology, Chang Gung Medical Hospital at Keelung, Taiwan
- Associate professor in Department of Radiology, Chang Gung Medical Hospital at Keelung, Taiwan

Yu-Ching Lin, MD, Taiwan

The Novel MR Imaging in Quantifying Skeletal Muscle Fibrosis

- **Synopsis:**
- Muscle fibrosis is considered as the end stage of all muscle injury. We believe the amount of muscle fibrosis can reflect on the severity of muscle disease. Histopathology from muscle biopsy is considered as the gold standard for evaluating muscle fibrosis, however it is an invasive procedure. Extracellular volume matrix fraction (ECV) obtained from MRI has been commonly applied in the evaluation of cardiac muscle fibrosis. However, the application of ECV measurement had not been reported in the assessing of skeletal muscle fibrosis. This talk will focus on the validating the ability of ECV in quantifying skeletal muscle fibrosis

AI in Osteoarthritis

Sharmila Majumdar, MD, PhD, USA

- Vice Chair for Research, Department of Radiology and Biomedical Imaging, UCSF
- Margaret Hart Surbeck Distinguished Professor in Advanced Imaging, UCSF
- Professor, Department of Orthopedic Surgery and Department of Bioengineering & Therapeutic Sciences, UCSF

AI in Osteoarthritis

- **Synopsis:**
- Emerging artificial intelligence methods applied to quantitative imaging, across the imaging cycle – from image acquisition, reconstruction, feature extraction and disease trajectory modelling will be presented. In this talk we will focus on imaging methods related to imaging degenerative joint disease and osteoarthritis. The focus will be specifically on tissues like cartilage, meniscus, muscle, bone and ligaments. We will focus on relating the quantitative tissue imaging to function, pain, skeletal biomechanics, and movement changes. The clinical deployment of these AI methods and their impact on patient impact will be discussed.

Radial T2 mapping of human meniscus*

Ping-Huei Tsai, PhD, Taiwan

- Associate Professor, Department of Medical Imaging and Radiological Sciences, Chung Shan Medical University
- Major interest: Quantitative MR imaging, Radial acquisition and reconstruction

Radial T2 mapping of human meniscus*

- **Synopsis:**
- Human menisci play important roles in stabilizing and maintaining normal functions in the knee joint. T2 values are reportedly reflective of subtle changes in water content and orientation of the collagen fibers in knee menisci and correlate with osteoarthritis (OA) severity. Conventional MRI cannot produce adequate signal from the meniscus because the short T2 time (approximately 5-8 ms at 1.5 T) of the water in this highly collagenous structure can lead to T2 overestimation. We aimed to validate a 2D radial T2* mapping method and assess its feasibility for detecting early meniscal abnormalities in patients with OA.

- **Key References:**

- Tsai PH, Wong CC, Chan WP, Radial T2* mapping reveals early meniscal abnormalities in patients with knee osteoarthritis. European Radiology 2022; DOI: 10.1007/s00330-022-08641-6