

Quantitative Evaluation of Myofascial Tissues: Potential Impact for Musculoskeletal Pain Research

September 16–17, 2020

An NIH HEAL Initiative Virtual Workshop

Co-organizers: NCCIH, NIBIB

NIH Partners: NIAMS, NICHD/NCMRR, NIDCR, NINDS

Day 1: September 16, 2020

8:45 a.m. Welcome and NIH HEAL Overview: Rebecca Baker, NIH HEAL Director

9:00 a.m. Opening Remarks: Helene Langevin, NCCIH Director

Historical Overview of Myofascial Pain Syndrome and Hypotheses

9:25 a.m. **Session One: State of Science of Myofascial Pain Syndrome: Clinical Presentation, Pathophysiological Hypotheses, and Challenges**

Chair: Michael L. Oshinsky, NINDS

Co-Chair: Leslie Derr, NIAMS

9:30 a.m. Carla Stecco, University of Padova
Fascial Anatomy, From Macro to Micro

9:42 a.m. Jay Shah, NIH /Clinical Center
Chronic Myofascial Pain: Myogenic Considerations in Its Pathogenesis and Clinical Manifestations

9:54 a.m. John Srbely, University of Guelph
The Role of Neurogenic Mechanisms in the Pathophysiology and Clinical Manifestation of Chronic Myofascial Pain

10:06 a.m. David Lesondak, University of Pittsburgh
A Clinician's Perspective on Treating Myofascial Pain: Overview and Challenges

10:18 a.m. Mary Barbe, Temple University
Basic Research/Animal Models Relevant to Myofascial Pain

10:30 a.m. BREAK

- 10:45 a.m. **Panelist Comments**
 Lynn Gerber, George Mason University
 Kendi Hensel, Texas College of Osteopathic Medicine
 Eric Jacobson, Harvard Medical School
 Jan Mundo, Mundo Lifework
 Niki Munk, Indiana University
 Kathleen Sluka, University of Iowa
 Heather Tick, University of Washington
- 11:05 a.m. **Panel Discussion**
- 11:45 a.m. **Questions and Answers From the Zoom and Videocast Audiences**
- 12:00 Noon VIRTUAL LUNCH
- 1:00 p.m. **Session Two: Current Structural Imaging Approaches With Potential Application to Myofascial Pain Syndrome**
 Chair: Guoying Liu, NIBIB
 Co-Chair: Merav Sabri, NCCIH
- 1:05 p.m. Garry E. Gold, Stanford Schools of Engineering and Medicine
Current Magnetic Resonance Imaging Approaches With Potential Application to Myofascial Pain Syndrome
- 1:17 p.m. Bruce Damon, Vanderbilt University
Quantitative MRI Methods With Potential Application to Myofascial Pain Syndrome
- 1:29 p.m. Sandip Biswal, Stanford University
Use of Molecular Imaging and MR Neurography in the Identification of Peripheral Pain Generators
- 1:41 p.m. Siddhartha Sikdar, George Mason University
From Qualitative to Quantitative: Musculoskeletal Ultrasound Imaging for the Evaluation of Myofascial Tissues: Opportunities and Limitations
- 1:55 p.m. **Panelist Comments**
 Christine Chung, University of California, San Diego
 Bharti Khurana, Harvard Medical School
 Levon Nazarian, Thomas Jefferson University
 Antonio Stecco, New York University Langone Health
- 2:05 p.m. **Panel Discussion**
- 2:35 p.m. **Questions and Answers From the Zoom and Videocast Audiences**
- 2:50 p.m. BREAK

- 3:05 p.m. **Session Three: Elastography Imaging Approaches with Potential Application to Myofascial Pain Syndrome**
- Chair: Helene Langevin, NCCIH
 Co-Chair: Merav Sabri, NCCIH
- 3:10 p.m. Kevin Parker, University of Rochester
 Ultrasound Elastography for Evaluation of Tissue Mechanical Properties
- 3:22 p.m. Helene Langevin, NCCIH
 Measurement of Shear Plane Tissue Mobility Using Ultrasound Elastography Techniques
- 3:34 p.m. Richard Ehman, Mayo Clinic College of Medicine and Science
 MR Elastography: Quantitatively Characterizing the Mechanical Properties of Skeletal Muscle and Myofascial Interfaces
- 3:46 p.m. **Panelist Comments**
 Shigao Chen, Mayo Clinic Rochester
 Dieter Klatt, University of Illinois, Chicago
 Neil Roberts, University of Edinburgh
 Sergio Sanabria, Stanford University School of Medicine
 Siddhartha Sikdar, George Mason University
 Robert Vining, Palmer College of Chiropractic
- 4:00 p.m. **Panel Discussion**
- 4:30 p.m. **Questions and Answers From the Zoom and Videocast Audiences**
- 4:45 p.m. **WRAP UP**
- 5:00 p.m. **ADJOURN**

Day 2: September 17, 2020

- 8:45 a.m. Welcome Back: Jill Heemskerk, NIBIB Deputy Director
- 9:00 a.m. **Session Four: Emerging Promising Technologies for Myofascial Pain Syndrome: Electrophysiology, MRI, and PET**
Chair: Alex Tuttle, NINDS
Co-Chair: Chuck Washabaugh, NIAMS
- 9:05 a.m. Abhijit J. Chaudhari, University of California, Davis
Innovations in PET for Future Applications in Myofascial Pain Syndrome
- 9:17 a.m. Espen Spangenburg, East Carolina University
Application of Techniques That Assess Physiological and Metabolic Parameters of Skeletal Muscle To Advance Our Understanding of Myofascial Pain Syndrome
- 9:29 a.m. Seward Rutkove, Beth Israel Deaconess Medical Center, Harvard
Electrophysiology Techniques and Potential Applications for Myofascial Tissues
- 9:41 a.m. Els Fieremans, New York University Langone Health
In Vivo Imaging of Tissue and Muscle Microstructure
- 9:53 a.m. **Panelist Comments**
Vania Apkarian, Northwestern University
Mark D. Does, Vanderbilt University
Jordi Serra, King's College Hospital, London
Samuel R. Ward, University of California, San Diego
- 10:05 a.m. **Panel Discussion**
- 10:35 a.m. **Questions and Answers From the Zoom and Videocast Audiences**
- 10:50 a.m. BREAK
- 11:10 a.m. **Session Five: Emerging Promising Technologies for Myofascial Pain Syndrome: Tissue Engineering, Artificial Intelligence, and Computational Modeling**
Chair: Yolanda F. Vallejo, NIDCR
Co-Chair: Theresa Hayes Cruz, NICHD/NCMRR
- 11:15 a.m. Jeffrey Lotz, University of California, San Francisco
Quantifying Associations Between Paraspinal Muscle Quality, Spinal Pathologies, and Skeletal Biomechanics
- 11:27 a.m. Sharmila Majumdar, University of California, San Francisco
The Role of Machine Learning for Muscle Segmentation and Characterization of Muscle Properties

- 11:39 a.m. Silvia Blemker, University of Virginia
Multiscale Computational Modeling Integrates Biology and Mechanics To Prove New Insights Into Muscle Dysfunction
- 11:51 a.m. Hai Yao, Clemson University/Medical University of South Carolina
Integrating Multimodality Measurement and Multiscale Modeling To Assess TMDs
- 12:05 p.m. **Panelist Comments**
Lucia Cevidanes, University of Michigan
Adam Hantman, Janelia Research Campus
Lealem Mulugeta, *InSilico* Labs, LLC, and Medalist Performance
Thomas Myers, University of Rochester
- 12:15 p.m. **Panel Discussion**
- 12:45 p.m. **Questions and Answers From the Zoom and Videocast Audiences**
- 1:00 p.m. VIRTUAL LUNCH
- 2:00 p.m. **Session Six: General Discussion**
Chair: Wen Chen, NCCIH
Co-Chair: Dena Fischer, NIDCR
- 2:05 p.m. **Panelist Comments**
Allan Basbaum, University of California, San Francisco
Christine Chung, University of California, San Diego
William Maixner, Duke University Medical Center
Julie Fritz, The University of Utah
Daniel K. Sodickson, New York University Langone Health
- 2:30 p.m. **Panel Discussion**
- 3:00 p.m. **Summary and Concluding Remarks**
Helene Langevin, NCCIH Director
- 3:30 p.m. **ADJOURN**