

PROGRAM

43rd International Symposium on Ultrasonic Imaging and Tissue Characterization

May 30 – June 1, 2018
Westin Arlington Gateway
Arlington, VA

The annual International Symposium on Ultrasonic Imaging and Tissue Characterization has long been recognized as one of the world's leading forums concerned with ultrasonic technology for medical applications. Fifty-six technical contributions will be presented this year. Many of the presentations will deal with clinical evaluation of novel methodologies and instrumentation for tissue characterization.

The program includes technical sessions on tissue parameters, tissue elasticity, photoacoustics, imaging, and photoacoustics/interventional ultrasound. In a special session to be held on Thursday afternoon, NIH representatives will respond to questions regarding research-funding opportunities in the face of budget constraints at NIH.

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PROGRAM

WEDNESDAY, MAY 30

8:00 a.m. **Registration/Coffee and Pastry**

9:00 a.m. **Welcome**
Ernest J. Feleppa, *Symposium Chairman*

9:05 a.m. **1. TISSUE PARAMETERS 1**
Chair: Gregory J. Czarnota, *U. Toronto*

1.1 **Quantitative ultrasound and texture predictors of breast-tumor response to chemotherapy prior to treatment**, Gregory Czarnota, Hadi Tadayyon, Mehrdad Gangeh, Lakshmanan Sannachi, Ali Sadeghi-Naini, William Tyler Tran, Sonal Gandhi, Maureen Trudeau, *Sunnybrook Health Sciences Ctr. and U. Toronto*

9:20 a.m.

1.2 **Comparing machine learning classifiers in breast cancer treatment response monitoring using quantitative ultrasound**, Lakshmanan Sannachi, Mehrdad Gangeh, Ali Sadeghi-Naini, William Tran, Sonal Gandhi, Frances Wright, Gregory Czarnota, *Sunnybrook Health Sciences Ctr. and U. Toronto*

9:35 a.m.

1.3 **Quantitative ultrasound characterization of breast-cancer hyperthermia treatment response *in vivo***, Deepa Sharma, Lakshmanan Sannachi, Holliday Cartar, Wentao Cui, William Tyler Tran, Gregory J. Czarnota, *Sunnybrook Research Inst., Sunnybrook Health Sciences Ctr. and U. Toronto*

9:50 a.m.

1.4 **Application of robust short-lag spatial-coherence beamforming to breast-ultrasound data**, Alycen Wiacek, Ole Marius

Hoel Rindal, Kelly Fabrega-Foster, Susan Harvey, Muyinatu A. Lediju Bell, *Johns Hopkins U. and U. Oslo*

10:05 a.m. **Coffee**

10:50 a.m. **2. TISSUE PARAMETERS 2**

Chair: Timothy J. Hall, *U. Wisconsin-Madison*

2.1 Comparison of human and nonhuman primate cervix: summary of quantitative ultrasound findings and implications for future research, Timothy Hall, Helen Feltovich, Ivan Rosado-Mendez, Lindsey Drehfal, Quinton Guerrero, Andrew Santoso, Mark Palmeri, *U. Wisconsin-Madison, Intermountain Healthcare and Duke U.*

11:05 a.m.

2.2 Correlation length ratio as a parameter for determination of fiber-like structures in soft tissues, Mohammadreza Kari, Andrew P. Santoso, Quinton W. Guerrero, Helen Feltovich, Timothy J. Hall, *U. Wisconsin-Madison and Intermountain Healthcare*

11:20 a.m.

2.3 Correlations between cervical smooth-muscle force generation and acoustic backscatter-coefficient parameters, Andrew P. Santoso, Joy Vink, George Gallos, Helen Feltovich, Timothy J. Hall, *U. Wisconsin-Madison, Columbia U. and Intermountain Healthcare*

11:35 a.m.

2.4 Quantitative ultrasound assessment of collagen fibers in ex-vivo human skin, Masaaki Omura, Kenji Yoshida, Shinsuke Akita, Tadashi Yamaguchi, *Chiba U.*

11:50 a.m. **Lunch**

1:15 p.m. **3. ELASTICITY 1**

Chair: Siddhartha Sikdar, *George Mason U.*

3.1 Exploiting correlation and signal-to-noise ratio for delineating human carotid plaque components in vivo in ARFI imaging, Gabriela Torres, Tomasz J. Czernuszewicz, Jonathon W. Homeister, Melissa C. Caughey, Benjamin Y. Huang, Ellie R. Lee, Carlos A. Zamora, Mark A. Farber, William A. Marston, David Huang, Timothy C. Nichols, Caterina M. Gallippi, *U. North Carolina at Chapel Hill and North Carolina State U.*

1:30 p.m.

3.2 Normalized shear-deformation indicator for ultrasound strain elastography in breast tissues: in vivo feasibility study, Jingfeng Jiang, Bo Peng, *Michigan Tech. U.*

1:45 p.m.

3.3 Characterization of local muscle-fiber anisotropy using shear-wave elastography in patients with chronic myofascial

pain, M. Bird, J. Shah, L. Gerber, H. Tandon, S. DeStefano, S. Sikdar, *George Mason U. and NIH*

2:00 p.m.

3.4 Longitudinal measurements of response to corticosteroid therapy in transplanted livers using attenuation-measuring ultrasound shear-wave elastography (AMUSE), Ivan Z. Nenadic, Luiz Vasconcelos, Sara Aristizabal, Matthew W. Urban, William Sanchez, James F. Greenleaf, Shigao Chen, *Mayo Clinic*

2:15p.m.

3.5 Characterization of nonlinear brain elasticity with shear shock waves, David Espindola, Bharat B. Tripathi, Gianmarco Pinton, *U. North Carolina at Chapel Hill and North Carolina State U.*

2:30 p.m. **4. ELASTICITY 2**

Chair: Jingfeng Jiang, *Michigan Tech. U.*

4.1 Strain-dependent corneal-elasticity measurement using high-frequency ultrasound, Laurentius O. Osapoetra, Dan M. Watson, Stephen A. McAleavey, *U. Rochester*

2:45 p.m.

4.2 In vivo assesment of interstitial fibrosis in renal allografts using simultaneous estimation of shear wave speed and backscatter coefficient, Roberto J. Lavarello, Gabriela Torres, Carolina Amador, Sara Aristizabal, Maria Luisa Montero, Andrew D. Rule, Naim S. Issa, Thomas D. Atwell, Matthew W. Urban, *Pontificia U. Católica del Perú, U. North Carolina, Chapel Hill, Philips Research North America, Mayo Clinic Coll. Med.,*

3:00 p.m.

4.3 Comparison of acoustic-radiation-force-based methods to characterize mechanical anisotropy: acoustic-radiation-force-impulse imaging, viscoelastic-response ultrasound and shear-wave elastography, Leela Goel, Caterina Gallippi, *U. North Carolina at Chapel Hill*

3:15 p.m.

4.4 Estimation of mechanical anisotropy from ARFI-induced peak displacements, Murad Hossain, Caterina Gallippi, *U. North Carolina at Chapel Hill*

3:30 p.m.

4.5 Fourier-domain shift matching: robust time-of-flight approach for shear-wave speed estimation, David Rosen, Jingfeng Jiang, *Michigan Tech. U.*

3:45 p.m. **Coffee**

4:15 p.m. **5. PHOTOACOUSTICS**

Chair: Muyinatu A. Lediju Bell, *Johns Hopkins U.*

5.1 **Integrated optical-acoustic numerical model for simulation of photoacoustic-imaging systems for breast-cancer detection**, Nima Akhlaghi, William C. Vogt, Keith A. Wear, T. Joshua Pfefer, Brian S. Garra, *FDA and Washington DC VA Med. Ctr.*

4:30 p.m.

5.2 **Implications of theoretical photoacoustic spatial covariance for short-lag spatial coherence imaging**, Michelle T. Graham, Muyinatu A. Lediju Bell, *Johns Hopkins U.*

4:45 p.m.

5.3 **In-vivo imaging of neurotransmitter modulation of brain network activity using transcranial photoacoustic voltage-sensitive dye imaging**, Jeeun Kang, Haichong K. Zhang, Shilpa Kadam, Joshua Elmore, Heather Valentine, Ying Yan, Jin U. Kang, Arman Rahmim, Albert Gjedde, Leslie M. Loew, Dean F. Wong, Emad M. Boctor, *Johns Hopkins U., U. Connecticut and U. Copenhagen*

5:00 p.m.

5.4 **Deep neural networks for photoacoustic imaging using LED light source**, Emran Anas, Haichong K. Zhang, Emad M. Boctor, *Johns Hopkins U.*

5:15 p.m.

5.5 **Feasibility of low-cost photoacoustic imaging using clinical ultrasound scanners without laser synchronization**, Yixuan Wu, Haichong Zhang, Emad M. Boctor, *Johns Hopkins U.*

5:30 p.m. **Adjourn**

THURSDAY, MAY 31

7:45 a.m. **Coffee and Pastry**

8:45 a.m. **6. ELASTICITY 3**

Chair: Nick Bottenus, *Duke U.*

6.1 **Imaging of prostate cancer by combined quantitative ultrasound and acoustic-radiation-force-impulse imaging**, Daniel Rohrbach, Mark Palmeri, Thomas Polascik, Jonathan Mamou, Ernest J Feleppa, Kathryn R. Nightingale, *Riverside Research and Duke U.*

9:00 a.m.

6.2 **Improving shear-wave speed image quality in 3D prostate elasticity imaging**, Derek Y. Chan, Samantha L. Lipman,

Ned C. Rouze, D. Cody Morris, Thomas J. Polascik, Mark L. Palmeri, Kathryn R. Nightingale, *Duke U.*

9:15 a.m.

6.3 **Ultrasound elastography in skeletal muscle**, Fabrice Prieur, Olivier Seynnes, *U. Oslo and Norwegian Sch. Sport Science*

9:30 a.m.

6.4 **First-order parameters influencing median nerve shear-wave speed estimates**, Anna Knight, Samantha Lipman, Thamathida Ketsiri, Lisa Hobson-Webb, Kathryn Nightingale, *Duke U.*

9:45 a.m.

6.5 **Subresolution displacement in tissue maps in ultrasound imaging simulation**, Sandhya Chandrasekaran, Bharat B. Tripathi, David Espandola, Gianmarco Pinton, *U. North Carolina at Chapel Hill and North Carolina State U.*

10:00 a.m.

6.6 **Feasibility of Synthetic Aperture Imaging (SAI) for parallel beamformed tracking of transient shear waves**, Rifat Ahmed, Marvin M. Doyley, *U. Rochester*

10:15 a.m.

6.7 **Comparison of two- and three-parameter viscoelastic material models using measurements of phase velocities and group shear-wave speeds**, Courtney A. Trutna, Ned C. Rouze, Mark L. Palmeri, Kathryn R. Nightingale, *Duke U.*

10:30 a.m. **Coffee**

11:10 a.m. **7. TISSUE PARAMETERS 3**

Chair: Ernest J. Feleppa, *Riverside Research*

7.1 **Identifying cancerous thyroid nodules by means of quantitative ultrasound**, Daniel Rohrbach, Jason Smith, Poorani Goundan, Harshal Patel, Ernest J. Feleppa, Stephanie L. Lee, *Riverside Research and Boston U.*

11:25 a.m.

7.2 **Ultrasound sensing-based intuitive proportional control: evaluation study with upper-extremity amputees**, Ananya Dhawan, Biswarup Mukherjee, Shriniwas Patwardhan, Joseph Majdi, Rahsaan Holley, Wilsaan Joiner, Michelle Harris-Love, Siddhartha Sikdar, *George Mason U. and MedStar National Rehab. Hosp.*

11:40 a.m.

7.3 **Application of quantitative ultrasound analysis to assessing pelvic floor injuries**, Qi Xing, Parag Chitnis, Siddhartha Sikdar, Abbas Shobeiri, Qi Wei, *George Mason U.*

11:55 a.m.

7.4 **Inferring micro-architecture parameters from the ultrasonic attenuation in cortical bone**, Omid Yousefian, Rebekah White, H. T. Banks, Marie Muller, *North Carolina State U.*

12:10 p.m.

7.5 **Simultaneous estimation of attenuation and backscatter coefficient with Dynamic Programming**, Zara Vajihi, Ivan M. Rosado-Mendez, Timothy J. Hall, Hassan Rivaz, *Concordia U, U. Nacional Autónoma de México and U. Wisconsin-Madison*

12:25 p.m. **Lunch**

2:00 p.m. **8. IMAGING 1**

Chair: Michael L. Oelze, *U. Illinois at Urbana-Champaign*

8.1 **Comparison of time-delay spectrometry and pulse-echo ultrasound imaging systems**, Biswarup Mukherjee, Ananya S. Dhawan, Elizabeth Tarbox, Nima Akhlagh, Paul Gammell, Parag Chitnis, Siddhartha Sikdar, *George Mason U. and Gammell Applied Tech.*

2:15 p.m.

8.2 **Speckle reduction using neural networks**, Dongwoon Hyun, Leandra L. Brickson, Kevin T. Looby, Jeremy J. Dahl, *Stanford U.*

2:30 p.m.

8.3 **Deep-learning alternative to beamforming ultrasound images**, Arun Asokan Nair, Trac D. Tran, Austin Reiter, Muyinatu A. Lediju Bell, *Johns Hopkins U.*

2:45 p.m.

8.4 **Size manipulation of ultrasound contrast agent and its impact on subharmonic emissions and delayed onset**, Jeff Rowan, James McGrath, Marvin Doyley, *U. Rochester*

3:00 p.m. **9. PHOTOACOUSTICS/ INTERVENTIONAL IMAGING**

Chair: Emad M. Boctor, *Johns Hopkins U.*

9.1 **Listening to cell membrane potential: a new diagnostic and interventional imaging approach** (invited), Emad A. Boctor, *Johns Hopkins U.*

3:20 p.m.

9.2 **In vivo demonstration of spectroscopic photoacoustic molecular imaging of prostate cancer**, Haichong K. Zhang, Ying Chen, Jeeun Kang, Ala Lisok, Il Minn, Martin G. Pomper, Emad M. Boctor, *Johns Hopkins U.*

3:35 p.m. **Coffee**

4:05 p.m.

9.3 **Deep learning for photoacoustic source detection and reflection artifact removal**, Derek M. Allman, Austin Reiter, Muyinatu A. Lediju Bell, *Johns Hopkins U.*

4:20 p.m.

9.4 **Photoacoustic sensing of bioelectric activity using quantum dots**, Nashaat Rasheed, Mara Casebeer, Okhil K. Nag, Michael H. Stewart, Alan L. Huston, James B. Delehanty, John R. Cressman, Parag V. Chitnis, *George Mason U.*

4:35 p.m.

9.5 **Photoacoustic-based catheter tracking: simulation, phantom and in vivo studies**, Alexis Cheng, Younsu Kim, Yuttana Itsarachaiyot, Haichong K. Zhang, Clifford R. Weiss, Russell H. Taylor, Emad M. Boctor, *NIH and Johns Hopkins U.*

4:50 p.m. **10. NIH PROGRAM FUNDING (Discussion)**
Houston Baker, *NCI*; +TBD; and James G. Miller, *Washington U. in St. Louis* (Moderator)

5:30 p.m. **Adjourn**

FRIDAY, JUNE 1

7:30 a.m. **Coffee and Pastry**

8:30 a.m. **11. IMAGING 2**

Chair: Gregg E. Trahey, *Duke U.*

11.1 **Comparison of ultrasonic image quality metrics: theory, simulation and in vivo results**, Will Long, Gregg E. Trahey, *Duke U.*

8:45 a.m.

11.2 **Pilot study of adaptive fetal imaging based on lag-one coherence**, Katelyn Flint, Will Long, James Long, David Bradway, Sarah Ellestad, Patricia McNally, Gregg Trahey, *Duke U.*

9:00 a.m.

11.3 **Short-lag spatial coherence imaging in 1.5-D and 1.75-D arrays: performance and implications for array design**, Matthew Morgan, Dongwoon Hyun, Gregg Trahey, *Duke U.*

9:15 a.m.

11.4 **Cardiac image quality reflected by spatial and temporal coherence**, Nick Bottenus, Vaibhav Kakkad, Will Long, Katelyn Flint, David Bradway, Melissa Lefevre, Gregg Trahey, *Duke U.*

9:30 a.m.

11.5 Visualization of the intensity field of a focused ultrasound (FUS) source *in situ*, Trong N. Nguyen, Minh N. Do, Michael L. Oelze, *U. Illinois at Urbana-Champaign*

9:45 a.m.

11.6 Comparative study of CT-US registration performance with DAS and SLSC ultrasound beamforming techniques, Eduardo Gonzalez, Muyinatu A. Lediju Bell, *Johns Hopkins U.*

10:00 a.m. **Coffee**

10:30 a.m. **12. IMAGING 3**

Chair: James G. Miller, *Washington U. in St. Louis*

12.1 Temperature imaging in real time with 1°C accuracy and 2x2 mm² resolution using a conventional ultrasonic imaging system, R. Martin Arthur, *Washington U. in St. Louis*

10:45 a.m.

12.2 Ultrasound thermal monitoring using external ultrasound elements: CNN approach, Younsu Kim, Chloe Audigier, Emran Anas, Jens Ziegler, Michael Friebe, Emad M. Boctor, *Johns Hopkins U.*

11:00 a.m.

12.3 Ultrasonic monitoring method for HIFU ablation using physics-based simulation, Chloé Audigier, Younsu Kim, Nicholas Ellens, Emad M. Boctor, *Johns Hopkins U.*

11:15 a.m.

12.4 Developments in pulse-echo sound-speed tomography, Anthony S. Podkowa, Michael L. Oelze, *U. Illinois at Urbana-Champaign*

11:30 a.m.

12.5 Correlation of ultrasound tomography with pathology and MRI in localizing prostate cancer, Reza Seifabadi, Alexis Cheng, Bilal Malik, Shun Kishimoto, Jeeva Munasinghe, Ayele H. Negussie, Murali Cherukuri, Peter Choyke, Peter Pinto, Arman Rahmim, Emad M. Boctor, Maria Merino, Mark Lenox, Baris Turkbey, Bradford J. Wood, *NIH, QTultrasound and Johns Hopkins U.*

11:45 a.m.

12.6 Transrectal ultrasound tomography with plane-wave full-waveform inversion, Lianjie Huang, Kai Gao, Yunsong Huang, Wenyong Pan, *Los Alamos National Lab*

12:00 p.m. **Adjourn**

