

QIBA Ultrasound Shear Wave Speed (SWS): System Dependencies Subcommittee

Friday, July 12, 2013; 11 AM CT

Draft Call Summary

Notes provided by Dr. Wear

In attendance

Mark Palmeri, MD, PhD (Co-Chair)

Keith Wear, PhD (Co-Chair)

Paul Carson, PhD

Timothy J. Hall, PhD

Jingfeng Jiang, PhD

Ted Lynch, PhD

Mike Macdonald, PhD

Kathy Nightingale, PhD

Nicolas Rognin, MSc, PhD

Matthew Urban, PhD

RSNA

Joe Koudelik

Julie Lisiecki

Moderator: Keith Wear, PhD

1. The call summary from 2013-07-12 was approved
2. "Effects of Phase Aberration on Acoustic Radiation Force-Based Shear Wave Generation" by Dr. Matthew Urban, Assistant Professor of Biomedical Engineering, Mayo Clinic College of Medicine

Phase aberration is a particular concern for imaging deep in the body. Overlying fat layers can produce phase aberration. Both attenuation and phase aberration reduce signal amplitude. Standard beam focusing assumes a constant sound speed (1540 m/s). Deviations from that constant assumption produce phase aberration. Dr. Urban's group used a Verasonics system with a linear array, curved linear array, and a phased array. Push frequencies ranged from 1.5 – 5 MHz. All probes were focused at 40 mm and used F/1. Shear waves were evaluated in a homogeneous phantom. The first test was a random phase screen aberrator. For the linear array and random phase aberrator, better shear waves were produced by reducing the push frequency from 4.5 to 3 MHz. Similar results were achieved for the curved linear array and phased array. The second test used tissue layers – excised pork belly with skin, fat, and muscle (attenuation + phase aberrator) on top of a CIRS homogeneous phantom. Similar trends were found. Other current work involves tracking with pulse-inversion harmonic imaging, which takes advantage of superior single-to-noise ratio compared with fundamental tracking.

3. QIBA Numerical Simulation Overview, Mark Palmeri

This is one component of the QIBA SWS Technical Committee NIBIB application (in addition to a phantom study and a clinical study). In simulations, it can be easier (compared with experiments) to isolate individual confounding factors. The overall objective is to simulate generation of acoustic radiation force (ARF) beams, models for deforming media, and ultrasonic estimation of displacement. Field II and FOCUS are candidates for simulating production of the ARF beam. FEBio is can be used to model propagation of shear waves in media. Field II could be used to simulate ultrasonic tracking of displacement fields in both elastic and viscoelastic materials. A Matlab GUI could be used to integrate simulation tools. Representative datasets will be made available for end-user download.

4. Characterization of System Spectral Content using CIRS elastic phantoms, Mark Palmeri

This is a follow-up to the System Dependencies Subcommittee's previous comparison of spectral contents of different systems. Shear wave spectral content is an important confounding variable for shear wave speed measurements. In the previous study, different groups used different phantoms so it was difficult to make meaningful comparisons. Therefore, Mark Palmeri recently sent out an email asking participants to measure frequency content of system shear waves using the CIRS phantoms that were distributed to all participants. Those participants who have access to their raw data can obtain spectral information for their system. Mark distributed a spreadsheet that provides an organized format

so that participants can record the important information for their system, including probe, focal depth, probe center frequency, minimum and maximum lateral range, shear wave center frequency and lower and upper limits for shear wave -6 dB bandwidth.

Proposed September call dates:

<i>Date</i>	<i>Time (CT)</i>	<i>Day</i>	<i>Committee/ Subcommittee</i>	<i>Moderator</i>
9/09/2013	1:00 pm CT	Monday	US SWS Technical Committee	Mr. Milkowski
9/16/2013	1:00 pm CT	Monday	Phantom System Testing & Measurement Subcommittee	Dr. Garra
9/20/2013	11:00 am CT	Friday	System Dependencies Subcommittee	Dr. Palmeri

RSNA 2013 Annual Meeting - QIBA Technical Committees Working Meeting:

Wednesday, December 4th | 3:00pm – 5:00pm | Chicago, McCormick Place | Room: TBD

Please let us know whether you plan to attend by responding to the following

poll: <http://www.doodle.com/fwf76cegg78r75b>.

We appreciate your continued support and look forward to your participation - Thank You!

RSNA Staff attempt to identify and capture all committee members participating on WebEx calls. However, if multiple callers join simultaneously or call in without logging on to the WebEx, identification is not possible. Call participants are welcome to contact RSNA staff at QIBA@RSNA.org if their attendance is not reflected on the call summaries. [QIBA wiki](#)