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

Friday, June 8, 2012; 11 AM CT

Call Summary

In attendance		RSNA
Mark Palmeri, MD, PhD (Co-Chair)	Brian Garra, MD	Joe Koudelik
Keith Wear, PhD (Co-Chair)	Timothy J. Hall, PhD	Julie Lisiecki
Paul L. Carson, PhD, (QIBA Sci. Coord)	Ted Lynch, PhD	
Claude Cohen-Bacrie, MS	Kathy Nightingale, PhD	
David Cosgrove, MD	Nicolas Rognin, MSc, PhD	
Liexiang Fan	Laurent Sandrin, PhD	
Caterina M. Gallippi, PhD	Hua Xie, PhD	

Moderator: Keith Wear PhD - System Dependencies Subctte (SC) will meet Fridays at 11 am CT, every three weeks.

System Dependencies SC charge discussed: http://qibawiki.rsna.org/images/5/52/3.pdf

Differences in regard to System Dependencies – topics included:

- Focused beam vs. flat beam and systems characteristics. To what level of detail are the systems to be described.
- To what level are they to be specified for Compliance to the profile:
    - By analogy, you can make precise measurements with spectral Doppler, but less precise with color flow Doppler. Similarly, shear wave velocity measurements may be displayed in a quantitative mode or imaging mode. We need to distinguish between Quantification Mode and Imaging Mode.
    - There are effects analogous to Doppler spectral broadening, particularly in shear wave imaging as opposed to single site measurements.
    - Dr. Tim Hall said that the Quantification Mode is more relevant to the committee's charge than Imaging Mode. Consider profile quantification just on single ROI measurements, rather than on qualitative imaging modes.
        - Got general agreement, but it was noted that we might be able to improve accuracy/reproducibility and clinical utility of imaging modes as well. That would require considerable additional work and intent of some companies.
- Characterization of higher level parameters such as frequency differences between transducers should be undertaken.
    - Important to understand sources of variance and first order effects that influence the measurement
- Quantification of 2 systems may be challenging because they do not operate in the same frequency range or depth of push; need to specify
    - Mr. Cohen-Bacrie to provide a PowerPoint slide summarizing this concept in a visual manner prior to the next call
- In addition to striving for consistency among different ultrasound methods for measuring shear wave speed, we should also strive for consistency between ultrasound and MR methods for measuring shear wave speed.
- Per Agenda item #4, the group needs to develop a useful way to describe the spectrum
    - We might include center frequency, and/or range of frequencies
    - Dispersion (rate of change of velocity with frequency) is a higher order effect, which may not be practical because of insufficient SNR in many applications.
- **Physician Support Tools:** Clinicians need information that they can digest quickly – a single number, such as velocity, can be more helpful to them in a clinical setting than many other measurements such as an entire spectrum.

- **Getting Started:** with specific targeted patient populations was suggested, to be organized by modality –
    - Database would show the ranges of some of the variables on which system performance depends
        - Would like to compile data ranges and determine a target metric as a group
        - The format of the database has not been established yet. It would be nice if the database is searchable. Fields in database might include modality, measurement method, patient population, number of patients, …
        - Candidate software: Google Docs (free) and Microsoft Excel (which is ubiquitous).
        - This task could be shared with the clinical subcommittee
        - The database could help answer what accuracy and precision are required.
    - Clinical data ranges are critical.
    - Note: Liver elasticity depends on interstitial pressure from inflammation in addition to blood pressure and fibrosis.
        - See paper by Dr. Laurent Sandrin with Mueller 2 yrs ago.
        - And Dr. D. Lynch's work on compartment syndrome (pressure in muscles can block blood flow and get necrosis) and intracranial pressure. Elasticity monitor for that could be a good clinical application.
    - Dr. Palmeri volunteered to be the conduit for this information and to set up a database format: mark.palmeri@duke.edu.
    - Dr. Hua Xie volunteered to do a clinical literature search and to compile significant citations, preferably in a searchable format for future use, focusing on what level of accuracy and precision may be needed in liver fibrosis staging

Other

- ***Ultrasonic Imaging and Tissue Characterization Symposium***, June 11-13, 2012, Hyatt Arlington, in Rosslyn, VA: http://uitc-symposium.org/
- Liexiang Fan (Siemens) had a comment that he wanted to make during the telecon, but couldn't due to microphone problems. His comments are summarized below for consideration:
- PRF of the displacement tracking beams should be considered, specifically in their effect in temporal quantization and resulting spectral influence (more significant with higher SWS estimates).
- Consider reporting the nature of the excitation (e.g., impulsive vs. repeated / modulated).
- Consider where to draw the line between system dependencies and biological variations / dependencies (cross communication w/ the clinical subcommittee).

Next steps:

- Mr. Cohen-Bacrie to provide a PowerPoint slide summarizing spectral Doppler vs. color elastography prior to the next call.
- Dr. Hua Xie to continue compilation of references
- Group welcome to send database entries to Dr. Palmeri: mark.palmeri@duke.edu
- Subcommittees to meet and begin discussion/ organization of tasks.

Next calls:

- QIBA US SWS Technical Committee - **Friday, June 22, 2012 at 11:00 AM CT** (Dr. Garra to moderate)
- Phantom Subcommittee - **Monday, June 25, 2012 at 1:00 PM CT** (Drs. Hall and Garra to moderate)
- System Dependencies Subcommittee - **Friday, June 29, 2012 at 11:00 AM CT** (Dr. Palmeri to moderate)

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