

## QIBA Perfusion, Diffusion and Flow – MRI Biomarker Committee (BC) Update Call

Wednesday, February 3, 2016 at 11 AM (CST)

### Call Summary

#### Participants

Michael Boss, PhD (Co-Chair)

Mark Rosen, MD, PhD (Co-Chair)

David Bennett, PhD

Thomas Chenevert, PhD

Amita Dave, PhD

Vadival Devaraju, PhD

Timothy Dondlinger

James Ewing, PhD

Jacob Fluckiger, PhD

Daniel Gembris, PhD

Wei Huang, PhD

Edward Jackson, PhD

Claudia Kirsch, PhD

Daniel Krainak, PhD

Hendrik Laue, PhD

Dariya Malyarenko, PhD

Elizabeth Mirowski, PhD

Nancy Obuchowski, PhD

David Purdy, PhD

Mark Shiroishi, MD

Jason Stafford, PhD

Ying Tang, PhD

Brian Taylor, PhD

Ona Wu, PhD

Junqian (Gordon) Xu, PhD

Yuxiang Zhou, PhD

#### RSNA

Joe Koudelik

Susan Weinmann

*Moderator: Dr. Boss*

#### DCE TF Update (Dr. Laue)

- The MR Vendor Subcommittee was invited to attend the next DCE TF call on February 9
  - Discussion to focus on vendor-specific solutions to clinical B1 mapping variation
  - An invitation to this call will be forwarded to all PDF-MRI BC members
- Groundwork project: parallel imaging and 3T imaging using the T1 phantom
  - Only slight influence from using parallel images
  - Completed scans with Siemens and Philips platforms at 1.5 and 3 T
  - Dr. Persigehl to add the reproducibility coefficient to inter class correlation (ICC) and SD
  - Goals: define the DCE Profile claim & publish (i.e., release)

#### DSC Update (Dr. Wu)

- NIST collaborators continue phantom prototype development for estimating reproducibility across imaging sites
- Phantom design will bootstrap off the 13-vial gadolinium model used by Dr. Boss in his work with the DWI TF, but a standard room temperature protocol will be used as opposed to using ice water protocol to better accommodate site implementation
- High-level generalized imaging protocol has been developed by Drs. Wu and Erickson; suitable for most scanners
- Two DSC Phantoms have been ordered
- Drs. Chenevert and Malyarenko will modify their MATLAB analysis software; they have been working on PDF protocol, which will be set to work on all systems
- Harmonized scanner protocols needed for Siemens (Dr. Kirsch), GE (Dr. Erickson) and Philips (?) system
- Progress is being made on all promised Round-5 deliverables

## DWI Update (Dr. Boss)

- Ground Truth measurement of DWI phantom fluids:
  - Equipment:
    - NIST multi-field NMR operating at 1.5 tesla
    - Triaxial gradient probe
    - High flow rate variable temperature gas (N<sub>2</sub>), ~35 slm
      - Enables operation down to 0 °C without liquid nitrogen or isopropyl bath
      - Samples weighted down by use of dense putty
    - Samples enclosed in 1.9 mm OD borosilicate glass
      - Sample ID 1.5 mm, tolerance is 1%
      - ~110 µL samples
    - Fiber optic thermometer for *in situ* temperature measurement
  - Calibration
    - Using 1.9 mm OD capillary to calibrate
      - Perform 1D MRI with frequency encoding, varying gradient strength
      - Fourier transform FID to get 1D image
      - Plot image “bandwidth” as function of gradient strength
      - Slope yields gradient strength (with some conversion factors)
    - Long-term plan is to 3D print calibration structure with features
      - Validate with microCT and optical microscopy
      - Anticipate sub-100 µm features
  - Measurement
    - Post-calibration, perform pulsed gradient spin echo
      - Stepping through *b*-values quadratically (linear increase in gradient current)
      - Good results so far, room for improvement
  - Future Plans
    - Currently performing single-axis measurement
      - Need to calibrate other gradient directions
    - Need for repeated measurements
      - Establish repeatability of NMR measurement
    - Pulse sequence optimization
      - Linear *b*-values, match *b*-values from MRI experiments
    - Measure full suite of PVP9 and PVP10

## **Other Business**

- F2F January 27 Steering Committee Meeting Update (Dr. Jackson)
  - MR Vendor Task Force proposal was presented by Dr. Guimaraes
    - Originally structured to report to the PDF-MRI BC, but modified to report to the MR CC to allow greater cross-modality BC interactivity
    - Good trial for MR – other modalities will observe the development and operation of this subcommittee
    - Drs. Jackson and Kirsch to follow up off-line to operationalize this new TF
  
- Round-6 Projects (Dr. Jackson)
  - Timeline for submitting and reviewing new project proposals will be distributed soon; submission to RSNA expected this April
  - Reminder to tie groundwork proposals to Profile completion
  - Funding has been secured for this second year; total cross-modality funding will be similar to Round-5

**Next PDF-MRI Biomarker Committee Call:** February 17, 2016 at 11 AM CST