QIBA Dynamic Susceptibility Contrast (DSC-MRI) Biomarker Committee (BC) Call

Wednesday, March 10, 2021 at 11 a.m. (CT)

Call Summary

Participants			**RSNA**
Ona Wu, PhD (Co-Chair)	Nancy Obuchowski, PhD	Jacob (Bram) Stolk, PhD, MBA	Joe Koudelik
Zhaoyang Fan, PhD	Mark Shiroishi, MD	Gudrun Zahlmann, PhD	Susan Stanfa
Todd Jensen, PhD			

Results of NIST Phantom Survey

- It was reported that Dr. Russek would like to include a static, DSC phantom in the NIST lending library
- Dr. Quarles had submitted a proposal for a physical perfusion (i.e., bioreactor) phantom to QIBA Leaders, but funding for groundwork projects was unavailable
- An overview was provided re: the DSC static phantom that was used during the round-robin study
    - The DSC static phantom consisted of 13 vials filled with various concentrations of agarose, EDTA, and gadolinium chloride
    - Dr. Katy Keenan (NIST) had built the original phantom and had updated the internal agarose samples
    - Dr. Wu had sent all phantom components back to NIST for characterization of magnetic properties
    - The NMR equipment at the NIST site was not working which led to a delay in characterization
    - Dr. Keenan characterized the previous samples and shipped new vials back to Dr. Wu; this occurred approximately 1 year ago
- The discrepancy in scanner results in the round robin study was caused by a difference of ingredients in a vial of one of the two phantoms
- Since some COVID scanning restrictions are still in place, it was agreed that Dr. Wu should proceed with writing the paper based on the round robin study results and not redo the experiment
- In the future, NIST may want to consider redesigning the DSC phantom to reduce susceptibility sources, e.g., leaving the screws out can lead to greater susceptibility distortion.
- Dr. Wu noted that the DSC Profile, published on the QIBA Wiki, contains a dedicated table of imaging site checklist items
- For transparency, it was advised that the DSC round robin study results be shared with the vendors and that they be notified that anonymization will occur prior to submitting the paper for publication
- DSC-MRI BC members will be encouraged to provide feedback on the paper prior to submission for publication

Possible Implementation of the DSC-MRI Profile in the GABLE Study

- An ad hoc meeting with QIBA Leadership and DSC-MRI BC Co-chairs was held on Tuesday, Feb. 16 to discuss the advancement of the DSC-MRI Stage 2: Consensus Profile to Technical Confirmation (TC) through implementation in the GABLE Study
- The GABLE Study would benefit from using the QIBA DSC Profile, as it would ensure high quality imaging and image analysis with a standardized approach
- GABLE intends to test multiple biomarkers that distinguish true progression from pseudoprogression in patients with newly diagnosed GBM and will eliminate biomarkers as early as possible if they do not contribute to decision making
- The main task for QIBA DSC-MRI representatives is to determine an analysis scheme to maximize the probability of success in using DSC-MRI as a biomarker to distinguish true progression from pseudoprogression

- It needs to be determined how GABLE will analyze the DSC data to decide whether it is a viable biomarker
    - Recommendation to propose methods used with post-contrast T1 images
    - Well-defined, established definitions for analyzing the required data is needed
    - There was concern about DSC being prematurely dismissed as an unviable biomarker, especially if a less than optimal analysis procedure was used in the study

- As GABLE plans to work with sites that are using 1.5T and 3T MR and the QIBA DSC profile focuses on only 3T, adjustments to the profile will be needed
    - Best practices for 1.5T to be researched and a guidance document to be developed
    - While there are not published data for DSC at 1.5T, checklists can be provided to GABLE to use to scan patients reproducibly across sites
    - Checklists will first be modified to exclude feasibility assessment of requirements
    - While reproducibility will not be as good with 3T, the resulting 1.5T data would still be valuable and the Profile Claim could be expanded to include those data
    - Profile caveat needed regarding the absence of variance details for 1.5T systems due to lack of supporting data
    - The only estimated adjustments should be an increase in echo time (TE) due to lower signal-to-noise ratio (SNR) and an increase in flip angle; other specifications e.g., acquisition timing at 1.5 seconds, may remain the same

QIBA Recommendations: Towards dynamic susceptibility contrast MRI-based quantitative imaging biomarkers for multi-center neuro-oncology trials White Paper

- The DSC-MRI BC Google Drive contains the Stage 2 Profile; access can be requested from Dr. Erickson
- Materials related to this effort can be found in the White Paper folder in the DSC-MRI BC Google Drive
- Writing assignments are documented in the **outline** Google Doc and work is underway
- Dr. Wu created a new DSC White Paper draft document

Next DSC-MRI BC Call: Wednesday, April 14, 2021 at 11 a.m. CT
