

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

Wednesday, July 14, 2021, at 11 a.m. (CT)

Call Summary

Participants

Bradley Erickson, MD, PhD (Co-Chair)

Ona Wu, PhD (Co-Chair)

Laura Bell, PhD

Jerrold Boxerman, MD, PhD

Kiran Dhakal, PhD

Zhaoyang Fan, PhD

Kathleen Schmainda, PhD

Yuxiang Zhou, PhD, DABR

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Joe Koudelik

Susan Stanfa

Progress Update on the DSC-MRI White Paper and Remaining Tasks

- The DSC-MRI BC [white paper draft](#) can be found in the group's Google Drive
- Harmonization with other efforts, e.g., BTIP and OSIPi, is a priority for this white paper as well as for the DSC-MRI Profile located on the [Profiles page](#) of the QIBA Wiki
- This paper contains thorough guidance on possible sources of variability, e.g.:
 - Disparities in performance due to flip angle
 - Different actors (acquisition device, radiologist, image analysis tool, etc.) at the two timepoints (i.e., the same scanner and image analysis tool must be used for both exams of each patient)
 - Software variance includes variation in integration of AUC and some algorithms will contain more noise than others
 - Scanner variance may be affected by differences in hardware and acquisition protocol, which can be measured using a physical phantom
- Feedback from other groups, e.g., Standardized brain tumor imaging protocol (BTIP) (Drs. Boxerman, Quarles, et al.), [Open Science Initiative for Perfusion Imaging \(OSIPi\)](#) (Drs. Bell, Schmainda, Sourbron, et al.) is welcome when deviations from their recommendations are identified in the DSC-MRI Profile
- Dr. Boxerman provided background on the BTIP effort, which emerged when the National Brain Tumor Society (NBTS) was charged with establishing standardized protocols for diffusion and perfusion
 - ASFNR work based upon the clinical experience of members was reviewed
 - Technical expertise from Dr. Quarles, et al., was leveraged
 - [Consensus recommendations for a dynamic susceptibility contrast MRI protocol for use in high-grade gliomas](#) includes recommendations with summarized methodology and acquisition protocol was published in *Neuro Oncology*; the DSC Profile contains some of these parameters and they will be included in the white paper
- There have been many advances in DSC-MRI acquisition methods since the initial Profile draft was written; newer test-retest data is needed, and Claims may need to be adjusted
- Newer references to be added to the Profile as many recent papers, e.g., related to simulation, have been published
 - A 90-degree flip angle (FA) is not recommended in the Profile, though Claims are based on it; a disclaimer is needed in the Profile for lines 403-409
 - DRO simulations show that variability expected as a function of flip angle is minimal; Dr. Bell to perform simulations using fewer voxels and clinically comparable resolution
 - The table of FA effects on CV in the DSC-MRI Profile was reviewed and discussed; Dr. Schmainda to add text to the white paper re: the history of flip angle adjustment with SNR/Ernst angle
 - A revised table of FA effects on CV with simulated results to be included in the white paper
 - Dr. Obuchowski to be consulted re: the best method to evaluate CNR/SSIM

- The Profile is focused on 3T as it is less sensitive to acquisition choices than 1.5T and supporting test-retest data for 1.5T has not been located
 - It was noted that by limiting the Profile to only 3T, variability is disregarded, and small differences are magnified
 - Drs. Erickson and Boxerman to add text to the white paper introduction re: expanding the Profile to include 1.5T
- Dr. Bell provided background on the Open Science Perfusion Initiative (OSIPI), which she and Dr. Sourbron established as an open-source software analysis initiative about three years ago
 - OSIPI does not seek to streamline consensus protocol but to function as a platform for centralized resources
 - Sharing perfusion imaging software to eliminate the practice of duplicate development is promoted
 - Reproducibility of perfusion imaging research is improved
 - Translation into tools for discovery science, drug development, and clinical practice is accelerated
 - Expanding to perfusion imaging outside MR, incorporating CT and PET is envisioned as a long-term goal
 - Listing consensus Profiles for sites that wish to reduce variability by implementing them is another plan

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

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