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

Wednesday, May 13, 2020 at 11 a.m. (CT)

Call Summary

Participants

Bradley Erickson, MD, PhD (Co-Chair)
Ona Wu, PhD (Co-Chair)
Michael Boss, PhD
Lisa Cimino, RT
Wolter de Graaf, PhD
Dena Flamini, RT(R)(MR)(M)
James Gimpel, RT(R)(MR)
Susie Huang, MD, PhD
Todd Jensen, PhD
Mo Kadbi, PhD
Nancy Obuchowski, PhD
(Christopher) Chad Quarles, PhD

RSNA

Joe Koudelik
Susan Stanfa

Moderator: Drs. Erickson and Wu

DSC Profile Update

- The Profile was released for public comment on March 2, 2020
    - As of May 13, 25 comments were received from five submitters through the online public comment form
    - The deadline for public comment submissions is May 15, 2020

Review of the DSC-MRI public comment resolution sheet

- The latest version of the Stage 1: Public Comment Profile was referenced
- The group addressed feedback received and consensus was reached regarding resolution
- Recommendation to make the claim parameter specifications adjustable as more supporting evidence becomes available (either globally for all or at a specific site)
    - Resolution: Existing text in Section 2.2: Clinical Interpretation discussion was moved to the top of that section to make it more prominent; qualifiers will also be added to the Executive Summary to state that values are subject to change with new data

- The Executive Summary was deemed too technical; suggestion to focus on clarifying the goal and target users
    - Resolution: The Executive Summary will be edited, and it will be noted that perfusion-weighted imaging (PWI) in context of other diseases is beyond the scope of the current Profile, but may be discussed for future Profiles

- Confusion re: the chosen biomarker and whether a vendor should report AUC-TN in addition to rCBV and how interpretation of data by researchers and clinicians is envisioned
    - Resolution: The Executive Summary was edited

- Critical parameters need better explanation
    - Resolution: Clarify that these are parameters for DSC phantom studies in Appendix D: Model-specific Instructions and Parameters, as well as in Appendix F: Technical System Performance Evaluation

- Supporting evidence that acquisition time has to be at least 180 s was requested; the comment submitter's site scans for 120 s, which is consistent with the ASFNR white paper (AJNR 2015).
    - Resolution: change to "at least 120 s" and modify Section 3.6.2: Protocol Design specification table

- Re: Echo Time (TE)=30 s - slightly shorter TE helps with susceptibility artifact while preserving enough contrast (e.g. > 10% described on this page)
    - Resolution: changed TE to 25-35 in section 3.6.2: Protocol Design specification table

- K2 is determined based on slope of post-bolus time point, which seems different than the widely used Weisskoff model
    - Proposal to provide an equation and the basis with reference of this method
    - Resolved to add reference to the following paper in Section 3.10.1: Image Data Reconstruction discussion: Boxerman JL, et al. **Relative cerebral blood volume maps corrected for contrast agent extravasation significantly correlate with glioma tumor grade, whereas uncorrected maps do not**. *AJNR Am J Neuroradiol*. 2006; (27) 4: 859–867.

- Saline chaser requirements reassessed
    - Resolution to change "20ccs" to "at least 20ccs" in section 3.4.1: Installation – Contrast Injector discussion subsection
    - It was also noted that the saline should be injected as the same rate as the contrast agent

- "Physicist" specified as "Actor for Contrast Injector"
    - It was clarified that checklists are associated with the main body of text and are broken up by actor
    - Ideally, there is a 1:1 correspondence between specifications in the Profile body and in the checklist
    - Multiple actors can fill this role, and this issue has been handled in various ways in other Profiles
    - Suggestion to update to, "physicist or technologist," and have a specification and reference for each
    - Dr. Wu explained that the DSC-MRI Profile did originally include both as possible actors for that role, but to avoid confusion, only one was given task priority
    - It was stated that ultimately it is the physicist's responsibility to make sure the task is completed, regardless of who performs it
    - Suggestion to add a qualifier in section 3.5.2: Periodic QA specification table that the physicist is responsible for ensuring the task is done
    - The following is noted at the top of the physicist checklist: "The role of the Physicist actor may be played by an in-house medical physicist, a physics consultant or other staff (such as vendor service or specialists or technologists) qualified to perform the validations described"
    - Suggestion to reach out to Mr. O'Donnell for his perspective on this wording/issue

- Acceptance and QA testing of the power injector should be the responsibility of a biomedical engineer (preferably) or technologist and not the medical physicist
    - Proposal: Assign the power injector actor (acceptance testing and QA) to biomedical engineer or technologist

- Discussion re: availability of the QIBA/NIST DSC phantom to purchase or whether there is a way to provide it
    - The DSC phantom is not a commercial product, but the appendix includes a recipe for how to make the phantom components and the shell is available for purchase from Verellium, LLC (formerly High Precision Devices)

- The DSC-MRI Profile includes Model-specific Parameters for Acquisition Devices provided by major vendors or their collaborators (Table D.1, F.1 and F.2); discussion re: whether to include Canon's sequence parameters in the Stage 2: Consensus Profile
    - The three existing protocols listed in the Appendix were used for the round-robin phantom study
    - Canon protocol has not been tested on the phantom; if incorporated, this would need to be noted
    - Dr. Kadbi to use a phantom similar to the DCE one and will demonstrate that a sequence can be run producing equivalent images; concern that the DCE phantom has a hard shell and screws, which may cause imaging distortion
    - The goal will be to run the sequence properly with minimal distortion

- It was noted that the DSC BC originally used a narrow Field of View (FoV) of 220, but expanded to 240 to facilitate the running of various vendor sequences

- Comments will continue to be addressed during the next DSC-MRI BC call

Next DSC-MRI BC Call: Wednesday, June 10, 2020 at 11 a.m. CT

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