QIBA Proton Density Fat Fraction Biomarker Committee (PDFF BC) Update Call
Thursday, November 7th, 2019 at 3 p.m. (CT)
Call Summary

Participants   **RSNA**

Scott Reeder, MD, PhD (Co-chair)   Diego Hernando, PhD   Nancy Obuchowski, PhD   Joe Koudelik

Takeshi Yokoo, MD, PhD (Co-chair)   Harry Hu, PhD   Suraj Serai, PhD   Susan Stanfa

Gavin Hamilton, PhD

Moderator: Scott Reeder, MD, PhD

Review of Previous Call Summary
- The 09.05.2019 call summary was approved as presented

Manuscripts Resulting from the Phantom Round Robin Study
- This round-robin study was to determine the range of bias in PDFF measurements using three vendor protocols at 1.5T and 3T and incorporate results into the Profile
    - Protocols run at each site: vendor-specific, QIBA-recommended and LipoQuant
    - Due to larger-than-expected systemic bias toward lower fat fraction, LipoQuant results were put aside

- An important outcome of the study will be the resulting papers, which will inform the PDFF Profile Claims
- To avoid delaying progress by pursuing poor LipoQuant correlations, it had been recommended that the manuscript be split into two papers: (1) focusing on vendor-specific and QIBA-recommended protocol results and (2) focusing on the outlying LipoQuant results (which will take more time to understand)
- A student reviewed and reproduced Dr. Hernando's past code on sensitivity and has examined new data
    - This study looked at fluctuations in temperature and its effects on phantom performance
    - Simulations were run to determine bias as a function of temperature for six different true PDFF values with no temperature correction to the signal model for 1.5T
    - Discussion regarding next steps to take based on the insights that resulted from the study
    - This project was deemed a solid one with usable data, and it was suggested that a paper be written

- Discussion re: a possible third paper focusing on correcting LipoQuant (LQ) scans and how to address LQ in the PDFF Profile
    - It was noted that though it is used by a variety of entities, LQ is not a commercially-available software
    - It was suggested during a previous call, that a physics experiment could be conducted to explain outliers of the LQ data, including the analysis and results
    - If LQ were to be included in the Profile, users developing new PDFF quantification techniques would be able to rely on a phantom to improve the accuracy of their method vs. having to conduct a major validation study
    - Since most clinical trials are using LQ, not including it in the Profile may negatively impact conformance testing
    - Suggestion to include corrected and non-corrected LQ analysis in the student's paper, using data from one-two sites that participated in the round robin study (data from every site not needed)
    - It was noted that temperature correction is needed for phantom studies only (not needed for human studies)
    - A few more simulations may need to be conducted before writing a paper

- The main goal is to report on range of bias, vendors, field strengths for the Profile
- Statistical considerations were discussed
  - Recommendation to use Generalized Estimated Equations (GEE) method when fitting a regression model
  - A linear progression needs to be run to determine slope differences and see how slopes vary along with varying biases; this would help to determine whether measurements are statistically different from one another across different platforms and sites
  - Offline discussion with Dr. Obuchowski suggested to work through the statistical considerations

- Additional discussion needed re: the swapped water and fat PDFF maps occurring with Siemens scanners
  - Suggestion to describe what happened and how improvements were performed through a retrospective reconstruction patch issued by Siemens for use at time of scanning (and how this QIBA phantom study was used by a major vendor to alter their reconstruction methods)
  - Original data that resulted from bad reconstruction to be omitted
  - In the spirit of collegiality, describe how round-robin sites overcame swap issues in a "matter of fact" way, downplaying any issues specific to Siemens

- On Sunday, Dec. 1st, at 10:45-12:15 PM, during the RSNA Annual Meeting, the following PDFF BC members to present during the "Physics (MRI - New Techniques and Image Quality)" session
  - Houchun H. Hu, PhD; Takeshi Yokoo, MD, PhD; Scott B. Reeder, MD, PhD; Mustafa R. Bashir, MD; Claude B. Sirlin, MD; Diego Hernando, PhD; Walter Henderson; Suraj D. Serai, PhD; Dariya Malyarenko, PhD; Thomas L. Chenevert, PhD; Gavin Hamilton, PhD; Michael S. Middleton, MD, PhD; Yunhong Shu, PhD; Mark A. Smith, MS, ARRT; Jean Shaffer; Jean A. Tkach, PhD; Andrew T. Trout, MD; Jean H. Brittain, PhD
  - The title of the presentation, which will be held in room E253A is: "Multi-Site, Multi-Vendor, and Multi-Platform Assessment of Accuracy of Quantitative Proton-Density Fat Fraction (PDFF) at 1.5 and 3 Tesla with a Standardized Spherical Phantom: Results from a Study by the RSNA QIBA PDFF Committee"

Next Steps
- Dr. Hu to work on presentation slides for the RSNA Annual Meeting presentation and conduct linear progression slope analysis
- No PDFF BC T-con on December 5th, due to the RSNA Annual Meeting; nor January 2nd, due to schedule conflicts

Reminder:
- Please RSVP for the Dec. 4 QIBA Working Meeting, which is held during the 2019 RSNA Annual Meeting
- Please sign up for the RSNA 2019 MTE Sessions at the QIBA Kiosk:
  - Type in your name next to the presentation time slot that works for you (we encourage that each 30-minute time slot is filled by at least one committee member)
  - Simply close out of the document (there is no save button and changes will automatically save)

Next call: Thursday, February 6th, 2020 at 3 p.m. CT [unless prior, off-schedule meeting is desired]

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