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QIBA Proton Density Fat Fraction Biomarker Committee (PDFF BC) Update Call
Thursday, September 5, 2019 at 3 p.m. (CT)
Call Summary

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Participants   **RSNA**

Scott Reeder, MD, PhD (Co-chair)   Diego Hernando, PhD   Nancy Obuchowski, PhD   Susan Stanfa

Mark Bydder, PhD   Harry Hu, PhD   Hans Peeters, PhD

Anil Chauhan, MD   Michael Middleton, MD   Andrew Trout, MD

Gavin Hamilton, PhD

Moderator: Scott Reeder, MD, PhD

Review of Previous Call Summary
- The 08.01.2019 call summary was approved as presented

Multi-Vendor Calimetrix Phantom Study Update (Dr. Hu)
- One large round-robin scan containing one smaller one for Siemens sites have been completed
- The original purpose of the overarching round-robin study was to determine range of bias in PDFF measurement using various vendor techniques at 1.5T and 3T
- Three protocols were 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
- Dr. Bydder at UCLA was contacted re: his insights into the LipoQuant bias issue on GE scanners; discussion occurred re: possible causes for this issue
    - LipoQuant has been found to be more sensitive to chemical shifts
    - Suggestion that echo times could be a factor; but it could be moderately confounded with the temperature
    - A student has begun to review and reproduce Dr. Hernando's past code on sensitivity and will examine new data
    - If proton resonance frequency is erroneous, issues with fat fraction may be caused
    - Suggestion that temperature difference could have adversely affected phantom performance
    - Storage of incorrect echo times, originally attributed to DICOM error, was suggested to be caused by automatic rounding
    - Suggestion that the phantom be tested upon its return to UW-Madison using previously acquired raw ROI data (in the format of uploaded, reconstructed PDFF maps), located at USCD

- The only reported issue occurred with PDFF vendor protocols for 1.5T and 3T Siemens machines at CHoP (Dr. Serai), Duke University (Dr. Bashir), Mayo (Dr. Shu) and Nationwide Children's Hospital in Columbus, OH (NCH) (Dr. Hu)
    - Water and fat PDFF maps were swapped, rendering the data unusable
    - Siemens addressed the issue through a retrospective reconstruction patch for use at time of scanning

- The work on the preliminary results of the round-robin (minus LipoQuant results) was presented at the May 2019 ISMRM Annual Meeting in Montréal, as well as at the July 2019 ISMRM Workshop on MRI of Obesity & Metabolic Disorders in Singapore and it will be presented at the December 2019 RSNA Annual Meeting
- An important outcome of the study will be the resulting paper, which will inform the PDFF Profile Claims
    - To avoid delaying progress by pursuing three poor correlations, it had been recommended that the manuscript be split into separate papers: one for vendor-specific and QIBA-recommended protocols results (which still amounts to 100 or so scans to be compiled and organized) and the other for the outlying LipoQuant results

- o It was assumed that by the 2020 ISMRM Meeting, data will already have been published via this manuscript
- o Dr. Hu asked for feedback on how to proceed next
- o Discussion re: the 2nd paper focusing on only LipoQuant data
  - Suggestion to conduct a physics experiment to attempt to explain outliers of the LipoQuant data; analysis and results to be included
  - It was stated that the first step will be to draft the technical abstract
  - It was pointed out that LipoQuant data has not yet been analyzed separately; Dr. Bydder to run linear progression to look at slope differences
  - Suggestion to table the LipoQuant data until it the bias is understood, and present only the vendor-specific and QIBA-recommended (protocol) data at the 2019 RSNA Annual Meeting
    - If data are complete and analyzed by the RSNA meeting, it may make sense to show all of it there and to focus on the RSNA abstract and manuscript in the meantime

- Once Dr. Reeder sends datasets to Dr. Hu, the acceptable range for bias needs to be determined
  - o The Claim pertains to the allowable amount of bias that can be afforded to guarantee 95% confidence; this value will be determined
  - o Large deviations from ground truth across the same model of scanner were observed
    - LipoQuant data among various acquisitions were quite different
    - Only a small number of scans from only two sites deviated; it was reported that less than 10% of the data had an issue
    - Only 5% of LipoQuant data were outliers; when the data is combined, bias appears minimal

- Now that the data is complete, Dr. Bydder to finish running simulations and discuss with Drs. Hu and Obuchowski how the data would best be presented for the first manuscript
- The last rescanning site was Mayo Clinic (Dr. Shu) and the phantom will be shipped to UW-Madison on September 5; Dr. Reeder will update the data once the phantom is received
- It was reported that the multicenter phantom data from a couple of years ago (located in an online data repository) has had moderate use: 317 views and 57 downloads, suggesting a that it has been helpful to users

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:
  - o 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)
  - o Simply close out of the document (there is no save button and changes will automatically save)

Next call: Thursday, October 3, 2019 at 3 p.m. CT