QIBA Musculoskeletal (MSK) Biomarker Committee (BC) Call

Tuesday, March 24, 2020 at 10 a.m. CT

Call Summary

In attendance			**RSNA**
Xiaojuan Li, PhD (Co-chair)	Maggie Fung, MEng	Leon Lenchik, MD	Joe Koudelik
Thomas Link, MD, PhD (Co-Chair)	Ali Guermazi, MD, PhD	Kecheng Liu, PhD, MBA	Susan Stanfa
Angie Botto-van Bemden, PhD	Peter Hardy, PhD	Nancy Obuchowski, PhD	
Robert Boutin, MD	Jason Kim, PhD	Yuxi Pang, PhD	
Majid Chalian, MD	Feliks Kogan, PhD		

Moderator: Drs. Li and Link

MSK Profile (Dr. Link)

- The latest Profile version was circulated prior to the March 24 MSK BC call and was posted to the MSK Committee QIBA Wiki page as a working draft
- The Profile was sent to Dr. Boss for review; it will be updated if necessary and circulated for a final internal BC review
- Once BC review has been completed, release of the Profile for Public Comment must to be approved
    - An e-ballot will be sent to eligible BC voters for a vote to release for public comment
    - Following a successful BC vote, MR CC voting members will also be asked to vote on release the Profile

- Drs. Chalian, Link & Li to draft a white paper based on the MSK Profile
    - There is no need to wait until the public comment period has been completed before submitting the paper to *Radiology*; these activities can proceed in parallel

Update on the Arthritis Foundation Funded Cross-Calibration Study (Dr. Li)

- A manuscript based on a multivendor, multisite Arthritis Foundation study was submitted to *Osteoarthritis and Cartilage* for publication and is under review
- Sites included Cleveland Clinic, Albert Einstein College of Medicine, UCSF and University of Kentucky; Siemens, GE and Philips machines were used
- Goal: evaluate reproducibility of T1ρ and T2 via a multi-site multi-vendor study design
- Twenty subjects were scanned, including two subjects scanned at all four sites
- A six-month project extension was granted to follow up with the two human subjects scanned at all four sites
    - Intra-site repeatability and inter-site/inter-vendor reproducibility were performed
    - Intra-site repeatability results were fairly consistent across platform (1.1-3.3% CV for phantoms, and 1.4-4.1% CV for human subjects)
    - Inter-site/inter-vendor reproducibility had CVs of 5.2%-6.5% for phantoms and 8.1%-10.1% for human subjects using MAPSS only; and CVs of 6.5% - 8.4% for phantoms and 13.6%-20.3% for human subjects.
    - The clinical performance target was to achieve a reproducibility of 4-5% for measurements of cartilage composition with T2 and T1ρ relaxation time measurements and a 95% confidence interval level for a true/critical change in cartilage composition (least significant change) with precision of 11-14%
    - The target applies to 3T MR scanners of one manufacturer with identical scan parameters across different sites; cannot be generalized to scanners from different manufacturers

    - Arthritis Foundation study results were very promising and align with the Profile Claims; longitudinal Claims used, with the expectation that Profile users would use the same vendors/platforms for follow-up scans

- Dr. Li has a pending R01 with a fundable score to perform a multi-center standardization study, which will help with technical and clinical confirmation
    - This will be a larger, more systematic evaluation to see whether inter-vendor variation can be mitigated
    - The sample of the original study was too small to determine differences between systems and linear or non-linear variance relationships
    - Additional study sites and data are needed to define clinically significant cartilage change over time

- Not only has Profile-writing benefitted as a result of Dr. Li's study, the Claim will be extended, and sequences will be optimized for better reproducibility and faster imaging
- Dr. Li will work with Kathryn Keenan, PhD (NIST) and Elizabeth Mirowski, PhD (Verellium) to develop a calibration phantom which can be made available for commercial use
    - The phantom will be developed and used in the study to obtain reference measurements with T1ρ and T2
    - The prototype will be shared and feedback on the phantom design will be requested from MSK BC members

- New MSK BC members were introduced
    - Jason Kim, PhD: Director of Osteoarthritis Research Programs at the Arthritis Foundation
    - Maggie Fung, MEng: Senior Scientist - Body and Vascular MR at GE Healthcare
        - Leads GE MR Applied Science Lab for NYC and Boston Area to collaborate with academic and clinical institutions in the development of new MR applications for oncology, neurology and MSK

Next Call: Tuesday, April 28, 2020 at 10 a.m. CT [4th Tuesdays of each month]

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