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QIBA Musculoskeletal (MSK) Biomarker Committee (BC)
Wednesday, February 21, 2018 at 9 AM CT
Call Summary

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In attendance			RSNA
Thomas Link, PhD (Co-Chair)	Ed Mojahed, PhD	Hollis Potter, MD	Susan Weinmann
Xiaojuan Li, PhD (Co-Chair)	Nancy Obuchowski, PhD	Ramya Srinivasan, MD	
Robert Boutin, MD	Edwin Oei, MD	Siegfried Trattnig, MD	
Christine Chung, MD	Valentina Pedoia, PhD	Cory Wyatt, PhD	
Leon Lenchik, MD	Rob Peters, PhD		

Moderator: Dr. Link

Summary of Last Meeting

- Osteoarthritis Research Society International (OARSI) imaging interest group was discussed:
    - This new forum could be leveraged to increase the visibility of QIBA's MSK quantitative efforts
    - It is an opportunity to better engage non-imaging clinicians, e.g. rheumatologists
    - Anyone interested in the osteoarthritis imaging group should contact Dr. Link

- Dr. Mirowski at QalibreMD, Dr. Keenan from NIST, and Dr. Li are collaborating on phantom development
    - Dr. Mirowski plans to submit a NIH/SBIR grant application (to develop phantom) by the April 4 deadline

- Arthritis Foundation study activities
    - Focusing on reproducibility, a meta-analysis paper on cartilage compositional biomarkers will be published in Osteoarthritis and Cartilage; Drs. Li and Link submitted an editorial concerning this paper
    - Editorial comments were received from the publisher and were addressed and incorporated into another draft

Presentation on Automatic Cartilage Segmentation and Voxel-based Relaxometry (Dr. Pedoia)

[Some information taken from presentation slides]

- Dr. Valentina Pedoia (UCSF), provided an overview of her work in the area of automatic cartilage segmentation
- AI machine-learning efforts were discussed
- Quantitative Compositional MRI: T1rho/T_2 relaxation time is a non-invasive imaging biomarker
- The following studies were highlighted:
    - UCSF (Center of Research Translation, Translation of Quantitative Imaging in Osteoarthritis, P50-AR060752):
        - Quantitative MRI and Gait Analysis for ACL-injured and Reconstructed Knees
        - T2 Relaxation Time in the Osteoarthritis Initiative
            - a. Normal, Incidence and Progression Cohorts
            - b. Risk Factors and Health Impact of Lateral compartment Knee Osteoarthritis

- UCSF
  - Loaded and Unloaded MR Imaging of Meniscus-Cartilage-Trabecular Bone in OA, R01 AR046905

- Multi-Center Collaborations
  - Arthritis Foundation: ACL Proof of Feasibility, Trial 6157
  - Osteoarthritis Initiative (OA)

- Automatic segmentation: U-net architecture and results
  - High Res & Low Res Manual Segmentation vs. High Res & Low Res Automatic Segmentation
    - Morphology (High-res Data)
    - $T_{1\rho}$ and T_2 Relaxation Times (Low-res data)

- Voxel Based Relaxometry: sagittal 2-D multi-echo spin-echo images were used for the quantification of the T_2 relaxation time
- Results:
  - It was found that ROI-based results from atlas-based segmentation were significantly correlated with the one obtained with a manual procedure
  - Group averages were also comparable between the two procedures with average absolute difference ranging from 0.31 ms for Medial Femoral Compartment and 1.32 ms for Medial Tibia

- Statistical Parametric Mapping: OAI & ACL
- Parameters that are potentially most important in regard to monitoring ACL degenerative changes were discussed
- Need to standardize image acquisition was stressed
- In the next few years, technology will be used with automatic segmentation and AI for new diagnostic understanding of changes regarding tissue structure and disease progression

Next Steps
- Dr. Link stated that Dr. Pedoia will be instrumental to the work of the QIBA MSK BC and hopes for her continued participation
- Other agenda items on phantom development and an update on the Arthritis Foundation study activities to be postponed until the next call

Next Call: Tuesday, March 20, 2018 at 10 AM CT [regular time slot]