QIBA Lung Density Biomarker Committee (BC)

Wednesday, November 4, 2020, 2 PM CT

Call Summary

In attendance

Sean Fain, PhD (Co-Chair)
Charles Hatt, PhD (Co-Chair)
Miranda Kirby, PhD (Chair)
Heather Chen-Mayer, PhD
Timothy Hall, PhD
Bernice Hoppel, PhD
Stephen Humphries, PhD
Philip Judy, PhD
Annelise Malkus, PhD
Joseph G. Mammarappallil, MD, PhD
Hatem Mehrez, PhD
John Newell, Jr., MD
Nancy Obuchowski, PhD
Sam Peterson
Joshua Schirm, BSE
Daniel Sullivan, MD
Gonzalo Vegas-Sanchez-Ferrero, PhD, MSc

RSNA

Joe Koudelik
Julie Lisiecki

Moderator: Dr. Hatt

Lung Density Profile's Advancement to Stage 2: Consensus

- The Lung Density Profile has successfully achieved consensus stage
- The updated Profile and resolution spreadsheet have been posted to the QIBA wiki Comment Resolutions page
- The Profile is published on the QIBA Wiki Profiles Page

Next QIBA Profile: Proposal Ideas Under Consideration (Dr. Hatt)

- The BC is in the process of considering ideas for a future Profile
- Availability of clinical evidence and potential claims are important considerations, as well as studies on reproducibility and repeatability, which focus on the specifics of quantification for the biomarker
- A Google document was compiled noting the pros and cons for the proposed topics for poll creation

Discussion

- BC leadership have narrowed down the focus for a future quantitative Profile for COPD and are considering the following areas:
    - Defining standardization and harmonization techniques for novel deep learning biomarkers based on image-to-classification predictions
    - Defining standardization and harmonization techniques for established quantitative CT biomarkers (e.g., airway dimension analysis and gas trapping)
    - Developing a multi-parametric risk prediction model related to clinical outcomes in COPD
    - Continuing to focus on clinical validation and development of calibration/QA phantoms for the current/emphysema Profile
    - Shifting focus to harmonization techniques for reduction of variability due to differences in scanners and reconstruction parameters
- A multi-parametric model for prediction and decision support / classification is being considered
    - A special call for Lung Density BC members was held with the Multi-parametric Metrology Task Force to exchange ideas
    - Lung Density is a real-world example of a multi-parametric biomarker, which could benefit from the guidance of the multi-parametric group
- Feedback from the QIBA Annual Meeting indicated that Profiles are complex and not user-friendly, particularly in local community hospitals
    - Working to make a new Profiles as simple and usable as possible will be a focus
    - The team will also consider ways to upload scans to the cloud to better share data
- A challenge that will need further study is that scanner model upgrades and reconstruction parameters introduce much variability
    - The BC is considering new techniques to try to harmonize iterative reconstructions (IR) and noise
    - They also want to standardize amongst software vendors as well, for a more quantitative approach
    - Dr. Gonzalo Vegas Sanchez Ferrero is conducting research on characterizing signal to noise with regarding to IR for a more homogeneous analysis, which will provide helpful data for a new Profile
- As there are several areas of interest, task forces may be formed to move forward more efficiently and in parallel

- Current topics of interest include harmonization with phantoms, using the emphysema Profile as a starting point, gas-trapping, and airway dimensions
    - It will be important to make certain that suitable data are available for whatever topics are selected
- Computational fluid dynamics was also mentioned, as well as consideration of associated variability for emphysema
- BC leaders seek feedback from BC members and will distribute a poll for voting prior to the next BC call in December
    - Ranking might be helpful in the poll
- Dr. Newell mentioned that a few long-awaited publications will be coming out soon including a helpful repeatability study
- Dr. Fain reminded the group that the IR issue is a significant challenge
    - Dr. Vegas Sanchez Ferrero has included IR in his study analysis, which properly characterizes bias and noise, and he things that his approach should work in theory and apply to the group's work

- For more detailed description of the previously discussed biomarkers, please see recent notes posted to the Lung Density BC QIBA wiki page

Action items:

- Vote via the Google forms poll regarding next direction for the BC prior to the next (December) BC call
- Continue discussion of multi-parametric Profile suggestions on next call

Next meeting: 12/16