

QIBA Lung Density Biomarker Committee (BC) Call

April 22, 2020 at 2 PM (CT)

Call Summary

In attendance

Sean Fain, PhD (Co-Chair)

Charles Hatt, PhD (Co-Chair)

Miranda Kirby, PhD (Co-Chair)

Ehsan Abadi, PhD

Chase Hall, MD

Stephen Humphries, PhD

Philip Judy, PhD

David Lynch, MD

Joseph Mammarrappallil, MD, PhD

Nancy Obuchowski, PhD

Juan Carlos Ramirez-Giraldo, PhD

Daniel Sullivan, MD

RSNA

Joe Koudelik

Julie Lisiecki

Moderator: Dr. Fain

Welcome of new members:

- *Dr. Joseph Mammarrappallil, MD, PhD (Duke University), Cardiothoracic Radiologist*
 - Research interest includes hyperpolarized imaging, interstitial lung disease, small airways disease, lung MRI and CT
- *Chase Hall, MD (University of Kansas), Pulmonologist*
 - Lung MRI and CT
 - Has a grant for CT use in asthma, trying to implement new technologies, such as hyperpolarized imaging and quantitative imaging for use in drug development
 - Also interested in deep learning and image segmentation

Overview of BC Work (Dr. Fain):

- Dr. Fain described the Profile document, parameter selection, performance levels for the lung density biomarker, and use of the emphysema index, as well as groundwork that has been done to establish the repeatability of the measurements and the role of reconstruction impact on quantitation
- The purpose of the Profile is to establish standards using investigative studies and interventions
- The BC has coordinated with researchers of severe asthma and the COPD Gene studies using low-dose technologies to include higher resolution reconstructions for airway measurements
- The BC is nearly ready to declare their Profile at the Consensus Stage, and is currently working on response to feedback received from public comment
- The majority of feedback was received from the AAPM, as well as QIBA contributors

Next Steps for the BC (Dr. Hatt):

- Dr. Fain noted the transition facing the BC, and how new quantitative lung metrics were needed
 - This was deemed a perfect time for new BC members to join and help map-out next steps
- The BC is considering exploration of Protease Inhibitor 10 (Pi10) as a metric for airway analysis
 - There may be an issue with Pi10, as there are vendor-specific proprietary methods for obtaining those metrics
 - Releasing details to create standards may also be problematic
- Another potential biomarker under consideration is the low-attenuation – 856HU threshold on expiration for gas-trapping, along with parametric response trapping as it relates to completeness and the study of fissures
 - This metric may have proprietary issues as well
- Parametric Response Mapping (PRM) may also be considered, as it is a non-invasive technique that measures lung density during inhalation and exhalation
- The BC is trying to obtain FDA approval for the lung density biomarker; there have been some discussions regarding potential combined approaches of CT Densitometry with CT Volumetry for lung cancer screening

- Rationale is to identify an established BM that is close to FDA approval
- Dr. Chase Hall mentioned possible use of automated coronary calcium screening and the need to get actual data
 - Academic centers that perform lung cancer screening need repeatability datasets

QIBA Efforts (Dr. Sullivan):

- Dr. Sullivan expanded on the proposal to combine QIBA Profiles and noted that, about a year ago, the FDA had released a guidance on medical devices that produce a quantitative output
 - This covers new scanners and algorithms, which are required to follow certain guidelines, e.g., CDRH
 - Many of these guidelines are based on QIBA concepts
- Clinical trials are a preliminary step before imaging biomarkers are used in clinical care
- CROs may see QIBA and the Profiles as a business advantage
- Dr. Sullivan also explained how QIBA is working with an initial CRO partner to achieve [QIBA conformance](#) and is also fostering partnerships with accreditation agencies to expand the prospects for QIBA conformance
- Expansion into the field of artificial intelligence (AI) will also allow for the development of standards for development and testing
- Using low-dose vs. regular standard CT dose was also discussed

Work within various QIBA BCs (Dr. Fain):

- Dr. Fain wants to focus on action items and thinks that the BC should focus on combined biomarkers
- There are Profile inconsistencies across biomarkers throughout QIBA, and finding a way to harmonize these Profiles would be beneficial
- It was also observed that there are many different phantoms needed for different Profiles – finding a common phantom (where possible) would be helpful
- Dr. Obuchowski supported the idea of a combined BM approach and analysis, noting that there was additional support in the community
- Dr. Hatt mentioned the idea of having automated reports, particularly for community hospitals
 - The BC is considering ways to implement automated solutions to obtain better data
 - The analysis of phantoms to drive qualification for scanners is worth exploring
 - CROs would greatly appreciate an automated process for sites to save time on phantom testing
 - A Small Business Innovation Research (SBIR) grant was suggested

Call for Ideas:

- All are asked to contact the co-chairs with any new ideas or feedback regarding the Profile using the contacts below:
 - Sean Fain, PhD sfain@wisc.edu
 - Charles Hatt, PhD charleshatt@imbio.com
 - Miranda Kirby, PhD Miranda.Kirby@Ryerson.ca

Profile Public Comment Resolution:

- The BC is working through resolution of public comments received from AAPM and Mr. O'Donnell
- A Google link for Public Comment Resolution has been created for ease of sharing updates with the group: https://docs.google.com/document/d/1uOzBaB_77vLSv8FKtQ59AxpfcAswtJ4t/edit#heading=h.gjdgxs
- Because Google documents eliminate line numbers, it is necessary to reference the original document that was sent out for Public Comment, which can be found on the QIBA Wiki Profiles Page:

- <http://qibawiki.rsna.org/index.php/Profiles>
- Reviewer comments are numerically marked to better index responses
- All are asked to review comments for discussion on the next call in May
- Once responses are complete, they will be posted on the [QIBA Wiki Profile Comment Resolution Page](#)

Next Steps:

- Once public comments are addressed, votes at the BC and CC level will be held to publish the Profile as Consensus (Stage 2)
- Following Consensus, the BC will consider how to move the Profile to Technically Confirmed (Stage 3)

Profile Stages:

- To officially reach Consensus (Stage 2), the BC must complete its response to the Public Comments received and request a vote to publish at both the BC and CT CC levels
 - Checklists and Conformance Procedures must also be established
- Profiles and respective [comment resolution sheets](#) and checklists to be updated

Action items:

1. BC members may be assigned follow up items (based on expertise) to resolve public comment questions and report back to the BC on a future call (Drs. Hatt and Fain to follow up offline)
2. Dr. Fain to follow up with Mr. O'Donnell (QIBA Process Cmte Chair) re: next steps for Profile advancement

Next meetings: 5/27, 6/24, 7/22, 8/26