

QIBA Lung Density Biomarker Committee (BC)

Wednesday, August 23, 2023, 2 PM CT

Call Summary

In attendance

Charles Hatt, PhD (Co-Chair)

Miranda Kirby, PhD (Co-Chair)

G. Vegas Sánchez-Ferrero, PhD, MSc (Co-Chair)

Ehsan Abadi, PhD

Rachel Eddy, PhD

Raúl San José Estépar, PhD

Sean B. Fain, PhD

Stephen Humphries, PhD

Ben Lavon, MS (guest)

Martha Menchaca, MD

Kyle J. Myers, PhD

John D. Newell, Jr., MD

Nancy Obuchowski, PhD

RSNA

Julie Lisiecki

Moderators: Drs. Kirby and Hatt

Agenda items:

- Software Comparison Challenge Update
- QIBA transition – review
- CT Lung Density BC next steps

Software Comparison Challenge Update (Dr. Kirby)

- Five people have signed up for the COPDGene sub study, though more are needed
- Dr. Kirby would like to proceed with the challenge to utilize staff support in the next 4 months, including:
 - recruitment of more participants
 - getting data transfer agreements (DUA) signed
 - anonymization of participant IDs
 - collecting anonymized data sheets
 - Analysis and manuscript would be done independently of RSNA staff support

Overview of the previous Challenge Process (Dr. Kirby)

- The purpose of the challenge was to evaluate inter software reproducibility of CT lung density measurements
- De-identified COPDGene scans from 50 patients were available for analysis
- Vendors (academic and commercial) participated anonymously and generated CT Lung density measurements and total lung volume from inspiratory scans to investigate inter software bias and the reproducibility coefficient, generated with and without quality assurance, e.g., manual correction of the scans.
- A Bland Altman analysis was conducted
 - For each vendor versus the vendor average, there was negligible bias
 - Reproducibility coefficients, when grouped by academic and commercial and with and without the quality assurance, showed a very comparable reproducibility depending on the academic or commercial vendor group.
 - Results demonstrated that segmentation QA had negligible impact on the measurement variability between the software tools.

For the 2023 proposed challenge on gas-trapping

- Some add-on analyses, like low-bar measurements and other published gas-trapping measurements may be included
- Additional expiratory images to be assessed
- Vendors will analyze CT images and provide results via an Excel spreadsheet
- Excel spreadsheets will be anonymized but classified by software type, e.g., fully automated, semi-automated, manual, etc.
- Vendors will need to agree to have de-identified results published
- Participating vendors to co-author all subsequent publications using this data
- Mr. Lavon, though interested, expressed concern re: General Data Protection Regulation ([GDPR](#))-compliant data use agreements for anonymization, since he works for a Belgian company
 - He needs to know if National Jewish would be willing to enter into a GDPR-compliant data use agreement.

- Mr. Lavon expressed concern that there would be no means of re-identifying any particular subject or key available to decode them.
- Dr. Humphries indicated that the condition of the data is such that it should be compliant to GDPR

Recap re: QIBA Transition (Dr. Hatt)

- A new RSNA committee, the Quantitative Imaging Committee (QUIC) will assume oversight of RSNA's quantitative imaging initiatives
- Administrative support for QIBA BCs and standing committees will cease in ~4 months, as the QUIC restructuring takes place
- In-process Profiles to be advanced to nearest stage and/or summary or white paper of the Profile to be published
- QUIC may initially focus on 1-3 QIBs
- Feasible BC deliverables need to be determined for 4-month window
- [QIBA Wiki](#) will continue to be accessible post-transition
- BC members welcome to submit comments / questions re: transition: [Future Direction of QIBA Activities Form](#)
- Dr. Hatt noted that the scope of the group's work will change if support is not provided
 - Supportive partnerships with *Prevent Cancer Foundation* or the *American Lung Association (ALA)* were suggested; though some felt that this should wait until a decision is made by the QUIC
 - Others felt that outreach to societies should begin in parallel with the work that the BC is trying to accomplish
- BC members intend to finish the reproducibility study and achieve Stage 3 for the Lung Density Profile
- A paper based on the Profile is also under consideration

Next Steps

- Dr. Hatt to continue collecting actor feedback from 3 different actors for the Lung Density Profile Checklist in efforts to reach Stage 3; Would like to obtain 3 responses for each actor
 - It is approximately 1/3 complete
 - Have site feedback from National Jewish and Brigham
 - Have radiologist feedback from Drs. Lynch and Newell
 - Have 2 responses from technologists
 - Need feedback from imaging core
- Dr. Hatt to request help from group members to obtain contact information for people who could help to review the *simplified* checklist (not the previous version)
- Some suggested contacts included:
 - Jered Sieren
 - Dr. Jonathan Goldin
 - Dr. Matt Brown at UCLA
 - Dr. Eric Hoffman
 - Dr. Lars Nordenmark
 - Dr. Susan Wood at VIDA, via brief summary and introduction from Dr. Newell
 - Dr. Kazerooni

Previous action items (please strike if complete):

- [Drs. Fain](#) and [Hatt](#) to work on streamlining the Lung Density Profile and making it more user-friendly
- [Dr. Kirby](#) to continue with the reproducibility for gas trapping study; may extend future scope to look at airways and vessels
- [Dr. Fain](#) to consider a paper on metanalysis comparison of the older and newer protocols that have been used for density measurements
 - Paper to reinforce Profile usefulness/availability and provide a benchmark for current performance
- BC members would like to continue having meetings in their usual time slot after staff support ends
- [Dr. Hatt](#) to follow up with [Dr. Kim](#) from Medical IP (AI solutions)
- [Dr. Vegas Sánchez-Ferrero](#) to follow up with [Dr. Abadi](#) offline re: modeling for gas-trapping
- [Dr. Hatt](#) to share the streamlined checklists for the lung density / emphysema Profile with BC members
- [Dr. Hatt](#) will solicit input from Dr. Kazerooni re: the Radiologist portion of the checklist

- [Dr. Hatt](#) to look into existing studies (e.g., spiromics, etc.) that might be compatible with the Lung Density Profile to aid with reaching Technical Confirmation and validating the algorithms used
 - Plan to replicate software comparison study with gas-trapping Profile
-
- [Mr. Avila](#) to follow up with Dr. Noël offline to discuss reproducibility and replication of 3-D printed phantoms
 - [Drs. Hatt, Mulshine,](#) and [Mr. Avila](#) to discuss a proposed combined Claim Confirmed (Stage 4) study with lung density and small lung nodule
 - [Dr. Fain](#) to follow up with a colleague, Alejandro C., regarding COPDGene papers, including FRC, Phase II, etc.
 - [Dr. Hatt](#) to ask Dr. Newell re: spiromics data ancillary studies once paper has been published
 - Volunteers needed to assist Dr. Vegas-Sánchez-Ferrero with segmentation work
 - [RSNA staff](#) suggest contacting [Dr. Hoppel](#) re: the multi-site Lung Density “road trip” experiment data
 - Standardized naming of actors across QIBA Profiles (medical physicist or image analysis core, TBD)
 - Exploration of cross-sectional claim instead of longitudinal for gas-trapping Profile

Next meetings: 9/27, 10/25, 11/15, 12/20

References: [Profile Stages page](#) | [Technical Confirmation Process](#) | streamlined Profile [conformance checklist](#)

- [Notes](#) posted to the [Lung Density BC QIBA wiki page](#) can be referenced for detailed descriptions of biomarkers
- Link to [Air-trapping Profile](#)