

QIBA CT Volumetry Biomarker Committee (BC)

23 July 2020 at 11 AM (CT)

Call Summary

In attendance

Ehsan Samei, PhD (Co-Chair)

Maria Athelougou, PhD

Hubert Beaumont, PhD

Heang-Ping Chan, PhD

Sean Fain, PhD

Ritu Gill, MD, MPH

Alex Guimaraes, MD, PhD

Timothy Hall, PhD

Jocelyn Hoye, PhD

Philip Judy, PhD

Hyun Grace Kim, PhD

James Mulshine, MD

Nancy Obuchowski, PhD

Kevin O'Donnell, MSc

Ying Tang, PhD

David Yankelevitz, MD

RSNA

Julie Lisiecki

Moderators: Dr. Samei / Mr. O'Donnell

Change Proposal #2: (Mr. O'Donnell)

- CP-CTVol-002, to allow higher resolution imaging - rationale for change:
 - Scanner resolution is trending toward higher resolutions. Since the goal of the Profile is more accurate quantification of volumes, it is proposed to shift the acceptance range of the MTF In-plane spatial resolution requirement toward higher resolution.
 - Some initial conformance testing seems to support the premise that the current state of scanning is higher than what is currently in the Profile.
 - Also consider raising the noise threshold. The current one was somewhat arbitrary. Most segmentation algorithms are not particularly sensitive to noise, and with the pressure for lower dose, that often produces higher noise.
- The Advanced Disease Profile recommends the scan occur in one breath
 - It will be necessary to check for lung motion artifacts
 - Guidelines refer to scan time rather than table speed; this may need rewording
- There are common statements across Profiles related to: "shall achieve a table speed of at least 4 cm per second, if table motion is necessary to cover the required anatomy."
 - Consensus to harmonize across Profiles where possible, to make more user-friendly
 - Dr. Fain and Mr. O'Donnell to collaborate on a statement and vet with both BCs
- Dr. Samei suggested that industry colleagues may have a problem with the effort to minimize motion artifact, if that is the only suggested improvement
- Another method might utilize wider collimation, to avoid advocating one technology or method over another
- A variety of options would be preferable, in addition to rewording as "results-based" rather than "parameter-based"
- The change proposal focuses on adjusting resolution, which relates to noise and resolution values
- The goal would be to have the F50 value between 0.3 and 0.5
- It was decided to shift the upper end of the measurement to 0.7 and to leave the lower end un-changed
- The requirement would apply to air edge and to soft tissue edge
- There may be a differential between air and soft tissue values; Dr. Samei to provide these to Mr. O'Donnell
- There is evidence to support this change based on the work of Drs. Hoye and Samei, which has been accepted for publication in *Academic Radiology*
 - Dr. Samei will supply a citation for Mr. O'Donnell to update the Profile once available
- Mr. O'Donnell moved to vote on the change proposal via e-ballot; Dr. Samei seconded the motion with no objections
- Dr. Samei also noted the applicability of this research to small lung nodule Profile work, and asked Dr. Hoye to provide an overview of the research

Simulation Study Update: (Dr. Hoyer)

- Goal for sites to confirm that they are conformant with the Profile and validate imaging protocols, demonstrating that noise resolution and metrics are within QIBA parameters
- Dr. Hoyer reviewed extended analysis for multiple sized groups
- She tested 297 protocols on Siemens and GE scanners with different slice thicknesses, reconstruction methods, F50 values and noise values, and reviewed the changes to noise and its effects
- Dr. Samei noted that keeping the noise at 80 instead of 60 was recommended to be mindful of dose
- For the F50 values, 0.3 was retained for the lower bound, and the upper bound was increased to 0.7, where lesion size was 10 mm
- Protocols with higher resolution also produce higher noise
- Lesson learned:
 - The QIBA Profiles have real value in minimizing variability, which prevails across different nodule sizes, though the impact varies with size
 - Performance results were always better if the Profile was followed for all tested nodule sizes in the 3mm-17mm range
 - Investigating more variations for the small lung nodule Profile would be useful
 - Dr. Mulshine confirmed that exploring smaller sized lesions would be important longitudinally, particularly for lung cancer screening, as lung cancer is often detected in the peripheral alveolar airways, which are very difficult to locate, and not often at iso-center
 - This is relevant data and helps us to set bounds
 - These results need to be shared with the Small Lung Nodule BC to make others aware that the study validates the 6mm lesion cutoff size in the SLN Profile
 - Study confirms that Profile Claims cannot be size agnostic

Call to action:

- Dr. Mulshine expressed concern regarding the release of a U.S. Preventive Services Task Force (USPSTF) public comment decision analysis report.
- The Radiation harms data are discussed in several sections, but in Appendix C Table 24 and 26, there is a summary of numbers (Table 26) of lung cancer deaths from medical radiation which range from 21-51 per 100,000.
- While this does not seem like a high number, it may represent 3-8% of all deaths prevented by lung cancer screening.
- Dr. Mulshine's understanding is that AAPM and other expert bodies would not frame the issue in this way, especially with the contemporary doses of medical radiation used for low dose CT screening.
- It was suggested that QIBA or AAPM or both may want to comment on this issue. Any questions may be directed to Dr. Mulshine: jamesmulshine@gmail.com.
- [Public comment is open until August 3rd](#).

Next call topic:

- An update on Dr. Beaumont's liver imaging project, if possible, and how to incorporate this into the Profile
- Dr. Beaumont is working with a French cancer center, and they have agreed to make measurements onsite with clinical data to better assess the phantom
- Discussion regarding QIBA work toward other radiomics features

Action items (ongoing):

- Mr. O'Donnell to provide details for the Change Proposal #2 e-ballot to RSNA Staff
- Mr. O'Donnell to add AAPM open-source software links to the Profile or for use on the wiki and to link a Google document that lists acceptable phantoms for the Profile for reference
- Obtain input from Dr. Obuchowski regarding the work of Dr. Samei's group to determine if a revised coefficient of variation is needed

Next Call: To be determined