QIBA CT Volumetry Biomarker Ctte (BC) Call

06 February 2020 at 9:30 AM (CT)

Call Summary

In attendance			**RSNA**
Rudresh Jarecha, MBBS, DMRE, DNB (Co-Chair)	Ritu Gill, MD, MPH	Nancy Obuchowski, PhD	Joe Koudelik
Ehsan Samei, PhD (Co-Chair)	Michelle Ginsberg, MD, FACR	Kevin O'Donnell, MASc	Julie Lisiecki
Jenifer Siegelman, MD, MPH (Co-Chair)	Lubomir Hadjiiski, PhD	Nicholas Petrick, PhD	
Hubert Beaumont, PhD	Jocelyn Hoye, PhD	Faiq Shaikh, MD	
Sotirios Bisdas, MD, PhD, MSc	James Mulshine, MD	Ying Tang, PhD	
Jamshid Dehmeshki, PhD			

Moderator: Dr. Jarecha

Discussion:

- Mr. O'Donnell gave a brief overview of the Canon (physicist) feedback received based on resolution specifications outlined in the Profile
- A change proposal was requested by Canon physicists to loosen the resolution parameters (i.e., allow more noise)
- Data are needed regarding resolution tolerances and what F50 values would be supportable
- Drs. Samei and Hoye described the testing they had recently performed in relation to this change proposal
- Dr. Hoye outlined the research as follows:
    - Minimum detectable difference calculation
        - 19 morphology features across 19 protocols using a single active contour segmentation
        - Using a population of 15 lung lesions
        - Normalized by average feature value for the population
    - Protocol grouping
        - The protocols were reviewed for minimum detectable difference with a strong dependence on slice thickness
        - Resolution was almost the same amongst protocols
        - This validates the QIBA restriction in range, being both narrower and lower
            - For example, Protocol A restricted noise from 60 to 40 with no effect and no deterioration in quality
            - It was determined that it is good to keep noise at 40 - 60 Hounsfield Units (HU) though it may also be possible to try 90 – 120 HU to see if anything changes
            - Smaller slice thicknesses were recommended
- Mr. O'Donnell would like to include testing 80 HU with a 0.5 - 0.8 noise resolution vs. 0.3 - 0.7 noise resolution
    - He would also like to know what the highest F50 value was
- Drs. Samei and Hoye agreed to run another test with additional protocol parameter sets
    - Results could be available for a late February meeting after SPIE, the week of 2/24
    - Current data are based on a model for 1 cm lesions
    - The data could be run for models with much smaller lesions
    - There is a hard stop for 1.25 mm slice thickness for small lung nodules to allow for measurable noise
- A question was posed regarding whether it would be possible to shift the protocol numbers higher with fewer low-resolution scans so long as there are reasonable noise measurements
    - If this is possible, the protocols may need to be updated
- It was suggested to make certain that the QIBA Small Lung Nodule BC was aligned with these changes
- Dr. Mulshine noted that measurement parameters may not be the same between Profiles due to differences in the use cases (much smaller lesions) and suggested that the parameters must line up with what makes sense for the clinical use case

- Dr. Siegelman asked that any further testing be inclusive of Small Lung Nodule BC Profile parameters to assess performance in the sub-centimeter size range
- Dr. Mulshine also pointed out that there are different performance criteria and a variety of ways to meet them
- Dr. Jarecha also raised the point that the parameters should be set in such a way that they are acceptable to the larger community to encourage use of the QIBA Profiles
- Dr. Gill provided feedback on the range for lesion sizes in centimeters
- Rather than the current 3-bin system in the Profile, she suggested 5 bins with much smaller ranges to more accurately reflect current practice
    - The current binning in the Profile was determined by available literature at the time the Profile was written; these ranges are no longer realistic at 10-35 mm, 35-50 mm, and 50-100 mm
    - Also noted were the different approaches needed when measuring small vs. large lesions
    - Drs. Samei and. Hoye will address the different calculation requirements for the two lesion types
- Dr. Gill also asked about whether there is a control for the density of the lesion, which would be interesting to explore

Next Steps:

- Reviewing binning of lesion sizes as a change proposal for the Profile
- Obtain input from Dr. Obuchowski regarding the work of Dr. Samei's group to determine if a revised coefficient of variation is needed
- Consider how noise and resolution are related and try to obtain additional data
- Explore the 80 HU noise with resolution changes allowing from 0.7 to 0.8, while keeping the bottom resolution point vs. shifting resolution
- Do not restrict measurements to deter acceptance or drop accrual
- Explore effective size and density and determine reasonable values

New BC participants:

- Drs. Faiq, Bisdas, and Dehmeshki from the Image Analysis Group joined the BC as new members
- Collectively, they have experience in oncology, radiomics, AI, medical image analysis, data mining, algorithm developments, mathematical, stochastic and forecasting modelling, numerical analysis, neuroradiology research, CT and MR imaging.

Action items:

- Schedule next call via doodle poll after the SPIE meeting, the week of 2/24
- Invite Dr. Schwartz to the CT CC call or the next CT Volumetry call to discuss his study

Next Call: TBD via doodle poll in two weeks or a month's time, per Dr. Samei's availability

---

NEW! **Visit the QIBA Citations EndNote Library! Details can be found on the QIBA Wiki**

The next **CT Coordinating Committee Call** is scheduled for **Wednesday, February 19th** at **1 pm CT**.

- **BC Co-Chairs**: If you have not already done so, please indicate your availability to moderate/provide updates on this call by visiting: https://tinyurl.com/QIBA-CC-Calls.
- Dashboard