QIBA CT Small Lung Nodule (SLN) Biomarker Ctte (BC) Call

19 April 2018 at 1 PM CT

Call Summary

In attendance:

Samuel G. Armato, III, PhD (Co-Chair)
David S. Gierada, MD (Co-Chair)
James L. Mulshine, MD (Co-Chair)
Rick Avila, MS
Edward Jackson, PhD
Artit Jirapatnakul, PhD
Nancy Obuchowski, PhD
Kevin O'Donnell, MASc
Mario Silva, MD
Raja Subramaniam, PhD

RSNA:

Julie Lisiecki

Moderator: Dr. Mulshine

International CT Image Quality Monitoring:

- As of 4/2/2018, 54 phantoms have been distributed across the world
- Data have been received and analyzed from 25 sites utilizing approximately 40 unique CT scanners
- More than 200 CT scans have been collected
- Four manufacturers with more than 20 different scanner models have been included:
    - Siemens, GE, Philips, and Canon (Toshiba)

Software Conformance Updates:

- The Profile specifies 1.25 mm or lower for slice thickness measurements; however measurements received from some of the testing sites have shown 2 mm or greater slice thicknesses; this raises concerns regarding quality of the data being collected
- A new study is being conducted on dose reduction impact for kilovolts (kV) and milliamperes (mA)
    - Results have not yet been published
    - Parameters include the following:
        - Scanner A: 3D resolution vs. iso-center distance
        - Scanner A: Noise vs. iso-center distance
        - Scanner B: 3D resolution vs. iso-center distance
        - Scanner B: Noise vs. iso-center distance
    - Unfortunately, in certain cases, the observed results being measured are not what is being requested with the acquisition setting
    - Some noise values were higher than anticipated and there was a loss of resolution with dose reduction that was more prominent in the periphery of the field of view
    - Additional sites are needed to test a series of low-dose protocols to determine how generalizable, the preliminary findings are
- Invitations have been made to additional sites to test the Profile; the co-chairs are waiting to hear back
    - Once results have been compiled, .csv reports will be distributed to testers, demonstrating results

Software Conformance Tests:

- CTLX1 phantoms with embedded synthetic precision engineered ellipsoids are being assembled for scanning in the near future
- Volume measurements will be made on the following:
    - Clinical zero change datasets
        - Evaluation of measurement precision in real nodules
    - CTLX1 phantoms with embedded ellipsoids
        - Evaluation of measurement precision, bias, and linearity in defined geometry synthetic objects

- Review of volume measurement prediction performance, though this is not needed for software conformance

Phantom modifications:

- A new, slightly larger, phantom with nodule objects and ellipsoids on different planes and orientations is in development
- This phantom will also be shipped to multiple sites for testing, starting with Mt. Sinai
- Testing will allow for the first linearity measurements for the Profile
- Dr. Yankelevitz is in the process of reviewing cases for final curation for use with this phantom, as the data contain real patient anonymized scans

Next items to address:

- Pitch and items related to pitch, such as resolution, linearity, spatial warping, etc.
- Field of View (FOV)
- Potential drift issues
- Linearity of measurements and software validation
- Adoption of a survey for field confirmation of Profile feasibility
- These items will also be discussed with a smaller group representing the BC at the QIBA Annual Meeting in May

Volunteers needed:

- Volunteers are needed for a scanner vendor / site testing which will include DOE scanning and the analysis process
- Volunteers are asked to please contact Mr. Avila or any of the co-chairs: Drs. Armato, Gierada and Mulshine

International Association for the Study of Lung Cancer (IASLC)

- Dr. Mulshine is trying to get collaborative interaction with the IASLC in hopes that they may also use the conformance technique for lung cancer screening; a potential MOU between RSNA QIBA/IASLC was suggested to develop a robust collaboration
- An endorsement from the IASLC would be very helpful in working with international centers) to build a cloud database resource for cancer imaging data
- An initial proposal pilot was to be comprised of four major sites with 10,000 images to be delivered over the next two years, but this may be staged starting a pilot proof of concept at one site contributing 10,000 images to establish feasibility
- BC members to consider ways to partner with these organizations
- Dr. Mulshine to provide a draft document which was proposed to IASLC for distribution to BC members

Next call: TBD (after the QIBA Annual Meeting in May)
Calls will be scheduled bimonthly in the near future and will eventually be scheduled monthly