QIBA VOL-CT Phantom Study Protocol Update WebEx
September 11, 2008
11AM CDT
Draft Call Summary

In attendance:

Nicholas Petrick, PhD (Chair)
Rick Avila, MS
Charles Fenimore, PhD
Michael McNitt-Gray, PhD
Binsheng Zhao, PhD
Daniel Sullivan, MD
Joe Koudelik (RSNA)

The group discussed the most accommodating time to schedule future calls. 1 PM EDT was agreed upon as was the pre-scheduled bi-monthly format.

Overview of the Anthropomorphic Thorax Phantom

- New phantom development
  - Peripheral nodules – compressible nodules needed to study chest wall region
  - Defining truth is difficult with compressed nodules, but good peripheral field approximations are still possible and useful
  - Anatomists and surgeons could be consulted to help design the new phantom, only radiologists currently consulted
- Mediastinal Nodules
  - Variation in nodule shape proposed
  - Compressible material may be difficult to define truth
  - Shape and local contour could be specific to particular locations in phantom
- Heterogeneous Nodules
  - Various materials used currently
  - Random pattern of directions and densities used
  - Lesions currently used not very realistic

Lesion Layouts/Configurations Discussed

- 6 nodules per phantom lung field, 10-20mm in size currently used in Dr. Petrick's examples
- Peripheral nodules could also be used, with repositioning between scans
- Would 10 repeat scans be enough – can variance be determined from 10 scans?
- Including the NIST calibration phantom within this study proposed
- Increase the number of nodules per phantom suggested

Data Collection Protocol Overview Discussed (Current Washington Univ and NIH protocol)

- Image data collected on GE scanner only
- 20/100/200 mAs exposure
- 10 repeat scans done
- Pitch used - 1.2 & 0.9
- Collamination – 0.75, 1.5, 3.0 mm
- Slice thickness – 0.75, 1.5, 3.0 mm
- Reconstruction Kernel – Detail & Medium used
- Phantom not moved between scans
- Possibly rotating spheres within phantom proposed to determine possible variance

Bottlenecks to Data Collection Discussed

- Access to CT machines
- Acquiring data
    - Time consuming process itself
    - 3-4 days for "basic" data collection, then data transfer to PACS, etc

Automated volume estimation

- Auto or semi-automated process needed to make volume estimations
- Methods being developed now based on spherical nodules only
- Need to evaluate automated reader algorithms
- Open source image sizing toolkit available soon (per Rick Avila)

Gammex 464 RMI CT Phantom - Modules of this ACR calibration phantom discussed

- Phantom composed of cylinders of various densities
- Data available from Philips scanner trials (per Dr. Petrick)
- Air measurement proposed – to compare contrast across various scanners
- -800, -1000 range proposed
- Would help determine contrast across machines
- Goal would be to provide a reproducible, homogeneous location as a "test standard"

Primary fundamental question that group is to address:

- Need to understand CT parameters (FDA project now)
- Develop validation methodology of software tools (not a current FDA goal)
- Develop lesions and protocols to test algorithms proposed
- Determine what particular analysis to perform on each image
- Develop segmentation tools
- Measure single tool performance
- Compare to RECIST/WHO
- Make data available to allow automated algorithms to run on
- Use same BIOEXCHANGE "seed point" process to approach process and to avoid confusion to test algorithms
- Help understand challenges to clinical data (e.g., determine minimum data required to determine variance)

Degradation of software

- How far do algorithms degrade with greater nodule complexity would be extremely useful to determine
- To understand the type of lesion that RECIST fails on would be extremely useful
- Quantitative methods to improve upon RECIST
- Focus on RECIST weak areas with phantom study
- Opportunity and failure of RECIST methods

Next Steps

- Expand study to diversified sites, geographically and hardware-wise
- Expand to diversified manufacturers (GE, Philips, Siemens, Toshiba)
- Expand to diversify across other systems (4-slice, 8-slice, 64-slice)

ACTION ITEMS:

- Rick Avila to contact Impact Scan to gather understanding of impact of CT parameters
- Charles Fenimore to follow-up with FDA (FDA investigating impact of CT parameters)
- Dr. Petrick to inquire with CIRS if deformable lesions can be produced
- Rick Avila to forward recent paper concerning WHO and RECIST criteria to group to start discussion