

QIBA COPD/Asthma Committee Phantom Design Call

Thursday, October 29, 2009

1 PM CDT

Call Summary

In attendance:

Philip Judy, PhD (Moderator)

Sean B. Fain, PhD

Zachary H. Levine, PhD

Joshua Levy

David A. Lynch, MD

John D. Newell, Jr, MD

RSNA

Susan Anderson, MLS

Joe Koudelik

Micro-Mini-Medical CT Foam Study-Review status

- CT analysis to be performed include:
 - **Micro** (10-12 microns) Dr Levine
 - **Mini** (125 microns) Dr Judy
 - **Medical** (600 microns) Dr Torigian
- Not able to differentiate medical from micro scale in the past
- Intermediate (mini) scale may help understand what medical CT is doing better; should help with filter determination
- Dr Levine already has foam materials for microphotronics analysis
- Micro and Mini CT scanner details needed to provide greater insight into problems
- PET CT micro-scanner (GE Vista) needed capable of a 7.5 cm aperture recon diameter (?)
 - What would the optimal diameter of material be to fit into scanner housing?
- Dr Drew Torigian may have analysis resources beyond foam material
- Dr Judy already sent COPDGene phantom images to Dr Torigian (Siemens scans)
- CT analysis would lead to a better understanding of calibration and measurements of density in a general way, with some control

ATTENUATION COEFFICIENTS

- Goal is the local assistance and help with underlying problems
- 2 issues raised:
 - Mini PET CT operators casual about calibration of CT numbers
 - Attenuation correction not routinely done on mini CT

Absorption of spectra from COPDGene foam

- Current models don't adhere to lung work
- Resolution and contrast scale issues exist
- Need to determine foam characteristics to mimic lung material
- kVp differ between patients and foam; spectra well understood/described though
- How to deal with differences in energies needs to be revisited
- NIST proposal submitted to Argonne National Laboratory by Dr Levine

- AAPM Report of Diagnostic Radiology Committee Task Force on CT Scanner Phantoms, “Phantoms for Performance Evaluation and Quality Assurance of CT Scanners” in 1977 specified the attenuation coefficient differences between acrylic and water (0.024/cm)
- Dr Robert Wagner of San Antonio studied attenuation coefficients in efforts to choose effective energies (Millner MR, Payne WH, Waggener RG, McDavid WD, Dennis MJ, Sank VJ. Determination of effective energies in CT calibration, *Med Phys.* 1978 Nov-Dec;5(6):543-5.)
- Parenchymal density and reductionist approach – need to connect with what’s done clinically
- Need additional insight from existing literature
 - Dr Judy to revisit these older articles/ideas to determine validity
 - Twenty+ year old *Medical Physics* article dealt with equivalent energy of CT scanners and schemes to predict effective attenuation coefficients
 - Dr Judy willing to circulate literature and commentary to those interested (e.g. Drs Levine and Newell)

Segmentation schema

- How segmentation schema are used may affect reconstruction kernels when dealing with large airways
- Need to sort out reconstruction filters and segmentation – how these are linked need to be addressed
- Dr Levine to ship (what) by end of next week (Nov 5) to Dr Judy; Dr Judy to forward hospital shipping address for USPO standard delivery (not express)

Define what phantom images sets to contribute to public image library

- Massive volume of data and re-anonymization of images expected
 - Systematically need to reassign DICOM headings with COPD names
 - Re-name (ID) for public access
- Need sites with adequate storage capability; TAR files perhaps?
- The Database of Genotypes and Phenotypes (dbGaP) hosts genetic data and CT images
 - 1 GB per patient approximated X 10,000 cases may overwhelm dbGaP host
 - dbGaP not deemed effective host for CT images
- Francine Jacobson (Radiology Theater) could store with IBM assistance
 - 350 cases to score and print in Feb 2010 (?)
- Great expense associated with maintaining public resources; where will funding come from?

COPDGene data to be made public

QIBA data being posted to National Biomedical Imaging Archive (NBIA) public site; NIBA currently hosts phantom and medical images

- MSKCC Coffee Break data hosted here
- COPD images could be uploaded and made available for public download
- Brigham and Women’s Hospital imaging people and Dr Torigian have already uploaded image data on NIBA
- Adding COPDGene images to NIBA proposed

Next steps

- Continue discussion on applicability of QIBA and COPDGene
- QIBA Phantom work to take the lead, while COPDGene to follow the QIBA “path/process”

- Dr Judy willing to circulate literature and commentary to interested committee members (e.g. Drs Levine and Newell)