

QIBA COPD/Asthma Committee

January 19, 2010

11 AM CST

Call Summary

In attendance

Philip Judy, PhD (Co-chair)
Andrew Buckler, MS
Harvey Coxson, PhD
James Crapo, MD
Zachary Levine, PhD
Michael McNitt-Gray, PhD

Berend Stoel, PhD

RSNA

Susan Anderson, MLS
Joe Koudelik

Status of COPDGene CT Number Accuracy Conference (Dr Crapo)

- Meeting title needs further discussion
- Two dates proposed for the Denver area:
 - Mon-Tues, March 29-30, 2010
 - Mon-Tues, April 5-6, 2010
- 30+ participants expected, including 4 major manufacturers (GE, Philips, Siemens, Toshiba), industry personnel (Vita and TeraRecon, etc), local attendees and others
- Goal: Need consensus on standards and processes to allow test-retest to be both qualitative as well as quantitative over time as equipment evolves across manufacturers; reproducible data is necessary for successful longitudinal studies
- Dr Crapo has raised \$10K for travel expenses, but additional funding needed
- Dr Crapo to forward meeting invite after appropriate stakeholders identified
- RSNA staff to supply committee roster
- Dr McNitt-Gray to send list of industry contacts to Dr Crapo
- Agenda to be drafted with opportunity for group feedback; COPD Profile to be one agenda item to discuss
- COPDGene grant renewal approaching, equipment capacity for reproducible longitudinal study data critical

Update on CT Scanning of Foam

- COPDGene phantom foam micro-CT scanned by Drs Judy and Levine
- Preliminary micro-CT has shown artifacts making calibration difficult; streaks seen possibly due to acrylic spacers/box used (also seen with clinical CT)
- Reconstruction software not as advanced in micro-CT as in clinical-CT; calibration issues expected
- Lung samples scanned by Dr Stoel; spatial variation matches spectra which was expected, therefore quantitative aspects may not be critical
- Matching foam with lung tissue image spectra would move the field forward by confirming that foam may be used as a reference object
- Drs Kijewski and Judy paper M. F. Kijewski and P. F. Judy, "The noise power spectrum of CT images," *Phys Med Biol* 32, 565-575 (1987), measured noise power spectra performed on differences between scans
- Goal is to compare COPDGene phantom material in relationship to Dr Levine published results in *Medical Physics*
- Existing foam material doesn't show reconstruction kernel or slice thickness effects as seen in the human lung

Reproducing Kemerink experiments

- Thorax phantom with two foams used in experiment
- Histograms examined based on a range of slice thickness and various recon filter use (smooth to sharp)
- Experimental coverage area not know
- Would expect the same results from thin slice averaging as you would from one thick slice
- Original experiment (1994 publication) should be redone using Siemens thin slice CT, the same thorax phantom with two foam densities (scanned one at-a-time) and the same coverage area/volume
- An optimized protocol to be designed around this phantom
- Dr Stoel to inquire with Dutch research team if the original thorax phantom is available
- Ideal thorax phantom would contain a trachea; need proper phantom for robust experiments
- Modifying the QIBA Q-CT FDA (Kyoto Kagaku) phantom suggested; has filled trachea structure
- Air trachea scans at -1000 HU within foam lung material and might be affecting CT numbers associated with the trachea; current foam may not be appropriate for these studies
- Lung model without trachea but including simulated vasculature proposed as option
- Kyoto Kagaku phantom company known to be responsive to modification requests; Dr Judy to inquire and report back

Addition to COPDGene Phantom

- Design of acrylic annulus discussed for COPDGene phantom modification; Phantom Labs to begin fabrication
- Dr Judy to evaluate if this structural change alters air CT numbers within the acrylic ring

COPD Profile

- Material from Dr Eric Hoffman's paper incorporated into posted Profile on the Wiki
- Profile could use more focus primarily in the technology efficiency proposal area; technical and diagnostic efficacy needed, maintaining measurement precision and accuracy as primary concern;
- Scope to include what is necessary to achieve clinical performance of quantitative readings QIBA to develop the best collective guidance for COPDGene and Eclipse studies based on 1mm slice thickness and 2 recon kernels
- Dependence on slice thickness would be interesting to pursue, e.g. is there an optimal slice thickness? Redoing the Kemerink experiment with thinner slices proposed.

Next Steps:

- Dr Crapo to circulate draft agenda for proposed Denver meeting
- RSNA staff to send Dr Crapo QIBA COPD/Asthma Committee roster
- Dr McNitt-Gray to forward contact list to Dr Crapo
- Dr Stoel to inquire with Dutch research team if the original Kemerink thorax phantom is available
- Continue with Profile development on next call
- Next call scheduled for Feb 2, 2010 at 11 AM CST