

QIBA COPD Phantom Design Subcommittee Update

Thursday, April 08, 2010

2 PM CDT

Call Summary

In attendance

Philip Judy, PhD (co-chair)
Heather Chen-Mayer, PhD
Eric Hoffman, PhD
Zachary Levine, PhD
Joshua Levy

RSNA Staff

Susan Anderson, MLS
Joe Koudelik

Plans for QIBA Annual Meeting (May 25-26, 2010)

- Much interest among COPDGene community in the QIBA annual meeting activities
- Possible phantom design working topic suggested for day one
- Dr Levine to be sent meeting details; Dr Hoffman will RSVP re: attendance

Status of evaluations of COPDGene Phantom 2

- Dr Hoffman observed that additional phantom work demonstrates that phantoms do not behave/respond as seen in humans e.g. air space values, etc
 - Mixed approach is needed; Phantoms used to help vendors calibrate scanners but need to determine range of variance in patients on same system
- Different scanners produce different air densities in both human tracheas and phantom air spaces
- More detail needed on HU range variation based on patient size (e.g. large vs small)
- Multiple patients on same scanner using same protocol needs investigating, similar to MESA study of coronary calcification effects based on gender, ethnicity, age, size, scanner type, etc
- Air trachea CT numbers vary patient-to-patient due to physical phenomenon
- Air density may be affected by air temperature and hydration
- Fraction below -950 HU introduce artificial dependencies due to noise and recon kernels
- Air space in phantoms did not mimic that in humans; phantoms show 15-20 HU difference; humans show 30-40 HU difference
- Need a phantom that simulates all air hole factors identified; to be given to vendors as a study object to help with standardizing phantom measurements
 - Manipulation of air hole size in phantoms suggested to mimic CT numbers produced within the trachea
 - Mr Levy (Phantom Laboratory) asked to look into cost of fabricating another phantom composed of various hole sizes
 - Dr Judy to assemble resources needed to help develop new phantom with air hole diameters between 1 and 3.5 cm (2.5 cm mimics the standard human trachea)
- Identifying boundaries of the data is recorded by scanners also needed

Posting of design of phantoms and reference standard

- Current phantoms are used to produce images for evaluation purposes, not to create reference standards, e.g. off-label phantom use so far, e.g. ACR phantom to study effects of air holes on CT numbers
- Group decision to not post phantom data on Wiki; further discussion needed

Next Steps

- Dr Judy to forward Dr Hoffman's slide deck to RSNA staff for distribution among the COPD Phantom Design group only
- Dr Judy to pursue additional modifications in hole size on phantom
- Drs Judy and Levine to continue work on analysis of foam CTs
- Next call scheduled (three week interval): Thursday, April 29th, at 2 PM CDT (3 PM EDT)