2010 QIBA Meeting
COPD/Asthma Committee Breakout Sessions
May 25-26, 2010

Session Summary

In attendance
Philip Judy, PhD
David Lynch, MB
Heather Chen-Meyer, PhD
Harvey O. Coxson, PhD
James D. Crapo, MD
Zachary H. Levine, PhD
Joshua R. Levy
John D. Newell Jr, MD
Lars Wigstron, PhD

RSNA
Joe Koudelik

Day 1, May 25, 2010

General discussion
COPDGene experience with COPDGene Phantom (Dr Philip Judy)

- Quality assurance (QA) phantom needed for cross-sectional (site-to-site) and reference phantom for longitudinal studies (over time)
- CT numbers found stable across scanner designs
- Push vendors to develop algorithms to match scanner output data

AstraZeneca experience with COPDGene Phantom (Dr Lars Wigstrom)

- Harder reconstruction kernels tend to produce greater variation in data
- Strong correlation with body mass index (BMI)
- Care needed not to make phantoms too general; false sense of security with phantoms

ECLIPSE experience with "ECLIPSE" Phantom (Dr Harvey Coxson)

- Longitudinal study scanning Kyoto Kagaku phantoms twice across 46 centers in the US, Europe and Eastern Europe
- Results showed a 4 HU scatter over a three year period; therefore scanning sites consistent
- All CT scanners underestimating foam densities by approximately 8 HU
- CT deemed useful for emphysema if images could be cleaned

Utility of phantoms (Mr. Joshua Levy)

- Variability discussed due to phantom shapes; CT number accuracy and attenuation
- ACR already providing CT number ranges for numerous material
- NIST to apply CT numbers to a numeric basis; push to get CT numbers "correct"
- Attenuation effects coefficient discussed
- Bias may be greater an issue than variability; need to correct for all bias; need to optimize phantoms to eliminate bias and accept variability

Internal correction for density overview (Dr David Lynch)

- Need to decrease the variability of Quantitative-CT measures
- Adjusting for variability in total lung capacity (TLC) via linear and volume corrections discussed
- Normalization of airway numbers discussed; airway measures to be next group focus

NIST Foam Experiments (Dr Zachary Levine)

- Various foam density studies discussed; bubble size decreases with increased foam density
- Foam analysis overview; foams may be useful as standard reference materials; NIST considering certifying foams for QA
    - Need to link Hounsfield Units to the SI System for NIST certification
    - Manufacturers could purchase "NIST Certified" material to scan alongside other reference samples
    - Phantoms of "known" foam density could be used for cross scanner/site comparisons
- CT numbers reasonably reproducible if data averaged (average across the data)
- No issues deemed with scanning foams within acrylic container
- FOV had no effect on CT numbers
- Hard reconstruction kernels have small affect on lowering CT numbers

Discussion of the use of available phantoms as reference standards

- Combining all useful COPDGene elements into one phantom discussed
- A single/simple phantom design needed for ease of handling; multiple compartments possible
- Phantom could be used to compare various algorithms and be used in clinical trials for longitudinal studies
- Clinical need is a standard (phantom) to use for 5+ years (longitudinal studies)
- Phantoms may also help answer dose-related questions
- Phantoms needed to identify all possible sources of scanner variability

QIBA's role is to education radiologists that this is the future; to convince the community that this is in their best interest

Resource Requirements

- Funding needed to move forward; for phantom modifications, NIST experiments, people in the field (ie, taking time off to scan materials, etc)
- Funding to address all phantom issues needed (via NIBIB, NIST, QIBA, etc)
- Dr Crapo proposed a f2f meeting in Oct/Nov of 2010 with manufacturers once phantom developed to challenge manufacturers to develop algorithms to meet specific performance claims based on the phantom
    - Dr Crapo to pursue funding/support for f2f meeting
    - Dr Judy to pursue funding/support for phantom development
        - Simple annulus design = 4 weeks fabrication
        - Complex annulus design = 3+ months fabrication

Day 2, May 26, 2010

COPD Profile Development/Update

- Profiling based on IHE model could lead to a "product compliance sticker" with vendor documentation of participation
- Profile seen as a "challenge format" (A Buckler) based on long-term picture, ie, 20+ years
    - Invite equipment manufacturers to participate in a "challenge" to find new ways to demonstrate their product performance
    - Manufacturer feedback is critical; participatory contributions with no trade details divulged
    - Manufacturers need to meet specific performance requirements
- Profiles deemed helpful with reimbursement and writing papers
- Need to visualize cross-impact for COPD
- COPD Profile groundwork could be based on COPDGene, ECLIPSE, or a combination of data

Vendor Roadshow planned for 2010

- Mr Buckler (QIBA) to coordinate a vendor Roadshow for summer 2010 to engage all levels of manufacture management, including engineers and marketing departments

Summary of progress and assignments

- Profile Next Steps and Assignments
    - Executive summary – Dr Coxson
    - Context – Dr Newell
    - Subjects – Dr Lynch
    - Imaging procedure / image analysis / post processing – Dr Judy
    - Claims and actors (those responsible) – Dr Eric Hoffman
- Wordsmithing of Claims language next; beginning with HU acceptable range, ie, 3 HU
- Range of CT numbers for lung segmentation needed
- Accuracy and noise are 2 parameters to pursue
- Dose variation
    - Intrinsic vs stat variation to be pursued
    - Dr Levine to continue foam scans in June using two recon kernels and 5-6 doses on four foam densities
- Next COPD/Asthma Ctte update call scheduled for 1 month (Tuesday, June 29 at 11 am CDT)