QIBA COPD/Asthma Committee Update Call
Tuesday, September 15, 2009
11 AM CDT
Call Summary

In attendance:

Andrew Buckler, MS (Moderator)
Sean B. Fain, PhD
Philip Judy, PhD
Zachary Levine, PhD
David Lynch, MD
Michael McNitt-Gray, PhD
John D. Newell, Jr, MD
Raul San Jose, PhD
George R. Washko, MD

RSNA
Susan Anderson, MLS
Joe Koudelik

For discussion
- Profile discussion
- Draft matrix of sources of variability (lung density)

Profile and matrix of sources of variability (Mr Buckler)
- Defining the clinical context can lead to Claims in Profile
- As Clinical *Context*, does the Coxson paper provide sufficient detail?
    - Dr Coxson's paper characterizes clinical trials issues well but does not address translation to clinical arena measurements
- Matrix to identify sources of variability needed to feed the experimental plan
- Issue of standardizing the technique/how to use the machinery, e.g. reconstruction, handling the patient
    - A workshop 6-7 years ago examined issue in detail as COPDGene was trying to agree on a protocol
- Hope to identify the work that has been completed in the field on necessary variance, e.g. variance in biology v. measurement error
    - What is the gold standard? What are we striving for? What is good enough?
    - What is being done now as the threshold for all measurement methods?
    - Need to sharpen and define what is needed in protocol
- First step in work was looking at airflow obstruction, diffusing capacity, severity of pathology
    - Dr Coxson's group had early papers; Dr Jaben (UWashington?) had work on pathologic correlations
    - Next steps were physiology and outcome
- It is an open question: how much variation can you have in images to allow for biological differences; what can be tolerated?
    - Level of respiration is a huge driver of non-disease biologic variation; need control for lung volume
    - Biologic variability or lung density signal?
        - Difficult to tease out; have we reached that point technically or in coaching patients
    - Look at inspiratory level-maximal and sub-maximal levels

- Compared to emphysema, COPD, asthma has a more complex range of variability
    - Not as many studies address asthma
- We could aim to isolate what variability comes from protocol/scanning platform v. biological variability
- There are many common technical issues with VolCT; vCT provides a starting point; could add or subtract issues
    - Similarities include: How do you instruct the patient to breathe?; Design; Algorithm; Spatial resolution in 3-dimensions; Importance in making measurements in bulk density
    - Differences include: essential set-up; MaS
- Better mathematical description of entire airway needed
- Strength of vCT is not resolution but capturing large part of entire tree with mathematical pattern or metric
- Discussion of data that is discarded: e.g. in 3-D acquisition of trachea, at high doses, software captures data but doesn't handle bifurcations well; tendency is to use mid-third of airway data while discarding the rest
    - Aim to have lumen in lung lobes, not airway, drive signals
- Confounding issue of physics and biology
    - Develop internal standards
    - Important to define: breathing instructions, managing patients between sites
    - There has been limited literature on using spirometry due to its complexity
- How is segmentation of lung area done? Do specific reference standards exist?
- Impressions from radiologists are important because patterns can vary even with same bulk density, especially in evaluating individual patients and classifying cases

Matrix of sources of variability

- Airway morphology is in early stages related to densitometry; treat as two distinct matrices/Profiles
    1. Lung density is more mature and ready for industrialization
    2. Morphology has more similarities to vCT than density matrix
- Need to create matrices and note what is needed for experimental groundwork and Profiles
- Clinical concern: we need to work at developing a reference system of protocols and phantoms
- Need to decrease sources of variance in efforts to decrease protocol size
- Initial draft matrix by Dr Judy focused on lung density and not airway wall thickness or morphology
    - Dr McNitt-Gray will review and add to Density matrix
- Dr Lynch will create first draft of Morphology matrix

Next steps:

- Dr Lynch will create first draft of Morphology matrix
- Dr McNitt Gray will continue refinement of Density matrix into categories , e.g. scanner variations, patient issues (biological and pathological), algorithms, measures and evaluation metrics
- Discussion to follow on significance and mitigation strategies
- RSNA staff will post Density matrix on wiki
- RSNA staff will distribute suggested reference documents (Strawman vCT)