QIBA VolCT Group 1B Update WebEx
Tuesday, Jan. 27, 2009
1PM (CST)

Call Summary

In attendance:

Michael McNitt-Gray, PhD
Robert Ford, MD
Daniel Sullivan, MD

RSNA
Fiona Miller
Susan Anderson
Joe Koudelik
Mary Cerceo

Introduction (Dr. McNitt-Gray)
Charge to Group 1B:

- To agree on questions to be answered by these Reference Datasets
- To identify requirements for those datasets based on questions to be answered.
- To identify existing datasets that can be leveraged to provide desired datasets.

Five questions were identified:

1) What level of accuracy and precision can be achieved in measuring tumor volumes in patient datasets?
2) What level of reproducibility in estimating change can be achieved when measuring tumors in phantom datasets?
3) What is the minimum detectable level of change that can be achieved when measuring tumors in patient datasets under a "No Change" condition?
4) What level of reproducibility in estimating change can be achieved in measuring tumors in patient datasets with "Unknown Change" condition?
5) What is the effect of slice thickness on estimating change in tumors using patient datasets?

Workplan
Question 1 was identified as the starting point
Accuracy and precision in measuring tumor volumes in patient datasets

- Next steps: Define requirements and design experiments

Specific aims:

- Investigate both bias and variance of both readers and algorithm-assisted readers in measuring volumes, and diameters and bi-directional diameters of lesions
- Investigate intra and inter-observer variability with each task
- Interpret "observer" broadly to mean reader measuring manually for diameters as well as algorithm-assisted reader measuring contours

Methods and materials:

- LIDC dataset to be used
- Lesions with "known size" will be used (size based on contours from 4 LIDC readers)

- Each lesion will have LIDC boundaries to represent "truth"
- Only a single time point is needed (no follow-up needed, no diagnosis needed)
- Need to identify which nodules to use-criteria?
- Like NIST Biochange 2008, lesions are identified and coordinates provided to readers

Reader tasks:

- Manually mark two Diameters (w/o LIDC marks)
    - Longest diameter and perpendicular diameter
- Also semi automated contour of lesion
    - From contour, determine volume, longest diameter and diameter perpendicular to longest diameter.
    - Have readers perform some cases more than once (intra reader variation)
    - Compare manual marks with semiautomated? is this intrareader variability?

Data collection chart includes:

Nodule #	R1LD
Coordinates	R1PD
LIDC vol	R2 Vol
LIDC longest Diam	R2LD
LIDC perp Diam	R2PD
R1 Vol	

Analyses

- LIDC would be considered "truth" (Gold Standard)
- Take the mean of measurements?
    - Union of contours (most inclusive)
    - Intersection of contours (most restricted)
- Validity study - compare each reader to gold standard
- Reliability study - compare reader to reader
- Estimate bias of each reader
    - Volume
    - Diameter (manual and assisted)
    - Product of diameters (LD x PD) (Manual and assisted)
- Estimate Intra-reader variability
    - Reader vs. "gold standard"
    - Reader vs. reader
- Reader 2 will not see Reader 1 comparisons
- Dr. Ford to annotate (i.e., circle lesion), then forward to readers for measurement

Questions

- How many cases?
- How many readers?
- Case composition (All spherical? Some spiculated? Range of sizes?)
- Enough of each subgroup to perform a statistical analysis?
- Significant analysis?
    - (reader bias on spherical nodules is XX)

        - (reader bias on spiculated nodules is YY)
        - Similar study deemed statistically significant using 60 lesions, cycled through 3 individual readers
        - Dr Ford will contribute 19 cases that have patient's lung lesions, including baseline and points; have not been outlined by LIDC criteria (use for change?)
    - Do we want to do both size and shape subgroup analyses?
        - Recommend taking shape into account
        - Only measure lesions 5mm-30mm in size -- 10mm lesions mimic clinical trial studies
        - Will poll the group on choice of size or shape as most important for subgroup analysis

Consent

- Ask IRB for approval to do additional analyses
- LIDC is public and meant to be used for analyses; Readers will be informed that they are participating in an experiment, readers will have to consent to participate (all data will be anonymized)
- If RadPharm data from clinical trail is used, will need IRB exemption

Next Steps

- There is more work to do designing the final layout of the experiment: sub-group analyses
- Question 3 will have input from Dr. Schwartz and Dr. Zhao
- Group to study Dr. McNitt-Gray's PowerPoint which will be circulated
- Dr. Fenimore will contact statistician to speak on finding cases within a couple of weeks
- Next call: Tuesday, Feb 10, 2009, 1 PM (CST)