

QIBA Quantitative CT Committee Update

Monday, June 21, 2010

11 AM CDT

Call Summary

In attendance

Andrew Buckler, MS (co-chair)
Maria Athelougou, MD
Charles Fenimore, PhD
David Gustafson, PhD
Philip Judy, PhD
Grace Kim, PhD
Michael McNitt-Gray, PhD
James Mulshine, MD

Nicholas Petrick, PhD
Anthony P. Reeves, PhD
Yuanxin Rong, MD, MPH

RSNA

Joe Koudelik
Madeleine McCoy

General discussion

Overview of MICCAI and Volcano challenges (Drs Gustafson and Reeves)

- Intention of challenges was to determine best ways to characterize biomarker capabilities
- Third International Workshop on Pulmonary Image Analysis (Beijing, Sept 20, 2010)
- MICCAI pulmonary workshops (www.lungworkshop.org)
- Challenges dealt with airway symmetry and lesion size; no MICCAI challenges based on pulmonary lesions identified; MICCAI liver study being developed; report-back expected in August 2010

Tasks associated with the MICCAI Challenge (Dr Gustafson)

- MICCAI studies used expert readers to contour CT lesions to develop objective criteria for segmentation algorithms based on expert reader comparisons (consensus lesion outlines/contours)
- MICCAI studies based on broad range of applications, e.g. cardiac, neuro, etc
- MICCAI had a single contour per lesion (Volcano study similarly done using lung cases) vs LIDC study which contained multiple expert contours per lesion

Value of MICAA results

- Characterized performance to inform QIBA VolCT Profile Claim language
- Identified relevant metrics, e.g. reproducibility
- Defined objective criteria based on numeric scoring can help algorithm development
- Datasets from Siemens may be available

Phantom studies

- Efforts needed to assimilate data from multiple phantom studies in efforts to aggregate characterization of phantoms
- Need to define meta-analysis for phantom data; Dr Athelougou to provide update from industry (Definiens') perspective concerning accuracy of volume measures
- Number of clinical studies to increase; both clinical and phantom data is important
- Link activities to provide "authoritative characterization" of biomarkers; MICCAI activities may contribute via combined data analysis; Dr Gustafson to lead this effort

Accurate tumor change (response) vs accurate tumor volume (burden)

- Goal of the Q-CT Committee is change analysis (including variance); therefore, response to therapy is primary focus, followed by tumor burden
 - Predictor of lesion growth is ultimate need; absolute size may not be needed
- Measurability of certain features vary; multiple ways to measure lesion change may be necessary

- Need exists to relate any volume change to actual size/volume measure; change and volume both eventually needed
- Consider mean and absolute measures together in efforts to capture consistency of segmentation
- Lesion shape descriptions to be considered
- Note that response to size and density is not the same

Next Steps

- Dr Athelougou to define an activity to broaden phantom studies to multiple algorithms and software implementations (where previous studies have generally been single algorithms)
- Dr Kim to draft intended results, e.g. characterize performance of volume in analysis using vol CT, to compare with effectiveness of RECIST
 - This will take time (i.e. summer) to refine
 - Drs Constantine Gatsonis (Brown) and John Lu (NIST) might provide additional statistical resources

MICCAI Challenge

www.lungworkshop.org

<http://grand-challenge2009.bigr.nl/>

<http://grand-challenge2008.bigr.nl/>

<http://mbi.dkfz-heidelberg.de/grand-challenge2007/>

Volcano challenge

<http://www.via.cornell.edu/challenge/>