QIBA Quantitative CT Group 1C Subcommittee Update
December 16, 2009
2 PM CST

Call Summary

In attendance:

Charles Fenimore, PhD (moderator)

Andrew Buckler, MS

Grace Kim, PhD

John Lu, PhD

Michael McNitt-Gray, PhD

Kevin O'Donnell

Anthony Reeves, PhD

Sheila Ross

Ehsan Samei, PhD

Daniel Sullivan, MD

RSNA

Susan Anderson, MLS

Joe Koudelik

General Discussion

- Implementation of 1C performance settings and starting point needed for image acquisition sites to begin testing phantom
- ACR and FDA (Kyoto Kagaku) phantoms are to be used for 1C study; all ACR accredited sites should possess their own ACR phantom while the FDA phantom can be shipped site-to-site

Group 1A update (Dr Kim)
- 1A data analysis being used to help in 1C study design
- Group 1A project focusing on single scanner results, 1C focusing on variation across scanners
- Significant reading component with both 1A and 1C studies
- 1A phantom size, shape, density show different intensities and bias with a fixed window; reader over/under estimate reads with RECIST criteria
- One-month time frame between read session 1 and 2; no reader memory effect in 'nodule remembering' was found
- True physical measurements done on nodules
- RECIST markups don't require repeat session reads based on 1A double-read analysis for 1-D measurements to be determined
- Siemens markup tool being used at RadPharm for 3-D measurements utilizing assisted algorithm to identify boundaries; need to know class of algorithm, i.e. more software details needed from RadPharm
- Need to revisit 1A data analysis with RadPharm reps on the next call

Staging 1C Project (Dr Fenimore)
- Need to test proposed resolution and noise settings; Dr McNitt-Gray to test at UCLA and draft performance setting protocol
- Basic setting objectives include slice thickness, beam collimation, KVP, field-of-view, spatial resolution, and specified noise levels; target levels for pitch to be close to 1
- ACR phantom to be worked with first, followed by the FDA (Kyoto Kagaku) phantom once performance settings determined; target voltage and slice thickness settings set, beam collimation ready

- Whether performance protocol will work on 4-row detectors not known; Profile will contain appendix listing scanner specific settings associated with bulls-eye approach (ideal/target/acceptable)
- Dr Fenimore's slide deck to be reformatted into an instruction sheet/manual for image acquisition sites, e.g. slide 5 (of 12) can be used as site instructions; a spreadsheet is needed to sites to document their settings used for the 1C study
- Drs Mahesh, Petrick and Samei to begin initial 1C scanning to determine what sites may require
- Dr Petrick to scan the ACR phantom using the new 1C performance settings while using the same scanning conditions as done for the anthropomorphic phantom in 1A, then repeat using the McNitt-Gray testing protocol
- Dr Petrick to also scan the ACR phantom using the 1A protocol for comparison; need to see 1A repeated on ACR phantom
- Dr Samei to test process based on Dr Fenimore's slides

Two pieces to pursue in parallel
- One procedure to measure performance metrics (in QA Profile section) using Petrick protocol
- One iterative process where no techniques known, needs to meet QA target by following specified parameters
- Nail down 'real' protocol if different than what we've been already doing
- Need the best protocol for this study; not to rely on 1A protocol if not accommodating

Dose and noise challenges
- High(er) dose protocols typically used in clinical practice; low dose protocols associated with more noise and less image detail
- Pushback possible from clinical practice with lower dose protocols
- Need to demonstrate the accuracy based on the Petrick (lower dose) protocol

Field-of-View (FOV)
- FOV not yet set for 1C study
- Need to answer the following questions: Will the same FOV across all scanners be needed to obtain same image resolution? Is this possible? Is tailoring the FOV to object size needed? Is FOV changeable on all scanners? Can protocol be prescriptive for FOV? Further discussion needed.
- Dr Fenimore to forward the recommended FOV details based on Dr McNitt-Gray's testing protocol to Dr Samei
- Dr Petrick to forward FOV details of Kyoto Kagaku phantom

Next Steps:
- Need to revisit 1A data analysis with RadPharm reps on the call
- Dr McNitt-Gray to test proposed 1C resolution and noise settings at UCLA and write-up performance setting protocol
- Dr Petrick to forward FOV details of Kyoto Kagaku phantom
- Dr Petrick to scan the ACR phantom using the 1A protocol for comparison
- Dr Fenimore to forward Dr Samei the recommended FOV details based on Dr McNitt-Gray's testing protocol
- Dr Samei to test process based on Dr Fenimore's slides