

QIBA Quantitative CT Group 1C Subcommittee Update

Wednesday, March 10, 2010

2 PM CST

Call Summary

In attendance:

Charles Fenimore, PhD (chair)

Andrew Buckler, MS

Baiyu Chen

Michael McNitt-Gray, PhD

Nicholas Petrick, PhD

David J. Vining, MD

RSNA

Susan Anderson, MLS

Joe Koudelik

Staging 1C Project (Dr Fenimore)

- UMaryland invited to participate with Philips 64 detector scanner
- Drs Eliot Siegel, Joseph Chen and Ganesh Saiprasad are contacts
- UMaryland does not have medical physicist involved but Drs Fenimore or McNitt-Gray may be present for scans; lack of medical physicist not to hinder data acquisition
- Results expected for RSNA 2010 Annual Meeting; possible scientific abstract or QIBA kiosk poster

Field of View (FOV) considerations

- Continued discussion of whether changing the FOV changes the resolution and noise in the various CT systems in the study; adaptive field of view issues lead to heterogeneous treatment of patient size
- Scanners differ in the number of bowtie filters and in the options for the operator to enter patient size. For example, Toshiba 16- and 64-detector row scanners have 3 bowtie filters and several patient sizes. GE scanners also have 3 bowtie filters, while Siemens has a single bowtie filter and there is no option to enter patient size.
 - Changing FOV distributes dose over different area; need to scan objects according to their specific size
 - Assumptions may be built into reconstruction process based on patient size, e.g. large patient/medium FOV
- Issues when scanning ACR phantom addressed in FAQs for Toshiba scanner
- One potential adaptation of protocol: in scanning the ACR phantom for the performance phase of the study, follow manufacturer's recommendations, if any, on setting the FOV. In scanning the lung phantom, keep the scanning conditions fixed to those determined in the performance phase, except for the scanning FOV, which is to be set by the size of the lung phantom
 - This modified procedure can result in a difference in the noise and resolution between the performance-protocol scan and the measurement-protocol scan of the lung phantom. It may sacrifice constancy of image quality across scanners in the imaging of the lung phantom.
 - For some scanners, non-uniformities may be introduced when the ACR phantom is scanned with a larger size FOV.

- Possible additional adaptation - collect data on the ACR phantom using both approaches.
 1. First, using the ACR phantom, execute the performance protocol using the smallest available scanning FOV that fully images the phantom – thus determining scanner settings that deliver the required resolution and noise.
 2. Then, scan the ACR phantom using the scanning FOV appropriate for the lung phantom while maintaining other system settings as in 1. Measure the noise and resolution for the new settings.
 3. Scan lung phantom with the settings for the FOV used in 2.
- Dr Fenimore will draft text to describe this section of protocol and will circulate among members on call for feedback
 - May also ask for review by industry reps such as Toshiba's Rich Mather or Dr Kirsten Boedeker

1C Performance Protocol Testing Update (Baiyu Chen of Duke University for Dr Samei)

- Dr McNitt-Gray and Ms Chen discussed images and results from performance protocol testing
- Dr McNitt-Gray to re-examine the arbitrarily set standard deviation of 12 ± 1 (units)
- Detailed reconstruction kernel had lower noise at same dose level
- Dr McNitt-Gray and Ms Chen will collect images for modules 3&4 (last 2 sets); 4 DICOM slices
- Ms Chen to forward spreadsheet of collected data and images to Dr Fenimore for review and distribution

Next Steps:

- Dr Fenimore to draft text to describe FOV section of protocol and will circulate among members on call for feedback
- Dr McNitt-Gray and Ms Chen to collect additional images for Modules 3&4
- Ms Baiyu Chen (baiyu.chen@duke.edu from Dr Samei's Duke lab) to forward images collected on a GE 64 detector scanner for distribution to the group
- Dr McNitt-Gray to re-examine the arbitrarily set standard deviation of 12 ± 1 (units)
- Next call scheduled for Wednesday, March 24, 2010 at 2 PM CDT