QIBA Quantitative CT Group 1C Subcommittee Update

Wednesday, April 7, 2010

2 PM CDT

Call Summary

In attendance:

Charles Fenimore, PhD (chair)
Andrew Buckler, MS
Tunc A. Iyriboz, MD
Grace Kim, PhD
Michael McNitt-Gray, PhD
Nicholas Petrick, PhD
Anthony P. Reeves, PhD
Ganesh Saiprasad

RSNA

Joe Koudelik

Protocol update

- The quality comparison elements of the 1C study may support manufacturers in developing better scanner performance/output; protocol to articulate levels of performance expected by vendors
- The goal is that manufacturers will implement changes within release products

UCLA resolution and noise overview

- Dr McNitt-Gray repeated previous scans done at UCLA with Siemens S64 platform
- Performance Based Protocol adapted (v2.2) in response to current data; noise of 12±1 HU SD relaxed to 13±1 HU SD
- Subjective assessment of line pairs done based on visually separating 6-7 lp/cm from background
- ACRIN 6678 protocol used with ACR phantom; values reported for Siemens S64 (using B30 filter and 100mAs)
- Spatial resolution of 6 lp/cm and noise of 17±1 HU SD deemed a more realistic performance level to pursue.
    - In order to have consistent measures of resolution, images showing typical bar patterns deemed to have resolutions of 5, 6, 7 . . . lp/cm are to be added to the protocol
- In order to measure noise consistently, we need to define a measurement ROI
    - Graphics to be added to protocol to show how ROI selection may affect noise

Two branches of Protocol

1. Performance based protocol - procedure to establish base-line quality while cross-standardizing imaging performance
2. ACRIN 6678 based protocol

- Better understanding needed of variation between scanners using ACRIN 6678 (using ACR accreditation phantom); if “large enough” variation determined, apply Performance Protocol to level imaging outcomes, e.g. want one comparable output across scanners
- Need to find a single system where there is no difference seen between the Performance Protocol and ACRIN 6678
- Note that routine clinical protocols and ACRIN 6678 produce difference results

- Another round of ACR phantom imaging needed at three pilot sites; decision made to use both protocols at each site
    - Mr Saiprasad (UMaryland) Philips 64-slice
    - Dr Petrick (FDA site) Philips 16-slice
    - Dr McNitt-Gray (UCLA) Siemens S64
    - Ms Baiyu Chen (Duke) GE 64
- Formalize the Performance Protocol with what group wants to see on scanners, e.g. rotate phantoms and rescan to check for possible variations

Performance Protocol Update

- Decision made to reduce spatial resolution to 6 lp/cm and relax noise to 17±1 HU SD
- Dr Fenimore to draft simple 1-2 page protocol statement to be used at three pilot sites

Modulation Transfer Function

- Modulation transfer function (MTF) as proposed as additional metric; may add more complication to measurements; more discussion needed
    - Bar patterns, resolution measurements, white-to-black signal modulation as function of lp/cm possible
- 4 lp/cm too close to full modulation; 6 or 7 lp/cm proposed more useful
- Measurement beyond "grid-pattern" may be needed if MTF to be pursued
- MTF software tools not available yet; Mitre has developed a package for computing the contrast transfer function using bar targets, which is one possible source in near future (http://www.mitre.org/tech/mtf/)

Next Steps:

- Define Performance Protocol based on 6 lp/cm resolution and 17±1 HU SD noise
- Dr Fenimore to draft simple 1-2 page protocol detailing each branch for ACR phantom scanning (ACRIN 6678 and Performance Protocol for acquisition site reference)
- Comparable window level images to be sent with protocols as examples of better consistency
- Dr Fenimore to follow-up with all pilot scanning sites
- Dr McNitt-Gray to update slide deck and spreadsheets with new performance criteria
- Next call: Wednesday, April 28 at 2 PM CDT