QIBA CT Volumetry Biomarker Ctte (BC) Call

16 November 2015 at 11 AM CT

Call Summary

In attendance:

Samuel G. Armato, III, PhD (Co-Chair)
Gregory Goldmacher, MD, PhD, MBA (Co-Chair)
Jenifer Siegelman, MD, PhD (Co-Chair)
Maria Athelogou, PhD
Andrew Buckler, MS
Charles Fenimore, PhD
Matthew Fuld, PhD
Marios Gavrielides, PhD
David Gustafson, PhD
Rudresh Jarecha, MBBS, DNB, DMRE
Hyun Grace Kim, PhD
Qin Li, PhD
Michael McNitt-Gray, PhD
Michael O'Connor, PhD
Kevin O'Donnell, MASc
Adele Peskin, PhD
Nicholas Petrick, PhD
Marthony Robins, PhD
Berkman Sahiner, PhD
Daniel Sullivan, MD
Ying Tang, PhD
Hiromitsu Tan'nai, MD
Pierre Tervé, MS
Binsheng Zhao, DSc

RSNA:
Joe Koudelik
Julie Lisiecki

Drs. Petrick / Li / Zhao Overview Presentation: "Phantoms for CT Volumetry of Hepatic Metastasis"

Project Overview:

- To evaluate the performance of lesion sizing tools in estimating the volume of synthetic low-contrast liver lesions across different CT vendor platforms and scanning parameters

Summary of Phase I:

- Designed and collected a comprehensive anthropomorphic liver phantom dataset including:
  - a wide range of CT acquisition parameters
  - data from two vendors' scanners
- Analyzed a subset of the collected data with two research baseline segmentation algorithms
  - Scanner investigation yielded similar performance for solid lesions
  - Lesion characteristics (size, contrast-to-parenchyma) are the most dominant factors affecting lesion sizing performance
  - Slice thickness and dose affect volumetry to various degrees
  - Two sizing tools yielded comparable performance

Summary of Phase II:

- Designed and built a fatty liver phantom
- Collected dataset with
  - varying slice thickness, doses (factors identified important in Phase I)
  - FBP and ASIR (three strength levels), VEO
- Analyzed a subset of the collected data with MF-FDA algorithm
  - Lesion characteristics (especially size) are the most dominant factors affecting lesion sizing performance
  - Effect of slice thickness and dose was consistent with Phase I
  - Recon algorithms were not a significant factor
  - More unexplained errors compared to Phase I (due to a more heterogeneous background)

Future Work:

- Complete VEO reconstructions and corresponding analysis
- Build a uniform phantom with same lesion sets to allow direct comparison between the different backgrounds
- Apply other segmentation methods to further investigate the impact of sizing tools (interaction with recon algorithms)

Conclusions

- Questions remain regarding to what extent this research supports the CT Volumetry claim for the Profile
  - Reproducibility results of 20-30% were larger than obtained previously, added variability to the measurement, affecting precision and making completion of the task more difficult
  - The smaller lesions added variability, as did the poor background contrast of the software tool
- Goal is to achieve same result whether measuring a virtual lesion or a real one, and to quantify bias and precision in both

Action items:

- Volunteers needed for Sunday MTE sessions for coverage of the QIBA CT Volumetry poster at *RSNA 2015*
- Topics requested for the breakout sessions at RSNA 2015 due by Friday, November 20th to RSNA Staff: Jlisiecki@rsna.org

Next Call: Monday, Dec. 14th at 11 am CT | 2016 planning and review of RSNA 2015 discussions at QIBA Working Meeting