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)
Jennifer Siegelman, MD, PhD (Co-Chair)
Maria Athelogou, PhD
Andrew Buckler, MS
Charles Fenimore, PhD
Matthew Fuld, PhD
Marios Gavrielides, PhD

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