

Quantitative Imaging Workshop XVIII

Technical Breakout Group Recommendations

November 5, 2021

QIW XVIII Technical Recommendations

- CT Image Quality
 - IAEA: “... no general international standard for measuring the MTF of CT scanners has been implemented yet.” MTF usually measures in-plane resolution (2D).
 - Each scanner vendor has a unique set of CT image quality phantom(s).
 - No accepted resolution methods exist for 100 to 200 mm from iso-center.
- Proposed Recommendation
 - We recommend that a multi-disciplinary group of engineers, scientists, physicians, ... from industry, academia, and government develops a 3D resolution measurement standard that works accurately at multiple locations across a full CT scanner field of view (~ 50 cm). Ideally this will be an open science, collaborative, constructive, data-driven, and pragmatic initiative with the additional goals of setting a low cost and easy to use 3D resolution measurement standard that is designed to be internationally accepted.
 - A study or clinical trial showing the benefits of being able to monitor and control CT 3D resolution and other image quality metrics would help motivate the field to adopt and use this new standard. Modeling and simulation with existing CT image quality data can help identify the importance of maintaining high CT image quality for CT lung studies.
 - We need to demonstrate that image quality controls lead to improved clinical actions.

QIW XVIII Technical Recommendations

- Questions for Combined Low Dose CT Lung Screening and COPD

1. What are the clinical application targets of a combined CT image acquisition protocol of COPD and Lung Cancer?
2. What studies will be necessary to demonstrate effectiveness of a combined protocol?
3. Do we have enough data to support the role and impact of multiphase (insp-exp) imaging?
4. What is the best way to disseminate and achieve acceptance of an early lung cancer and COPD CT imaging guidance document?

- Recommendations

- “Our failure to establish a standard is the reason we do not have a therapy” – George Washko
- We recommend that low dose CT imaging guidelines are developed that support:
 - Early detection of lung cancer
 - Quantitative measurement and change measurement of suspicious lung nodules
 - Early detection of emphysema
 - Quantitative measurement and change measurement of emphysema
- The guidelines will need to consider that there are several different forms of emphysema including centrilobular, panlobular, and paraseptal.
- Visual observation of emphysema level is associated with lung cancer risk. Therefore a long-term goal of quantitatively measuring emphysema in low dose lung cancer screening scans is to help establish a quantitative lung cancer risk score.
- The low dose CT lung cancer screening and emphysema scoring scan should be performed at full inspiration.
- We should also consider support for other diseases (ILD, bronchiectasis, ...) as well as emphysema.