

AbstractID: 3866 Title: A Simple and Effective Method to Determine Clinical Significance of CT Ring Artifacts

Purpose: To investigate the feasibility of using air scan to determine quantitatively whether CT ring artifacts are clinically significant.

Method and Materials: Clinical contrast medium Optiray 320 was used to make CT artifact tools, which were attached to CT detectors at various locations. Preliminary scans of standard uniform phantoms were acquired on a 16-slice CT scanner with and without artifact tools. Images of an anthropomorphic phantom (ATOM, CIRS, Inc.) were acquired with the chest pulmonary embolus protocol to determine whether the rings are clinically significant. Air scans were acquired with the same artifact tools in place using a clinical as well as a QC protocol. Standard deviation values of ROI placed in images of uniform phantoms and air scans were recorded. The air scan data associated with the rings that are least visible in the anthropomorphic phantoms were used to investigate whether a threshold exists which indicates if rings are clinically significant.

Results: Sensitivity of this method varies slightly with image thickness, mAs, scan mode, and ROI size. Evaluation of QC air scans showed good separation of the standard deviation values between “blank” air scans and those with artifacts for different ring diameters. Different threshold values were found based on size of ROI used to measure standard deviation, and it is necessary to use at least two different ROI sizes for either small or large ring artifacts.

Conclusion: While air scans are overly sensitive for the visual detection of ring artifacts in CT images, they may be useful in establishing quantitative criteria for determining whether the rings present are clinically significant. With stack mode viewing, a quick and simple evaluation may be feasible for multidetector row CT scanners of large number of data channels for those institutions without the means to develop automated off-line analysis.