

AbstractID: 11007 Title: Effects of kVp on dose-normalized contrast-to-noise ratio relevant to pediatric CT

Purpose:

The purpose of this research was to systematically explore the change in contrast-noise ratio (CNR) for a variety of substances as a function of kV in CT examinations for small body habitus under the condition of constant dose.

Method and Materials:

The head module of a Gammex RMI 461A Head/Body phantom (constructed from solid water) was suspended from the end of the table of a Philips Brilliance 6-slice CT scanner. An ion chamber introduced into the center of the phantom was used to adjust the mAs at kVp values of 90, 120 and 140 so that the exposure at the center was the same at all kVp values. Fifteen materials were tested at the center of the phantom for each of the kVp values with the CT number mean and standard deviation (SD) measured for each of the resulting 45 scans. A control area in the solid water was also tested for each scan using an identical ROI. Related tests were performed on all samples at once using other scanners.

Results:

For all 45 scans, the SD was independent of kVp demonstrating that the noise was a function of dose only and not kV. For high density materials, lowering the kV improved the CNR in a predictable way. For materials with CT numbers not far from water, however, in some cases the CNR became worse with decreasing kVp while in others, the CNR improved.

Conclusion:

While lowering the kVp vs. lowering the mAs in small body habitus may result in an improved CNR, it should not be assumed that this is always the case. Dose reduction strategies for particular situations may benefit more by reducing the beam intensity and keeping the kV high.