

AbstractID: 2094 Title: Non-ideal Image Noise Variations In CT Scanners

Image noise is a useful measurement in comparing the image quality of scans having the same MTF using CT scanners from the same manufacturer. Here the low contrast detectability will track with the image noise. In this study we assess the image noise in four models of CT scanner from the same manufacturer including four, eight, and sixteen channel scanners. Similar image noise was expected when using the same techniques since SID and beam filtration were the same in all scanners.

We used the same two phantoms throughout this study: a cylindrical 20 cm diameter water phantom and a cylindrical 48 cm diameter polyethylene phantom. Both phantoms were scanned in axial mode at all available scan times from 0.4 to 1.0, and also 4 sec. Then at each scan time, the mA was varied from 100 to 440 in increments of 20 mA. Standard deviation measurements were taken at five regions of interest in the image. Each standard deviation value was normalized to the standard deviation from the four channel scanner at 1.0 sec scan time by dividing by the square root of the mAs.

The normalized image noise actually varied by a factor of 3 in our scans, though ideally it should be constant. Generally the image noise was substantially higher at lower mA scans and with scanners having more detection channels in the z direction. We will discuss trends and possible causes for these variations that indicate practical limits of CT image quality in present scanners.