

Purpose: To quantify the effect of pitch on noise in abdominal multi-detector CT.

Methods: The standard acrylic abdominal CTDI phantom was modified so that it could be supported on the gantry shroud and remain stationary during a helical multi-detector CT image acquisition. The table top height was positioned 1 cm below the phantom so that the table could move during helical image acquisition without touching the phantom. The phantom was scanned with the x-ray tube voltage, x-ray tube anode current, reconstructed slice thickness, multi-detector selection and reconstruction kernel typically employed in a standard abdominal protocol for the different pitches available. On a given unit only the pitch was varied. The pixel standard deviation (noise) for four small (100 mm²) centrally located regions of interest were measured and averaged. Sixteen slice and 64 slice multi-detector CT scanners were studied. On both scanners the standard filtered backprojection image reconstruction (FBP) algorithm was utilized.

Results: On both the 16 slice and 64 slice scanners the noise varied to a reasonable approximation with the square root of the pitch for pitches ranging from ~0.5 to ~1.0. On the 16 slice scanner the noise increased only slightly when the pitch was changed from 1.375 to 1.75.

Conclusions: In the cases of the CT scanners studied our results support the widely accepted fact that noise in an abdominal (noncardiac) mode multi-detector helical CT image varies with pitch (and to the first order with the square root of the pitch) for pitches up to one when the FBP algorithm is employed. Our results do not support this fact when the pitch is increased above 1.0 and in particular as the pitch is increased to 1.75.