

Purpose:

Mis-registration from cardiac motion causes artifacts in both the soft-tissue-only and bone-only dual energy (DE) subtraction images. Previous investigations have attempted to avoid mis-registration artifacts by cardiac gating of the first and second exposures. This study is to determine whether a commercial phantom with simulated beating heart can be used to investigate factors affecting mis-registration in DE chest radiology.

Method and Materials:

DE images of the Kyoto Kagaku cardiac motion phantom were made in postero-anterior orientation using two General Electric indirect DR systems (XQ/i and Definium) at approximately 60 and 125 kVp. Images were acquired for a stationary heart and at heart rates between 50 bpm and 120 bpm without coordination of cardiac cycle with the initiation of exposure sequence. DICOM images were transferred to a PC where the area of the artifact on the silhouette of the heart was measured from both soft-tissue only and bone-only images using ImageJ.

Results:

The area of the artifact generally increases with heart rate for both machines. Variation in the area of the artifact for the Definium is twice that for the XQ/i. The time interval between the end of the first and the beginning of the second exposure is constant for XQ/i, but variable for the Definium. The duration of the low kVp pulse was different for XQ/i and Definium.

Conclusion:

Although designed for horizontal operation and CT, this phantom can be used upright to simulate heart motion for investigating DE mis-registration artifacts and control.

Conflict of Interest (only if applicable):