Comparison of single-view and dual-view digital chest tomosynthesis

Innovation/Impact: We demonstrate a dual-view DTS imaging method which may improve the quality of reconstructed images for potentially better chest imaging screening and diagnosis.

Scanning techniques:
The PA and lateral views of the object are illustrated using large and small ellipses, respectively. For CBCT, the object scans over the whole 360°. For single-view DTS, the object orientation and scanning angle are shown using the blue lines. For dual-view DTS, red color illustrates the additional lateral scans. In our study, $\alpha=30^\circ$.

Results:
The sagittal view slice images are shown in Fig. 2. The CBCT image in Fig. 2(b) closely resembles the original phantom image in Fig. 2(a). The shape of the phantom and most of the structures are visible in the dual-view DTS image in Fig. 2(c), despite the presence of some artifacts. The image quality is the worst for single-view DTS image (Fig. 2(d)), in which the shape of the chest anatomy is seriously distorted and barely recognizable.

Fig. 1 Imaging geometry for the CBCT, single-view and dual-view DTS techniques. Blue color illustrates the PA view scan used for both single- and dual-view DTS. Red color illustrates the additional lateral view scan used for dual-view DTS.

Fig. 2 Sagittal view slice images obtained (a) directly from the original digital chest phantom, (b) with the CBCT technique, (c) with the dual-view DTS technique and (d) with the single-view DTS technique.