

AbstractID: 8846 Title: Assessment of Conebeam CT image quality in the presence of an electromagnetic tracking system

**Purpose:**

A novel electromagnetic tracking system is being used for real-time tracking during treatment delivery. On board cone-beam CT imaging is routinely being used for real-time imaging and localization. Concurrent use of these two modalities might prove beneficial for correlating imaging and tracking information. The purpose of this study is to investigate the effect of the presence of the electromagnetic tracking system on the CBCT image quality.

**Materials and Methods:** A commercial CT performance phantom (Catphan, Phantom Laboratory, Salem, NY) containing various image quality assessment tools was imaged using a kilovoltage on-board cone-beam CT system (Varian Medical Systems, Palo Alto). An electromagnetic tracking system (Calypso® 4D Localization System, Calypso Medical, Seattle, WA) uses an electromagnetic array for tracking transponder positions.

The imaging quality assessment phantom was imaged with and without the electromagnetic tracking system in place. To quantify the effect on the image quality, the CT number accuracy, spatial integrity, image uniformity, high and low contrast resolution were compared.

**Results:** CT number accuracy, spatial linearity and high contrast resolution were unaffected by the presence of the array. The visibility of the 1% cylindrical low contrast resolution targets was 15 mm and 7 mm for with and without the array respectively. The inherent streaking artifacts degraded the low contrast image quality significantly.

**Conclusions:** Presence of an electromagnetic array significantly degrades CBCT low contrast resolution while other image performance parameters are minimally affected. For imaging human anatomy, algorithms to improve image quality may need to be developed.

**Conflict of Interest (only if applicable):** This work is supported in part from a grant from Calypso Medical Systems.