Purpose: To compare two methods for reducing artifacts in cone-beam CT (CBCT) images caused by the presence of an electromagnetic array used for tracking transponders during radiotherapy.

Methods: A pelvis phantom was imaged using a gantry mounted CBCT system at two dose levels typical for prostate imaging. Both dose protocols acquired approximately 670 projections at 125 kVp. Tube currents and pulse widths were 80 mA/13 ms and 63 mA/10 ms for standard and low dose scans. The phantom was imaged with and without the array in position. The two methods used to reduce artifacts were: 1) filtering projection images prior to reconstruction, and 2) halving the dose per projection and doubling the number of projections. The filtering method replaced pixel values with neighboring values when pixels differed from neighboring pixels by a threshold percentage. 18, 22, 26 and 30% thresholds were investigated. Artifact reduction was quantified by computing difference images between the 'corrected' reconstructions and the image reconstructions for the phantom without the presence of the array. The filtering method was also applied to a prostate patient data set.

Results: Average pixel values of the difference images were reduced by 6.4 and 7.3% for the 18% threshold filtered reconstructions for low and high doses, respectively, compared with difference images between the unaltered reconstructions with and without the panel. Reductions were 4.4 and 4.9% for other thresholds for low and high dose images. 8.6 and 19.6% reductions were calculated for low and high dose images using increased projection numbers. Improved soft tissue visibility was noted in the filtered patient reconstructions.

Conclusions: Both filtering and increasing projection numbers reduced artifacts caused by the presence of an electromagnetic array in CBCT imaging. Quantitative and visual analyses suggested that greater artifact reduction was achieved with increased projection numbers.