AbstractID: 8559 Title: The metal artifact reduction technique for accurate prostate seed localization using limited EPID projections and deformable registration

Purpose: Scatter radiation can degrade the quality of a kilovoltage cone-beam CT (KV CBCT) image due to the use of a larger flat-panel detector. Especially, if KV CBCT is employed for seed localization, the effect of streak metal artifacts of the seeds can be magnified in CBCT images. In this study, we describe the preliminary application of MV cone-beam reconstruction (CBR) image from EPID projections and deformable registration for metal artifact reduction in a test phantom. **Method and Materials:** To perform the CBR and deformable registration based technique, the following three steps were used. (1) Extract a seeds only image and an image of seeds with bright metal streak regions by using a user-defined threshold value in the CBR image and KV CBCT images. (2) A derived intensity based 3D 'demon' deformable registration algorithm was applied to both seeds images, and the use of the algorithm generated the deformation field. (3) Resample the original CT image according to the deformation field. **Results:** The intensities of the metal artifact region were decreased with the use of the deformation grid, as the seeds in KV CBCT images were deformed as compared to the original seeds in CBR images. Although image quality was not dramatically enhanced, the metal artifact removed volume which causes the dose calculation error was 2.795 mm^3 over 61 CT slices of the test phantom. **Conclusions:** Preliminary results with a test phantom demonstrated a bright streak metal artifact reduction effect. We believe that if dose calculation associated with KV CBCT yields reliable results, our study could provide an efficient method for post-implant dosimetry. **Conflict of Interest:** This research sponsored by the Seoul R&BD Program (10550) and the Mid- and Long-Term Nuclear R&D Program of the Ministry of Science and Technology (M20706000007-07M0600-00710)