

AbstractID: 1298 Title: Dose Reconstruction from MV Conebeam CT for Dose-Guided Radiation Therapy

The goal is to reconstruct the dose delivered at treatment time and provide the information for the verification and correction of the planned dose distribution.

A large array (41 x 41 cm²) a-Si flat panel EPID (RID 1640) and a standard Linac were used to perform MV Conebeam CT reconstruction with a small patient dose and determine the exact position of the patient/phantom at the time of treatment. Then, portal images of the treatment beams were acquired to measure the delivered fluence. A cone beam image of a CT phantom with various density inserts was acquired to calibrate the cone beam image and provide the attenuation coefficients. The panel was calibrated for exit dose measurements. The delivered dose to a phantom head was reconstructed by back-projecting the energy fluence from each treatment beam into the reconstruction volume using the projection matrices and spreading the energy released using a 3D dose spread kernel.

By registration of the MV CBCT image with the planning CT, the actual and desired isodose distributions can be compared. A visual inspection shows a general good agreement between the isodose contour plots of the reconstructed and planned dose distributions. A more quantitative comparison is in progress. In this scenario, future treatments could be modified based on the dose already delivered. This dose-guided radiation therapy is an extension of adaptive radiation therapy where dosimetric considerations would constitute the basis of treatment modification.

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