

AbstractID: 7050 Title: A feasibility study using a CCD-based EPID for digital tomosynthesis

Purpose: To investigate the feasibility of using digital tomosynthesis to extract volume data from images produced by a CCD-based electronic portal imaging device (EPID).

Method and Materials: A simple phantom geometry was created by placing several contrasting material amongst layers of 1cm thick bolus. Nine images of the phantom were acquired using the CCD-based EPID mounted on a Varian 2100 C/D linear accelerator. Images were taken from 340° to 20° in 5° steps using 1 MU per image. A more realistic case using a humanoid phantom and implantable tumor makers was investigated. The acquired data was post-processed using a shift-and-add algorithm implemented in an in-house developed software. The processing of the images allows the reconstruction of coronal slices at various depths in the phantom for positional verification.

Results: The results from the reconstructed digital tomosynthesis images in the bolus phantom demonstrate that the objects at the plane of the tomosynthesis are in focus while other structures that were out of plane were blurred. Reconstructed images using implantable tumor markers in an anthropomorphic phantom were comparable to the ones reconstructed by a treatment planning system from megavoltage CT data.

Conclusion: While structures not on the reconstructed plane are not completely taken out of the image, they are blurred enough that it is obvious whether they are on the reconstructed level or not. The results obtained from this experiment confirm the viability of using this low-dose technique to obtain CT-quality planar images that can be used for patient positioning and daily target localization.