

AbstractID: 5206 Title: Daily 3D on-line setup verification and correction for 45 prostate patients using implanted gold markers

Purpose: To minimize the CTV-PTV margin by correcting for prostate motion and positioning during external beam therapy using implanted gold markers and a 3D on-line correction protocol.

Method and Materials: 45 patients had four gold markers (1x7 mm) implanted in their prostate. They are inserted under ultra sound guidance by an urologist using a standard prostate biopsy tool. The beams eye view projection of the markers is outlined in the DRR's. Patients are treated with a three field technique. For each treatment session four images are acquired with a Theraview NT or Iview GT EPID and stored in a central database. First 5MU of the AP and 10MU of the LL beam are delivered. While the patient is on the couch, templates of the reference images are matched with the MV images. For shifts ≥ 2 mm the technician enters the treatment room and moves the couch. Then the rest of the treatment is delivered and images are acquired of the LL and AP beam. These images were analyzed and the effect of using the NAL protocol or no correction was simulated.

Results: The systematic (random) ($\Sigma(\sigma)$) variation was reduced in lateral, cranial-caudal and AP direction to respectively 0.6 (1.1), 0.6 (1.1), 0.5(1.6) mm, compared to 1.3(1.7), 1.4(1.9), 1.8(2.5) mm when using the NAL protocol and 2.2, 2.4, 3.5 mm without correction. Based on these results we reduced, after treating 10 patients, the CTV-PTV margin to 6 mm in all directions and increased the dose to the prostate from 74 to 78 Gy. The whole procedure could be done in a standard 10 minute treatment slot. To reduce the workload remote couch steering is currently being tested in cooperation with the linac manufacturer.

Conclusion: Using a simple and effective method the CTV-PTV margin was reduced to 6 mm in all directions.