

AbstractID: 5310 Title: First clinical results of an adaptive off-line radiation scheme using cone-beam ct scans for treatment of prostate cancer

Purpose:

We developed an adaptive scheme for prostate cancer radiotherapy based on kV cone-beam-CT (CBCT) images that are obtained on the machine during the first six treatment days. The aim of this scheme is to improve knowledge of the average prostate position and average rectum shape and safely reduce the PTV margin.

Method and Materials:

CBCT-scans, acquired on Elekta Synergy systems, were first matched on the planning CT scan using the pelvic bones. Automatic grey-value matching was then used to match the prostates of the CBCT-scans to the prostate of the planning CT scan. The mean of the obtained translations and rotations was used to move the prostate of the planning CT scan to its average position. Subsequently, the rectal wall was delineated in the CBCT-scans, and coordinates of corresponding points of the 7 rectums were averaged to obtain the average rectal wall. Based on average prostate and rectum a new IMRT treatment plan was made with a reduced PTV margin of 7 mm. Weekly CBCT-scans were made to verify that the new PTV encompasses the prostate.

Results:

So far, 16 patients were successfully treated with our adaptive treatment scheme. For 85% of the CBCT-scans a successful grey-value match was obtained, the other scans were discarded. For 88 out of 89 verification scans the prostate was inside the PTV. The mean dose received by the rectum reduced on average by 7.6%, and the equivalent uniform dose (a=12) by 1.5%.

Conclusion:

This is the first routine clinical application of soft tissue image guidance for the prostate using kV CBCT. Contrary to adaptive schemes that use implanted markers, our method is non-invasive and improves localization of both prostate and rectum.

Conflict of Interest:

Elekta, Inc financially supported part of this study.