Repeated CT-scans in Pulsed Doserate Prostate Brachytherapy: assessment of deviations from the Treatment Plan.

Repeated imaging (EPID, Conebeam CT) during the course of treatment is common practice in EBRT. In Brachytherapy, however, the only imaging performed is for Treatment Planning and once the treatment is started imaging is rarely performed.

At our institution all brachytherapy is done with Pulsed Doserate (PDR) techniques. Our treatment regimens (#pulses, total dose, overall treatment time) are based on Continuous Low Doserate schemes as were used in the pre stepping source era. Therefore, overall treatment times vary between several hours and several days, depending on tumor site. Prostate patients (T2, T3a) receive a PDR boost dose of 2880 cGy in 24 pulses of 120 cGy, in a continuous day and night scheme of little more than 46 hours. This makes PDR more prone to errors of technical nature but also of dosimetric nature, when compared with High Doserate, where overall treatment times are substantially shorter. Occurrence frequency of errors of technical nature in PDR has been extensively described in ref. 1.

In this pilot study, the influence of long treatment times on the stability of the delivered dose has been investigated by making one or two repeat CT-scans during the course of treatment, i.e. about halfway and shortly before the end of treatment.

Figure 1: Implantation procedure (Left) and detail of “umbrella” catheter, offering fixation in the prostate during treatment (Right).

Figure 2: Volume (cc) of Prostate PTV (Left) and \( V_{100} \) (Right), both based on Planning CT and repeat CT’s respectively.

Figure 3: Influence of rectum filling on rectum dose, resulting in \( D_{2cc} \) difference for rectum, between Planning CT (Left) and a repeat CT (Right).