

Purpose: To quantify dose perturbation in uniform scanned proton radiotherapy when used as a boost therapy following prostate seed implant. By comparing the combined rectal dose-volume curves for proton therapy and intensity modulated conventional radiotherapy (IMRT); it has been shown that [1] at low doses proton radiotherapy offers better rectal sparing than IMRT. As such proton radiotherapy may be a good candidate for use as boost radiation therapy.

Methods: A slice of prostate seed implant phantom is constructed to investigate proton dose distribution perturbations. Water equivalent materials (PMMA) are used for phantom construction. Seeds are implanted into the phantom in different configurations with various orientation and proximity to each other. The phantom is imaged on a Philips CT scanner and plans are generated using Varian Eclipse treatment planning system (TPS). Phantoms are irradiated under a uniform scanning proton beam at Hampton University Proton Therapy Institute. Dose perturbation due to the seed implants is studied with radiographic film dosimeters as well as IBA MatriXX detector. Irradiation outcome is analyzed on OmniPro I'mRT software. Results are compared with dose distributions from Eclipse TPS.

Results: These studies indicate that there may potentially be small perturbations in proton dose distribution. This should be considered since commonly vast number of these seeds is being implanted.

Conclusions: Our preliminary results indicate that proton dose perturbations are present when proton radiotherapy is used as a boost therapy following prostate seed implant. These effects have been analyzed with Eclipse TPS for protons.

[1] Vargas et al (IJROBP 2008; 70: pp. 744–751)