

AbstractID: 1096 Title: Investigation of Dose Variation to Critical Organs Resulting From Prostate Interfraction Movement in External 3D Conformal Radiotherapy for Prostate Cancer

To treat patients with early stage carcinoma of the prostate, which confined within the prostate gland, radiation oncologists often use the external beam radiation therapy with the 6-field 3D conformal technique. The treatment course will normally deliver over 7500 cGy over a period of 7 to 8 weeks. It is expect that the high dose conformity to the prostate and sparing the critical organs such as rectum and bladder can result in improved cure rate and less clinical complication. However, the prostate interfraction movement over the treatment course due to bladder and rectal filling can affect the targeting isocenter and may shift the irradiation volume in the beam ports towards adjacent critical organs, rectum and bladder. In this study, we determined the prostate interfraction movement by daily ultrasound-based localization system (BAT) and weekly portal images or films of the prostate of which two fiducial golden markers implanted before treatment start. We then investigated the effect of isocenter displacements to dose variations on the rectum and bladder by means of the quantitative dose-volume-histogram (DVH) analysis. It was found that within the shift of isocenter in 1 to 1.5 cm the dose to rectum could be increased 10% or more in comparison with that if efforts are taken to minimize the prostate movement to insure correct targeting. This increase of rectum dose of 10% or more may result in exceeding the tolerance dose for rectum at the end of treatment and thus increases the probability of clinical complication.