

**Purpose:** To evaluate daily setup error and interfraction prostate motion using tomotherapy MVCT.

**Methods:** The evaluation was based on 400 daily shifts from 10 prostate patients. Prior to daily treatment, prostate patients were initially setup with the tattoos and then Tomotherapy MVCT scans were performed and registered with planning KVCT in 3D. The shifts based on the registration were applied before treatments. The shift information in LR, SI, and AP directions was analyzed to characterize the setup error and interfraction prostate motion. Statistic analysis was performed by using mean, standard deviation, maximum and minimum values.

**Results:** The mean shifts of daily setup are 0.1mm, -0.5mm, and 1.5mm in LR, SI, and AP directions respectively and the standard deviations are 4.3mm, 2.0mm, and 4.0mm respectively. Maximum shifts of 18mm, 9mm, and 18.4mm in LR, SI, and AP directions were observed. The shifts are patient dependant. The mean shifts vary from 0.1mm to 4.0mm (LR), from 0.6mm to 2.8mm (SI), and from 0.1mm to 11.6mm (AP) among the 10 patients. Standard deviations range from 2.6mm to 7.2mm (LR), from 1.4mm to 2.6mm (SI), and from 2.8mm to 6.1mm (AP). However, in general, the LR and AP shifts showed larger standard deviation than the SI shifts. This is mostly due to filling status of bladder and rectum, which pushes or moves prostate in AP and LR directions more than in SI direction. The maximum shift value of 18mm was observed in the data set and was most likely caused by the initial setup error.

**Conclusions:** The study shows larger interfraction prostate motion in AP and LR than in SI direction. The results suggest a smaller margin of prostate CTV in SI direction for treatment planning.