

Purpose: For prostate IMRT, a rigid body model and serial portal imaging data were used to generate the cumulative dose distribution for the rectum incorporating internal organ motion by using equivalent uniform dose per fraction (EUD_f). The impact of the rectal movement on NTCP over the course of treatment was evaluated. **Methods and Materials:** The rectal positional variations were measured fraction-to-fraction from MV portal imaging for 20 prostate patients implanted with gold seeds. The rectal dose change per fraction can be expressed as EUD_f variation. Five-field (5F) and seven-field (7F) IMRT plans for prostate patients were made with prescribed dose 78 Gy/39 fractions using a Pinnacle³ treatment planning system with 15 MV x-rays. The evaluation was performed by comparing the fractional dose-volume histogram, the rectal EUD_f and NTCP with and without internal organ motion. **Results:** The increase or decrease of cumulative rectal EUD over the course of treatment depends on the motion amplitude and frequency in the anterior or the posterior directions. EUD increased in 45% of the patients with greater than 2.5% increase for 5% of the patients. EUD decreased in 55% of the patients with greater than 2.5% decrease for 10% of the patients. The rectal NTCP decreases for half of the patients and increases for the other for both 5F and 7F plans in this group. Comparing 5F and 7F plan for the same patient, NTCP is lower for 7F plan compared to 5F plan with and without considering rectal movement. **Conclusions:** EUD_f is a useful QA parameter for interpreting the biological impact of geometric uncertainties on the static dose distribution. The increase or decrease of the cumulative rectal dose depended on the motion amplitude and frequency in the anterior or the posterior direction and rectal NTCP is patient dependent and must be determined individually.