

Objective: The application of IMRT in clinical trials has been hindered by a lack of internationally accepted standards for prescribing dose as in 2D and 3DCRT external beam planning. We aimed to study the relationship of ICRU reference dose to mean, median, and modal PTV doses for IMRT applied to diverse targets.

Materials and Methods: DMLC-IMRT plans for 70 patients treated for prostate (14), gynecological (19), head and neck (19), lung (4), rectal/anal (8), brain (4) and abdominal disease (2) were randomly selected and analyzed. The ICRU reference point was located in each plan following ICRU report 50 and 62 guidelines. The ICRU reference dose, PTV mean, median, and modal doses, and DVHs were calculated with an Eclipse treatment planning system (Varian). PTV range was 50 – 1937 cc. Median PTV was 508 cc.

Results: In general, ICRU reference dose was > PTV mean dose (in 82% of the cases studied). The difference between the PTV mean and the ICRU reference doses was 2% or less in 77% of the cases studied (mean difference -0.73%, range -4.2% to +3.6%). The ICRU reference dose and the PTV median and modal doses were not significantly different ($p = 0.3$ and 0.15 respectively).

Conclusion: The ICRU reference point dose for the IMRT described herein appears to be reflective of PTV median or modal doses but does not represent PTV mean dose. New dose specification standards for IMRT, consistent with methods used to accredit facilities to apply IMRT in clinical trials, may enhance the quality of these trials and of other trials using rapidly emerging radiation planning and delivery techniques.