

AbstractID: 4818 Title: Estimation of whole body dose during the delivery of step-and-shoot Intensity Modulated Radiation Therapy

Purpose:

To investigate whether the increase in the number of monitor units required to deliver IMRT results in a significant increase in the whole body dose to the patient.

Method and Materials:

IMRT and conformal plans were constructed using Nucletron MasterPlan for head and neck and prostate tumours. The anthropomorphic phantom RandoMan was used as a dummy patient. TLD 100's were placed along the central axis of the phantom in 5cm intervals and the whole body dose was then measured for all plans. In addition, the effective whole body dose was calculated for the head and neck plans using NCRP report 116.

Results:

The number of monitor units required to deliver a cGy to the isocenter was up to three times greater for the IMRT plans in comparison to the conventional conformal plans. A significant increase in whole body dose was observed when comparing 15MV IMRT prostate plans with the conformal prostate plan. The 6MV prostate plans showed no significant increase in whole body dose due to the lack of neutron production at this energy. The calculated whole body effective dose per Gy delivered to the isocenter for the head and neck plans was 6.23mSv, 5.12mSv and 4.27mSv for the nine field IMRT, seven field IMRT and conventional conformal plans respectively.

Conclusion:

The 15MV prostate plans should be avoided where possible as they lead to a significant increase in whole body dose. Due to the larger treatment field with the conformal head and neck plan, the scatter leakage along the patient is greater for the conventional plan than the IMRT plans up to 40cm from the isocenter, beyond this the head leakage becomes dominant and the dose from IMRT plans is greater. The whole body effective dose is lower for the IMRT head and neck plans than the conformal plans.