

AbstractID: 1559 Title: Investigation of Neutron Dose in Intensity Modulated Radiotherapy for High Energy Photon Beam

Neutrons produced in the multileaf collimators (MLC) from high-energy photons (>10 MV) and the contribution of neutron dose to an Intensity Modulated Radiotherapy Treatment (IMRT) phantom plan have been investigated. Measurements were performed using TLD-600 chips on a Clinac 23EX linac. Lithium-6 is sensitive to both gamma and thermal neutrons because the cross section of ^6Li is very high (942 barn). TLD-700 is not sensitive to thermal neutrons but good for measurement of x-ray dose. A combined measurement with both materials was used to obtain a net neutron dose. TLD-600 and 700 were placed at the central axis of a phantom and irradiated in 23 MV photons on a prostate IMRT plan. A separate set of TLD was exposed in the same plan using 6 MV photons for reference. Few sets of TLD were given 400 MU by placing them on a phantom at 1 m from the isocenter at different jaw and multileaf settings. These TLD's were then sent to Landauer, Inc. for dose measurements. The results did not show any detectable neutron dose on IMRT plan. However, on different jaw and multileaf profiles, the neutron dose was found to about 4% of the given dose (16 rad/400MU). In addition, the tissue equivalent rem response was measured using a Ludlum neutron detector for different jaw settings and leaf profiles used for acceptance test. The average dose equivalent rate was found to be about 4.2 R/hr. More studies are needed to confirm the TLD results, which are in progress.