

STUDY OF DOSE TRANSMISSION IN A MULTILEAF COLLIMATOR ON A VARIAN HALCYON ACCELERATOR

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The study of dose transmission is a vital topic because the number of patients who have developed delayed radiation injuries increases every year [2,3].

Recently commissioned linear accelerator Varian Halcyon V1.0 (Varian Medical Systems, Palo Alto, Calif., USA) without collimation shutters is now gaining popularity in oncology clinics. The Halcyon MLC System features the stacked and staggered dual-layer multileaf collimator. The primary and secondary collimators are fixed; there is no flatterer filter [1, 4].

This study aims to measure dose transmission from a Varian Halcyon multileaf collimator experimentally. Our experiments were carried out on the Varian Halcyon linear accelerator with a boundary photon energy of 6 MeV:

1. Investigation of the effect of field size on dose transmission. IMRT plans were created to irradiate the phantom with different sized fields in the treatment planning system Eclipse. The dose profile was measured with an IC Profiler SunNuclear array detector. A water-equivalent Solid Water GMMEX phantom was used. The data obtained were used to plot the beam profiles. All received doses were normalized to a absorbed dose in a 10×10 cm² reference field at a depth of 10 cm.
2. Measurement of dose transmission at a small field size. In this experiment, a plan was created to irradiate the 3D Scanner SunNuclear water phantom. The multileaf collimator was positioned to create a rectangular beam size 1×2 cm². The SNC125c ionization chamber was used. The experiment showed that despite the fact that in all experiments, the same dose of 200 monitor units was applied, the dose transmission becomes larger with increasing field size. At a distance of 16 cm from the central axis, doses of 0.003, 0.012, 0.029, 0.052, 0.092, 0.128 Gy are observed for fields with sizes 5×5 , 10×10 , 15×15 , 20×20 , 25×25 cm², respectively. The results of the current study are essential for understanding how field size affects dose transmission.

Bibliography:

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