AbstractID: 9615 Title: A Human Head Phantom for Dose Measurements in Boron Neutron Capture Therapy

Boron Neutron Capture Therapy (BNCT) is an alternative and promising therapy to treat inoperable brain tumors. Research has been carried out for the last several years to produce the optimum neutron beam for BNCT and to develop an effective pharmaceutical drug as a boron delivery agent to maximize boron concentration in the tumor. These experimental studies, however, were insufficient to distinguish the doses due to the several forms of radiation generated in the treatment process. In the present work, monoenergetic neutrons were generated via the $^{7}Li(p,n)^{7}Be$ reaction in a metallic lithium target near the reaction threshold using the 5.5 MV Van de Graaff accelerator at the University of Massachusetts Lowell. A human head phantom was built to measure and to distinguish the doses which result from proton recoils induced by fast neutrons, alpha particles and recoil lithium nuclei from $^{10}B(n,\alpha)^{7}Li$ reaction, and photons generated in the ^{7}Li accelerator target as well as those generated inside the head phantom through various nuclear reactions at the same time during neutron irradiation procedures. The phantom consists of two main parts to estimate dose to tumor and dose to healthy tissue as well: a 3.22 cm^3 boron loaded plastic scintillator which simulates a boron containing tumor inside the brain and a 2780 cm^3 cylindrical liquid scintillator which represents the surrounding healthy tissue in the head.

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