

STUDY OF DOSE-ENHANCING AGENTS ON BREMSSTRAHLUNG PHOTONS FROM SL75-5MT MEDICAL ACCELERATOR

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Contrast-enhanced radiotherapy allows to enhance the radiation dose absorbed by the tumor when using the hard elements (I, Gd, Au, Bi, etc.) for a photon absorption [1]. The dose-enhancing agents have a better absorption capacity, than biological tissues and thus sparing the surrounding healthy cells. In [2], an increase dose absorbed by iodinated water (for 50 mg/ml iodine concentrations) was obtained at using bremsstrahlung photons generated by the clinical linear electron accelerator SL75-5MT. Normally, dose-enhancing agent concentrations employ up to 15 mg/ml.

In our work, we investigated the possibility of using metal-organic composites containing dose-increasing agents to increase the absorption of SL75-5MT bremsstrahlung photons. The present study aims to assess feasibility of using of the metal-organic composites SL75-5MT bremsstrahlung photons to increase radiation absorbed by [3]. The linear accelerator 0.5-4.5 MeV photons (80% of total flux and 2 Gray/min absorbed dose) created secondary X-rays and electrons in the dose-enhancing metallic agents of the metal-organic composites. This is enhanced the radiation dose absorbed by the tumor. The dose absorbed by tissue-equivalent phantom with metallic agents (Cd, Au, W, Bi, Pb) was measured by PTW MULTIDOS dosimetry with clinical ionization chambers. In addition, a gamma radiation from the phantom were measured using BDMG-08R gamma detectors. For Au, Bi, Pb dose-enhancing agents the absorbed dose increased by 10-20%. The significant increase in the absorbed dose (> 50%) was observed from $d(\gamma,n)p$ reaction when using deuterated water instead of tissue-equivalent phantom. Therefore, it is possible to employing deuterated water for photon energy spectra of SL75-5MT clinical accelerator in order to reach a therapeutically significant effect.

References:

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