

Characteristics Assessment of Neutron Contamination for the High Energy Linear Accelerator using in Radiotherapy

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Abstract

The medical linear accelerator (Linac) is the most popular unit in clinical radiotherapy. Photon and electron beams produced by Linac are the major considered radiations in tumor treatments. As the photon energy is higher (especially beyond 10 MV), probabilities of photonuclear reactions are increased; secondary particles such as neutrons are then following emitted. Thereby, the particles produced by a high energy Linac would activate the shielding materials in treatment head. This would increase the uncertainty of delivered dose, and may cause different level of radiation exposure for the radiological technologists as they position the patient before and after the treatment. This study investigated the neutron activation characteristics of the treatment head for the high-energy medical Linac using in radiotherapy. Activation products in the treatment head will be also investigated. Results and findings of this research will be provided to the department of radiation oncology or radiotherapy. For the departments of radiation oncology in hospitals which use beam energy above 10MV of photons frequently and treat large number of patients per day, assessment of the increased dose and relative characteristics due to neutron activation is an important issue.

Keywords: Ion chamber, Neutron Activation, High Energy Linac