عنوان مقاله:

Dental Materials Effect in Neutron Contamination: Electron Mode of a Linac

محل انتشار:

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خلاصه مقاله:

Background: Neutron contamination is produced in electron beams of linac when tooth or dental materials are located in the path of beam. Objective: This study aims to determine the neutron dose contamination from different dental restoration materials in electron mode of a linac. Material and Methods: In this experimental study, the neutron dose contamination was calculated in the presence of tooth and tooth restored by Ceramco C۳ veneer, Eclipse or amalgam. The electron mode included ۸, ۱۲, and ۱۴ MeV electron beams of Siemens Primus linac at different depths before and after tooth. MCNPX code was used to simulate the linear accelerator and dental restoration materials. Tooth and tooth restoration materials were located in the beams' central axis and the neutron dose was scored in ۳ × ۳ × ۱ cm۳ voxels at different depths before and after the tooth. Results: The highest neutron dose contamination was observed for the combination of the tooth and Eclipse in ۱۲ and ۱۴ MeV beams and the maximum calculated relative neutron dose was ۱.۵۳ for tooth and Eclipse for ۱۴ MeV electron beam. Conclusion: Tooth and dental materials lead to neutron dose contamination production, therefore, in order to avoid having harmful effects on normal tissues due to the neutron beam in head and neck cancer, it is recommended that treatment planning performed should not place tooth with dental restoration materials in the path of the beam and lower energy electron beams be used.

کلمات کلیدی:

Siemens Primus linac, Electron Beam, Tooth, Restoration Material, Neutrons, Monte Carlo Method