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SIMULATION PROTON DEPTH DOSE DISTRIBUTION FORMED USING PLEXIGLASS RANGE SHIFTER.

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When treating cancer with proton beams, it is important to obtain flat dose plateau of the beam covering target volume where the tumor is located [1]. In the dynamic irradiation method, the beam energy is changed using range-shifter to create the Spread-out Bragg peak (SOBP) at the required distance. In this work, the relationship between Plexiglas range-shifter and Bragg peak position was simulated using Fluka Monte Carlo code [2]. A linear relationship was found between Plexiglass thickness and proton range in water phantom. To obtain a flat dose plateau at the depth 15cm with a width determined by a fraction 0.66 of the maximum depth consisting of 51 different energy intervals, the range of each contributing beam was determined by the Kleeman-Bragg rule [3]. The distal Bragg peak had the highest weight and the proximal Bragg peak had the lowest weight. To find the optimal weighting of the irradiating time to obtain the desired SOBP, the p-value needed to be adjusted. The p-value can vary for different depths and energies. For the depth chosen for this simulation, the p-value 1.32 proved to be an adequate choice. The dose plateau is tilted in one direction or the other if a suitable p-value is not applied.

References:

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