

## عنوان مقاله:

Calculating Weighting Factors for Mixing Megavoltage Photon Beams to Achieve Desirable Dose Distribution in Radiotherapy

## محل انتشار:

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## خلاصه مقاله:

Background: In radiotherapy, low-energy photon beams are better adapted to the treated volume, and the use of high-energy beams can reduce hot spots in the radiation therapy. Therefore, mixing low and high energies with different ratios can control the rate of hotspots, as well as the dose distribution of the target volume. Material and Methods: The percentage depth doses (PDDs) were calculated at various depths, by using a fitted double exponential equation. Then, using quality factor equation and PDD of a  $10 \times 10$  cm<sup>2</sup> field, the amount of energy equivalent to each PDD and the value of weighting factors of 6, 18 MV energies were calculated to produce different energies. To validate the mathematical model, dosimetry of 10 MV energy was used. For this purpose, PDDs and dose Profile of 10 MV obtained from the mix were compared with ones obtained from the measurement Results: The value of weighting factor of 6 MV energy required for the  $10 \times 10$  cm<sup>2</sup> field to create dose distribution of 15 MV energy using 6 and 18 MV energies was obtained as equal to 0.57. Comparison of percentage depth dose curves and dose profile shows good agreement with the practical measurements of 10 MV for  $10 \times 10$  cm<sup>2</sup> field using gamma index. Conclusion: The simultaneous use of high and low photon energies with different weighting factors to achieve desirable energy makes possible the treatment of tumors located at various depths without the need for different modes of energy in the accelerator leading to a decrease in the cost of the equipment and a safer treatment of the cancerous patients.

## کلمات کلیدی:

Percentage depth dose, Weighting Factors, Mathematical Model, Dose Profile

