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Dosimetric Verification of Monte Carlo and Collapsed Cone Models

Monte Carlo and Collapsed Cone algorithms are widely used for dosimetric verification and calibration of linear accelerators in external beam radiotherapy. This study presents a comparative dosimetric verification of both models at different depths and field sizes using an Elekta linear accelerator. The goal is to assess the agreement between theoretical dose distributions and measured data, a crucial aspect in ensuring treatment accuracy in clinical radiotherapy. Measurements were conducted using a photon beam, a Farmer-type ionization chamber, and a water phantom. The experimental results were compared to dose calculations obtained from the Monte Carlo and Collapsed Cone algorithms. These models provide a predictive framework for estimating radiation dose distribution in tissues at varying depths. Verifying their accuracy is essential for confirming the consistency between theoretical planning and physical dose delivery. Our results show a generally acceptable level of agreement between the measured and calculated doses, supporting the validity of both algorithms for clinical use. Differences observed in specific field sizes and depths offer insight into model limitations and potential areas for optimization. This verification contributes to improved confidence in treatment planning systems and enhances the quality assurance process in modern radiotherapy.

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