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Gamma radiation dose simulation in EGSnrc for in vitro human glial brain tumors

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One of the critical steps in planning and assessing the effectiveness of radiation therapy is the accurate calculation of absorbed dose and the modeling of its distribution within biological tissues. Achieving this requires precise simulation methods that account for complex physical interactions and anatomical geometry. The Monte Carlo method is widely recognized for its ability to meet these demands.
In the present work, dose distribution calculations were performed using the EGSnrc Monte Carlo simulation system, chosen for its high accuracy in modeling photon and electron transport in matter. The photon source 60Co was used, with human glial brain tumor samples serving as biologically relevant targets. The simulations incorporated key physical processes such as photoelectric absorption, Compton scattering, and bremsstrahlung. This modeling framework provides a solid basis for assessing dose deposition in radiobiological contexts and emphasizes the value of detailed computational approaches in radiotherapy optimization [3].

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