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#9-169 Evaluation of Alpha and Lithium-7 Energy Release in BNCT using a multi-system: A Geant4 Simulation Approach

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This research investigates the microdosimetry of Boron Neutron Capture Therapy (BNCT) through advanced multicellular modeling. We designed a Geant4-based Monte Carlo simulation featuring a configuration of 7 interconnected cells. The study comparatively evaluates different water models (G4_WATER and H2O) and three distinct physics lists (Geant4-DNA, G4QGSP_BIC, G4QGSP_BIC_HP) to determine their influence on energy distribution in the central cell and its microenvironment. Results demonstrate notable variations in energy deposition profiles between cells, emphasizing the critical importance of bystander effects in BNCT context. The analysis reveals that the choice of water model and physics list significantly impacts simulation accuracy, with direct implications for treatment optimization. This multicellular approach provides a more faithful understanding of the complex interactions occurring at the tissue level during BNCT, paving the way for more precise and efficient therapeutic protocols.

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