Abstract Submitted
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Monte Carlo Simulations for Radiobiology NICOLE ACKERMAN, Stanford University, Dept of Physics, MAGDALENA BAZALOVA, Stanford University, Dept of Radiation Oncology, KEVIN CHANG, Stanford University, Dept of Bioengineering, EDWARD GRAVES, Stanford University, Dept of Radiation Oncology — The relationship between tumor response and radiation is currently modeled as dose, quantified on the mm or cm scale through measurement or simulation. This does not take into account modern knowledge of cancer, including tissue heterogeneities and repair mechanisms. We perform Monte Carlo simulations utilizing Geant4 to model radiation treatment on a cellular scale. Biological measurements are correlated to simulated results, primarily the energy deposit in nuclear volumes. One application is modeling dose enhancement through the use of high-Z materials, such gold nanoparticles. The model matches in vitro data and predicts dose enhancement ratios for a variety of in vivo scenarios. This model shows promise for both treatment design and furthering our understanding of radiobiology.

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