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## USE OF GEANT4 CODE FOR VALIDATION OF RADIOBIOLOGICAL PARAMETERS OBTAINED AFTER PROTON AND CARBON IRRADIATIONS OF MELANOMA CELLS

*Friday, 16 October 2009 16:50 (20 minutes)*

Series of numerical simulations with the GEANT4 code were carried out to verify and better interpret radiobiological parameters and biological effects obtained after irradiation of HTB140 human melanoma cells. Irradiations were performed at INFN-LNS with the 62 MeV proton beams at the full energy Bragg peak as well as along the spread out Bragg peak (SOBP) and its distal fall-off part. HTB140 cells were also exposed to the beams of the 62 MeV/u 12C ions, along the Bragg curve including its distal declining edge. The doses ranged from 2 to 24 Gy. The surviving fractions at 2 Gy (SF2) and the corresponding relative biological effectiveness (RBE) obtained with respect to gamma-rays, differed along the proton full energy and the spread out Bragg peak (SOBP), as well as along the carbon Bragg peak. These variations were analysed and compared through the proton and carbon depth dependant dose, fluence, energy and linear energy transfer (LET) distributions produced by numerical simulations. For carbon ions these distributions were also followed for the secondary particles. Depth dependent distributions of fluence and LET revealed different damages in the sense of the ratio of irreparable to reparable breaks that were caused by distinct radiation types. This enabled a more in-depth interpretation of cell proliferation results which reflect the quality of life of irradiated cells and was particularly useful for the assessment of the events at the distal declining edge of the Bragg curves.

### **Are you a Member of the Geant4 Collaboration (yes/no)**

no

### **Keywords**

GEANT4, simulations, experiments, protons, carbon ions, melanoma cells, RBE, LET, fluence

### **Summary**

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