**CALCULATION OF DELETION, INVERSION, AND RING SPECTRA USING A COMPUTATIONAL MODEL OF THE RADIATION-INDUCED CHROMOSOME ABERRATIONS WITH STOCHASTIC AND AMORPHOUS PARTICLE TRACKS**

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At the NASA Johnson Space Center, we produced new results with a computational chromosome and radiation-induced DNA damage model, named BDSTRACKS (Biological Damage by Stochastic Tracks), which simulates general types of chromosome aberrations (CA) from low- and high-LET (linear energy transfer) radiations, using two different physical models of particle tracks: stochastic and amorphous. The chromosomes were simulated by a polymer random walk (RW) algorithm. The stochastic dose to the nucleus was calculated with the code RITRACKS [1]. The new simulation results were compared with results calculated with amorphous tracks, a common model for ionizing radiation transport in matter [2]. The number and spatial location of DSBs (DNA double-strand breaks) were calculated using the simulated chromosomes and local (voxel) dose. Assuming that DSBs led to chromosome breaks and simulating the rejoining of damaged chromosomes occurring during repair, BDSTRACKS predicted the yield of various types of chromosome aberrations. We reported some of these data in previous work and, herein, we focus on deletions, inversions, and rings, which are relevant biological endpoints for the prediction of risk from space radiation in astronauts. Specifically, we simulated, previously hard to model, ring-size distributions. We calculated these new data for a number of ions: 1H+, 4He2+, 12C6+, 28Si14+, and 56Fe26+, with energies varying from 7.7 to 1,000 MeV/u. We also present calculated RBE’s (relative biological effectiveness) for deletions, inversions and rings, which predict a realistic peak for LET values around 100 keV/μm. We suggest using this model for situations that are hard to obtain experimentally and are looking forward to comparing this model of the experimental data, when they become available.

[1] Plante I. et al (2013) *Phys. Med. Biol.* 58, 6393-6405. [2] Ponomarev A.L. et al (2014) *Rad Res* 181, 284-292.