The Biological Effectiveness of Four Energies of Neon Ions for the Induction of Chromosome Damage in Human Lymphocytes

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Chromosomal aberrations were measured in human peripheral blood lymphocytes after *in vitro* exposure to neon ions at energies of 64, 89, 142, or 267. The corresponding LET values for these energies of neon ranged from 38-103 keV/µm and doses delivered were in the 10 to 80 cGy range. Chromosome exchanges were assessed in metaphase and G2 phase cells at first division after exposure using fluorescence *in situ* hybridization (FISH) with whole chromosome probes and dose response curves were generated for different types of chromosomal exchanges.

The yields of total chromosome exchanges were similar for the 64, 89, and 142 MeV exposures, whereas the 267 MeV/u neon with LET of 38 keV/µm produced about half as many exchanges per unit dose. The induction of complex type chromosome exchanges (exchanges involving three or more breaks and two or more chromosomes) showed a clear LET dependence for all energies. The ratio of simple to complex type exchanges increased with LET from 18 to 51%. The relative biological effectiveness (RBE) was estimated from the initial slope of the dose response curve for chromosome damage with respect to γ-rays. The RBE_{max} values for total chromosome exchanges for the 64 MeV/u was around 30.