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PRELIMINARY STUDY OF THE CYTOGENETIC EFFECTS OF NEUTRONS PRODUCED IN REACTOR ON HUMAN BLOOD LYMPHOCYTES

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Studies on the effects of different types of ionizing radiation on cells are of great value not only from a radiobiological viewpoint but also for dosimetric and therapeutic purposes. In general, the high-LET radiation (Linear Energy Transfer), including alpha particles and neutrons, produce more damage that low-LET radiation, as gamma radiation, X-ray and beta particle. This is because all the energy is deposited within a short distance, causing dense ionizing and therefore the damage is more complex and located and it is less efficiently repaired by the cell. Despite the considerable quantity of published data on cytogenetic effects of gamma radiation and X-rays, there is little information on the effect of the neutrons in human cells, also of great importance since it is involved in several nuclear accidents. The purpose of this study is to evaluate the cytogenetic effect of neutrons on peripheral blood lymphocytes through the technique of chromosome aberrations. For that, blood samples from two, 22 and 25 years old, healthy donors, of the both sexes, were irradiated in the Reactor Research IEA-R1 of IPEN/CNEN-SP with thermal and epithermal neutrons, at doses of 0.5, 1, 2 and 4 Gy. The cytogenetic analysis showed an increase in the frequency of cells containing aberrations as function of radiation dose (7.5, 12.4, 24 and 45%) with 0.8% in the control sample. The number of aberrations/cell ranged from 0.008 to 0.729 in the control and 4 Gy samples, respectively. The hypomodal chromosome number increased at a dose of 0.5 Gy (9.8%), reaching value of 14.3% in the dose of 4 Gy in relation to the control (7.2%). These observations suggest a possible aneugenic effect of the neutrons when compared to data obtained from low-LET radiation, showing a potentially higher damage of neutrons, both clastogenically and aneugenically.