

DOSE ESTIMATION BY CYTOGENETIC ANALYSIS IN AN ACCIDENT WITH ^{137}Cs in GOIANA (BRAZIL). EVALUATION OF PROBABLE EXPOSURE DOSES RANGE.*

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Chromosome aberration analysis in human peripheral lymphocytes is recognized as a valuable tool to estimate whole body doses after actual or suspected overexposure to ionizing radiations when physical dosimetry ^{137}Cs systems fail or are not available. An "in vitro" dose response curve for ^{137}Cs was generated using blood samples from three healthy donors. These samples were irradiated in an appropriate device to maintain the temperature at 37 °C and its homogenization. For the calibration curve, samples were irradiated with doses of 20, 50, 100, 200, 400 and 600 cGy at a dose dose rate of 300 cGy.h⁻¹. Finished the irradiation the whole blood samples were cultured in a mixture containing RPMI 1640 medium, fetal calf serum, phytohaemagglutinin. After 47 hours the cells were arrested with colchicine. For each data point more than 500 cells were observed to score for dicentric and centric ring aberrations. The aberration yields were fitted to the quadratic function $Y = \alpha D + \beta D^2$, where α and β parameters were 4.34×10^{-4} and 3.56×10^{-6} , respectively. From this calibration curve, twenty two blood samples from persons involved in the radiation accident with ^{137}Cs in Goiania, Brazil, were analysed taking into considerations: (i) the dose rate effect, where the high dose rate equation was $Y_4 = 4.34 \times 10^{-4} D + 3.56 \times 10^{-6} D^2$ and the low dose rate equation $Y = 4.34 \times 10^{-4} D$; (ii) post-irradiation blood sampling delay using correction factors of 1.39 to $t = 30$ days and 1.63 to $t = 60$ days after the initial exposure.

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