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Intra- and inter-individual variability of the dicentrics frequency in human lymphocytes exposed to ionizing radiation at different temperatures

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Dicentric assay is currently a gold standard for classic biodosimetry because it possess all features of an ideal assay: low background level, clear dose-effect relationship for different radiation qualities and dose rates, specificity to ionizing radiation, low invasiveness, good reproducibility and comparability of in vitro and in vivo results. This method is based on the assumption that the intra- and inter-individual variability of dicentric frequencies observed at a given dose point is similar. Since it is well known that the temperature during in vitro irradiation of human peripheral blood lymphocytes affects the level of dicentrics, it was interesting to verify whether the temperature influences the intra- and inter-individual variability in the donor's sensitivity to irradiation. Peripheral blood was collected 3 times from 6 healthy donors. PLB were kept at 0℃ , 20 ℃ and 37 ℃ for 30 minutes and exposed to 0; 0.5, 1, 1.5, 2; 2,5 and 3 Gy of gamma-rays. For the analysis of dicentric yield, chromosome preparations were obtained after 48 h of lymphocyte culture post irradiation. The results showed that the overall intra- and inter-individual variation of the dicentric yield (CV) at 0℃ was higher than the intra- and inter-individual variation at 20°C and 37°C. The overall intra-individual CV of the dicentric yield at 0°C was 1.3 times higher than at 20°C and 37°C. The overall inter-individual CV of the dicentric yield at 0°C was about 1.2 times higher than at 20℃ and 37 ℃. The overall inter-individual CV for all doses and temperature points was 1.3 times higher than the overall intra-individual CV.

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