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FREQUENCY AND DISTRIBUTION OF STABLE CYTO-GENETIC DAMAGE AMONG HUMAN LYMPHOCYTE CHROMOSOMES.

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The goals of this work were to determine whether stable aberration frequencies are proportional to chromosome size and whether aberration frequencies are chromosome specific. We analyzed photographic slides of metaphase cells from a previously characterized population of 24 healthy, unexposed adults and 3 umbilical cord blood samples (Mutat. Res. 338:95-106) in which stable aberration frequencies in chromosomes 1, 2 and 4 were previously determined by single color painting. From these same subjects we hybridized replicate microscope slides and measured aberration frequencies in chromosomes 3, 5 and 6 painted in unique colors. The aberration frequencies in chromosomes 3, 5 and 6 were similar to those observed in chromosomes 1, 2 and 4, after adjusting for the different amounts of the genome that were painted. The distribution of damage in the population among chromosomes 1 through 6 was measured and found to be proportional to chromosome size. However, in some subjects the distribution of damage was not proportional due to the presence of clonal aberrations. We also compared two aberration scoring systems: the classical scoring method where all exchanges were assumed to be reciprocal, and PAINT. This comparison shows that the aberration frequencies measured by the two systems are highly correlated ($r = 0.99$) and differ by a constant value (PAINT x 0.58 = classical). Our results indicate that exchanges occur proportional to chromosome size adding support to the hypothesis that cytogenetic evaluations for biodosimetry can be performed with any one or more of the chromosomes studied here. Work performed under the auspices of the US DOE by LLNL, contract No. W-7405-ENG-48, and WVU.