DISTRIBUTION OF STABLE CYTOGENETIC DAMAGE AMONG MULTI-COLOR PAINTED HUMAN CHROMOSOMES.

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Chromosome painting is routinely used to identify and quantify stable cytogenetic damage, although distinguishing between different chromosome types painted in the same color can be difficult. The solution to this problem is to paint each chromosome in a unique color. The goal of this work was to determine whether stable aberration frequencies are proportional to chromosome size. In the first experiment, peripheral blood lymphocytes were irradiated *in vitro* with 2 Gy ^{137}Cs and analyzed by painting chromosomes 3, 5, and 6 in red, green, and yellow, respectively. These results show that radiation-induced aberration frequencies are indeed proportional to chromosome size. In the second experiment, we are determining whether this same conclusion applies *in vivo* in the absence of known genotoxic exposure. To accomplish this, we are analyzing slides from a previously characterized population of 77 healthy, unexposed adults (Ramsey et al., Mutat. Res. 338:95-106, 1995) in which stable aberration frequencies in chromosomes 1, 2, and 4 were determined by single color painting. We are now extending this study by measuring aberration frequencies individually in chromosomes 3, 5, and 6. Preliminary results suggest that stable aberration frequencies as measured by three-color painting of these chromosomes are very similar to the frequencies observed when chromosomes 1, 2, and 4 are painted in a single color, after adjusting for the different fractions of the genome that were painted. Furthermore, the distribution of damage among chromosomes 3, 5, and 6 in this population is proportional to chromosome size. Work performed under the auspices of the US DOE by LLNL, contract No. W-7405-ENG-48.