

Chromatin structure and radiation-induced intrachromosome exchanges

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We have recently investigated the location of breaks involved in intrachromosomal type exchange events, using the multicolor banding *in situ* hybridization (mBAND) technique for human chromosome 3. In human epithelial cells exposed to both low- and high-LET radiations *in vitro*, intrachromosome exchanges were found to occur preferentially between a break in the 3p21 and one in the 3q11. Exchanges were also observed between a break in 3p21 and one in 3q26, but few exchanges were observed between breaks in 3q11 and 3q26, even though the two regions were on the same arm of the chromosome. To explore the relationships between intrachromosome exchanges and chromatin structure, we used probes that hybridize the three regions of 3p21, 3q11 and 3q26, and measured the distance between two of the three regions in interphase cells. We further analyzed fragile sites on the chromosome that have been identified in various types of cancers. Our results demonstrated that the distribution of breaks involved in radiation-induced intrachromosome aberrations depends upon both the location of fragile sites and the folding of chromatins.