GENETIC INSTABILITY IN BIOMONITORING EXPOSURES TO CARCINOGENS

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Genomic instability and in particular the most common form –- chromosomal instability (i.e. structural or numerical chromosome aberrations) –- is thought to be an early event in tumorigenesis, resulted from a large spectrum of mechanisms including defect in DNA repair and cell cycle control pathways. They may also result from exposure to genotoxic carcinogens. Several genomic instability biomarkers have been used in biomonitoring carcinogen exposure and mostly measured in blood cells. They ranged from chromosomal aberrations, changes in DNA copy number, microsatellite instability, single-nucleotide polymorphisms (SNPs), and telomere shortening, epigenetic changes such as microRNA expression, DNA methylation and histone modifications. This study summarizes biomarkers currently used for carcinogen biomonitoring and highlights their values and limitations, restricting the examples of exposures to those chemicals classified in groups 1 and 2A by the International Agency for Research on Cancer. Several tests to monitor individuals exposed to carcinogens have been introduced, but their clinical and preventive relevance is still uncertain. A new era for biomarkers may result from the application of novel high-throughput techniques.