GENOTOXIC BIOMONITORING OF HUMANS INHABITING A VOLCANICALLY ACTIVE ENVIRONMENT

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The micronucleus assay in exfoliated buccal cells is a minimally invasive method for monitoring human populations exposed to mutagenic agents. The present study was designed to evaluate whether chronic exposure to a volcanically active environment might result in genotoxic effects in human oral epithelial cells. A study group of 120 individuals inhabiting a volcanically active environment (Furnas village) and a reference group of 122 individuals inhabiting a village without historical records of active volcanism (Santo António village) were examined in this study. Individuals from Furnas village inhabit a volcanically active environment marked by several degassing manifestations, including fumarolic fields, thermal and cold CO2 springs and soil diffuse degassing areas. For each individual, 1000 buccal epithelial cells, stained according to the Feulgen method, were analyzed for the frequency of micronucleated cells and cells with other nuclear anomalies (pyknosis, karyorrhexis and karyolysis). Information on life-style factors and an informed consent were obtained from each participant. Significant differences ($p<0.001$) in the median frequencies of micronucleated cells (4.3 vs. 1.7) and cells with other nuclear anomalies (23.5 vs. 7.7) were observed between exposed and non-exposed individuals. The risk of having a high frequency of micronucleated cells was increased 5.43 fold (95% CI = 2.8 to 10.6, $P<0.001$) in exposed individuals compared to non-exposed. No significant association was observed between cells with micronuclei and age, gender, smoking, consumption of alcohol or use of mouthwash elixir. The higher genotoxic risk of individuals inhabiting a volcanically active environment is for the first time clearly highlighted by this biomonitoring study. Given that micronucleated cells in oral epithelia are recognized as a predictive biomarker of cancer risk within a population of healthy subjects, these findings could contribute to explain the high incidence rates of lip, oral cavity and pharynx cancers previously referred for Furnas village inhabitants.

Keywords: micronuclei, volcanism, human biomonitoring