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Chromosomal aberrations and oxidative DNA adduct 8-hydroxy-2-deoxyguanosine as biomarkers of radio toxicity in radiation workers

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Background: There are evidences of association between occupational radiation exposure, cytogenetic alterations and the increase in cancer rates. It is known that the probability of carcinogenesis is greater in populations exposed to radiation, since ionizing radiation can raise the frequency of chromosomal aberration and spontaneous mutations.

Objective: Our purpose was to assess the role of chromosomal aberrations and oxidative DNA adduct 8-hydroxy-2-deoxyguanosine (8-OHdG) as biomarkers of radiation injury in individuals occupationally exposed to ionizing radiation.

Subjects & Methods: Blood samples were collected from 60 radiation workers and 30 healthy volunteers of age and sex matched as control group who had never worked in radiation-related jobs. Chromosomal aberrations in peripheral blood lymphocytes were assayed by conventional cytogenetic technique and serum levels of 8-OHdG was measured by enzyme linked immunosorbent assay (ELISA).

Results: The incidence of all types of chromosomal aberrations was significantly higher in all exposed groups than in controls with the highest rate of chromosomal aberrations in the industrial radiographers. Serum 8-OHdG in all radiation workers was significantly higher than in control group. There was a significant higher values among industrial radiographers compared to diagnostic radiologists or radiotherapists. Significantly lower mean corpuscular volume (M.C.V) was found among radiation workers versus the controls reflecting erythrocyte microcytosis.

Conclusions: Scoring of chromosome aberrations such as breaks, fragments and dicentrics is a reliable method to detect previous exposure to ionizing radiation. This type of monitoring may be used as a biological dosimeter instead of physical dosimetry. 8-OHdG is a useful oxidative DNA marker among radiation workers and those exposed to environmental carcinogens.

Biography

Sanaa A El-Benhawy has completed his PhD from Alexandria University, Egypt. She is working as a Lecturer of Radiation Sciences and teaching many courses such as radiation protection, exposure to radiation and radiation chemistry for Master's and PhD students. She has published more than 10 papers. She has supervised many Master's and PhD theses.

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