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NUCLEOPLASMIC BRIDGES AS A BIOMARKER FOR GENOMIC INSTABILITY AND PREDICTORS FOR CANCER RISK

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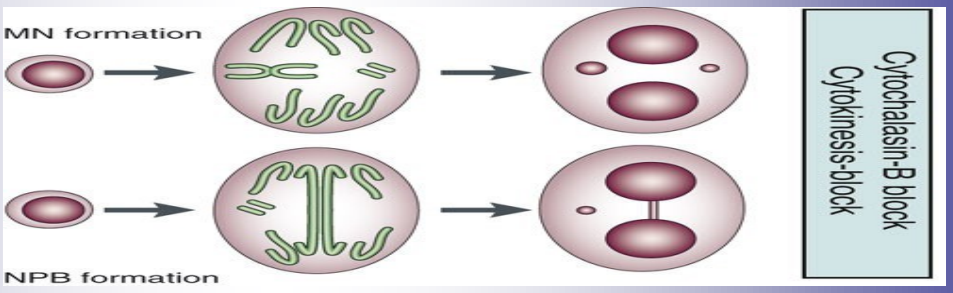
Introduction

Chromosome and nuclear alterations, especially nucleoplasmic bridges (NPBs) are excellent biomarker to detect short- and long-term genotoxic effects. For that reasons these abnormalities can be reasonably used as biomarkers to evaluate an individual's cancer risk.

With Cytokinesis-Blocked Micro Nucleus (CBMN) assay we could measure early biological effects of ionizing radiation and different genotoxic chemicals or genotoxic damage on human cells.

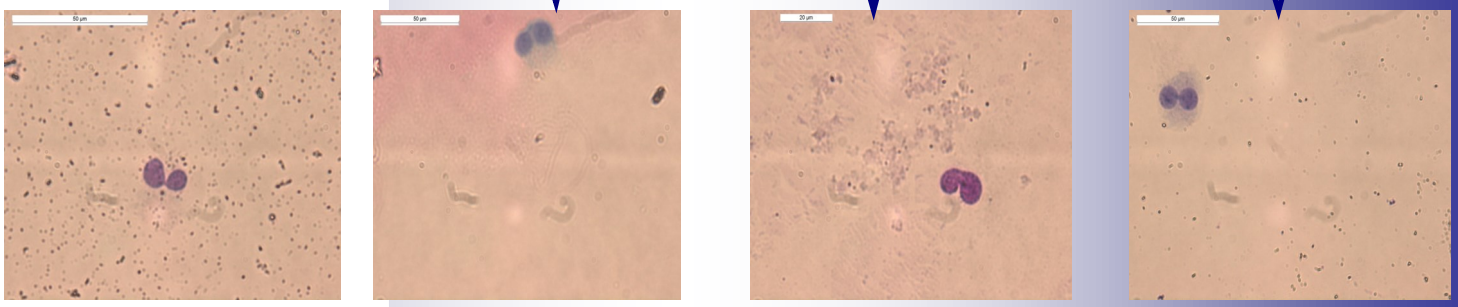
Material and methods

Blood samples were collected from health workers exposed to IR a strong clastogenic agent and a potent inducer of NPBs. Blood culture protocol was done according to Fenech.
0.5-ml of blood sample was added to the culture tubes containing 4.5 ml of RPMI 1640 media enriched with 20% fetal bovine serum, L-glutamine and 0.2 ml of phytohaemagglutinin 1 % and each supplemented with 100 units/ mL penicillin and 100 µg/mL streptomycin. The lymphocytes were incubated for 44h at 37 °C in a slant position. Cytochalasin B was added at a concentration of 3 µg/ml to block cell cytokinesis and cultures were reincubated at 37 °C for further 28 h. Cells were then harvested by centrifugation. After fixation the slides were stained by 2% alkaline Giemsa for 8 minutes and examined by light microscope Leica DM4500 P (×40 and×100).



Results:

The presence of nuclear anomalies observed as a NPBs confirmed the genotoxic effects two or more years after an exposure of human population to IR. The health workers with long exposer on IR similary as smokers have a high frequency or presence of NPBs than the control group, young and healthy population, non-exposed to IR.



Examples of Nucleoplasmc bridges (NBUDs) in blood of exposed health care workers

CONCLUSION

CBMN assay has proven to be a reliable and useful assey in the field of cytogenetics and human biomonitoring. NPBs can confirm the influence of genetic damage induced by ionizing radiation and smoking, and also can be used as biomarkers to evaluate genomic instability as predictors for individual's cancer risk.