EVALUATING CHANGE IN GENOMIC FREQUENCY OF TRANSLOCATIONS IN 20 PATIENTS EXPOSED TO LOW-DOSE X-RAY IRRADIATION DURING ROUTINE VERTEBROPLASTY

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Aim. Fluorescopic X-ray imaging is progressively used in routine noninvasive medical procedures such as vertebroplasty. There is still no consensus among researchers on the long-term effects of low-dose irradiation (<100mGy) considering the factor of a possible increase in stable chromosomal aberrations in the human cell which are recognized as potentially carcinogenic. The aim of this study is to evaluate the change in genomic frequency of translocations (GF) in the genetic material in peripheral blood mononuclear cells – lymphocytes of patients exposed to low-dose X-ray irradiation during vertebroplasty.

Methods. (Fig.1-5) Peripheral blood samples were acquired immediately before and after the medical intervention from 20 patients of whom 15 women and 5 men within range of 60-91 years old. The average cumulative dose received was 25.49±20.26mGy. Blood samples were cultured following dicentrics assay protocol and three-colored FISH was applied for 2 microscopic slides for each patient. The fluorescent analysis was carried out on 32 378 cells in total and GF was calculated according to Loucas et. al. equation for whole-genome equivalency. Statistical analysis for correlation was performed.

Results. (Fig.6) The calculated average genomic frequency of translocations in peripheral blood mononuclear cells analyzed from 20 patients undergoing vertebroplasty medical procedure was 0.008±0.010 before and 0.018±0.020 after the intervention. In 65% of all cases (13 patients) there was an average increase in GF by nearly twofold. In 3 cases there was no change and in 4 cases there was a decrease in GF. No significant correlation was found between age, genomic frequency of translocations, and cumulative dose (p>0.050).

Conclusion. After analyzing blood samples from 20 patients undergoing vertebroplasty we found an average increase in the genomic frequency of translocations by nearly twofold in 65% of all cases (13 of all the patients). This preliminary research shows a tendency for an increase in stable chromosomal aberrations in peripheral blood mononuclear cells after low-dose X-ray irradiation during routine medical procedure. Because of the small group of subjects and the limited amount of data more patients undergoing noninvasive fluorescopic guided interventions need to be included in this research.

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