

## The Genome modification by Metals

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The modification of chromatin in eukaryotes is the basis of epigenetic variability. Epigenesis is important factor in the regulation of the genome in eukaryotes. Modification of the chromatin can be programmed. For example, the programmed heterochromatinization of chromatin occurs during aging. In some cases, the modification of the chromatin can be induced by different chemicals.

We studied the effect of ions of nickel, zinc and cobalt on chromosomal parameters, that are indicators of changeability of chromatin - the frequency of sister chromatid exchanges (SCE), the activity of nucleolar organizer regions (NORs) and the level of expression of fragile sites of chromosome. The study was conducted with the use of the lymphocyte cultures of individuals - 20-30 and 75-86 years. Specific effect for test SCE showed zinc ions and cobalt. Zinc causes an increase of the frequency of SCE in the cells of senile individuals ( $11.1 \pm 0.5$  exchange/cell, in intact cultures -  $5.9 \pm 0.4$  exchange/cell). Cobalt in the same model cell system induced increase the frequency of pericentromeric exchanges (15.4% of the total number of exchanges, in intact cultures - 4.5%). Variability of the level of activity NOR was observed only by influence of zinc, which in the first age group induces decline of this parameter, and in old age group - increases. All studied metals sharply increased the level of expression of fragile sites of chromosomes in the first age group. In the cells of the elderly the frequency of fragile sites, by exposition with metals was increased slightly.

The influence of metals in changeability of this indicator was specific. Cobalt induced a significant increase in the frequency of pericentromeric fragile sites (69.1% of the total; in intact cultures - 21.7%), zinc and nickel - subtelomeric (11.3% and 10.5%, respectively, in intact - 4.8%). Based on the analysis of the results it can be concluded that all three of the studied metals have a specific modifying effect that depends on the variability of chromatin in age.