THE ROLE OF RADIATION-INDUCED INSTABILITY OF THE GENOME IN CHILDREN BORN IN THE FAMILIES OF LIQUIDATORS OF THE CHORNOBYL NUCLEAR POWER STATION

Betsa O.V., Yeriomenko R. F., Litvinenko A. L.
Scientific superviser doctor biology Kovalova V. I,
National University of Pharmacy, Kharkiv, Ukraine
klinlab@nuph.edu.ua

The alarming reality of recent years is the change in the environmental situation, which led to an increase in mutagenic pressure and, as a consequence of a significant deterioration in the health of the population. There are some negative trends, such as declining birth- rates and increasing mortality, increased frequency of genetic disorders and birth defects. However, the most dangerous consequence of man-made ecogenetic risk is a sharp increase of the transformation of the genetic apparatus and changes evolutionarily established ways of implementing genetic information in the wildlife, including man. At present, for various reasons, not less than half of the original gene pool is not restored in the next generation. This problem, which is actual for all developed countries, is acute in Ukraine, as the accident at the Chornobyl Nuclear Power Station led to a huge ecological catastrophe.

Among the many issues that arise after the accident, one of the most important is the problem of transmission by irradiated sex cells of parents, which will cause the genome to become insensitive to the first generation of their descendants. The remote biological effects of radiation are random in nature. The basis of these effects is the emergence of stable compatible with life damages of the genetic apparatus of cells, the so-called mutations that affect the life activity and function of the cell. The resulting mutations, rapidly recovering cells, in most cases, are eliminated, eliminated together with their cells, their relatives. Mutations in stem cells that are compatible with life can be stored for a long time and participate in the emergence of leukemia and large tumors. In tissues that are slowly regenerating (central nervous system, glands of inner secretion, myocardium, liver, and bone muscles), with the weakness of intraocular reparation and repopulation recovery that arise in low intensity irradiation, somatian mutations accumulate, gradually reduce the functionality of organs and make its contribution to the accelerated aging of tissues and the whole body. This process is the basis of the most universal remote effect of radiation.

To the number of casual remote effects of radiation include taratogenic and genetic effects that appear over a number of generations of descendants of the radiation-exposed persons.

But it should be noted that " the exit " of the inherited radiation effects fundamentally depends on the set of factors. Thus, the effects of ionizing radiation will be determined by the stage of development of the germ cells during irradiation, which have different genetic radiosensitivity, which grows in the following order:spermatogonia and spermatheosis , in oogenesis-maturing and mature oocytes. The degree and type of induced mutations, the degree of their reparation and elimination in hematogenesis depends on the stage of development of germ cells at the time of irradiation. Thus, the chromosomal instability in spermatozoa is 4-5 times higher than in lymphocytes and is one of the most severe negative effects of ionizing radiation exposure.

In recent years, interest has increased in transmissive genomic instability, which is manifested in the next generation of organisms, and to remote genetic instability, which is expressed in post-radiation cellular generations.

Convincing data testify that part of cells that survived after irradiation can give the functionally changed progeny , in which during many generations arise de novo aberration of chromosomes and genetic mutations that in a number of cases lead to increase of cellular death by apoptosis. These delayed displays of the radiation effect have no clonal character and have been called the radiative-induced instability of the genome.

The literature also discusses the possibility of the transition of genomic instability in the germ cells of the parents to the somatic cells of the descendants. This kind of genomic violations may occur in cells that have not been exposed to radiation, but the damage signals have been received from irradiated ones.

Thus, the relevance of this problem is determined not only by the theoretical interest, but also of great practical significance for solving the problems of modern clinical genetics.