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«TAILED» NUCLEI AS A POSSIBLE EXPRESS-INDICATOR OF RADIATION-INDUCED GENOMIC INSTABILITY

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Epidemiological express-methods using for selection of patients with increased genetic and cancer risk after Chernobyl accident up to now are actual.

In examining peripheral blood smears from irradiated patients (liquidators who took part in the clean-up and recovery work on the Chernobyl nuclear plant) we have revealed a definite type of morphologic anomalies of lymphocyte nuclei. The anomalies consisted in that nuclei of some lymphocytes had a thin outgrowth into the cytoplasm. Appearance of dicentric chromosomes as a result of chromosome aberrations can bring about formations of bridges. One of possible end results of the mitosis termination can be breakdown of the bridges, with a subsequent formation of semi-bridges or «tailed» nuclei (TN).

By using method of TN were examined 160 liquidators of Chernobyl accident and 89 health donors (control group). TN in lymphocytes were present in the most radiation-exposed persons (the average frequency of lymphocytes with TN - 0.56%, in the control group - 0.14%). This difference between the exposed and control group was statistically significant ($p<0.001$).

We have found positive correlation between number of TN in vivo and a number of dicentric chromosomes in vitro ($p<0.001$).

Increased level of dicentric chromosome (from 0.5% to 6.0%) observed in 15 from 20 patients which had TN from 0.8% and higher.

Stable aberrations were studies with use of the procedure of reconstruction of the karyotype of G-stained chromosomes from 100 to 500 metaphases per person. Apart from radiation markers (dicentric and rings) in the lymphocytes, there were revealed stable translocations (t(3;11)(q11;q24); t(1;7)(p13;q35); t(3;5)(q13;q33), as well as the loss of genetic material del(7)(pter-q31:);del(11) (pter-q23). Two patients was shown to have cells clones. Comparison of localization of sites of chromosome breakdown in the revealed chromosomal reconstruction with the known sites of localization of protooncogenes and fragile sites has shown their significant coincidence, and the stable translocations were formed by the chromosomes that the most commonly are involved in translocations accompanying hematological malignancies and solid tumor. The proposed approach (prescreening by TN method and subsequent complete cytogenetic study) has allowed, in our opinion, revealing patients with a probable cancer risk. The using in the population investigations of the «tailed» nuclei as a possible express-indicator of radiation-induced genome instability has allowed effective scheme observation of irradiated patients for aim of long-term health consequences of the Chernobyl disaster.