

The genetic consequences of exposure.

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The results of the study of genetic consequences of external gamma-irradiation of man and animals to 1 Sv are given. The investigation was performed in 3 groups under different conditions of exposure of the population:

- among the people of Russia and Belorussia exposed due to the Chernobyl accident;
- among the people living on the Tetscha river basing in the South Urals;
- among the occupational contingent of "Mayak" and the members of their families;

The experimental estimation of genetic consequences was made on the offsprings of the white male rats.

The male rats were irradiated daily for 10 - 15 days with external gamma- radiation of different dose power. The range of the doses received by the animals was approximated to the conditions of the exposure of man to the interval from 4 to 79 cSv for a year.

It was shown that:

- the most distinct effects were observed in the groups "237" cSv and "158" cSv;
- the main contribution into the remote effects of radiation action on the reproductive function of the males gives the loss on the preimplantation stage of pregnancy. The statistically reliable increase in group "237" cSv of the stillbirths incidence and the increase (very important, to 25% compared to the control) of dominant lethality incidence attract attention. In addition, the decrease of the fertility and the decrease (not very significant) of the number of litters and first of all because of the decreased number of males in the litters were revealed;
- the statistically reliable growth of the birth weight of the newborns in groups "237" cSv and "158" cSv that is preserved in the following periods of development;
- the influence in the dose range investigated doesn't bring the increase of the mortality of offspring or the impairment of forming sensoro- motor reflexes in any group;
- the reliable impairment of development of locomotor function in offspring of the animals in group "237" cSv and the impairment of curious behaviour at the age of 30 days in groups "237" cSv and "158" cSv;
- the change of the rat conduct in the crest- line labyrinth in the offsprings of animals received summary absorbed dose 237, 158 and 48 cSv.

Thus, when estimating the remote genetic effects of the exposure it is necessary to take into account, first of all, the integral indices.

It's reasonable to study the effects on the large number of animals with the most detailed dosages in the range to 100 cSv and using more sensitive methods. It's absolutely necessary to be supported financially for the new experimental study.

With the purpose of studying the possible unfavourable outcomes of the exposure of the population due to the Chernobyl accident, the investigation was performed in the Mogilev, Gomel and Briansk regions. The summary doses of exposure of the man living in 226 villages examined during the period from 1986 to 1992 were estimated. The doses of external radiation varied from 0,31 to 11,0 cSv. The doses of internal radiation varied from 0,08 to 4,19 cSv. The summary doses were from 0,39 to 15,19 cSv.

The frequencies and the structure of untoward pregnancy outcomes (UPO), in general, were studied. The frequencies of UPO reflecting the character of reproduction in the population living on the contaminated territories. It's necessary to point out that the frequencies of UPO in the populations living on the territories contaminated with radionuclides are reliably higher (13,4 c 1,03 per 100 pregnant women) compared to the control population (4,31 c 0,35 per 100 pregnant women).

When studying the UPO frequencies in the dose groups (group 1 - to 3 cSv; group 2 - from 3 to 5 cSv; group 3 - from 5 to 10 cSv & group 4 - more 10 cSv), it was revealed that they received the meaning 8,0 c 1,36 per 100 pregnant women (in group 2) to 13,5 c

1,2 per 100 pregnant women (in group 4). The UPO frequencies was reliably higher only in the summary dose more than 10 cSv.

The study of antropometric indices of newborns showed the decrease of the number of children with the optimal weight at the birth. The specific weight of such children was during the preaccident period 32,3% & 34,8%, and during the postaccident period 24,1% & 26,9%, in girls and boys respectfully.

The adaptation of the the newborns to the enviroment during the first six years after the accident was decreased. Thus, the meanings of the indices reflecting the background medico- genetic situation during the preaccident period and during the first years after Chernobyl accident were dermined.

The untoward pregnancy outcomes was studied in the families exposed due to the breaks of radionucleids waste products into the Tetscha river in the South Urals. The study showed that at the average dose on the gonads of the parents to the moment of the conception equal to 12 - 15 cSv, the UPO frequency when only the father was exposed was 11%, when the mother was exposed was 9%, when the both parents were exposed was 6,1%. The UPO frequency in the control was 5,8%.

The most reliable data were in the families of the personal at the atomic industry plant "Mayak" in the South Urals, where not only the UPO frequencies but also the offspring mortality from the moment of the birth to the age of 45 years old were taken into consideration. The average doses on the gonads of the fathers were 144 cSv, on the gonads of the mothers were 142 cSv. The average doses during the pregnancy period varied from 0,1 cSv to 233 cSv, with the mean one 19 cSv.

In the investigation the UPO frequency increase and the growth of the offspring mortality correlated with the increase of the gonad dose of the external gamma-radiation of the mother (1.04 cases per 1 Sv). The constant of the doubling gonad dose of the mather exposure was 1,4 Sv.

Thus, the material evidence of the remote genetic effects of the human exposure was, for the first time, received and the estimate of the doubling dose on the gonads when the mother is exposed was determined to be 1,4 Sv.