# "CHORNOBYL CATASTROPHY AND HEALTH STATUS OF PREGNANT WOMEN AND NEWBORNS"

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Dear Presidium, dear colleagues!

Since the first days of the Chornobyl catastrophe, our Institute had begun studying its medical and biological consequences on status of the biological system 'pregnant woman — fetus — child' that made it possible to estimate the dynamics of health status of women and newborns over the entire after-accident period (Slide).
Such studies were made possible due to development of a specialized academic register in the Institute in the very first days of the accident. The register with several thousands items includes information on health status of pregnant women and newborns from each of the radiation survey areas, including those evacuated from the 30 km zone.

These studies (Slide) have been carried out within the framework of the state National Program "Chornobyl Children" supervised by Academician O.M. Lukyanova. It is necessary to point out the fact that excellence of their performance was also secured by involvement of wide range of specialists and scientific cooperation with scientists of the National Academy of Science and different countries that have experience in studying the radiation effects on human, as well as their financial support that allowed conducting the up-to-date researches. In particular, our Institute has a long-term experience in working with the scientists from the US, the UK, Japan, Germany, France, Switzerland, and the Netherlands (Slide).
Experience in studying the medical effects of the Chornobyl catastrophe on health status of pregnant women and newborns gained by our scientists has been widely discussed in the academic publications in Ukraine and abroad (Slide).
Within the time we have for our speech, I would like to present only some results of our studies of the health effects of the Chornobyl catastrophe.

As we believe the Chornobyl problem to be a problem of preservation of the nation’s gene pool in the first place, during the two after-accident decades we defined certain correlations and specificities in changes of health status of the women that were subject to acute and long-term irradiation as a result of the accident at the Chornobyl nuclear power plant.
The dynamics of health status of child-bearing women and children, that constitue different radiation survey groups, demonstrates certain specifics of its decline.
According to our data, teenage girls and child-bearing women that were subject to low-dose irradiation, demonstrate higher rate of gynecopathies.
For instance, in the after-accident period, rates of neoplasms and inflammations of internal female genital organs tripled, this being primarily the stress-induced effect upon the immune and endocrinal systems. First of all, we registered pituitary dysfunctions under effect of varied radionuclides spectrum that resulted in doubling of sterility rates (Slide).
Decline of the reproductive function in women from the radiation survey areas is one of the reasons why the birth rate dropped 40 percent in this population group (Slide).
Parallel to the birth rate falling, rate of various somatic diseases increases among pregnant women. Increased rate of anemia, which grew tenfolds in the areas polluted by radionuclides, calls for special attention since its effects seriously damage health indicators of both mothers and newborns. High rates of infections and inflammations of urogenital system, coupled with anemia (Slide), among pregnant women result in sharp increase of intrauterine fetus infections and child infections at birth.

Various stressors play significant role in increase in sickness rates among women in the radiation survey areas.

Our studies of stress resistance of pregnant women under the long-term light irradiation demonstrated that 90 percent of women experienced various psychosomatic stresses that caused increase in a number of cases of vegetative-vascular dystonia coinciding with the conception (Slide).
Analysis of carrying of a pregnancy, delivery, fetus and newborn statuses demonstrated high rates of obstetric and perinatal complications, in particular, among women from the areas highly Cs-polluted.
During the first years after the Chornobyl catastrophe, we have registered an increase in a number of natural abortions and fetal death; at that, it is necessary to point out the fact that these numbers closely correlated with a level of nuclear environment pollution (Slide). The data presented at the slide is the result of the analysis of Polissia and Chernihiv regions based on comparison of the monitorings of carrying of pregnancies of 7, 000 women three years prior to the catastrophe and 5 year after.
Such serious pregnancy complications, as late gestational toxicosis, premature labor, uterine bleeding almost tripled during the post-accident period (Slide).

The above-mentioned complications overlapped with the changes in hormonal level of fetoplacental complex and increase in placental insufficiency rates. All this has been aggregating in harmful effect on carrying of pregnancy and the newborn health status.
It is necessary to point out that now, in spite of the period of time that passed after the accident, the placenta of women who dwell in areas contaminated with radionuclides carry the radionuclides that penetrate the placental septum and concentrate in the various organs of fetuses (Slide).
We were the first to establish the relationship between the level of radionuclide concentration in the system 'mother — placenta — fetus' and various defects in physical development of fetus, mostly, growth inhibition (Slide). Rates of this complication is three times higher in this group of population than average that clearly indicates serious functional placental disability.
On the basis of the fundamental research, we suggested that incorporation of alpha irradiators in vitals and bones of a fetus during the pregnancy results in risk of birth defects and various pathologies in the future.

The period of time that passed after the accident has also set another important problem to the scientists, in particular, to study health status of pregnant women sick with thyroid cancer, since this oncological disease was identified as radiation-induced. These problems of utter importance are a part of the Institute’s agenda, and the research results demonstrate that they are of significant academic and practical importance. We have proved that almost 100 percent of women that underwent surgery for thyroid cancer experienced various obstetric and perinatal complications during the carrying of pregnancy and labor and their rate is 3.5 times higher than analogous indicators of the control group of pregnant women.
This is the reason why newborns from women with oncological pathology of thyroid are in need of medical health control since they are born with a number of health defects.

At the same time, we have not identified any symptoms of congenital hypotheriosis and birth defects in this group of children.

Due to psychoemotional stress, hormonal and immune disbalance, and fetoplacental insufficiency, high complication rate among the pregnant women that were subject to acute and long-term irradiation had negative effects upon health status of the newborns that showed up as disorders in the processes of early adaptation (Slide), doubling of a number of labor asphyxia and tripling of respiratory impairment.
Our studies of certain indicators of the fetus immune system (umbilical blood) demonstrated that

newborns of certain groups of the women under survey have protective proteins to the cell nuclear component that may result in autoimmune diseases in future.
On the basis of the data received, we have developed a special placenta certificate and immunological passport for the newborns from the radiation risk groups (Slide).
Use of the additional information, which is a part of the placenta certificate and immunological passport, will give an opportunity to carry out adequate regular medical check-up of children that dwell in radiation survey areas.

Currently, among the negative factors of Chornobyl catastrophe that influence the human body, osteotropic radionucleads stay unexplored. At that, they should be a part of the scientific agenda since the skeletal system pathologies are the third most widely spread type of health disorders and develop twice more often than among children from the 'tentatively clean' areas (Slide).
Disorders of the osseous tissue mineralization processes among the children that dwell in the radiation survey areas are clearly a result of the fetal period since the radionuclides penetrate placenta and concentrate in the osseous tissue of a fetus (Slide).
The morphological analysis of bones of the abortive fetuses indicated the disbalance between the osteoblasts and osteoclasts that, in the process of the osseous tissue formation, may merge with its destructive changes.
During the further periods of intensive development of children, the dystrophic processes in the osseous tissue may be enforced by the detected microvascular changes (Slide).
Fetal teeth of children, born in the post-accident period, incorporate a-radionuclides on top of deep caries of many teeth.
We have also diagnosed early developmental changes in osseous tissue, resulting in its structural change, among the first generation of offspring of the mothers who were subject to irradiation as children (Slide).
The type of such changes depends on the type and dose of irradiation sustained by the mother in her childhood. Increase of the dose resulted in development of osteofibrosis and osteoporosis while smaller irradiation doses resulted, to the contrary, in osteopenia and osteomalacia. Irradiation of mothers in early childhood in any doses results in ostefibrosis of their children.

The studies carried out allow us to believe that the biological effects of irradiation in mothers in childhood and in their children are similar but call to further profound research.

DEAR COLLEAGUES,

One of the most important problems that both the specialists and the wide public face is the genetic effects of the Chornobyl nuclear power plant accident and their impact on health of the future generations.
Assessment of rate of inherited mutation in seven hypermutable satellite genome locus, carried out jointly by Ukrainian and French scientists, indicated (Slide) that ionizing radiation does not significantly influence the level of mutations in children of the liquidators of the Chenobyl NPP catastrophe. At that, the research indicated that mutagenesis occurs only in time of sperm cell maturation and does not have effect on the stem sex cell. This statement is proved by the fact that a level of inherited mutations among children conceived during the first month after the fathers stopped working as liquidators at the Chornobyl NPP was twice higher than among children conceived one or more months after the fathers stopped working as liquidators.

To round up the report (Slide), we believe that it is necessary to stress that the situation of the long-term small-dose irradiation results in certain typical changes in the biological system 'pregnant woman — fetus — child'. These changes have negative effect upon health of both a mother and her child and make their input in aggravation of the demographic rates in the country and public health.
Dynamics of sickness rates of pregnant women and their children in the areas contaminated with radionuclides does not make it possible to hope for their decrease in the nearest futures. Therefore, further scientific researches and their practical implementation in order to minimize

the effects of the Chornobyl catastrophe on health status of pregnant women and their children is still an urgent issue.

We believe (Slide) that the following directions are the prospective research areas in the sphere of medical effects of the Chornobyl catastrophe:

- to continue studies of the reproductive heath of women that were children at the time of the accident;
- to assess status of somatic health, physical, psychical and intellectual development of children whose parents sustained fetal irradiation or sustained irradiation in early childhood;
- to study genetic effects of children of irradiated persons, first of all, of the disaster liquidators.

THANK YOU FOR YOUR ATTENTION!