SOME FACTS OF ECOLOGICAL AND MEDICAL CONSEQUENCES OF CHERNOBYL CATASTROPHE ACCORDING TO THE DATA OF SOCIOLOGICAL RESEARCHES

L. Amjadeen
Institute of sociology of NAS of Ukraine

Since 1992 the Institute of sociology of NAS of Ukraine carries out the research of social and socially-psychological consequences of Chernobyl catastrophe (Sayenko Y.I. is the scientific leader); having collected a unique database of subjective perception of the reality by different categories of victims for this time. These data argue that after 20 years of the accident on Chernobyl Atomic Power Station, the population (including the inhabitants of radioactive contaminated areas and resettled persons as well as inhabitants of relatively "clean" territories) is worried about the condition of the environment in a place of residence. Among the victims of Chernobyl catastrophe the resettled persons are the most optimistic in estimation of the condition of the environment, tending to put the ecological risk out of the consciousness because the official data confirm the radioactive contamination. The inhabitants of radioactive contaminated areas of obligatory resettlement estimate the ecological situation in the settlements as the lowest. The level of the awareness of population concerning the condition of the environment is low: the third part of inhabitants of radioactive contaminated areas is not aware about the level of radioactive environmental contamination, a half of population is not aware about a level of contamination of local products and houses with a garden, almost two third of population cannot identify the kinds of available ecological contamination (thus, 35 % is not aware about such factors, and 27 % hesitate in determination of area contamination). Recognizing the necessity of actions to be implement on improvement of the environment, the inhabitants of contaminated territories noted their almost full absence. Mainly the central and local authorities are responsible for the environmental problems solving but the possibility to lead the environment to pre-catastrophe state is determined only by each tenth inhabitant of contaminated territories. The inhabitants of radioactive contaminated territories noted that the unclear perspectives of problem solving are compensated by the perspectives of "new workplaces creation" (30 %) and "creation of conditions for effective ways of housing" (20 %). During all 20 years on the catastrophe the victims note worsening their health level during the post accident period and the role of the ecological factor of health worsening grows. If in 1999 the negative influence of ecological situation in the affected regions on the health had by 49% of interrogated people, in 2001 this part increased up to 64%. In 2003 only 3 % of those who lives on radioactive-contaminated territories (with a different level of contamination), estimated own health as "absolutely healthy"; 44 % - "not absolutely healthy"; 39 % had chronic diseases (on relatively "clean" territories - 10 %; 45 % and 30 % accordingly). In 2003 among the inhabitants of "Chernobyl" territories 5 % of interviewed population had not any illness; had illness during some days - 17 %; had illness - 19 %; during 2-3 weeks and more - 60 % (for the comparison: on "clean" territories - 8 %, 22 %, 24 % and 46 % accordingly). Especially such victims as resettled persons sharply change the self-estimations of health. In 1999 they estimated themselves as the most healthy in comparison with other categories of victims: every tenth of them considered himself/herself as "healthy"; everyone the second – "not absolutely healthy"; 37 % had chronicle diseases; 3 % – Chernobyl invalids. After four years (in 2003) there is no one who considered himself/herself "absolutely healthy". 67 % had chronic diseases, and 15 % - invalids as a result of the Chernobyl catastrophe. The number of days of the illness among the resettled persons has changed sharply: from 0 days in 1999 to 18 days (on average) - in 2003. Now the well-known vital optimism and mythological consciousness will not prevent them from estimating their health conditions sensibly as low. On the grounds of scientific disputes on organizational and technical aspects of life renewal on affected territories, every-day life of the inhabitants of these territories continues to enrich with different contradictions in judgments and behaviour, in particular:

- at the time of negative changes of environment there is a growth of the level of satisfaction by the population;
- with a low level of satisfaction by the ecological situation in region there is insignificant nature protection activity;
- determining the negative influence of ecological situation in region on health state, the inhabitants estimate the level of influence of the environment on health as "low";
- stating high concern a state of own state of health as well as children, the inhabitants of radioactive contaminated territories, nevertheless, do not keep necessary requirements and rules of behaviour in contaminated areas;
- keeping the requirements on use of wood mushrooms and berries during all of time after catastrophe, the constant export of wood production from the polluted territories on sales observed.

The consequences of Chernobyl catastrophe emphasize the necessity of simultaneous work on minimization of the objective and subjective risks caused by the catastrophe, including formation of considerations and informing the suffered communities about them, which are competitive to present ecological opinions and

belief of the population which can assist in preventive behaviour.

CHERNOBYL DISASTER NONSTOCHASTIC RADIATION EFFECTS ON THYROID

A.K. Cheban
Association "Physicians of Chernobyl", Ukraine

Studies have been carried out in hospital and out-patient clinics for 18 years since the accident. Over 30,000 persons were examined according to the standardized protocol with general clinical examination, thyroid ultrasonography and hormonal assay. Persons involved were representatives of the surviving population of various registration groups both control and comparison groups. The cohorts studied were as follow: children of various age including those irradiated in prenatal period, evacuees people, residents of contaminated territories and liquidators 1986. Were used the results of individual and reconstructive thyroid dosimetry. The risk group with prognosis is formed from persons with the most complex mode of thyroid irradiation, i.e. a combination of internal exposure to 131 I and short- lived iodine isotopes on the one side and external gamma-radiation on the other side.

Chronologically we detailed three periods:

- primary thyroid reaction near 1986-1987;
- latent preclinical period- 1988-1989;
- period of clinical manifestation non-stochastic thyroid diseases – after 1990.

Primary thyroid reaction manifested through "euthyroid" hipertiroxinemia and short-term "stress" hyperthyrotropinemia. No other clinical of thyroid manifestations. In second period were show up evident structure disorders typical for chronic thyroiditis and the results of immunological studies indicated the thyroid autoimmune diseases. For third period were typical clinical forms of thyroid radiation effects- chronic thyroiditis resulting in hypothyroidism. Was establish that nonstochastic radiation effects on thyroid were dependent on thyroid dose and mode of radiation. Threshold dose at which radiation induced effects were registered was about 30 cGy. Risk groups for chronic thyroiditis and hypothyroidism are presented by children (at the time of the accident) and females. Nonstochastic radiation effects on thyroid will further a substantial contribution to thyroid morbidity in Chernobyl disaster survivors. Progress of thyroid disorders with time will have a substantial impact on organism of energy – supply system, especially on mechanism of adaptation and compensation for strain, which will affect the general psychosomatic morbidity. Participation of thyroid disorders and related integral disorders in endocrine regulation ispossible in puberty period disorders (physical and sexual progress disorders), reproductive function and premature aging process.

RESULTS OF SURGICAL TREATMENT OF THYROID TUMOURS IN VARIOUS GROUPS OF CHERNOBYL VICTIMS

S. Cherenko, O. Larin, M. Gorobeiko
Ukrainian research and practical center of endocrine surgery
Ministry of Public Health of Ukraine
Ukraine Kyiv 02091 Kharkivske shosse 121
e-mail: endosurg@unet.net.ua

Aim: Since thyroid cancer in children of Ukraine after 1986 has been recognized precisely as radio-induced pathology and described clinically and morphologically as much more malignant than sporadic cancer, the question about development of similar thyroid tumors in adult exposed patients remains controversial yet. The aim of study was to compare clinical and pathologic findings of surgical tumor pathology of thyroid in adults with or without history of radioactive irradiation due Chernobyl disaster. **Material and Methods:** 2363 adult patients have been consequently operated on thyroid (benign and malignant thyroid nodules) during 1998-2002 with no evidence of radiation influence in history (A group). At the same period 311 patients (born before 1969) with thyroid nodules and strict evidence of Chernobyl irradiation were operated (B group). Both groups were similar in age, sex and mode of preoperative examination (sonography, fine-needle aspiration with immunocytochemistry, serum TSH). Patients of B group represented three from four official categories of people suffered from Chernobyl: I–participants of accident consequences liquidation; II–people evacuated from restricted area; III–inhabitants of polluted territories. Group C is consisting of people who were born from 1969 to 1986 yy. **Results:** The rate of thyroid carcinoma among all cases of thyroid nodules was significantly higher in B group–32,8% (102 patients) and C group 41.6% (565 patients) vs. 27,2% (644 patients) in A group ($P<0,05$). But more distinct difference was observed in I and II categories of group B patients (the rate of cancer correspondingly 54,8% and 47,8%;$P<0,01$). Hystological types of cancer were similar in three categories of B group but the prevalence of papillary carcinomas was found in B group vs. A (85% and 74%;$P<0,05$). The share of advanced form of cancer (T_4) was significantly higher in adult irradiated patients–40.1% and children group 37% vs. 23% ($P<0,05$). More than two times frequently regional metastases (N_{1a-1b}) were found in C group–47.7% and B group–42.9 % vs. 18.3 % ($P<0,01$). Another marked feature of carcinomas in B group was a higher level of multifocality (34.4% vs. found in I category of B group: T_4–in 49%, N_{1a-1b}–in 63.5%,

23.0%;P<0,05). The most distinguished features were multifocality–in 42.3%. **Conclusion:** The increasing rate of thyroid malignancy in irradiated due Chernobyl adult patients and likelihood of their carcinomas with children pattern of radio-induced tumors demand performing the most radical mode of treatment in such patients.

VERIFICATION OF THE CHERNOBYL REGISTRY DOSIMETRIC DATA AS A RESOURCE FOR EFFICIENT DOSIMETRIC SUPPORT SOLUTION FOR POST-CHERNOBYL HEALTH EFFECTS STUDIES

V. Chumak
Scientific Center for Radiation Medicine AMS Ukriane
04050, Melnikova 53, Kiev, Ukraine
Chumak@leed1.kiev.ua

Findings of several studies of the medical consequences of Chernobyl accident among the most exposed cohort of the affected population – clean-up workers (or "liquidators") suggest that observed end-points are not restricted solely to the predicted leukemia, yet include broader range of somatic and psycho-somatic pathology. At the same time, observed increase of morbidity among liquidators cannot be unequivocally related to Chernobyl radiation because doses of liquidators either are not known or cause doubts in their quality and accuracy. Without reliably estimated individual doses of liquidators it is impossible to evaluate risks of radiogenic effects. Unfortunately, large scale reconstruction of individual doses by instrumental (EPR dosimetry with teeth) or analytical (RADRUE) methods is not feasible due to high cost and labor intensity of analyses. Large, virtually unused array of dosimetric information (in a form of Official Dose Records – ODR) is contained in the State Chernobyl Registry (SCR). The registry contains about 70,000 ODR for liquidators who took part in clean-up activities in 1986-1987 when exposure was the highest. However, it was demonstrated that 95% of these records are related to military liquidators whose doses were monitored by the least accurate methods – "group dosimetry" and "group assessment". Unusual shape of dose distributions (depleted left wing and sharp cut-off above permissible dose limit) traditionally suggested nearly total falsification of the dosimetric data. Results of the pilot studies reveal that the fraction of falsified dose values in the SRU is relatively low (up to 10%), yet ODRs registered in SRU as point values and are endowed with both random uncertainty and bias. It was found that ODR on average overestimate real exposure of military liquidators two-fold. These results, from one hand support the point regarding impossibility of the direct application of SRU data for analysis of Chernobyl medical effects, though suggest the way of verification and validation of ODR, from the other hand. Proposed plan of validation of the official dose records in SRU envisages retrospective assessment of uncertainty and adjustment of the bias in existing records related to military liquidators. High precision EPR dosimetry with teeth should be used as a references ("gold standard"). Results obtained to date with the limited sample (106 subjects) show feasibility and efficiency of this approach. As a results of the proposed study, about 60,000 individual dose records of liquidators of 1986-1987, who are registered in SRU, could be verified and adjusted and thus become available for use within the broad spectrum of scientifically sound epidemiological studies. The main advantage of this approach vs. individual dose reconstruction is its some orders of magnitude lower cost and labor budget.

ANALYSIS OF HEALTH CONDITION OF CHILDREN FROM LUNINETS AREA, BREST REGION (2000-2005)

R.A.Dudinskaya, Y.P. Zhivitskaya, Y.N.Yurevich
International State Environmental University
named after Sakharov, Minsk

The current environmental situation in Belarus does not allow to single out diseases that are caused only by the radiation-dependent reasons. They should be connected with the whole complex of negative implications that have arisen as a result of Chernobyl accident. They have altered the system of demographic reproduction and led to a decrease in the birth rate, changed the reproductive settings of the population. Study of children's health is very important in the health evaluation of overall population health in the areas with unfavorable environmental conditions since it is this group of population will make up the basic part of reproductive population in the XXI century and its health will determine the health of this nation as a whole. Polyclinic in the village of Senkevichi, Luninets area of Brest region services 396 children from the neighboring towns and villages. (1,88±0,13; T=14,4**,**P<0,05). The goal of this work was to conduct a retrospective analysis of the dynamics of morbidity of children from Luninets area. On the basis of information on the number of cases and quantity of children, we calculated coefficients of morbidity, as well as annual indicators of frequency of morbidity, annual tendency indicators for 2001-2005 per 1000 children and relative risk (RR) for kids to get sick with certain types of illnesses in every next year compared to previous one, as well as in 2005 compared with the start of period studied. The first on the list of most frequent illnesses were respiratory failures, infection and parasite sicknesses, mental and nervous system disorders. The period of study allowed to discover the insignificant tendency to decrease for the following types of illnesses: respiratory organ problems (RR = 0,70 [0,59;0,83]), intestinal illnesses (RR = 1,04 [0,99;1,16]), endocrine system, metabolism and

nutrition disorders (RR = 0,63 [0,648;0,72]) musculoskeletal system and connective tissue problems (RR = 0,17 [0,14;0,21]). At the same time, mental disorders (RR = 3,70 [3,54;3,91]), infection and parasite illnesses (RR = 1,54 [1,37;1,68]), skin and subcutaneous tissue problems (RR = 1,70 [1,47;1,89]), have tendency to increase. In 2000 and 2003 there have been no cases of neoplasms and congenital anomalies among the children serviced by the polyclinic in the village of Senkevichi. In addition the differences ($p < 0,05$) in the levels of children morbidity in 2005 compared to 2000 to the decreasing side were discovered in the following types of illnesses: endocrine system, nutrition and metabolism disorders. Respiratory problems. Other differences for the increasing side were discovered for the mental disorders.

EPIDEMIOLOGICAL AND CYTOGENETICAL INVESTIGATIONS IN THE COHORT OF LIQUIDATORS OF THE CHERNOBYL ACCIDENT CONSEQUENCIES

E. Dyomina
R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology National Academy of Sciences of Ukraine, Kyiv, Ukraine

Objective. Investigation of the informative criteria of radiation effects and prediction of health risks of radioinduced injuries in humans has been a major focus of radiation biology. Correlation between radiation dose and stochastic effects (cytogenetic and cancerogenic) in group of liquidators of the Chernobyl accident consequences in the early and remote terms after irradiation were studied. Materials and Methods. On the basis of cytogenetical, haematological, epidemiological and statistical methods the analysis of the observation data of 17 000 liquidators was carried out. Results. With the purpose to predict cancer risk in the examined group of liquidators the complex of cytogenetic parameters of radiation injury in peripheral blood lymphocytes was indicated. It is recommended to take it into account during monitoring of health status and formation of groups with increased cancer risk among the liquidators. The method of the dose-effect dependence approximation based on the spline-regression model which objectively reflects dose dependence of the frequencies of radioinduced chromosome aberrations has been developed. It was found out that tumour yield per dose unit in the examined group increased with the decreasing of total radiation loading. Only in the group of liqiudators with malignant formations in the remote terms after irradiation the dose-effect dependence for radiation markers (dicentric and ring chromosomes) was observed. The mechanisms of the effects revealed are discussed. Conclusions. Complex application of cytogenetical, haematological, epidemiological and statistical methods of indication and analysis of radiation stochastic effects can result not only in obtaining objective parameters of radiation damage but also be the basis for the prediction of the remote negative effects in the health status of irradiated individuals.

EXPEDIENCY OF THE ASSESSMENT OF INDIVIDUAL RADIOSENSITIVITY OF RELATIVELY HEALTHY PERSONS AFTER CHERNOBYL ACCIDENT

E. Dyomina , N. Ryabchenko
R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology National Academy of Sciences of Ukraine, Kyiv, Ukraine

Objective. Complicated ecological situation formed after the Chernobyl accident causes the actuality of the investigation of human individual radiosensitivity in conditions when the essential part of Ukrainian population lives on the contaminated territories and consequently is exposed to the chronic effects of radionuclides. Preconditions of individual radiosensitivity and cancer risk increasing are formed on the background of a complex of deep metabolic postradiation injuries of immune system, including lymphocyte functions, repair system etc. From this point of view development and improvement of the methods that make it possible to determine and predict human individual radiosensitivity has essential practical importance. The present study was carried out on the basis of the scheme of cytogenetic examination of relatively healthy persons in order to assess and predict their individual radiosensitivity. Methods. Examination of 60 relatively healthy individuals was carried out by means of the adopted G2-assay consisting in the analysis of radioinduced cytogenetic effects in peripheral blood lymphocytes in the most radiosensitive post-synthetic phase of cell cycle. The variability of radiosensitivity cytogenetic parameters was estimated with the help of dispersive analysis. Results. The cytogenetic parameters of individual radiosensitivity obtained on the basis of the adopted G2-test revealed the essential interindividual variability: 0,18 – 1,24 aberrations/metaphase, mean value – $0,41 \pm 0,10$; coefficient of variation (CV) - 24%. Chromatid breaks prevailed in aberration spectra up to 98% with mean $0,37 \pm 0,097$, CV = 27%. Applicated approach makes it possible to reveal in the group 12% of individuals with increased chromosomal radiosensitivity. Conclusions. The developed scheme of cytogenetic examination recommended for revealing individuals with increased radiation sensitivity includes: cytogenetic analysis of radiation induced chromosomal aberrations in the first mitosis, observation of unified cell irradiation and fixation procedures, analysis of anamnesis data which take into account contacts with radiation sources, other

carcinogens, impairing habits etc.

MICROSATELLITE MUTATIONS OF THE CHILDREN OF CHERNOBYL LIQUIDATORS IN BELARUS

K. Furitsu[a, b], H. Ryo[a, c], K. G. Yeliseeva[d], H. Nakajima[a], T. Nomura[a, c]
a. Department of Radiation Biology and Medical Genetics, Graduate School of Medicine, Osaka University, Japan
b. Department of Medical Genetics, Hyogo Collage of Medicine, Japan
c. National Institute of Biomedical Innovation, Japan
d. Institute of Genetics and Cytology, National Academy of Sciences of Belarus, Minsk, Republic of Belarus

Liquidators, who worked in the highly contaminated areas after the Chernobyl nuclear power plant accident, sustained both external and internal radiation exposures during their duty. Many liquidators fathered children during the clean-up period and after the work had been terminated. The potential health problems in their offspring have been a matter of great concern. We performed a study on Belarusian liquidators, exploring whether increase in the frequencies of germline mutations at microsatellite loci could be found in their progeny. Microsatellite is classified as simple tandem repeat sequence in the DNA. The liquidators we surveyed involved in clean-up operation during 1986 and 1987 following the accident. The numbers of families studied were 64 (liquidators) and 66 (controls). A total of 72 loci (31 autosomal, one X-linked and 40 Y-linked) were used. DNA was isolated from peripheral blood lymphocytes and the microsatellite loci were amplified by the polymerase chain reaction with fluorescence-labelled primers. Mutations were detected as variations in the length of the loci. At the Y-linked loci, the mutation rates (expressed as number of mutations among the total number of loci for the individuals included) are 2.9 x 10^{-3} (4/1392) and 2.1 x 10^{-3} (3/1458) in the children of exposed and control parents, respectively. This difference is not statistically significant. At the autosomal loci, the corresponding estimates are 5.9 x 10−3 (11/1862; exposed group) and 8.5 x 10^{-3} (18/2108; control). The difference is not significant, either. The possibility that the Belarusian population might have been unexpectedly exposed to some chemical contaminants in the environment appears unlikely in view of the finding that the spontaneous mutation rates at the same set of loci in several non-Belarusian populations were similar to those in Belarus. The estimated mean radiation dose to the liquidators was small, being about 39 mSv, and this might be one reason why no increases in mutation rates due to radiation could be found.Further research in other radiation-exposed populations with higher doses and confirmatory study in experimental animals is necessary to assess the transgenerational radiation risk to humans.

DEALING WITH PSYCHOSOCIAL CRISIS IN CHERNOBYL AFFECTED COMMUNITIES.

O. Garnets
UNDP, Ukraine

Long-lasting aftereffects of Chernobyl catastrophe are, to large extend, of psychosocial nature. The dynamic of the post-Chernobyl situation was determined by a combination of negative factors –ecological situation, dramatic change in traditional household management in rural areas, deterioration, poor information of the affected people, general transformation of socio-economic situation, deterioration of health, resettlement etc. These factors entailed serious psychological aftereffects related to the overall crisis, especially those touching upon the psychological mechanisms of life regulation, goal setting and long-term life planning. The post-Chernobyl situation could be described as a situation of multy-modal crisis not only of individuals but of entire communalities. Therefore the whole situation should be viewed not in the context of stress theory but rather the theory of social crisis. Models of dealing with psychosocial crisis both on individual and community levels are analyzed. Community development centers are presented as one of effective models of dealing Chernobyl related psychosocial problems.

Key words: Psychosocial crisis, crisis communities, models of overcoming psychosocial crisis, providing information to population, community development centers.

THE RADIATION-ECOLOGICAL AND MEDICAL-GENETIC CONSEQUENCES OF CHERNOBYL DISASTER AFTER TWENTY YEARS AND THE PROGNOSIS FOR THE FUTURE

A.I. Glouchtchenko, .I. I.Suskov, N.I.Vavilov
Institute of General Genetics, Russian Academy of Sciences, 117809, Russia, Moscow, Gubkin str.3
E-mail: suskov@vigg.ru, a-glushchenko@mail.ru
L.S. Baleva, A.E. Sipiagina
Federal Center of the Radiation Defence of Chidren, Moscow, Taldomskaya st, 4.
K. P.Checherov
RSC «Kurchatov Institute», Kurchatov square,1.

The complex analysis of the radiation-ecological and medical-genetic consequences of the Chernobyl Disaster, happened 26 April 1986 year, has shown

unprecedented consequences which had affected on many countries and their population even after twenty year. There is an opinion which have a solid base which says that real accidental Chernobyl release essentially exceed the officially accepted estimation 50 million curies (or 3.5 % from content of fuel in reactor RBMK-1000). As the authors point out**, the nuclear explosion of Chernobyl has effluented at least 85% of the fuel from the pit of the reactor**. This corresponds to ellluent approximately one billion three hundred millions Kuri. The pit of the reactor is empty. During twenty years the effluented transuranium elements, especially Pu-239, have been transforming into the daughter radionuclides (Am-241), which have the relative biological efficiency (RBE) ~10-20 and accumulated in environment. This process shoes that the negative consequences will be to increase. Thus, it's necessary to perform the complex radiation-ecological and medical-genetic monitoring in the zones of the higher risk. Germany has the large experience in the field of the radiation-ecological monitoring. The long-term medical-genetic monitoring registeres the increasing somatic diseases together with the increased level of the chromosome mutagenes and the phenomenon of the «induced genome unstability». The state of health and genefund could be estimated on complex of analysis of functional indexes of organism and genetic -immunological data. The work, mentioned above, allows to give a complex risk's estimation of health for the examinated local human population, as it have revealed latent pre-morbid functional disorders of principal systems and organs, degree of defeat of organism. Also, it has determined the state of stability of the genome of somatic cells, immune deficiency, absorbed doze on the frequency of chromosome aberrations. The genetic prognosis of health of inspected persons and their children may be performed on the base of this data. In general, the received results form the basis for population diagnostic of functional and geno\immunotoxical effects in modern generations depending on quantities of accumulated doses and levels of radioactivity. It is important for scientifically-grounded outcomes of prophylactic-rehabilitation measures and securing of genetic-ecological safety of population , living on contaminated territories. The abovementioned confirms the necessity of founding a European network for ecological-genetic monitoring with «Internet» translation of information on radionuclide composition and chromosome/genome aberration levels in people, inhabiting polluted areas, with delivery of prognosis on national television for the «public control». Taking into attention that the main part of the territory of Western Europe is contaminated by the radionuclides of the cesium-137 (T 1/2 ~ 30 years), the actuality of problem of the creation of the all-European network of the ecological-genetic monitoring is increasing every year. Besides, possibility of radiation terrorizm should be taken into the consideration as well.

PATTERNS OF LEUKEMIAS AND LYMPHOMAS IN CLEAN-UP WORKERS AND CHILDREN IN POST-CHERNOBYL PERIOD

D.F. Gluzman, N. Imamura, V.A. Nadgornaya, L.M. Sklyarenko, M.P. Zavelevich, S.V. Koval, V.M. Machilo, V.D. Drozdova

R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology, Kyiv, Ukraine

The data on the patterns of hematological malignancies in representative groups of population of Ukraine in post-Chernobyl period in 1996-2005 have been reviewed upon the findings of Reference Laboratory operating since Chernobyl accident in Immunocytochemistry Department. Two independent sets of data are included in the survey. First, the data on 218 consecutive cases of malignant diseases of hematopoietic and lymphoid tissues in Chernobyl clean-up workers diagnosed in 1996-2005 are given in comparison with the data of 2697 consecutive patients of general population. Second, the structure of hematopoietic malignancies in population of pediatric patients in Kyiv and 24 regions of Ukraine in 1993-2004 has been summarized (in total, 5,630 children) with particular emphasis on the children born in 1986-1987 (227 patients) and the infants at the age below one year (218 patients). The precise diagnosis of hematopoietic malignancies was based on cytomorphology and cytochemistry of bone marrow and peripheral blood cells and their immunophenotyping employing the broad panel of monoclonal antibodies to lineage specific and differentiation antigens of leukocytes in accordance with FAB, WHO, EGIL, ICD-10 and ICD-O-2 classifications. B-cell chronic lymphoid leukemia was a predominant form of hematopoietic malignancies in clean-up workers under study (25.68%), although its percentage did not differ significantly from that in the patients of general population. Among 34 cases of acute myelogenous leukemia, leukemia was preceded by MDS in seven patients. The multiple myeloma percentage (7.79%) in clean-up worker patients was twice as much as in the patients of general population (4.0%). In five patients working in Chernobyl in 1986-1987, the unusual chronic lymphoproliferative disorder, large granular lymphocytic leukemia was diagnosed. The overall distribution of different forms and subtypes of acute leukemias and non-Hodgkin's lymphomas in pediatric patients did not differ significantly from those in West European countries. Meanwhile, several distinctive features were revealed in the patterns of leukaemias in the patients born in 1986-1987, namely increasing relative number of AML cases (21.2 and 25.3% in 1986 and 1987) in the

structure of acute leukemias. The analysis of the hematopoietic malignancies in the infants throughout the study has revealed the increased relative frequency of AML (28.4%) and JMML (11.4%); ALL (T and B cell variants) have been found much more rarely than in children aged 1-15 years.

Such data may represent the basis for future epidemiologic surveys aimed at clarifying the association between the lymphohematopoietic neoplasms in children and clean-up workers and their exposure to ionizing radiation following Chernobyl accident.

RADIATION CONTAMINATED BY ACCIDENTAL POLLUTIONS OF CHERNOBYL NPP AND RESIDUES OF URANIUM PRODUCTION TERRITORIES. COMPARATIVE ANALYSIS.

M. G. Buzinny, Y. N. Soroka

The Marzeev Institute of Hygiene and Medical Ecology AMS of Ukraine

Since 1944 in Ukraine was discovered 21 uranium ore bodies. Uranium was processed in two plants: Pridneprovsky chemical plant (PCP) near Dneprodzherzhinsk and East hydrometallurgical plant at Zhovti Vody. At 1991 PCP plant was closured. Annual ore load of East hydrometallurgical plant is 1 million ton. Ore treatment cause 70% radioactivity transfer to ore production residue – tailings. That include first of all long living radionuclides - ^{230}Th and ^{210}Ra, as well as ^{210}Pb and ^{210}Po. All working period of PCP cause generation of 42 million ton of uranium tailings, which were stored near to Dniprodzherzhinsk Operation of East hydrometallurgical plant at Zhovti Vody cause generation more than 40 million ton of radioactive residues. Irradiation of population is caused by diffusion into environment dose forming radionuclides with water, air and foodstuff. Separate problem is caused by unauthorized use for home building purposes processed rock, ores and other highly active materials. In that situation problem is irradiation by radon. Other example is radioactive discharges cause increase uranium concentration in water of Zhovta river 5-10 fold up to 3-6 Bq·l^{-1}, ^{210}Pb concentration in air outside sanitary zone former PCP plant tailings 10-50 fold natural background. Corresponding irradiation doses are comparable and even higher of irradiation doses for population in situation Chernobyl accident at present time. During 20 years after Chernobyl accident it was grounded system of radiation and social protection of population involved, especially for settlements in which accidental component of irradiation of population is considerable at present. At the same time for more than 50 years of uranium mining and processing problems of radiation and social protection of population in settlements and premises around uranium plants was out control. It is violation of equality principle of all to Law, principle of social justice. Taking into account that the same doses causes the same risks (under similar other conditions of irradiation) we consider necessity of introduction of common standards and rules for protection of population for all sources of irradiation. Knowledge of Chernobyl and its lessons should be taken into account as base of that approach as it is foreseen in conception we have developed.

MONITORING OF RADIATION-INDUCED GERMLINE MUTATION IN HUMANS.

Y. E. Dubrova

Department of Genetics, University of Leicester, Leicester LE1 7RH, UK

Experimental evidence for radiation-induced mutation in the human germline still remains highly controversial, which is mainly attributed to the low sensitivity of traditional approaches for mutation detection in humans. We have developed a new system for monitoring of radiation-induced mutation in the human germline. This technique employs highly unstable minisatellite loci and because of the very high rate of spontaneous mutation altering allele length (repeat copy number) provides a system capable of detecting induced mutations in relatively small population samples. The results of recent studies have shown that tandem repeat minisatellite loci provide highly efficient system for monitoring radiation-induced mutation in humans. Using this technique, germline mutation has been studied among families from rural areas of Ukraine (Kiev and Zhitomir regions) and Belarus (Mogilev region), which were heavily contaminated by radionuclides after the Chernobyl accident. The control and exposed groups were composed of families containing children conceived before and after the Chernobyl accident, respectively. A statistically significant 1.6-fold increase in mutation rate was found in the germline of exposed fathers, whereas maternal germline mutation rate in the exposed families was not elevated. Within the Belarus cohort, mutation rate was significantly greater in families with higher parental radiation dose estimated for chronic external and internal exposure to caesium-137, consistent with radiation induction of germline mutation. These data suggest that the elevated minisatellite mutation rate can be attributed to post-Chernobyl radioactive exposure. We have recently extended this analysis to another cohort of irradiated families chronically exposed to radioactive fallout near the Semipalatinsk nuclear test site in Kazakhstan. The results of this study also show an elevated germline mutation rate in the exposed population and demonstrate a significant correlation between mutation rate and the decay of radioisotopes in the late 1950's

and after the cessation of surface and atmospheric nuclear tests. The results of our studies provide the first experimental evidence that mutation rate in human population is increased by ionising radiation and show that minisatellite loci represent a powerful tool for monitoring germline mutation in humans. The advantage and shortcomings of this system and new experimental approaches for monitoring radiation-induced mutation in the human germline will be discussed.

DISABILITY IN UKRAINE IN CONNECTION WITH ACCIDENT ON ChNPS

A.B. Ipatov, O.V.Sergieni, T.G. Voitchak
Ukrainian State Research Institute of Medical and Social Problems of Disability

Since 1992 till 2001 in Ukraine as invalids in connection with accident on the ChPNS annually recognized primarily more than 7 thousand persons, and more than two thousand persons which earlier have been recognized by invalids from the common disease, changed in following year the reason of physical inability to connection with accident on the ChPNS after an establishment interdepartmental regional commissions of experts of connection of their disease with influence of consequences of accident on the ChPNS. Therefore annually at 10 thousand persons from among adult population physical inability has been bound to accident on the ChPNS. Till 2001 in disability in connection with accident on the ChPNS the prevailing part was made by participants of liquidation of consequences of accident: in 1992 - 76,3 %, in 2000 - 51,6 %. Then the amount primarily recognized by invalids from them has started to decrease gradually and makes in 2005 39,6 % from total of primary invalids in connection with accident on the ChPNS. There was it because first because of a high mortality the last years, the amount of sick participants of liquidation of accident which for the first time established the diagnosis invalid diseases began to decrease. Secondly, for this time have already been recognized by invalids up to 30 % from the common number of liquidators. In structure of primary disability in connection with accident on the ChPNS on groups of the account the amount of invalids from among the suffered population gradually was enlarged - from 23,7 % in 1992 up to 60,4 % in 2005. The nosological structure of primary disability in connection with accident on the ChPNS has changed. A prevailing part of primary physical inability invalids owing to diseases of system of a circulation (15 years ago made 39,0%, including an idiopathic hypertensia - 19,7%, ischemic disease of heart - 9,2%, cerebrovascular diseases - 4,6%), diseases of nervous system (32,3%, including vegetovascular dystonias - 16,5%, diseases of organs of digestion (9,0%). In the structure of primary disability of a Chernobyl contingent since 2001 the first place is occupied with neoplasms on which in 2005 is necessary 53,3% of primary disability in connection with accident on ChNPS. For period 1992-2005 disability of a Chernobyl contingent owing to neoplasms has grown almost in 4 times. In disability as a result of malignant neoplasms the first place is occupied with oncologic diseases of organs of digestion, respiration, a thyroid gland. Second place in primary disability of a Chernobyl contingent is occupied with diseases of system of a circulation on which in 2005 is necessary 32,5%, among them cerebrovascular diseases (insults, discirculatory encephalopathy) - 41,4%, ischemic heart disease - 27,7 %, an idiopathic hypertensia - 26,9 % prevail. This physical inability has influence on primary disability on these classes of diseases in regions which population has suffered from accident on the ChPNS. From the general number of pensioners in Ukraine participants of liquidation of accident on the Chernobyl atomic power station and suffered from Chernobyl accident was on the account in the Pension fund on 1.1.2005 of pensioners on physical inability of 148199 persons. Such quantity of the saved invalids among of Chernobyl contingent emphasizes necessity of an rehabilitation of such invalids and for prophylaxis of physical inability - prophylactic medical examinations and improvements of all Chernobyl contingent and carrying out of actions on minimization of influence of consequences of accident.

RADIATION EPIDEMIOLOGICAL ANALYSIS OF HEMOBLASTOSES AMONG LIQUIDATORS OF RUSSIA IN 20 YEARS AFTER THE CHERNOBYL ACCIDENT

V.K.Ivanov, A.F.Tsyb, S.E.Khait, A.I.Gorsky, M.A.Maksioutov, N.V.Schukina
Medical Radiological Research Center of Russian Academy of Medical Sciences, National Radiation-Epidemiological Registry, Obninsk, Russia

Ecological consequences of the Chernobyl catastrophe, the most important social event in Ukraine, Belorus and Russia for the 20 years, attract attention of scientists of different specialties. Study of malignant blood diseases among people exposed to radiation is of great concern. World practice of study of health effects of radiological accidents shows that some hemablastoses are induced by radiation. Relative risk of leukemia development is known to increase due to combined effects of some harmful factors. This fact should be taken into consideration when health effects of the Chernobyl accident are studied. The proper evaluation of health effects of the Chernobyl accident, true contribution of radiation at low level, which effects on quality of life of exposed people, can be resulted from large-scale long-term follow up. Results

of study of hemoblastoses incidence among emergency accident workers taken part in mitigation of consequences of the Chernobyl accident in the period from 1986 to 1990 are presented. These people called "liquidators" were mainly men in their heyday. Data on incidence of hamoblastoses among 180 thousand liquidators residing in Russia have been accumulated in the Russian National Radiation-Epidemiological Registry. Hemoblastosis cases following exposure to radiation were collected and verified in accordance with specially designed procedure. Primary medical documents (patients' outpatient chart, case history, autopsy protocols, review of cytological and histological preparations , etc.) were examined by experts in diagnostics of hemoblastosis. Diagnostic material available at the Registry (blood and bone marrow smears, histological preparation of bioptate) were used for electronic archive of microphotographs of cases of leukemia and other hemoblastosis. It was shown that the total number of hemoblastosis cases among liquidators detected from 1986 to 2005 and their structure corresponded to average statistical data on malignant blood diseases incidence Europe and America. Analysis of dynamics of detection of leukemia cases showed that the highest number of the cases was detected between 1993 and 1998. There were some features of morbidity structure in the cohort of liquidators. The fraction of myeloleucosis in the structure of leukemias increased (especially up to 1996), increase in the number of myeloma cases was observed after 1996. Special epidemiological analysis showed evident increase in relative risk of leukemia among liquidators got radiation dose above 150 mGy. Radiation-induced leukemias were detected in the first decade following the Chernobyl accident. Increase in the total number of hemoblastoses including leukemias and myelomas was observed in the second decade following the Chernobyl accident. Absence of radiation risk of leukemias among liquidators after 1996 does not mean that further study should be stopped.

ANALYSIS OF LEUKEMIA PREVALENCE IN TERRITORIES OF BRYANSK AND KALUGA REGIONS CONTAMINATED WITH RADIONUCLIDES FOLLOWING THE CHERNOBYL ACCIDENT

V.K.Ivanov, A.F.Tsyb, S.E.Khait, A.I.Gorsky, M.A.Maksioutov, N.V.Schukina
Medical Radiological Research Center of Russian Academy of Medical Sciences, National Radiation-Epidemiological Registry, Obninsk, Russia

Search for appropriate criteria for estimation of relationship between exposure to ecological harmful agents and state of health is important component of social policy in the Russian Federation.. According to caused by environmental agents. For study of leukemia prevalence among children and adults residing in territories of Kaluga and Bryansk regions contaminated with radionuclides following the Chernobyl accident data on 333 leukemia patients for the period from 1980 to 1998 were collected, reviewed, verified and analyzed. In five mostly contaminated districts of Bryansk region marginal increase in the number of leukemia cases was found in 1993-1998. More pronounced increase in leukemia cases was observed in Kaluga region. Leukemia prevalence was 10.8% for children and 89.2 for adults. In order to distinguish the role of radiation in induction of leukemia all leukemia cases were distributed by their cytological type. It is known that acute and chronic myeloleucosis can be induced by radiation. Analysis of collected data allowed us to state that the majority of leukemia cases among children could be assigned to acute lymphoblastic leukemia, 38.8% of all cases among adults could be assigned to acute leukemia and 55.2% - to chronic leukemia, the ratio of chronic lympholeucosis to chronic myeloleucosis was 2.5:1, this corresponded to national and international statistics for sporadic leukemias. Recently radiogenic origin of some types of chronic lymphocytic leukemia is discussed. We did not find cases with leukemic lymphocytes typed as large granular lymphocytes or NE-cells.If we consider data on a specific district we will find anomalous distribution of chronic leukemia, almost equivalent number of chronic lymphocytuc leukems and myeloleucosis detected in contaminated territories of Kaluga region.

THE EXPERIENCE OF CHERNOBYL CATASTROPHE AND CULTURE OF RADIOLOGICAL SAFETY

N. Khodorivska
Institute of sociology nas Ukraine, kiev
Csep@csep.kiev.ua

The modern analysis of general human experience in overcoming the large-scale catastrophe and results' generalization of many-years sociological researches of the consequences of Chernobyl catastrophe provoke to make conclusion about the sharp necessity to form and improve the culture of safety as general as well as Ukrainian society. Mostly, it concerns the culture of radiological safety. Probably, the following aspects of the culture of safety can be determined within the society: industrial, informational-communicative, scientific-research, governmental and professional-institutional, cultural and religious, every-day. The culture of safety is presented as a level of perfection of that specific "branch" of economic and mental human activity that is in close relations with prevention, overcoming and opposition to the catastrophe, thus,

as a complex of ways and approaches of organization, realization and development of method to minimization of risks. The culture of safety is the research and implementation of the effective schemes of institutional work and also the models of bahaviour and human activity, which have been developed and proved their opposition to the catastrophe. The risks of nuclear branch development have actualized the notions of nuclear and radiological safety. Nuclear safety is determined as controlled process of division in nuclear reactors. The spread determination of this notion using the term of "radiological safety": nuclear safety – fulfillment of "norms, rules, standards and conditions of nuclear materials use that provide the radiological safety". In its turn, the radiological safety is determined as "level of protection of modern and future generation from harmful influence of ionized exposure on human health". The regulation and controlling of nuclear branches of industry. The experience of Chernobyl catastrophe demonstrates the insufficient level of regulation-controlling approaches for effective formation all necessary aspects of the safety. Neither informational-communicative nor everyday aspects of the safety are not affected to clear regulation and controlling as it means the safety of life of million people. We can use the term of "radiological safety" in order to differ the formation of nuclear and radiological safety in industrial area from those needs and possibilities of risks' protection which are observed within human life. The radiology research the various influence of ionized exposure on human health; the diseases and patalogical human states as a result of ionized exposure use for diagnostic and treatment. Thus, the notions of radiological safety can be determined a little wider than "radiological safety": it can be considered as situational protection of people from the influence of ionized exposure. The radiological safety can be achieved owing to regulation and controlling the measures as well as own efforts of every individual. According to the results of sociological researches the government, communicative, professional areas of the culture of safety have not been achieved yet such development in Ukraine to assist in improvement of formation of every-day culture of radiological safety of population. The development of special social techniques will assist in raising individual knowledge and skills on opposition the radiological risk.

CHERNOBYL LESSONS IN RADIO-BIOLOGY FIELD – 20 YEARS AFTER.

O.O. Kliuchnykov, E.M. Pazukhin

1. The first important practical lesson of the Chernobyl Accident of 26.04.1986, which today is beyond question among specialists, consists in fact that the complete secrecy around this event didn't allow to the researchers to get objective balanced dosimetric information. This has brought to that the all negative consequences that have observed among suffered from the accident, were connected recently with radiation factor only . As it turned out this was far from correspondence with the truth.

2. The second lesson concerns to the level of the modern knowledge concerning to the small doses irradiation effect on organism. The serious arguments were adduced against the high doses irradiation effects' extrapolation on the low intensity irradiation influence in small doses. The correctness of linear nonthreshold conception in all ranges of the doses was called into question. And if the earlier radioactive irradiation was interpreted only as a striking factor, at present the emphasis is displaced to radiation effects, that carrying to breach of the information processes at molecular-genetic level. 3. The third lesson is one of the most important. As a work experience on liquidation of Chernobyl NPP accident consequences is shown the, the hypothesis made by ICRP assumes that people who irradiated by small dose cannot suffer from other diseases except cancer and benign tumor of some organs is far from the truth. As the data available in Russian State Physician-Biological Register show, the main contribution to life span reduction of irradiated people deposited by non-oncological diseases. 4. The fourth lesson. The cause of nuclear accidents including Chernobyl one is consider a human factor that is the human behaviour under the hazardous works realization. It concerns not only to personnel NPP but also to pilots, spacemen, submariners. Thus such people should have a keen sense of hazard and not any psychophysiologic type of person approaches to such sort of activity. That's why under the designing of the nuclear dangerous object as a system in which human factor is one of the main its characteristics, the psychophysiologic ability of person and particularities of his social behaviour should be taken into account.

DISTRIBUTED SYSTEM OF THE THYROID GLAND MONITORING OF THE POPULATION SUFFERED FROM CHERNOBYL ACCIDENT

M. Kononov, S. Radchenko, V. Ruditsa, A. Sudakov
SII «Intermag», Kiev

In the world practice the task of acquisition of data about the health state of population group, which lives in the sufficiently large territory, appears frequently. The typical problem concerned with guaranteeing a sufficient level of medical care — is a control of the health state of the population, suffered from the consequences of Chernobyl accident in Ukraine. This problem is caused by a considerable increase of the thyroid gland diseases for this group of risk. Based on the modern level of thyroid gland diagnostics, the monitoring system software provides the support of the necessary set of medical examinations: 1.Preliminary information about patient state;

2.Inquirer based screening examination; 3.Thyroid gland ultrasonic imaging (image grabbing from ultrasound scanner); 4.Hormone tests; 5.Biopsy (image input from microscope). To guarantee the reliability and universality in the applied level protocols and data formats, the hierarchic structure of the tag stream was used (similar to DICOM, but with the significant extensions according to the project requirements).

The dedicated server architecture of information system with the use of independent buffer database at each physician workplace for obtaining the diagnostic information was used. A two-level database (central on the kernel and local on each client) with the unified structure of the tables was proposed. For simplification in the implementation of this system and for guaranteeing the possibility of the flexible modification of the database tables formats during the system operation we proposed a projection of data forms to the table of uniform structure. This projection is carried out by the replacement of arbitrary type data with the integer value (or several integer values). In accordance with the proposed database architecture, the databases consist of two table groups:

1. Data tables — data of the forms;
2.Auxiliary tables — information, that makes it possible to reproduce the real view of the forms from the rows of data table, including the formation of the true structure of form fields, displaying correct values, converting aliases' codes into the real values. For reliable storage of graphical information the system supports accumulation of the files, linked with the database and their backup simultaneously with the database tables. The specially developed packed format was used to solve the task. This format is capable to store an arbitrary number of images and additional viewing data in the single compressed file. The tag stream with the arbitrary tags length, open format of tag, and the possibility of expanding the commands sets (tag sets) is used for the interaction between client and kernel. For simplification in the system implementation, the protocol is divided into two parts: service level (tracking of the integrity of the tag stream); data level (extraction of the tag semantic content). Each of the levels has its title, which is added at tag beginning, i.e., the title of data level follows immediately after service header. Testing of the system made possible its installation both under the conditions of persistent network connection and in the mode of autonomous workplaces in the conditions of session connection, the possibility of flexible tuning and changing the data structure while operation is in progress. It makes possible to use this system not only for collection and processing of monitoring data, but also for use as the information systems of the medical institutions.

Perinatal mortality in Belarus and Ukraine before and after Chernobyl

Alfred Korblein
Nuremberg, Germany
Alfred.koerblein@gmx.de

Perinatal mortality annual data from Gomel, the region of Belarus with highest radiation exposure from Chernobyl, are compared with the rates in the rest of Belarus except Minsk City (control area). To this end, the ratios of mortality rates in Gomel to the rates in the control area (odds ratios) are calculated. In 1985-1988, perinatal mortality rates do not differ in Gomel from the rates in the control area but then they rise and reach an increase of about 30% in the 1990's until the end of the observation period in 1998. The trend of the odds ratios is associated with the average strontium-90 burden in pregnant women (solid line in Fig.1). Perinatal mortality monthly data, 1985-1991, show a pronounced peak in the beginning of 1987 in Zhytomyr, the region with highest level of caesium-137 deposition in Ukraine. This increase is associated with caesium burden in pregnant women 7 months earlier. After 1988, the rates start to rise. This increase continues until the end of the observation period in December 1991. The data are well fitted by a logistic regression model with a falling time trend plus an additional term for the calculated average strontium-90 burden in pregnant women (see Fig.2 and Fig.3).

Reference: Korblein A. Strontium fallout from Chernobyl and perinatal mortality in Ukraine and Belarus. Radiats Biol Radioecol. 2003 Mar-Apr;43(2):197-202.

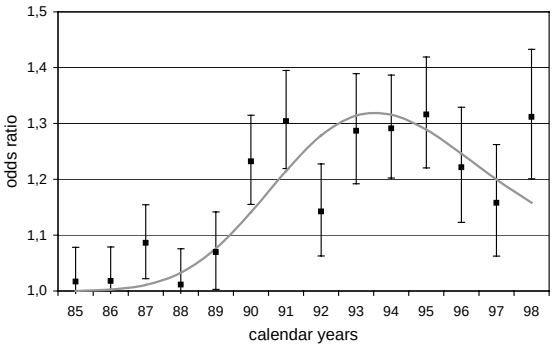

Fig.1: Ratio of mortality rates in Gomel to the rates in the rest of Belarus minus Minsk City (odds ratios). The solid line is the result of a regression with the calculated average strontium-90 concentrations of pregnant women.

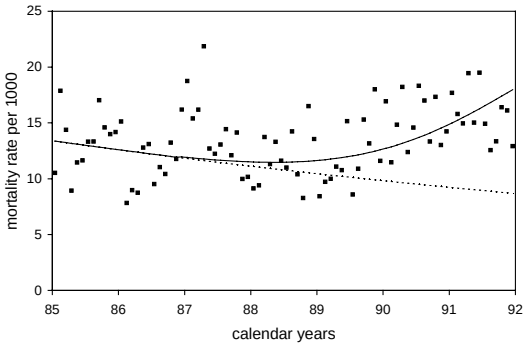

Fig.2: Perinatal mortality rates in Zhytomyr, 1985-1991 and result of a regression using a trend model which includes a possible strontium effect (solid line). The data for 1987 are omitted in the regression. The dotted line is the expected trend without the strontium term.

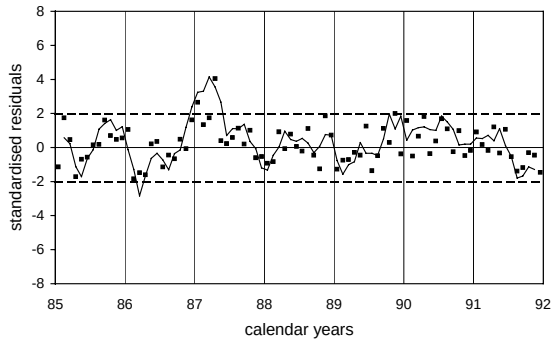

Fig.3: Excess perinatal mortality rates, i.e., observed minus expected rates, in units of standard deviations (standardised residuals). The solid line is the 3-month moving average, the broken lines indicate the range of two standard deviations.

PROPHYLAXIS OF IODODEFICIENCY DISEASES AMONG POPULATION AFFECTED JOINT IMPACT OF RADIATION AND OTHER GOITROGENIC FACTORS

V.N.Korzun, A.N.Parats, O.M.Marzeyev
Institute for Hygiene and Medical Ecology of the Academy of Medical Sciences of Ukraine, Kyiv

In spite of prophylactic and medical measures (use of iodated salt, water, confectionery and cookeries enriched with inorganic iodine compounds – KI or KIO_3), frequency of iododeficiency diseases (IDD) decreases insignificantly. Growth of IDD is marked even in the regions with a sufficient content of iodine in soil, water and foodstuffs. Many scientists explain it by joint effect of radiation, ecological, economical, and social factors. Analysis of factual nutrition of the population in the Northern regions of Ukraine demonstrated a deficiency of a number of the most important microelements both in daily food intake and separately given vegetables (potatoes, beetroot, carrot, and cabbage). It stipulated a low use of iodine by the population, it was evidently seen in the urine discharges. It made up 30-45 μk/daily. Besides, an insufficient content of Selenium (15-17μk/foodstuff), iron (8-11μk/foodstuff), and Cobalt, Copper, Zinc was revealed in the daily food intake. . Taking into account, that synthesis and metabolism of thyroid gland hormones is rather a complicated biochemical process, a simple addition of inorganic iodine compounds (potassium iodide or potassium iodate) in food salt and other foodstuffs doesn't allow to solve a problem of iododeficiency diseases adequately and completely. Last years it was proved by us and the scientists of many countries that a use in food of sea fish, mollusks, and especially algae, as salads, garnishes, culinary products and BAAs, produced of them,was the best method for group and individual prophylaxis of IDD. These algae contain all microelements (Iodine, Selenium, Copper, Zinc, Iron, Cobalt etc.) that take part in the synthesis of the hormones of thyroid glands..We have studied the efficiency and advisability of algae use in IDD prophylaxis and treatment. In our work we used brown algae Laminaria japonica, Laminaria digitata, Laminaria saccharina, Costaria costata, Cystosira grassipes, Fucus seratus, Ascophyllum nodosum, Zostera marina L., and also the products of its processing – powder, water and alcohol extracts, jams etc. Recipes and technologies for the production of the foodstuffs, BAAs have been elaborated. Medical-and- biological assessment at clinical and field observations among children and adult patients have been fulfilled. Provision of the population with these BAAs and foodstuffs with the addition of algae doesn't replace a use of iodated salt for mass IDD prophylaxis, it is intended mainly for critical contingents of the population, requiring additional efforts (pregnants, nursing mothers, children and teenagers, patients with hypertension, kidney's pathology, cardiovascular insufficiency etc.), that are recommended a limited use of a table salt.

THE LESSONS OF CHERNOBYL: DEFENSE FROM THE POTENTIAL EXPOSURE IN THE CASE OF POSSIBLE EMERGENCY SITUATION ON ACTING NPP OF UKRAINE

I.P.Los', O.M.Tsymbaliuk
The Marzeyev Institute for Hygiene and Medical Ecology of the AMS of Ukraine

The necessity of using the "Chernobyl experience" for preparation of emergency planning documents in case

of radiation accident was signed. It is known, that there are 15 acting power units in Ukraine. Transfer of radioactivity after the accident on Chernobyl NPP lead to Caesium-137 pollution of areas more than 1 Ci/km^2 on distance 1000 and more km (Sweden, Finland). The spots of pollution of areas more than 5 Ci/km^2 was fixed on distance 600 km. So, territories 400 km in radius is the zone of high potential danger. In this zone must to be well trained specialists and resources for adequate action in case of accident. Known the location of nuclear blocs in European part of Russian Federation and on the territory of Ukraine, it should be prognose, that can be mutual radiation pollution of the territories of both countries in case of serious radiation accident. Moreover, power units in Ukraine was made in Russia. This 2 aspects needs on unite efforts of both countries for the defense of population from potential exposure and minimization of accident consequences, for unification of normative and also instructive and methodical documents on radiation-accidental reaction. For this purpose exist the interstate contract among AMS of Ukraine and All-Russian Centre of Accident Medicine "Defense" of Russia on united reaction in case of potential radiation accident. Since 2006 started the united science work.

EPIDEMIOLOGY OF RADIATON CATARACTS IN CLEAN-UP WORKERS (LIQUIDATORS) OF THE CONSEQUENCES OF THE CHERNOBYL ACCIDENT

Y. I. Kundiyev, B.V. Worgul, P. M. Vitte, R. Shore, M. M. Sergiyenko, V. V. Chumak

Institute for Occupational Health of Academy of Medical Sciences of Ukraine, Columbia University, New York University, Kiev Medical Academy of Post-graduate Education Ministry of Health of Ukraine, Scientific Center of Radiation Medicine of Academy of Medical Sciences of Ukraine.

Key words:
EPIDEMIOLOGY, RADIATION CATARACTS, OCCUPATIONAL FACTORS, LIQUIDATORS OF THE CONSEQUENCES OF THE CHERNOBYL ACCIDENT

The initial group of participants of liquidation of consequences of the Chernobyl accident ("Liquidators") was formed from the 32000 exposed subjects. From them 12638 subjects were surveyed by investigators-ophthalmologists and 9481 Liquidators were selected in a cohort for analysis. For this cohort of Liquidators there was information on individual doses of gamma- and beta irradiation was estimated. These subjects resided in 7 cities of 6 districts of Ukraine. This cohort was surveyed 2 times with an interval of 20-26 months. The gender distribution of the selected cohort is: 4% women, 96% males. So:

1. The dependence of cataracts occurrence on the dose of irradiation proved.
2. It is proved that the dose threshold of cataract occurrence should be decrease in 10 times. With this in view radiation regulations should be reexamined.
3. In risk analysis of radiation cataracts development it is necessary to take into account non radiation factors.

THE LESSONS OF CHERNOBYL: DEFENSE FROM THE POTENTIAL EXPOSURE IN THE CASE OF POSSIBLE EMERGENCY SITUATION ON ACTING NPP OF UKRAINE

I.P.Los', O.M.Tsymbaliuk

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The necessity of using the "Chernobyl experience" for preparation of emergency planning documents in case of radiation accident was signed. It is known, that there are 15 acting power units in Ukraine. Transfer of radioactivity after the accident on Chernobyl NPP lead to Caesium-137 pollution of areas more than 1 Ci/km^2 on distance 1000 and more km (Sweden, Finland). The spots of pollution of areas more than 5 Ci/km^2 was fixed on distance 600 km. So, territories 400 km in radius is the zone of high potential danger. In this zone must to be well trained specialists and resources for adequate action in case of accident. Known the location of nuclear blocs in European part of Russian Federation and on the territory of Ukraine, it should be prognose, that can be mutual radiation pollution of the territories of both countries in case of serious radiation accident. Moreover, power units in Ukraine was made in Russia. This 2 aspects needs on unite efforts of both countries for the defense of population from potential exposure and minimization of accident consequences, for unification of normative and also instructive and methodical documents on radiation-accidental reaction. For this purpose exist the interstate contract among AMS of Ukraine and All-Russian Centre of Accident Medicine "Defense" of Russia on united reaction in case of potential radiation accident. Since 2006 started the united science work.

IMMUNOGENETIC APPROACHES TO PREDICTION OF POSTRADIATION EFFECTS REALIZATION IN THE ONKOHEMATOLOGIC AND THYROID PATHOLOGIES

J.N. Minchenko (Ukraine)

Radiation factor is the predominance among Chernobyl accident factor. Possibility of the onkohematologic and thyroid diseases realization that could be caused by ionizing exposure in removed period acquires a big importance. The aim of this investigation was the prediction of possible realization of genetic predisposition to onkohematologic and thyroid contribution to forming of pathologic process in radiation exposure. 65 reconvalescents of acute

radiation sickness (ARS) were studied by clinician, immunologic and immunogenetic methods. As a control nonirradiated persons-citizens of Central-Ukrainian genogeographic zone were investigated. Comparison analysis of dispersion of histocompatibility antigens loci A, B, C, Dr in the reconvalescents of ARS and control group shows that antigen specificity HLA-A10; HLA-A28; HLA-B16; HLA-B38; HLA-B35; HLA-DR3; HLA-DR4 significantly associated with radiation pathology. This fact gives possibility to attribute them to the markers of organism radiosensitivity. Specificity HLA-B15; HLA-DR2 have protective function. It was determined that realization of HLA-genetic predisposition to disease is the one from possible mechanisms of forming of radio inducted onkohematologic and thyroid pathologies. Immunogenetic component of radiosensitivity have the big contribution in the realization of this mechanism in the conditions of exposure. Presence of isolated antigens, that associated with organism radiosensitivity, in combination with genetic alleles, associated exactly with diseases (HLA-A*24; HLA-A*02 HLA-A*11; HLA-B*18; HLA- B*35; HLA-B*51; HLA-Cw*3; DRB1*11 and gaplotype DQA1*0101, DQB1*0501) in the phenotype increases realization risk of pathological process.

DYNAMICS OF HEALTH INDICES OF THE CHILDREN'S CONTINGENT, LIVING ON POLLUTED BY RADIO-ISOTOPES TERRITORIES OF THE KALUGA PROVINCE AFTER THE CHERNOBYL ACCIDENT

Matveenko E.G., Borovikova M.P., Gorobets V.F., Davydov G.A., Maksjutov M.A., Korelo A.M.
The State institution – the Medical radiological research centre of Russian Academy of Medical Science, Obninsk, Russia

The children's population of polluted by radio-isotopes districts of the Kaluga province continues to be exposed to long chronic influence (external and internal) of radiation small dozes on all body mainly due to Cs-137, and during Chernobyl accident and in the first months after it (from the end of April on the end of July, 1986) it has gone through also the sharp irradiation of a thyroid gland caused by incorporation of technogenic iodine-131. The purpose of the present investigation – studying in dynamics before and after the Chernobyl accident (1981-2000) the basic demography-epidemiological health indices of the children's population, and also levels and structure of the first revealed somatic and oncological diseases in polluted districts of the Kaluga province for an estimation of the possible remote effects of a chronic irradiation by small dozes of radiation. For the decision of the tasks put in work has been created scientifically proved model of the specialized dispensary system for prevention and treatment of diseases, which including: registration of injured persons on a district level with filling the formalized documents, the control of their quality, formation on their basis of electronic databases and their transfer on regional and republican levels of the Russian state medical-dosimetric register; system of annual medical-dosimetric surveys of the population with the automated operative leading their results and planning of necessary medical improving and preventive actions; conducting the generalized computer database of results of physical examinations and annual reports on addressing for medical help, allowing at use of the developed special program-mathematical software to carry out an estimation of character of changes of health indices of observable persons and dependences of these changes on size of the average saved up doze of an irradiation of all body. It is shown, that changes of demography-epidemiological indices 5 years prior to and 15 years after Chernobyl accident in the polluted and in "pure" control districts are same and have the negative tendency (decrease in birth rate, a negative natural increase of population). In all groups of observation for the investigation period the increase in dynamics of intensive indices of the first revealed diseases (FRD) was marked, but rate of this increase in injured districts was higher. In polluted districts was marked significant growth (in comparison with the data of control districts) of numbers of FRD of a thyroid gland. In structure of FRD the high percent was formed with syndromes and functional disturbances of separate organs and systems. Growth of number of oncological diseases was observed both in polluted, and in control districts. By comparison of levels of intensive indices of FRD to size of the average saved up effective doze on all body at children for 10 years of residing in the polluted districts dose-effect dependence it is not revealed. On the basis of the analysis of results of the carried out investigations 4 groups of risk of the remote radiating effects development are allocated. Deterioration of health indices of children living of 15 years on the polluted by radio-isotopes territories, and also in control districts and in the Kaluga province as a whole, it is possible to connect with influence of a complex of adverse social conditions in connection with social and economic transformations to the country, feeding deterioration, deficiency of vitamins and the microelements, caused both social, and the natural reasons, and also radiating and not radiating factors of Chernobyl accident.

TO THE PROBLEM OF THE ASSESSMENT OF LONG-TERM EFFECTS OF LOW DOSE RADIATION

A.M. Nikiforov[1], R.F. Fedortseva[1], R.P.Stepanov[2],

I.B. Bychkovskaya [1]
[1]All-Russian Centre of Emergency and Radiation Medicine (ARCERM) of the EMERCOM of Russia;
[2]Institute of Experimental Medicine of RAMS,
St. Petersburg

Up to now the problem of long-term effects of low-dose radiation in humans has been a subject for numerous studies and discussion. The need for assessment and in-depth understanding of the remote radiation consequences, identification of «high risk» groups for developing of the most social significant somatic pathology – cardiovascular, cerebrovascular, endocrine, oncology and some other, along with research of risk factors and pathogenic mechanisms underlying vascular pathology, comprises a new strategy aimed at medical aftermath of a disaster, development of international standards of prevention and treatment of the most life-threatening diseases and long-term rehabilitation. Electron-microscopy studies of low-dose radiation effects demonstrated, that along with «target» effects does exist a special cell damage category, not so well-known to scientific community. This damage can be attributed to the manifestations of radiation induced genome instability. It is practically irreversible massive inherited cell change, occurring just at the low threshold radiation doses (0,25 Gy). They can be induced by some non-radiation factors as well, however radiation is their ultimate cause. These so called «alternative» effects have been revealed in different low-regenerating tissues of mammals (vascular endothelium, smooth muscles of vascular wall, renal tubular epithelium). The manifestations of these changes include stable (practically irreversible) dose-independent increase of chance for cell damage and death early after exposure. They manifested mainly in cytoplasm structure disturbances. As it was shown, these effects does not strengthen with radiation dose increase, involve the majority of cell population, does not decrease with time, manifest irrespective of cell cycle. Due to these non-traditional properties these effects in mammals are most distinct in low-renewing tissues, and their damage is known to play a major role in pathogenesis of the development of the delayed non-cancerogenic somatic postradiational sequelae and of the acceleration of natural aging. Transmission of these changes to somatic cell of the offspring F1 is reported.

Taking into account all these properties these effects obviously can not be related to mutations and the authors consider them manifestations of genome instability due to epigenetic changes. If low-renewing tissues can be judged as radioresistant according to the reproductive cell death and chromosome aberrations criteria, they are radiosensitive as for alternative effects criterion. The fist-hand task for further studies is going to be an identification the minimal («triggering») radiation doses for various low-renewing tissues and organs, which cause damages of alternative type. It should allow assessing risk of low-dose radiation from new point of view. Basing on the results of experime studies and literature we suggest some additions onventional conceptions of harmful radiation effects.

RADIOECOLOGICAL SITUATION AND STATE OF HEALTH OF THE VICTIMS IN UKRAINE AS A RESULT OF CHERNOBYL CATASTROPHE ON A THRESHOLD OF THE THIRD DECADE

Omelyanets N.I.
National Commission on Radiological Protection of the Population of Ukraine
Kiev, Ukraine

Under the emergency criteria of former USSR in 1986 in Ukraine 5 rayons of Zhitomir and Kiev oblasts were referred to radioactive contaminated territories as a result of accident on ChNPP and to the end of 1987 264587 irradiated persons were registered in medical establishments. Since transition to national criteria (1991) 2293 settlements, 73 administrative rayons and 12 oblasts were recognized as radioactive contaminated territories. The contaminated territories were distributed on 4 zones with an establishment of their borders. For the last years a level of radioactive contamination and irradiation doses of the population has decreased. At the beginning of 2005 the annual irradiation doses were smaller than 0,5 mSv in 1511 settlements, in 410 one - 0,5-1,0 mSv, in 202 - 1,0 -5,0 mSv at criteria 1 mSv. First of them can be excluded from the list is radioactive contaminated territories, second of them - can be transferred to a zone of the strengthened radioecological control, third – can be referred to a zone of guaranteed voluntary resettlement. Under the data of Ministry of health of Ukraine, in 2005 the greatest excess of allowable levels of the contents of radiocaesium in milk and meat of private sector was marked in the Volyn, Zhitomir, Kiev, Rovno, Chernigov oblasts (from 1,1 up to 70,8 %). That is, the measure the antiradiation protection according to radioecological parameters is still necessary for carrying out about 600 settlements. The greatest number of the victims as a result of catastrophe - 3364475 persons was registered in 1998. At January 1, 2006 still 2594071 citizens in the country are the victims, among them - 106824 invalids and sick people and 617660 children in the age of till 14 years. The state of health of the victims for years after accident is gradually worsened. Under the results of annual dispensarization, at the beginning of 2006 95,3 % of the liquidators of accident and 79,8 % of children is recognized as the patients. The number of the children-invalids among the victims in 4 times exceeds an average population level. At the beginning of 2005 the mortality of all groups of the victims has made 16,1 ‰, the mortality of the adult inhabitants in radioactive

contaminated territories - 21,7 ‰, evacuated - 11,5 ‰ at the mortality of the population of the country 16,0 ‰. The mortality of the liquidators of accident has reached 16,6 ‰. For 1999-2004 the level of their mortality were statistically authentically exceeded the mortality of the persons of able-bodied age from the population (t = 9,6), and for 1999-2004 – the mortality of the persons of able-bodied age of a male from the population (t = 5,62). The decrease mortality of the victims of children is only positive parameter. The given data testify that in the third decade the scales and the levels of radioactive contamination remain still significant. According to the prognosis calculation the worsening of health of the liquidators of accident and inhabitants of the contaminated territories it is possible to expect. More than 2 million of victims will be exposed still by chronic irradiation by small radiation doses. The decision of existing problems will be provided by measures of the Nation-wide program of overcoming of consequences of Chernobyl catastrophe in 2006-2010 years, which was authorized by Supreme Council of Ukraine 14.03.2006.

DEFEAT OF AN ORGANISM BY A RADOACTIVE RADIATION ©

Pshenichnikov B. V.
National commission on a radioactivity protection of the population, Kiev, Ukraine

On the basis of the statistical data of the State registers on a morbidity in Belarus and in Ukraine the analysis of a morbidity of the population damaged after detonating of the fourth reactor Chernobyl A-plant was conducted. . The observation encompassed period with 1993 for 2000. The researches have found possible due to discovery by the author of process of a defeat of an organism by a radiation damage called by him "the radiation sclerosis". Designed on the basis of this discovery the Theory of the radiation sclerosis has allowed to show up the basis regularity of development of diseases of an organism after effect of a nuclear radiation. The outcomes of the conducted analysis have allowed to draw a conclusion, that on all classes of illnesses of group **B** is watched increase of a level of diseases of the irradiated people. The greatest abundance is detected for the liquidators that have absorbed the maximum exposure dose. Values of a general morbidity for of evacuees, that have found in a dangerous fields were a little bit below. The inhabitants of the contaminated territory basically had a morbidity in two and more times superior mean for all population of country. Thus, for elapsed 20 the general morbidity years exceeds in 2-8 times a level of a morbidity of all population of country. And this level carry on to grow! Is convincingly rotined, that the consequences of irradiation within the maiden 10 years have an effect for increase of a morbidity of the irradiated people by illnesses of a system of blood circulation, digestive tube and nervous system. These illnesses carry on to develop and today, and with increasing speed! The reason in that in an organism is shattered a network of microcirculation of all organs, with the defeat of the radiation sclerosis. But also today, unfortunately, matching of a morbidity of the irradiated and unirradiated population is carried out only on the oncologic diseases which are not having any attitude to consequences, any relation, of obtained atomic irradiation. It is necessary to remind, that this class of diseases concerns to last IV to a kind, i.e. does not introduce radiation hazard.

THE "CHERNOBYL" FOR TODAY: THE PROLONGED EXPOSURES SITUATION AND THE WAYS IN WHICH IT'S MAY BE DECREASED ADDITIONAL IRRADIATION DOSES

T.A. Pavlenko
The Marzeev Institute of Hygiene and Medical Ecology, AMSU

The system of radiological protection based on the estimation of exposures applies to type of exposure situations. The subsequent (reconstruction) phase of the Chernobyl accident causing prolonged exposures for public. In this situation, value of additional annual dose may be petty, but time its realization due to existence of several generations. Report includes estimation of the irradiation doses for public of "Chernobyl's" regions in context of the prolonged exposures. The values of existing and prediction annual doses were estimated due to "accidentally" and "non-accidentally" sources for the public. The structure of summary effective doses due to prolonged exposures for "Chernobyl's" regions has been discussed. The ways in which it's may be decreased additional irradiation doses are considered for same Chernobyl's" regions.

HOW RELIABLE ARE THE DOSE ESTIMATES OF UNSCEAR FOR POPULATIONS CONTAMINATED BY CHERNOBYL FALLOUT? A COMPARISON OF RESULTS BY PHYSICAL RECONSTRUCTION AND BIOLOGICAL DOSIMETRY

S. Pflugbeil1, I. Schmitz-Feuerhake2
[1]Berlin, Germany;
e-mail: Pflugbeil.KvT@t-online.de,
[2]University of Bremen (retired),Germany;
e-mail: ingesf@uni-bremen.de

According to the United Nations Committee on the Scientific Effects of Atomic Radiation UNSCEAR

which is adopted by the World Health Organisation WHO in evaluating the sequels of the Chernobyl accident the average dose of the population in the contaminated regions was very low – except for the thyroid in the nearby countries. The main contributions for the other tissues are thought to be generated – externally and internally – by the cesium isotopes 137 and 134. Relevant nuclides for the exposure as Sr-90 and Pu-239 are assumed to be negligible in distances greater than 100 km from the plant. Even for highly contaminated regions outside the evacuation zone where more than 37 kBq/$m^2$of Cs-237 surface activity were measured the mean effective dose was estimated to only about 10 mSv. For the neigbouring country of Turkey und the Central European countries in greater distances the estimated exposures remain below 1.2 mSv (effective dose). These results are in contradiction to findings by biological dosimetry. Several research groups investigated radiation-specific cytogenetic alterations in the lymphocytes of persons in the contaminated regions directly after the accident or some years later. The majority of studies revealed that the rate of unstable and stable chromosome aberrations is much higher – by up to about 1 to 2 orders of magnitude – as would be expected if the physically derived exposures where correct. A further finding was the occurence of multiaberrant cells which indicate a relevant contribution of incorporated alpha activity. Emitted nuclear fuel and breeding products should therefore be considered in the physical dose calculations.

ROLE OF REPAIR IN FORMATION OF HUMAN INDIVIDUAL RADIOSENSITIVITY IN POSTCHERNOBYL PERIOD

Ryabchenko N, Dyomina E.
R.E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology of National Academy of Sciences of Ukraine, Kyiv, Ukraine

Objective. It has been suggested that variations in DNA repair system activity might be the main reason of interindividual differences in human radiosensitivity and precondition for increase of cancer risk especially in the conditions of continuos effects of radiation factor of Chornobyl accident (internal irradiation). In the present study we investigated qualitative and quantitative dependencies of the formation of chromosome aberrations during S-phase as the highest activity of repair processes is dated to this period of cell cycle, and determined the contribution of repair to the formation of human individual radiosensitivity on the chromosomal level of the somatic cells. Materials and Methods. γ-irradiation of human peripheral blood lymphocytes of relatively healthy persons were carried out at the different phases of cell cycle including S and G2 at the 1,0 – 4,0 Gy dose range. To estimate the role of repair proteins in the formation of individual radiosensistivity, lymphocyte cultures were subjected to hypertermia (42^0 C, 1 h) after S-irradiation. Metaphase analysis was carried out at the first postirradiation mitosis. Results. The observed total chromosome aberration yield after S irradiation was shown to increase linearly with dose (value of dose squared coefficient was close to 0). Aberration distribution in cells in S-phase in the studied dose range corresponded to Poisson distribution. Mainly chromatid and isochromatid breaks were observed in aberration spectrum after S-phase irradiation and their levels also increased linearly with dose. The comparison of chromosomal aberration levels in lymphocytes after S-phase irradiation and in the conditions of thermal inhibition of repair proteins in two of examined persons groups (with normal and increased G2 chromosomal aberration levels) was carried out. Mean value of aberration frequency in the first group was $15{,}2 \pm 1{,}1$ after S-irradiation and $48{,}0 \pm 2{,}0$ after additional hyperthermia. At the same time in the second group these values were $22{,}4 \pm 2{,}1$ and $30{,}5 \pm 1{,}2$ accordingly. Thus the amplification of radiation-induced cytogenetic effects after hyperthermia supression of repair proteins was 32% and 7,3 % accordingly. Conclusions. Cytogenetic parameters obtained made it possible to determine contribution of repair processes to the formation of human individual radiosensitivity on chromosomal level.

INCREASE OF MALFORMATIONS, PERINATAL MORTALITY, AND CHILDHOOD MORBIDITY AFTER IN UTERO EXPOSURE BY CHERNOBYL FALLOUT

I. Schmitz-Feuerhake1, W. Hoffmann2, S. Pflugbeil3
1University of Bremen (retired),Germany;
e-mail: ingesf@uni-bremen.de
2Institute of Community Medicine,
Ernst-Moritz-Arndt Universität, Greifswald, Germany;
e-mail: wolfgang.hoffmann@uni-greifswald.de
3Berlin, Germany;
e-mail: Pflugbeil.KvT@t-online.de

In September 2005, the World Health Organisation WHO has published that there were less than 50 radiation-induced deaths because of the Chernobyl accident up to now. These had mainly occured among the clean-up workers who cared for shielding and removal of radioactivity after the event. Further assured effects of radiation on the health of the concerned population are not seen, except for thyroid cancer in children and adolescents which is thought, however, to be highly curable. Considering the low exposures which are reported for the contaminated populations this result would be even plausible. It is, however, in severe contrast to numerous findings after

Chernobyl which are published in the scientific literature. This is shown by the example of damages observed in children after in utero exposure. In the neighbouring countries of Belarus and Ukraine, in Turkey, and different countries of Central Europe elevations of malformations in newborn children and lost fetuses were observed as well as increases of perinatal deaths. Additionally there were rising rates of childhood morbidity and Down´s syndrome. It must be concluded by these findings that the spectrum of developmental defects generated by incorporated radioactivity in humans is much larger than derived by international radiation committees from the Japanese A-bomb survivors.

THE CONCEPTION OF RADIATION DEFENSE OF UKRAINIAN POPULATION AT RESUMPTION PHASE OF CHERNOBYL ACCIDENT

A.M.Serdyuk, I.P.Los'
The Marzeyev Institute for Hygiene and Medical Ecology of the AMS of Ukraine

The Conception of radiation defense of Ukrainian population at resumption phase of Chernobyl accident is the scientific strategy of defense the population's health from all sources of exposure. The accidental "Chernobyl" exposure summons the greatest disturb among all natural and synthetic sources of exposure of Ukrainian population. Today the annual "Chernobyl" doses at 89 % inhabitants of more than 2000 villages are lower 1 mSv per year. In structure of annual summary doses of exposure of Ukrainian population (7 mSv per year) the payment of "Chernobyl" doses of exposure is nearly 4 %. The greatest doses make the supervised part of natural radioactivity – 70% (nearly 5 mSv per year). Today the doses are not leading accidental factors of potential negative action on people's health. There are: sense of warning on own health and health of relatives, poverty and endemicion of polluted areas. The rehabilitation of manufacturing activities on polluted areas, promotion of business activity of population as the base of better life quality and preserve of own and relatives health today is the main direction of actions on minimization of consequences of the accident on people's health. Obtain of uranium in Ukraine made the great masses of technological remainders with higher contents of natural radionuclides. Doses of exposure of the population from this source are similar to doses of exposure at situation of Chernobyl accident and even exceed them. But that inhabitants have no any compensations. Break the principle of social truth and elimination of it is the single task of the Conception.The single part is problem of defense of human from the potential exposure and from exposure at situations of potential accidents on acting NPP. The lessons of Chernobyl here is the main source of information.

MEDICAL-BIOLOGICAL CONSEQUENCES OF CHORNOBYL CATASTROPHE: PATHOLOGIST OPINION

Tereshchenko V.P.*, Degtiariova L.V., Segeda T.P., Ivanova O.M., Bubelo G.O.*
Institute of Human Ecological Pathology, Kiev
Institute for Sorption and Problems of Endoecology NAS of Ukraine, Kiev

The principled pathologist's position, which fully studied the changes in organs and tissues of suffering persons during "post-Chornobyl" period, consists in following:

1. Verification of connection of diseases with influence of ChNPP accident's factors is possible by morphological researches. Concrete criteria of vital and postmortal diagnostics are worked up and inculcated by us in clinical practice and educational process.
2. "Chornobyl" experience makes enormous sense for development of medical-biological knowledge on the whole. This is proved by us on numerous examples.
3. Application of enterosorbents in overcoming of consequences of influence of accidents factors on human organism is pathogenically grounded, not only in medicine, but and in veterinary science. The last is necessary for mediated protection of habitants of radiation muddy territories (by decontamination of food products).

THE LIQUIDATORS AFFAIR CENTER ACTIVITY REVIEW

N.P. Tkachenko, M.A.Kaplan, A.F.Tzyb
Medical Radiological Research Center RAMS, Obninsk Russia

The approximately 500 emergency workers of ChNPP accident – inpatients have been observed. The majority of them were men worked in ChNPP area in 1986. Total dose of external irradiation - up to25 mSv. The basic pathology was cardiovascular diseases: multifocal atherosclerosis, hypertension, ischemic heart disease. Associated diseases were osteochodrous, bronchitis, goitre, obesity, prostatitis. In some cases (N=4) the oncopathology has been estimated (thyroid cancer – 2, prostate cancer – 1, stomach cancer – 1). The treatment of liquidators included medicines and low level infrared laser therapy. We have not found any difference between the liquidators and other nonexposed patients clinical data. The emergency workers demonstrated the alterations in the psychological status: high level of personal anxiety, hesitation, indecision, tension, pressure, inner conflict, the reducing of social activity. The majority of liquidators are handicap. It's well known that the

emergency workers had been undergone the extreme factors combination. Our data correlate with the similar investigations data obtained in other research center (A.M.Nikiforov, 2002). The liquidators are divided in two groups: social activity positive and social activity negative. Thus the emergency workers need not only the therapeutical, neurogical treatment but the special psychological support as well.

THE ROLE OF THE RADIATION FACTOR IN THE FORMATION OF THE HEALTH OF CHERNOBYL ATOMIC POWER STATION DAMAGE LIQUIDATORS HEALTH

Torbin V., Voronenko V.,Dotsenko V.
Institute of hygiene and medical ecology named after A.N.Marzeev
Academy of Medical Science of Ukraine

With the helping of index method of analysis which allowed to exarticulate the main reasons of changes in health indicators we identified that the total death-rate among liquidators had been 2.1 times increased in the period from Y1999 till 2002. At the same time due to aging factor it was increased in 1.53 times and due to other risk factors – in 1.39 times. For the total mortality of population in Ukraine all the negative shifts were caused by the aging factor only. Total value of the liquidators sickness-rate during the mentioned period had been increased in 1.98 times, including due to aging factor – in 1.24 times, and other risk factors – in 1.59. Should be considered that irradiation got by liquidators during operating in the zone of estrangement was included in the structure of the other risks. Our results of research in the field of dependence of sickness and death rates from irradiation dozes are the evidence of that. With the help of dispersed analysis we have found that there is well-defined, direct and reliable correlation ($\eta = 0.691$, $p<0.05$) between total sickness level of liquidators and doses of irradiation received by them. So, when the radiation dose up to 5,5 ber total level of morbidity caused 547 cases then after doze 25-35 ber this caused 655 cases per 1000 liquidators, that is 19,7 % more. Average correlation strength ($\eta = 0.309$, $p<0.01$) also was found between irradiation dose and total death rate of liquidators but without injuries and poisonings which pathogeneticly are not connected with irradiation. As in case with sickness with increase of irradiation dose total mortality of liquidators also increases. So in case of doze of radiation got up to 5 ber total level of mortality caused 11,5 cases then in case of doze up to 35 ber this resulted in 21,2 case per 1000 persons that is 84% more. These results are the direct evidence of the radiation influence on the liquidators health according to the "dose – effect" principle. But also there are exists indirect evidences. As was shown by our researches the most frequent level of morbidity calculated in the period Y2000-2001 for the liquidators operated in Y1986 (1091 case per 1000 person) the those operated in Y1987 (706‰), in Y1988 (672‰) and in 1989 (672‰). Difference between levels of morbidity between liquidators who worked in zone of alienation consists 65,3% ($p<0,01$). The same regularity is shown up under the separate diseases. Besides this with the regularity of 90-95% could be affirmed that among the liquidators of Y1986-86 in Y2000-01 total level of death was 68,9% higher then for liquidators who worked later. Thus all the data received directly and indirectly stated that irradiation got by liquidators during their work in the zone of estrangement provided and still providing negative influence on their health.

EPIDEMIOLOGICAL CHARACTERISTIC OF THE PROCEDURE OF COHORT FORMATION OF THE JOINT UKRAINE-USA THYROID PROJECT

[1]M.D. Tronko, [1]V.P. Tereshchenko, [1]I.P. Pasteur, [1]V.M. Shpak, [1]A.A. Derevyanko, [1]L.V. Chaikovska, [1]G.A. Zamotayeva, [2]M. Hatch, [3]G.R. Howe, [2]I.J. Masnyk, [3]L.B. Zablotska
[1]V.P. Komisarenko Institute of Endocrinology and Metabolism of AMS of Ukraine
[2]National Cancer Institute, Rockville, MD, USA
[3]Columbia University, New York, NY, USA

Since 1996, V.P. Komisarenko Institute of Endocrinology and Metabolism of the Academy of Medical Sciences of the Ukraine together with the Scientific Center of Radiation Medicine of the Academy of Medical Sciences of the Ukraine, Public Health Departments of Zhytomyr, Kyiv, and Chernihiv Oblast State Administrations of the Ukraine, National Cancer Institute (Rockville, MD, USA) and Columbia University (New York, NY, USA), have carried out investigations in the framework of the "Protocol for the study of thyroid cancer and other thyroid diseases in the Ukraine following the Chornobyl accident". This Project provides for examination of such inhabitants of the Ukraine that a) were, at the time of the Chornobyl accident, permanent residents or provisionally stayed in the most contaminated regions; b) who were aged up to 18 years at the moment of the accident; c) who had had thyroid radiometry in the first weeks after the accident; and d) who were selected at random. From Ukrainian Information-Dosimetry Database contained records for 75349 persons cohort of potential study subjects has been established, which comprised 32385 persons. After their current place of residence has been established, 20138 persons were invited for examination. For the period April 1998 to December 2000, 13243 potential study subjects have undergone medical examination. Out of this number 46.4% had a thyroid exposure dose under 0.3 Gy; 26.3% between

0.3 and 1.0 Gy; and 27.3% a dose over 1 Gy; among those screened 50.8% were females and 49.2% males; at the time of the Chornobyl accident, 30.5% were aged up to 4 years; 29.0% were 5 to 9 years old; 31.2% from 10 to 14 years; 9.3% were aged 15 to 18 years. The main advantages of the Project are as follows: a) large size of sample (over 13000 screened subjects); b) availability of thyroid radioactivity measurements made shortly after the Chornobyl accident; c) possibility of individual exposure dose estimates taking account of the modifiers of the effect; d) wide range of thyroid exposure doses (from minimum to maximum ones); e) minimal impact of subjective factors' on results; f) high degree of reliability of thyroid pathology diagnosis reviewed by an international expert group of specialists. Thus, an analysis of the data from the largest epidemiological study as to the number of subjects involved, conducted in the post-Chornobyl period in the Ukraine, will allow to perform many important scientific tasks in connection with radiation-induced thyroid pathology.

CHORNOBYL ACCIDENT GENETIC CONSEQUENCES AND THEIR PROPHYLAXIS

Tymchenko O.I., Lynchak O.V., Kartashova S.S., Omelchenko E.M., Polka O.O., Pokanevych T.M., Gorina O.V., Prykhodko T.A., Metenko O.L.

Institute of Hygiene and Medical Ecology, Ukraine

Since G.Meller have established damaging influence on genetic material, ionizing radiation have taken a special sit among damaging factors because of Chornobyl accident and also its influence as a professional, diagnostic and medicinal factor. Effects of low dosage ionizing radiation are realized by reactions caused by free acid radicals in cytoplasm and nucleus membranes. Free acid radicals can damage genetic material, in somatic cells they can stimulate tumor formation, in gametes they can cause reproductive losses. Scientific Committee of Atomic Radiation Influence Estimation attached to WHO (2000) admits possibility of increase of death from some solid tumors risk, but does not connect increase of reproductive loses with radiation factor. This problem is still unsolved and needs more data. Possibility of ionizing radiation influence on probability of spontaneous abortions up to 12 weeks gestation term and congenital pathology among newborns was studied. Methods. There were estimated cases of spontaneous abortions up to 12 weeks gestation term (1442) among desired pregnancies, cases of birth children with congenital pathology (1004), cases of healthy carried children birth (904) which were registered by special cards in Genetic Monitoring Kyiv Region System. Total exposure cumulative dosage was calculated according to "The General Dosimeter Pasportisation of Settlements of Ukraine" (2000). If dosage was unknown cases were excluded. Dosage of thyroid gland irradiation was calculated according to "The Thyroid Dosimeter Pasportisation" (2000) taking into account birth date and residence at the time of Chornobyl accident. Odds ratio was calculated with 95% confidence intervals. The following factors were not taken into account: natural radiation, psychological factors, medical care availability and quality, nutrition quality, marriage distance, which can influence pregnancy outcome. Results. Women who live in radioactive polluted areas and have cumulated certain general dosage have increased risk of spontaneous abortions in comparison with women who live in radioactive non-polluted areas (OR=1,36 при ДІ 1,14-1,63). Risk was equally increased in all groups of observation. If woman lives in radioactive polluted areas and cumulated dosage is more than 5 mZv the probability of birth children with left palatine is increased (OR=5,79 DI 1,50-23,93). Thyroid gland irradiation more than 20 sGy increases probability of nervous system birth defects among newborns even if woman lives in radioactive non-polluted area. There was no increase of birth children with Down syndrome, polydactylism and web-fingered children. Smoking, chronic infectious diseases increase spontaneous abortions risk, connected with ionizing radiation, twice. Mother's age is a risk factor also. Above-mentioned data demonstrate necessity of forming healthy mode of life among women including eating products with antioxidant (antimutagen) qualities.

RADIOACTIVE CONTAMINATION AND THE HEALTH OF WOMEN AND POST-CHERNOBYL CHILDREN -Based on the comparative study of Chernobyl, Seveso and Hiroshima/Nagasaki

R. Watanuki, Y. Yoshida, K. Futagami

Chernobyl Health Survey and Health Care Support for the Victims – Japan Women's Network

We established "Chernobyl"- Japan Women's Network in 1990 to deeply consider from women's perspective the consequences of the Chernobyl catastrophe on the life and health of women and their offspring.

1. Health condition of women and children living in contaminated areas Twenty years have passed since the accident. During these years, various adverse health effects have been observed in Chernobyl children, although they have not been recognized yet officially as health consequences of Chernobyl catastrophe. Nowadays, among post-Chernobyl children we can see various diseases, unhealthiness and physical weakness. Epidemiological studies on women living in contaminated areas and animal experiments showed

that the high incidence of endocrine diseases and disorders of reproductive system such as disturbance of sexual development and menstrual disorders among young and adolescent girls living in contaminated areas. Their adverse reproductive health might affect offspring's health condition. For this situation, we can see some similar health effects between radiation and chemical exposure cases.

2. A new concept of "Endocrine disruption"

Through consideration from extensive studies on the effects of chemicals to wildlife and human, T Colborn (USA, environmental biology) proposed a new concept called "Endocrine disrupting effect" in early 1990s. Now, the endocrine disrupting effects on developing organisms are of greatest concern in USA and Europe as well as in Japan. Some chemicals can disrupt the normal function of hormones and cause irreversible effects on the reproduction and offspring's health. Animal studies showed that effects of endocrine disrupters appear at levels far below than what had been believed to be "safe" in traditional toxicology. Recently, the focus of developmental toxicology has changed to an important and emerging area. The effect in utero exposures to some environmental agents which cause permanent functional changes, results in increased susceptibility to disease/dysfunction later in life span. (Heindel, 2003). As a possible mechanism, it is thought that such contaminants might change the program of gene expression.

3. Comparative study (I) – CHERNOBYL vs. SEBESO (Dioxin exposure case) "Seveso accident" happened on 10 July 1976. It is a dioxin contamination case due to a reactor explosion in a chemical factory. In previous epidemiological studies, the government recognized skin damages (chloracne) only as the health consequences of the accident, though people claimed various health effects. But 20 years later (1996), the Seveso Women's Health Study (SWHS) began afresh with the new concept of "Endocrine disrupting effect". It investigates a relation between serum dioxin levels and women's reproductive health. The study is still on-going. (Eskenazi, 2005)

4. Comparative study (II) - CHERNOBYL vs. HIROSHIMA/NAGASAKI

1) Recent A-bomb survivors' epidemiological survey showed an elevated incidence of myelodysplastic syndrome (MDS) during 1980-2004. MDS is closely related to leukemia. Also, the elevated incidences of solid cancers are still persisting in 1980-2004 (Tomonaga, WHO-Nagasaki Univ. joint seminar in Geneva, 2005). This new finding is revealed 60 years after A-bombs' explosion.

2) In the genetic studies, indication of radiation effect has not been obtained so far. It is said that the results should be taken to indicate that radiation effect by the atomic bomb was not discernibly large under the study conditions employed (Nakamura, RERF, 2005). Extended genetic studies are still on-going. The other hand, children of A-bomb survivors (the second generation) demand the Government to investigate actual health effects. Additionally we reviewed the studies of Hiroshima/Nagasaki focusing the women's reproductive health and found such studies few and insufficient. We continue reviewing them.

5. Our hypothesis Based on integrating above results of comparative studies, we hypothesize as follows: In Chernobyl case, Cs137 as well as I131 might have the endocrine disrupting effect that can disrupt biological response, programs of gene expression and/or other biological homeostasis including in immune, nervous and reproductive systems. These effects may lead susceptibility to subsequent exposure to environmental agents. In utero exposure may induce more serious effect to developmental embryo/fetus. Epidemiological studies show that Cs137 was detected in placenta and was passed into organism of fetus. And after birth, in contaminated area, newborn is continuously exposed to radiation even they are at low level. This is a reason that among post-Chernobyl children under radio-ecology circumstances the increased incidence of various diseases, unhealthiness and/or physical weakness have been observed, we consider.

We call such diseases "new type of disease". It is why because these diseases may have same origin of exposure to pollutants during developmental period in utero. This expansion of children's diseases induced from 'trans-generational effect' of pollutants is an unprecedented experience in human history. We propose that epidemiological health studies of Chernobyl children should be re-evaluated with the new concept of "endocrine disruption". And therefore in current technological society the Ecological Ethics should be discussed as the critical issue on our generation's responsibility for the future generations.

BASED ON THE COMPARATIVE STUDY OF CHERNOBYL, SEVESO AND HIROSHIMA/NAGASAKI

R. Watanuki, Y. Yoshida, K. Futagami
Chernobyl Health Survey and Health Care for the Victims –Japan Women's Network

<Background>

We established "Chernobyl Health Survey and Health Care for the Victims –Japan Women's Network" in 1990. A motive of our organization is based on Watanuki's 30 years study concerning major incidents in the world which affected subsequent generations. Our philosophical motto is "Human being is a part of Nature, and is not more than a part of Nature". During these 16 years we have made some medical materials assistance to victims-children as well as health survey from the viewpoint of relation between pollutants and health of women and offspring.

<Introduction>

Looking back not only to the Chernobyl catastrophe but to the period after World War II, we can see the history of numerous ecosystem pollutions due to radioactive and/or chemical substances all over the world (Table).

Major incidents which affected unborn generations

Year	Pollutant	Incidents
1945	Radioactive substances	Atomic bomb (Japan)
1940−	Radioactive substances	Nuclear tests (USA, USSR, UK, France, China, India)
1950s−	Methyl-mercury	Minamata disease (Japan)
1961−70s	Dioxin (Chemical weapon)	Vietnam war (South Vietnam)
1950s−90s	Radioactive substances	Sellafield re-processing plant (UK)
1968	PCBs (Dioxin)	Yusho (rice oil) case (Japan, Taiwan)
1976	Dioxin	Seveso accident (Italy)
1979	Dioxin	Love Canal Incident (USA)
1979	Radioactive substances	TMI Nuclear accident (USA)
1984	Methyl isocyanate	Bhopal incident (India)
1986	Radioactive substances	Chernobyl accident (USSR)

By Reiko Watanuki

All such cases regardless of the period of their occurrence, wartime or so-called "peace time", have rendered a serious negative influence over the life and health of unborn generations. This adverse effect might reveal after a long time, sometimes 10 years after, sometimes after half a century. From 1950s up to the present, along with the scientific progress and the expanded use of advanced technologies there has been a clear rise of the accumulation level of environmental pollutions which can burden unborn generations with a heavy load. Considering these circumstance, we can see the importance of mother's reproductive health, because uterus is a smaller ecosystem included in our ecosystem. Uterus links a developmental embryo/fetus with the ecosystem through mother's body. During past two decades a great concern has been arisen for the effect in utero exposures to some environmental agents that cause permanent functional changes, which results in increased susceptibility to disease/dysfunction later in life span. (Heindel, 2003)

<Our comparative study: Chernobyl, Seveso, and Hiroshima/Nagasaki>

1. From a review of Chernobyl studies, we paid attention to following points. Cs137 accumulation in various organs and/or tissues including placenta and its transmitting into fetus are observed. Reproductive health of girls, adolescents and women, living in contaminated areas, has been damaged. Gynecological pathologies or problems such as hormone imbalance, disturbance of menstrual function, and morphological change of reproductive organs are observed. A growth rate of morbidity of children born and living in contaminated areas is still observed. (Watanuki & Yoshida, 2005)

2. Seveso accident (1976, Italy) is a dioxin contamination case due to a reactor explosion in a chemical factory. In previous studies, recognized health effects were mainly skin damages (chloracne). But 20 years after the accident, the study on women's reproductive health (Seveso Women's Health Study) began afresh with a new concept of "Endocrine disrupting chemicals". It investigates a relation between serum dioxin levels and women's health. The study is still on-going. (Eskenazi, 2005)

3. In Hiroshima/Nagasaki case, a new finding of radiation effect on increased cancer risk was revealed 60 years after A-bomb explosion (Tomonaga, 2005). For women's reproductive health, we found the studies few and insufficient. Now genetic studies are still on-going and second generation of survivors demand the Government to investigate actual health effect of radiation. Based on the comparative study, we can believe that Chernobyl as well as Hiroshima/Nagasaki data should be re-evaluated with the new concept of "endocrine disruption" and more close attention to reproductive health is needed. (Waatnuki, Yoshida & Futagami, in print, 2006)

<Ecological Ethics and Unborn Generations>

The framework of Ethics in its original meaning indicates moral duties among people who coexist in the same historical age. However, in the human society of the nuclear age with substantial scientific potential it is no longer permitted to consider this ethics to be only the problem arising among people living in the same epoch. It is required to acknowledge the ethics implying inter-human relations that exceed current generation as well as the relations between human being and all living things. We call it "Ecological Ethics". We think that it is necessary to reconstruct and extend the ethical framework from traditional Ethics to essential Ecological Ethics. The ecological principle of "Human Being is a part of Nature and more than a part of Nature" might sound a self evident truth. But it is extremely important to deeply catch the essence of the principle, because a culture in which we live has been practically based on a concept that human being controls Nature. The alarm bell given by the soundless voices of Chernobyl children has revealed the responsibility of our generation. The responsibility to unborn generations includes a problem of choice what kind of technology we select or not. We will discuss these issues.

PROSPECTS FOR RUSSIAN CHILDREN IN THE FOLLOW-UP PERIOD OF CHERNOBYL

Christoph Zenses

Pro-Ost e.V., Solingen , Germany

As a consequence of the accident in Chernobyl in 1986 totally 970.295 children and young persons under 18 years have been exposed to the strong radiation in 14 russian federations. The aftereffects with genetic,

morphological and clinical characteristics raise up in the increased rates of handicaps as well as in the growing rates of thyroid gland cancer regarding children mainly. With the aim to protect these children in social, psychological and medical regard as well as to improve their health and living conditions the german association Pro-Ost-e.V. and his russian partner association Radimitschi 14 years ago started their common work in the high contaminated russian town Novozybkov. Since 1993 the *Early Promotion Center* offers physiotherapy and therapy for babies and little children with most serious handicaps. Such kind of early promotion did not exist until then in this town. Due to indoctrination and exchange with german physiotherapists until now there could be treated 900 children. The building-up and the long-termed management of a *Special School* improve intensivly the life situation of children with mental handicaps. Actually there are 18 children educated daily. They get travel service, food and therapies. The staff is regularly instructed by german specialists. In order to be able to offer the "Chernobyl children" convalescence, the children's holiday camp *"Nowocamp"* has been built up in Russia in a non-contaminated aerea. Since 11 years in each summer 500 children are coming there. The program has been developed in a close team-work and is accompanied by german persons in charge respectively young persons. Pro-Ost investigates long-termed in a qualified equipment and supports the national financing. In the center of Radimitschi a permanent *Screening with Ultra-Sound Diagnostics* takes place due to the increased rate of thyroid gland cancer. Screening and education is combined here. Russian and german doctors are working hand by hand. Patients with special characteristics get an aimed diagnostic, malignancies will be selected in time in order to start a definitiv therapy. The projects improve the medical and social-economical situation of the children in this region und create new structures and prospects for the people living in a bleeding and hopeless region.

TWENTY-YEAR HISTORY OF THE CHERNOBYL AFTERMATH

Dr. Zenon Matkiwsky
Children of Chernobyl relief and development fund
Short Hills, New Jersey (USA)

For all the heartbreak and illness it has caused, the Chornobyl nuclear disaster provides the world with a unique and important opportunity to learn as much as it possibly can about the health impact of large-scale human exposure to atomic radiation. For much of the past 20 years, the health research establishment around the world has squandered this opportunity as it sought desperately to downplay the accident and to rely on Soviet health data that was notoriously unreliable. In the next ten years we have an opportunity to reverse this trend. We also have an opportunity to save the lives of thousands of children who are being stricken with life-threatening or disabling illnesses. Whether or not these illnesses are ultimately tied to Chornobyl is of secondary importance. Our primary goal should be to strengthen the medical infrastructure of the most affected nations and to expand their capacity to improve the health of their children and to safeguard future generations against birth defects or disabilities. Besides accelerating the process of democratic reforms that eventually led to the collapse of the Soviet Union, Chornobyl has served as an important catalyst for the revitalization and modernization of the medical systems of Ukraine, Belarus, Russia, and other former Soviet republics. We have seen how even modest investments in new medical technology and training programs have had a significant effect on the quality of care in many hospitals that were once 40 to 60 years behind Western medical advances. The US National Academy of Sciences in its BEIR reports (BEIR = Biological Effects of Ionizing Radiation) has repeatedly stated that there is no safe dose of radiation. Even a tiny particle of plutonium if ingested in the lung can cause cancer over time. The amounts of radiation released by Chornobyl were anything but tiny. Chornobyl unleashed over 185 million curies of radiation over a vast area of Ukraine, Belarus and much of Eastern and Northern Europe. By some estimates, this was the equivalent of 270 Hiroshima-sized bombs. We should not forget that much of this radiation drifted well beyond the borders of Ukraine and Belarus. We forget that the first reports of abnormally high radiation levels came from Sweden, over 1,000 miles north of the disaster site. Indeed, recent studies have shown that cancer rates even in these remote areas have risen. Even as far away as Wales and Ireland, and southern France, health authorities have been forced to impose restrictions on dairy products, mushrooms, berries and other foodstuffs that were found with high concentrations of radiation as late as 1998. A second, enormous plume of radiation drifted south-southeast across Turkey, Iraq, Lebanon and Kuwait. Instead of looking closely at new evidence, the IAEA, and many other institutions that have the funds to launch large-scale research studies have chosen instead to look the other way and to cling to long-cherished assumptions based on partial and incomplete data from the aftermath of Hiroshima. For nearly 40 years, the finest scientists in the United States and Europe and the Soviet Union assumed that an accident like Chornobyl could never happen. It is the assumption of safety and the assumption of minimal health impact that led to the Chornobyl disaster to begin with. The only way we will truly learn from this tragedy is to look at the affected population in all its dimensions. Because so much of

the health data from the Soviet Union was falsified and classified and destroyed, we must increasingly rely on health studies from other nations such as Sweden, Germany, Greece, and Austria. Inevitably, this information will only give us a small piece of the massive epidemiological and demographic puzzle that Chornobyl created as millions of curies of radiation spread across the Northern Hemisphere. Everyone now agrees that the massive release of radioactive iodine 131 caused an epidemic of thyroid cancer both in children and in adults. We have learned that another 9,000 children in Ukraine are diagnosed with pre-cancerous lesions of the thyroid gland, so we are likely to see a second wave of cancer in the years to come. But thyroid cancer cannot possibly be the only major health effect stemming from Chornobyl. Over the past 4 years, a team of American and Ukrainian geneticists have tracked the condition of 104,000 newborn children in the provinces of Rivne (REEV-neh) and Volyn (VAW-lynn). These provinces in northwestern Ukraine received a significant amount of nuclear fallout from Chornobyl. In the first stage of their study, these researchers found a FOUR-FOLD increase in spina bifida in children. What is especially telling is that the rate of spina bifida and neural tube defects is even higher among newborns in the contaminated northern districts of Rivne known as Polesye. If the national average in Ukraine is 12 cases per 10,000, the rate in Polesye is 28 per 1,000, or nine times higher than the international norm of 3 per 10,000. The March of Dimes was sufficiently disturbed by the spina bifida epidemic that they launched a special campaign in Ukraine to introduce more folic acid into the diet of pregnant women. This afternoon, we will be hearing from an eminent geneticist, Dr. Wolodymyr Wertelecki, the team leader of this important screening program, but since some of our foreign guests may not be able to attend the medical workshop, I wanted to inform you, at least in summary, of these key findings. The researchers in Volyn and Rivne also discovered many rare and unusual birth defects such as polydactilism – infants born with extra fingers or toes, conjoined twins, cataracts, deformed or missing limbs, and deformed or missing critical organs. They documented and photographed these cases, and set up the first birth defects registry in Ukraine. We have also learned from the Institute of Genetics in Kyiv that over 2,500 children have been registered with cataracts in recent years. In 2001, the rate of cataracts was twice as high as in 1993. Last year alone, 423 infants were registered with cataracts. Another case-controlled study funded by the US Office of Naval Research found a statistically significant increased risk of leukemia, especially acute lymphoblast leukemia in children in the radiation-contaminated regions of Rivne and Zhytomir, Ukraine following the Chornobyl accident. These rates were found to be twice as high as the rates for the region of Poltava, which had the highest rates of childhood leukemia prior to 1986. At the Children of Chornobyl Relief & Development Fund, we are hoping that a new wave of cancers does not occur, because Ukraine is ill-prepared to handle such an epidemic. At the same time, we are anticipating the worst, and working very hard to rebuild Ukraine's medical infrastructure that was terribly neglected during the Soviet era. In the past 16 years, our Fund has delivered over $55 million dollars worth of medical aid and modern technology to our partner hospitals in Ukraine. In the early 1990s we concentrated our efforts on developing a premier children's cancer center in Lviv for the treatment of leukemia and Hodgkin's Disease. We created a diagnostic laboratory with Ukraine's first flow cytometer and various blood analyzers that enabled doctors to tailor their treatment to each child. I'm pleased to report that this Lviv hospital has now achieved remission rates that may be compared to Western hospitals. We also installed an MRI system at the Kyiv Emergency Hospital and Trauma Center, which provided screenings for over 10,000 patients, enabling doctors to locate and extract many malignant tumors. By the mid-1990s we recognized the need to improve the treatment of premature infants and newborns with various birth defects and complications. We have now established 10 model neonatal intensive care units complete with respirators, pulse oxymeters, incubators and infant warmers. After the introduction of this new technology and training, many of these hospitals have achieved steep reductions in infant mortality even as they have increased their volume of patients and are handling more difficult pathologies. It's worth pointing out that until the 1990s neonatology was an untapped discipline in Ukraine. Babies who were born weighing less than 1 kilogram were treated as if they were stillborn because doctors had no way of treating them. Their deaths were never tabulated in national mortality statistics, and we will never know the total number of newborns that died as a result of inoperable birth defects or complications. Today, the infant mortality rate in Ukraine stands at 24 per thousand live births, still three times higher than in the United States, but the number is much lower in our partner hospitals where we have invested substantial resources. Besides supplying new technology and essential hospital supplies, CCRDF also organized regional and national conferences to train doctors and anesthesiologists in the basic techniques of neonatal intensive care. We also published the first Ukrainian translation of medical manuals in neonatal intensive care and pediatric cardiology, and distributed thousands of copies for free to medical professionals.

DISONTOGENEZIS OF SEXUAL DEVELOPMENT OF YOUTH AS A RESULT OF PARTICIPATION THEIR FATHER'S IN LIQUIDATION OF CONSEQUENCES OF FAILURE ON CHERNOBYL

Markova M.V.
Ukrainian Research Institute of Forensic, Social Psychiatry and Substance Abuse, Kyiv

The purpose of work – the study of sexual development' features of modern youth. Method of conducting of research. By the method of random sample on condition of the informed consent 450 persons – students of I course of different universities of Kiev in age from 16 to 21 years were inspected. Middle ages of explored – 17,8 ± 2,7 %; 54 % (243 persons) were women, 46 % (207 persons) – men. For the systems approach study of features of sexual development on the basis of principles of classic sexology inspection the card of inspection was developed. It included anamnesis, sexology, psychology, psychopathology and social-demographic blocks. Results. The forms of disontogenezis sexual development of modern student youth were: a) the breach of the temps of somatosexual developments (speed upping and braking), b) speed upping of psychosexual development or it somatogennistic, psychogennistic or sociogenistic retardation; c) combinationed or difficult asinhronisations of sexual development. Thus simple asinhronisations of somatosexual development took place in 14±2,8 % men and 10±2,4 % girls; simple asinhronisations of psychosexual development – in 6±2,1 % men and 4±2,8 % girls; combinationed asinhronisations of psychosexual development in 38±2,8 % men and 58±2,7 % girls; difficult asinhronisations of sexual development – 49±4,2 % men and 41±3,6 % girls. It is needed to mark that among persons with speed upping of sexual development specific gravity was made by young people, whose parents (before their birth) took direct part in liquidation of failure on CHAES (among the descendants of liquidators such persons were 62 %, and among other quantity of inspected – 37 %). Conclusion. Finding testify to the presence of influencing of participation a father's in liquidation of failure on CHAES on the origin to disontogenezis of sexual development at a child. In our opinion, it must be taken into account by specialists during the work with an afore-mentioned contingent in relation to prevention of the possible forming of violations of sexual conduct at the given category of young people.

COMMUNITY-DRIVEN DEVELOPMENT IN CHERNOBYL REGIONS IN UKRAINE: EXPERIENCES, RESULTS AND PERSPECTIVES

Pavlo Zamostyan
UNDP Ukraine
Chornobyl recovery and Development Program

The Chornobyl Recovery and Development Programme (CRDP) launched its activities based on the recommendations of the report *"The Human Consequences of the Chornobyl Nuclear Accident. A Strategy for Recovery",* initiated by the UN Agencies in February 2002. CRDP forms the third phase of the UN Chornobyl Programme, which had been operating in 1999-2002. The goal of CRDP's activities is to support the efforts of the Government of Ukraine to mitigate long-term social, economic and ecological consequences of the Chornobyl catastrophe, to create more favorable living conditions and promote sustainable human development in Chornobyl affected regions. Due to the partnerships with international organizations, oblast and rayon state administrations, village councils, scientific institutions, non-governmental organizations and private businesses, CRDP supports community organizations in the implementation of their initiatives on economic, social development and environmental recovery as well as promotes information distribution about the Chornobyl catastrophe within Ukraine as well as internationally.

In order to achieve its goals, CRDP is working in such areas: *Rendering assistance for the improvement of state policy* – supporting legislation changes and innovative strategies towards mitigation of the consequences of the Chornobyl catastrophe, which, in turn, are focused on providing sustainable development in the affected regions, secure living and distribution of comprehensive information to the population. *Self-governance and community development* - rendering assistance to community organizations in self-organization and self-governance, increasing their potential for implementing their own priority programmes of social, economic, and ecological recovery and development. *Institutional support* – enhancement and development of the institutional support system, which foresees the expansion of institutional opportunities, strengthening the potential of organizations and institutions that promote socio-economic development and ecological recovery of the Chornobyl affected regions. CRDP works in the 4 most Chornobyl-affected oblasts in Ukraine, namely Kyivska, Zhytomyrska, Chernihivska and Rivnenska, which include 17 raiyons: Borodyansky, Ivankivsky, Kyivo-Svyatoshynsky, Makarivsky, Polissky (Kyiv oblast), Brusylivsky, Korostensky, Ovrutsky, Luhynsky, Narodytsky, Olevsky, Emilchynsky (Zhytomyr oblast), Chernihivsky, Ripkynsky

(Chernihiv oblast), Dubrovytsky, Zarichnensky and Rokytnivsky (Rivne oblast). CRDP's approach, focusing on community development, has not only begun to change the attitudes of the communities towards greater self-help, but has also led to a much more enthusiastic response from the donor community. At present, CRDP has acquired almost USD 4 mln. Current CRDP donors include: UN Trust Fund for Human Security / Government of Japan; Canadian International Development Agency / Government of Canada; The Swiss Development and Cooperation Agency; UN Development Programme; UN Special Voluntary Fund; The United Nations Office for the Coordination of Humanitarian Affairs. CRDP's Main Achievements: Supported the improvement of national programmes for the mitigation of Chornobyl catastrophe consequences (research, round-tables, conferences, participation of the CRDP's national and international partners in the dialogue). Provided the Government of Ukraine with advisory support on national policy and regional cooperation issues, including hosting of various round tables and providing support for studies on Chornobyl-specific policy issues. Realization of the principle "Community organizations and authorities: partners on recovery and development issues". As of January 2006, more than 200 community organizations (COs) were formed in 139 villages of Ukraine (involving almost 20,000 members), who resolve important socio-economic problems in the villages: reconstruction of water pipe-lines and gasification; reconstruction of schools, baths, village health centers, and ambulatories; creation of youth, public and service centers; etc. In 2004-2005, community organizations implemented more than 100 recovery and development projects totaling over 9 mln. UAH, 3 mln. of which were contributed by CRDP. Community organizations successfully mobilized significant financial resources for implementation of their own priority projects. On average, for the implementation of one project, a community organization itself contributes 20% of the total amount, local village and rayon authorities – 40%, CRDP – 31%, other sponsors – 9%. Conducted a series of trainings throughout the regions on organization of CO's activities; leadership; medical and preventive measures; project preparation and management; and local economic development and planning. In 2005, about 4000 persons took part in those trainings, including representatives of local executive authorities and self-governance. More than 20 village health centres have been provided with medical equipment. Supported the creation of Youth Centres in 24 villages; 6 of which were provided with equipment for computer centres. In two village schools (Pershotravneve, Ovruch rayon and Pakul, Chernihiv rayon) projects on creation of Internet centres and web-sites are successfully being implemented. 41 Community Organizations received and successfully implemented grants, totaling $72,000 USD, for developing business plans, economic and business trainings, registration of a new businesses, etc. Awarded grants for developing of activities of Regional Economic Development Agencies in three rayons of Zhytomyr oblasts (Brusyliv, Korosten and Ovruch) and 2 rayons of Kyiv oblast (Borodyanka and Ivankiv). Initiated the work of the Chornobyl Economic Development Forum as a platform for working out a strategy of sustainable development of territories, attracting investment into the region, creation of the conditions for partnerships between businesses and authorities for recovery and development of affected territories. In cooperation with leading scientific institutions, developed and distributed information materials (brochures, booklets, posters, CDs – totally about 20 titles) regarding the Chornobyl accident consequences and conditions of secure living in contaminated territories. Conducted a series of trainings for teachers and medical workers on issues of radiation security and healthy life styles. CRDP's main goals for 2006: Continue to support the development and self-organization of village community organizations in affected territories, including offering "seed" grants for development projects. Stimulate state policy and institutional changes. Enhance the capacity of local public institutions to further mitigate the consequences of the Chornobyl catastrophe. Promote regional cooperation in Chornobyl-affected areas in Ukraine, Russia and Belarus. Disseminate information about consequences of the Chornobyl catastrophe and CRDP activities. Preparation for the 20th Commemoration Anniversary of the accident at the Chornobyl Nuclear Power Plant (ChNPP).

COMPARATIVE ASSESSMENT OF THE SOCIALLY-PSYCHOLOGICAL CONDITION OF THE POPULATION WHICH LIVES ON RADIOACTIVE POLLUTED TERRITORIES AND MIGRANTS AFTER 20 YEARS OF CHERNOBIL ACCIDENT

Prilipko V.A., Ozerova J.J.
Centre of science of radiating medicine of Medicine Academy of Ukraine, Kiev

Big technogenic accident which took place 20 years ago on the Chernobyl atomic power station, pulls behind itself a number till now unresolved problems: medical, ecological and socially-psychological. The last one are long-term problems, due to of some factors: not verified and nonflexible state social policy concerning liquidation of accident consequences, disregard of psychological problems of the suffered population, reorganization of a society as a whole. The purpose of the given fragment of research became definition of cause-effect relation between major factors of Chernobyl accident and social factors of a

population living conditions, which lives on the radioactive polluted territories and the moved population. Complex socially-hygienic research enables to confirm priority of social -psychological factors of vital activity conditions in formation of rural able-bodied population's health. Was defined cause-effect relation between a physical condition of health in accordance with self-estimations of the population, a mental state of health and social factor actions. There is no tendency to improvement of health among the population not only through influence of consequences of Chernobyl accident, and as a result deterioration of a is material-economic condition the population. Ultra low sufficiency of the basic spheres of vital activity for all groups of respondents is established; the lowest level of social state of health at the moved population in comparison with polluted territories population and conditionally clean territories; material, recreational-cultural, professional-labour spheres carry main load in the common dispersion of parameters of social condition of health . Parameters of physical and mental health authentically differ at the suffered population and control group of the population, the common parameter of the moved population health is worse in comparison with health of population radioactive polluted territories and control group . Among the moved population the greater population is on dispensary account in comparison with population radioactive polluted territories . Among migrants value of "health" stands on the first place in hierarchy of base vital values and unlike other categories of the population, it closely connected with purpose which influence the further behavior concerning preservation of health.

CHERNOBYL AND TIME

I. Labunska
Science Unit, Greenpeace International
e-mail: I.Labunska@ex.ac.uk

Chernobyl. It would probably be difficult to find a person who has never heard of the name of this town. Not only has Chernobyl taken hundreds of thousands of human lives and affected the lives of millions more – it has also permanently changed our perception of time. For territories contaminated by radioactive materials, especially by plutonium isotopes, April 1986 has become the new reference point from which we have begun to calculate time, not in days or even years, but in tens of thousands of years. During the course of these thousands of years the process of the disintegration of plutonium will continue, producing ever more radioactive elements, with no visible end to this chain of events. A nuclear reactor, meanwhile, can rage out of control in mere seconds. In mere seconds a person can receive a deadly dose of radiation. The future of any given country, as well as of humanity in general, has always been determined by the health of the current generation of mothers and children. It has been proved that consequences of the Chernobyl catastrophe will affect many generations to come due to the rise of genetic mutations it has caused. The level of mutation in the genome of children whose parents have received various doses of radiation from the Chernobyl accident is seven times higher than the natural level. The results of such mutations could only surface after these children have themselves become parents. Despite the considerable amount of information already available on the health problems of "the children of Chernobyl", the effects of long-term radiation on children are still uncertain. At present, 250 thousand children abide in three of the most contaminated regions of the Ukraine – Kiev, Zhytomyr and Rivne. This, coupled with the number of children who have suffered as a result of the Chernobyl catastrophe, living elsewhere in the Ukraine, raises the figure to an excess of 400 thousand. Yet no one had asked these children or their parents whether they were prepared to sacrifice their health and their lives merely for the purpose of producing energy. It is possible that many who have not been directly affected by Chernobyl would see this as a philosophical question. For those on whom the consequences have had their toll, however, it is a question of life or death. Unfortunately the conclusions of the IAEA and the WHO regarding the consequences of the Chernobyl catastrophe on people's health are far from reality. More disappointing still is that their misrepresentation did not occur due to scientific error, but for politically driven reasons. At the same time, I have no doubts as to what reply any representative of either the IAEA o the WHO would give when faced with the question of whether they would be prepared to part with their lives to provide energy for other people. It is hard to imagine that anyone would actually think that in the 21st century it is permissible to continue subjecting millions of people to an unjustified risk by producing nuclear energy, so that others can enjoy what can be termed as the "privileges" of civilisation. There can be no argument that strong contradictions already exist in the fact that nuclear energy is still being produced and there are even plans of developing it. These contradictions are obvious enough:

- The production of nuclear energy is dangerous. A catastrophe like Chernobyl can happen at any moment, on any nuclear reactor. The only questions are when and where;
- Nuclear energy is expensive. Financial calculations for a full cycle of production of nuclear energy (including the hundreds of years during which it would be necessary to monitor and control the storage of radioactive waste, even in completely safe conditions), show that this is the most wasteful energy source on the planet;

- Nuclear energy can never solve the problems of global warming, as it only produced electricity. Electricity constitutes less than 20% of worldwide energy consumption. Nuclear energy contributes approximately 17% to worldwide electricity. Upholding this figure alone would require massive programmes for construction of new reactors, taking into account both the increasing number of reactors that need to be shut down in the near future, and the predicted rise in energy consumption;
- 50 years and hundreds of billions of dollars in public subsidies on, no nuclear power plant can compete on the open market. Every single attempt to make nuclear energy competitive has failed miserably;
- The nuclear industry provides a perfect target for terrorism. Without even mentioning of the possibility for the production of nuclear weapons.

These are only a few contradictions out of many…

However, despite everything, there are still plans to develop nuclear energy, even though it is absolutely clear that this would be a grave mistake - a principal mistake – both economically and politically speaking.

Firstly: The 3rd statute of the IAEA states that the IAEA has the authority to "encourage and promote … the development and practical application of atomic energy". This is a principal mistake as, if nuclear energy is a commercially profitable industry, there should not be UN agency, which promotes it. I presume that everyone is aware of the fact that the given statute was produced at the time of the Cold War, when it was positive development. But who does it serve today? Why has this outdated statute not been changed as yet? Does it, perhaps, serve someone's financial interests? Or – even worse - someone's military interests?

Secondly: From an ethical point of view, it is unacceptable to build installations, which could inflict harm on people without their voluntary agreement. Furthermore, any such potentially dangerous installation would be made operational only after the people it could affect have been insured against the risks (taking into account economic and medical aspects). In the worst case scenario, we may expect to witness situations akin to those we see now in the post-Chernobyl period – no one is singularly responsible for the catastrophe and no one can provide the due help to all its victims. With regards to nuclear energy, more questions arise – could you conceive of any insurance company that would give an insurance policy covering the population of half the globe? Could you conceive of any industry that would be capable of paying for such a policy? The latest assessments show that the damage inflicted by the Chernobyl catastrophe has amounted to hundreds of billions of dollars. Meanwhile, transboundary liability in case of nuclear installation accident is still limited to … as much as 5 millions USD according to Vienna Convention!

Thirdly: The people found responsible for the accident on the 4th block of the Chernobyl NPP were the director and a number of staff. But where are the people who were in truth responsible? Who has claimed political responsibility? No one. Should the entire nuclear industry not bare this responsibility? In 2005 the IAEA went public in a press-release, saying that "persistent myths and misperceptions about the threat of radiation have resulted in "paralyzing fatalism" among residents of the affected areas." I would say that there is no such a thing among the residents. If anything, a misperception of nuclear danger has resulted in "paralyzing optimism" towards the nuclear industry and appropriate agencies. They simply ignore even the thought that Chernobyl can be repeated today. I think that they should be reminded about it. It is now time to globally distribute and put into work market-ready renewable energy and energy efficient technology in order to start the energy revolution which is necessary to fight global climate change and help to end the nuclear threat.

CHERNOBYL CATASTROPHE AND MENTAL HEALTH OF THE VICTIMS

Rumyantseva G.M.

Serbsky National Research Centre for Social and Forensic Psychiatry, Moscow

Radiation accidents – new kind of a stress which has emerged during the last decades of the last centaury, as the result of the escape of the human control of one of the most technologies – nuclear. In radiation catastrophes humankind first faced the complex, multifactor stresseffect, which includes two differently orientated factors:

- biological effect of the radiation, influencing not only on the health of the suffered, butt through embryotoxic and genetic effects on the health of the following generations;
- psychological stress of complicated structure, which is categorized by the absence sensory perception of radiation effect, expecting of following effects for their health or their forthcoming generation postponed, particular understanding of the inescapable pathogenicity of the ionizing irradiation, inherited in common human consciousness after atomic booming of Herosim and Nagasaki.

Such structure of stress distincts radiation accidents from other technogenic catastrophes. Influence on a human being of two factor groups forms polymorbid psychic disorders, not common for other catastrophes. From one hand, this disorder is associated with stress and expressed by neurotic level of reactions, depressions and posttraumatic stress disorders, which tend to be adjacent to somatic pathology and engraves any somatic diseases. Existence of these kind of disorders prolongs for years. On the other hand, these

gradually forming cerebrovascular diseases, influencing first cognitive sphere of patients and resulting in several years in psychoorganic disorders. This kind of pathology emerges mainly in the participants of the radiation accident liquidators. Genesis of organic pathology is multifactor and seems associated with the disturbances of higher regulatory functions, as well as the damage small vessels. However, clinico-casual associations of the development of this pathology are presently not sufficiently studied. Presence of such psychic pathology requires special methods of therapy and rehabilitation, which are not used in other catastrophic situations.

PSYCHIATRIC AND PSYCHOLOGICAL CONSEQUENCES OF THE SEPARATED EXTRAORDINARY SITUATION (ON EXAMPLE OF SKNILOVSKOY TRAGEDY)

S.I. Tabachnikov, E.G. Grinevich, Yu.V. Dubinska
Ukrainian Research Institute of Social, Forensic Psychiatry and Drug Abuse, Ministry of Public Health of Ukraine

Research purpose: to define influence of extraordinary situations, tehnogenical failures and catastrophes on the mental and psychological population's state, living in the victim region. **Research methods:** clinical-epidemiological, clinical-psychopathological (in particular method of standardizing interview), psychodiagnostical, methods of mathematical statistics. **Research results:** On the base of theoretical and system approaches was analyzed the state of population's mental health, living in a victim by extraordinary situation (ES) region. The purpose was: determinate the degree of ES influencing, and also sure exposure the ES consequences on a background of the morbidity's natural fluctuations by psychical and behavioral disorders. For this question decision a ES must answer two basic criteria's: scale – substantial influence on large the masses of people, and it's origin in relatively „quiet" (tehnogenical- and natural- catastrophes safe) region (as in other case the consequence of different ES will accumulate one on one and complicate the analysis). The sadly tragedy on July, 27 in 2002 answers criteria's, what described higher, was happened on the air field "Skniliv" under Lvov. Then, during an air show with implementation the figures of aerial acrobatics the airplane of Su-27-27 fell down on an audience. The common number of the victims made 165 persons 77, from which are considered lost, including - 28 children. Similar, after the scales, ES in the Lvov region during the last years was not present. For the exposure of influencing of sknilivskaya tragedy on the population's mental health state in this region, we were conducted screening of all accessible indexes of psychical and behavioral disorders morbidity in the Lvov region with the purpose of determination of their local extreme's (local maximums) which would clash with marked ES. As a result of this screening were definitude three groups with psychical and behavioral disorders, namely: neurotic, related with stress, and somatoform disorders (heading F4 for MHC-10), behavioral syndromes related to physiology violations (F5) and disorders of personality and conduct in mature age (F6). Presence of neurotic, related with stress, and somatoform disorders in this list gets up to fully natural and does not require the special comments. The morbidity on these disorders in 2002 grew on 9,2 % on attitude toward in 2001 and even through a year did not get back to the initial level. Extreme of the personality and conduct in mature age disorders morbidity becomes clear, if to remember that this disorder's group belong, including, changes of personality after the outlived catastrophe (F62.0), and also row of other motion disorders which can be sharpened by an enough powerful psychical trauma (anxious (F60.6), hysterical (F60.4) and some other). The morbidity on these disorders in 2002 grew on 16,5 % on attitude toward in 2001 and, similarly, through a year (in 2003 to the year) did not get back to the initial level. Finally, extreme of behavioral syndromes related to physiology violations morbidity it is explained to those, that a few disorders having the clinical manifest if a psychotrauma belong to them. Among them there are disorders of sleep of inorganic nature, inclusive: insomnia of inorganic origin (F51.0), horrors during sleep (F51.4) and nightmares (F51.5), and also sexual dysfunctions, which are unstipulated to organic by disorders or by the diseases (F52). The morbidity of these disorders in 2002 grew on 14,9 % on attitude toward in 2001, but through a year, in 2003 diminished to the level a bit below in relation to initial. Thus, on conditions of absence the other extraordinary events in the Lvov region in the flow in to a 2002 year, the rise of psychical and behavioral disorders morbidity, what was described higher, can be considered as a direct damage which the Sknilivska tragedy inflicted to the population's psychical health of this region.

EXTRAORDINARY SITUATIONS AND MENTAL, BEHAVIORAL DISORDERS AT NATIONAL AND REGIONAL LEVEL (CORRELATIONS AND TENDENCIES OF DEVELOPMENT)

S.I. Tabachnikov, E.G. Grinevich, Yu.V. Dubinska
Ukrainian Research Institute of Social, Forensic Psychiatry and Drug Abuse, Ministry of Public Health of Ukraine

Research purpose: to set the correlations and define the tendencies of mental and behavioral disorders development and extraordinary situations.

Research methods: clinical-epidemiological, clinical-psychopathological (in particular method of standardizing interview), psychodiagnostical, methods of mathematical statistics. **Research results:** The dichotomy's convention between the tehnogenical (TC) and the natural (NC) catastrophes was proved as a result of correlation and regressive analyses of the dynamics TC and NC frequency in the administrative-territorial units (A-TU) of Ukraine. We were definite following tendency: in all high-urbanized and industrially saturated regions of country there is positive correlation between the considered types of events. The Kharkov region is the exception from this rule. The regression levels we've got testify that the increase of tehnogenical extraordinary/extreme situations (ES) quantity on 10 units is accompanied by growth of natural ES number on 2,5 units, and vice versa, the increase of natural ES quantity on 10 units is accompanied by growth of tehnogenical ES number on 6,4 units. Analysis of mental and behavioral disorders morbidity after the exception the drug abuse testifies that directions of its constituent's development during the last years were divided. In relation to stable were the morbidity by schizophrenia, shizotypical disorder, raving and affective disorders, and also mental and behavioral disorders, having the organic genesis, that is in which genesis (by modern points of view) heredity does large payment. In same queue, reduction of morbidity by neurotic, related to stress and somatoform disorders (NRS and SFD) took place together with reduction, or stopping growth rates of other indexes of public confusions, for example, drug addictions, criminality and suicide. In this communication, among mental and behavioral disorders, exactly neuroses and similar to them psychopathological states primary morbidity ought to be considered (together with the level of suicide activity) like index of tension in society degrees and its unhappiness caused, including, and extraordinary situations. Most morbidity on NRS and SFD (per a 100 thousand of population) in the flow 2000-2004 years was incorporated (in a direct grade order) in Kirovogradsky, Zhitomirsky, Kievsky, Khersonsky, Ivano-Francovsky, Dnepropetrovsky and Lugansky regions. Thus, two from the three first positions in resulted higher rating occupy A-TU, with Chernobyl AES catastrophe in 1986 most suffered from the consequences (Kievsky, Zhitomirsky). Thus, it is possible to establish that on territory of Ukraine there are two permanent areas with the promoted NRS and SFD morbidity, in the origin one of them, after supposition, substantial payment was done by the consequences of the Chernobyl catastrophe in 1986 (Kievsky, Zhitomirsky regions), and other - the unfavorable terms of life, linked, in particular, with not such scales, but frequent ES. Thus, by us set, national presence of correlation between neuroses morbidity and ES quantity and also their absence between neurotic register disorders morbidity and the level of heavy still human consequences by catastrophes. It ensues from levels of regression: increase of tehnogenic ES quantity on a 1 unit per a 100 thousand of population results in growth of NRS and SFD morbidity at 16,12 cases per a 100 thousand of population. Regressive interdependence of the ES natural character with primary neurotic disorders morbidity only substantially got around the level of statistical meaningfulness, but did not attain him. The results of regressive analysis at a regional level testify that the tehnogenic catastrophes having greater psychotraumatic action than natural. Thus exactly primary (but is not hospitalized) NRS and SFD morbidity ought to serve as one of that tension markers, that arises up among the victim's population after the tehnogenic catastrophes in regions. Through conducting of correlation screening of all present data array it is led to, that ES are related not only to neurotic register disorders, and with personality of mature age disorders, affective disorders, sharpening of schizophrenia and sharp alcoholic psychoses (positive regressive dependence between the extraordinary situations quantity in the regions of Ukraine and mental and behavioral disorders morbidity).