

CLINICAL AND PARACLINICAL ASPECTS OF CHILDREN'S HEALTH TEN YEARS AFTER THE CHERNOBYL ACCIDENT

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Introduction. These investigations are devoted to the problem of medical consequences of Chernobyl catastrophe to the children's population of Ukraine.

Concerning different reports, Chernobyl accident negatively influenced to the children health indexes (1,2). Astonishing fact is that among children under radiation action only 2,1% have no functional deflexions (I group of health) and 28% have chronical diseases with often aggravation (3). Our previous investigation in children evacuated from 30 km zone showed an unfavourable changes in immune system. There are reports about disorder in immune, cardio-vascular and other systems in children suffered from Chernobyl accident (5,6).

We have shown the data of investigation carried out in the frames of National Program "Children of Chernobyl". We have studied the morbidity, immune some functional characteristics and metabolism indexes in 2700 children aged 0-15 years, continually living within radiation contaminated territories. The results were compared with the control indexes, obtained during examination of 980 children from conditionally "clean" regions.

Methods of study. Immunological investigations include determination of: 1) lymphocyte subsets by flow cytometry using monoclonal antibodies ("IMK Kit", Becton Dickinson, USA); 2) levels of immunoglobulins G.A.M. by lazer nephelometry using polyclonal monospecific antisera ("Microplus", Russia); 3) phagocyte activity by flow cytometry using FITS labeled *St.aureus* (Wood 46) and

Some indices of morbidity structure in children

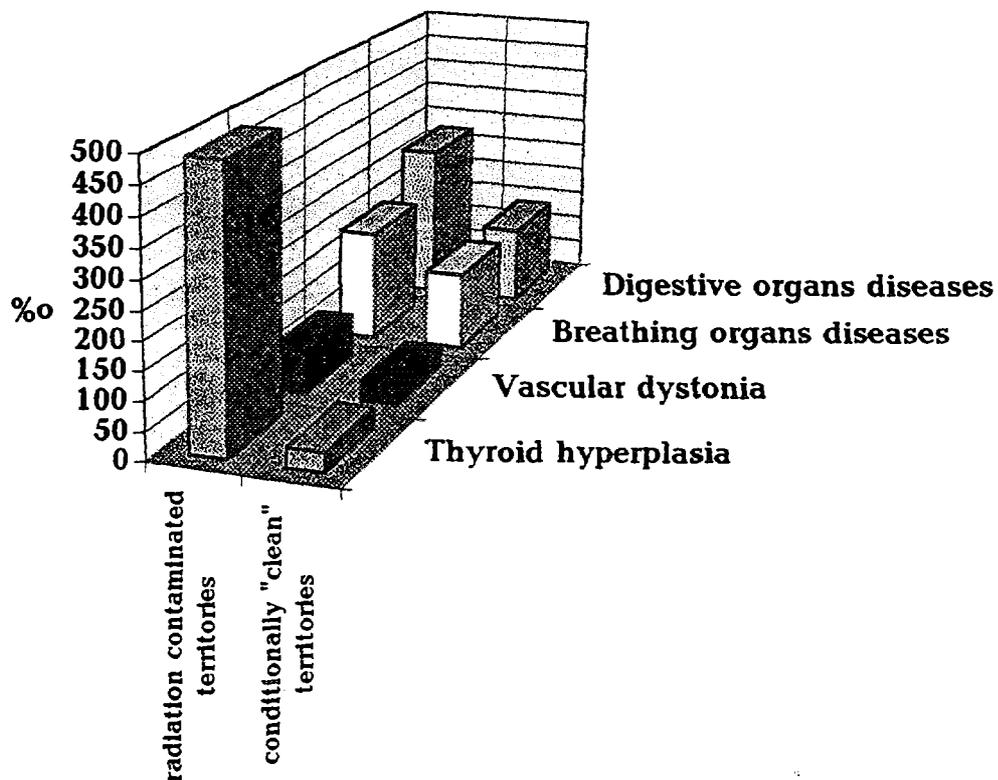


Fig. 1

Correlation of different classes of lymphocytes in perypheral blood in children with recurent respiratory diseases taking into account the absorbed dose of radioactive iodine by thyroid

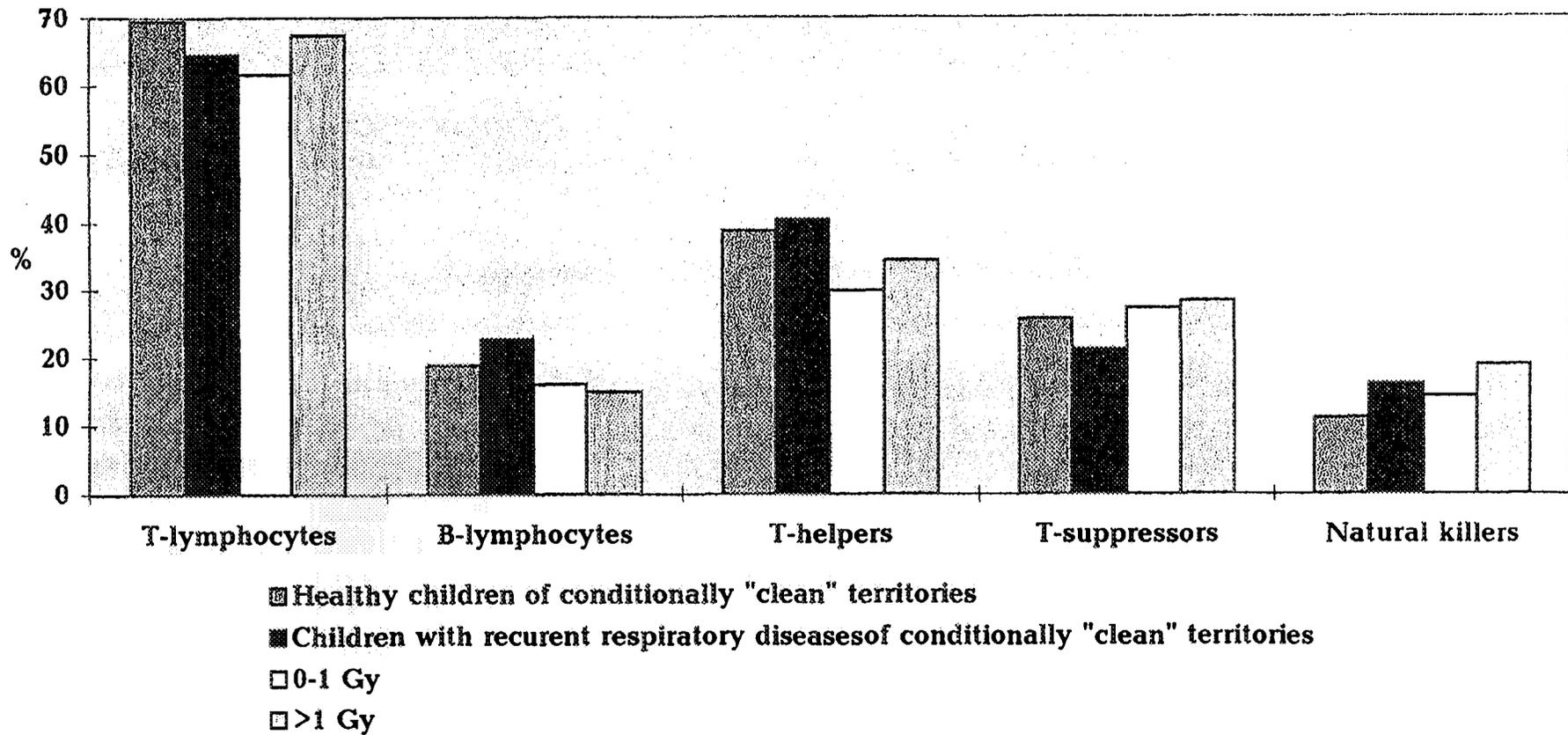


Fig. 2

Indices of bowels microbiocenosis in children from radiation contaminated and conditionally "clean" territories

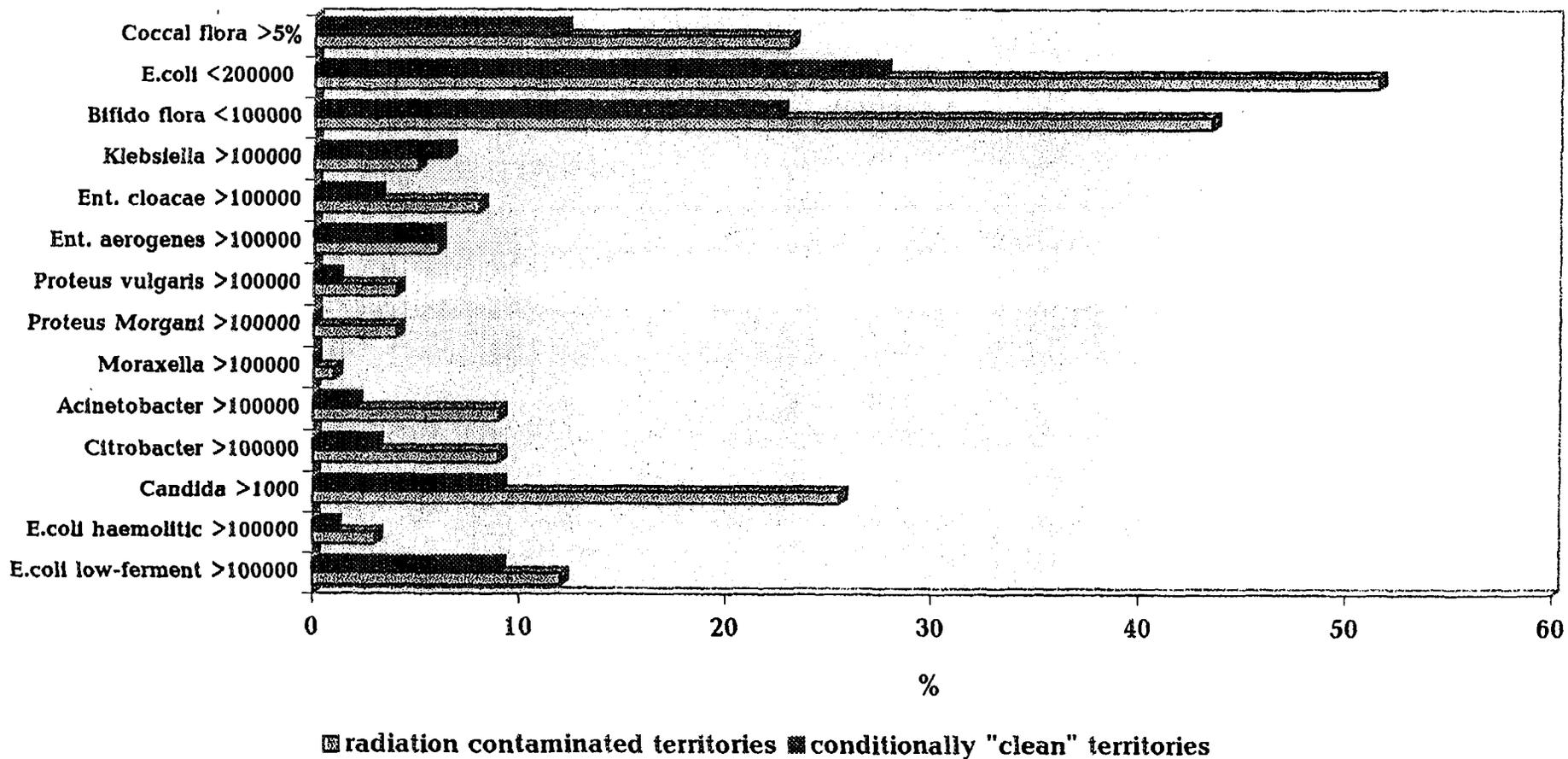
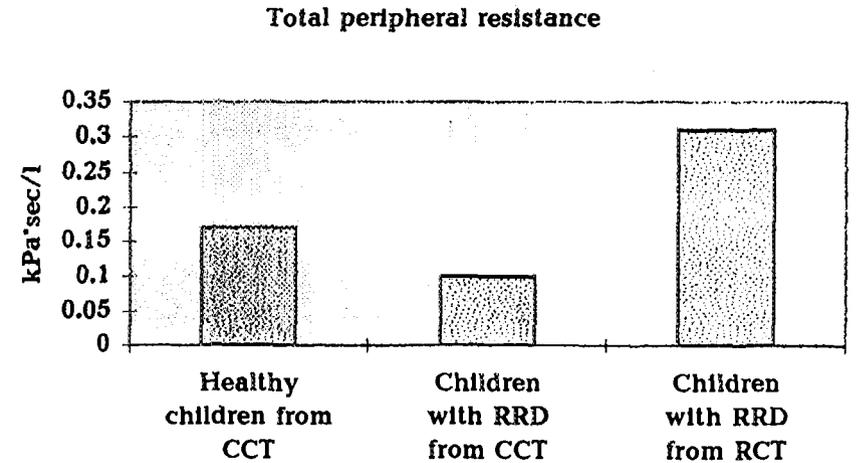
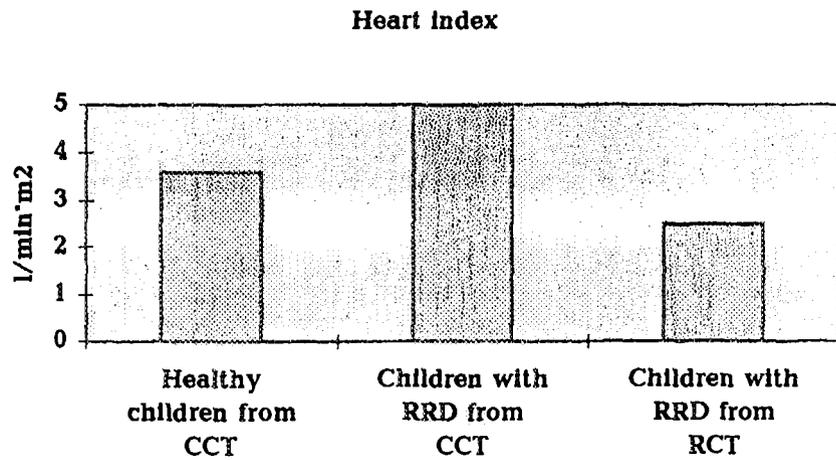
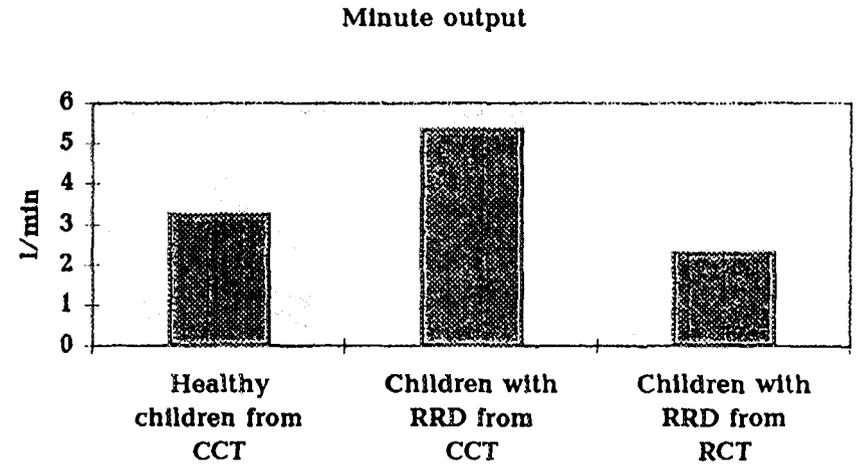
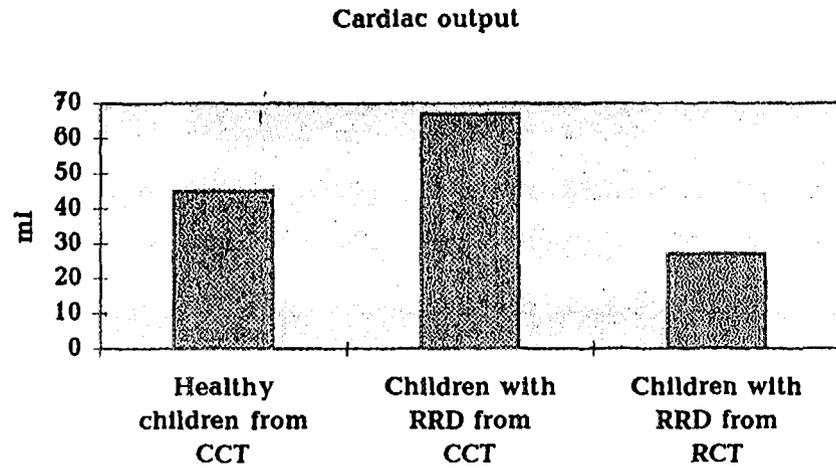


Fig. 3

Some indices of central haemodynamic in children with recurrent respiratory diseases



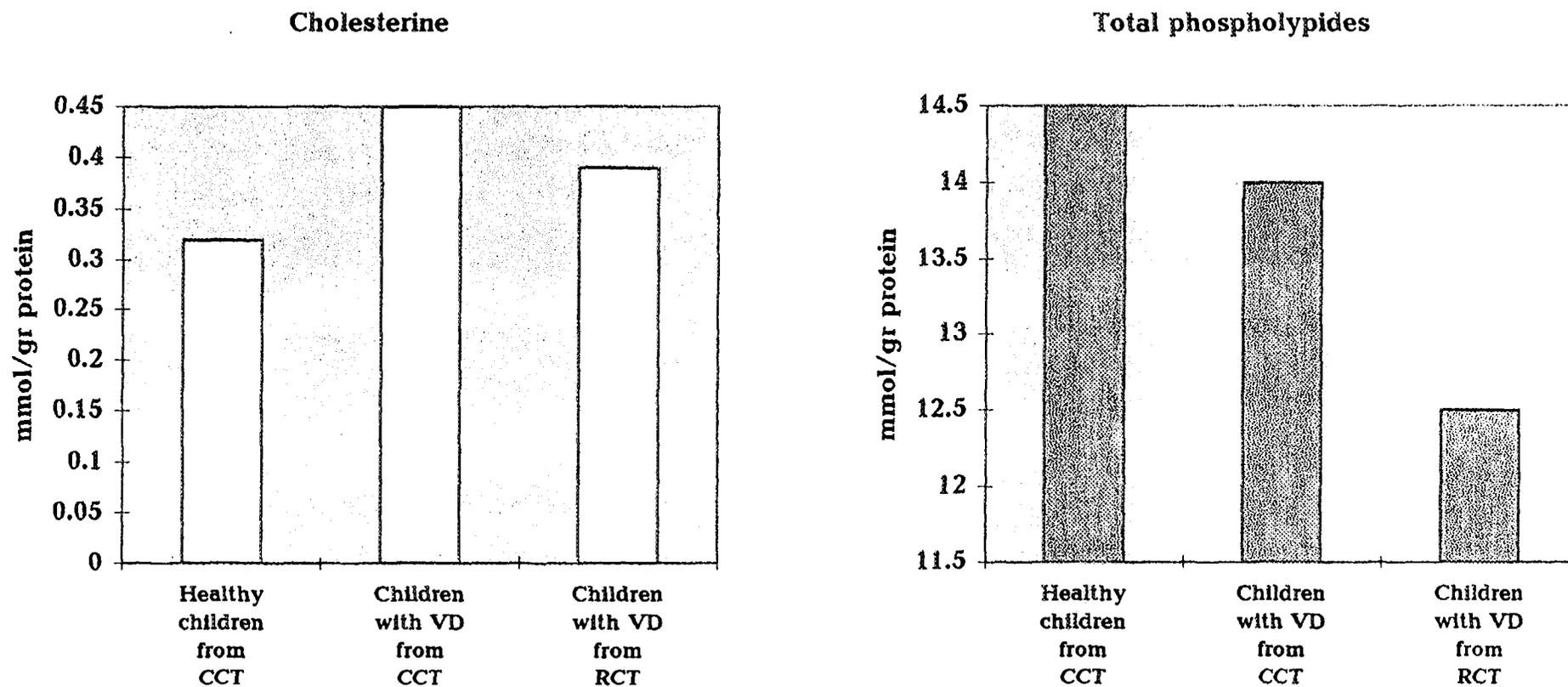
RRD - recurrent respiratory diseases

CCT - conditionally "clean" territories

RCT - radiation contaminated territories

Fig. 4

Total phospholipides and cholesterol concentration in erythrocytes membranes in children with vascular dystony living within radiation contaminated territories



VD - vascular dystony

CCT - conditionally "clean" territories

RCT - radiation contaminated territories

Fig. 5

Table 1

Indices of peroxid oxidation and antioxidant system in erythrocytes and plasma of children
with vascular dystonia

Region	Hydroperoxides suspension of erythrocytes, mmol Fe/l	Malon dialdehyde, mmol/l	Reduced glutation, mmol/l	Glutation peroxidase, mmol GSH/l
Conditionally "clean"	1,4±0,1	41,7±3,1	2,5±0,7	4,0±1,2
Radiation contaminated	2,6±0,3	67,3±1,8	2,8±0,5	5,0±1,2

latexmicrobeads ($d=1,1 \text{ mkm}$). Immunological studies were carried out in cooperation with Japanese (Institute of Nuclear Medicine and Biology, Hiroshima University) and German (Institute of Infectious and non-infectious diseases - Robert Koch Institute) specialists. Bacteriological investigations used standard bacteriological medium for determination of dysbacteriosis degree. Biochemical studies include the determination of calcium in serum and erythrocytes by biotest (Lachema, Czech Republic) and non-organic phosphorus by Dyce method [7]. Osmotic resistance of erythrocytes determined in a condition of 50% hemolysis in 0,4% NaCl solution [8]. Total lipid level in serum carried out by test (Lachema, Czech Republic). Hydroperoxide of lipid- by Romanov method with thiocyanate ammonium [9], diene-conjugate- by Kostuk method [10], malonaldehyde - by placcr [11], the activity of glutathione-dependent antioxidant enzyme glutathione peroxidase by Olinesan [12], reduced glutathione - after Sedlak [13], catalase - after Beers [14], antioxidant activity - after Sevanian [15].

Results. Total morbidity in children, suffered from the radiation action is increased in comparison with the children morbidity in conditionally "clean" regions. There is an increase of cases of thyroid hyperplasia, some breathing and digestive organs diseases, vascular dystonia in the structure of morbidity. The number of healthy children is decreased among the children's population, permanently living within contaminated by radionuclides territories (fig.1).

It was determined, that the children with recurrent respiratory diseases have the disorder of mucous membrane resistance; the concentration of secretory Ig A in saliva is decreased. The level of T-lymphocytes and true helpers ($CD3+/CD4+$) in patients with recurrent respiratory diseases (RRD) and absorbed dose of radioactive iodine in thyroid not exceeded 1 Gr, is lower than in patients from conditionally "clean" regions. The content of B-lymphocytes in peripheral blood was in physiological level, but it was much decreased in patients with the absorbed dose of iodine in thyroid more than 2 Gr (fig.2). It was also found out the changes of intestinal microflora in children from basic group - the increasing of conditionally pathogenic microorganisms content, changes of their enzymatic peculiarities (fig.3).

The hypokinetic type of cardiac phase prevails in children with recurrent respiratory diseases, living within contaminated by radionuclides territories; and the oxygen consumption is decreased (fig.4). The hyperkinetic type of blood circulation prevails in patients from control group. The oxygen consumption by tissues is increased. It was determined that vascular dystonia in children from basic group is characterized by astheno-neurotic symptoms with a headache, vertigo, emotional lability, undue fatigability. Patients from basic group have dystonia crisis (abdominal, cerebral and oth.). The cases of vascular dystonia in children from basic group were determined in earlier age (prepubertal). And the cases of vascular dystonia in children from control group were determined more late (in pubertal) period of development.

Metabolic disorder prevails in patients with vascular dystonia from contaminated by radionuclides regions. The content of calcium in plasma and erythrocytes in venous blood is decreased. The content of cholesterol is increased. The content of total phospholipids in erythrocytes membranes is decreased (fig.5). It was also determined the increasing level of erythrocytes diene conjugate, malonaldehyde and free radicals in plasma (tab.1). The changes of osmotic and acidic resistance of erythrocytes in peripheral blood in patients was found out.

Conclusions. The health state of children's population of Ukraine suffered from radiation action is characterized by higher total morbidity, the increasing of cases of thyroid hyperplasia and vascular dystonia. Children with recurrent respiratory diseases have symptoms of immune dysregulations. This fact in future may cause the autoimmune pathology, decreasing of antiviral and antitumor organism protection. The increasing of cases of vascular dystonia, metabolic disorders in children suffered from the Chernobyl catastrophe show the possible risk of development of cardio-vascular pathology, including early atherosclerotic changes. These results testify about the necessity of following scientific investigations, including clinical observation and laboratorial examination of above mentioned group of children in dynamics, and also control investigations in children living within conditionally "clean" territories. It is also necessary to estimate the significance of radiation factor in genesis of health, immune and metabolic disorders in children's population suffered from radiation. Children who are living within contaminated by radionuclides territories need a permanent medical observation. Healthy life, giving bad habits up, timely social and medical rehabilitation are quite important for them.

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