MORPHOLOGICAL PECULIARITIES OF CHRONIC GASTRITIS IN CHILDREN AND ADOLESCENTS OF BELARUS UNDER CONDITIONS OF LOW DOSE RADIATION-CHEMICAL EXPOSURE

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Following the accident at the Chernobyl nuclear power station, the unfavourable ecological situation due to chemical contamination of the environment was aggravated by the radiation effect. At present, radionuclides of caesium and lead, as well as the nitrates, are the most widely distributed ecotoxicants.

Under conditions of the negative ecological effect as the result of per os penetration of the majority of xenobiotics, the gastro-intestinal tract is at particular risk. During 1990-1994, 442 children and adolescents aged 10-17 residing at the ecologically different regions of the Republic have been examined. The program of examination included morphological investigation of bioptates of the stomach mucous membrane, determination of the radiocaesium specific activity in the body and the evaluation of lead content in blood and nitrates content in urine.

Depending on the level of radionuclides and xenobiotics accumulated in the body, all the children were divided into two groups. The main group (n=289) was represented by the schoolchildren residing at the contaminated with radionuclides territories of the Gomel and Brest Regions. Average annual effective dose equivalent in these children exceeded 3-5 times relatively permissible level (1 mSv). In 2/3 of the examined children, due to the Cs-137 accumulation in the body, the contribution from the internal exposure to the total dose formation made 63-96%. Besides, an excess of the permissible level of lead in blood was marked in 53.3% of children from this group (average index in the group- (0.117 ± 0.008 mg/l) and an excess of nitrates in urine - in 24.4% of children (71.8 ± 3.5 mg/l).

The control group (n=153) was represented by the schoolchildren residing under similar socio-economical conditions of the Vitebsk Region at the territory with natural background radiation. Nitrates loads in these children were identical with those of the main group (average index - 72.0 ± 5.2 mg/l) with the permissible lead indices in blood (0.053±0.009 mg/l).

It has been ascertained that the occurence of chronic gastritis is high in the first and second group with no statistically significant differences between them and equals, accordingly, to 70.9 ± 2.7% and 71.2 ± 3.7%. The majority of chronic gastritis are helicobacter (HP)-ass0ciated (Table 1).

The occurence of HP infection with the unchanged stomach mucous membrane was considerably higher in schoolchildren residing under conditions of ionizing exposure.

Table 1

Distribution of the examined children (%) with respect to the revealed HP-infection in the stomach mucous membrane

Analysed index	Main group	Control group
Chronic gastritis associated with HP	88.8 ± 2.2	78.0 ± 4.0

Table 1 (continuation)

Analysed index	Main group	Control group
HP presence on the stomach mucous membrane in healthy children	44.0 ± 5.4 *	18.2 ± 5.8 *

Note: * - differences are statistically significant ($p < 0.001$).

According to literature reports, statistically significant relationship between the HP infection of the stomach mucous membrane and the morbidity and mortality from stomach cancer has been ascertained [1,2,3], the possibility of procancerogenous effect from the HP infection being increased when combined with the effect of toxic factors of the environment.

It is known that chronic gastritis caused by HP infection is developing, as a rule, until atrophyc changes in the stomach mucous membrane occur [3]. The conducted by us analysis revealed statistically significant differences ($p < 0.001$) in the frequency of atrophy of the stomach mucous membrane in schoolchildren from the first and second groups (Table 2).Intestinal metaplasia of the mucous membrane epithelium and a combination of metaplasia with the atrophyc changes on the background of chronic gastritis were also observed more frequently in children residing at the contaminated with radionuclides territories.

Table 2

Occurence (%) of atrophy and intestinal metaplasia in stomach mucous membrane in children and adolescents with chronic gastritis

Analysed index	Main group	Control group
Atrophy	16.1 ± 2.6 *	2.7 ± 1.6 *
Intestinal metaplasia	5.4 ± 1.6	2.7 ± 1.6
Atrophy + intest. metaplasia	2.9 ± 1.2	0.9 ± 0.9

Note: * - differences are statistically significant ($p<0.001$).

It's important to note that the frequency of the mucous membrane atrophy was growing with the increase of a number of toxicants in the body.In schoolchildren residing under conditions of high radiation levels, the occurence of atrophyc gastritis made 4.1% with the permissible concentrations of lead and nitrates in the body. In children of the same group with the elevated concentration of nitrates in urine (more than 100 mg/l), the occurence of the stomach mucous membrane atrophy was increasing and reached 9.4%. With the elevated lead concenrations in blood (more than 0.10 mg/l),it made 11.7%. With the elevated level of three toxicants in the bodsy (caesium-137, lead, nitrates), the frequency of atrophyc gastritis made 36.8%.

Thus, in a considerable number of children and adolescents residing at the contaminated with radionuclides territories of Belarus, an increased content of caesium radionuclides in the body was revealed, as well as increased concenrations of lead and nitrates which present a potential health hazard.

From our point of view, these factors contribute to the appearence, already in the childhood, of chronic stomach pathology, to its rapid growth with the development of atrophy and intestinal,metaplasia of the mucous membrane. Taking into account high occurence of the HP stomach infection not only in patients with chronic gastritis, but also in healthy children, we face the situation which is not typical for children's age and prognostically dangerous, since it suggests high pre-cancerous potential for chronic gastritis.

REFERENCES

1.EUROGAST study group, Lancet,V.341,1359-1362(1993).
2.J.Parsonnet, G.D.Friedman, D.P.Vandersteen et al.,New Engl.J.Med., V.325,11-27 (1991).
3.M.Stolte, S.Eidit, M.Ritter, B.Bethke, Pathologe, Bd.10,21-26 (1989).
4.L.I.Aruin,Archives of Pathology 3,3-5 (1994).