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IODINE DEFICIENCY AS A FACTOR OF THE THYROID PATHOLOGY DEVELOPMENT IN THE POLTAVA REGION

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Iodine deficiency – a problem for the entire territory of Ukraine. It varies only in severity – from mild on the East, South and centre of the country, to moderate and severe in the mountainous areas of the Carpathians. The purpose of the work was to analyze the thyroid pathology in the Poltava region in the conditions of iodine deficiency. Assessment of the ecological situation in the Poltava region shows that this region is the zone of moderate iodine deficiency because a decline in the iodine content is observed in all aquifers of Poltava region. The preventive measures must be permanent, because iodine deficiency is impossible to eliminate, as the environmental problem. The world and domestic experience shows that the cessation of prevention leads to a rapid increase of the frequency of iodine deficiency diseases in the population. Prevention of iodine deficiency diseases is much more effective than the treatment of the iodine deficiency effects, especially since some of them (mental retardation, cretinism) are almost irreversible. Thus in the development of endemic goiter the environmental conditions of a region play a big role. The inducer of thyroid pathology in general is iodine deficiency, both direct and relative, the main cause of which is anthropogenic pollution (fluoride, of radionuclide, etc.). That is endemic goiter or iodine deficiency has regional differences related to the environmental conditions of that particular region.

Key words: thyroid gland, thyroid pathology, iodine deficiency disease, iodine, fluorine, radionuclide contamination.

The work is a fragment of the research project "Development of a strategy for the use of epigenetic mechanisms for prevention and treatment of diseases associated with systemic inflammation", № 0114U000784.

The term "iodine-deficient diseases" (IDD) is used for all unfavorable influences of iodine deficient (direct or indirect) on the growth and the development of organism and for the forming of infant brain first of all. The prevalence of regions with iodine deficiency in the biosphere is large. According to the data of WHO and UNISEPH, approximately 1.5 billion persons with high risk of IDD development live in these regions. In 200 million (from the total number of such persons) the goiter is diagnosed. About 3 million persons have endemic cretinism. Millions of persons suffer from more mild form of psychomotor disorders. As the iodine resorption by the thyroid gland in endemic regions is increased, the gland is more sensitive to radioactive effect. These cases were registered after the accident at the Chernobyl Nuclear Power Plant. The most fatal consequences of iodine deficiency are the birth of defective intellect babies. Ukraine (the third part of it is iodine deficient) inaugurates one school every year for defective intellect children. In some generations it can lead to intellectual degeneration of nation [1-3, 9, 10].

The purpose of work was to analyze the thyroid pathology in the Poltava region in the conditions of iodine deficiency.

Materials and methods. The study of iodine, fluorine and radionuclides containing in drinking water, what Poltava region residents use, was held and analyzed morbidity of thyroid disease in Ukraine and Poltava region. Comparative characteristics of thyroid pathology in the last 20 years have been carried out with the assistance of the annual review of the Ministry of Health of Ukraine and the Institute of Endocrinology and Metabolism "Main indicators of activity of the endocrinological service of Ukraine". Statistical processing of the data was carried out using the standard package of statistical calculations of Microsoft Excel.

Results of the study and their discussion. It should be noted that the water supply districts of Poltava region is provided by three basic water-bearing stratum: the Senoman-lower-cretaceous, Buchatsky and Alluvial. Evaluating the ecological situation in the Poltava region, we note that this region is the zone of moderate iodine deficiency because a decline in the iodine content in all aquifers of Poltava region. Increases insufficiency of iodine the increased level of fluoride in Buchach water-bearing stratum, which provides water to 42.3% of districts of Poltava region. Fluorine is more active halogen, entering the tissue of the thyroid gland, inhibits of the thyroid peroxidase and organification iodides in the thyroid gland, which leads to the decrease in the synthesis of thyroid hormones [1].

The analysis of the prevalence of disease of the thyroid gland in Ukraine and in Poltava region indicates that beginning with 1980 to 2003 has increased not only the amount of thyroid pathology in general, but also changed its structure. This period of time is taken not by chance – at the Chernobyl nuclear power plant occurred the accident in April 1986. In the environment has been thrown a huge number of short - and long-lived radionuclides, which played a role in the development of thyroid pathology. So, only since 1989 have started to be recorded in the reports of diseases such as nodular goiter, thyroiditis, cancer

of thyroid gland, simple and inadjusted goiter of 1-2 degrees (up to that point had recorded only its 3-5 degree increase).

It should be noted that for the last 20 years in the Poltava region thyroiditis increased proportion of 54.5 times, while in Ukraine - in 31.7, 18.3 times increased volume of nodular goiter, in Ukraine it rise to 12, 7 times, thyroid cancer increased up to 0.6 times, in Ukraine – up to 0,4 times; hypothyroidism – up to 3.6 times, this pathology has grown up to 4.2 times in Ukraine in general and the proportion of diffuse toxic goiter - a total of 1.3 times, in Ukraine - 3.1 times [1].

According Yarmonenko S. [7] glands of internal secretion is radioresistant, including the thyroid gland. The radiosensitivity of the thyroid gland increases sharply in a state of hyperplasia. The hyperplasia or goiter of I-II degree is dominant of all the pathology of the thyroid gland, in the period after the Chernobyl accident. Thus, we can assume, that radionuclides with short half - life - Ra224, J131 - are bombarding tissue, depriving them of "radioprotection" and then on "unprotected" tissue affect radionuclides with a long half-life (U234, U235, U238, Ra226, Sr89, Sr90, etc.), that is, in the development of hyperplasia of the thyroid gland play a big role radionuclides with short half-life, and in the development of thyroid cancer - radionuclides with long half-life.

Thus, the group of patients with hyperplasia of the thyroid gland should be considered as "the risk group" for thyroid cancer and, of course, from this group should start preventive measures (fig. 1).

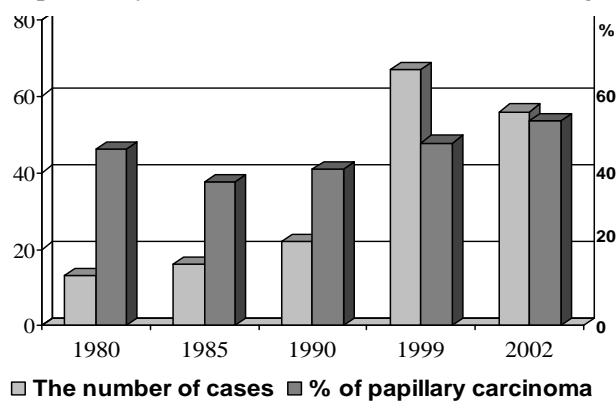


Fig. 1. Number of cases and percentage of papillary carcinoma in patients with hyperplasia of the thyroid gland.

Radiation induced thyroid cancer is papillary cancer. We studied the data of histological examination of remote tumors of the thyroid gland - with malignant neoplasms, there were papillary, follicular, medullary, and undifferentiated carcinoma and others [1, 6, 8].

It should be noted that patients who were born in 1968 and later operated on for thyroid cancer, the papillary cancer is dominated, in 1999 of 6 cases of thyroid cancer in 33.3% is papillary cancer, in 2000 of 5 cases – in 100% is papillary cancer, in 2001 of 9 cases – in 77,8% is papillary cancer and in 2002 of 6 cases – in 66,7% is also papillary cancer.

One of the most significant indicators of the prevalence of severity of iodine deficiency diseases is the frequency of goiter in children of primary school age. Nowadays, the term "goiter" refers to any increase in thyroid in excess of the physiological norm. The size of the thyroid gland is determined by palpation or with the help of ultrasonography. Modern classification of goitre has been adapted by experts for mass screening of thyroid disease and takes into account the growth of the child. The volume of one lobe of the thyroid gland in norm does not exceed the size of the distal phalanx of the thumb of the examinee [1, 3, 4].

As the critical point of the prevalence of thyroid disease in the population of children of primary school age selected the threshold of 5%, which allows to take into account the fact, that the goitre may develop and in the population with normal iodine content due to other causes (autoimmune thyroiditis, the effect of goitrogenic, etc.). If the frequency of the goiter at carrying out of screening studies exceeds 5%, problems with provision of iodine of the population proved. In regions with iodine deficiency of medium severity and subject to the effects of other goitrogenic (industrial pollutant, poor nutrition of the population, of excess pesticides and herbicides in the soil, water chlorination, etc.) frequency of the goiter may exceed 20%, and in severe iodine deficiency – 40% [3, 5, 11].

Since 2007, an additional criterion of the severity of IDD in the population recognized the frequency of newborns with hyperthyrotropinemia – levels of TSH above 5 mu/l according to the data of neonatal screening for congenital hypothyroidism. Numerous studies have shown that in regions with adequate iodine provision of the population, including pregnant women, those children are born down to 3%. The higher the degree of iodine deficiency, the more disturbed hormonogenesis of the thyroid of mother and fetus, the higher the frequency of neonatal hyperthyrotropinemia [1, 2, 5].

Implementation of prevention of IDD considering regional features of iodine deficiency more efficiently, than treating the consequences of iodine deficiency, especially as some of them (mental retardation, cretinism) is practically irreversible. Daily need for iodine is extremely small is 3-5 g of iodine. The norm of iodine should receive daily, year after year. It's enough to forget about it, as iodine deficiency reminds of itself. Real consumption of iodine in Ukraine is only 40-60 mg a day that two to three times

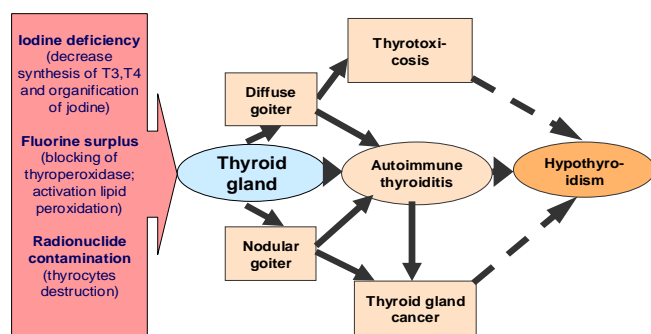


Fig. 2. Scheme of the thyroid pathology occurrence resulting from the iodine deficiency.

lower than the recommended level, which requires the implementation of measures for the prevention of mass and group, taking into account regional differences in iodine deficiency (fig. 2).

For optimal realization of this program it is essential to implement educational activities among all groups of population (the organization of endocrinology clinics at schools and to highlight this problem in the media) [1, 8, 10].

Conclusions

Thus in the development of endemic goiter the environmental conditions of a region play a big role. The inductor of thyroid pathology in general is iodine deficiency, both direct and relative, the main cause of which is anthropogenic pollution (fluoride, of radionuclide, etc.). That is endemic goiter or iodine deficiency has regional differences related to the environmental conditions of that particular region. In this case, environmental conditions are such that the primary pathology is nodular goiter, thyroiditis autoimmune etc. More than half of autoimmune thyroiditis ends the development of hypothyroidism. On this basis, treatment and prevention of endemic goiter should be carried out taking into account the environmental conditions of the region concerned.

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Реферат

ЙОДДЕФИЦИТ ЯК ФАКТОР РОЗВИТКУ ТИРЕОЇДНОЇ ПАТОЛОГІЇ В ПОЛТАВСЬКІЙ ОБЛАСТІ

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Йодний дефіцит - проблема актуальна для всієї території України. Різниця полягає тільки в його тяжкості - від легкого на сході, півдні та в центрі країни до середньотяжкого і важкого в гірських районах Карпат. Метою дослідження було провести аналіз патології щитовидної залози в Полтавській області за умов йоддефіциту. Оцінюючи екологічну ситуацію в Полтавській області, можна відзначити, що дана область відноситься до зони помірного йодного дефіциту, оскільки відзначається зниження вмісту йоду по всім водоносним горизонтам Полтавської області. Профілактичні заходи повинні бути постійними, оскільки йодний дефіцит як екологічну проблему ліквідувати неможливо. Світовий і вітчизняний досвід показують, що припинення профілактики призводить до швидкого зростання частоти йоддефіцитних захворювань в популяції. Здійснення профілактики йоддефіцитних захворювань набагато ефективніше, ніж лікування наслідків йодного дефіциту,

ЙОДДЕФИЦИТ КАК ФАКТОР РАЗВИТИЯ ТИРЕОИДНОЙ ПАТОЛОГИИ В ПОЛТАВСКОЙ ОБЛАСТИ

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Йодный дефицит – проблема актуальная для всей территории Украины. Разнится только в его тяжести – от легкого на востоке, юге и в центре страны до среднетяжелого и тяжелого в горных районах Карпат. Целью исследования было проведение анализа патологии щитовидной железы в условиях йоддефицита. Оценивая экологическую ситуацию в Полтавской области, можно отметить, что данная область относится к зоне умеренного йодного дефицита, поскольку отмечается снижение содержания йода по всем водоносным горизонтам Полтавской области. Профилактические меры должны быть постоянными, поскольку йодный дефицит как экологическую проблему ликвидировать невозможно. Мировой и отечественный опыт показывают, что прекращение профилактики приводит к быстрому росту частоты йоддефицитных заболеваний в популяции. Осуществление профилактики йоддефицитных заболеваний гораздо эффективнее, чем лечение последствий йодного дефицита, тем более, что некоторые из них (умственная

тим більше, що деякі з них (розумова відсталість, кретинизм) практично незворотні. Таким чином, у розвитку зобної ендемії велику роль відіграють екологічні умови відповідного регіону. Індуктором тиреоїдної патології в цілому є йододефіцит, як прямий, так і відносний, основною причиною якого є техногенне забруднення навколишнього середовища (фтористі з'єднання, радіонукліди і ін.). Тобто зобна ендемія або йододефіцит має регіональні відмінності, які пов'язані з екологічними умовами цього чи іншого регіону.

Ключові слова: щитовидна залоза, патологія щитовидної залози, йододефіцитні захворювання, йод, фтор, забруднення радіонуклідами.

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отсталость, кретинизм) практически необратимы. Таким образом, в развитии зобной эндемии большую роль играют экологические условия соответствующего региона. Индуктором тиреоидной патологии в целом является йододефицит, как прямой, так и относительный, основной причиной которого является техногенное загрязнение окружающей среды (фтористые соединения, радионуклиды и др.). То есть зобная эндемия или йододефицит имеет региональные различия, связанные с экологическими условиями этого или иного региона.

Ключевые слова: щитовидная железа, патология щитовидной железы, йододефицитные заболевания, йод, фтор, загрязнение радионуклидами.

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COMMON LABORATORY DIAGNOSTIC DATA ANALYSIS OF PATIENTS WITH DUPUYTREN'S CONTRACTURE AT THE STAGES OF PATHOLOGICAL PROCESSES IN PALM APONEUROSIS

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The study of the characteristic features of laboratory data in patients with Dupuytren's contracture, which in the past was verified as having been exposed to ionizing radiation, showed that in the examined patients with Dupuytren's contracture there is a concordance of the fibrous process in the palmar aponeurosis and liver, and the pathological process in the liver is one of the primary pathogenetic links in the formation of contracture. It was revealed that there is a relationship between the degree of fibrous liver damage and the biochemical blood parameters of patients with Dupuytren's contracture.

Key words: Dupuytren's contracture, liver fibrosis, connective tissue, ionizing radiation.

The work is a fragment of the research project "Determination of the connective tissue pathology etiopathogenesis in victims after radiation accidents based on which the pathogenetic justification for the victims treatment will be developed", state registration No. 0118U002106.

Frequent connective tissue pathology symptoms regularity is diagnosed as neuromuscular affect and lesions of the joint, which may be characterized by muscle weakness, myalgia, arthralgia, arthritis (mostly observed symmetrical joint damage). This fact is proved by the logical progress of symptoms of various extrahepatic manifestations, among which the DC often comes to the fore in the clinical picture and a significant number of experts consider DC as a typical stigma for patients with chronic alcoholic hepatitis [3, 4, 5].

The worldwide studies of the impact of ionizing radiation on the connection tissue were carried out, but those studies were carried out in experiments at significant irradiation doses for a very short time without regard to radionuclide incorporation.

Statistics points out the increase in the prevalence of clinically manifested pathology of connection tissue in individuals exposed to ionizing radiation and scientists describe such phenomena [2, 4, 6].

The purpose of the study was to identify the typical peculiarities of common laboratory data of patients with Dupuytren's contracture who had been exposed to ionizing radiation (this fact was verified and confirmed by state register records) at different stages of the pathological process in the liver with determination of typical morphological changes till pathological changes in the tissues of the palm aponeurosis.

Materials and methods. The results of our work are based on the integrated dynamic supervision data of the individuals (accident liquidators of the Chernobyl nuclear power plant (ChNPP)) with Dupuytren's contracture (DC) performed on the basis of the clinic of radiation registry of the National Academy of medical Sciences (NAMS) of Ukraine in 2002 through 2012. The study used case follow-up cards and patient's chart stored in the archive of the National Research Center for Radiation Medicine (NRCRM) of NAMS of Ukraine, military hospital in Irpin and surgical departments of the Kyiv City Emergency Care Hospital (KCECH).