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Morpho-Functional Changes in the Liver as a Result of Groundwater Consumption

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Annotation. The task of providing the population with high-quality, and therefore safe for health, drinking water is set by the highest authorities of the country as a state priority. The task is not easy, since the quality of water supplied to the consumer is determined by many factors: the natural composition of the water source, anthropogenic impact (primarily the volume and composition of wastewater discharged into surface water sources or pumped into underground horizons), water treatment technology, reagents used, the state of utilities and so on. [1–3]. The situation is complicated in cases where a water source that does not fully meet hygienic requirements is uncontested or all water bodies in the territory are characterized by a similar chemical composition due to the natural geochemical characteristics of the area.

Key words: liver, underground water, morphology, organism, heavy metals.

Relevance. WHO experts have found that 80% of all diseases in the world are associated with unsatisfactory quality of drinking water and violations of sanitary and hygienic water supply standards. On May 6, 2003, Uzbekistan was one of the first CIS countries to adopt the Law on Water and Water Resources Management. In order to protect the following rivers flowing through the country - Kashkadarya, Chirchik, Surkhandarya, Zarafshan, Karadarya, Naryn, Amu Darya and Syrdarya, as well as 11 groundwater areas of national importance, the Cabinet of Ministers adopted 11 resolutions. [2] The annual reserves of groundwater in Uzbekistan are 19 km3, of which on average 9.5 km3 are used per year. The level of mineralization of the main part of the water used does not exceed 3 mg/l. This is an indicator of good water quality, so one third (3.43 km3) is spent on drinking water, and the rest for technical needs. However, overall groundwater quality is deteriorating in some parts of the country. Over the past 15-20 years, the level of groundwater mineralization in the western and southwestern regions of the country, including the Republic of Karakalpakstan, Khorezm and Bukhara regions, has increased several times [Jahangirova G.Z., 2024].

The Bukhara oil refinery is the main polluter of the area's water resources. The content of phenols and petroleum products in water exceeds the maximum permissible concentration by 2-3 times. Fresh groundwater reserves are depleted, and the region experiences a shortage of drinking water. Water mineralization is up to 1.5 g/l, and its hardness is 11-12 mEq. [Turaeva G. G., 2024].

Phenol is one of the industrial pollutants, quite toxic to animals, humans and many microorganisms [16]. Causes dysfunction of the nervous system. Dust, vapors and phenol solution irritate the mucous membranes of the eyes, respiratory tract, and skin. It has a pronounced carcinogenic effect. Formaldehyde is an irritating gas that is generally toxic. It has a general toxic effect. Causes damage to the central nervous system, lungs, liver, kidneys, and organs of vision. Possible skin-resorptive effect. Formaldehyde has an allergenic, mutagenic, sensitizing and carcinogenic effect.

The task of providing the population with high-quality, and therefore safe for health, drinking water is set by the highest authorities of the country as a state priority. The task is not easy, since the quality of water supplied to the consumer is determined by many factors: the natural composition of the water source, anthropogenic impact (primarily the volume and composition of wastewater discharged into surface water sources or pumped into underground horizons), water treatment technology, reagents used, the state of utilities and so on. [1–3]. Moreover, if anthropogenic pollution, technical and technological equipment of water treatment systems are controllable factors, then the natural chemical composition of a water body practically cannot be changed by modern means. The situation is complicated in cases where a water source that does not fully meet hygienic requirements is uncontested or all water bodies in the territory are characterized by a similar chemical composition due to the natural geochemical characteristics of the area.

The presence of pollutants such as aluminum and organochlorine substances (primarily chloroform) in water negatively affects health. As is known, chloroform has a general toxic effect on the body (the heart, liver, kidneys are affected), irritant, mutagenic, and causes cancer. Aluminum, having a toxicological effect, affects the central nervous system. The content of arsenic, boron, molybdenum, manganese, iron, strontium, nitrites, nitrates, chloroform in drinking water exceeding the maximum permissible concentration can cause the development of adverse effects on public health from the gastrointestinal tract, kidneys, cardiovascular, hormonal, immune systems, central and peripheral nervous systems [3]. As is known, bacterial and viral intestinal infections are transmitted with water. The cause of infection with viral hepatitis A (50% of cases), intestinal infections (9%) was poor-quality drinking water [5].

High-quality drinking water is water that does not contain impurities harmful to human health. It must be odorless and colorless, safe for long-term use, safe in epidemiological and radiological terms, harmless in chemical composition and have favorable organoleptic properties [1,2]. Consumption of poor-quality drinking water leads to an increase in diseases [3]. The quality of drinking water deteriorates due to the unsatisfactory condition of surface water sources and a low degree of water purification.

In general, the main factors determining the likelihood of the appearance of high concentrations of toxic elements in surface and groundwater - sources of drinking water supply - within the boundaries of hydrogeochemical provinces are: - the presence of rocks characterized by relatively high concentrations of these substances; – high leaching capacity of water-bearing rocks; – a variety of forms of presence of elements in rocks, including the presence of easily soluble compounds; – favorable hydrogeological and hydrochemical conditions, determined by the high rate of water exchange and chemical types of water; – intensive exploitation of groundwater for the purposes of domestic water supply, which determines the active interaction of various aquifers, increases the rate of water exchange and the intensity of physical and chemical interaction in the "water-rock" system.

Metals, mainly those with variable valence, are subject to reduction and oxidation in the body. The distribution of metals among organs and tissues is determined to a certain extent by the physical and chemical properties of compounds formed in the blood. Large colloidal particles are captured by the reticuloendothelial system of the liver, spleen, kidneys, and bone marrow, where they are temporarily retained. An incomparably more durable depot is the skeletal system, where, as a rule, metals are deposited, arriving predominantly in the form of highly soluble compounds [1]. Heavy metal compounds are selectively toxic mainly to the specific epithelium of the kidneys, liver, intestines, red blood cells and nerve cells, where an increased concentration of these substances is observed. Compounds of these metals can enter the body orally, inhalation, through the skin and mucous membranes, or through parenteral administration [2]. Thus, the accumulation of heavy metals in soil, water, and plants in humans causes specific toxicoses and mutagenic effects. The result of such a disorder in ordinary (non-reproductive) cells can be an imbalance in the regulation of their division, resulting in malignant diseases. Their influence on the cells of the germinal tract and on the germ cells can lead to mutations and the birth of hereditarily sick children (mentally disabled). Degeneration of peripheral nerves, pneumosclerosis, cirrhosis of the liver, and blindness are also possible. The effect of excess heavy metals on plants can be both direct and indirect. The direct effect is associated with the direct accumulation of metals by plants, the indirect effect is associated with the negative impact of heavy metals on the composition and properties of the soil and on its fertility. Studying the response of plants to environmental pollution with heavy metals is one of the tasks of environmental monitoring of the environment [3]. Zinc. The daily requirement of zinc is from 12 to 50 mg. The main causes of zinc deficiency: lack of proteins, alcoholism and drug addiction, kidney disease, intestinal dysbiosis, psoriasis, excess of certain heavy metals (for example, copper, cadmium, lead, mercury), some cancer diseases, stress conditions. Organs and consequences of deficiency in them: skin (dermatitis, eczema, furunculosis, acne, trophic ulcers); hair (loss, slow growth); mucous membranes (ulcers, stomatitis); central nervous system (developmental delay in children, decreased appetite, depression); pancreas (lack of insulin); pituitary gland (disorder of puberty in boys); prostate (decreased potency, infertility); cardiovascular system (increased cholesterol). Indicators: hair, whole blood, serum [4].

Zinc in the form of a divalent element is included in over 20 enzymes, including those involved in the metabolism of nucleic acids. In the blood, it is present in red blood cells as a cofactor in carbonic anhydrase. Excess zinc can unbalance the metabolic equilibrium of other metals. An imbalance in the zinc/copper ratio is a major causative factor in the development of coronary heart disease. Excessive consumption of zinc salts can lead to acute intestinal poisoning with nausea. In general, zinc is not very dangerous, and the possibility of poisoning most likely depends on the co-presence of toxic cadmium [5].

Deficiency symptoms occur when there is too little zinc to support normal enzymatic functions. In plants, zinc concentrations in tissues of less than 10-20 mg/kg are considered insufficient. The toxic effects of zinc can generally be described as the replacement of other metals in enzymes by zinc ions or due to the high affinity of zinc ions for – SH (thiol) and – NH (imine) bonds in molecules. Such substitution or binding may cause deficiency of enzymatic functions. Many organisms can adapt to some extent to elevated zinc concentrations in soil and may develop detoxification mechanisms [6]. Under the influence of zinc, a decrease in the amount of calcium in the bones and blood is observed, phosphorus metabolism is disrupted; the effect of zinc chloride on the body is manifested in damage to the nucleolar apparatus of bone marrow cells by a decrease in transcriptional activity in direct dependence on the duration of exposure to the xenobiotic. The toxic dose of zinc for humans (with chronic intake) is 150-600 mg, the lethal dose is 6 g for the entire body weight [7]. Copper is an essential cofactor for several essential enzymes. Normally, there is a system that prevents the continuous accumulation of copper in tissues by limiting its absorption or stimulating its excretion. Chronic excess of copper in tissues in corresponding diseases causes toxicosis: leads to growth arrest, hemolysis, decreased hemoglobin content, and degradation of liver, kidney, and brain tissues. [9]. Although copper is essential for most living species, it can be highly toxic. For many species, there is a "window of essentiality"—an optimal range of concentrations at which the organism can survive. Concentrations less than optimal may cause symptoms of deficiency, and concentrations exceeding them may cause toxic effects. When there is an excess of copper, it accumulates in the liver, followed by sudden destruction of red blood cells and a sharp increase in the concentration of bilirubin; excess free copper inhibits the activity of oxidative enzymes, which leads to cell death; can lead to functional disorders of the central nervous system (memory impairment, depression, insomnia) [5-6]. At high levels, copper has a wide spectrum of toxic effects with diverse clinical manifestations. A decisive role in the mechanism of the toxic effect of copper is played by the ability of its ions to block the -SH groups of proteins, especially enzymes. Acute intoxication with copper ions is accompanied by severe hemolysis of erythrocytes. Intoxication of copper compounds may be accompanied by autoimmune reactions and metabolic disorders [10]. Excess copper (II) causes disruption of the brain, liver, and vestibular apparatus, leads to a lack of zinc in the body, and at very high levels, to death [11]. Iron. Excess iron in water contributes to the development of many diseases. This element can accumulate to toxic concentrations in organs and tissues, including joints, liver, endocrine glands and heart. Iron can create a nutrient medium for the growth of harmful microorganisms and malignant tumor cells, and also additionally stimulate the carcinogenic effect of free radicals. If the total iron content in the body exceeds 15 g, then internal organs are affected. This condition is called hemochromatosis. Iron stimulates the oxidation of “bad” cholesterol, which causes the progression of atherosclerosis and, secondarily, coronary heart disease. Relatively large doses of iron inhibit the absorption of other microelements in the small intestine (Cu, Mn, etc.) and may have adverse health effects. The main reason for the increased release of these trace elements from the body with a high level of iron in food is the presence of competition between these metals for transferrin - a protein that transports metals from the intestinal mucosa to the organs and tissues of the body, with preference given to the iron ion, which has a higher affinity for transferrin [11-12].

Emerging evidence suggests that myocardial iron overload resulting from inhalation of airborne metal-rich nanoparticles is a likely and modifiable environmental risk factor for cardiac oxidative stress and cardiovascular disease internationally [13].

Morphological changes resulting from the influence of groundwater with a high chemical composition on the internal organs of the body have been little studied, and the results of experimental studies on the effect of biological preparations have been published. However, the morphological changes that occur in the liver under the influence of groundwater with high chemical content, the level of the new therapeutic and prophylactic effect of bioactive additives, as well as the level of influence of biological preparations on the level of morphological changes are not shown.

Literature

1. Джахангирова Г.З, Гаффорхонова М.А, Миралимова А.И, Байматова Н.Р, Шарипова У.И, Пулатова Н.Э ИСПОЛЬЗОВАНИЕ ПОДЗЕМНЫХ ВОД В ПРОМЫШЛЕННОСТИ // SAI. 2024. №Special Issue.
2. Дунаев А.М., Румянцев И.В., Гриневич В.И. Тяжелые металлы как фактор риска в урбанизированных системах: приложение к г. Иваново. Изв. вузов. Химия и хим. технология. 2015. Т. 58. Вып. 2. С. 77-81.
3. Куленцан Антон Львович, Марчук Наталья Александровна АНАЛИЗ ВОЗДЕЙСТВИЯ НА ЧЕЛОВЕКА И ОКРУЖАЮЩУЮ СРЕДУ ЗАГРЯЗНЯЮЩИХ ВЕЩЕСТВ // Известия ВУЗов. Химия и химическая технология. 2022. №1.
4. Машкин Д.В., Извекова Т.В., Гущин А.А., Гриневич В.И. Оценка уровня загрязнения почв г. Иваново тяжелыми металлами и нефтепродуктами. Изв. вузов. Химия и хим. технология. 2017. Т. 60. Вып. 5. С. 94−99.
5. Ситуация с обеспечением населения чистой питьевой водой. // Пресс-служба Экологического движения Узбекистана. www.eco.uz. 19.06.2017.
6. Соколов В., Пять компонентов водной безопасности Азиатского банка развития: ценный подход к разработке водной политики в странах Центральной Азии. Узбекистан на пути достижения водной безопасности: сборник статей. -Ташкент: Red Grey, 2019 -68 с. 40-с.
7. Степанян А. А. и др. Токсиколого-гигиеническая характеристика элементного состава воды подземных горизонтов.
8. Тураева Г. Г. АКТУАЛЬНЫЕ ПРОБЛЕМЫ СОВРЕМЕННОЙ ЭКОЛОГИИ УЗБЕКИСТАНА И МЕРЫ ПО СТАБИЛИЗАЦИИ ВЫБРОСОВ В ОКРУЖАЮЩУЮ СРЕДУ //PEDAGOG. – 2024. – Т. 7. – №. 2. – С. 92-103.
9. Фоменко А.Н., Аристов В.А., Маклакова О.А., Хорошавин В.А. Факторы и уровни риска здоровью населения при воздействии компонентов питьевых вод в границах природных гидрогеохимических провинций Пермского края // Анализ риска здоровью. 2018. №3.
10. Шамшиев А.Б. Негативные последствия загрязнения окружающей среды тяжелыми металлами и их влияние на живой организм. Наука, нов. технол. и иннов. Кыргызстана. 2021. № 1. С. 49-54.
11. Олимова А. З., Шодиев У. М. Репродуктив Ёшдаги эркакларда бепуштлик сабаблари: Бухоро тумани эпидемиологияси //Scientific progress. – 2021. – Т. 2. – №. 7. – С. 499-502.
12. Zokirovna O. A., Abdurasulovich S. B. Ovarian Diseases in Age of Reproductive Women: Dermoid Cyst //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 154-161.

13. Olimova A. Z. ECHINOCOCCOSIS OF LIVER OF THREE MONTHLY WHITE RAT //Scientific progress. – 2022. – Т. 3. – №. 3. – С. 462-466.

14. Олимова А. З. Морфологические и морфометрические особенности печени белых беспородных трех месячных крыс после тяжёлой черепно-мозговой травмы вызванной экспериментальным путём //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 557-563.

15. Oglu M. Z. M., Zokirovna O. A. МОРФОЛОГИЧЕСКИЕ И МОРФОМЕТРИЧЕСКИЕ ПАРАМЕТРЫ ПЕЧЕНИ БЕЛЫХ БЕСПОРОДНЫХ КРЫС, ПЕРЕНЕСШИХ ЭКСПЕРИМЕНТАЛЬНУЮ ЧЕРЕПНО-МОЗГОВУЮ ТРАВМУ ПОСЛЕ МЕДИКАМЕНТОЗНОЙ КОРРЕКЦИИ //JOURNAL OF BIOMEDICINE AND PRACTICE. – 2023. – Т. 8. – №. 1.

16. Олимова А. З., Турдиев М. Р. БУХОРО ШАҲРИДА МЕЪДА ВА ЎН ИККИ БАРМОҚЛИ ИЧАК ЯРАСИ УЧРАШ ЭПИДЕМИОЛОГИЯСИ //Oriental renaissance: Innovative, educational, natural and social sciences. – 2022. – Т. 2. – №. 4. – С. 642-647.

17. Zokirovna O. A. Modern Concepts of Idiopathic Pulmonary Fibrosis //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 3. – С. 97-101.

18. Zokirovna O. A. Pathology of Precancerous Conditions of the Ovaries //American Journal of Pediatric Medicine and Health Sciences. – 2023. – Т. 1. – №. 3. – С. 93-96.

19. Зокировна, Олимова Азиза и Тешаев Шухрат Джумаевич. «Морфологические аспекты печени белых беспородных крыс после тяжелой черепно-мозговой травмы, вызванной экспериментально в виде дорожно-транспортного происшествия». *Scholastic: Journal of Natural and Medical Education* 2.2 (2023): 59-62.

20. Zokirovna O. A. Comparative characteristics of the morphological parameters of the liver at different periods of traumatic brain injury //Euro-Asia Conferences. – 2021. – С. 139-142.

21. Zokirovna O. A. Macroand microscopic structure of the liver of threemonthly white rats //Academic research in educational sciences. – 2021. – Т. 2. – №. 9. – С. 309-312.

22. Олимова А. З. Частота Встречаемости Миомы Матки У Женщин В Репродуктивном Возрасте //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 551-556.

23. Zokirovna O. A., Abdurasulovich S. B. Ovarian Diseases in Age of Reproductive Women: Dermoid Cyst //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 6. – С. 154-161.

24. Zokirovna O. A. Cytological screening of cervical diseases: pap test research in the bukhara regional diagnostic center for the period 2015-2019. – 2022.

25. Zokirovna O. A., PREVALENCE R. M. M. EPIDEMIOLOGY OF CANCER OF THE ORAL CAVITY AND THROAT IN THE BUKHARA REGION //Web of Scientist: International Scientific Research Journal. – 2022. – Т. 3. – №. 11. – С. 545-550.

26. Olimova A. Z. The frequency of occurrence of my uterus In women of reproductive age //JOURNAL OF ADVANCED RESEARCH AND STABILITY (JARS). – 2021. – Т. 1. – №. 06. – С. 551-556.

27. Olimova Aziza Zokirovna. (2023). MODERN PRINCIPLES OF THE EFFECT OF HEMODIALYSIS THERAPY ON HEART RATE. *International Journal of*

Integrative and Modern Medicine, *1*(1), 80–85. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/28

28. Olimova Aziza Zokirovna. (2023). PATHOMORPHOLOGICAL CHARACTERISTICS OF THE EPIDIDYMIS UNDER IRRADIATION. *International Journal of Integrative and Modern Medicine*, *1*(1), 96–100. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/31
29. Olimova Aziza Zokirovna. (2023). THE INCIDENCE OF CANCER OF THE ORAL CAVITY AND PHARYNX IN THE BUKHARA REGION. *International Journal of Integrative and Modern Medicine*, *1*(1), 86–89. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/29
30. Olimova Aziza Zokirovna. (2023). INFLUENCE OF ALCOHOL INTOXICATION ON THE HEART TISSUE OF RATS IN THE EXPERIMENT. *International Journal of Integrative and Modern Medicine*, *1*(1), 90–95. Retrieved from http://medicaljournals.eu/index.php/IJIMM/article/view/30
31. Olimova Aziza Zokirovna. (2023). Modern Aspects of the Etiology of Gastric Ulcer and Its Complications. *American Journal of Pediatric Medicine and Health Sciences (2993-2149)*, *1*(3), 163–166. Retrieved from http://grnjournal.us/index.php/AJPMHS/article/view/208
32. Zokirovna O. A., Jumaevich T. S. Morphological Aspects of the Liver of White Outbred Rats After Severe Traumatic Brain Injury Caused Experimentally in the Form of a Road Accident //Scholastic: Journal of Natural and Medical Education. – 2023. – T. 2. – №. 2. – C. 59-62.
33. Aziza Zokirovna Olimova GASTRIC ULCER AND ITS COMPLICATIONS // Scientific progress. 2022. №3. URL: https://cyberleninka.ru/article/n/gastric-ulcer-and-its-complications (дата обращения: 28.09.2023).
34. Olimova Aziza Zokirovna. (2022). TECHNIQUE FOR CUTTING BIOPSY AND SURGICAL MATERIAL IN THE PRACTICE OF PATHOLOGICAL ANATOMY AND FORENSIC MEDICINE. *Web of Scientist: International Scientific Research Journal*, *3*(7), 116–120. https://doi.org/10.17605/OSF.IO/PSQ59
35. Zhumayevich N. F., Zokirovna O. A. PATHOMORPHOLOGY OF GASTRIC CANCER //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2022. – C. 330-333.
36. Zokirovna O. A. Epidemiological and Etiological Data of Morphogenesis and Pathomorphology of Congenital Heart Diseases in Children //American Journal of Pediatric Medicine and Health Sciences. – 2023. – T. 1. – №. 4. – C. 88-91.