morphofunctional markers of the general physiological state, reproductive potential, and resistance to stress factors. The queen bee can be used as a model object for studying the influence of environmental factors on the reproductive system and systemic adaptive-pathophysiological reactions.

Conclusion. Morphometric parameters of queen bees have applied value for assessing the adaptive reserve of the organism and can be considered as early indicators of functional exhaustion and stress reactions, which expands the possibilities of their use in research on clinical pathophysiology.

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THE EFFECT OF IONIZING RADIATION ON BIOLOGICAL OBJECTS

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Introduction. Radiation risks are an integral part of environmental risks and are associated with the presence of radionuclides of both natural and anthropogenic origin in the environment. April 26 marks 40 years since the major man-made disaster – the accident at the Chernobyl Nuclear Power Plant, which resulted in the loss of thousands of lives and contamination of millions of hectares of agricultural land. In the long term, radionuclides with long half-lives that are highly soluble in body fluids have a significant impact. These include cesium-137 and strontium-90. The combined intake of these radionuclides determines the nature and severity of damage in people living in radioactively contaminated areas or consuming food contaminated with strontium-90 and cesium-137 [1].

An important factor contributing to the potential contamination of the territory of Ukraine with radionuclides is the ongoing war with the Russian Federation. The Zaporizhzhia Nuclear Power Plant is currently under occupation. There is a constant risk of an accident, which could result in a catastrophe comparable to the Chernobyl disaster. During the period of the Russian Federation's aggression against Ukraine, attention to radiation safety within the territory of Ukraine, especially in areas surrounding nuclear power plants, has significantly increased due to ongoing missile strikes and attacks using unmanned aerial vehicles [3].

Sources of radionuclides entering the bodies of animals and humans include cosmic radiation, natural background radiation, activities of nuclear industry and energy enterprises, scientific research, military activities, X-ray diagnostic procedures, the use of television and computer equipment, air travel at high altitudes, accumulation of radioactive waste, and other factors. Like other types of anthropogenic risks, radiation risk is characterized by the probability of harmful effects occurring in an individual or their descendants as a result of radiation exposure, including an increased risk of cancer and hereditary defects [2]. After entering the body, radioactive substances are absorbed into the blood and lymphatic systems and distributed to various organs and tissues. Knowledge of the patterns of distribution, metabolism, accumulation, and redistribution of radionuclides within the body is of exceptional importance, as it makes it possible to assess damage to specific organs, understand the mechanisms of radionuclide action, identify critical organs, estimate radiation doses received by these organs, and draw conclusions regarding the prognosis of radiation-induced damage.

Aim of the Study. To investigate the specific effects of ionizing radiation on living organisms and the pathological changes observed in critical organs.

Analysis of recent research on the topic. Radioactive elements undergoing decay emit three main types of radiation: alpha, beta, and gamma radiation, which can cause serious diseases, genetic disorders, and death in humans and animals. Radioactive isotopes enter the body through dust, air, food, or water and exhibit different patterns of distribution. Some isotopes are distributed relatively evenly throughout the body (tritium, carbon, iron, polonium); others accumulate in bone tissue (radium, phosphorus, strontium); some are retained in muscles (potassium, rubidium, cesium); while others accumulate in specific organs such as the thyroid gland (iodine) or the liver, kidneys, and spleen (ruthenium, polonium, niobium). Under the influence of ionizing radiation, atoms and molecules within living cells become ionized, initiating complex physicochemical processes that affect the functioning and viability of the organism. According to one viewpoint, radiation-induced ionization of atoms and molecules leads to the rupture of chemical bonds in protein molecules, resulting in cell death and damage to the organism as a whole. According to another viewpoint, the biological effects of ionizing radiation are largely mediated by the products of water radiolysis, since water constitutes up to 70% of the human body mass [4].

During the ionization of water, free radicals such as H^+ and OH^- are formed, and in the presence of oxygen, peroxide compounds are generated. These compounds are strong oxidizing agents that interact chemically with proteins and enzymes, causing their destruction and leading to the formation of substances uncharacteristic of living organisms. As a result, metabolic disorders develop, enzyme activity and individual functional systems are inhibited, and the vital activity of the entire organism is disrupted.

Ionizing radiation and the associated excitation of atoms and molecules act as triggering mechanisms for processes that lead to radiation damage of biological structures, including cells, tissues, organs, systems, and the organism as a whole. Under the influence of ionizing radiation, highly chemically active substances – free atoms and radicals – are formed in the body, which damage and destroy cellular structures. Ionizing radiation can also exert a direct effect on biological molecules. The extent of cellular damage largely depends on the intensity of metabolic processes within cells: the higher the metabolic activity, the greater the susceptibility of cells to radiation exposure [5].

The most radiosensitive cells include those of the hematopoietic organs, intestinal epithelium (which contains a large number of immune cells), germ cells, skin epithelium, the lens capsule, as well as connective tissue, cartilage, bone, muscle, and nervous tissue. Radiation can cause a wide range of diseases, including infectious diseases due to decreased immunity, metabolic disorders, oncological diseases, infertility, cataracts, and others. Ionizing radiation has a particularly severe effect on the developing organism, which is why it poses a significant danger to children and adolescents. The impact of low levels of radiation is difficult to identify, as the effects may not become evident for decades. Even small doses of radiation can cause irreversible genetic changes that may be inherited, leading to the birth of children with genetic disorders (e.g., Down syndrome), epilepsy, and impaired mental and physical development [6, 7].

Hematopoietic organs (lymph nodes, spleen, red bone marrow, and various lymphoid formations) are extremely sensitive to the effects of ionizing radiation. Hematological syndrome, characterized by granulocytopenia, thrombocytopenia, anemia, and hemorrhagic diathesis, develops in most laboratory animals during the 2nd and 3rd weeks after radiation exposure, while in humans it typically develops during the 3rd and 4th week. The main reason for this difference is the unequal rate of blood cell renewal. Lymphoid tissue is more radiosensitive than red bone marrow. Destructive changes occur in lymph nodes due to massive lymphocyte death, leaving only a depleted reticular framework. In the spleen, lymphoid follicles are destroyed, their cells die, and cellular debris is subsequently phagocytosed. Lymphoid organs of the digestive tract wall, tonsils, as well as Peyer's patches and solitary intestinal follicles, undergo necrosis, and the mucous membrane covering them becomes ulcerated. The bone marrow undergoes particularly severe changes. Immature cell forms, myeloblasts, myelocytes, and lymphocytes, are especially radiosensitive. Exposure to high radiation doses leads to the disappearance of not only immature cells but also mature lymphocytes, neutrophils, and erythrocytes. Hemorrhages and replacement of bone marrow cells with adipose tissue are observed.

It is also necessary to note several characteristic features of the effects of ionizing radiation on the human body:

– Sensory organs do not perceive radiation;

– Small doses of radiation can accumulate in the body, producing a cumulative effect;

– Radiation affects not only the exposed individual but also their offspring (genetic effect);

– Different organisms exhibit varying sensitivity to radiation. The most vulnerable are red bone marrow cells, the thyroid gland, lungs, and internal organs, whose cells have a high rate of division.

Conclusions. The specificity of the effects of ionizing radiation lies in the fact that it induces the formation of free radicals, which intensify chemical reactions and involve hundreds or even thousands of molecules that were not directly affected by radiation. Thus, the effect of ionizing radiation is determined not by the amount of energy absorbed by the irradiated object, but by the form in which this energy is transmitted. No other form of energy (thermal, electrical, etc.), when absorbed by a biological object in an equivalent amount, causes changes comparable to those induced by ionizing radiation. Radiation exposure of cells in living organisms alters their capacity for repair, which may result in cell death, damage, or incorrect recovery. Moreover, ionizing radiation may trigger DNA mutations that, if left unrepaired, can ultimately lead to cancer development.

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ПАТОМОРФОЛОГІЧНА ДІАГНОСТИКА ТРІАДИТУ КОТІВ

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Вступ. Термін «тріадит» позначає одночасну наявність ідіопатичного запального захворювання кишечника (ЗЗК), холангіту та панкреатиту у котів. Тріадит – це єдиний антиген-залежний процес, де імунна система реагує на бактерії або білки, що потрапляють через спільну протоку. На сьогоднішній день існує недостатня кількість наукової літератури, присвяченої тріадиту у котів, а також бракує кількість клінічних досліджень [1].

Діагностика тріадиту включає комплексне клінічне дослідження тварин із застосуванням лабораторних та інструментальних методів [2-4]. Остаточний діагноз ставиться на основі гістологічного дослідження біоптатів органів відібраних лапароскопічним методом. Гістопатологія одночасних, але часто субклінічних запальних процесів печінки, підшлункової залози та тонкого кишечнику котів у науковій літературі описана недостатньо [3].

Мета дослідження. Підтвердити правильність поставленого діагнозу та призначеного лікування кішок хворих на тріадит. Ми мали на меті дослідити частоту ентериту, холангіту, панкреатиту або деяких їх комбінацій у симптоматичних та безсимптомних котів, клініко-патологічні особливості та співвіднести гістопатологічні дані з лабораторними.

Матеріал і методи дослідження. Проведено патологоанатомічний розтин 2 тварин хворих на тріадит (кішка «Шаурма», 9 років та кішка «Боні», 4 роки), які загинули під час лікування. Для проведення патогістологічного дослідження були відібрані шматочки внутрішніх органів (печінки, підшлункової залози, дванадцятипалої кишки) та зафіксовані у 10 %-му нейтральному формаліні. Для отримання гістологічних препаратів шматочки органів заливали в парафін за загальноприйнятими методиками [5]. З парафінових блоків на санному мікротомі МС-2 виготовляли гістологічні зрізи товщиною 7–10 мкм, із подальшим їх забарвленням гематоксиліном та еозином за загальноприйнятими [5]. Мікроскопічні дослідження гістологічних препаратів виконували за допомогою світлового мікроскопа Micromed XS–3330, а фотографування фотокамерою Micromed MDC–500.