СЕКЦІЯ 1. **КЛІНІКО-МОРФОЛОГІЧНІ АСПЕКТИ ЗДОРОВЯ ТВАРИН У ЦИФРОВУ ЕПОХУ**

TOXIC EFFECTS OF INCORPORATED RADIONUCLIDES ON ANIMAL ORGANISMS

Sapronova V. O.– PhD in Agricultural Sciences, Associate Professor
Zamula D. S. – Master's Degree Student
Dnipro State Agrarian and Economic University, Dnipro

Relevance. Life on earth is adapted to a certain level of ionizing radiation. The dose of ionizing radiation received by a person consists of three main components: external dose due to cosmic radiation and radiation from natural and artificial radioactive elements, internal dose formed when radionuclides enter the body with food and water, and inhalation dose. This also refers to internal radiation, but is formed by radioactive substances entering the body with air through the lungs.

The study of radioactive transformations in a living organism is extremely important due to the consequences of environmental disasters, especially the Chornobyl accident. The effects of which will have an impact on human and farm animals' health, quality and environmental purity, safety of livestock and crop products for a very long time. This is due to contamination of agricultural land and soil in general with long-lived radionuclides.

Literature review. Incorporated radionuclides are substances that, when entering the body through contaminated feed and water, become integrated into cells and tissues. Radionuclides that enter the gastrointestinal tract

are not considered incorporated since most are excreted with feces and urine, and only a portion is absorbed into the blood, enters metabolism, and becomes part of cells and tissues.

When radioactive substances enter the body, depending on their physicochemical characteristics, amount, localization, and duration in the organism, radiobiological effects similar to those from equivalent doses of external exposure may occur (Hudkov, 2024).

First and foremost, their main hazard is the ability of some radionuclides to selectively accumulate in certain tissues and organs. While all tissues are exposed evenly during external irradiation, in cases of internal irradiation, high local doses in tissues and organs may occur, which is caused by the chemical properties of the radionuclide, specific metabolism of substances, and biological characteristics of the organism.

The second important feature of incorporated radionuclides is an increase in the hazard of α- and β-radiators. Due to their low penetration into the substance, they do not pose a threat or have little effect on internal tissues of the body under conditions of external exposure, but can become extremely strong sources of radiation damage when ingested. This is especially true for nuclides from α-radiation sources: plutonium, americium, curium, radium, uranium, and others, which, having a high relative biological efficiency, can cause severe radiation damage.

The third feature is the prolonged irradiation period due to the long half-life and biological retention of radionuclides like ^{90}Sr and ^{239}Pu, which lead to chronic exposure throughout an organism's lifetime.

The radiobiological effects of incorporated radionuclides in animals largely depend on their accumulation in

specific body areas, forming strong irradiation centers (Hudkov, 2024; Kutlakhmedov Yu.O. et al., 2011).

Many radionuclides selectively deposit from the bloodstream into bones, where they remain for long periods. Consequently, bone tissue and the red bone marrow within or near the radiation range are exposed to ionizing radiation. Such radionuclides are called osteotropic.

These include 45Ca and calcium analogs – artificial (e.g., ^{90}Sr and its daughter product ^{90}Y) and natural (e.g., ^{226}Ra), and actinides like ^{239}Pu, ^{241}Am (artificial), and ^{232}Th, ^{238}U (natural).

Calcium analogs, like calcium itself, distribute relatively evenly throughout the bone. Actinides deposit on bone surfaces and later redistribute within the bone matrix. Concentrations in bones are typically hundreds of times higher than in soft tissues, leading to intense exposure of red bone marrow – the most radiosensitive critical organ.

Red bone marrow produces mature blood cells. Under normal conditions, the loss of any cell in the peripheral blood or elsewhere is compensated by new cell production in the marrow. However, damage to a single marrow cell can lead to the absence or malfunction of an entire cell line. Massive radiation damage to bone marrow cells causes marrow syndrome, which can be potentially fatal to the animal.

For most mammals and humans, the lethal dose of 90Sr is 10-40 MBq/kg body weight. At lower doses, blood diseases such as anemia, leukemia, and others may develop, which are manifested in drowsiness, fever, loss of appetite, and bleeding of the mucous membranes. In general, the reaction of animals to the intake of large amounts of 90Sr differs little from the reactions to external radiation, which are characteristic of different degrees

of radiation sickness. And this is natural, since in both cases, the development of the bone and brain syndrome is the basis of radiation damage (Davydenko, 2012; Gudkov, 2024).

Plutonium, americium, and other actinides transition from blood to bone more slowly and in smaller quantities but have much stronger destructive effects due to alpha radiation. Plutonium may also accumulate in reproductive organs, irradiating oocytes and spermatogenic cells. This leads to reduced sperm production and hormonal function, negatively affecting offspring and increasing radiation-related genetic effects in future generations.

Other radionuclides (^{45}Ca, ^{131}I, ^{137}Cs) also accumulate in germ cells, causing mutations and chromosomal abnormalities. Among fission products, ^{137}Cs is the most dangerous for animals. It mainly accumulates in soft tissues, especially metabolically active ones like muscles and the heart. Its gamma radiation damages both target tissues and critical organs systemically.

Cesium is absorbed through lungs and the gastrointestinal tract, distributing up to 50% in muscles, with less than 5% in bones. Symptoms include general malaise, cardiovascular dysfunction, and muscle weakness, typically appearing 2–3 months post-exposure. Since cesium is a chemical analogue of potassium, it localizes predominantly intracellularly, and its concentration in the blood is insignificant. The elimination of ^{137}Cs occurs through the kidneys (60%) and the intestines (40%). Clinical signs of cesium incorporation, depending on its distribution, may include general systemic reactions combined with functional impairments of critical organs such as the liver and muscles. Typically, the first signs of radiation exposure become apparent only 2–3 months after incorpora-

tion and manifest as asthenic syndrome, autonomic dysfunction, muscular dystonia, and similar conditions.

During pregnancy, ^{137}Cs readily crosses the placenta, equalizing concentrations between mother and fetus. It also transfers through milk to offspring. This applies not only to ^{137}Cs but also to ^{90}Sr and ^{131}I. to varying degrees.

Conclusions. The radiobiological effects of incorporated radionuclides in animals depend on their tendency to accumulate in specific tissues, creating localized radiation zones. These effects are determined by the chemical nature of elements and their physiological roles. Overall, animal responses to internal radionuclide exposure resemble those of external exposure, particularly in the manifestation of radiation sickness.

MAST CELL TUMORS IN DOGS: CLINICAL DIVERSITY AND BREED PREDISPOSITION

Zhelavskyi M. M. – Doctor of Vet. Science, Professor
Vinnytsia National Agrarian University, Vinnytsia

Introduction. Mast cell tumors (MCTs) are among the most commonly diagnosed cutaneous neoplasms in dogs. Arising from mast cells—key players in allergic responses and inflammation—they exhibit a wide range of clinical presentations and histopathological features, often complicating diagnosis and treatment (Blackwood et al., 2012; Gerasimos et al., 2023; Zhelavskyi et al., 2024). MCTs account for approximately 7–21% of all skin malignancies in dogs (Gómez et al., 2020), typically affecting middle-aged to older individuals, with breeds such as Boxers, Labrador Retrievers, Boston Terriers, and Pugs being predisposed (Warland and Dobson, 2013).