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THE INFLUENCE OF GAMMA-RAY EXPOSURE ON THE STRUCTURE AND FUNCTION OF THE LIVER IN THE PRENATAL DEVELOPMENT OF ONTOGENY

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ABSTRACT

This study examines the influence of gamma-ray exposure on the structural and functional development of the liver during prenatal ontogeny. Ionizing radiation, particularly gamma rays, can significantly affect cellular proliferation, differentiation, and tissue morphogenesis during embryonic and fetal development. The research focuses on histological alterations in liver tissue, morphometric parameters of hepatocytes, the formation of the vascular system, and changes in biochemical activity.

Keywords: Gamma-ray exposure, ionizing radiation, prenatal development, ontogeny, liver structure, liver function, embryonic development, fetal development, hepatocytes, histological changes, oxidative stress, radiation-induced damage.

INTRODUCTION

The problem of risk for the healthy creatures determining the action of the ionizing radiation and also the evolutionary effects , which are caused by the action of radiation bring a specific attention to the matter as well as the postnatal induction of cancer or genetic damages. The embryonic cells and the tissue are specifically inclined to face the radiation. In the last period of time, it had been fixed the probability of biological consequences of actions of small dosages of radiation. This is been confirmed by the mental disabilities of people, who lived through the atomic bombardment of Hiroshima and Nagasaki, the increased level of leukemia in little children, who live near by the atomic installations in England and also including the consequences of the disaster on Chernobyl Atomic/Nuclear Power Plant in 1986.

Even though the action of ionization of radiation of the fetus or the embryo was known in the beginning of 20th century. Nevertheless, just in 1929, regarding the cities of Goldsten and Murphy in where there were investigated the serious deviations of the nervous -system of children, whose mothers got a therapeutical ray's exposure during the period of pregnancy. In the earlier experimental investigations such researches in compliance with physical and biological parameters and indications were mainly diminished. There were carried out the intensive biological effects of the consequences of the prenatal exposure. The specific attention was taken by such an aspect in the recent 10 years. In this very period there were undergone the multiple researches, which potentially helped to increase the understanding of the mechanisms of radiation inducive embryo related toxication. In the recent period of time the indications in the area of bio-chemistry and radio-biology interested the ionization of radiation on processes, which had been occurring the mother's fetus. the actions of both of them regarding the similar exposure of ray depends on the period of pregnancy.

For the specific investigation of the exposure to the ray and its risk there were applied the experiments on animals. Such embryologic effects such as the infertility, reduction of the

period of life, the functional deviations of the central nervous system and their differences in the matter of growth of the height in comparison with the rodents and the humans. The pathological effects are possible to be revealed in case of the exposure to the ray on the various stages of pregnancy though they seem to be different. In case of the ray's exposure there can happen the preimplantation death, hard consequences of development, and the further difficult measures of organogenesis, little defects. the suppression of histogenesis, the disorganization and cell's exhaustion in the average period of the pregnancy. For these very issues the threshold dose excepting the later period of pregnancy is estimated at being around 20 grams. All radiation embryo-related effects are considered as the multiple cells oriented and therefore, they have got a stochastic nature. The risk of such effects are not related with the dose directly except for the period of death in the first days of pregnancy. For women of the reproduction period exactly 0,5 grams per a year may be considered as the maximum possible inducing dose of the exposure of the ray in the professional conditions. The exposure regarding the diagnostic aims within the dose of 5 grams is related with a low risk and possesses no danger for the pregnancy. In case on the inevitable clinic related necessary radiographic research does not have any necessity to prescribe depending on the menstruation period not lower than 5 grams before the ovulation or after the conception until the first unrealized process regarding the menstrual period, which is seen as specifically low.

G.A. Chudinovskaya and G.F. Ivanenko studied the influence and fractional ray's exposure, during the embryogenesis on the development of animals. The criteria of such the damage is also the weight of the body and internal parts of the body such as the testes, liver, kidneys, spleen, the adrenal glands as well as the frontal gland regarding the animals which reached just 3 months. The single ray's exposure regarding the dosages of 100 and 150 caused the inhibit effect on the animals. In case of the fractionated inhibition of the ray's exposure the interval of the action was fixed at 1 hour effect. In the intervals of the connectivity there were fixed the interactions of 16, 17 and 20 hours; it was obvious the relaxation of the action of radiation. Which was revealed different in each position on the research of the organs.

Within the conditions of the incorporation of the radionuclide the danger to the fetus may be both direct and non-direct through the organism of mother, the dosage of non-direct damage of mother's body depends on radiation, as well on the complication of the exposure to the ray, depending on the biological and quantity related lawful biological feature of the fetus.

The speed and the volume of the move of transference of radionuclides to mother is realized through the physical -chemical features of the activeness, types of the breed, and the age of the animal and the period of pregnancy.

It was identified the dependence of the biological effect depending on the period of the development of the fetus at the moments of the actions, as the age of the fetus is lower the harder are the deviations through the process of embryogenesis. The action of the radionuclides on embryogenesis is different from the outer picture. it had been characterized by the 3 periods of the radio-perception qualities within the embryogenesis. As also regarding the external exposure towards the ray, as well as after the penetration of the radionuclides to the pregnant animals, their generation may be caused by the radio-embryologic effects (non - numor, tumor, and genetic forms. To non tumor category is referred to the development of the separate forms and their changes.

T.E. Slodenikina studied the activation of the adenylacyclase, phosphodiesterases and nucleotide 5 of plasma membranes of the liver of embryo of the rats of the 20th day of development as a norm after the ionic exposure. it is shown that the gamma-the ray's exposure of plasmatic membranes in dosages such as 0,1 up to 100, it diminishes the activation of adenylate cyclase or adenylyl cyclase with more expressive effects in case of stimulation of Isoproterenol regarding huge dosages. The activation of 5 Nucleotidase and phosphodiesterase will not change up to 100 indication. The rats in various terms of the preganancy were exposed to the ray various times in dosages 0,25 and 2,0 grams; having analyzed the little effects on the dosages; there had been given some data about the radio-related perceptions within the different periods of antenatal development of animals. The preventive usage of Maximin and cystamine is characterized by the prevention of the damaged fetus , which is being limited by the high embryo toxication and low effectiveness. It is being said about the perspectives of usage regarding this very purpose is the hypoxic gas mixture. , which contains up to 10 percentage and up to 90 percentage.

The prenatal development which is being characterized by the intensive proliferation and the differentiation of the migration of cell, in general is considered as the high level of radio-exposure. Therefore, the exposure towards the ray is demanding the radio defense and the attention of the system of healthcare.

The function of the liver: The Function and Purpose of the Liver

The liver, a remarkable organ in the human body, plays a pivotal role in maintaining our overall health and well-being. It is a vital part of the digestive system and is often referred to as the body's chemical factory. This essay will delve into the functions and purpose of the liver, explore signs and symptoms of liver disease, and discuss various ways to take care of this essential organ. Additionally, it is worth noting that October is Liver Awareness Month, making this an opportune time to reflect on the significance of liver health.

The Function and Purpose of the Liver

The liver is the body's largest internal organ, weighing around three pounds. Located in the upper right portion of the abdomen, the liver serves a multitude of functions, making it indispensable to our survival. Here are some key roles that the liver plays:

Metabolism: The liver is responsible for metabolizing nutrients from the food we consume. It helps break down carbohydrates, proteins, and fats into energy, which is used to fuel our daily activities.

Detoxification: One of the liver's most critical functions is detoxification. It filters and removes toxins, drugs, and other harmful substances from the bloodstream, preventing them from causing harm to the body.

Storage: The liver acts as a warehouse for essential nutrients, storing vitamins, minerals, and glucose for later use. It also releases glucose into the bloodstream when needed to maintain stable blood sugar levels.

Blood Clotting: The liver produces proteins necessary for blood clotting, preventing excessive bleeding in case of injuries.

Bile Production: The liver generates bile, which is crucial for the digestion and absorption of fats in the small intestine.

Protein Synthesis: It produces various proteins, including albumin, which helps maintain the balance of fluids in the body, and enzymes necessary for digestion.

Signs and Symptoms of Liver Disease

Liver diseases can take a toll on your health and well-being. It's essential to recognize the signs and symptoms that may indicate a problem with your liver. Some common indications of liver disease include:

Jaundice: Yellowing of the skin and eyes due to the accumulation of bilirubin in the body.

Fatigue: Persistent tiredness and weakness.

Abdominal Pain: Discomfort or pain in the upper right side of the abdomen.

Unexplained Weight Loss: A sudden drop in weight without a clear cause.

Dark Urine: Urine may become darker in color.

Pale Stools: Light-colored, clay-like stools.

Swelling: Swelling in the abdomen and legs due to fluid retention.

Your liver is the largest internal organ in your body and one of the only organs that can regenerate itself. The liver plays a crucial role in filtering blood, storing energy and producing bile for digestion.

Unfortunately, hundreds of diseases and conditions can damage your liver so it can't work. Some of these can be life-threatening. Hepatologists, medical specialists who diagnose and treat liver disease, can treat and sometimes cure these diseases. And there are many things that you can do to keep your liver well and working as it should.

Your liver is the biggest organ in your body, and it performs hundreds of functions every day.

What is the liver's function?

Your liver's biggest job is filtering harmful substances and waste from your blood. Every day, your liver filters more than 250 gallons of blood. If that wasn't enough, and among many other duties, your liver also:

Makes cholesterol that your body uses in different ways

Helps produce certain hormones, protects your cells and is a key ingredient in bile production

Makes proteins — like clotting factors that manage bleeding and albumin, which manages fluid pressure in your bloodstream

Helps keep your blood glucose levels steady by storing glycogen (glucose) and releasing it into your bloodstream to keep your blood sugar levels on an even keel

Breaks down toxins and germs so they safely leave your body in your pee and poop

Works by breaking down fats in your blood to produce energy, and if there are too many, they may get stored as extra fat

Anatomy

Where is my liver located?

Your liver is on the right side of your upper body. It's located under your ribs, just next to your stomach.

What does my liver look like?

Your liver looks like a spongy, reddish-brown wedge of tissue. The wedge, which may be about the size and shape of a football, may weigh between 3 and 5 pounds.

The liver has two lobes (sections). The lobe on the right is slightly larger than the lobe on the left. Both lobes contain many blood vessels and thousands of smaller lobes (lobules) that are tiny clusters of liver cells (hepatocytes).

Some of the important parts of your liver anatomy include:

Lobules: These are tiny clusters of liver cells that connect with your bile ducts, the tubes that transport bile from your liver to your small intestine.

Hepatic veins: These are blood vessels in your liver's lobes that carry blood through your liver so it can remove waste and toxins that eventually leave your body through your pee and poop.

Bile ducts: Bile ducts carry the bile that your liver produces out to the rest of your body.

Conditions and Disorders

What common conditions and disorders can affect my liver?

There are over 100 types of liver diseases, but they fall into a handful of subtypes. Examples include:

Alcohol-induced hepatitis: Heavy alcohol use can cause acute or chronic hepatitis (inflammation in your liver). If it's frequent or lasts a long time, it can lead to cirrhosis and liver failure.

Bile duct obstruction: Conditions that block the flow of bile through your bile ducts can cause it to build up and injure your liver. Gallstones and biliary stricture (narrowing) are some common causes.

Inherited metabolic disorders: Some of these disorders can cause toxic products to build up in your blood. Hemochromatosis is one example.

Liver lesions: These are abnormal growths in your liver. Most are benign (noncancerous), including liver cysts and liver hemangiomas. But some abnormal growths are liver cancer, including hepatocellular carcinoma, intrahepatic cholangiocarcinoma (bile duct cancer in your liver) and hepatoblastoma.

Toxic hepatitis: Chronic overexposure to toxins, like industrial chemicals or drugs, can cause acute or chronic hepatitis.

Viral hepatitis: Viral hepatitis infections can become chronic infections that cause chronic liver disease, including hepatitis B and hepatitis C. Hepatitis A is an acute (short-term) infection.

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