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ACTIVITY OF PANCREATIC TISSUE'S ENZYMES IN DIFFERENT DOSES OF GAMMA-RADIATION

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Annotation
The influence of γ-radiation in Grey dosage 1, 2, 4 and 6 on the activity of pancreatic tissue's enzymes has been studied. The activity of amylaza, and lipaza enzymes and general proteolytic activity has been determined in 1, 3, 10, 20, 30, 45 and 60 days after radiation of pancreatic tissue's homogenate in rats. The results of changes in the activity of pancreatic tissue's enzymes depending on the dosage of γ-radiation have been obtained. It was stated that gamma-radiation decreases the activity of all studied enzymes.

Keywords: grey, gamma radiation, pancreas, amylases and lipases.

Gamma radiation, depending on the dose, reduces the synthesis of enzymes (amylases, lipases, and proteases) in the pancreas and their incretion (amylases and lipases) into the blood. 30- and 60-days of hypokinesia, lipase activity in the blood increases, in the pancreas decreases. 20- and 30- days of hypokinesia in pancreatic tissue, the overall proteolytic activity increases. With the combined effect of hypokinesia and gamma radiation in the pancreatic tissue and in the blood, amylolytic activity increases. On day 30, the activity of this enzyme returned to the initial level in the gland tissue, and it also remained elevated in the blood on day 60.

The problem of radiation damage has acquired particular relevance throughout the world over the past decade. Radiation in our region is considered as one of the most important environmental factors that has a moderate dose of positive — adaptive, largely damaging effect, affecting nerve endings, melanocytes and other skin formations, indirectly causes various structural changes in internal organs.. As a result, an increasing number of people are exposed to the harmful effects of ionizing radiation, which often lead to severe and irreversible consequences. With this in mind, the goal of this work was to study the secretion of pancreatic enzymes under gamma radiation. The problem of radiation damage has acquired particular relevance throughout the world over the past decade. This is due to the widespread use of nuclear energy and radioactive substances in many sectors of the national economy - in industry, agriculture, medicine, research institutions.

The experiments were carried out on 60 adult mongrel rats, males weighing 150-200 g. The irradiation was reproduced using the "Ray" apparatus, Co60- γ radiation was given. The irradiation area is 20x20cm, the focus distance is 75 cm. The radiation dose is 0.86-0.85 Gy/min, the absorbed dose is 1, 2, 4, 6 Gray. After irradiation, rats were slaughtered under ether anesthesia after 1,3,10,20,30 and 60 days. Amylase, lipase, and total proteolytic activity were determined in pancreatic homogenate.

The indicators of intact rats served as a control: in the pancreatic homogenet, enzyme activity corresponded to amylase 1460±56.0u/g, total proteases 230.0±6.1u/g, lipase activity 70.1±3.1u/g.

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The results showed that after gamma irradiation at doses of 1, 2, 4 Gray on day 3, amylolytic activity in pancreatic tissue decreased. On the 7th and 10th days, the decrease in the activity of this enzyme reached its maximum values, i.e. this indicator became 20-40% less than the control indicator.

On day 60 after gamma irradiation at doses of 1 and 2 Gray, the amylolytic activity of pancreatic tissue reached its initial values.

With an increase in the dose of gamma radiation, changes in amylase activity in the gland tissue were more pronounced. With gamma irradiation at a dose of 4 Gray, amylolytic activity in the gland tissue decreased and remains at this level until 60 days after irradiation. When animals were irradiated with a dose of 6 Gray, the activity of amylase in the pancreatic tissue decreased sharply after a day. On the 3rd day after gamma irradiation, its activity slightly recovered, but in the following days it became lower and lower, and on the 30th day it became 70% lower than the control.

After gamma irradiation at doses of 1, 2, 4 Gray on day 3, amylolytic activity in pancreatic tissue decreased. On the 7th and 10th days, the decrease in the activity of this enzyme reached its maximum values, i.e. this indicator became 20-40% less than the control indicator.

On day 60 after gamma irradiation at doses of 1 and 2 Gray, the amylolytic activity of pancreatic tissue reached its initial values.

At a dose of 1 and 2 Gray, the lipolytic activity in the homogenate of the gland tissue and blood remained at the level of the initial values (Tables 3, 4). Therefore, these doses do not affect the secretion of pancreatic lipase and its increment in the blood.

With an increase in the dose to 4 Gray, the activity of lipase in the gland tissue on the next day of gamma irradiation decreased approximately twice, on the tenth day after irradiation, its activity became 3 times lower than the initial values. On the 60th day of follow-up, lipolytic activity in pancreatic tissue also remained much lower than the control indicators.

At a dose of 6 Gray, the lipolytic activity of the tissue on the next day after irradiation decreased by about 3 times, for 20-30 days this indicator became 4 times lower than the initial values.

The change in the overall proteolytic activity of pancreatic tissue also depended on the dose of gamma radiation.

With gamma irradiation at a dose of 1 Gray on the tenth day of the experiment, the total proteolytic activity of the gland tissue decreased by 18%, on the twentieth day it returned to its original values. On the 30th and 45th days after irradiation, its activity in the pancreatic tissue significantly decreased, and on the 60th day of the experiment, the activity of the total protease returned to the control level.

At a dose of 2 Gray, a different pattern of changes in the activity of proteases in pancreatic tissue was observed. At the beginning, it decreased by 37%, then gradually, on the 45th day of the experiment, it returned to the initial values.

With gamma irradiation at 4 Gray on the next day of the experiment, the proteolytic activity in the gland tissue decreased by 13%, from the 20th to the 60th day of the experiment, its activity became approximately 4 times lower than the initial level.

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When the animals were irradiated at a dose of 6 Gray, the next day the activity of proteases in the gland tissue decreased by 30%, in the following days of the experiment its activity decreased more and more, on the 30th day of the experiment it became 2 times lower than the control.

A decrease in the secretion of pancreatic enzymes may be the result of a weakening of stimulating influences at the level of their generation, as well as signals in the chain of neurons of the meta–sympathetic ganglia of the gland, as well as the result of inhibition of neurohumoral regulation processes, expressed in a violation of the balance of adrenergic and cholinergic mediation in the gastrointestinal tract, the predominance of destructive processes and microcirculation disorders, hormone imbalance, and mediators. A decrease in the activity of pancreatic enzymes may also be the result of a violation of enzyme protein synthesis.

T

hus, two periods are outlined in the development of functional changes in the animal body during experimental gamma irradiation. The initial one, when the changes characteristic of the stress reaction prevail, and the subsequent one, when violations of the synthesis of the protein molecule of enzymes in the pancreas are detected, the control and consistency of various metabolic links is disrupted.

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