УДК: 612.343+612.014.482.4

СЕКРЕЦИЯ ГИДРОЛИТИЧЕСКИХ ФЕРМЕНТОВ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ ПРИ γ- ОБЛУЧЕНИИ

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Аннотация: Гамма-излучение в зависимости от дозы снижает синтез ферментов (амилазы, липазы, и протеазы) в поджелудочной железе и инкрецию их (амилазы и липазы) в кровь. 30- и 60-дни гипокинезии активность липазы в крови увеличивается, в поджелудочной железе снижается. 20- и 30- дни гипокинезии в ткани поджелудочной железы общая протеолитическая активность увеличивается. При сочетанном влиянии гипокинезии и γ -излучении в ткани поджелудочной железы и в крови амилолитическая активность повышается.

Ключевые слова: Гамма-излучение, γ –излучении, кровь, фермент, поджелудочной железа, амилаза.

UDC: 612.343 + 612.014.482.4

SECRETION OF HYDROLYTIC ENZYMS OF THE PANCREAS AT γ-IRRADIATION

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Abstract: Gamma radiation, depending on the dose, reduces the synthesis of enzymes (amylase, lipase, and protease) in the pancreas and their increment (amylase and lipase) into the blood. On the 30th and 60th days of hypokinesia, the activity of lipase in the blood increases, in the pancreas it decreases. On the 20th and 30th days of hypokinesia in the tissue of the pancreas, the total proteolytic activity increases. With the combined influence of hypokinesia and γ-radiation in the tissue of the pancreas and in the blood, amylolytic activity increases.

Key words: gamma radiation, γ-radiation, blood, enzyme, pancreas, amylase.

Relevance: The problem of radiation injuries has acquired particular relevance throughout the world over the past decade. Radiation in our region is considered as one of the most important factors of the external environment, which in a moderate dose has a positive - adaptive, significantly - damaging effect, acting on nerve endings, melanocytes and other skin formations, indirectly causes various structural rearrangements in internal organs .. As a result , an increasing number of people are exposed to the harmful effects of ionizing radiation, often leading to severe and irreversible consequences.

Purpose of the research: to study the secretion of pancreatic enzymes during γ-radiation. Over the past decade, the problem of radiation injuries has acquired particular relevance throughout the world. 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.

Material and methods: The experiments were carried out on 60 adult outbred rats, males weighing 150-200 g. The irradiation was reproduced using the "Luch" apparatus, and Co60-γ radiation was given. The irradiation area is 20x20 cm, 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, the rats were killed under ether anesthesia after 1,3,10,20,30 and 60 days. In the homogenate of the pancreas, amylase, lipase, and total proteolytic activity were determined. The indices of intact rats served as control: in the homogenet of the pancreas, the activity of the enzymes corresponded to amylase 1460 ± 56.0 U / g, total protease 230.0 ± 6.1 U / g, lipase activity 70.1 ± 3.1 U / g. / g.

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

On the 60th day after γ-irradiation at a dose of 1 and 2 Gray, the amylolytic activity of the pancreatic tissue reached its initial values.

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

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

On the 60th day after γ-irradiation at a dose of 1 and 2 Gray, the amylolytic activity of the pancreatic tissue reached its initial values.

At doses of 1 and 2 Gray, the lipolytic activity in the homogenate of glandular tissue and blood remained at the level of the initial values.

This means that 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 lipase activity in the glandular tissue on the next day of γ-irradiation decreased approximately two times; on the tenth day after irradiation, its activity became three times lower than the initial values. On the 60th day of observation, the lipolytic activity in the tissue of the pancreas also remained much lower than the control values.

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This means that 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 lipase activity in the glandular tissue on the next day of γ-irradiation decreased approximately two times; on the tenth day after irradiation, its activity became three times lower than the initial values. On the 60th day of observation, the lipolytic activity in the tissue of the pancreas also remained much lower than the control values.

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

The change in the general proteolytic activity of the pancreatic tissue also depended on the dose of γ-irradiation.

With γ-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%, and on the twenty day it returned to its original values. On days 30 and 45 after irradiation, its activity in the tissue of the pancreas significantly decreased, and on day 60 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 the pancreatic tissue was observed. At the beginning, it decreased by 37%, then gradually, on the 45th day of the experiment, it returned to its original values.

With γ-irradiation at 4 Gray on the next day of the experiment, 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.

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%, on 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 can be the result of a weakening of the stimulating effects at the level of their generation, as well as

the transmission of signals in the chain of neurons of the meta sympathetic ganglia of the gland, as well as the result of inhibition of the processes of neurohumoral regulation, expressed in a violation of the balance of adrenergic and cholinergic mediation in the gastrointestinal tract, the predominance of destructive processes and impaired microcirculation, imbalance of hormones, and mediators. A decrease in the activity of pancreatic enzymes can also be the result of a violation of enzymatic protein synthesis.

Conclusion: Thus, in the development of functional changes in the body of animals under experimental γ-irradiation, two periods are outlined. Initial, when the changes characteristic of the stress reaction prevail and the subsequent, when violations of the synthesis of the protein molecule of enzymes in the pancreas are detected, the control and coordination of various metabolic links are disturbed.

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