

INFLUENCE OF ORGANOCHLORINE COMPOUNDS ON SECRETORY ACTIVITY OF THE PANCREAS

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Abstract. *In recent years new organochlorine pesticides have become widely used. Among them, hexachlorocyclohexane (HCH) is being introduced. This requires studying the toxic properties of the drug, as well as the development of hygienic standards for their composition in food products. The results of all experiments conducted with HCH allow us to conclude that it causes significant changes in the exocrine function of the pancreas, their direction and depth depend on the dose of the drug and the duration of its administration.*

Keywords: *organochlorine pesticides, hexachlorocyclohexane, pancreas, exocrine function, activity of pancreatic enzymes.*

Changes in the secretory activity of the stomach under the influence of pesticides affect the activity of the pancreas, which is closely connected with the stomach. It is also possible that pesticides directly affect the pancreatic acinar apparatus.

There is information in the literature about the effect of organochlorine compounds on the exocrine activity of the pancreas. In particular, when examining individuals receiving hexachlorocyclohexane (HCH), a significant decrease in the activity of pancreatic enzymes in the substance inside the duodenum was observed [4].

In the studies of V.P. Bezugliy and co-authors obtained information about a decrease in lipase activity by 2/3 and trypsin activity by 1/3. Under the influence of various organochlorine compounds, not only the secretion, but also the secretion of pancreatic enzymes changes. For example, ethylene chlorohydrin and tetrachlorpropene in certain doses increase the amount of trypsin in the blood of rats and reduce the activity of the trypsin inhibitor [2].

Research has shown that organochlorine pesticides may affect exocrine pancreatic function. However, based on the available data, it is difficult to obtain a complete understanding of changes in the secretory activity of the pancreas under the influence of organochlorine compounds.

Purpose of the work: to study the effect of HCH on the secretory activity of the pancreas.

Materials and methods. Experiments were carried out on inbred white rats of both sexes. The activity status of the pancreas was judged by the activity of the main pancreatic enzymes in the homogenate of chyme and gland of the small intestine: lipase according to G.K. Shlygin et al., amylase according to A.M. Ugolev in the Smith-Roy modification and proteases determined by the Gross method. Animals (300) were divided into 5 groups, one of which served as control. Rats of groups II, III, IV, V were administered an oil solution of HCH in doses of 1/3, 1/5, 1/20, 1/50 of the LD50 (LD50 = 177.0 mg/kg).

The first dose was administered once, the rest were administered daily until the end of the experiments. Rats in the control group were injected with the appropriate amount of fat into their stomachs.

Research results. 6 hours after a single administration of the drug, the activity of the main pancreatic enzymes in the chyme of the small intestine of rats decreased. The activity of amylase,

lipase and proteases was lower by 72, 72 and 35%, respectively, compared to animals in the control group. It can be assumed that these changes are caused by a decrease in the activity of lipase and amylase in the organ homogenate. In this case, as in chyme, more amylolytic activity decreases.

Although in the first hours after administration of HCH to rats, the secretion of the main pancreatic enzymes decreased, their activity in the gland decreased. This can be assessed as a decrease in the rate of enzyme synthesis in acinar cells /1/.

The activity of lipase, proteases and amylase in the intestinal chyme remained significantly reduced 24 hours after administration of the drug. The activity of these enzymes in the pancreatic homogenate of animals from the experimental and control groups was almost identical.

Thus, poisoning animals with relatively large doses of HCH reduces the secretion of the main pancreatic enzymes and somewhat reduces the rate of their synthesis in the pancreas /4/.

Repeated administration of HCH to rats at a dose of 1/5 of the LD50 dose for 20 days increased the activity of proteases in the chyme. By the 5th day, the activity of these enzymes was 2 times higher in animals of the experimental group compared to the control group. By day 10 it decreased slightly, but remained significantly higher than in the control group. At the end of the study (20th day after administration of the drug), the proteolytic activity of chyme was almost the same in rats of the experimental and control groups /5/.

Changes in lipase and amylase activity with 1/5 dose of GXTsG LD50 were in most cases similar and opposite to changes in proteolytic activity. On the second day of HCH administration, a tendency towards a decrease in the activity of these enzymes was observed. By day 3, the decrease in lipolytic and amylolytic activity was significant. Subsequently, the activity of these enzymes increased, and on the 5th day of the study, lipolytic activity, and on the 10th day, amylolytic activity increased to the level of the indicator in the control group.

The increase in the activity of these enzymes continued until the end of the experiments, and on the 20th day, lipase activity was 84% higher than the control, and amylase activity was 64% higher.

Enzyme activity in the pancreas homogenate decreased at the beginning of the experiment in rats treated with HCH, at a level of 1/5 of the LD50. Amylolytic activity decreased 3 times in rats of the experimental group compared to the control group on the third day of drug administration. In rats treated with HCH for three days, it remained at approximately the same level for three days. By days 5-10, the amylolytic activity of pancreatic tissue increased and did not differ from that in control animals, and by day 20 it was significantly higher than in untreated rats.

Amylolytic activity decreased only 24 hours after the introduction of pesticides, then returned to the initial state and did not differ from the control until the end of the study.

On the first day of HCH administration, a tendency towards a decrease in proteolytic activity in pancreatic tissue was observed. On days 3-5-10, this activity did not change significantly, and by day 20 it increased 2 times compared to the control.

Comparing the dynamics of changes in the activity of pancreatic enzymes in the homogenate of chyme and gland, it can be assumed that the decrease in the secretion of amylase and lipase in the first days of the experiments is due to a decrease in the rate of their synthesis. in acinar cells. By the end of the study, the enzymatic function of the gland was restored or even increased, and the release of amylase and lipase into the small intestine decreased.

With long-term use of HCH 1/20 LD50, some changes in the indicators of exocrine activity of the pancreas can be noted. On the 15th day of the experiments, the lipolytic activity of chyme decreased significantly; proteolytic and amylolytic activity did not change. Lipase activity then increased and by day 60 was 67% higher than in the control group. At the 3rd and 4th months, the activity of this enzyme in the chyme was the same in animals of the experimental and control groups.

At the end of the 2nd month, there was a tendency for protease activity to decrease, and at the end of the 4th month, an increase. At month 4, there was also a trend towards increased amylolytic activity. At the end of the experiments (day 180), the activity of all three chyme enzymes was at the control level.

The animals used in this series of experiments showed signs of decreased pancreatic activity within 1 month. In particular, on the 15th day after the administration of HCH LD50 at a dose of 1/20, the lipolytic activity in the gland tissue decreased, and the proteolytic activity decreased significantly on the 15th and 30th days.

Amylolytic activity did not change until the end of the 4th month, then it increased sharply and on the 180th day it was 2 times higher than the value in the control group. At the end of the experiments, lipolytic and proteolytic activities also increased significantly, whereas at the beginning of the experiments they did not change.

The results of this study showed that with long-term poisoning with HCH at a dose of 1/20 LD50, there is first a slight decrease in the secretion and synthesis of pancreatic enzymes, then the activity of the gland is normalized, and by the end of the study there is a significant increase in the processes of enzyme formation.

The smallest dose of the toxic chemical we used (1/50 of the LD50) caused the smallest changes in pancreatic function after long-term use. In the first month, a decrease in lipolytic and proteolytic activity was observed in the chyme and glandular tissue and, conversely, an increase in amylolytic activity. Subsequently, no differences in the activity of enzymes in chyme and pancreatic homogenate were observed in rats of the experimental and control groups, but there was a tendency to increase enzyme activity under the influence of a small dose of a toxic substance.

Conclusions:

1. HCH causes a significant shift in the exocrine secretory activity of the pancreas.
2. The direction and depth of changes in the exocrine activity of the pancreas depend on the dose of the drug and the duration of its use.

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