GLAND ENZYMES SECRETION

Mukhayo Bafoyevna Togaeva *- Senior teacher*
Ismailov Asrorbek Otkirbek ugli,
Leader of the Faculty of Agronomy and Biotechnology of BukhSU Youth Academy"
Istamova Jasmina Ulug`bek kizi
A gifted student

Annotation The article describes the anatomo-morphology of the pancreas and its age-related features, pancreatic insufficiency;

V state description of the anatomo-morphology of the pituitary gland and age-related features, pancreatic deficiency;

Keywords: trypsinogen, Islet of Langerhans, insulin, glucagon,protease, trypsin, chymotrypsin, carboxypeptidase.

The main part of the cells that make up the pancreas produces juice and participates in digestive processes. Among these exocrine cells, there are cells with endocrine activity - the islets of Langerhans. In adults, only 1-2% of the pancreatic mass corresponds to the islets of Langerhans. The islets are not evenly distributed in the gland: their number is 2 times more in the tail than in the head.

The amount of endocrine tissue in the gland of babies is compared to that of adults

4-6 times more. Large size - more than 200 μm in diameter, medium diameter
Islets with a diameter of 100-200 μm and small ones with a diameter of less than 100 μm are distinguished.

Islets of Langerhans are composed of alpha (a), beta (b) and delta (D) cells. The outer layer of islet cells is formed by mixed α and D cells. The medulla consists of only β cells. The ratio of cells in the islets of Langerhans of babies is different:
The number of β-cells does not exceed 50%, the number of D-cells is around 30%. This ratio changes during growth. In six-month-old children, the number of β-cells increases to 70%, and the number of D-cells decreases to 15%.

β-cells in the islets of Langerhans synthesize insulin, α-cells - glucagon, and D-cells - somatostatin hormones.
Insulin consists of two (A and B) polypeptides connected by two disulfide bridges. Different animal and human insulins have 51 amino acids and they differ in sequence. In terms of structure, pig, rabbit, whale insulin is close to the human hormone.

α-cells in the islets synthesize the peptide hormone glucagon, consisting of 29 amino acids. There is no difference in the amino acid sequence of glucagon from

different mammals.

Delta cells synthesize the hormone somatostatin, which is composed of 14 amino acid residues. Somatostatin is synthesized not only in the hypophysiotropic area of the hypothalamus and the islets of Langerhans, but also in the epithelium of the digestive system, in D-cells found among the parafollicular cells of the thyroid gland. This hormone is not detected in the blood, its effect is revealed by the paracrine pathway.

The cells that make up the islets are connected to each other by gap junctions and tight junctions. Gap junctions have low resistance and ensure that the protoplasm of adjacent cells remains connected, because through them substances with a molecular weight of up to 800 can easily pass from one cell to another.

Such cracks exist not only between cells of the same type (b-b), but also between cells of different (a-D, a-b) types. Due to the presence of gap junctions, many cells can receive information at the same time and respond to it in a unified way. The function of tight junctions is still unclear.

Cracked contacts allow the following paracrine effects of pancreatic hormones to occur: insulin inhibits the secretory activity of α-cells, glucagon stimulates the secretory activity of β and D-cells; somatostatin inhibits the secretory activity of α and β cells.

Characteristic symptoms of diabetes are constant hunger, unbearable thirst. Excessive urination and constant weight loss.

Diabetes mellitus in children is evident in the period from 6 to 12 years, especially after acute infectious diseases (measles, chicken pox, measles). The development of the disease is caused by eating a lot of food, especially foods rich in carbohydrates.

According to its chemical nature, insulin is a protein substance, it has been isolated in the form of crystals. Under its influence, synthesis of glycogen from sugar molecules and storage of glycogen reserves in liver cells is ensured.

At the same time, insulin is oxidized in the tissues, thus ensuring its complete absorption.

Due to the interaction of adrenaline and insulin effects, the amount of sugar in the blood is maintained at a certain level, which is necessary for the body's moderate state. As I mentioned above, the head, body and tail of the pancreas are divided. The head is surrounded by the duodenum and the tail protrudes to the left. Its secretory cells produce pancreatic juice. This juice drains into the duodenum in the glandular tract.

Pancreatic enzymes are a clear fluid that contains enzymes that act on proteins, fats, and carbohydrates. The main of these enzymes is trypsinogen.

The trypsinogen enzyme is converted into the active form - trypsin under the action of the enterkinase enzyme of the small intestinal juice. Unlike pepsin, trypsin cleaves intact proteins and their breakdown products (albumoses and peptones) into

amino acids in a weakly alkaline, neutral or weakly acidic medium. Amino acids are absorbed from the villi of the small intestine into the blood.
The enzyme amylase breaks down starch into disaccharides, and maltase breaks down disaccharides into monosaccharides (glucose) that can be absorbed into the blood. The lipase enzyme breaks down emulsion fats into glycerol and fatty acids, which combine with alkalis to form soluble soaps and are absorbed into the lymphatic system.

Lipase enzyme is activated by bile acids. The amount and composition of pancreatic juice depends on the nature of the food. A large amount of juice is released from the pancreas to break down carbohydrate foods. A little less juice is released to break down meat foods and even less to break down fats.

Secretion of pancreatic juice is controlled by the nervous system and occurs reflexively in response to the digestive effects of taste receptors. Hydrochloric acid, fats and their decomposition products (fatty acids and soaps), water, and alcohol have been found to be substances that stimulate pancreatic secretion in a neurohumoral way. In addition, the activity of the pancreas depends on substances that act on the duodenum through the sympathetic nerve mentioned above, and which are called secretin, which act on the secretory cells of the pancreas through the blood.

Human pancreatic juice is a colorless, clear liquid that contains 98.7% water, is alkaline (pH 7.5 to 8.5), and varies in sodium hydroxide content. For this reason, the loss of a large amount of juice also leads to a violation of the acid-alkaline balance of the body. Proteins make up the bulk of the solids in sap, up to 10%. Depending on the amount of enzymes in sap, the amount of proteins varies from 0.1 to 10%.
Proteases, amylases and lipase enzymes are stored in pancreatic juice. Among them, the main or main proteolytic enzyme is trypsinogen, and this enzyme is converted into active trypsin under the action of enterokinase enzyme.

Trypsin consists of several proteases: trypsin itself, chymotrypsin and carboxypeptidases. Chymotrypsin is also converted from the inactive state of chymotrypsinogen to the active state by the enzyme entrokinase. Unlike pepsin, trypsin breaks down all proteins and products of protein breakdown, such as albumose and peptonar, in a weakly alkaline, neutral or weakly acidic medium, until the end products suitable for absorption - amino acids.

The second proteolytic enzyme- melt and it is actively separated. It breaks down peptones and albumoses into amino acids without affecting whole proteins.

Amylolytic enzymes of the pancreas: amylase breaks down starch into disaccharides, maltase breaks down disaccharides into monosaccharides, and lactase breaks down milk sugar into monosaccharides. These enzymes are more active in a neutral environment. Pancreatic lipase breaks down fats into glycerol and fatty acids, and fatty acids combine with alkali to form soap. Almost all lipase is secreted in an inactive state and activated by bile acids.

Fats are emulsified with the help of pancreatic juice and bile alkalis, and as a result, its digestibility increases. Phospholipases break down phospholipids.

A protein substance that inhibits the activity of proteolytic enzymes is formed in the pancreas. It is believed that this substance protects the gland itself from self-digestion.

Pancreatic juice begins 1-3 minutes after eating. Each type of food is distinguished by the release of different enzymes in different amounts and contents. Both the course of sap separation and its duration depend on the type of nutrients.

The secretion of pancreatic juice in humans decreases the more fatty foods they eat, and it decreases by 2.5 times compared to those who eat lean meat.

A large consumption of fatty foods accelerates the release of lipases, the consumption of carbohydrates accelerates the release of amylases, and protein foods accelerate the release of trypsin. Replacing hay with silage for ruminants increases the activity of trypsin and amylases. And the consumption of milk calls for the release of all enzymes. In humans, 1.5-2.0 l of pancreatic juice is secreted in one night, in dogs - 600-800 ml, in ruminants - 6-7 l, in pigs - 8 l and more. The rate of secretion of saliva in humans is on average 4.7 ml per minute, while in dogs it is 2.3 ml.

Books:

1. S M. The role of enzyme supplementation in digestive disorders. Alt Med Rev. 2008;(13):307-314.
2. Leipner J, Iten F, Saller R. Therapy with proteolytic enzymes in rheumatic disorders. Biodrugs. 2001;(15):779-789.
3. Leipner J, Saller R. Therapy with proteolytic enzymes in oncology. Drugs. 2001;15(12): 779-789.
4. Gardner MLG, Steffens .J. Absorption of orally administered enzymes. Springer-Verlag, Berlin, Heidenberg, New York. 1995; 96.
5. Lorkowski G. Gastrointestinal absorption and biological activities of serine and cysteine proteases of animal and plant origin: review on absorption of serine and cysteine proteases. Int J Pathophysiol Pharmacol. 2012;4(1):10-27.
6. Veremeenko K.N., Kizim A.I., Dosenko V.E, Terzov A.I. Theoretical basic systemic enzyme therapy. Systemic enzyme therapy. Experience and perspective. Pod ed. V.I. Kulakova, V.A. Nasonovoy, V.S. Saveleva. SPb.: Inter-Medica. 2004;17-30.
7. Lysiak JJ, Hussaini IM, Webb DJ, et al. Alpha2-macroglobulin as a cytokine carrier to induce nitric oxide synthesis and cause nitric oxide dependent cytotoxicity in the RAW – 264.7 macrophage cell line. J Biol Chem, 1995;70(37):21919-21927.
8. Veremeenko K.N., Dosenko V.E., Kizim A.I., Terzov A.I. Mechanism of therapeutic action of systemic enzyme therapy. Lik sprava, 2000;2:3-11.

9. Koshkin V.M., Minaev S.V., Spesivtsev Yu.A., Knorring G.Yu. Polifermentnye preparations and surgical practice. SPb.: Chelovek. 2004; 112.
10. Tkachuk V.N., A.E. Lukyanov, N.Yu. Noskov. Systemic enzyme therapy and complex treatment of patients with chronic prostatitis. Vrachebnoe soslovie. 2007;(5):2-7.
11. Sternin Yu.I. Izbrannye voprosy systemic enzimoterapii: Posobie dlya vrachey. Pod ed. Chl.-corr. RAMN V.I. Mazurova. SPb.: InformMed,; 2010; 116.
12. Neverov V.A., Sternin Yu.I. Systemic enzymotherapy and complex treatment of injury to the musculoskeletal system: Teaching method for doctors. Izd. vtoroe, dop., pererab. St. Petersburg. 2013;56.
13. Dosenko V.E., Veremeenko K.N., Kizim A.I. Sovremennye predstavleniya o mechanizakh vsasyvaniya proteoliticheskikh enzemov v zhudochno-inshechnom tracte. Probl Med. 1999;(7,8):6-12.
14. Veremeenko K.N., Kizim A.I., Dosenko V.E. Alpha2-macroglobulin: structure, physiological role and clinical significance. Lip Diagn. 2000;(2):3-11.
15. Mitra UK, Pizzo SV Ligation of the alpha2-macroglobulin signaling receptor on macrophages induces synthesis of platelet activating factor. J Cell Biochem. 1996;61(1):39-47.
16. Sharapov U.B. Internal diseases. 2003, 2006. Textbook.
17. Gordienko A.V. Hospital therapy, St. Petersburg.: SpetsLit., 2016, 533 S. Textbook.
18. Okorokov. A.N., Diagnostika i lechenie bolezney vnutrennix organov. Moscow 2009
19. Strutynsky A.V., Baranov A.P., Roytberg G.E., Gaponenkov Yu.P. Osnovy Semiotiki vnutrennix organov. Moscow, MEDpress-inform., 2013. 304 S, Uchebnoe posobie.
20. Ryabov S.I. Vnutirennie diseases Volume 1. St. Petersburg.: SpetsLit., 2015, 783 S. Textbook
21. Ryabov S.I. Vnutirennie disease Volume 2. Saint-Petersburg.: SpetsLit., 2015, 575 S. Textbook
22. Scott Stern, Adam Saifu, Dane Altkorn. Diagnosis of horse symptoms, Moscow Geotar-Media, 2008. 816 S. Rukovodstvo dlya vrachey (Perevod s angliyskogo).