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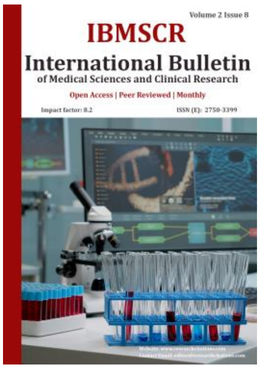

MAIN TYPES OF DIGESTION AND THEIR DISTRIBUTION AMONG GROUPS OF LIVING ORGANISMS

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Resume. This type of digestion is characterized by the fact that enzymes synthesized by secretory cells are released into the extracellular environment, where their hydrolytic effect is realized. The secretion of hydrolytic enzymes from cells into the digestive cavities first appeared in coelenterates and ctenophores. In annelids, crustaceans, insects, cephalopods, tunicates, and chordates (with the exception of the lancelet), extracellular digestion predominates. It is especially developed in highly organized animals and humans, in which it provides the initial digestion of nutrients. In these organisms, secretory cells are located far enough from the digestive cavities, where the action of hydrolases is realized, so extracellular digestion is defined as distant. Distant digestion occurring in special cavities is referred to as cavitary. Extracellular digestion is characteristic of all heterotrophic organisms whose cells have a cell wall - bacteria, archaea, fungi, carnivorous plants, etc. With this method of digestion, enzymes are secreted into the external environment or are fixed on the outer membrane (in Gram-negative bacteria) or on the cell membrane. wall. Digestion of food occurs outside the cell, the resulting monomers are absorbed with the help of cell membrane transporter proteins.
Keywords: cavity digestion, intracellular digestion, digestion in animals.

Extra-intestinal digestion is characteristic of some animals that have an intestine, but inject digestive enzymes into the body of the prey, then sucking up the semi-digested food (spiders and swimming beetle larvae are well-known examples of such animals).

Parietal digestion is carried out in the mucus layer between the microvilli of the small intestine and directly on their surface (in the glycocalyx) in vertebrates and some other animals.

Intracellular digestion is a process closely related to endocytosis and is characteristic only for those groups of eukaryotes that lack a cell wall (some protists and most animals). Phylogenetically, this type of digestion is the most ancient, since it is common in the simplest and most primitive multicellular organisms, often in flatworms. There are two types of intracellular digestion. The first is associated with the transport of small molecules across cell membranes and subsequent digestion by cytosol enzymes. Intracellular digestion can also occur in specialized intracellular cavities - digestive vacuoles, which are constantly present or formed during phagocytosis and pinocytosis and disappear after the splitting of the captured food is completed. This second type of intracellular digestion is in most cases associated with the participation of lysosomes, which contain a wide range of different hydrolytic enzymes with an optimum pH of 3.5-5.5, regardless of which organism they belong to. The enzymes of lysosomes differ significantly from the enzymes involved in extracellular digestion.

Food particles or food solutions in the pericellular environment cause invaginations of the plasma membrane, which then lace up and sink into the cytoplasm, forming pino- and

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phagocytic vacuoles. Connecting with the latter, lysosomes form the so-called phagosomes, where the contact of enzymes with the corresponding substrates takes place. In this case, intracellular extraplasmic digestion takes place, the physicochemical laws of which do not differ or differ little from the laws of abdominal digestion. Therefore, intracellular digestion of the second type can be characterized as microcavitary. Since the inner surface of the membrane of lysosomes and vacuoles contains various hydrolytic enzymes, microcavitary hydrolysis can be supplemented by membrane hydrolysis. The resulting hydrolysis products are absorbed through the phagosome membrane. After the end of the digestive cycle, the remnants of phagosomes are thrown out of the cell by exocytosis. Lysosomes also play an important role in the breakdown of the cell's own structures, which are used as food material either by this cell or outside it.

In most animals, intra-intestinal digestion is combined with intracellular digestion. Only intracellular digestion is present in sponges. Predominantly intra-intestinal digestion (sometimes supplemented by extra-intestinal) is characteristic of insects, nematodes, and vertebrates. In some animals, the intestines are absent (sponges, placozoa, cnidosporidia, dicyemides and orthonectids, pogonophores, tapeworms, trematode sporocysts, adult stages of rhizocephalic crayfish and certain species of other groups). Such animals use intracellular digestion (sponges, placozoans), extraintestinal external or parietal digestion (placozoans, tapeworms), or feed on endosymbionts. which can be digested intracellularly (pogonophores, some bivalves).

In some animals (cnidarians, nemertodermatids and xenoturbellids, many flatworms), the intestines are blindly closed (only the mouth opening leads into it). At the same time, a muscular pharynx is often developed; in turbellarians, pharyngeal glands open into it, releasing digestive enzymes.

In most animals, the digestive tract is through. It contains the anterior, middle and hindgut; the anterior and hindgut develop from the ectoderm, the middle gut from the endoderm. Often the digestive tract is divided into functional sections - the oral cavity, pharynx, esophagus, stomach and intestines. Digestion in mollusks and most arthropods involves the digestive glands - the hepatopancreas, whose ducts open into the stomach, and often also the salivary glands.

In arthropods, in the foregut (in particular, in the stomach), some predominantly herbivorous species have chitinous formations that serve to grind solid food. The oral apparatus is formed by modified limbs.

Digestion in vertebrates is a combination of the following interrelated processes: mechanical and physical processing of food, its movement through the digestive tract, chemical destruction (hydrolysis) of food components, which is realized by the secretory function of the gastrointestinal tract; the process of absorption of organic and inorganic compounds, including trace elements and water, into the blood and lymph; excretion into the lumen of the gastrointestinal tract of the body's waste products to be removed; their removal from the body along with undigested food residues.

Vertebrates are characterized by the absence or weak expression of intracellular digestion and the predominance of intra-intestinal and parietal digestion. In all vertebrates, the liver and pancreas participate in digestion; in terrestrial animals, the salivary glands also participate.

In humans, digestion begins in the mouth, where food is chewed. This process stimulates the exocrine glands that secrete saliva. Amylase present in saliva is involved in the breakdown of polysaccharides and the formation of a bolus - a food lump, which facilitates the passage of food through the esophagus. Irritation of receptors in the mucous membrane of the pharynx causes a swallowing reflex, which is coordinated in the swallowing center located in the medulla oblongata and the pons. The coordinated act of swallowing involves the soft palate and uvula, which prevent food from entering the nasal cavity, and the epiglottis, which prevents food from entering the trachea.

The stomach is located under the diaphragm in the left hypochondrium and epigastric region. There are 3 skins:

1. External (peritoneum)
2. Muscle layer

o outer layer (longitudinal)
o middle layer (circular);
o inner layer (oblique).

3. Internal (mucous membrane) - lined with non-keratinized, cylindrical epithelium.

Food enters the stomach by passing through the cardiac sphincter. There it mixes with gastric juice, the active components of which are hydrochloric acid and digestive enzymes:

• Pepsin - breaks down proteins to amino acids, polypeptides, oligopeptides.
• Rennin (or chymosin) - available in children under 1 year old, helps to digest dairy products.

After one year, chymosin disappears, its functions will be performed by hydrochloric acid.

The parietal cells of the stomach also secrete the intrinsic factor of Castle, which is necessary for the absorption of vitamin B12.

Through the pyloric sphincter, food enters the small intestine. The first section of the small intestine is the duodenum, where food is mixed with bile, which ensures the emulsification of fats by pancreatic and small intestine enzymes that break down carbohydrates (maltose, lactose, sucrose), proteins (trypsin and chymotrypsin). In the small intestine, the main volume of nutrients and vitamins is absorbed through the intestinal wall.

After passing through the small intestine, food enters the large intestine, which consists of the caecum, colon, sigmoid, and rectum. Here the absorption of water and electrolytes occurs, and the formation of feces also occurs here.

Digestion in humans is a psychophysiological process. This means that the sequence and speed of reactions are influenced by the humoral abilities of the gastrointestinal tract, the quality of food and the state of the autonomic nervous system.

Humoral abilities that affect digestion are determined by hormones that are produced by the cells of the mucous membrane of the stomach and small intestine. The main digestive hormones are gastrin, secretin and cholecystokinin. They are released into the circulatory system of the gastrointestinal tract and contribute to the production of digestive juices and the movement of food.

Digestibility depends on the quality of the food:

• a significant content of fiber (including soluble) can significantly reduce absorption;
• some trace elements contained in food affect the absorption of substances in the small intestine;

• Fats of different nature are absorbed differently. Saturated animal fats are absorbed and converted into human fat much more easily than polyunsaturated vegetable fats, which practically do not participate in the formation of human fat;
• intestinal absorption of carbohydrates, fats and proteins varies somewhat depending on the time of day and season;
• absorption also changes depending on the chemical composition of the products that entered the intestine earlier.

The regulation of digestion is also provided by the autonomic nervous system. The parasympathetic part stimulates secretion and peristalsis, while the sympathetic part suppresses.

The gastroenteropancreatic endocrine system is a department of the endocrine system, represented by endocrine cells (apudocytes) and peptidergic neurons that produce peptide hormones scattered in various organs of the digestive system. It is the most studied part of the diffuse endocrine system (synonymous with the APUD system) and includes about half of its cells. The gastroenteropancreatic endocrine system is called "the largest and most complex endocrine organ in the human body".

Gastrin is a hormone synthesized by G-cells of the stomach, located mainly in the pyloric region of the stomach. Gastrin binds to specific gastrin receptors in the stomach. The result of increased adenylate cyclase activity in the parietal cells of the stomach is an increase in the secretion of gastric juice, especially hydrochloric acid. Gastrin also increases the secretion of pepsin by the chief cells of the stomach, which, together with an increase in the acidity of the gastric juice, providing an optimal pH for the action of pepsin, promotes optimal digestion of food in the stomach. At the same time, gastrin increases the secretion of bicarbonates and mucus in the gastric mucosa, thereby protecting the mucosa from the effects of hydrochloric acid and pepsin. Gastrin inhibits gastric emptying, which ensures sufficient duration of exposure of hydrochloric acid and pepsin to the food bolus for digestion. In addition, gastrin increases the production of prostaglandin E in the gastric mucosa, which leads to local vasodilation, increased blood supply and physiological edema of the gastric mucosa and to the migration of leukocytes into the gastric mucosa.

Secretin is a peptide hormone consisting of 27 amino acid residues, produced by S-cells of the small intestine mucosa and involved in the regulation of the secretory activity of the pancreas. Bile acids enhance the stimulation of secretin production. Being absorbed into the blood, secretin reaches the pancreas, where it enhances the secretion of water and electrolytes, mainly bicarbonate. By increasing the amount of juice secreted by the pancreas, secretin does not affect the formation of enzymes by the gland. This function is performed by another substance produced in the mucous membrane of the small intestine - cholecystokinin. The biological definition of secretin is based on its ability (when administered intravenously to animals) to increase the amount of alkali in the pancreatic juice. Secretin is a blocker of the production of hydrochloric acid by the parietal cells of the stomach. The main effect caused by secretin is the stimulation of bicarbonate production by the epithelium of the bile, pancreatic ducts and Brunner's glands, thus providing up to 80% of bicarbonate secretion in response to food intake. This effect is mediated through the secretion of cholecystokinin and results in increased bile production, stimulation of gallbladder and intestinal contractions, and increased intestinal juice secretion.

Cholecystokinin (CCK; formerly known as pancreozymin) is a neuropeptide hormone produced by the I-cells of the duodenal mucosa and the proximal jejunum. Cholecystokinin acts as a mediator in various processes occurring in the body, including digestion. Cholecystokinin stimulates relaxation of the sphincter of Oddi; increases the flow of hepatic bile; increases pancreatic secretion; reduces pressure in the biliary system: causes contraction of the pylorus, which inhibits the movement of digested food into the duodenum. Cholecystokinin is a blocker of hydrochloric acid secretion by gastric parietal cells. Somatostatin is a cholecystokinin inhibitor.

Glucose-dependent insulinotropic polypeptide (previously common names: gastroinhibitory polypeptide, gastric inhibitory peptide; common abbreviations: GIP, GIP or GIP) is a peptide hormone consisting of 42 amino acid residues produced by K-cells of the mucous membrane of the duodenum and proximal part of the jejunum. Belongs to the secretin family. Glucose-dependent insulinotropic polypeptide is an incretin, that is, it is produced in the intestine in response to oral food intake. The main function of the glucose-dependent insulinotropic polypeptide is to stimulate the secretion of insulin by pancreatic beta cells in response to food intake. In addition, GIP inhibits fat absorption, inhibits the reabsorption of sodium and water in the digestive tract, and inhibits lipoprotein lipase.

Vasoactive intestinal peptide (also called vasoactive intestinal polypeptide; common abbreviations VIP and VIP) is a neuropeptide hormone consisting of 28 amino acid residues found in many organs, including the intestines, brain and spinal cord, and pancreas. Vasoactive intestinal peptide, unlike other peptide hormones from the secretin family, is exclusively a neurotransmitter. It has a strong stimulating effect on the blood flow in the intestinal wall, as well as on the smooth muscles of the intestine. It is an inhibitor that inhibits the secretion of hydrochloric acid by parietal cells of the gastric mucosa. VIP is also a stimulator of pepsinogen production by the chief cells of the stomach.

Motilin is a hormone produced by chromaffin cells of the mucous membrane of the gastrointestinal tract, mainly the duodenum and jejunum.

Somatostatin is a hormone of the delta cells of the islets of Langerhans of the pancreas, as well as one of the hormones of the hypothalamus. According to its chemical structure, it is a peptide hormone. Somatostatin inhibits the secretion of somatotropin-releasing hormone by the hypothalamus and the secretion of the anterior pituitary gland of somatotropic hormone and thyroid-stimulating hormone. In addition, it also inhibits the secretion of various hormonally active peptides and serotonin produced in the stomach, intestines, liver and pancreas. In particular, it lowers the secretion of insulin, glucagon, gastrin, cholecystokinin, vasoactive intestinal peptide, insulin-like growth factor-1.

Digestive enzymes are a group of enzymes that break down complex food components into chemically simpler substances, which are then absorbed directly into the body or enter the circulatory system. In a broader sense, digestive enzymes also refer to all enzymes that break down large (usually polymeric) molecules into monomers or smaller parts. Digestive enzymes are produced and act in the digestive system of humans and animals. In addition, intracellular enzymes of lysosomes can be attributed to such enzymes. The main sites of action of digestive enzymes in humans and animals are the oral cavity, stomach, and small intestine. Digestive enzymes are produced by the glandular tissue of the digestive organs: salivary glands, gastric glands, liver, pancreas and glands of the small intestine. In addition, part of the enzymatic functions is performed by the obligate intestinal microflora.

Microorganisms living in the human large intestine secrete digestive enzymes that help digest certain types of food:

- Escherichia coli - promotes the digestion of lactose;
- Lactobacilli - convert lactose and other carbohydrates into lactic acid.

References:

1.Ш Шадиева, М Гиязова. СОЧЕТАННАЯ ПАТОЛОГИЯ: ЗАБОЛЕВАНИЯ ПАРОДОНТА И ГАСТРОДУОДЕНАЛЬНОЙ ЗОНЫ// Stomatologiya, 80-83. 2021

2.Ш Ш Шадиева. ИЗМЕНЕНИЕ СТОМАТОЛОГИЧЕСКОГО СТАТУСА И КАЧЕСТВА ЖИЗНИ У ПАЦИЕНТОВ С HELICOBACTER PYLORI-АССОЦИИРОВАНHНОЙ ФУНКЦИОНАЛЬНОЙ ДИСПЕПСИЕЙ// Биология и интегративная медицина, 424-426.2021.

3.Ш Шадиева, М Гиязова. Коморбидность болезней пародонта и желудочно-кишечного тракта// Общество и инновации 2 (4/S), 424-428. 2021.

4.Ш Ш Шадиева. Характеристика системы иммунитета у больных с хроническим генерализованным пародонтитом// Современные инновации, 38-39. 2019.

5.Ш Ш Шадиева. РОЛЬ ИММУННЫХ МЕХАНИЗМОВ У БОЛЬНЫХ С ВОСПАЛИТЕЛЬНОЙ ПАТОЛОГИЕЙ ПАРОДОНТА // Новый день в медицине, 707-709. 2020.

6.Sharipova Gulnihol Idiyevna. DISCUSSION OF RESULTS OF PERSONAL STUDIES IN THE USE OFMIL THERAPY IN THE TREATMENT OF TRAUMA TO THE ORAL MUCOSA// European Journal of Molecular medicineVolume 2, No.2, March 2022 Published by ejournals PVT LTDDOI prefix: 10.52325Issued Bimonthly Requirements for the authors.

7.Sharipova Gulnihol Idievna. THE USE OF FLAVONOID BASED MEDICATIONS IN THE TREATMENT OF INFLAMMATORY DISEASES IN ORAL MUCUS// Asian journal of Pharmaceutical and biological research 2231-2218 SJIF 2022:4.465 Volume 11 Issue 1 JAN-APR 2022. P-98-101

8.Sharipova Gulnihol Idievna. THE EFFECT OF DENTAL TREATMENT-PROFILACTICS ON THE CONDITION OF ORAL CAVITY ORGANS IN CHILDREN WITH TRAUMATIC STOMATITIS // «Tibbiyotdayangikun» scientific - abstract, cultural and educational journal. - Bukhara, 2022. - №5 (43). - С.103-106.

9.Sharipova Gulnihol Idievna; Nuraliev Nekkadam Abdullaevich. GENERAL DESCRIPTION AND RESEARCH METHODS USED IN CHILDREN WITH TRAUMATIC STOMATITIS//European Journal of Research: volume 7 pp. 51-56 (Issue 1 2022).

10.Sharipova Gulnihol Idievna. CHANGES IN THE CONTENT OF TRACE ELEMENTS IN THE SALIVA OF PATIENTS IN THE TREATMENT OF PATIENTS WITH TRAUMATIC STOMATITIS WITH FLAVONOID-BASED DRUGS//Journal of research in health science: Volume 6 pp. 23-26 (issue. 1-2 2022).