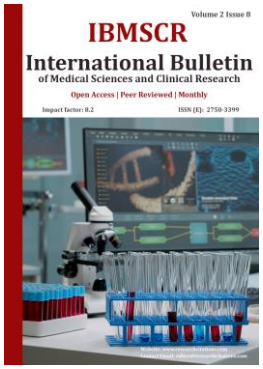


# BASIC TYPES OF DIGESTION, BASIC FUNCTIONS OF THE DIGESTIVE SYSTEM

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Summary: Only such food components that are absorbed from the digestive tract into the internal environment can be included in the metabolic processes of the body. Therefore, food consisting of proteins, fats and carbohydrates must undergo both mechanical and chemical processing in the digestive system. Solid food is subjected to mechanical crushing, grinding with the help of teeth in the human oral cavity. For further digestion, it is very important that the grinding of food is carried out carefully, since in this case the small components of the food become more accessible for the action of enzymes. Numerous enzymes ensure the breakdown of polymeric nutrients to monomers. The following types of enzymes are distinguished: proteases (or proteolytic enzymes) carry out the gradual hydrolysis of peptide bonds in protein molecules of varying complexity.
Keywords. Secretory, motor, absorptive, humoral immunity

Endopeptidases hydrolyze the internal bonds of the protein molecule, exopeptidases cleave off the amino acid from the terminal part of the molecule. As a rule, protease enzymes are secreted in an inactive form. Lipases hydrolyse fats and fat-like substances (lipids) to fatty acids and glycerol. Amylolytic enzymes (amylase, maltase, sucrase, etc.) carry out the hydrolysis of simple sugars, polysaccharides of plant and animal origin to glucose, fructose, galactose.

According to the mode of action of enzymes on the substrate, two types of digestion are distinguished: intracellular and extracellular. During intracellular digestion, the substrate undergoes hydrolysis inside the cell by its enzymes, while 2 types of hydrolysis are possible: molecular and vesicular. The molecular type is associated with the transport of small molecules into the cell (di-, tripeptides) and their hydrolysis by cytosol enzymes. In this way, peptides are hydrolyzed in the intestinal and renal epithelium of infants. The vesicular type of digestion is associated with endocytosis. The substrate causes an invagination of a part of the plasma membrane of the cell, followed by lacing and immersion of the vacuole into the cytoplasm of the cell. Hydrolysis of the contents of the vesicle occurs with the help of lysosomal enzymes in an acidic environment (vacuole + lysosome → phagosome). The end products of hydrolysis are absorbed through the membrane of phagosomes, the remains of phagosomes are ejected from the cell by exocytosis (Fig. 1). This type of digestion is an important mechanism of nutrition and simultaneously performs protective functions, and is of great importance in the early postnatal period. There is evidence that it partially persists in adults.

Extracellular digestion is divided into cavity, parietal and membrane. Cavitary digestion is carried out in the cavity of any part of the digestive tract with the help of digestive juices containing various enzymes. The interaction of the enzyme with the substrate occurs when they accidentally collide, which is facilitated by the motor activity of the digestive tract.

Intermediate products of hydrolysis are formed in the cavities, the absorption of which is impossible. A special type of cavity hydrolysis of nutrients is the autolytic type of digestion. It is observed when feeding newborns with breast milk. Mother's milk contains inactive enzymes (lipase, lactase, hydrolases) that are activated in the baby's stomach. Abdominal digestion should not be underestimated. It is especially important when the food consists of large polymer compounds.

Parietal digestion is carried out in the mucus layer and glycocalyx of the small intestine by enzymes adsorbed from pancreatic and intestinal juices (A.M. Ugolev, 1960).

The glycocalyx is formed by numerous very thin filaments consisting of acid mucopolysaccharides linked by calcium bridges. A network of filaments with a thin layer (0.1-0.5 μm) covers the brush border of enterocytes and fills the space between the microvilli. The glycocalyx is quickly updated (discarded), which ensures the effective functioning of membrane enzymes. Mucus and glycocalyx perform the following functions:

1. serve as a buffer barrier and form an epithelial environment in which the ionic composition, pH, chemical and physical characteristics differ from the intestinal environment,
2. provide cell protection from mechanical and chemical damage,
3. represent a molecular sieve through which only low molecular weight nutrients and ions penetrate,
4. provide selective transfer of certain substances (vitamins, iron, etc.) due to specific binding proteins.
5. serve as a biological barrier (antigenic, antibacterial) due to the enzymes adsorbed in it,

Parietal digestion occupies an intermediate position between cavity and membrane digestion and largely determines the interaction between them. Occurs on a huge digesting and absorbing surface.

Membrane digestion is carried out by enzymes localized in the apical membrane of the enterocyte on microvilli. The synthesis of enzymes occurs in the enterocyte. Enzymes are an integral part of the apical membrane and are most often integral glycoproteins of the microvillus membrane. The active centers of enzymes are always directed to the intestinal lumen, so the substrate inevitably collides with the enzyme. In this, membrane digestion differs from abdominal digestion. It is the final step in the hydrolysis of nutrients, since large molecules cannot penetrate the glycocalyx and brush border. Thanks to the layer of glycocalyx, membrane digestion occurs in a zone inaccessible to bacteria. This ensures the sterility of the final stage of hydrolysis and inhibits the overdevelopment of the intestinal microflora, since the bacteria cannot absorb the monomers. Membrane digestion is associated with the transport of nutrients (nutrients), since the enzyme and the transport system are a single structural and functional complex (Fig. 2). The rate of absorption of monomers during membrane hydrolysis is much higher than during cavitary.

The described types of digestion of food, except for autolytic, refer to one's own digestion. In all cases, enzymes are synthesized by the organism that consumes food. In the intestines, especially the large intestine, there are numerous microflora (symbionts of the host organism), which digests food residues with its enzymes. As a result, an additional flow of nutrients (amino acids; vitamins of groups B, K, E; lactic, succinic acids) into the host organism is formed. This type of digestion is called symbiotic digestion and is present in many animals and humans.

M - membrane, F - enzyme, P - carrier, C - substrate.
1 - initial state
2 - formation of a substrate-carrier complex
3 - translocation.
4 - disintegration of the complex
5, 6 - return of the carrier.

The main functions of the digestive system are:
1. secretory - consists in the synthesis and secretion of digestive juices (saliva, gastric, pancreatic, intestinal juices, bile) by glandular cells;
2. motor, or motor: chewing, swallowing, advancing and mixing with digestive juices, and excretion of residues - is carried out by smooth muscles, and only the oral cavity, the initial section of the esophagus and the external sphincter of the rectum have striated muscles;
3. suction - penetration through the mucous membrane into the blood or lymph of the breakdown products of proteins, fats and carbohydrates, water, salts and vitamins.
The processes of secretion, motility and absorption are interconnected and are subject to complex neuro-humoral mechanisms of regulation. In addition to digestive functions, the digestive system is characterized by: endocrine function associated with the secretion of hormones and biologically active substances into the blood; excretory, associated with the removal of toxins and food debris into the external environment; protective function.
Protective systems of the digestive tract
The theory of adequate nutrition considers the intake of food into the body not only as a way to restore plastic and energy costs, but also as an allergic and toxic aggression. Nutrition is associated with the danger of penetration into the body of exogenous food antigens (food proteins and peptides), autoantigens of desquamated intestinal cells. With food through the digestive tract, a lot of bacteria, viruses and various toxic substances enter the body. It can be said with certainty that at present there are practically no environmentally friendly food products and natural water. In the second half of the 20th century, there was widespread pollution of the environment by industrial, in some regions, radioactive waste. In plant growing and animal husbandry, chemical and biological technologies are widely used without appropriate strict sanitary and epidemic control of the products produced.
Currently, food additives (preservatives, dyes, flavoring agents) are widely used in the manufacture of food products. These are, as a rule, chemicals, the use of which in food production must be scientifically substantiated, and their content in the product must not exceed the permissible limits. Many of these substances can cause not only allergic reactions, but also have a carcinogenic effect. Plant foods can contain excessive amounts of nitrates and pesticides (chemicals used to protect plants from pests), many of which are poisonous to humans. Products of animal origin may contain drugs used to treat animals, growth stimulants used in their cultivation. The presence of these drugs in food can change the sensitivity to antibiotics and cause endocrine disorders. The above negative aspects of nutrition in a healthy body are neutralized due to the complex system of protection of the digestive tract. There are non-specific and specific (immune) defense mechanisms.
Types of non-specific protection:

1. Mechanical or passive protection is associated with limited permeability of the mucous membrane of the digestive tract for macromolecular substances (with the exception of newborns).
2. The mucous membrane is lined with a layer of mucus, which protects it not only from mechanical, but also chemical influences. The outer layer of mucus adsorbs viruses, toxic substances, salts of heavy metals (mercury, lead) and, being rejected into the cavity of the stomach and intestines, promotes their excretion from the body.
3. Saliva, gastric juice, bile have antibacterial activity. Hydrochloric acid creates an acidic environment in the stomach, has a bacteriostatic effect, preventing the development of putrefactive processes.
4. The non-specific protective barrier is associated with the preliminary enzymatic hydrolysis of antigenic molecules, which lose their antigenic properties.

Specific protection in the digestive tract is carried out by immunocompetent lymphoid tissue. In the mucous membrane of the mouth and tonsils there are a large number of cellular elements: macrophages, neutrophils, lymphocytes that carry out phagocytosis of bacteria and antigenic proteins. In the mucous membrane of the small intestine there is a powerful leukocyte layer that separates the enteric and internal environments of the body. It consists of a large number of plasma cells, macrophages, eosinophils, lymphocytes. The intestinal immune system is part of the body's immune system. The lymphatic tissue of the small intestine (25% of the entire mucosa) consists of Peyer's patches, individual lymphatic nodules localized in the region of the lamina propria of the villi and T- and B-lymphocytes scattered in the epithelium (see Fig. 3). Designations in the figure, description in the text. There are also intraepithelial lymphocytes.

## 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-АССОЦИИРОВАННОЙ 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). - C.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).