

## Digestion In The Duodum 12

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**Annotation.** The Duodenum Is Called The Central Link Of Digestion. The Acidic Gastric Chyme That Enters The Intestine Is Alkalized Under The Influence Of Digestive Juices, Which Creates An Optimal Environment For Further Hydrolysis Of Nutrients. Three Digestive Juices Are Secreted Into The Cavity Of The Duodenum: Pancreatic, Intestinal And Bile. Pancreatic Juice. The Exocrine Elements Of The Pancreas Secrete Pancreatic Juice, Which Is Secreted Through The Ducts Into The Duodenal Cavity. 1.5–2.5 Liters Of Juice Is Formed Per Day. Pancreatic Juice Is A Colorless Transparent Liquid. Composition Of Pancreatic Juice: 99% - Water, 1% - Dry Residue. The Dry Residue Consists Of Inorganic And Organic Substances. Inorganic Substances Are Represented By Sodium, Potassium, Calcium, Magnesium Chlorides, Sulfates And Phosphates.

**Keywords.** Duodenum, Trypsin, Chymotrypsin, Bile

The Main Feature Of The Inorganic Composition Of Pancreatic Juice Is A High Concentration Of Bicarbonates, Which Create A Ph Of 7.5–8.8. Such An Alkaline Reaction Ensures The Neutralization Of The Acidic Gastric Chyme, The Termination Of The Action Of Gastric Pepsins And The Creation Of Optimal Conditions For The Action Of Pancreatic And Intestinal Juice Enzymes.

Organic Substances Are Represented By Enzymes. Pancreatic Juice Contains All Groups Of Enzymes That Can Hydrolyze Proteins, Fats, And Carbohydrates. The Main Proteolytic Enzymes That Break Down Proteins Are Trypsinogen And Chymotrypsinogen (As Well As Carboxypolypeptidase And Elastase), Which Are Secreted As Proenzymes. Trypsinogen Under The Influence Of Entero-34 Kinase (A Proteolytic Enzyme Of The Intestinal Juice Of The Duodenum 12) Is Converted Into An Active Form - Trypsin. Chymotrypsinogen Is Converted To Chymotrypsin By Trypsin. Trypsin Also Activates Other Proteolytic Enzymes. The Main Amylolytic Enzyme Hydrolyzing Carbohydrates Is Pancreatic A-Amylase.

This Enzyme Hydrolyzes Polysaccharides To Disaccharides (Amylose, Maltose) And Dextrins. The Digestion Of Starch, Started In The Mouth And Stomach, Is Vigorously Continued By Pancreatic A-Amylase And Completed By Intestinal Disaccharidases. The Main Lipolytic Enzyme In The Pancreas That Breaks Down Fats Is Pancreatic Lipase. In An Adult, Lipid Hydrolysis Begins In The Duodenum. Pancreatic Lipase Is Secreted In An Active Form. The Hydrolysis Of Fats Is Also Facilitated By Bile, Which Emulsifies Them. Reducing The Size Of Fat Droplets Increases The Affinity Of The Enzyme For The Substrate, As A Result, Lipolysis Is Accelerated. The Composition Of Pancreatic Juice Also Contains Ribo- And Deoxyribonuclease, But The Role Of These Enzymes In Digestion Is Small. Regulation Of Pancreatic Secretion.

The Secretion Of Pancreatic Juice, Like Gastric Juice, Proceeds In Three Phases.

1. Cerebral - An Increase In Pancreatic Secretion In Response To Conditioned Reflex Stimuli And Unconditioned Reflex Irritations Of The Oral Mucosa By The Food Taken.
2. Gastric - An Increase In Pancreatic Secretion In Response To Irritation Of The Receptors Of The Stomach With Its Contents.
3. Intestinal (Main) - An Increase In Pancreatic Secretion In Response To The Entry Of Chyme Into The Duodenum.

The Regulation Of Pancreatic Juice Production Is Carried Out By Nervous (Reflex) And Humoral Mechanisms. The Composition And Amount Of Secretion Depends On The Volume And Composition Of The Food. The Main Secretary Nerve Of The Pancreas Is The Vagus Nerve. During A Meal, The Tone Of The Nuclei Of The Vagus Nerves Reflexively Increases, Which Leads To An Increase In The Secretion Of Juice. Sympathetic Fibers Of The Splanchnic Nerves, On The Contrary, Inhibit Pancreatic Secretion. The Secretion Of Pancreatic Juice Also Increases Reflexively During The Evacuation Of Acidic Gastric Chyme Into The Duodenum.

The Main Humoral Stimulators Of Pancreatic Secretion Are Gastrointestinal Hormones: Gastrin Increases Sap Secretion, Secretin, Vip (Vasoactive Intestinal Peptide) - Increase The Production Of Bicarbonates And

Water In The Juice, Cck-Pz - Increases The Formation Of Pancreatic Enzymes. Pancreatic Secretion Is Also Enhanced By Serotonin, Insulin, Bombesin, Bile Salts, Hydrochloric Acid. Inhibits - Glucagon, Somatostatin, Substance P, Enkephalins, Calcitonin.

Bile. Bile Is Formed In Hepatocytes Continuously, Because. Is A Product Of Metabolism. It Is Finally Formed As Digestive Juice In The Bile Ducts And Deposited In The Gallbladder, From Where It Is Excreted Through The Bile Ducts Into The Duodenum. Approximately 0.5–1.5 Liters Of Bile Is Formed Per Day. It Is A Golden Liquid. Bile Composition: 95–97% Water And 3–5% Solids. The Dry Residue Contains Inorganic And Organic Substances. Inorganic Substances Are Represented By Sodium, Potassium, Calcium, Chlorine Ions. But The Most Important Inorganic Component Bile component is bicarbonate, which creates an alkaline reaction in bile - pH 7.3–8. The main organic components of bile are: bile acids, bile pigments, cholesterol, fatty acids, inorganic salts, lecithin.

It should be noted that the composition of cystic bile differs from that of the liver. In the gallbladder, water and salts are absorbed, so gallbladder bile is more viscous, dark and thick. The dry residue in it is up to 20%. The mucus of the bile ducts and bladder is added to the bile.

The pH decreases to 6.5–6.8. The value of bile:

- 1) emulsifies fats, increasing their surface for hydrolysis by lipase;
- 2) increases the activity of pancreatic and intestinal enzymes;
- 3) neutralizes acidic gastric chyme;
- 4) inactivates pepsins;
- 5) promotes the absorption of fat-soluble vitamins, amino acids, cholesterol, calcium salts;
- 6) participates in parietal digestion, facilitating the fixation of enzymes on the intestinal microvilli;
- 7) enhances intestinal motility;
- 8) stimulates bile formation and bile secretion: bile acids in the small intestine are absorbed into the blood, reach the liver through the portal vein, and again participate in choleresis and cholekinesis (the intestinal-hepatic circulation of bile acids is 6–10 cycles per day);
- 9) inhibits the development of pathogenic flora, prevents putrefactive processes in the intestines.

regulation of bile synthesis. As noted earlier, bile formation (choleresis) occurs continuously in the liver. Bile excretion (cholekinesis) is associated with food intake. The intensity of bile formation and bile excretion directly depend on the diet. Strong stimulants are milk, meat, bread, egg yolks, butter. As for the nervous regulation, the parasympathetic fibers of the vagus nerves increase choleresis and cholekinesis, while the sympathetic ones depress. Humoral stimulants are secretin, bile acids, gastrin, CCK-PZ, the latter becoming the main one.

Digestion in the Small Intestine The small intestine is the main chemical reactor of the digestive tract. Here, abdominal and parietal digestion occurs, which complete the hydrolysis of nutrients, followed by the absorption of hydrolysis products into the blood and lymph. Cavitory digestion consists in the hydrolysis of nutrients by the enzymes of digestive juices. Cavitory digestion provides hydrolysis of 50% of carbohydrates and 10% of proteins, as a result of which oligomers are formed from polymers. Parietal digestion is carried out on the villi and microvilli of the mucous membrane of the small intestine. The outer surface of their plasma membrane is covered with glycocalyx - mucopolysaccharide filaments on which enzymes of pancreatic and intestinal juices are adsorbed, which hydrolyze oligomers to dimers.

Enzymes are built into the membrane of enterocytes, which are synthesized by the enterocytes themselves. These enzymes complete the hydrolysis by breaking down the dimers into monomers. Transport systems are also located here, providing the absorption of monomers, water and electrolytes into the blood and lymph.

secretory activity of the small intestine. Intestinal juice is produced by the glands of the mucous membrane of the small intestine throughout its entire length. 2.5 liters of intestinal juice are produced per day. It is a cloudy viscous liquid. The composition of the intestinal juice: 98% water and 2% solids. In the dry residue, inorganic and organic substances are distinguished. Inorganic substances are represented by chlorides, bicarbonates, phosphates, sodium, potassium, calcium ions, which create an alkaline reaction (pH 7.2–7.5), and with increased secretion up to 8.6–9.3. Organic substances are represented by proteins, amino acids, urea, uric acid. Intestinal juice contains more than 20 different enzymes involved in intestinal digestion: proteases, peptidases, nucleases, amino-, dipeptidases, lipases, phospholipases, amylase, maltase, lactase, enterokinase, etc.

Intestinal juice also contains mucus produced by goblet cells, which forms a protective layer and protects the mucous membrane from damage.

regulation of intestinal secretion. Along with the nervous and humoral mechanisms of regulation of intestinal secretion, the leading role belongs to local mechanisms. Excitation of the parasympathetic fibers of the vagus nerves increases the production of enzymes in the small intestine, without affecting the amount of secreted juice. Excitation of sympathetic nerve fibers, on the contrary, reduces intestinal secretion.

Humoral regulation - duocrinin and enterocrinin, produced in the mucous membrane of the small intestine, VIP, motilin, hormones of the adrenal cortex (cortisol and deoxycorticosterone) stimulate the secretion of intestinal juice, and somatostatin has an inhibitory effect. Local regulatory mechanisms are associated with mechanical irritation of the mucous membrane of the small intestine by chyme, which causes an increase in the secretion of the liquid part of the juice, and the effect of the products of digestion of nutrients contributes to increased production of intestinal juice enzymes. Motor function of the small intestine. Motility of the small intestine promotes hydrolysis and absorption of nutrients. It occurs as a result of coordination oval contractions of the circular and longitudinal layers of muscles that form the wall of the intestine. There are several types of abbreviations.

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