

**Ministry of health of the Republic of Belarus**  
**Educational institution**  
**«Gomel State Medical University»**

Department of general and clinical pharmacology

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**METHODOLOGICAL RECOMMENDATIONS**

for a practical lesson on the discipline "Pharmacology"  
for the third-year students of the Faculty of Foreign Students,  
studying at the specialty 1-79 01 01 "General medicine"

**TOPIC 18: «DRUGS AFFECTING GASTROINTESTINAL SYSTEM (ending) »**

Time: 3 hours

Approved at the meeting of the department of general and clinical pharmacology  
the protocol № 18 of 30.06.2022

## **LEARNING AND EDUCATIONAL GOALS, OBJECTIVES, MOTIVATION FOR LEARNING THE TOPIC**

Medical statistics show that in recent decades, gastrointestinal pathologies have taken a leading place in the list of diseases. Specialists confirm that the majority of city dwellers to a greater or lesser extent suffer from eating disorders.

The modern rhythm of life, full of permanent stress, bad ecology, wrong and irrational nutrition lead to the fact that by the age of 30 every fourth person has in his or her anamnesis one of the GIT diseases.

It is important to remember that there is a close connection in dysfunction of different parts of GIT: stomach, intestines, liver and pancreas. It predetermines the necessity of complex treatment with the inclusion of drugs of different pharmacological groups.

Patients with GIT pathology, especially of functional character, can be met at the reception of doctors of different specializations: general practitioners, gastroenterologists, neurologists and others.

All these facts make medicines influencing gastrointestinal function a necessity in practical medicine, and their knowledge is necessary for doctors of different specializations.

### **Learning objective:**

- formation of scientific knowledge about the classification, pharmacokinetic and pharmacodynamic properties, indications for prescription and side effects of drugs that affect gastrointestinal functions for use in medical and preventive activities.

### **Educational purpose:**

- to develop their value-personal, spiritual potential, to form the qualities of a patriot and citizen, ready for active participation in the economic, industrial, socio-cultural and public life of the country; to realize the social significance of their future professional activities, to learn to follow academic and work discipline, standards of medical ethics and deontology.

### **Tasks:**

As a result of the study lesson, the student should

#### **know:**

- classification and basic characteristics of drugs that affect the functions of the gastrointestinal tract, pharmacodynamics and pharmacokinetics, indications and contraindications for their use, side effects; dependence of pharmacotherapeutic effect on the properties of drugs, conditions of their use, depending on the characteristics and condition of the body;

- features of pharmacokinetics and pharmacodynamics of drugs on the topic of the class, advantages and disadvantages of different dosage forms used for the treatment of emergency conditions;

- principles of research and testing of new drugs affecting gastrointestinal functions; information and reference and search systems.

#### **be able to:**

- analyze the indicators of pharmacokinetics and features of pharmacodynamics of drugs that affect gastrointestinal functions, assess the possibility of the development of the effect when using them;

– analyze the effect of drugs on the topic of the class on the totality of their pharmacological properties and the possibility of their use for therapeutic treatment; write them out in prescriptions;

– use different dosage forms of drugs affecting the functions of the gastrointestinal tract, in the treatment of pathological conditions, based on the features of their pharmacodynamics and pharmacokinetics;

– work with scientific literature, search for information about the use and action of the studied drugs;

**possess:**

– skills of using basic pharmacokinetic parameters and information about the dependence of pharmacodynamics on the properties of drugs affecting gastrointestinal functions, conditions of use, features of their forms of release, dosage regime and ways of drug delivery to the body;

– rules of prescribing the studied drugs for the treatment, prevention of various diseases and pathological conditions, taking into account the indications;

– skills of choosing drugs that affect the functions of the gastrointestinal tract, for therapeutic measures for the most common diseases and conditions in the adult population and adolescents;

– skills to search, analyze and summarize information about the use and effect of drugs on the topic of the class.

**Motivation for learning the topic:**

The specifics of training doctors in this specialty determines the need for purposeful study of students' knowledge of the classification, pharmacokinetic and pharmacodynamic properties, indications for prescription and side effects of drugs that affect gastrointestinal functions.

## **MATERIAL EQUIPMENT**

Reference and informational literature, charts, tables, presentations, drug collections.

## **CONTROL QUESTIONS FROM RELATED DISCIPLINES**

1. Anatomical and physiological features of the gastrointestinal tract.
2. Neurohumoral regulation of the digestive tract. Digestive enzymes.
3. Pathogenesis of acute pancreatitis.
4. Types of biliary dyskinesia.
5. Mechanism of encephalopathy in liver cirrhosis.

## **CONTROL QUESTIONS ON THE TOPIC OF THE CLASS**

1. Hepatotropic agents. Diuretics: dehydrocholic acid, osmid, magnesium sulfate, drotaverine, M-cholinoblockers, phytopreparations. Chololytic agents (ursodeoxycholic acid). Hepatoprotectors: betaine, ademetonine, essenciale.

2. Drugs affecting the function of the pancreas: hydrochloric acid diluted, pancreatin, cholecystokinin, M-cholinoblockers. Principles of pharmacotherapy of acute and chronic pancreatitis.

3. Drugs affecting tone and motility of the gastrointestinal tract. Agents depressing motility: choline blockers (dicycloverine, atropine); myotropic and mixed action antispasmodics (drotaverine, pinaverium bromide). Antidiarrheals: opiate receptor agonists (loperamide); adsorbents and astringents. Motor stimulants: cholinomimetics (pyridostigmine bromide, neostigmine), dopamine receptor antagonists (metoclopramide).

4. Laxatives: senna preparations, bisacodyl, magnesium sulfate, lactulose, methylcellulose, vaseline oil. Localization of action and rate of onset of laxative effect. Indications and contraindications for the use of laxatives.

## **PROCESS OF THE STUDY**

### **Theoretical part**

Theoretical questions are described in the appendix to the methodological recommendations.

### **Practical part**

1. Take notes on theoretical material demonstrated by the teacher.
2. Master the methods of solving the tasks and writing out prescriptions on the topic of the class.

### **Theme learning control**

Conducted in the form of independent written work (solution of practical problems and prescriptions for individual task).

## **METHODOLOGICAL RECOMMENDATIONS FOR ORGANIZATION AND EXECUTION OF STUDENTS' INDEPENDENT WORK (SIW)**

### **The time given for independent work can be used by students for:**

- preparing for the practical classes;
- completing the tasks on the topic of the class in the workbook;
- preparing thematic reports, essays and presentations;
- taking notes from academic literature.

### **The main methods of organizing independent work:**

- completing tests and practical tasks of the electronic educational-methodical complex (EEMC) for self-monitoring and self-assessment.

### **The list of tasks of the SIW:**

- solving practical problems in the EEMC;
- completing the test tasks of the EEMC.

### **Control of the SIW is carried out in the form of:**

- assessment of an oral answer to a question, report, report, or solution of a task in a practical class;
- individual conversation.

## **METHODOLOGICAL RECOMMENDATIONS FOR ORGANIZATION AND EXECUTION OF CONTROLLED INDEPENDENT WORK OF STUDENTS (CIWS)**

### **Recommended forms of CIWS organization:**

- doing exercises on the topic of the class in the workbook;
- writing an essay on a given topic;
- preparing a report and a multimedia presentation on a given topic.

### **The list of tasks of the CIWS:**

Topics of essays / multimedia presentations:

1. Problems of pharmacotherapy of irritable bowel syndrome.
2. Plants having choleric action.
3. Proven effectiveness of various hepatoprotectors.

### **Forms of control of CIWS realization:**

- checking and grading an essay on a given topic;
- checking and grading a multimedia presentation on a given topic.

### **LIST OF REFERENCES**

1. Харкевич, Д. А. Фармакология : учебник для использования в учеб. процессе образоват. организаций, реализующих программы высш. образования по специальностям 33.05.01 "Фармация", 31.05.01 "Лечеб. дело", 31.05.02 "Педиатрия", 32.05.02 "Мед.-профил. дело", 31.05.03 "Стоматология" / Д. А. Харкевич. - 12 изд., испр. и доп. - Москва : ГЭОТАР-Медиа, 2017. - 754 с. : ил., табл., фот. - Рек. ФГАУ "ФИРО".

2. Конорев, М. Р. Курс лекций по фармакологии. В 2 т. Т. 2, ч. 1 : для студентов 3 и 4 курсов фармацевт. фак. учреждений высш. образования, обучающихся по специальности 1 - 79 01 08 "Фармация" / М. Р. Конорев, И. И. Крапивко, Д. А. Рождественский ; УО "ВГМУ", Каф. общей и клинической фармакологии с курсом ФПКПК. - Витебск: ВГМУ, 2019. - 294 с.: ил., табл. - Рек. УМО по высш. мед., фармацевт. образованию.

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4. Кратко о лекарственных средствах: учебно – методическое пособие для студентов 3 курса лечебного., мед.-диагност., фак. подг. спец. для зарубеж. стран, 6 курса лечебного факультета и фак. подг. спец. для зарубеж. стран, аспирантов, магистрантов, учреждений мед. образования: в 2 ч. / Е. И. Михайлова [и др.]. – Гомель: ГомГМУ, 2019. – Ч. 1. – 56 с.

5. Кратко о лекарственных средствах: учебно – методическое пособие для студентов 3 курса лечебного., мед.-диагност., фак. подг. спец. для зарубеж. стран, 6 курса лечебного факультета и фак. подг. спец. для зарубеж. стран, аспирантов, магистрантов, учреждений мед. образования: в 2 ч. / Е. И. Михайлова [и др.]. – Гомель: ГомГМУ, 2019. – Ч. 2. – 84 с.

## Cholagogue agents

| Classification          | Agents stimulating bile formation   |  | Agents stimulating bile release  |   |
|-------------------------|---|--|--|---|
|                         | Choleretics   |  | Cholekinetics  | Cholespasolytics  |
| Drugs                   | <p><i>Preparations of bile acids:</i></p> <ol style="list-style-type: none"> <li>1. <b>Allochol</b></li> <li>2. <b>Cholenzym</b></li> <li>3. <b>Lyobil</b></li> </ol> <p><i>Synthetic agents:</i></p> <ol style="list-style-type: none"> <li>4. <b>Oxafenamide (Osalmide)</b></li> <li>5. <b>Nicodine</b></li> </ol> <p><i>Herbal preparations:</i></p> <ol style="list-style-type: none"> <li>6. <b>Brier syrup</b></li> <li>7. <b>Cornsilk</b></li> </ol> <p><i>Hydrocholeretics:</i></p> <ol style="list-style-type: none"> <li>8. <b>Alkaline mineral water</b></li> </ol>  |  | <ol style="list-style-type: none"> <li>9. <b>Extract of Cynara leaves</b></li> <li>10. <b>Magnesium sulfate (per os)</b></li> <li>11. <b>Spirituos tincture of leaves of barberry</b></li> <li>12. <b>Oils (sunflower, olive); amarines (wormwood, yarrow)</b></li> <li>13. <b>Cholecystokinin</b></li> <li>14. <b>Sorbitol, mannitol</b></li> </ol> | <p><i>With myotropic action:</i></p> <ol style="list-style-type: none"> <li>15. <b>Papaverine</b></li> <li>16. <b>Drotaverine (No-spa)</b></li> <li>17. <b>Mebeverin (Duspalatin)</b></li> <li>18. <b>Aminophylline (Euphyllinum)</b></li> </ol> <p><i>Muscarinic antagonists:</i></p> <ol style="list-style-type: none"> <li>19. <b>Atropine</b></li> <li>20. <b>Patifillin</b></li> <li>21. <b>Metacin</b></li> </ol>   |
| Mechanism of action     | <ol style="list-style-type: none"> <li>1. Stimulation of receptors of the small bowel mucosa, secretory function of the liver parenchyma → ↑ bile formation (1-7)</li> <li>2. ↑ osmotic gradient between bile and blood → osmotic filtration of water and electrolytes into the bile capillaries (1-7)</li> <li>3. ↑ bile flow through the bile ducts → prevention of ascent of infection and ↓ inflammatory process (1-7)</li> <li>4. ↑ cholates content in the bile → ↓ the possibility of bile cholesterol precipitation and the formation of gallstones (1-7)</li> <li>5. ↑ the amount of bile due to the water component → ↑ fluidity of bile (8)</li> </ol> |  | <ol style="list-style-type: none"> <li>1. Irritate duodenal mucosa → excretion of cholecystokinin → contraction of the gallbladder, relaxation of the sphincter of Oddi → the entry of bile into the duodenum and the removal of cholestasis</li> </ol>  | <ol style="list-style-type: none"> <li>1. PDE inhibition → ↑ intracellular cAMP → ↓ Ca<sup>2+</sup> ions and ↓ smooth muscle tone (15,16,18)</li> <li>2. Blocks the flow of Na<sup>+</sup> and Ca<sup>2+</sup> ions into the cell → slows membrane depolarization and prevents the contraction of muscle fibers → relaxes smooth muscles (17)</li> <li>3. Blockage of muscarinic receptors → prevent acetylcholine action → antispasmodic effect (19-21)</li> </ol> |
| Pharmacological effects | <ol style="list-style-type: none"> <li>1. <b>Cholagogue</b></li> <li>2. Laxative (1)</li> <li>3. Antispasmodic (4), antibacterial (5)</li> <li>4. Diuretic, hemostatic (7)</li> </ol>   |  | <ol style="list-style-type: none"> <li>1. <b>Cholagogue</b></li> <li>2. Hepatoprotective (9)</li> <li>3. Spasmolytic (10)</li> <li>4. Choleretic (11,14)</li> </ol>  | <ol style="list-style-type: none"> <li>1. <b>Antispasmodic</b></li> <li>2. Myotropic (15-18)</li> <li>3. Bronchodilating (18)</li> </ol>  |
| Indications for use     | <ol style="list-style-type: none"> <li>1. Chronic hepatitis (1,2,4,6,7,8)</li> <li>2. Chronic cholecystitis (1-8)</li> <li>3. Chronic cholangitis (1,4,5,6,7,8)</li> <li>4. Chronic pancreatitis (2,3,8)</li> <li>5. Atonic constipation (1), cholelithiasis (4), urinary tract infection (5), dyskinesia of bile ducts (5,6)</li> </ol>  |  | <ol style="list-style-type: none"> <li>1. Hypokinetic biliary dyskinesia</li> <li>2. Duodenal drainage</li> <li>3. Chronic cholecystitis</li> <li>4. Chronic hepatitis</li> </ol>  | <ol style="list-style-type: none"> <li>1. Hyperkinetic biliary dyskinesia</li> <li>2. Cholelythiasis, cholecystitis (15,16,18-21)</li> <li>3. Irritable bowel syndrome (16,17)</li> <li>4. Hepatic colic (15-17,19-20)</li> </ol>   |
| Side effects            | <ol style="list-style-type: none"> <li>1. Diarrhea</li> <li>2. Allergic reactions</li> <li>3. Edema (8)</li> </ol>  |  | <ol style="list-style-type: none"> <li>1. Nausea</li> <li>2. Palpitations, arrhythmias (15,16,18)</li> <li>3. Atropine-like effect (19-21)</li> </ol>  |   |
| Contraindications       | <ol style="list-style-type: none"> <li>1. Acute hepatitis (1,2,4)</li> <li>2. Acute pancreatitis (1,2,3)</li> <li>3. Obturation jaundice (1-4,6,7)</li> <li>4. The gastroduodenal ulcer (1,2,4)</li> <li>5. Calculous cholecystitis (1,2,3,6,7)</li> <li>6. Anacid gastritis (5); thrombophlebitis, ↑ blood coagulability (7)</li> </ol>  |  | <ol style="list-style-type: none"> <li>1. Acute liver disease</li> <li>2. Stones in the gallbladder</li> <li>3. Exacerbation of peptic ulcer</li> </ol>  | <ol style="list-style-type: none"> <li>1. Arrhythmias (15,16,18-21)</li> <li>2. Severe hepatic failure (15,16)</li> <li>3. The gastroduodenal ulcer (18)</li> <li>4. Glaucoma (19-21)</li> <li>5. Prostatic hypertrophy (19-21)</li> </ol>  |

**Cholelitholytics** are medicines that promote the dissolution of bile (cholesterol) stones

| Classification          | Cholelitholytics   | Biliary colic management   |
|-------------------------|--|--|
| Drugs                   | <ol style="list-style-type: none"> <li>1. Chenodeoxycholic acid (Henofalk, Henodiol)</li> <li>2. Ursodeoxycholic acid (Ursofalk, Ursosan)</li> </ol>   | <p><b>Biliary or hepatic colic</b> is pain from a blocked bile duct. It is a complication of cholelithiasis and some other hepatobiliary diseases.</p> <p><b>Management:</b></p> <ol style="list-style-type: none"> <li>1. <i>Myotropic spasmolythics</i> (Platyphylline 0.2% by 2 mL IM; atropine sulfate 0.1% by 1 mL IM; Drotaverine 2% by 2–4 mL IM, IV by drop infusion; Papaverine 2% by 2 mL IM, IV by drop infusion)</li> <li>2. <u>For severe pain:</u> <i>antispasmodics + analgesics</i> (Baralgin 5 mL IM, IV; Analgin 50% by 2 mL IM; Ketorolac by 1 mL IM, right up to narcotic analgesics – promedol, tramadol).</li> </ol> |
| Mechanism of action     | <ol style="list-style-type: none"> <li>1. ↓ synthesis of cholesterol in the liver and ↓ its absorption in the intestine.</li> </ol> <p><i>Bile containing a lot of bile acids and phospholipids, can dissolve small cholesterol gallstones in the gallbladder in about 50% of patients.</i></p>                        |  |
| Pharmacological effects | <ol style="list-style-type: none"> <li>1. Cholelitholytic</li> <li>2. Hepatoprotective (2)</li> <li>3. Cholagogue (2)</li> </ol>   |  |
| Indications for use     | <ol style="list-style-type: none"> <li>1. Small cholesterol gallstones (up to 20 mm) invisible in X-rays</li> <li>2. Chronic hepatitis, toxic hepatitis (2)</li> <li>3. Primary biliary cirrhosis (2)</li> <li>4. Primary sclerosing cholangitis (2)</li> <li>5. Biliary dyskinesia (2)</li> </ol>                     |  |
| Side effects            | <ol style="list-style-type: none"> <li>1. Diarrhea / constipation</li> <li>2. Nausea, epigastric pain</li> <li>3. Increased hepatic transaminases level</li> </ol>   |  |
| Contraindications       | <ol style="list-style-type: none"> <li>1. Gallstones visualized during routine radiology</li> <li>2. Severe dysfunction of the intestine</li> <li>3. The gastroduodenal ulcer</li> <li>4. Diseases of the pancreas</li> <li>5. Frequent biliary colic</li> <li>6. Chronic hepatitis, cirrhosis, cholangitis</li> </ol> |  |

**Hepatoprotectors** are drugs that increase the resistance of the liver to the effects of damaging factors, promote the restoration of its functions, increase its detoxification capabilities.

| Classification          | Herbal preparations  | Amino acids   | Complex of essential liver phospholipids   | Vitamins; antioxidants  |
|-------------------------|--|---|--|---|
| Drugs                   | 1. Legalon (Karsil, Silymarin)<br>2. Bilignin<br>3. LIV-52<br>4. Hepatofalk planta   | 5. Ademethionine (Heptral)<br>6. Gepa-Merz: ornithine + aspartate   | 7. Essentiale (Essential phospho-ipids + vitamins (pyridoxine, cyanocobalamin, nicotinamide, panto-tenanoic acid) + fatty acids (linoleic, linolenic acids)                      | 8. Lipoic acid (Thiocacid, Thio-gamma, Thioctic acid)<br>9. Choline Chloride<br>10. Vitamins A, E, C  |
| Mechanism of action     | 1. Normalization of metabolic processes and restoration of the integrity of hepatocyte cell membranes<br>2. ↓ peroxide oxidation of lipids (1,4) | 1. Normalization of metabolic processes<br>2. Activation of membrane phospholipids synthesis, as well as the formation of glutathione, sulfates and taurine which have detoxifying properties (5)<br>3. Inhibition of urea biosynthesis (6) | 1. Normalization of metabolic processes<br>2. Restoration of the phospholipid composition of hepatocyte membranes<br>3. Stimulation of interferon production, ↑ phagocytosis (8) | 1. Participates in the regulation of lipid and carbohydrate metabolism, affects the exchange of cholesterol, has a detoxifying effect (8)<br>2. Participates in the metabolism of phospholipids, donator of methyl groups (9) |
| Pharmacological effects | 1. Hepatoprotective<br>2. Lipid-lowering<br>3. Antioxidant (1,4)   | 1. Hepatoprotective<br>2. Antioxidant (5)<br>3. Antidepressant (5)  | 1. Hepatoprotective<br>2. Antioxidant  | 1. Hepatoprotective<br>2. Antioxidant (8)   |
| Indications for use     | 1. Acute (toxic) hepatitis (1,3,4)<br>2. Chronic hepatitis, liver cirrhosis  | 1. Chronic hepatitis, liver cirrhosis<br>2. Hepatic encephalopathy (6)<br>3. Depressive syndrome (5)  | 1. Chronic hepatitis, liver cirrhosis<br>2. Toxic hepatitis<br>3. Fatty liver degeneration   | 1. Chronic hepatitis, liver cirrhosis<br>2. Hepatitis A (Botkin’s disease)<br>3. Coronary atherosclerosis (8)<br>4. Neuropathies (8)  |
| Side effects            | 1. Dyspeptic disorders   |   |  |   |
| Contraindications       | 1. Hypersensitivity  | 1. I and II trimesters of pregnancy   | 1. Hypersensitivity  |   |
| NB!                     | See pharmacological characteristics of vitamins in study guide № 26 «Antioxidants. Vitamins. Enzymes and antienzymes»                            |   |  |   |



## Drugs for pancreatic function disturbances

| Classification          | Enzymes   |   |  | Antienzymes   |
|-------------------------|---|---|--|---|
|                         | Animal enzymes drugs  | Preparations containing pancreatin, bile components, hemicellulase, etc.  | Vegetable drugs  |   |
| Drugs                   | <b>1. Pancreatin (Pancrenorm)</b><br><b>2. Pancitrate</b><br><b>3. Mezim-forte</b><br><b>5. Penzital</b><br><b>6. Panzinorm forte-H</b>   | <b>6. Festal</b><br><b>7. Digestal</b><br><b>8. Enzistal</b><br><b>9. Panzinorm forte</b>   | <b>7. Pepfiz</b><br><b>8. Oraz</b><br><b>9. Solizim</b>  | <b>10. Tracerol</b><br><b>11. Gordox</b><br><b>12. Counter</b><br><b>13. Pantrypine</b><br><b>14. Inhistrol</b>   |
| Mechanism of action     | 1. Split fats, proteins and carbohydrates → their absorption in the small intestine<br>2. ↓ abdominal pain syndrome   | 1. Split fats, proteins and carbohydrates → their absorption in the small intestine<br>2. Enzyme hemicellulase ↑ splitting of plant fiber and digestive processes → ↓ formation of gases (6-8)<br>2. Amino acids ↑ secretion of gastric juice, intestinal and pancreatic enzymes. Hydrochloric acid ↑ acidity of stomach contents (9) | 1. Normalizes digestion, ↓ gas formation and ↑ motility of the gastrointestinal tract  | 1. Inhibit proteases (trypsin, chymotrypsin, plasmin) → prevent the release of biologically active polypeptides (kinin) → stabilize the permeability of capillaries, inhibit the development of edema and pancreatic necrosis |
| Pharmacological effects | <b>1. ↑ digestion</b><br>2. Cholagogue (6-8)  |   |  | <b>1. Antifibrinolytic</b>  |
| Indications for use     | 1. Chronic pancreatitis with insufficient pancreatic function<br>2. Maldigestia and malabsorption syndrome<br>3. Hypo- and anacid gastritis<br>4. Flatulence<br>5. After an operation on the pancreas | 1. Chronic pancreatitis with insufficient pancreatic function<br>2. Flatulence<br>3. Cholecystectomy<br>4. Maldigestia and malabsorption syndrome<br>5. Biliary dyskinesia  | When intolerance to pancreatic enzymes in:<br>1. Chronic pancreatitis with insufficient pancreatic function<br>2. Flatulence<br>3. Errors in nutrition | 1. Prevention of blood loss during operations<br>2. Acute pancreatitis and exacerbation of chronic pancreatitis<br>3. Shock   |
| Side effects            | 1. Nausea, vomiting   |   |  | 1. Vascular thrombosis<br>2. Impaired renal function<br>3. Dyspepsia<br>4. Arterial hypotension   |
| Contraindications       | 1. Hypersensitivity<br>2. Acute pancreatitis  | 1. Hypersensitivity<br>2. Hepatitis, hepatic failure, hyperbilirubinemia (5)<br>3. Acute pancreatitis   | 1. Patients with fungal and household sensitization (8)<br>2. Allergy to penicillins (9)<br>3. Hypersensitivity  | 1. DIC-syndrome (except for coagulopathy phase)<br>2. Pregnancy<br>3. Hypersensitivity  |
| NB!                     | There are combined enzymes containing pancreatin in combination with plant enzymes, vitamins (wobenzyme, phlogenzyme).  |   |  |   |

### Acute pancreatitis management

|  |   |
|--|---|
| <b>1. No food or drink; cold</b> (ice pack) on the epigastric area |   |
| <b>2. Analgesics</b>   | <p><i>Narcotic drugs</i> for severe pain syndrome (<i>Trimeperedine (promedol)</i> subcutaneously or IV by 1 ml 1% or 2% every 6 hours</p> <p><i>Non-narcotic</i> (at option: <i>Metamizole (analgin)</i> IM or IV by 2 ml 50% solution every 6-8 hours; <i>Tramadol</i> by 50-100 mg IV or IM every 6-8 hours);</p> <p>* Morphine is not recommended: it provokes spasm of sphincter of Oddi</p> |
| <b>3. Spasmolytics</b>   | <i>Papaverine</i> 2 ml 2% solution IM, <i>drotaverine</i> 40-80 mg 1-3 times daily IM, IN or subcutaneously   |
| <b>4. Muscarinic antagonists</b>                                   | <i>Atropine</i> 0,1% solution (if there are no contraindications) 1 ml subcutaneously twice daily; <i>platyphylline</i> 1-2 ml 0,2% solution subcutaneously twice daily   |
| <b>5. Infusion therapy</b>   | Up to 40 ml per 1 kg of patient body mass:<br>basic infusion solutions: saline (0,9% sodium chloride solution), 5% or 10% dextrose solution; balanced polyionic solutions; plasma substitutes (neorondex, dextran, polyvinylpyrrolidone and others.)  |
| <b>Additional agents:</b>  |   |
| <b>6. Antisecretory agents</b>                                     | <p><i>Proton pump inhibitors</i>: omeprazole 20 mg twice daily</p> <p><i>Histamine H<sub>2</sub> receptor antagonists</i>: famotidine IV or 20 mg orally every 12 hours</p>   |
| <b>7. Enveloping and absorbing agents</b>                          | <i>Aluminum and magnesium hydroxide</i> 1 dosing spoon 30 minutes before meals and 4 times a day in the evening, etc.   |
| <b>8. Antienzymes</b>  | <i>Ovomisin</i> IV slowly, initial dose is 1500-1800 antitrypsin units per kg; maintenance dose 750-800 antitrypsin units per kg every 6 hours  |
| <b>9. Antibiotics</b>  | <i>Ampicillin</i> 1 g IM every 4-6 hours, <i>Oxacillin</i> (1 g IM every 4-6 hours) and others  |

\*For vomiting - metoclopramide IM or IV 10 mg 3-4 times daily. Duration of treatment is 3-7 days.

### Antidiarrheal agents are drugs for diarrhoea

| Classification          | Enveloping, absorbent agents  | Muscarinic antagonists  | Myotropic spasmolytics   | Opioid agonists   |
|-------------------------|---|---|--|---|
| Drugs                   | <b>1. Smecta (Diosmectite)</b><br><b>2. Activated carbon</b>  | <b>3. Buscopan (Hyoscine butyl bromide)</b>   | <b>4. Papaverine hydrochloride</b><br><b>5. Drotaverine (No-spa)</b><br><b>6. Mebeverine (Duspatalin)</b><br><b>7. Otilonium bromide</b>   | <b>8. Loperamide (Imodium)</b><br><b>9. Diphenoxylate (Reasek, Lomotil)</b>   |
| Mechanism of action     | 1. Forms polyvalent bonds with glycoproteins of mucus → ↑ the amount of mucus and improves its gastroprotective properties. Has selective sorption properties (1)<br>2. Adsorbs substances → prevents their absorption into the blood (2)   | 1. Blockage of muscarinic receptors → ↓ tone of smooth muscles of internal organs, including gastrointestinal tract, ↓ their contractile activity | 1. Inhibitors of PDE → ↑ cAMP in smooth muscle cells → ↓ Ca <sup>2+</sup> level → relaxation of the musculature and ↓ tone of smooth muscle organs including the stomach and intestines<br>2. Eliminate spasm with no effect on normal peristalsis (6) | 1. Stimulate intestinal opioid receptors → ↓ peristalsis, ↑ tone of intestinal sphincters, ↓ secretion of water and electrolytes. → ↓ promoting of intestinal contents<br>* <i>Loperamide does not pass through the BBB</i> |
| Pharmacological effects | 1. Adsorbing (1,2)<br>2. Enveloping (1)<br><b>3. Antidiarrheal</b>  | <b>1. Anticholinergic</b><br><b>2. Antidiarrheal</b>  | <b>1. Antispasmodic</b><br><b>2. Antidiarrheal</b>   | <b>1. Antidiarrheal</b>   |
| Indications for use     | 1. Acute and chronic diarrhea<br>2. Symptomatic treatment of heartburn, swelling, discomfort in the abdomen (1,2)<br>3. Flatulence<br>4. Intoxication   | 1. Irritable Bowel Syndrome<br>2. Spastic pain states in cholelithiasis and urolithiasis, chronic cholecystitis                                   | 1. Irritable bowel syndrome<br>2. Pain in the abdomen of spastic nature<br>3. Renal colic (4,5)<br>4. Biliary dyskinesia (5)   | 1. Acute and chronic diarrhea   |
| Side effects            | 1. Constipation<br>2. Black stool (2)   | 1. Dry mouth<br>2. Tachycardia<br>3. Retention of urination   | 1. Nausea, constipation (4,6)<br>2. AB blockade (4,5)<br>3. Dizziness (4-6)  | 1. Dizziness<br>2. Flatulence<br>3. Dry mouth (8)   |
| Contraindications       | 1. Intestinal obstruction (1)<br>2. Gastric bleeding (2)<br>3. The gastroduodenal ulcer (2)   | 1. Glaucoma<br>2. Prostatic hypertrophy   | 1. AV-blockage (4)<br>2. Glaucoma (4)<br>3. Prostatic hypertrophy (5)  | 1. Acute dysentery<br>2. Nonspecific ulcerative colitis<br>3. Intestinal obstruction  |
| NB!                     | <b>Drugs for flatulence</b> – are local-acting drugs that: 1. Absorb gases in the intestine and stomach ( <i>Charcoal</i> ); 2. ↓ surface tension at the interface between the liquid contents of the gastrointestinal tract and gas bubbles and destroy these gas bubbles ( <i>Simethicone, Dimethicone</i> ). Combined drug alverine + simethicone = <i>Meteospasmil</i> . <i>Side effects</i> : violate absorption of nutrients and medicinal substances at simultaneous reception with the activated coal, occasionally allergies (simethicone) and constipation (dimethicone). |   |  |   |

PDE - phosphodiesterase, cAMP - cyclic adenosine monophosphate, BBB - blood-brain barrier, AV - atrio-ventricular

**Laxatives** are drugs that ↑ motility of the intestine and causing the elimination of semiliquid or liquid feces

| Classification          | Vegetable fibers   | Osmotic  | Irritants of intestinal receptors (contact laxatives)   | Softening feces  |
|-------------------------|--|--|---|--|
| Drugs                   | 1. Methylcellulose   | 2. Magnesium sulfate (Cormagnesin)<br>3. Sodium sulfate (Glauber's salt)<br>4. Lactulose (Dufalac, Fortrans)   | 5. Castor oil<br><i>Preparations of Senna, rhubarb, buckthorn, etc., containing anthraglycosides:</i><br>6. Senadexin<br><i>Synthetic:</i><br>7. Bisacodyl  | 8. Vaseline oil<br>9. Olive oil<br>10. Sunflower oil   |
| Mechanism of action     | 1. Increase in the volume of intestinal contents → irritation of the mechano-receptors and laxative effect   | 1. Create high osmotic pressure in the lumen of the intestine and delay the absorption of water → ↑ content volume → mechanical stimulation of bowel function, ↑ its motor activity and accelerated evacuation<br>* <i>Lactulose acts only in the large intestine!</i> | 1. Is split by lipase in the small intestine to form ricinoleic acid → it causes irritation of the intestinal receptors throughout its entire length and reflexively ↑ peristalsis (5)<br>2. Irritate bowel receptors → ↑ peristalsis and evacuation of intestinal contents (6,7) | 1. Isn't absorbed and soften the stool (8)<br>2. Softens the stool and ↑ intestinal motility (9-10)  |
| Pharmacological effects | 1. Laxative  | 1. Laxative<br>2. Cholagogue, hypotensive, antiarrhythmic (4)  | 1. Laxative   | 1. Laxative<br>2. Cholagogue (9-10)  |
| Indications for use     | 1. Chronic constipation  | 1. Acute poisoning<br>2. Preparation for colon examination (4)<br>3. Chronic constipation (4)<br>4. Prevention of encephalopathy in portal cirrhosis (4)   | 1. Chronic constipation<br>2. Preparation for colon examination (5,7)<br>3. After the operation of removal of hemorrhoids to prevent physical efforts in case of heart attack and stroke  | 1. Chronic constipation<br>2. After the removal of hemorrhoids (9-10)  |
| Side effects            | 1. Flatulence  | 1. Nausea, vomiting<br>2. IV: sensation of heat (2)<br>3. IV: bradycardia (2)<br>4. Electrolyte disturbances (2,3)   | 1. Atony of the intestine when prolonged use<br>2. Proteinuria, hematuria (6)<br>3. Convulsions, muscle weakness (6,7)  | 1. Atony of the intestine (8)<br>2. Deficiency of vitamins E, A, K (8)   |
| Contraindications       | 1. Intestinal obstruction<br>2. Severe constipation<br>3. Anal bleeding of unknown nature<br>4. Appendicitis | 1. Severe bradycardia, AV blockade (2)<br>2. Severe chronic renal failure (2)<br>3. Appendicitis, intestinal obstruction<br>4. Galactosemia (4)  | 1. Hypersensitivity<br>2. Intestinal obstruction<br>3. Appendicitis, diverticulitis<br>4. Ulcerative colitis, Crohn's disease   | 1. Hypersensitivity<br>2. Intestinal obstruction<br>3. Fever (8)<br>4. Ulcerative colitis, Crohn's disease<br>5. Cholecystitis, biliary dyskinesia |

AV - atrio-ventricular