DRUGS INFLUENCING THE GASTROINTESTINAL TRACT (PART I and II). ANTISPASTIC DRUGS.

A. Actuality. Gastrointestinal diseases are very common in the medical practice. Drug therapy of those requires the usage of a wide range of drugs and a great knowledge in order to prescribe them rationally.

Smooth muscle contractions of internal organs (bronchi, gall bladder, urinary bladder, myometrium) are the manifestations of many acute and chronic diseases, having inflammatory, allergic and neural (dyskinesia) origins. In such cases an active intervention of a specialist is necessary. Fundamental knowledge of antispasmodic drugs is required for this.

B. The purpose of the training is to familiarize students with basic drugs affecting the functions of gastrointestinal tract and antispasmodics from different groups, and the principles of choice of the necessary drug in each specific diseases.

C. Learning objectives:

a) The students must **know**: drugs affecting the functions of gastrointestinal tract, their classification, mechanism of action, indications, contraindications, side effects.

a) The students must **be able to:** prescribe the drugs affecting the different functions of gastrointestinal tract and basic antispasmodics in different medicinal forms, write them out in special diseases and pathological states.

D. Initial level of knowledge required for interdisciplinary integration:

Histology. Morphological and functional characteristics of gastrointestinal tract. General principles of gastrointestinal tract structure: mucosa, submucosa and serous membranes. General characteristics of mucosa, its structure. Peculiarities of mucosa in different gastrointestinal tract regions. The pancreas: morphofunctional characteristics. Exocrine and endocrine pancreas, vascularization and innervation. The liver. Morphofunctional characteristics. The hepatic lobe as the structural unit of the liver. The structure of hepatocytes. Peculiarities of vascularization. The ability of the liver to (self) regenerate. Gall bladder, bile ducts, their structure. Bile ducts mucosal regeneration.

Human physiology. The importance of digestion for the organism. Physiological bases of hunger, appetite and satiety. Digestion in the oral cavity. Composition and properties of saliva, its enzymes. Digestion in stomach. Composition and properties of the gastric juice, its importance. Mechanism of gastric secretion, its regulation. Phases of gastric juice secretion. The influence of humoral factors on the gastric glands. Enterogastrine, enterogastrone. Digestion in duodenum. The role of duodenum in digestion. Composition and properties of pancreatic juice, its effect on proteins, carbohydrates, lipids, nucleic acids. Enterokinase. Mechanisms of bile formation in liver. Excretion of bile into duodenum. Bile excretion stimulants. Digestion in the small and large intestines, absorption of nutrients in the gastrointestinal-tract. Intestinal juice. Gastrointestinal tract motility, antiperistaltic contractions, vomiting.

Mechanism of smooth muscle contraction. Physiology of the autonomic nervous system (sympathetic, parasympathetic). Tone and motility regulation of

internal organs (bronchi, stomach, intestine, gall bladder, bile ducts, uterus and urinary bladder).

Biochemistry. The main nutritive substances. Decomposition of carbohydrates, proteins, lipids. Absorption. Fermentation in the intestine. Biochemical regulatory mechanisms of digestion. Parenteral feeding. Biochemistry of smooth muscle contraction. Adenilatecyclaze, cAMP, phosphodiesterase.

Pathophysiology. Gastrointestinal insufficiency, its causes. Disturbance of appetite, gastric digestion (secretion and excretion, motility, absorption). Disturbance of duodenal digestion in pancreatic juice and bile deficiency.

E. Self-training questions:

1. Classification of drugs affecting the functions of gastrointestinal tract.
2. Drugs used in gastric hyposecretion: classification, mechanism of action, effects, indications and side effects.
3. Drugs for replacement therapy in pancreas hypofunction. Classification, mechanism of action, effects, indications and side effects.
4. Drugs that are used in gastric hypersecretion. Classification.
5. M-cholinoblockers as antiulcer drugs: classification, mechanism of action, antiulcer effect, indications and side effects.
6. H_2-histaminoblockers as antiulcer drugs: classification, mechanism of action, antiulcer effect, indications and side effects.
7. Proton pump inhibitors as antiulcer drugs: classification, mechanism of action, antiulcer effect, indications and side effects.
8. Drugs with antigastrine action, prostaglandin and somatostatin analougs as antiulcer drugs: classification, mechanism of action, antiulcer effect, indications and side effects.
9. Antacids: classification, mechanism of action, effects, indications and side effects.
10. Gastroduodenoprotectors and cytoprotectors. Classification, mechanism of action, effects and indications of the sucralfate, bismuth drugs, prostaglandins, vegetable drugs, synthetic drugs, vitamins and anabolics.
11. The classification of antiulcer drugs.
12. Drugs that inhibit the pancreas exocrine function: classification, mechanism of action, effects and side effects.
13. Classification of drugs that intensify digestive tube peristaltism.
14. Prokinetic drugs: classification, mechanism of action, effects, indications and side effects.
15. Laxatives and purgatives: classification. Mechanisms of action, effects, indications and side effects of volume and emollient laxatives, osmotic and irritating purgatives.
16. Drugs that inhibit the motility of gastro-intestinal tract: classification.
17. Antiemetics: classification. Mechanisms of action and indications.
18. Antidiarrheal: classification. Mechanisms of action. Characteristic of drugs from M-cholinoblockers, opioid, astringent, absorbent and protective origin.
19. Antiflatulents: classification. Mechanisms of action and indications.
20. Classification of hepatotropic drugs.

21. Hepatoprotectives: classification by origin, mechanisms of action, indications and side effects. Entomologic hepatoprotectors.
22. Classification of drugs that affect bile formation, secretion and excretion.
23. Cholesecretic drugs: classification, mechanism of action, effects, indications.
24. Cholecistokinetic drugs: classification, mechanism of action, effects, indications.
25. Cholelitolitic drugs: classification, mechanism of action, effects, indications.
26. The classification of antispasmodic drugs that affect smooth muscles (spasmolitics).
27. Neurotropic antispasmodics: classification, mechanism of action, indications and side effects.
28. Myotropic antispasmodics: classification, mechanism of action, indications.
29. Combined antispasmodics: classification, mechanism of action, indications.

F. Independent work (is done in written form while preparing for the lesson)

1) Brief characteristics of compulsory drugs (Medicinal forms, ways of administration, doses (therapeutic, maximal for one intake and for 24 hours). Mechanism of action. Indications. Contraindications. Side effects).

1. Pancreatine. 2. Creon. 3. Famotidine. 4. Omeprazol. 5. Almagel. 6. Sucralfate. 7. Bismuth subcitrate. 8. Regesan. 9. Aprotinine. 10. Metoclopramide. 11. Simethicone. 12. Magnesium sulfate. 13. Bisacodyl. 14. Picosulphate. 15. Thyethylperazine. 16. Ondansetron. 17. Lactulose. 18. Macrogol. 19. Loperamide. 20. Enterol. 21. Bactisubtil. 22. Essentiale. 23. Ademetionine. 24. Silimarine. 25. Ursodeoxycholic acid. 26. Holosas. 27. Papaverine hydrochloride. 28. Drotaverine. 29. Atropine sulphate. 30. Platiphylline. 31. Baralgine.

2) Questions on medical prescriptions.

To prescribe the following drugs in all possible medicinal forms**:** 1. Pancreatine. 2. Creon. 3. Famotidine. 4. Omeprazol. 5. Almagel. 6. Sucralfate. 7. Bismuth subcitrate. 8. Regesan. 9. Aprotinine. 10. Metoclopramide. 11. Simethicone. 12. Magnesium sulfate. 13. Bisacodyl. 14. Picosulphate. 15. Thyethylperazine. 16. Ondansetron. 17. Lactulose. 18. Macrogol. 19. Loperamide. 20. Enterol. 21. Bactisubtil. 22. Essentiale. 23. Ademetionine. 24. Silimarine. 25. Ursodeoxycholic acid. 26. Holosas. 27. Papaverine hydrochloride. 28. Drotaverine. 29. Atropine sulphate. 30. Platiphylline. 31. Baralgine.

Drugs used in (for): hypoacid gastritis, reflux esophagitis (esophageal reflux disease), Zollinger-Elison syndrome, antisecretory in gastric and duodenal ulcer, antiacids in gastric and duodenal ulcer, acute pancreatitis, chronic pancreatitis, gastroprotectors in gastric and duodenal ulcer, gastric hypomotility, chronic functional constipation, chronic constipation, hepatic encephalopathy, bowel evacuation in surgical emergencies (acute constipation), preparation for radiological and endoscopic examination of the digestive tract, preparation for surgical intervention, drugs or food intoxication (poisoning), postoperative meteorism, flatulence and meteorism in diseases of the digestive tract, drug-

induced vomiting, vomiting in sick motion, cytostatic and radioprotective-induced vomiting, non-specific acute diarrhea, toxic hepatitis, hepatocolecystitis, cholelithiasis, biliary colic, intestinal colic.

3) Tests (Guidelines for Laboratory Work in Pharmacology).

4) Clinical case (Guidelines for Laboratory Work in Pharmacology).

5) **Virtual situations** (Guidelines for Laboratory Work in Pharmacology).

6)Virtual didactic movie.

7) Tables

Table N1

The comparative characteristics of gastric antisecretory drugs

Drugs	Mechanism of action	Antiulcer effect	Indications	Side effects
M-cholinoblockers				
H_2-histaminoblockers				
Proton pump inhibitors				
Somatostatine analouges				
Gastrine analouges				

Table N2

The comparative characteristics of gastro and citoprotector drugs

Drugs	Mechanism of action	Antiulcer effect	Indications	Side effects
Bismuth preparation				
Aluminium preparation				
Prostaglandine analouges				
Vegetative oils				
Synthetic preparation				

The presence of effect mark with “+”

Table N3

The comparative characteristic of laxative and purgative drugs

Laxatives and purgatives	Onset of the effect	The location of action		Indications		
		Large intestine	All intestines	Chronic constipation	Acute constipation	Intoxications (poisoning)
Bulk laxatives						
Emolient laxatives						
Irritatans						
Osmotic laxatives						

Table N4

Antiemetic drug indications

Pharmacological group	Motion sickness	Vomiting in the postoperative period	Vomiting in actinic disease	Chemotherapy-induces vomiting
M-cholinoblokers				
H_{1}-antihistamines				
Dopamine-blockers				
Neuroleptics				
Antiserotoninics				

Note: Sign the presence of the effect with "+"

Table N5

Mechanisms of action of the drugs, which increase the formation and elimination of bile

Mechanism of action	Choleretics	Hydrocoleretics	Cholecystokinetics	Cholespasmolitics
Stimulation of liver secretion (hepatocytes)				
Increase the volume of bile by increasing the aqueous component (bile dilution)				
Increase the tone of the gallbladder				
Increase the tone of the bile ducts				
Decrease the tone of the sphincter Oddi				

Note: Sign the presence of the effect with "+"

Table N 6

The use of antispastic drugs

	High arterial blood pressure	In ophthalmic practice	Asthma attacks	Spastic algodysmenorrhea	Spastic intestinal, kidney and biliary colic	Spasm of peripheral and cerebral vessels
Papaverine hydrochloride						
Platyphylline hydrotartrate						
Aminophylline						
Atropine sulfate						
Drotaverine						
Baralgine						

Note: For filling out the table use the next signs:

"++"- the highest effect,

"+"- the lowest effect.

Table N7

The identification of the antispastic drugs

Drugs	Ways of administration	Time of action		Mechanism of action	Chemical membership
		Onset (hours)	Duration(hours)		
A	Oral, intravenous, intramuscular, rectal	0,5-1 min 15 min	4-6	Myotropic	Purine derivatives
B	Oral, intravenous, intramuscular	0,5 min	10-12 5-8	Myotropic	Combined medications
C	Oral, intravenous, intramuscular, rectal	20-30 min	6-7	Myotropic	Isochinoline derivatives
D	Oral, subcutaneous, rectal	15-30 min	4-6	Neurotropic	Methyl pyrrolidine derivatives

8) Solve the cases:

A. Pacient X, 61 y.o., was hospitalized with the following complaints: heartburn, nausea, pain in epigastric region that appeared in 1,5 hour after meal, frequent "night" pain. From anamnesis: approximate 15 years is suffering from gastric ulcer with frequent exacerbations. *Helicobacter pylori* was detected during the biopsy of the gastric mucosa.

Name the possible schemes of treatment and explain them.

B. A purgative drug was prescribed to a pregnant woman with an intestinal constipation. After administration the patient showed signs of premature birth.

What kind of purgative was prescribed?

What caused the early labor?

C. A patient with a gastric ulcer presents increasing pain. A drug was prescribed by the doctor. The pain was considerably diminished, but xerostomia, palpitations and visual disturbances had occurred.

What drug was prescribed?