**DRUGS INFLUENCING THE GASTROINTESTINAL TRACT (PART 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 remedies 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 training** is to study the pharmacological properties of drugs affecting the different functions of gastrointestinal tract and antispasmodics from different groups. Also, it consists of learning how to choose the right drug in different pathologies.

**C. Learning objectives**.

1. The students must **know**: classification, mechanism and peculiarities of action, indications and side effects.
2. 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 interdisciplinary integration:**

**Histology.** Morphological and functional characteristics of different portions of the gastrointestinal tract. 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.** 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.** Biochemistry of smooth muscle contraction. Adenilatecyclaze, cAMP, phosphodiesterase.

**Pathophysiology.** Disturbance of appetite, gastric digestion (secretion and excretion, motility, absorption). Disturbance of duodenal digestion in pancreatic juice and bile deficiency. Disturbance of the digestion in small and large intestines. Diarrhea, constipation. Autointoxication, intestinal impracticability.

**E. Self-training questions:**

1. Prokinetics, drugs that increase intestinal peristaltism. Classification.
2. Mechanism of action, effects, indications and side effects of cholinomimetics, dopamine blockers, serotoninergic drugs and motilin agonists.
3. Emetic drugs (vomitiv). Classification. Mechanisms of action. Indications.
4. Laxatives and purgatives. Classification. Mechanisms of action, indications and side effects of volume and emollient laxatives, osmotic and irritating purgatives.
5. Drugs that inhibit the motility of gastro-intestinal tract. Classification.
6. Antiemetics. Classification. Mechanisms of action. Indications.
7. Antidiarrheal. Classification. Mechanisms of action. Characteristic of drugs from opioid, astringent, absorbent and protective origin.
8. Antiflatulents. Classification. Mechanisms of action. Indications.
9. Hepatotropic drugs. Classification. Drugs that affect bile secretion and excretion. Classification. Mechanisms of action. Indications.
10. Hepatoprotectives. Mechanisms of action, indications and side effects.
11. Drugs for treating gallstones (colelitolitics). Mechanisms of action, indications and side effects.
12. The classification of antispasmodic drugs that affect smooth muscles.
13. Neurotropic antispasmodics. Classification, mechanism of action. Comparative characteristics. Indications and side effects.
14. Antispasmodics with myotropic action. Classification, mechanism of action. Comparative characteristics of antispasmodic drugs with myotropic action. Indications.
15. Comparative characteristics of myotropic and neurotropic antispasmodics. Combined antispasmodics. Their characteristics.
16. Antispasmodics of vegetable origin. Peculiarities of action. Indications.

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

**1) Brief characteristics of compulsory drugs:**

**Down:** drugs name: 1. Metoclopramide. 2. Ondansetron. 3. Thyethylperazine. 4. Loperamide. 5. Bisacodyl. 6. Simethicone. 7. Magnesium sulfate. 8. Enterol. 9. Bactisubtil. 10. Essentiale. 11. Ademetionine. 12. Holosas. 13. Silimarine. 14. Ursodeoxycholic acid. 15. Papaverine hydrochloride. 16. Drotaverine. 17. Mebeverine. 18. Lactulose. 19. Macrogol. 20. Picosulphate.

**Drugs that also refer to the task, which need to be repeated:** 1. Atropine sulfate. 2. Platifiline hydrotartrate. 3. Aminophylline. 4. Baralgine.

**Across:** 1. Medicinal form. 2. Ways of administration. 3. Doses (therapeutic, maximumal for one intake and for 24 hours). 4. Mechanism of action. 5. Indications and contraindications. 6. Side effects.

**2) Questions on medical prescriptions.**

**To prescribe** thefollowing drugs in all possible medicinal forms**:** 1. Metoclopramide. 2. Ondansetron. 3. Thyethylperazine. 4. Loperamide. 5. Bisacodyl. 6. Simethicone. 7. Magnesium sulfate. 8. Enterol. 9. Bactisubtil. 10. Essentiale. 11. Ademethionine. 12. Holosas. 13. Silimarine. 14. Ursodeoxycholic acid. 15. Papaverine hydrochloride. 16. Drotaverine. 17. Mebeverine. 18. Atropine sulfate. 19. Lactulose. 20. Macrogol. 21. Picosulphate. 22. Platyphylline hydrotartrate. 23. Aminophylline. 24. Baralgine.

**Drugs used in (for):** reflux oesophagitis, 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), 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).“Intestinal motility”.

**6)Virtual didactic movie.**

**7) Tables**

*Table N1*

**The comparative characteristic of laxative drugs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Laxatives | 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 N2*

**Antiemetic drug indications**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pharmacological group | Motion sickness | Vomiting in the postoperative period | Vomiting in actinic disease | Chemotherapy-induces vomiting |
| M-cholinoblokers |  |  |  |  |
| H1- antihistamines |  |  |  |  |
| Dopamine-blockers |  |  |  |  |
| Neuroleptics |  |  |  |  |
| Antiserotoninics |  |  |  |  |

**Note:** Sign the presence of the effect with “+”

*Table N3*

**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 4*

**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 N5*

**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)** 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?***

**b)**  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?***