

## **PHARMACOKINETIC AND PHARMACODYNAMIC PRINCIPLES OF RATIONAL USING OF REMEDIES THAT INFLUENCE THE GENERAL METABOLISM AND PHOSPHORUS-CALCIUM METABOLISM. VITAMINS, ENZYMES AND ANTIENZYMES.**

### **A. Actuality:**

Pharmacodynamic spectrum study of vitamins, enzymes, drugs that influence the phosphorus-calcium metabolism demonstrate that these substances can be used for treatment goals as remedies of metabolism correction in different diseases and pathological states, thus being able to be named drugs of metabolic therapy.

### **B. Training aim:**

Studying argumentation of clinic-pharmacological principles of prescription, election, dosage regimen of the drugs with metabolic action and estimating of their efficiency.

### **C. Learning objectives**

*The students should be able to:*

- a) Select a minimum complex of investigational methods in order to estimate the pharmacodynamic effect of drugs with metabolic action.
- b) Analyze and estimate pharmacodynamical study results of metabolism activators obtained by laboratory and instrumental methods.
- c) Prognose the complications and side-effects of drugs from these groups.
- d) Prognose the dependence of side-effects appearance on dosing regimen of drugs from metabolic stimulants groups and functional state of the body's organs and systems.
- e) Apply contemporary methods of pharmacological and non- pharmacological correction of adverse effects produced by drugs with metabolic and action.

### **D. Knowledge from other studied subjects**

**Histology, morphology, pathological physiology.** Cell structure. Mitochondria and ribosome role in assuring of cell metabolic vital processes. Hormonal regulation of calcium and phosphorus metabolism. Oxidative phosphorylation - basic mechanism of energy formation in the body. Classification of biological active compounds that regulate essential biological processes. Vitamin and coenzyme role in metabolic processes.

**Clinical subjects.** Vitamins deficiency. Hypervitaminosis. Clinical manifestations. Pathogenesis and clinical manifestations of calcium and phosphorus deficiency.

**Pharmacology.** Classification of vitamins, enzymes, coenzymes, metabolic stimulators, and other substances that act on bone and tissue metabolism. Indications, contraindications. Adverse reactions.

### **E. Questions for self training**

#### **A. Clinical-pharmacological characteristics of drugs used in stomatological metabolic disorders.**

1. Vitamins and cofactors importance as prophylactic and treatment remedies for vitamin deficiency. Vitamins pharmacotherapeutic principles (replacement and prevention goal). Vitamins and coenzymes usage in different diseases, infection and intoxications treatment.
2. Vitamins deficiency - clinical manifestation. Vitamins as remedies that regulate the metabolism. Hypervitaminosis, clinical manifestation, treatment.
3. Vitamins classification. Pharmacodynamics. Pharmacokinetics. Pharmacotoxicological bases of vitamins.
4. Hydrosoluble vitamins. Group of B-vitamins. Pharmacodynamic and pharmacokinetic aspects. Mechanism of action.
5. Importance of vitamin B<sub>1</sub> and its active form-coccarboxilase in regulation of carbohydrates metabolism.
6. Vitamine B<sub>2</sub> and its biological active forms-flavin-mononucleotid and flavin-adenin-dinucleotide, that exert the coenzyme function of flavoproteins. Their importance for cell oxide-reducing reaction.
7. Group of B<sub>6</sub> vitamins - piridoxine, piridoxal and active form - piridoxalphosphate. Their importance in metabolic reactions of aminoacids

8. The role of pantothenic acid (vitamin B<sub>5</sub>) in carbohydrates, lipid and porfirins metabolism regulation.
9. Clinical pharmacology of vitamin B<sub>12</sub>.
10. Nicotinic acid (vitamin PP) and its biologic active forms - NAD and NADP – as dehydrogenases coenzymes. Nicotinic acid usage in treatment of hyperlipidemias.
11. Ascorbic acid (C-vitamin) participation in oxidation reaction and aminoacids synthesis.
12. Role of folic acid participation in aminoacids synthesis and treatment of anemia.
13. Lipoic acid,s participation in regulation of lipids metabolism, its hematotrop action and antitoxic proprieties.
14. Liposoluble vitamins. Pharmacodynamic and pharmacokinetic aspects of liposoluble vitamins. Clinical usage, dosing principles. Complication caused by overdoses.
15. Vitamin-A. Pharmacotherapeutic spectrum.
16. Vitamin-E. Antioxidant peculiarities.
17. The importance of vitamin D in calcium and phosphorus homeostasis. Vitamin D interrelation with parathyroid hormone. Hypovitaminosis D and hypervitaminosis D, clinical description, treatment.
18. Vitamin K participation at biosynthesis of blood coagulation plasmatic factors. Hypo- and hypervitaminosis K clinical description, treatment
19. Polivitamines (aevit, decamevit, hexavit, kvadevit). Vegetal vitamin preparations. Their importance in prophylaxis and treatment of different diseases associated with hypo- and avitaminosis. Their importance in pediatric and geriatric medicine.
20. Vitaminoids. Characterization, clinical usage.
21. Vitamins' classification according to clinic and prophylactic usage.
22. Vitamin preparations that influence general reactivity of the body (thiamine, riboflavine, nicotinic acid, pyridoxine, calcium pangamat, retinol, ascorbic acid).
23. Vitamin preparations that protect mucous membranes and teguments (retinol, riboflavine, calcium pantotenat, nicotinic acid, pyridoxine, biotin, tocopherol).
24. Antitoxic and anti-infections vitamin preparations (ascorbic acid, retinol, te thiamien, riboflavine, calcium pantotenat, nicotinic acid, pyridoxine, cianocobolamine, folic acid.)
25. Vitamin preparations that influence hematopoesis and sanguine coagulation (cianocobolamine, folic acid, ascorbic acid, pyridoxine, ruthin, vit. K).
26. Vitamin preparations that influence bone and dental mineral homeostasis (ascorbic acid, ergocalciferol, thiamine).
27. Vitamin preparations that influence the vision (retinol acetate, ascorbic acid, tocopherol acetate, riboflavine).
28. Clinical usage of vitamins in pediatric medicine.
29. Vitamins interaction. Rational and irrational vitamins associations. Reciprocal incompatibilities of vitamins and incompatibilities with other groups of drugs.
30. Coenzymes. Classification. Coenzymes of non-vitamin origin. Incompatibility between vitamins and other medicines.
31. Clinic pharmacology of enzymes.
32. Digestive ferments. Clinical usage, doses, contraindications.
33. Clinical pharmacology of ferments with application in purulent-suppurative-necrotic processes.
34. Clinical pharmacology of enzymes with fibrinolytic action.
35. Clinical pharmacology of ferments with hialuronidaze action.
36. Pharmacotherapeutic aspects of enzymatic preparation: substitutive, local and resorbtive therapy.
37. Classification of anti-enzymatic preparations.
38. Clinical pharmacology of proteolysis inhibitors.
39. Clinical pharmacology of fyirinoliysis inhibitors.
40. Clinical pharmacology of cholinesterase, monoaminoxidase inhibitors etc.
41. Clinical pharmacology of angioprotectors of synthetic, animal and vegetal origin.

42. Using peculiarities of metabolisms' stimulants to treat stomatological affections. Adverse reactions, contraindication, interactions.
43. Clinical pharmacology of drugs that influence bone mineral homeostasis, calcium and phosphorus.
44. Role of Calcium in regulating bone mineral homeostasis. Mechanism of action, clinical effects, indications in stomatology.
45. Role of phosphorus in regulating bone mineral homeostasis. Mechanism of action, clinical effects, indications in stomatology.
46. Role of fluoride in regulating bone mineral homeostasis. Mechanism of action, clinical effects, indications in stomatology.
47. Role of parathyroid hormone and calcitonine in regulating bone mineral homeostasis. Mechanism of action, clinical effects, indications in stomatology.

## **B. Clinical-pharmacological selection and use of drugs in some stomatological metabolic conditions and disorders.**

### **Principles of drug selection and use:**

- In stomatitis, gingivitis, cheilitis, nerve disorders.
- In rickets, caries, periodontitis and as a mineral support in children with retention of tooth eruption.
- In purulent, necrotic wounds of the oromaxillofacial area.

### **F. Individual work.**

#### **1. Brief characterization of the main drugs:**

*Down:* drug's names.

*Across:* synonyms, delivering forms, administration routes, doses (therapeutic, maximum), indication, contraindication, side-effect reactions.

Niacină, pantotenat de Ca, clorura calciu, chimotripsină.

#### **2. Exercises of medical prescription**

Tiamină, riboflavină, piridoxină, cianocobalamină, acid ascorbic, acid folic, acid lipoic, retinol, ergocalciferol, tocoferol, fitomenadionă, cocarboxilază, piridoxalfosfat, pancreatină, „festal”, tripsină, ribonuclează, hialuronidază, aprotinină, fluorat de sodiu, lac fluorat, vitaflor, gluconat de calciu, lactat de calciu, etidronat, miacalcic, acid nicotinic, alteplază, acid tranexamic.

#### **3. Indicate medicines for:**

Beri-beri disease, Peripheral neurites, Pellagra, Nutritional rickets, Paradontosis, stomatites, gingivites, Hepatic cirrhosis, Chronic pancreatitis, Arterial thrombosis, Osteoporosis, Osteomalacia, Scarves, Night-blindness, Complicated caries, Incipient caries, Caries reccurens

**4. Tests. "Clinical Pharmacology", Chisinau, 2000 (self-assessment tests), p. 292**

**5. Клиническая фармакология (Тесты для самоподготовки. Кишинэу, 2014, стр. 139)**

**6. Virtual situations: Guide for laboratory works on pharmacology, Chisinau 2016, page 261 “**

**7. Selection of drugs with an influence on metabolism according to the criteria of efficacy, harmlessness, acceptability and cost, for inclusion in the personal form (P drugs).**