

# CLINICAL PHARMACOLOGY OF THE DRUGS USED IN HYPERLIPIDEMIA OBESITY AND OSTEOPOROSIS

## A. Actuality

In the last decades, a large number of drugs used in hyperlipidemia, obesity and osteoporosis have appeared. Some medicines, especially those used in obesity, have been withdrawn from the pharmaceutical market due to severe adverse reactions, others are not indicated for a long time, therefore the understanding of the causes, the pathogenetic mechanisms of disease development, as well as the knowledge of the particularities of drugs action is essential for proper pharmacotherapy.

Osteoporosis is a major public health problem, with an impact on quality and life expectancy with important medical, social and economic implications. Osteoporotic fractures are the main cause of disability and mortality, however prophylaxis is possible and indispensable. The administration of antiresorptive treatment, together with changing of diet and lifestyle, may contribute to the significant reduction of these risks.

Cardiovascular diseases, conditions that could be prevented, are a burden for both the patient and society. Increased lipid profile, especially low density lipoproteins, is an important cardiovascular risk factor. Hypolipemic agents can reduce the risk of atherosclerotic complications: myocardial infarction, stroke, coronary heart disease and so on.

## B. Training aim

Acquiring the clinical and pharmacological principles to justify the prescription, use, dosage regimen medications used in hyperlipidemia, obesity and osteoporosis.

## C. Teaching objectives

*The student should be able to:*

- a) choose a minimum complex of investigation methods to assess the pharmacodynamic effect of drugs used in hyperlipidemia, obesity and osteoporosis;
- b) analyze and appreciate the results of pharmacodynamic studies of drugs used in hyperlipidemia, obesity and osteoporosis;
- c) predict possible complications and side effects of medications from these groups;
- d) predict adverse reactions depending on the dosage regimen of these drugs and the functional state of organs and systems of the body;
- e) apply contemporary methods of pharmacological and non-pharmacological correction of adverse reactions caused by drugs used in metabolic disorders: obesity, osteoporosis, hyperlipidemia.

## D. Knowledge from previously studied disciplines and related subjects

*Medical-biological disciplines.* Cell structure. The role of mitochondria, ribosomes in providing vital metabolic processes in the cell. Hormonal regulation of lipid, protein and carbohydrate metabolism; blood lipid profile. Bone metabolism, bone remodeling and the factors that influence them.

*Endocrinology and internal disease.* Etiology, pathogenesis of hyperlipidemia, obesity, osteoporosis.

*Pharmacology.* Classification of drugs used in hyperlipidemia, obesity and osteoporosis. Their mechanisms of action, effects, indications and contraindications, side effects.

## E. Questions for self-training

### I. Clinical and pharmacological characteristics of drugs used in hyperlipidemia, obesity and osteoporosis.

1. Classification of anti-atherosclerotic drugs. Classification of hypolipidemic preparations based on clinical use. Mechanisms of action. Indications, dosage regimen and administration principles.

2. Statins: Mechanism of action, pharmacological effects, indications and principles of use, contraindications, adverse reactions.
3. Bile acids resins: Mechanism of action, pharmacological effects, indications and principles of use, contraindications, adverse reactions.
4. Fibrates: Mechanisms of action, pharmacological effects, indications and principles of use, contraindications, adverse reactions.
5. Nicotinic acid used as lipid-lowering medication: mechanisms of action, pharmacological effects, indications and principles of use, contraindications, adverse reactions.
6. Other lipid-lowering agents (ezetimibe, preparations of unsaturated fatty acids, PCSK9 inhibitors, etc.): mechanisms of action, pharmacological effects, indications and principles of use, contraindications, adverse reactions.
7. Classification of preparations used in obesity. Lipase inhibitors: mechanism of action, effects, indications, adverse reactions.
8. Anorexigenic preparations: classification, mechanism of action, indications, adverse reactions, principles of drugs selection and use in obesity.
9. Beta-3-adrenomimetics, antidiabetic drugs, combined preparations: particularities of action and use in the treatment of obesity
10. Classification of drugs used in osteoporosis.
11. Bisphosphonates: mechanism of action and pharmacological effects, indications, contraindications, adverse reactions.
12. Vitamin D preparations: mechanism of action and pharmacological effects, indications, contraindications, adverse reactions.
13. Calcium preparations: mechanism of action and pharmacological effects, indications, contraindications, adverse reactions.
14. Fluoride preparations: mechanism of action and pharmacological effects, indications, contraindications, adverse reactions.
15. Calcitonin preparations: mechanism of action and pharmacological effects, indications, contraindications, adverse reactions.

## **II. Clinical and pharmacological selection and use of drugs in some pathological conditions and diseases:**

- Principles for the selection and use of drugs in primary hypercholesterolemia;
- Principles of selection and use of drugs in secondary hypercholesterolemia;
- Principles for the selection and use of drugs in the treatment of obesity;
- Principles for the selection and use of drugs in osteoporosis.

### **F. Individual work**

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

*Vertically.* International Non-Proprietary Name (INN) of the drug.

*Horizontally.* Synonyms, forms of delivery, way of intake, doses (therapeutic, maximal doses), mechanisms of action, prescriptions, contraindications, adverse reactions:

Rosuvastatin, atorvastatin, ezetimibe orlistat, alendronate, alfacalcidol, calcium citrate.

#### **2. Exercises on medical prescription** (see methodological instructions for practical works on pharmacology for the 3<sup>rd</sup> year):

Calcitonin, clofibrate, nicotinic acid, cholestyramine, pyricarbate, lovastatin.

#### **3. Indicate the drugs used in (for) :**

hypercalcemia of different genesis, hypoparathyroidism, postmenopausal osteoporosis; glucocorticoid-induced osteoporosis, bone metastases, tetany; type II primary hypercholesterolemia; secondary hypercholesterolemia; primary hypertriglyceridemia; familial hypertriglyceridemia; obesity.

- 4. Tests on Clinical Pharmacology** (for faculty of medicine), Chisinau-2004, page 74.
- 5. Clinical cases in Clinical Pharmacology**, Chisinau-2017, page 105
- 6. Virtual Cases.**
- 7. Personal Drug (P-Drug) Selection and P-Treatment (Personal Treatment) according to the criteria of efficacy, safety, acceptability and cost for inclusion in the personal form (P drugs).**