CLINICAL PHARMACOLOGY OF ANALGESICS AND ANTI-INFLAMMATORY DRUGS

A. Actuality:

Acute and chronic pain therapy, nociceptive and neuropathic pain remains one of the most important problems of medicine. The knowledge of the pharmacokinetics and pharmacodynamics of drugs from different groups used in the treatment of pain allows the rational selection of centrally acting analgesics (opioid, neopioid and mixed) and peripheral, paraanalgesic, co-analgesics and associations and the optimal dosing regimen.

Currently, there is a rich arsenal of analgesic preparations. For their efficient and rational use it is important to know their pharmacokinetic and pharmacodynamic particularities.

Inflammation, a universal reaction of the body to the action of various endogenous and exogenous harmful factors, is a characteristic pathological process for most diseases, which has an increasingly frequent incidence and requires a contemporary medicinal approach. Anti-inflammatory drug preparations have a wide variety of groups with rapid and slow symptomatic effects, intended for the treatment of a variety of diseases and pathological conditions.

For their efficient and rational use it is important to know the pharmacokinetic and pharmacodynamic particularities, the principles of selection, use and dosage, the adverse reactions.

B. Training aim:

Acquiring the clinico-pharmacological principles of argumentation for reasoning and appropriate selection of drugs in pain therapy in order to individualize and optimize the administration of analgesic preparations.

Acquiring the clinico-pharmacological principles of proper argumentation and selection of anti-inflammatory drugs in order to individualize and optimize the administration of anti-inflammatory preparations.

C. Teaching objectives

The student should be able to:

a) choose a minimal complex of investigative methods to assess the pharmacodynamic effect of centrally acting analgesics (opioid, nonpioid and mixed) and peripheral (antipyretic), of anti-inflammatory and immunomodulatory preparations;

b) analyzing and evaluating of the results of pharmacodynamic study of drugs used in pain therapy, rheumatoid arthritis and osteoporosis, obtained by laboratory and instrumental methods;

c) to predict the possible complications and adverse reactions of the drugs from studied groups;

d) to predict the dependence of adverse reactions on the dosing regimen and on the functional state of organs and systems of the body;

e) apply contemporary methods of prophylaxis and treatment of adverse reactions of analgesic, anti-inflammatory and immunomodulatory preparations;

f) predicts the interaction of analgesic, anti-inflammatory and immunomodulatory preparations; together and with other drugs.

D. Knowledge from the previously studied disciplines and related subjects:

Histology, morphopathology, pathophysiology and microbiology.

Anatomy of the spinal cord, peripheral and central nervous system. Nerve fiber classification, nerve fiber conduction, nerve fiber transmission. The concept of pain, the reception of painful information. The notion of nocireceptor, their classification. Higher integration of pain,

modification of nociceptive messages in the nervous system. The role of substance P and bradykinin in modulation of pain. The role of endorphins in transmition of pain. Inflammation. Basic components of the inflammatory process: alteration, vascular exudation and phagocytosis, proliferation. Classification of inflammation mediators. Independence of alteration and protection and adaptation reactions in the inflammatory process.

Clinical disciplines. Acute and chronic pain in internal medicine, surgery, anesthesia and resuscitation. Pharmacotherapy. Rheumatoid arthritis and osteoporosis, pharmacotherapies. Immunodiagnostic states.

Pharmacology. Classification of opioid analgesics and anti-inflammatory remedies according to pharmacological effects and chemical structure. Mechanism of action. Pharmacodynamics and pharmacokinetics. Indications, side effects, prophylaxis and treatment.

E. Questions for self-training:

I. Clinical and pharmacological characteristics of analgesics.

1. Classification of analgesics according to the mechanism of analgesic effect. Classification of real analgesics.
2. Opioid analgesics: classification by affinity to receptors, comparative characterization of analgesics by activity and duration of action.
3. The mechanism of action of opioid analgesics at the systemic level and the clinical importance. Pharmacodynamics of opioid analgesics. Pharmacological effects of opioid analgesics on CNS and clinical manifestations. The action of opioid analgesics on the respiratory, cardio-vascular, digestive tract, bladder and clinical manifestations. Particularities of action of agonists, agonists-antagonists and antagonists.
4. Indications, principles of selection, use and dosage, contraindications and precautions, adverse reactions (particularities of manifestation, prophylaxis and treatment). Acute opioid intoxication and principles of treatment. Opioid addiction: clinical manifestations and treatment principles.
5. The pharmacokinetic peculiarities of opioid analgesics. New medicinal forms for treatment optimization of pain.
6. Classification of nonopioid analgesics with central action. Pharmacodynamic and pharmacokinetic properties, use and selection of paraaminophenol derivatives.
7. Nonopioid analgesic drugs with central action from various groups (ketamine, clonidine, anticonvulsants, central myorelaxants, antidepressants):
8. Analgesics with peripheral action: classification, particularities of the mechanism of action and analgesic effect, indications and principles of selection and use.
9. Analgesics with predominantly peripheral action: classification, particularities of the mechanism of action and analgesic effect, indications and principles of selection and use, side effects, pharmacokinetic aspects. The pharmacodynamic and use of ketorolac, dexketoprofen.

II. Clinical-pharmacological characteristic of anti-inflammatory preparations.

1. Classification of anti-inflammatory preparations: non-steroidal anti-inflammatory, steroidal anti-inflammatory, specific anti-inflammatory (slow, basic, anti-rheumatic) preparations.
2. Classification of non-steroidal anti-inflammatory drugs by selectivity. Clinical pharmacology of anti-inflammatory preparations, pharmacological effects and clinical manifestations; indications and principles of selection, use and dosage; contraindications, adverse reactions, clinical manifestations and prophylaxis; pharmacokinetic features; the particularities of the manifestation and use of non-steroidal anti-inflammatories as analgesics, antipyretics and anti-inflammatories.

3. Selective cyclooxygenase-2 inhibitors: features of the mechanism of action and pharmacodynamic effects, indications, contraindications and principles of use, adverse reactions and their prophylaxis, pharmacokinetics.

4. Clinical pharmacology of steroidal anti-inflammatory drugs (glucocorticoids): classification by mode of administration, duration of action, activity and ratio of anti-inflammatory/ mineralocorticoid effect; genomic and non-genomic mechanism of action; the particularities of the anti-inflammatory effect.
5. Pharmacodynamic indications of glucocorticoids. Principles of glucocorticoid use and dosage in pharmacodynamic therapy. Principles of local use of glucocorticoids. Contraindications and precautions for glucocorticoids. Adverse reactions, clinical management and prophylaxis. Monitoring of glucocorticoid treatment. The pharmacokinetic peculiarities of glucocorticoids.
6. Classification of anti-inflammatory preparations with specific antirheumatic action (slow, basic): non-biological, biological and immunosuppressive.
7. Clinical pharmacology of non-biological anti-inflammatory preparations: 4-aminoquinoline derivatives, gold compounds, thiol derivatives; the particularities of the mechanism of action and pharmacodynamic effects, indications, contraindications and principles of use, adverse reactions and their prophylaxis, pharmacokinetics.
8. The 5-aminosalicylic acid derivatives: classification, pharmacokinetics, particularities of the mechanism of action and pharmacodynamic effects, indications, contraindications and principles of use, adverse reactions and their prophylaxis,
9. Cytotoxic immunosuppressants: classification, pharmacokinetics, particularities of the mechanism of action and pharmacodynamic effects, indications, contraindications and principles of use, adverse reactions and their prophylaxis.
10. Clinical pharmacology of biological anti-inflammatory preparations used in the treatment of rheumatoid arthritis: classification, pharmacokinetics, particularities of the mechanism of action and pharmacodynamic effects, indications, contraindications and principles of use, adverse reactions and their prophylaxis, drug interactions.

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

For analgesics:

Principles of pain treatment and analgesics selection in neuropathic pain.

Principles of selection and use of analgesics in myocardial infarction, biliary, renal, intestinal colic, inoperable cancer, etc.

Principles of analgesic selection and use in febrile conditions.

Principles of selection and use of non-steroidal anti-inflammatory preparations in various inflammatory joint, periarticular, and of soft tissues.

Principles of selection and use of slow (specific) anti-inflammatory drugs in the treatment of rheumatoid arthritis.

Principles of glucocorticoid selection and use in the treatment of inflammatory diseases.

F. Individual Work:

Brief characterization of main drugs

***vertically* – International Nonproprietary Name (INN) of drug,**

***horizontally* – synonyms, forms of delivery, mode of administration, (therapeutic, maximal) doses, mechanisms of action, indications, contraindications, side effects:**

buprenorphine, methadone, celecoxib, gabapentin, tolperisone, amitriptyline, clonidine, penicillamine, cyclophosphamide, dexamethasone, methotrexate, etanercept, leflunomide, infliximab, rituximab.

2. Exercises on medical prescription (see methodological instructions for practical works on pharmacology for the 3rd year): morphine, trimeperidine, fentanyl, tramadol, tilidine, omnopone, naloxone, naltrexone, dexketoprofen, baralgine, acetylsalicylic acid, paracetamol, ketorolac,

chloroquine, diclofenac, phenylbutazone, indomethacin, naproxen, auranofin, aurothiomalate, ibuprofen, mefenamic acid, meloxicam, nimesulide, azathioprine, prednisolone.

3. Indicate the drugs used in (for):

Acute myocardial infarction with algic syndrome; traumatic and combustion shock; cancer inoperable; biliary colic, renal colic, neuroleptanalgesia; headache, migraine, acute dental pain; pain in the postoperative period; fever; neuralgia; pain in myositis, tendinitis; dysmenorrhea; pain after traumatological, orthopedic and dental procedures; trigeminal neuralgia; diabetic neuropathy; algic syndrome with spastic muscular states; Chronic algic syndrome with depression; lumbags, rheumatoid arthritis; rheumatoid endomiocarditis; osteoarthritis; rheumatoid arthritis; lupus erythematosus; scleroderma; dermatomyositis; Ankylosing spondylitis; gouty arthritis; the recovery period after serious infections.

4. Tests on Clinical Pharmacology (for faculty of medicine), Chisinau-2004, page .

5. Clinical cases in Clinical Pharmacology (Clinical Cases Guide), Chisinau-2017, page .

6. Virtual situations.

7. Personal Drug (P-Drug) Selection and P-Treatment (Personal Treatment) according to the criteria of effectacy, safety, acceptability and cost for inclusion in the personal form (P drugs).