FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION OF HIGHER EDUCATION "NORTH OSSETIAN STATE MEDICAL ACADEMY "MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

Department of Pharmacology with Clinical Pharmacology

DRUGS AFFECTING THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM

Educational and methodological manual for students of medical, pediatric and medical-prophylactic faculties.

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DRUGS AFFECTING THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. Teaching manual.

This manual is intended for independent classroom and extracurricular work of students of the 3rd course of medical, pediatric and medical-prophylactic faculties of medical universities. The manual contains training and controlling elements of the section "Means affecting the central nervous system."

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DRUGS FOR NARCOSIS. AETHANOL. PILOT MEANS.

Objectives of the lesson

Student must know:

- characteristic of general anesthesia, stage of anesthesia;

- classification of anesthetics; comparative characteristics of the means for inhalation and non-inhalation anesthesia;

- the mechanism of action of alcohol on the central nervous system;

- the use of ethyl alcohol in medical practice;

- acute alcohol poisoning, relief measures; treatment of chronic alcoholism;

- classification of hypnotic drugs; indications for the appointment of sleeping pills;

- measures of assistance in case of poisoning by hypnotic drugs;

The student should be able to:

- to justify the choice of the drug, taking into account the absolute and relative contraindications;
- write prescriptions for drugs of the studied groups.

Test questions:

1. Classification of general anesthetics.
2. Comparative characteristics of the means for inhalation anesthesia: ether for anesthesia, ftorotana, nitrous oxide, cyclopropane.
3. Comparative characteristics of non-inhalation anesthesia: propanidide, ketamine, thiopental sodium, hexenal, sodium hydroxybutyrate.
4. The mechanism of the effect of ethyl alcohol on the human body, pharmacological effects, pharmacokinetics, use.
5. Acute poisoning with ethyl alcohol. Help measures.
6. Chronic alcoholism, its treatment.
7. Classification of sleeping pills.
8. Barbiturates: indications, side effects. Barbitural poisoning: symptoms and relief measures.
9. Benzodiazepine derivatives: indications for use, side effects.

Anesthesia is a reversible state of loss of consciousness, sensitivity, and reflexes caused by the effects of a drug while maintaining the physiological stability of the patient.

The main requirements for the means for anesthesia: the rapid onset of anesthesia without a pronounced period of arousal, sufficient depth and good controllability of anesthesia, quick and without consequences, the exit from anesthesia. In addition, it is important to reduce the direct and mediated side effects of anesthetics, including cardiac rhythm disorders and myocardial contractile activity, vascular tone fluctuations, suppression of protective reflexes, changes in thermoregulation and metabolism. The depth and duration of general anesthesia should correspond to the stages and duration of surgery.

Classification means for anesthesia

I. Means for inhalation anesthesia

1. Volatile liquids
   Ether for anesthesia
   Halothane (ftorotan)
   Isoflurane
   Enfluran
2. Gaseous substances
   Nitrous oxide

II. Means for non-inhalation anesthesia

1. Short acting
   Propanidide
   Propofol
   Ketamine
2. The average duration of action
   Thiopental sodium
   Hexenal
3. Long acting
   Sodium oxybutyrate

Possible mechanisms of action of drugs for anesthesia

- • Sensitivity of GABA receptors to GABA
- • Increasing the ability of glycine to activate glycine-regulated Cl-channels
- • Inhibition of NDMA receptors of neurons
- • Activation of potassium channels of nerve cells
- • Inhibition of brain N-cholinergic receptors

Stages of ether anesthesia

I. - stage of analgesia

II. - stage of excitement

III. –stage of surgical anesthesia
   Level 1 - Superficial Anesthesia
   Level 2 - Light anesthesia
   Level 3 - Deep anesthesia
   Level 4 - Ultra Deep Anesthesia

IV.– awakening

Table 1.1. Remedies for anesthesia

A drug	Speed induction anesthesia	Stage arousal	Depth anesthesia duration	Awakening	Application	Effect on the central nervous system Side effects
Ether for anesthesia	20-30 min	Up to 10 min	Deep, depending on the type of intervention	Within 30 minutes, the complete restoration of CNS functions within a few hours	Maintenance anesthesia	Minor hypotension, respiratory depression. In Art. excitations are possible reflex cardiac arrest and apnea.
Halothane (ftorotan)	3-5 min	-		After 5-10 min	Induction and maintenance of anesthesia	↑ intracranial pressure (ICP) Respiratory depression, arrhythmogenic effects, toxic hepatitis and liver necrosis
Nourish nitrogen	3-5 min	-	Surface	For several minutes	Induction of anesthesia, combined anesthesia, analgesia	↑ cerebral blood flow and ICP With prolonged use: impaired blood formation, increased pressure in the cavities containing air
Thiopental sodium	up to 1 min	-	Deep, 20-30 min	Long after anesthetic sleep	Induction and maintenance of anesthesia, stopping seizures	↓ cerebral blood flow, ↓ ICP, ↓ need for O2 Post-anesthesia drowsiness, depression, depression of the respiratory center, increased secretion of bronchial mucus, increased tone n. vagus, ↓ AD
Ketamine	30-60 sec (i/v)	-	Surface dissociative anesthesia, 5-10 min	Post-anesthetic locomotion, delusions, hallucinations	Anesthesia induction, analgesia	Neuroprotective action ↑ ICP Tachycardia, ↑ AD. Post-anesthetic agitation, delusions of hallucination
Propanidide	30-40 sec	-	Deep	2 -3 min, full recovery	Induction, brief anesthesia	↓ heart rate, ↓ blood pressure, hyperventilation

Ethyl alcohol or ethanol (Spiritus aethylicus) - C2H5OH

Pharmacokinetics

Ethyl alcohol is well absorbed when taken orally. Absorption increases when taken on an empty stomach, food delays absorption. Does not bind to proteins and is not deposited.
90% of ethanol is metabolized in the liver; 5-10% is excreted unchanged with exhaled air and urine. Ethanol is oxidized to acetaldehyde with the participation of the enzyme alcohol dehydrogenase, then acetaldehyde is metabolized with the participation of aldehyde dehydrogenase to form CO2 and water. With prolonged use of ethanol (alcohol), induction of liver enzymes can be observed → the metabolic rate increases.

Pharmacological effects.
Ethyl alcohol is a drug with a narcotic type of action, has a suppressive effect on the central nervous system.

Stages:

1. *Excitement.* It causes euphoria and the state of emancipation due to suppression of the inhibitory effect of the cerebral cortex, has anti-anxiety effect.
2. *Anesthesia.* Drowsiness, impaired consciousness, depression of reflexes.
3. *Agonal.*

• Potentiates the effect of CNS depressant drugs.
• Causes vasodilation of skin vessels and increased heat transfer (false sensation of heat).
• ↓ secretion of ADH → ype diuresis.
• ↑ secretion of the salivary glands and glands of the stomach; in high concentrations → inhibition of the secretion of hydrochloric acid, decreased motility, increased production of mucus.
• When applied topically - antiseptic action:
- 96% - for sterilization of instruments;
- 70% - for the treatment of hands.

Chronic ethyl alcohol abuse - alcoholism
Symptoms: reddening of the skin of the face, hoarseness of the voice, neurological disorders (polyneuritis, decreased mental performance, memory impairment), mental disorders. Alcohol abuse is accompanied by damage to the internal organs (chronic gastritis, cirrhosis of the liver, renal dysfunction), is a risk factor for the development of cardiovascular diseases (coronary artery disease, hypertension, stroke).
Medical treatment in combination with psychotherapy.
Disulfiram (teturam). Delays the metabolism of ethanol at the level of acetaldehyde (inhibits aldehyde dehydrogenase). Accumulation of acetaldehyde causes intoxication, accompanied by a feeling of fear, pain in the heart, palpitations, hypotension, nausea, vomiting, physical exhaustion, fever.

Drug interactions.

- Strengthens the effect of CNS depressants.
- Accelerates the metabolism of a number of drugs (barbiturates, benzodiazepines, phenytoin) due to the induction of microsomal enzymes.
- Disulfiram-like reactions when interacting with metronidazole.

Application. As an antiseptic, for compresses.

Hypnotic drugs.

Classification

I. Benzodiazepine receptor agonists.

1. Benzodiazepine derivatives: nitrazepam, lorazepam, nozepam, diazepam, phenase-pam.
2. Preparations of a different structure: zolpidem, zopiclone

II. Hypnotic drugs with narcotic type of action.

1. Barbiturates: phenobarbital, ethaminal sodium.
2. Aliphatic compounds: chloral hydrate

Table 1.2. Sleeping pills

Drugs	Mechanism of action, pharmacological effects	Side effects
Benzodiazepines	See table 2.1. Little effect on the phase structure of sleep.	
Zolpidem	Selectively interacts with BZ1 receptors, has a pronounced hypnotic and sedative effect. Anxiolytic, anticonvulsant, muscle relaxant effects are expressed slightly. It has little effect on sleep phases.	Allergic reactions, hypotension, agitation, hallucinations, ataxia, daytime sleepiness, nausea, vomiting
Zopiclone	It has a sedative, sedative, anxiolytic, muscular-relaxing and anticonvulsant action.	Metallic taste, nausea, vomiting, headache, dizziness, mental and behavioral disorders, incoordination, addiction, dependence.
Barbiturates	Interact with the allosteric site of GABA-benzodiazepine-barbituric complex, increase the affinity of GABA to GABAA receptors → ↑ opening time of membrane channels of ions Cl- → ионов incoming current of ions Cl- → membrane hyperpolarization and suppression of neuronal activity. Features of FC: induce microsomal liver enzymes, cumulated (material cumulation).	Disturbance of sleep patterns - shortening the phase of REM sleep. After-effects:drowsiness, depression, weakness, incoordination, headache, vomiting, irritability. Drug addiction, addictive. The phenomenon of "return".

Treatment of various clinical options for insomnia:

- presomnic - difficulty falling asleep with lengthening the time of onset of sleep by more than 30 minutes - short-acting benzodiazepines (oxazepam), zopiclone, zolidem;
- Intrasomnic - frequent nocturnal awakenings - benzodiazepines (diazepam, phena-zepam);
- postsomnicheskaya - early awakenings - sedative antidepressants, long-acting benzodiazepines (nitrazepam).

Acute poisoning with barbiturates.

Symptoms:

- sleep, passing into a coma;
- hypothermia;
- constriction of the pupils;
- depression of reflexes;
- depression of the respiratory center;
- depression of the vasomotor center - collapse.

Death occurs from paralysis of the respiratory center.

Therapy for acute barbiturate poisoning:

- acceleration of elimination (gastric lavage with sodium bicarbonate, saline laxatives, forced diuresis, hemosorption, hemodialysis);
- analeptics for mild / moderate severity, for severe poisoning - mechanical ventilation;
- symptomatic therapy: norepinephrine, plasma substitutes, strophanthin, piracetam, etc..

TEST JOBS

Specify all correct answers.

I. MARK THE MAIN FEATURES OF ESSENTIAL DRUGS
1) severe stage of excitation
2) short-term stage of excitation
3) good handling of the depth of anesthesia
4) poor handling of the depth of anesthesia
5) rapid awakening after stopping inhalation of the drug
6) prolonged sleep after stopping inhalation of the drug
7) irritant effect on the mucous membranes of the upper respiratory tract

II. WHAT PROPERTIES ARE CHARACTERISTIC FOR NITROGEN
1) has a high narcotic activity
2) has a low narcotic activity
3) causes pronounced analgesia
4) does not cause sufficient skeletal muscle relaxation
5) has little effect on the function of internal organs.
6) irritating mucous membranes.

III. FLUOROUNA CAUSES
1) tachycardia
2) bradycardia
3) cardiac arrhythmias
4) increase in blood pressure
5) hypotension

IV. SPECIFY THE PECULIARITIES OF AN ADDICTION CAUSED BY PROPANIDIDE
1) develops in 30-40 seconds
2) develops in 20-40 minutes
3) the duration of the stage of anesthesia 3-5 minutes
4) the duration of the stage of anesthesia 30-40 minutes
5) the possibility of apnea
6) sufficient analgesia
7) lack of analgesia
8) severe toxicity
9) low toxicity

V. MARK THE BASIC PROPERTIES OF SODIUM OXYBUTIRATE
1) slow development of anesthesia
2) rapid onset of anesthesia
3) a low stage of excitation
4) long stage of excitation
5) low narcotic activity
6) high drug activity
7) no effect on muscle tone
8) severe muscle relaxation
9) the possibility of intravenous and oral administration

VI. WHAT IS CHARACTERISTIC FOR KETAMIN?

1) non-competitive NDMA receptor antagonist
2) causes deep surgical anesthesia
3) causes a condition characterized by immobilization, partial loss of consciousness and severe analgesia
4) when administered intravenously, the effect develops in 30-60 seconds
5) the duration of the effect after the introduction into the vein 5-10 minutes
6) little effect on skeletal muscle tone
7) causes pronounced muscle relaxation

VII. ADVANTAGES OF THE BENZODIAZEPINS SONTING GROUPS BEFORE BARBITURATES

1) обладают меньшей терапевтической широтой
2) менее опасны в отношении развития лекарственной зависимости
3) меньше влияют на структуру сна
4) существенно не влияют на активность микросомальных ферментов печени
5) не усиливают действие других веществ, оказывающих угнетающее влияние на ЦНС

VIII. MAIN SIGNS OF ACUTE BARBITURATE POISONING

1) arousal
2) coma
3) respiratory depression
4) lowering reflex excitability
5) increase in blood pressure

IX. MAIN ACTIONS FOR ACUTE BARBITURATE POISON

1) gastric lavage with a probe
2) forced diuresis
3) the introduction of analeptics in large doses
4) artificial lung ventilation
5) the introduction of flumazenil
6) use of substances that increase blood pressure
7) hemodialysis

X. WHAT PHENOMENA CAN YOU BECOME A DURING LONG-TERM APPLICATION OF BARBITURATES?

1) addictive
2) drug dependence
3) extrapyramidal disorders

Write out

1. Means for inhalation anesthesia for diseases of the respiratory system.
2. Means for inhalation anesthesia for diseases of the cardiovascular system.
3. The drug for intravenous anesthesia of ultrashort action.
4. Ethyl alcohol for the treatment of the surgeon's hands, for compresses, for the sterilization of instruments.
5. Sleeping pills - a derivative of barbituric acid.
6. Hypnotic drug that has little effect on the phase structure of sleep

ANTI-EPILEPTIC MEANS. ANTI-PARKING MEANS.

Objectives of the lesson

The student should know:

- possible ways of pharmacological correction of various psycho-emotional disorders;
- classification of antiepileptic drugs;
- classification of anti-parkinsonian drugs;
- pharmacological effects of antiepileptic, anti-Parkinsonian drugs.

Student must be able to

- to justify the choice of the drug, taking into account the absolute and relative contraindications;
- write prescriptions for drugs of the studied groups.

Test questions:

1. The concept of hyperkinesis.
2. Classification of antiepileptic drugs depending on the type of disease.
3. Indications and contraindications for prescribing drugs. The main side effects.
4. Means for stopping the epileptic status.
5. The basic principles of pharmacotherapy of Parkinson's disease and parkinsonism syndrome.
6. Classification of antiparkinsonian drugs.
7. Comparative evaluation of the effectiveness of drugs. Major side effects.
8. Principles of the combined use of anti-parkinsonian drugs.

Epilepsy is a disease of the central nervous system, accompanied by periodic attacks (seizures) with impaired consciousness with or without convulsive manifestations. The occurrence of seizures is explained by the presence in the central nervous system of the focus, the cells of which are able to spontaneously pass into a state of excitement under the influence of impulses that do not cause this under normal conditions.

Its frequency ranges from 2 to 10 cases per 1 thousand of population. Among children there are about 1% of patients with epilepsy.

There are partial (partial, focal, focal) seizures and generalized seizures.

Partial seizures are associated with the occurrence of individual foci of excitation in the motor or sensorimotor cortex. Partial seizures can manifest short-term (30-60 s) muscle contractions of limited localization without loss of consciousness or with impaired consciousness.

In generalized convulsions, arousal covers both hemispheres of the brain and is manifested in EEG by high-amplitude discharges. Generalized seizures may manifest in the form of tonic-clonic seizures, absences or myo-clonic seizures.

The seizure *of tonic-clonic seizures* (grand seizure, grand mal) is characterized by generalized seizures that occur on the background of loss of consciousness. It includes the tonic phase (tension of the body muscles with a fall) and the clonic phase (twitching of the limbs).

The seizure usually lasts a few minutes, may be accompanied by cessation of breathing, involuntary urination, and ends with a transition to deep sleep.

Abscesses (small episodes; petit mal) manifest short-term (5-15 seconds) loss of consciousness, with a fixed look, usually without noticeable convulsions, after which the usual behavior continues.

Myoclonic convulsions are manifested by sudden short-term symmetrical twitching of the limbs, flinching, which may be accompanied by impaired consciousness.

Severe epilepsy is an epileptic status in which large su-road seizures follow one after another so often that the patient usually does not regain consciousness, death is possible due to respiratory failure.

NB!Antiepileptic drugs are administered orally systematically for a long time to prevent attacks of epilepsy.
When the status is epileptic, drugs are injected intravenously to stop seizures.

Classification

Given the effectiveness of each form of manifestation of the disease are allocated:

1. *Means effective for generalized seizures:*

a) for the prevention of grand-mal: carbamazepine, phenytoin (difenin), sodium valproate, phenobarbital, primidone (hexamidine), lamotrigine (lacmital);

b) at absans: ethosuximide (suksilen), lamotrigine (lamictal), clonazepam, valproic acid;

c) with myoclonus epilepsy: sodium valproate, clonazepam, lamotrigine.

2. *Means effective in partial seizures:*

a) for the prevention of psychomotor equivalents: carbamazepine, sodium valproate, phenytoin, gabapeptin, lamotrigine, clonazepam.

3. *Means for stopping the epileptic status:*

a)diazepam, clonazepam, phenytoin-sodium, phenobarbital-sodium, anesthetics (thiopental, propofol).

According to the mechanism of action:

Sodium channel blockers

- phenytoin (difenin)
- carbamazepine
- lamotrigine
- sodium valproate

Activators GABA-ergicheskoy system

- phenobarbital
- sodium valproate

Calcium channel blockers

- ethosuximide
- sodium valproate

Glutamatergic Blockers

- lamotrigine

Phenobarbital

. The mechanism of action is mediated through the GABAergic system: chlorine ions at the same time more penetrate into the cell and hyperpolarization of the membrane occurs - the excitability of neurons of the epileptogenic focus and neurons of other brain regions decreases. The drug has a pronounced hypnotic effect. For the treatment of epilepsy used in subhypnotic doses. Due to good lipophilicity, it can be deposited in adipose tissue, which creates conditions for material cumulation.

The following *undesirable effects* are characteristic of phenobarbital: CNS depression: drowsiness, nystagmus, decreased attention; addiction associated with the induction of microsomal enzymes; shows drug dependence - after discontinuation of drug administration, abstinence develops, which manifests itself as a violation of the function of blood circulation, respiration, irritability.

Contraindications:

- severe damage to the liver and kidneys; alcoholism; drug addiction; myasthenia gravis; pregnancy (teratogenic effect); feeding the baby.

Difenin (Phenytoin)

The mechanism of action is not sufficiently studied. It is believed that it blocks the sodium channels of the membranes of nerve cells and limits the spread of seizure activity. In connection with the blockade of sodium channels of cardiomyocytes, it has anti-arrhythmic effect.

In the digestive tract it is absorbed well, but the peak of concentration occurs slowly after 4–6–24 hours. 90% bound to plasma proteins. May induce microsomal liver enzymes. Period T ½ -12-24 hours. Cumulates to a lesser extent than phenobarbital. Effective with some forms of cardiac arrhythmia, especially with arrhythmias caused by an overdose of cardiac glycosides.

Side effects: Gastrointestinal disorders (transient); ataxia; rash; gum hyperplasia (local action on the mitotic activity of cells).

Contraindications: diseases of the liver, kidneys; heart failure; kayhek this.

Clonazepam (Antelepsin) similar in structure to nitrazepam (benzodiazepine derivative). Unlike nitrazepam, the drug is more pronounced anticonvulsant than the hypnotic effect. It is used in various forms of epilepsy.

Side effects: movement coordination disorders; nystagmus; myalgia; reduction of blood formation; allergic reactions.

Contraindications: abnormal liver function and kidney function; myasthenia gravis; pregnancy; lactation.

With the simultaneous use of clonazepam, sodium valproate and difenina provocation of convulsive seizures is possible. Enhances the effect of alcohol, neuroleptics, analgesics and muscle relaxants.

Ethosuximide (Suksilep) - inhibits the permeability of calcium channels in the membrane of nerve cells, which suppresses their excitability in epileptic foci.

It absorbs well, the peak of concentration occurs after 4 hours, it does not bind to plasma proteins. Metabolized in the liver and 80% excreted from the body as glucuronides.

It is most effective for small seizures, however, it is also used for myoclonic seizures, for trigeminal neuralgia.

Side effects: dizziness, headaches; visual impairment; nausea, vomiting.

Contraindications: renal and hepatic failure; pregnancy; lactation; during the period of treatment, it is necessary to refrain from driving vehicles and other occupations that require

increased attention, fast physical and mental reactions; exclude alcohol intake.

Sodium Valproate (Acetiprol, Konvulsofin) inhibits the activity of the enzyme GABA transferase, as a result increases the content of GABA in the central nervous system, which causes a decrease in the excitability threshold and the level of convulsive readiness of the motor areas of the brain.

The drug not only prevents seizures, but also improves the mental status of the patient and his mood. Well absorbed in the gastrointestinal tract, the peak concentration is reached after 2 hours, metabolized in the liver with the conversion of inactive metabolites, T ½ - 8-15 hours.

Side effects: Gastrointestinal disorders; a decrease in platelet aggregation and a decrease in blood clotting; teratogenic; calcium salt of valproic acid can worsen the utilization of carnitine, which can lead to impaired liver function, muscular dystrophy, cardiomyopathy.

Contraindications: abnormal liver function and pancreas; hemorrhagic diathesis; pregnancy; lactation.

Carbamazepine (Finlepsin, Tegretol) inhibits the permeability of sodium channels and reduces the excitability of NMDA receptors, therefore, reduces the excitability in the epileptogenic focus and suppresses the formation of a pathological impulse. The drug is more effective with psychomotor equivalents.

Unlike other drugs, carbamazepine has an antidepressant effect, improves mood (normochemical effect), and disrupts brain intellectual activity less than others. It has a therapeutic analgesic effect in trigeminal neuralgia.

Side effects: dizziness, headache; accommodation disturbance; ataxia; violation of blood formation; nausea, vomiting; abnormal liver function; psychic disturbances.

Contraindications: violations of atrioventricular conductivity; liver damage; blood disorders; porphyria; pregnancy.

Lamotrigine (Lamictal) blocks sodium channels and the release of glutamate from presynaptic endings. Well absorbed from the digestive tract. Peak concentration occurs within 2-2.5 hours after oral administration. The duration of the effect is 24-30 hours.

Approximately 65% of the drug is metabolized in the liver.

Lamotrigine is indicated for small seizures, psychomotor equivalents and for large seizures.

Side effects: ataxia; nausea; diplopia; allergic reactions.

Contraindications: liver failure; renal failure; children under 2 years old; pregnancy.

Gabapentin (Neurontin) GABA analogue promotes stimulation of GABAergic receptors. Applied with partial convulsions. The drug is characterized by anxiolytic and analgesic activity.

Carboanhydrase Inhibitors

Acetazolamide (diacarb) It has an antiepileptic effect, since it inhibits the production of cerebrospinal fluid by inhibiting carbonic anhydrase in the central nervous system. Also, acetazolamide is effective for altitude sickness (to accelerate adaptation).

Anti-Parkinsonian drugs

This group of drugs is used to treat Parkinson's disease, as well as in parkinsonism syndrome of various origins.

Parkinson's disease is a chronic neurodegenerative disease in which the nuclei of the extrapyramidal system are affected. The etiology of the disease has not been adequately studied. It is known that with this disease in the basal nuclei and in the substantia nigra dopamine content decreases, which has an inhibitory effect on the neostria-tum.

The dopamine deficiency leads to an imbalance between the dopaminergic, glutamateric, cholinergic systems of the brain.

Typical symptoms of parkinsonism:

- rigidity - sharply increased muscle tone;
- tremor - constant involuntary trembling of the head, hands;
- bradykinesia - difficulty, slow movements;
- bradyphrenia - mental retardation and depression of mental activity (gradually);
- salivation, sweating, bradycardia - the result of increasing the tone of the parasympathetic division of the autonomic nervous system.
- a mincing gait, patients hardly change the direction of movement.

The axons of the dopaminergic neurons of the substantia nigra terminate in neostriatum and release dopamine as an inhibitory mediator, which, acting on D2 receptors, has a inhibitory effect on the neostriatum cholinergic neurons.

Thus, for the treatment of Parkinson's disease and parkinsonism, it is necessary either to enhance dopaminergic effects, or to reduce the effect of cholinergic neurons.

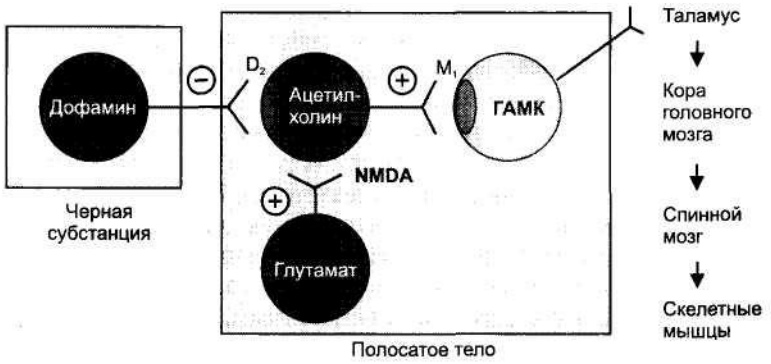

Figure 2-1. Possible localization of anti-parkinsonian drugs

Parkinsonian drugs can:

1) increase the release of dopamine (levodopa, amantadine)

2) stimulate dopamine D2 receptors (bromocriptine)

H) block NMDA receptors and prevent the excitation of cholinergic neurons by glutamate (amantadine)

4) block M1 -cholinergic receptors of GABA-ergic neurons (trihexyphenidyl)

Classification of anti-Parkinsonian drugs.

I. Drugs that increase the activity of the dopaminergic system:

1. Dopamine precursors:

- levodopa
- Levodopa + Carbidopa = Nakom, Bluenet
- levodopa + benserazid = madopar

To reduce peripheral side effects, levodopa is combined with peripheral DOPA decarboxylase inhibitors (carbidopa, benserazide).

2. Dopamine receptor agonists:

- bromocriptine
- pergolide (permax)

3. MAO-B inhibitors:

- selegiline

4. COMT inhibitors:

- entacapone
- tolcaphone

II. Substances that inhibit glutamatergic effects (NMDA receptor block):

- midantan
- gloudantan

III. Drugs that reduce the activity of the cholinergic system:

- trihexyphenidyl (cyclodol, sertan)
- biperiden (akinet)

Drugs block central M-cholinergic receptors (used to treat parkinsonism, which is caused by antipsychotics).

Drugs that increase the activity of the dopaminergic system:

Dopamine precursors

Levodopa is a levorotatory isomer of diphenylalanine, which is a precursor of dopamine. Unlike the latter, it penetrates well through the BBB, and then into neurons. In levodopa neurons, under the influence of DOPA decarboxylase, it is converted into dopamine, which accumulates in the basal ganglia and eliminates or reduces manifestations of parkinsonism.

Side effects: anorexia; nausea; vomiting; headaches, dizziness; arrhythmia, ventricular tachycardia; orthostatic hypotension; abnormal liver function; dyskinesia may occur in large doses; when re-introduction decreases efficiency; "On-off" -phenomenon - the alternation of hypo-and hyperkinesia.

Peripheral effects: due to the fact that levodopa turns into dopamine and on the periphery, therefore arrhythmia, vomiting, orthostatic hypotension, liver damage occurs.

Contraindications: pronounced atherosclerosis; arterial hypertension; hepatic diseases; glaucoma; pregnant and lactating women (may disrupt the development of the bone skeleton); during treatment can not take vitamin B6, because it blocks the action of levodopa.

Sinemet (Nakom) The combined drug - Levodopum 0,25, Carbidopum 0,025.

Carbidopum does not penetrate the BBB. Inhibits DOPA decarboxylase at the periphery, therefore, reduces the formation of dopamine, reducing the manifestation of peripheral undesirable effects.

Dopamine receptor agonists

Bromocriptine (Parlodel) D2-receptor agonist, has a distinct anti-Parkinsonian activity, and is also able to inhibit the production of prolactin and growth hormone. Causes vomiting effect, lowers blood pressure and body temperature.

Side effects: anorexia; nausea; vomiting; constipation; orthostatic hypotension; dyskinesia; disturbance of consciousness; hallucinations; headaches; insomnia.

Contraindications: pregnant women in the first trimester of pregnancy.

Pergolid the mechanism of action is associated with the activation of D1 and D2 receptors.Suppresses the production of prolactin and somatotropic hormone.

Side effects: arrhythmias; dizziness; sleep disturbance; dry mouth; anorexia; constipation.

Contraindications: pregnancy and breastfeeding.

MAO-B inhibitors

Selegiline (Deprenyl) It penetrates the BBB, blocks the MAO-B enzyme, which inactivates dopamine. Thus, the drug creates conditions for increasing the level of dopamine. It is usually prescribed with levodopa.

Side effects: insomnia; anorexia; nausea; vomiting; dyskinesia; abnormal liver function.

Contraindications: pregnancy and breastfeeding.

COMT inhibitors

Tolcapone - mechanism of action: blocks the enzyme catechol-O-methyltransferase, which is involved in the inactivation of levodopa and dopamine.

Side effects: nausea; vomiting; anorexia.

Contraindications: pregnancy and breastfeeding; Patients with caution with severe impaired liver and kidney function (transaminase levels should be determined every 6 weeks of therapy).

Substances that inhibit glutamatergic effects (NMDA receptor block)

Amantadine The mechanism of action blocks NMDA receptors, and, thereby, reduces the stimulating effect of cortical glutamate neurons on the neostriatum, which occurs on the background of dopamine deficiency.

The drug acts quickly: improvement occurs in 1-2 days, the maximum effect in a few days.

Side effects: headache; dyskinesia; dyspepsia; be wary of patients with mental illness

(CNS excitability may increase), thyrotoxicosis, epilepsy; Do not prescribe the drug in the evening.

Drugs that reduce the activity of the cholinergic system

Cyclodol (Sertan). The mechanism of action is associated with a central and peripheral M-anticholinergic effect. It is recommended for patients with a predominance of tremor, since it eliminates tremor most effectively, has little effect on rigidity and hypokinesia.

Applied for the treatment of patients with Parkinson's disease and with parkinsonism caused by antipsychotic drugs.

Side effects: dry mouth; tachycardia; constipation; perhaps excitement and hallucinations; long-term use develops addiction.

Contraindications: glaucoma; prostate hypertrophy.

Biperiden (Akineton). Blocks central and peripheral cholinergic receptors. In connection with the M-anticholinergic action has antispasmodic properties.

Side effects: similar to cyclodol.

Contraindications: glaucoma; prostate hypertrophy; tendency to tachycardia.

TEST JOBS

Specify all correct answers.

I. CALCULATE MEDICINES FOR PREVENTION OF LARGE SHIPPING STRAADES OF EPILEPSY
1. carbamazepine
2. sodium valproate
3. ethosuximide
4. difenin (phenytoin)
5. phenobarbital

II. SEE PREPARATIONS FOR PREVENTION OF SMALL EPILEPSY PENTS
1. ethosuximide
2. Lamotrigine
3. carbamazepine
4. sodium valproate
5. difenin (phenytoin)

III. SPECIFY THE MECHANISMS OF ANTIEPILEPTIC ACTION BY SODIUM WALTPROAT
1. accumulation in the brain GABA
2. blockade of Na + - channels
3. blockade of Ca2 + - channels
4. suppression of the central effects of stimulating amino acids
5. decrease in the content of norepinephrine in the brain

IV. REQUIREMENTS TO BE EFFECTED BY ANTIEPILEPTIC PREPARATIONS
1. effectiveness in various forms of epilepsy
2. must show sedative and hypnotic effects
3. should not accumulate, cause addiction, drug dependence
4. should not cause induction of liver microsomal enzymes
5. must be of low toxicity and have a greater breadth of therapeutic action

V. INDICATE ANTIEPILEPTIC AGENT USED IN SMALL EPILEPSY EPILEPSY
1. phenobarbital
2. difenin (phenytoin)
3. cyclodol
4. carbamazepine
5. sodium volproate

VI. INDICATE A MEANS FOR THE PURCHASE OF WOUNDS AT EPILEPTIC STATUS
1. difenin (phenytoin)
2. cyclodol
3. diazepam
4. sodium volproate
5. ethosuximide

VII. INDICATE AN ANTIEPILEPTIC AGENT BLOCKING SODIUM CHANNEL OF THE BRAIN NEURON MEMBRANES
1. difenin (phenytoin)
2. levodopa

3. diazepam
4. clonazepam
5. ethosuximide

VIII. SEE ANTI-EPILEPTIC MEANS INTERACTING WITH BARBITURAL RECEPTORS
1. difenin (phenytoin)
2. levodopa
3. phenobarbital
4. clonazepam
5. ethosuximide

IX. CERTIFY ANTIPARKINSIC DOPAMINERRICANTS
1. selegilin
2. cyclodol
3. Midantan (amantadine)
4. tolcapon
5. levodopa

X. SEE THE DRUG - PRECIOUS OF DOPAMINE
1. bromocriptine
2. Midantan (amantadine)
3. levodopa
4. cyclodol
5. selegilin

XI. SPECIFY TOOTH INJECTIVE CHOLINERGIC SYSTEMS
1. cyclodol
2. levodopa
3. selegilin
4. bromocriptine
5. midantan (amantadine)

XII. SEE MAO-B INHIBITOR IN BRAIN TISSUES
1. selegilin
2. cyclodol
3. Midantan (amantadine)
4. bromocriptine
5. levodopa

TASKS

1. A patient suffering from epilepsy turned to a dentist. The doctor stated hyperplastic gingivitis in a patient. What antiepileptic drug can have this side effect?

2. A patient suffering from epilepsy, voluntarily stopped taking medications. Pristu-py epilepsy resumed. Cause?

3. In a patient, the trigeminal nerve is affected. What antiepileptic drug can be prescribed?

4. To a patient with Parkinson's disease, a drug was prescribed to reduce muscular rigidity, after which the patient had weakened muscular stiffness. However, the patient paid attention to dry mouth, increased heart rate and deterioration of near vision. What drug was taken by the patient? What is the mechanism of the complications caused by it?

Write out

1. Means for the prevention of large convulsive seizures.
2. Means for the prevention of small convulsive seizures.
3. Means for stopping the epileptic status.
4. A remedy for the treatment of parkinsonism from the group of dopamine receptor agonists.
5. Agent for the treatment of Parkinson's disease, the precursor of dopamine.
6. The agent for the treatment of Parkinson’s disease is a central holinoblocker.

PAIN REMEDIES.

Objectives of the lesson

Student must know:
- the point of application of analgesic action of anaalgetikov;
- pharmacological characteristics of natural opium alkaloids, synthetic morphine substitutes, non-narcotic analgesics;

The student should be able to:
- to justify the choice of the drug, taking into account the absolute and relative contraindications;
- write prescriptions for drugs of the studied groups.

Test questions:

1. Possible points of impact of painkillers of different groups.
2. Classification of narcotic analgesics.
3. Central and peripheral effects of morphine.
4. Synthetic substitutes for morphine.
5. Comparative characteristics of narcotic analgesics.
6. Indications and contraindications for narcotic analgesics.
7. Side effects of narcotic analgesics.
8. Acute and chronic morphine poisoning, relief measures, prevention.
9. Classification of non-narcotic analgesics.
10. Comparative characteristics of non-narcotic analgesics.
11. Indications and contraindications in the appointment of non-narcotic analgesics.
12. Complications in the treatment of non-narcotic analgesics, prevention and treatment.

Analgesics - drugs that selectively suppress pain sensitivity.

Classification

I. *Means mainly central action*

A. Narcotic analgesics

1. Agonists: morphine, codeine, omnopon, promedol, fentanyl, sufentanil.
2. Antagonist agonists and partial agonists: pentazocine, nalbuphine, butorphanol, buprenorphine.

B. Non-narcotic analgesics

1. Paraaminophenol derivatives: paracetamol.
2. Drugs of different pharmacological groups with analgesic component of the action: carbamazepine, amitriptyline, imizine, ketamine, nitrous oxide, clofelin, baclofen, etc.

II. *Predominantly peripheral agents*

Salicylic acid derivatives: acetylsalicylic acid.

Pyrazolone derivatives: metamizole-sodium, phenylbutazone.

Phenylpropionic acid derivatives: ibuprofen.

III. *Means with a mixed mechanism of action* - tramadol.

Narcotic analgesics (NA) - drugs of plant or synthetic origin, selectively suppress the perception of pain, increase its tolerance, reduce the emotional coloring and the vegetative accompaniment of pain.

Table 3.1. Localization and function of opioid receptors

Receptor	Localization	Activation effects
μ	Neostriatum, cortex, thalamus, hippocampus, amygdala, surface layer of gray matter of the posterior horns cn / m, large suture core, near-conductive gray matter, n. accumbens.	Supraspinal and spinal analgesia, euphoria and drug dependence, sedative effect, respiratory depression, decreased GI motility, miosis, bradycardia, prolactin secretion, growth hormone.
δ	Olfactory bulb, cortex, neolstrium-tum, thalamus, hypothalamus, brainstem, surface layer of gray matter of the posterior horns c / m, n. accumbens	Supraspinal and spinal analgesia, respiratory depression, decreased GI motility, secretion of growth hormone.
κ	Cerebral cortex, septum, n. accumbens, interpeduncular nucleus.	Supraspinal and spinal analgesia, sedation, dysphoria, miosis.

Mechanism of anesthetic action:

Main components:

1) inhibition of the process of interneuronal transmission of pain impulses in the central part of the afferent path; 2) violation of the subjective-emotional perception of pain and the reaction to it.

The main pharmacological effects of morphine (μ +++> κ + = δ):

Central:
- analgesia
- euphoria
- mental and physical dependence
- sedative and hypnotic
- depression of the respiratory center
- inhibition of the cough reflex
- miosis, accommodation spasm (stimulation of the centers of the oculomotor nerve)
- ↑ secretion of prolactin, ADH
- excitation of the dorsal nucleus n. vagus
- nausea, vomiting (15-40%) (stimulation of receptors of the starting zone of the vomiting center

Peripheral:
- GI motility depression
- inhibition of gastrointestinal secretion
- improving the tone of the sphincter of the digestive tract
- increasing the tone of the hl / m intestine
- increased tone hl / m bronchus
- increased urinary sphincter tone and bladder

Promedol (μ++>κ+=δ).

For analgesic activity inferior to morphine by 3-4 times. Less commonly it causes nausea and vomiting, less oppresses the respiratory center, reduces the tone of the bronchi and ureters, to a lesser extent causes a spasm of hl / m GI tract, increases the contractile activity of the myometrium.

Fentanyl (μ++>κ+=δ).

Surpasses morphine by analgesic activity 100-400 times. It has a short-term (up to 30 min) effect. Causes severe respiratory depression.

Pentazocine (κ ++ δ + μ-).

It does not cause euphoria, can cause dysphoria, low risk of developing addiction, less oppressive breathing and gastrointestinal motility. Increases the work of the heart due to an increase in preload (do not use for myocardial infarction!).

Buprenorphine (μ ±).

Surpasses morphine by analgesic activity by 20-60 times. Less effect on the digestive tract. It has a low narcotic potential.

Butorphanol (μ ± κ +++).

More active morphine 3-5 times. The effect on the heart is similar to pentazocine. Less than morphine, inhibits the respiratory center and less likely to cause addiction.

Acute poisoning with narcotic analgesics

Symptoms:

- stunning, loss of consciousness, coma
- respiratory depression (progressive drop in minute volume of breathing, irregular and intermittent breathing)
- skin is pale, cold
- miosis (with severe hypoxia - mydriasis)
- spinal tendon reflexes saved
- arrhythmia
- hypotension
- vomiting
- delay urination and bowel movements

Death from paralysis of the respiratory center.

Help measures:

- elimination of respiratory disorders (ALV);
- competitive intravenous naloxone antagonist;
- measures to accelerate the excretion of narcotic analgesics.

TEST JOBS

Specify all correct answers.

I. ANALGETICS - FULL AGENTISTS OF-RECEPTORS CAUSE
1. analgesic effect
2. euphoria
3. respiratory depression
4. fever
5. mydriasis
6. obstipation
7. drug dependence

II. SPECIFY WHAT ARE THE BINDING EFFICIENCY ACTION OF OPIOID ANALGETICS
1. with inhibition of the formation of prostaglandins in peripheral tissues
2. with violation of synaptic transmission in the pathways of pain sensitivity of the brain and spinal cord
3. with a change in emotional attitude to pain

III. SPECIFY PROPERTIES, CHARACTERISTIC FOR MORPHINE
1.opioid μ receptor agonist
2. an opioid μ receptor antagonist
3. has a pronounced analgesic effect
4. depressing breathing
5. increases the tone of smooth muscles of internal organs
6. lowers the tone of smooth muscles of internal organs
7. constricts the pupils
8. valid 4-5 hours
9. valid 12-24 hours
10. addictive and drug addicted

IV. SPECIFY THE CAUSES OF OBSTIPATION USING MORPHINE
1. Inhibition of the secretion of digestive glands
2. relaxation of the intestinal smooth muscles
3. relaxation of the gastrointestinal sphincter
4. suppression of intestinal motility

V. LIST THE MAIN ACTIVITIES IN ACUTE POISONING BY MORPHINE.
1. the use of respiratory stimulants reflex action
2. use of centrally acting respiratory stimulants
3. artificial lung ventilation
4. gastric lavage
5. administration of opioid receptor antagonists
6. forced diuresis

VI. SPECIFY PROPERTIES, CHARACTERISTIC FOR PROMEDOL
1. surpasses morphine in analgesic action
2. inferior to morphine for analgesic action
3. valid 3-4 hours
4. has a spasmolytic effect on the smooth muscles of some internal organs
5. more than morphine inhibits intestinal peristalsis

VII. SPECIFY PROPERTIES, CHARACTERISTIC FOR FENTANILE
1.opioid μ receptor agonist
2. opioid μ receptor antagonist agonist
3. surpasses morphine in analgesic action
4. inferior to morphine for analgesic action
5. depresses respiration stronger than morphine
6. depresses respiration weaker than morphine
7. 4-5 hours valid
8. valid for 15-30 minutes

VIII. INDICATE WHAT IS CHARACTERISTIC FOR BUPRENORPHINE
1. partial opioid μ receptor agonist
2. complete opioid μ receptor agonist
3. κ receptor antagonist
4. depresses respiration less than morphine
5. inhibits intestinal motility more than morphine.
6. has a relatively low narcotic potential

IX. SPECIFY PROPERTIES, CHARACTERISTIC FOR NALOXONE
1.opioid receptor agonist
2. opioid receptor antagonist
3. no analgesic action
4. eliminates only respiratory depression caused by narcotic analgesics
5. eliminates almost all effects of narcotic analgesics

X. SPECIFY NONARCOTIC ANALGETICS OF CENTRAL ACTION
1.ketamine
2. fentanyl
3. paracetamol
4. ketorol
5. analgin

XI. SPECIFY THE THERAPEUTIC EFFECTS OF PARACETAMOL
1. painkiller
2. antipyretic
3. anti-inflammatory
4. antiplatelet

XII. SPECIFY THE SIDE AND TOXIC EFFECTS OF PARACETAMOL
1.allergic reactions
2. respiratory depression
3. nephrotoxic effect
4. hepatotoxic action
5. ulceration of the gastrointestinal mucosa
6. oppression of blood formation

TASKS

1. Patient L., 52 years old, suffers from lumbosacral radiculitis. A month ago, he was hospitalized due to an exacerbation of gastric ulcer. What analgesic should be prescribed for the treatment of radiculitis?
2. Patient S. was admitted to the toxicological department, 22 years old, with acute morphine poisoning (parenteral). Your treatment recommendations.

Post:

1. Analgesic for sedation before anesthesia.
2. Analgesic for trigeminal neuralgia.
3. Analgesic with antipyretic activity.
4. Analgesic for myocardial infarction.
5. A tool used in overdose of narcotic analgesics.

ANTIPSYCHOTIC MEANS. ANTIDEPRESSANTS. MEANS FOR THE TREATMENT OF MANIA.

Objectives of the lesson

The student should know:

- possible ways of pharmacological correction of various psycho-emotional disorders;
- classification of psychotropic drugs;
- pharmacological effects of neuroleptics, antidepressants, lithium salts.
- Clinical use of neuroleptics, antidepressants, lithium salts.

The student should be able to:

- to justify the choice of the drug, taking into account the absolute and relative contraindications;
- write prescriptions for drugs of the studied groups.

Test questions:

1. Classification of neuroleptics.
2. Pharmacological effects of neuroleptics, effects on the central nervous system, vegetative and somatic spheres.
3. Comparative characteristics of neuroleptics of different groups.
4. Indications and contraindications for prescribing drugs. Symptoms of overdose, relief measures.
5. Classification of antidepressants.
6. Comparative characteristics of antidepressants.
7. Indications for appointment. Rules of application.
8. Lithium salts: pharmacological effects, indications for use, side effects.

Antipsychotics (Neuroleptics)

They have antipsychotic and to some extent pronounced sedative effect. Antipsychotic action is manifested in the elimination of productive or negative symptoms of psychosis and delayed progression of the disease.
Productive (positive) symptoms (easier to treat):
- hallucinations (visual and auditory);
- nonsense;
- impaired thinking.
Negative symptoms (worse treatment):
- autism;
- speech impoverishment;
- social “fenced off”;
- depersonalization;
- deterioration of cognitive activity;
- inertness of mental processes.

Classification

I. “Typical” antipsychotics
   Phenothiazine derivatives:
   - Aliphatic: chlorpromazine (aminazine)
   - Piperazinovye: triftazin, fluorophenazine, eperacine
   - Piperidine: Thioridazine

   Derivatives of butyrophenone: haloperidol, droperidol
   Thioxanthene Derivatives: Chlorprothixen

II. "Atypical" antipsychotics
   Benzamide: Sulpiride
   Benzodiazepine derivatives: clozapine

Table 4.1. Neuroleptics

Drugs	Mechanism of action, pharmacological effects	Side effects
Phenothiazine derivatives Aminazine	Blocks dopamine D2, D3 receptors, serotonin α-a / p, 5-HT2A receptors, M-h / p, histamine H1 receptors. *Central effects:* - moderate antipsychotic (D2, D3-receptor block is pre-famine), reduction of productive symptoms - pronounced psycho-sedative (aftereffect - lethargy, inhibition, apathy, depression) - pronounced hypothermic (inhibition of the center of thermoregulation) - antiemetic (block of dopamine receptors of the starting zone of the vomiting center) - Strengthening the action of oppressive central nervous system *Peripheral effects:* - hypotension (α-adrenoblokiruyuschee action) - decrease in secretion of exocrine glands, tachycardia (atropi-like effect) - myotropic antispasmodic action - antihistamine action	*Neurological* Extrapyramidal disorders (parkinsonism) (antagonist with dopamine in the striatum) - rigidity, tremor, hypokinesia, mask-like face, unsure gait. Neuroleptic malignant syndrome (antagonism with dopamine in the hypothalamus, striatum, spinal cord) - catatonia, stupor, malignant hyperthermia, unstable blood pressure, tachycardia, arrhythmias, rhabdomyolysis, renal failure. Lethality 10-20%. Late dyskinesia - blinking, eyelid spasm, grimaces, loss of tongue, involuntary sucking, chewing, limb dystonia *Various* Drowsiness, apathy, drowsiness, dry mouth, disc-fort in the heart, hypotension, collapse, congestive jaundice, anorexia, nausea, leukopenia, agranulocytosis. Neurological - see. Aminazin Cardiotoxic action, atropine-like action, toxic retinopathy (3-14%).
Thioridazine	Blocks dopamine D2 receptors, serotonin α-a / p, 5-HT2A receptors, M-h / p, histamine H1 receptors. *Central effects:* - mild antipsychotic - pronounced psycho-sedative, anti-anxiety - not with accompanying after-effect - antidepressant *Peripheral effects*: see. Aminazin	Parkinsonism and other side effects are more severe than with sedative antipsychotics. Significantly increase the secretion of prolactin.
	Block D2-dopamine receptors, α-a / p, 5-HT2A serotonin receptors	

Fluorophenazine Triftazin Eperapezine	*Central effects:* - pronounced antipsychotic (weakening of negative symptoms - activating - antiemetic (10-20 times more active than aminazine) - hypothermic *Peripheral - practically absent*	
Haloperidol	Blocks dopamine D2, D3 receptors, serotonin 5-HT2A receptors *Effects:* *Central* - pronounced antipsychotic - relieves acute psychomotor agitation - moderate sedative, activating - antiemetic (50 times more active than aminazine) - increased secretion of prolactin. *Peripheral* - practically absent	Parkinsonism (see Aminazin)
Sulpiride	It blocks the D2, D3 receptors of the dopamine of the limbic system, does not affect the striatum D2 receptors. *Effects:* *Central* - antipsychotic (weakening of negative symptoms, in higher doses - elimination of delusions, hallucinations) - moderate anti-anxiety - psychostimulant, antidepressant - antiemetic (140 times more active than aminazine)	
Clozapine	Blocks D4 receptors in the limbic system and the prefrontal area of the cortex, α-a / p, H1-histamine and 5-HT2A-serotonin receptors. *Central effects:* - antipsychotic - psycho-sedative	Extrapyramidal disorders - rare. Orthostatic hypotension, toxic-allergic myocarditis, agranulocytosis (1%).

Antidepressants

Depression is a mental disorder that manifests itself as depressed, depressed, melancholy mood, hopelessness, despair, possible suicidal feelings. Antidepressants reduce the appearance of depression, their therapeutic effect usually develops after 2-3 weeks.

Classification

I. Agents suppressing neuronal seizure of monoamines

1. *Non-selective action* (tricyclic antidepressants) - imipramine, amitriptyline.
2. *Selective action:*
   A. Selective serotonin reuptake inhibitor fluoxetine.
   B. Selective Norepinephrine Reuptake Inhibitor — Maprotiline.

II. Monoamine oxidase inhibitors (MAO)

1. *Indiscriminate, irreversible action* - nialamide.
2. *Selective, reversible action* - moclobemide.

Table 4.2. Antidepressants - monoamine reuptake inhibitors

Drugs	Tricyclic antidepressants	Maprotiline	Fluoxetine
Mechanism of action	- Inhibition of reverse neuronal capture of monoamines → increase in the concentration of mono amines in the synaptic cleft. - Blockade of M-cholinergic receptors, histamine H1 receptors and α-adrenoreceptors	- Inhibition of reverse neuronal trapping of noradrenaline (mainly) → increase in the concentration of noradrenaline in the synaptic cleft. - Weak blockade of M-cholinergic receptors, histamine H1 receptors and α-adrenoreceptors.	- Inhibition of serotonin reuptake → increase in serotonin concentration in the synaptic cleft.
Pharmacological effects	Antidepressant: + sedative (amitriptyline); + psychostimulant (fluoxetine); balanced (maprotiline); + analgetic (amitriptyline, imipramine, maprotiline, fluoxetine); + anorexigenic (fluoxetine).		
Indications	Depression; pain syndrome, bulimia (fluoxetine).		
Side effects	Cancellation syndrome,tremor, anxiety, anxiety, seizures, erectile dysfunction.		
	Sedation, orthostatic, arrhythmias, IOP elevation, accommodation disturbance, urination disturbance, agranulocytosis, cholestasis, weight gain.		Nausea, diarrhea, anorexia, weight loss, "serotonin syndrome" *.

Table 4.3. Antidepressants - MAO inhibitors

Drugs	Nialamide	Moklobemid	Pirazidol
Mechanism of action	Indiscriminately and irreversibly inhibits	Selectively and reversibly inhibits MAO-A →	Selectively and positively inhibits MAO-A

	MAO (MAO-A and MAO-B) → an increase in the concentration of monoamines in the synaptic cleft	an increase in the concentration of monoamines in the synaptic cleft.	+ inhibits reverse capture-radrenaline → an increase in the concentration of monoamines in the synaptic cleft.
Pharmacological effects	Antidepressant: + psychostimulant (nialamide, moclobemide), + balanced (pyrazidlol); + analgesic (nialamide).		
Indications	Depression, pain syndrome (nialamide).		
Side effects	Cancellation syndrome, tremor		
	Anxiety, anxiety, sleep disturbances, convulsions, erectile dysfunction, mental excitement, tachycardia, orthostatic hypotension, dyspepsia, "cheese syndrome" **	Tachycardia, dry skin and mucous membranes.	

* "Serotonin syndrome" is manifested in the form of discoordination, hypertonicity of muscles, tremor, fever, profuse sweating, tachycardia, increased blood pressure, confusion, disorientation, and death is possible.

** "Cheese syndrome" develops while taking MAO inhibitors with food containing tyramine (cheese, bananas, beans, liver, smoked meats, chocolate, coffee, beer, red wine, etc.). Main symptoms: hypertensive crisis, arrhythmias, angina, cerebral circulation disorders.

Remedies for the treatment of mania (lithium salts)

Manic-depressive psychosis includes two phases: manic and depressive. The clinical manifestation of the manic phase, or mania, is an upbeat, cheerful, "serene" mood, combined with increased mental activity, overestimation of one's abilities, accelerated thinking in the form of "leaps of ideas", a tendency to rash and indefinite actions, lack of criticism of the relation to his condition. Symptoms of the depressive phase are described above.

Mechanism of action. Substitution of Na + ions with Li + ions and violation of the formation of action potential. Reducing the level of secondary messengers ITP, DAG, cAMP.

Pharmacological effects. Normoleptic, antidepressant.

Indications for use. Relief of manic and prevention of the depressive stage of manic-depressive psychosis.

Side effects. Tremor, ataxia, dysarthria, polyuria, polydipsia, interstitial nephritis, swelling, hypothyroidism, leukocytosis, cardiac arrhythmias, weight gain, nausea, vomiting, folliculitis,erectiledysfunction.

TEST JOBS

Specify all correct answers.

I. SPECIFY THE EFFECTS OF DERIVATIVE PHENOTIAZINE

1. easing or eliminating the productive symptoms of psychosis
2. sedative
3. increase in motor activity
4. decrease in motor activity
5. antiemetic effect
6. enhancing the effect of drugs for anesthesia, sleeping pills, narcotic analgesics
7. hyperthermic action

II. SPECIFY PROPERTIES CHARACTERISTIC FOR HALOPERIDOL

1. phenothiazine derivative
2. Butyrophenone derivative
3. has a pronounced antipsychotic property
4. sedative inferior aminazin
5. peripheral effects are more pronounced than aminazine
6. extrapyramidal disorders cause more often than aminazin

III. INDICATE WHICH NEUROLEPTIC IS USED FOR NEUROLEPTANALGESIA

1. haloperidol
2. chlorpromazine
3. Chlorprothixen
4. droperidol
5. clozapine

IV. INDICATE THE REMEDY USED FOR THE CORRECTION OF EXTRAPYRAMIDAL DISORDERS CAUSED BY NEUROLEPTIC

1. sibazon
2. phenobarbital
3. carbacholine
4. cyclodol
5. galantamine

V. SPECIFY THE PROPERTIES OF AMITRIPTILIN

1. oppresses MAO
2. inhibits neuronal capture of monoamines in the central nervous system
3. possesses antidepressant activity
4. has a psychoactive effect
5. has a pronounced sedative effect.
6. blocks M-cholinergic receptors
7. antidepressant effect develops within 10-14 days

VI. SPECIFY PROPERTIES, CHARACTERISTIC FOR IMIZINA

1. oppresses MAO
2. inhibits neuronal capture of monoamines in the central nervous system
3. possesses antidepressant activity
4. has a psychoactive effect
5. has a pronounced sedative effect.
6. antidepressant effect develops within 2-3 weeks

VII. SPECIFY IMMINAL SIDE EFFECTS

1. dry mouth
2. accommodation disturbance
3. tachycardia
4. bradycardia
5. constipation
6. diarrhea
7. difficulty urinating
8. high blood pressure

VIII. SPECIFY PROPERTIES CHARACTERISTIC FOR FLUOXETINE

1. inhibits neuronal uptake of norepinephrine and serotonin in the central nervous system
2. MAO inhibitor
3. selectively inhibits neuronal seizure of serotonin
4. psychostimulant
5. has no sedative effect
6. causes psychoactive effect
7. does not affect adrenoreceptors and M-cholinergic receptors

IX. SPECIFY THE MECHANISM OF ACTION OF MOCLOBEMIDE

1. inhibits the reuptake of monoamines in the CNS
2. inhibits equally MAO-A and MAO B
3. reversibly inhibits predominantly MAO-A

TASKS

1. The paramedic of the district hospital needs to calm the patient in a sharply excited state: the patient runs around the emergency room, throws his fists at the orderlies, is aggressive. Choose and prescribe a drug to eliminate psychomotor agitation.

2. An ambulance doctor was called to the girl S., 18 years old, due to the fact that she has been sleeping for more than 20 hours, they cannot wake her up. The day before she came up from work upset, she cried for a long time, took several pills of some kind of medicine and went to bed. On examination: the patient is in a state of deep sleep, the reflexes are weakened, the pupils are constricted, the pulse is 100 beats / min, the blood pressure in the supine position is 80/40 mm Hg, while trying to plant it is 45/50 mm Hg. What drug did the patient take? Describe help measures.

Write out

1. Means for relieving acute psychomotor agitation.
2. A psychotropic agent with antiemetic activity.
3. Atypical antipsychotic.
4. Antidepressant with a pronounced sedative effect.
5. Antidepressant with sedative and psychostimulant properties.
6. Antidepressant with psychostimulant properties.
7. Remedy for treatment of mania

ANXIOLYTIC MEANS. SEDATED MEANS. PSYCHOSTIMULATING AND GENERALIZING AGENTS. NOOTROPICAL MEANS.

Objectives of the lesson

The student should know:

- pharmacological properties of tranquilizers;
- pharmacological properties of general-learning remedies;
- classification of substances that excite the central nervous system;
- features of the influence of drugs that excite the central nervous system on neurotransmitter peredachu;
- pharmacological properties of psychostimulants, analeptics;
- clinical use of excitatory type of substances.

The student should be able to:

- to justify the choice of the drug, taking into account the absolute and relative contraindications;
- write prescriptions for drugs of the studied groups.

Test questions:

1. Classification of tranquilizers.

2. Tranquilizers of the benzodiazepine series: pharmacological effects, indications for use, side effects, comparative characteristics of drugs.

3. "Daytime" tranquilizers: mechanism of action, indications for use.

4. The use of tranquilizers in the clinic of internal diseases, dentistry.

5. Sedatives. Pharmacological features. Practical use.

6. Nootropic drugs: mechanism of action, pharmacological effects, use.

7. Psychostimulants: classification, comparative characteristics of drugs (mechanism of action, pharmacological effects, indications for use, side effects).

8. General tonic agents: classification, comparative characteristics of drugs (mechanism of action, pharmacological effects, indications for use, side effects).

Tranquilizers (anxiolytics).

The main for this group is the anxiolytic effect, which is manifested in the reduction of internal stress, the elimination of fear, anxiety, anxiety.

Classification.

1. Benzodiazepine receptor agonists (benzodiazepines):
   - Long-acting (T1 / 2 = 24-48 h): phenazepam, diazepam (sibazon, rel-mind), chlordiazepoxide (elenium).
   - The average duration of action (T1 / 2 = 6-24 h): nozepam, lorazepam.
   - Short-acting (T1 / 2 <6 h): midazolam (dormicum).
2. Serotonin receptor agonists: buspirone.
3. Different: amisyl, hydroxyzine, etc.

Table 5.1. Tranquilizers

Drugs	Mechanism of action, pharmacological effects	Side effects
Benzodiazepines	They are benzodiazepine receptor agonists within the GABA-barbiturate-benzodiazepine receptor complex. Stimulation of benzodiazepine receptors → allo-steric activation of GABAA receptors → ↑ frequency of opening of the Cl – → ионов ion channels of the incoming current of Cl – → ions → membrane hyperpolarization and suppression of neuronal activity. The main effect is on the limbic system. Effects: anxiolytic, sedative and hypnotic (with the exception of "daytime" tranquilizers), muscle relaxant, anticonvulsant, amnesic.	Drowsiness, congestion, slowed-down reactions, memory impairment, headache, nausea, menstrual cycle disorder, skin lesions, mental and physical dependence, withdrawal syndrome. Paradox-greasy reactions are possible
Buspirone	It is an agonist of 5-HT1A serotonin receptors. Stimulation of 5-HT1A receptors → ↓ activity of suture neurons, ↓ synthesis and release of serotonin. Effects: anxiolytic.	Nervousness, dizziness, headache, paresthesias, nausea, diarrhea.
Amizil	Is the central holinoblokator, oppresses the Mkh / r of a reticular formation. Effects: anxiolytic, sedative. Possesses peripheral M-anticholinergic activity.	Atropinopodobnoe action: dry mouth, tachycardia, dilated pupils, etc.

Application: neurosis and neurosis-like states; sedation (benzodiazepines); epilepsy (benzodiazepines); sleep disturbances (benzodiazepines, see below); neurological diseases accompanied by hypertonicity of skeletal muscles.

Acute poisoning with benzodiazepines.

Drugs have a large therapeutic breadth and rarely cause acute poisoning. Symptoms: hallucinations, disorders of articulation, nystagmus, ataxia, mouse atony, then impairment of consciousness (coma), respiratory depression and cardiac activity.

Treatment. A specific antagonist is flumazenil (a benzodiazepine receptor blocker); symptomatic therapy.

Sedatives

This group includes drugs that have a moderate sedative effect: bromine salts (sodium bromide and potassium bromide), valerian preparations, motherwort.
Bromine salts enhance the processes of inhibition in the central nervous system, and the effect depends on the type of the nervous system. They have a sedative effect on neurosis, irritability, insomnia. Cumulative (material cumulation) → chronic poisoning - bromism. It is manifested by inhibition, apathy, memory impairment, acne bromica, inflammation of the mucous membranes.
The preparations of valerian (tincture, tincture, dry extract) and pous-tyrnika (tincture, tincture) are widely used.

Analeptics

Tone the respiratory and vasomotor centers of the medulla oblongata.
Direct action - bemegride, caffeine, aetizol, strychnine.
Reflex action - lobelin, cytisine.
Mixed action - camphor, kordiamin.
Bemegride, camphor, Cordiamine have an awakening effect, i.e. reduce the depth of CNS depression, clarify consciousness, improve coordination of movements. They are used in case of mild poisoning with narcotic analgesics, sleeping pills, tranquilizers, ethyl alcohol. Currently rarely used, because inadequately increase the brain's need for oxygen, increase hypoxia, and deplete functional reserves.

Nootropic drugs

Preparations. Piracetam, Aminalon, Picamilon, Phenibut, Cerebrolysin.
Mechanism of action

- Increased synthesis of ATP and cAMP, adenylate cyclase activity, glucose utilization, activation of glycolysis and aerobic respiration → stimulation of metabolic and bioenergetic processes in brain tissue.
- Increased synthesis and release of neurotransmitters.
- Increased protein synthesis and membrane fomfolipids.
- Antioxidant action.

Pharmacological effects.

- Activation of intellectual functions, increased ability to learn, improve memory.
- Neuroprotective.
- Antihypoxic.
- Membrane stabilizing.
- Improvement of cerebral blood flow, antiplatelet action.

Application.

- Oligophrenia, cerebral palsy.
- Atherosclerosis of cerebral vessels, encephalopathy, stroke and its consequences.
- Mnestic disorders.
- Post-traumatic brain damage.
- Asthenia and depression in the elderly, senile dementia.
- Neurotic states, marked fatigue.

Side effects. Irritability, anxiety, insomnia, anxiety,

Table 5.2. Psychostimulants

Drugs	Mechanism of action, pharmacological effects	Side effects
Phenylalkylamine *Phenamine*	*Psychoactive effect.* Enhanced release of NA and dopamine from presynaptic endings and inhibition of their reverse neuronal uptake → stimulating effect on the ascending activating reticular formation of the brain stem, direct excitation of cortical neurons, stimulation of certain formations of the limbic system, inhibition of non-striatum. *Other effects* Suppression of hunger (suppression of hunger center and activation of the center of saturation); peripheral sympathomimetic action (increased blood pressure, tachycardia, arrhythmias, pupil dilation); increase the tone of the respiratory center;	Cardiovascular disorders (marked hypertension, tachycardia, rhythm disturbances), anxiety, insomnia, irritability, dependence, addiction.
Derivatives of Sidnonimine *Sydnokarb*	*Indirect central adrenomimetic* - increased release of AN in the central nervous system. *Other effects* Peripheral sympathomimetic action of little pronounced.	When using high doses, increased irritability, anxiety, moderate hypertension.
Methylxanthines *Caffeine*	*Psychostimulant action* Blocks A1-adenosine receptors → ↑ increase in cAMP synthesis. Inhibition of phosphodiesterase → inhibition of inactivation of cAMP. Strengthening of transmission in dopaminergic and cholinergic synapses of the cortex and medulla, adrenergic synapses of the hypothalamus and the pro-long brain. *Other effects* Increased heart rate; Increase (direct enhancement of activity of the sinus node) or decrease (excitation of the center of the vagus nerve) heart rate; narrowing of the vessels of the skin, mucous and abdominal organs, dilation of the coronary vessels, vessels of the lungs and skeletal muscles; myotropic antispasmodic action; diuretic action; stimulation of gastric gland secretion; increased lipolysis, glycogenolysis, increased basal metabolism.	Anxiety, sleeplessness, ispochondria, tremor, tachycardia, arrhythmias, myo-carditis, frequent urine-emission, diarrhea, abdominal pain. Mental dependence (theism).

General tonic Drugs -of various plants. These include preparations of ginseng, golden root, Eleutherococcus, Schizandra, Leuzea, Zamaniha, Aralia, and other plants. Of organo-preparations using pantokrin and rantarin. The therapeutic effect is manifested only with prolonged use. Drugs are characterized by low toxicity, a wide breadth of therapeutic action, a slight stimulating action without pronounced arousal. When they are used, they improve their state of health, appetite, performance, increases muscular strength, body weight, increases energy metabolism, normalizes secretion of adrenal hormones, sex hormones, and increases the body's resistance to adverse factors. Therefore, these drugs are called adaptogens. In medical practice, general tonicity agents are widely used in the form of tinctures and extracts for the treatment of functional disorders of the nervous system with general weakness, fatigue, hypotension and other conditions.

TEST JOBS

Specify all correct answers.

I. INDICATE INDICATIONS FOR THE USE OF PSYCHO-STIMULATING DRUGS

1. neurotic disorders with signs of asthenia
2. psychotic disorders accompanied by delusions, hallucinations
3. narcolepsy
4. for a temporary increase in physical and mental performance

II. SPECIFY PROPERTIES, CHARACTERISTIC FOR CAFFEINE

1. methylxanthine derivative
2. stimulates adenosine receptors in the brain
3. an adenosine receptor antagonist
4. enhances mental and physical performance
5. temporarily reduces the need for sleep
6. stimulates vasomotor and respiratory centers
7. depresses respiratory center
8. has a direct inhibitory effect on myocardium.
9. has a direct myotropic spasmolytic effect on vascular smooth muscles and internal organs

III. SPECIFY THE EFFECTS THAT CAN BE OBSERVED BY LONG-TERM APPLICATION OF PSYCHOSYTIMULATING MEANS

1. addictive
2. hypersensitivity to the action of psychostimulants
3. drug dependence
4. extrapyramidal disorders

IV. SEE THE PHENAMINE EFFECTS

1. stimulation of higher nervous activity
2. depression of higher nervous activity
3. stimulation of the respiratory center
4. depression of the respiratory center
5. increased heart rate
6. reduction of heartbeat
7. high blood pressure
8. lowering blood pressure

V. SPECIFY WHAT EFFECTS ARE OBSERVED WHEN CAFEIN IS USED BY THE CARDIOVASCULAR SYSTEM?

1. dilation of the brain vessels
2. narrowing of cerebral vessels
3. dilation of heart vessels
4. narrowing of the heart vessels
5. expansion of bronchus

6. bronchoconstriction
7. weakening of the heart and bradycardia
8. strengthening of the heart and tachycardia

VI. SPECIFY INDICATIONS FOR THE APPOINTMENT OF BEMEGRID
1. convulsions
2. prevention of reflex respiratory arrest
3. breath stimulation after anesthesia
4. with paresis and paralysis
5. With an overdose of psychostimulants

VII. ORDER INDICATIONS FOR THE APPOINTMENT OF CAMFORA
1. pneumonia
2. heart failure
3. paresis, paralysis
4. carbon monoxide poisoning
5. atherosclerosis
6. fatigue

VIII. SPECIFY WHEN ANALYPTIC ACTION OF CORDIAMINE APPEARS
1. depression of consciousness
2. suppression of the vascular-motor center
3. depression of the respiratory center
4. high blood pressure
5. with paresis and paralysis

IX. SPECIFY THE EFFECTS OF ANXIOLYTIC-BENZODIAZEPINE DERIVATIVES:
1. elimination of feelings of emotional tension, anxiety, anxiety, fear
2. sedative
3. sleeping pills
4. increased skeletal muscle tone
5. anticonvulsant.
6. enhancing the effect of drugs for anesthesia, sleeping pills, analgesics
7. antagonism with anesthetics, hypnotics, analgesics
8. psychostimulant

X. INDICATE PROPERTIES, CHARACTERISTIC FOR DIAZEPAM
1. inhibits GABA-ergic processes in the central nervous system
2. enhances GABA-ergic processes in the central nervous system
3. has an anxiolytic effect
4. relaxes skeletal muscles, disrupting the transmission of impulses in the neuromuscular synapses
5. centrally acting muscle relaxant
6. has a sedative and hypnotic effect

7. has an anticonvulsant effect
8. does not cause drug dependence
9. may cause drug dependence

TASKS

1. 1. An ambulance doctor was called in to a girl of 19 years due to the fact that she had an attack of seizures that covered her entire body. And she touched the bed only the back of his head and heels. When she touched the patient, she had an attack of tetanic convulsions. The mother of the patient reported that her daughter suffered from a lack of appetite, and the doctor prescribed her chilibuha tincture. The night before, the girl was upset about something, and in the morning, her mother found 3 empty bottles of medicine on the nightstand. To explain the cause of the poisoning.

2. 2. Derived xanthine, refers to psychostimulants. The nature of the influence on the higher nervous activity depends on the dose. The main point of application of the action is the neurons of the cerebral cortex. It has a pronounced stimulating effect on the respiratory and vasomotor centers, it has a direct and central effect on the vessels, stimulates the functioning of the heart, causes a diuretic effect. To determine the drug. Explain the mechanism of action.

Write out

1. The drug in neurotic states, accompanied by anxiety, fear, emotional stress.
2. Tranquilizer in convulsive states, epileptic status.
3. Psychotonic drug.
4. Analeptik for poisoning with barbiturates.
5. "Day" anxiolytic.
6. A means to restore the functions of the brain in its traumatic injury

Drugs causing drug dependency

Objectives of the lesson

The student should know:

- The main groups of substances that cause drug dependence;
- mechanism of action, pharmacological effects of hypnotic drugs, narcotic analgesics, psychostimulants, ethyl alcohol, hallucinogens, nicotine.
- Clinical use of hypnotics, narcotic analgesics, psychosis-mulators

The student should be able to:

- to substantiate the choice of the drug from the group of hypnotic drugs, narcotic analgesics, psychostimulants, taking into account absolute and relative contraindications;

- write prescriptions for drugs of the studied groups.

Test questions:

1. The main groups of substances that cause drug dependence.
2. Pharmacological effects of narcotic analgesics, effects on the central nervous system.
3. Clinical manifestations of withdrawal syndrome with opiate abuse.
4. Treatment of opiate addiction.
5. Chronic alcoholism, its treatment.
6. Features of the action of psycho-stimulating drugs: cocaine, amphetamine, "ecstasy"
7. Barbiturates, benzodiazepine derivatives: side effects, effects of use.
8. Consequences of the use of hallucinogens: LSD, psilocybin.
9. Consequences of the use of inhalants.

Drug dependence is an irresistible desire to take drugs in order to improve well-being, improve mood, and also eliminate unpleasant experiences or sensations caused by the discontinuation of taking these funds.

The formation of drug dependence depends on many factors, including the type and mechanism of action of the medicinal substance, the method of its use and the individual characteristics of the organism. The rapid intake of substances into the body (for example, intravenous administration of drugs or smoking cocaine and heroin) accelerates the development of drug dependence.

Drug dependence is often combined with the development of tolerance (reducing the body's sensitivity to the drug with its long-term use), which leads to the need to constantly increase the dose of the substance to achieve the usual effect.

Prolonged use of drugs causes the development of homeostatic adaptive changes in the brain, which lead to a decrease in the activity of drugs. Adaptive changes are different in nature and manifest themselves:

- an increase in the permeability of the Ca channels of the neuronal membranes;
-depletion of neurotransmitters;
-reduction of receptor activity;
- changes in the system of secondary messengers;
-increased synthesis of endogenous agonists of irreversible action.

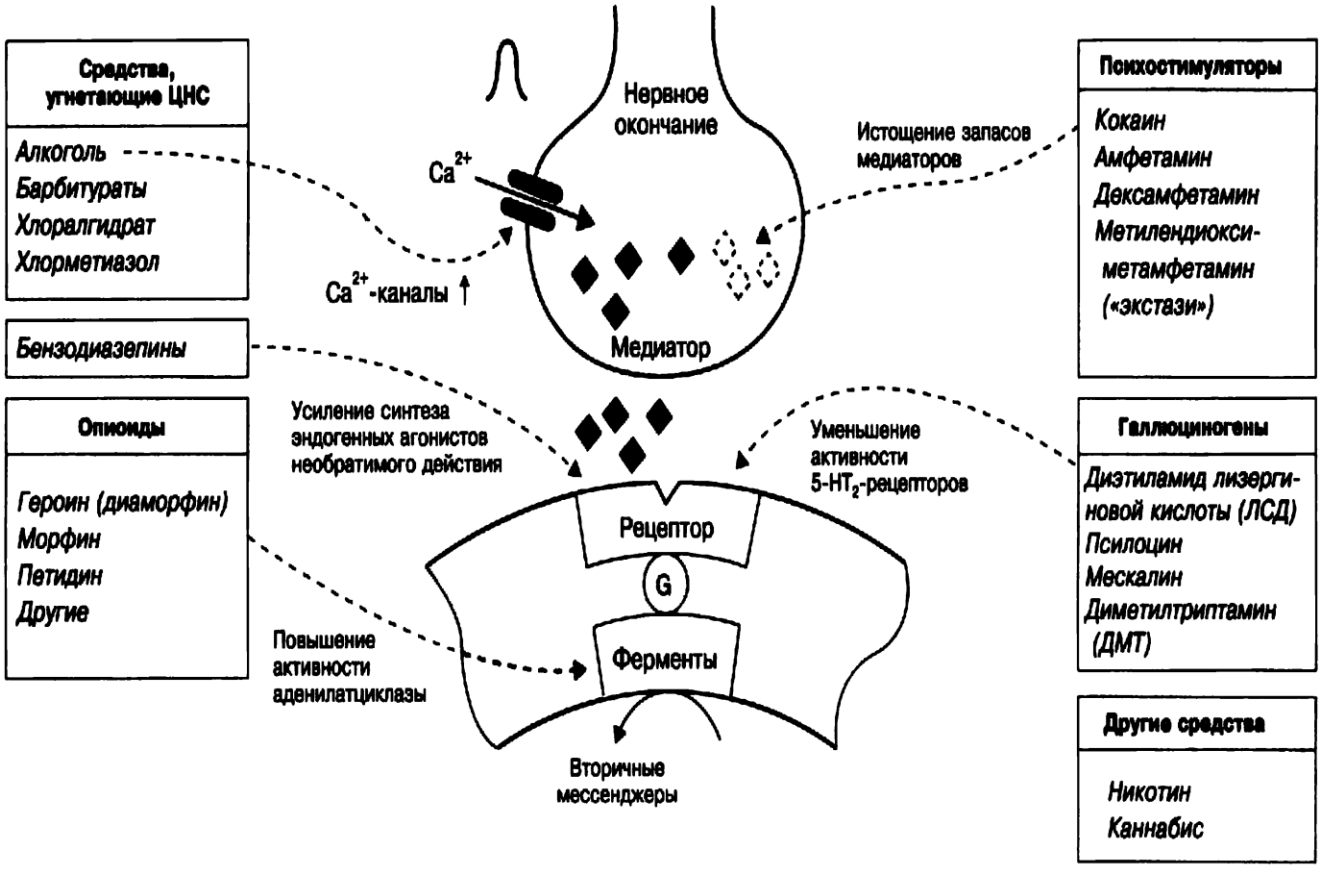

Figure 6-1. Drugs that cause drug addiction.

There are mental and physical drug dependence.

Psychic dependence is a condition in which a drug causes a feeling of satisfaction and mental recovery and requires periodic administration of drugs to normalize the mental state.

Syndrome of mental dependence - the pathological need for the use of drugs in order to avoid mental disorders (without somatic symptoms of withdrawal).

Physical dependence - an adaptive state, manifested severe somatic disorders at the termination of the introduction of the drug substance that causes this condition.

Syndrome of physical dependence is a condition characterized by the development of abstinence after drug withdrawal or the introduction of its antagonists.

Abstinence is a complex of disorders arising after a certain time after the cessation of the action of medicinal substances that cause addiction (mental and physical disorders).

Drug dependence should be distinguished from drug dependence in case of pharmacotherapy for substitution and pharmacotherapy of chronic diseases (for example, when corti-

costeroids are canceled in patients with collagenoses, irregular insulin use in patients with diabetes mellitus), which is exacerbated by the course of the disease .

The main groups of drugs that cause addiction.

Alcohol (ethyl alcohol, approximately 250 million addicts in the world);

Opioids: morphine, heroin, narcotic analgesics (more than two million dependent in the world);

Cannabinoids: marijuana, hashish (approximately 25 million addicts in the world);

Sedatives: benzodiazepines - tranquilizers, hypnotics - barbiturates (the number of addicts is not exactly counted, as they are taken by a large number of somatic patients);

Cocaine and its derivatives (about seven million addicts in the world);

Stimulants: amphetamine, caffeine, ephedron, ecstasy, coffee;

Hallucinogens: LSD, mescaline, psilocybin;

Aromatic volatile substances: household chemicals, gasoline;

Tobacco (nicotinism is called household addiction).

Opioids

Drugs with sedative, "inhibiting" action. This group includes natural and synthetic morphine-like compounds. All natural opium drugs are obtained from poppy. Cause a state of euphoria, tranquility, peace.

Drug addiction caused by opiates is very difficult to treat.

- *Heroin* is the most common opium drug. Along with a very strong and pronounced narcotic effect, it has extremely high toxicity and the ability to quickly (after 2-3 doses) form a physical dependence.

- *Poppy straw* - crushed and dried parts of stems and poppy boxes. Co-breaking is used to prepare a solution of acetylated opium.

-*Acetylated opium* is a ready-to-use solution resulting from a series of chemical reactions. It has a dark brown color and a distinctive vinegar smell.

-*Opy raw*, specially processed juice of poppy plants, is used as raw material for the preparation of a solution of acetylated opium. A substance that resembles clay.

Metadone is a strong synthetic opium drug. Substance in the form of white powder or ready solution.

Abstinence syndrome with opiate abuse:

- irresistible desire to receive opiates;
- anxiety, irritability;
- hyperalgesia;
-convulsive contractions, muscle pain;
-dysphoria;
-fever;

- arterial hypertension, tachycardia;
nausea, vomiting, diarrhea;
-expansion of pupils;
-insomnia;

delayed symptoms:
-the desire to receive opiates;
-anxiety;
-insomnia.

Treatment of opiate addiction:
The basic principle is substitution therapy:
-methadone is an opioid, practically has no euphoric effect, acts for a long time (24 hours), is effective when taken orally, takes opioid receptors and prevents the manifestation of the effects of heroin when it is taken, as a result of euphoria is not significant, there is no withdrawal.
-buprenorphine is a partial opioid receptor agonist (μ-agonist, κ-antagonist), does not cause dysphoria, is 30 times more active than morphine, can be administered sublingually, with abolition signs are weak.antagonists
- naloxon - valid for 20-30 minutes when administered intravenously, is used to change the type of drug dependence.
-naltrexone - acts 24 hours, is effective when taken orally, blocks opioid receptors, is used to change the type of drug dependence and treatment of drug dependence.
stabilizers of the cardiovascular system
-Clofelin (clonidine) - eliminates nausea, vomiting, diarrhea.
- tranquilizers.

Ethanol
Ethyl alcohol (C2H5OH).
-reduces the permeability of the presynaptic neuron membranes for Ca 2+ (increasing the release of mediators);
-potentiates GABA-ergic inhibition.
As a result, with prolonged use:
- marked increase in blood pressure;
arrhythmias, cardiomyopathy;
- developing dementia;
- the veins of the esophagus are affected (varicose);
- decrease in ADH - increase in diuresis;
-expansion of skin vessels;
-toxic liver damage.
Abstinence syndrome is manifested in the form of:
- tremor;
- delirium (prolonged hallucinations, marked arousal).

Treatment:
1. *Intensive treatment* of acute conditions (intoxication, withdrawal, psychosis).
2. *Preventive (anti-relapse) therapy*
- teturam (disulfiram) - causes - acetaldehyde accumulation (nausea, vomiting occur) due to high concentrations of acetaldehyde;
- opioid receptor antagonists (alcohol - increased concentration of β-endorphins);
-naltrexone (hydrochloride): opioid receptor block - inhibits the action of β-endorphins, there is no positive reinforcement;
-Li salt;
-Buspirone, fluoxetine (effect on serotonin transmission);
-glycine.

Nicotine
Harm of smoking:
- violation of mucociliary clearance (COPD);
-carcinogenesis;
-nicotine-drug addiction;
-risk of developing cardiovascular diseases.
Withdrawal syndrome (duration 2-3 weeks) is manifested in the form of:
- traction to tobacco smoking;
- irritability, impaired concentration,
-increase body weight.
Addiction treatment:
- replacement therapy (often ineffective);
- chewing gum with nicotine provokes gastritis, gastric and duodenal ulcers.

Cannabis preparations
Hemp grows in regions with a moderately warm climate. The active substances are cannabinoids. Impact - a change of consciousness. The characteristic smell of burnt grass remains in the room for a long time. Keeps this smell and clothes.
- Marijuana - dried or raw green grassy part of hemp.
- Gashish - a mixture of tar, pollen and crushed hemp tops - resinous substance of dark brown color, similar to clay. Contains more than 20% kannabioi-Dov. All cannabis derivatives belong to the group of illegal drugs and are completely prohibited.

Consequences of use:

- loose thoughts, frustration, depression and a feeling of isolation;
- impaired coordination of movement, memory and mental abilities;
-slow sexual development and maturation, including violations of sperm formation and the menstrual cycle;
- when taking a large dose of the drug, hallucinations and paranoia may occur;

-provocation of the simultaneous use of alcohol and the transition to heavier drugs;
- bronchitis, lung cancer

Stimulants

Drugs with psychostimulating, "stimulating" action. This group includes synthetic substances containing amphetamine compounds. In most cases, administered intravenously. These drugs are derived from drugs containing ephedrine (solutan, efidrin hydrochloride). In nature, ephedrine is found in the plant "ephedra". The drug lasts 2–12 hours (depending on the type of substance). Formed mental and physical dependence. Prolonged use requires a constant increase in the dose of the drug. Hot temper, nastiness, aggressiveness are exacerbated.
- Ephedron - ready-to-use solution obtained as a result of chemical reaction. It has a pinkish or transparent color and a characteristic smell of violet.
-Pervitin - a ready-to-use solution obtained as a result of a complex chemical reaction. An oily liquid with a yellow or clear color and a characteristic smell of apples.
- Ephedrine - white crystals, obtained from the plant ephedra, is used for medicinal purposes, and is also used for the preparation of ephedron and perventine most often by manipulation with drugs.

Consequences of amphetamine use:

- Headache, headaches, blurred vision and excessive sweating;
- Infarctions, strokes;
- Nervous exhaustion;
- significant changes in mental activity and irreversible changes in the brain;
- damage to the cardiovascular system and all internal organs: the liver due to the low quality of drugs - iodine, potassium permanganate and red phosphorus, which are used in the preparation of the drug, remain in them;
- risk of being infected with HIV and hepatitis due to the use of common syringes;
- a significant decrease in immunity, the risk of overdose with severe consequences, until death.

Cocaine
A psychostimulant of plant origin, derived from the leaves of the coca plant.
- Cocaine is a white crystalline powder. Cocaine hydrochloride is easily dissolved in water, so it is not only sniffed, but sometimes administered intravenously or swallowed.
-Krek - fragile plates, used for smoking. Crack extremely quickly forms both physical and psychological dependence.

Consequences of cocaine use:
-Arrhythmia;
- bleeding and other damage to the nasal cavity;

-atrophy of the nasal mucosa and loss of smell;
- taste disorders;
-deafness;
paranoid psychosis, hallucinations, aggressiveness;
- death as a result of disturbance of cardiac activity (myocardial infarction) or respiratory arrest

Hallucinogens

A group of psychedelic drugs that alter consciousness — sensations, thoughts, emotions, and perceptions (psycho-dysleptics) —homogeneous in origin and chemical composition.
LSD is a synthetic drug, a derivative of lysergic acid contained in ergot. A colorless, odorless powder or a clear, odorless liquid, color and taste. The action develops in 30–60 minutes and lasts up to 12 hours. It has a huge hallucinogenic effect in low concentrations - 30g. LSD is enough for 300,000 thousand people.

-Psilocin and psilocybin are narcotic substances with a hallucinogenic effect. Contained in toadstools. For the onset of the narcotic effect, it is enough to take 2 grams of dried mushrooms. The main danger of this drug is its availability.

Consequences of the use of hallucinogens:

Irreversible changes in the structure of the brain, mental disorders of varying severity, until the complete disintegration of the individual. Even a single dose of LSD can lead to changes in the genetic code and permanently damage the brain. Mental disorders are indistinguishable from schizophrenia. The drug accumulates in the brain cells. Staying there for a long time, he may, after a few months, cause the same sensations as immediately after taking it. The effect of the drug lasts 2-12 hours (depending on the type of substance). Formed mental and physical dependence. Prolonged use requires a constant increase in the dose of the drug. Aggravated temper, anger, aggressiveness. Over time, there is unreasonable anxiety and suspicion. Possible suicide attempts.

Ecstasy

“Ecstasy” is the common name for a group of synthetic drugs that stimulate the amphetamine group, often with a hallucinogenic effect. White, brown, pink and yellow tablets or multicolored - capsules contain about 150 mg of the drug. Ecstasy is an expensive drug, and usually its users switch to systematic use of heroin or amphetamines.

Consequences of use:
-psychic addiction;
- depression, up to suicide;

- physical and nervous exhaustion;
- suffers the nervous system, heart, liver, degeneration of internal organs;
-the change of the genetic code;
- deaths from dehydration, overheating of the body, and acute renal failure are possible.

Sleeping pills

A group of sedatives (sedatives) and hypnotic substances found in the form of official preparations, usually tablets or capsules. There are many different types, the most dangerous are barbituric acid derivatives, but other drugs that are sold more or less freely in pharmacies (phenazepam, Relanium, Rela-Dorm) can cause mental and physical dependence. Sleeping pills are usually taken by mouth, but sometimes they are administered intravenously.

Consequences of the use of sleeping pills:

- persistent insomnia;
- brain damage clinically similar to epilepsy;

psychoses with hallucinations, delusions of persecution;

- dystrophy of the heart muscle;

-depletion of the liver;

- death from overdose and from the rapid rejection of large doses.

Inhalants

Volatile aromatic substances of narcotic action. Contained in household chemicals: dyes, solvents, glue, gasoline, hair spray, insect repellents. By themselves, they do not belong to drugs. An intoxicating effect is possible if the amount of a substance entering the body is very large.

Consequences of the use of inhalants:

- coughing, cough, runny nose, nosebleeds;

-nausea;

- violation of heart rhythm and pain in the chest;
- loss of coordination, balance;

-toxic liver damage after 8-10 months of continuous use;

irreversible brain damage;

-frequentandseverepneumonia.

TEST JOBS

Specify all correct answers.

I. IDENTIFY A GROUP OF DRUGS THAT CAUSE DRUG DEPENDENCE

1. knitting
2. enveloping
3. adsorbing
4. annoying
5. local anesthetics

II. SEE PREPARATION CALLING MEDICINAL DEPENDENCE

1. tannin
2. ammonia
3. cocaine
4. activated carbon
5. starch mucus

III. SPECIFY MEDICATIVE DEPENDENCE

1. Cordiamin
2. chlorpromazine
3. acetylsalicylic acid
4. phenobarbital
5. sodium thiopental

IV. IDENTIFY A GROUP OF DRUGS THAT CAUSE DRUG DEPENDENCE

1. sedatives
2. barbiturates
3. means for anesthesia
4. neuroleptics
5. analeptics

V. DYSULFIRAM APPLY FOR ABUSE

1. nicotine
2. morphine
3. caffeine
4. cocaine
5. alcohol

VI. IDENTIFY A GROUP OF DRUGS THAT CAUSE DRUG DEPENDENCE

1. psychostimulants
2. nootropics
3. analeptics
4. tonic

VII. INDICATE A DRUG THAT CAUSES ADDICTION

1.tincture of Hypericum

2. piracetam
3. camphor
4. caffeine
5. imizin

VIII. GET THE DRUG CALLING FOR THEISM
1. sodium bromide
2. caffeine
3. tincture of valerian
4. piracetam
5. Aminalon

IX. IDENTIFY A GROUP OF DRUGS THAT CAUSE DRUG DEPENDENCE
1. non-inhalation anesthetic agents
2. anti-parkinsonian drugs
3. narcotic analgesics
4. nonsteroidal anti-inflammatory drugs
5. antidepressants

X. SPECIFY MEANS FROM THE PSYCHOTOMETIC GROUP
1. caffeine
2. tincture of ginseng
3. LSD
4. camphor
5. nicotine

XI. IDENTIFY A GROUP OF DRUGS THAT CAUSE DRUG DEPENDENCE
1. m-anticholinergics
2. opiates
3. alpha adrenomimetics
4. beta adrenomimetics
5. n-cholinomimetics

XII. SPECIFY THE MEANS USED IN ALCOHOL ABSTINENT
1. chlorpromazine
2. diazepam
3. atropine
4. morphine
5. caffeine

XIII. SPECIFY MEANS TO REDUCE IMPACT TO NICOTIN
1. tubocurarine
2. tabex
3. theophylline
4. tramadol
5. ticlopidine

XIV. SPECIFY SUBSTANCE THAT CAUSES MEDICINAL DEPENDENCE
1. adrenaline
2. atropine
3. amphetamine
4. chlorpromazine
5. Aminalon

XV. IN THE MECHANISM OF ACTION OF GALLUCINOGENES TAKES PART IN
1. cholinergic system
2. adrenergic system
3. noradrenergic system
4. dopaminergic system
5. serotonergic system

XVI. SPECIFY WHAT A GROUP OF MEDICINES A HEROIN RELATES TO
1. m-holinoblokatory
2. alpha-blockers
3. n-holinoblokatory
4. beta blockers
5. opioids

XVII. FLUMAZENIL IS THIS
1. benzodiazepine receptor antagonist
2. Cholinergic agonist
3. antagonist of adrenoreceptors
4. antagonist of GABA receptors
5. dopamine receptor agonist

XVIII. NALORPHIN IS THIS
1. benzodiazepine receptor antagonist
2. Cholinergic agonist
3. opioid receptor antagonist agonist
4. antagonist of GABA receptors
5. dopamine receptor agonist

XIX. ORDER PSYCHOSTIMULATOR-ADAPTOGEN
1. caffeine
2. piracetam
3. tincture of ginseng
4. alcohol
5. nicotine

STANDARDS OF ANSWERS

Drugs for narcosis. OVERFLOW MEANS. ETHANOL

I. 1, 3, 6, 7
II. 2, 3, 4, 5
III. 2, 3, 5
IV. 1, 3, 5, 7, 9
V. 1, 3, 6, 8, 9
VI. 1, 3, 4, 5, 7
VII. 2, 3, 4
VIII. 2, 3, 4
IX. 1, 2, 4, 6, 7
X. 1, 2

ANTIEPILEPTIC DRUGS. ANTI-PARKING MEANS.

I. 1, 2, 4, 5
II. 1, 2, 4
III. 1, 2, 3
IV. 1, 3, 4, 5
V. 5
VI. 3
VII. 1
VIII. 3
IX. 1, 5
X. 3
XI. 1
XII. 1

TASKS

1. Difenin. 2. Recoil syndrome. 3. Carbamazepine. 4. M-holinoblokator tsiklodol

ANALGETIC MEANS

I. 1, 2, 3, 6, 7
II. 2, 3
III. 1, 3, 4, 5, 7, 8, 10
IV. 1, 4
V. 1, 3, 4, 5, 6
VI. 2, 3, 4
VII. 1, 3, 5, 8
VIII. 1, 4
IX. 2, 3, 5
X. 1, 3, 4, 5
XI. 1, 2
XII. 1, 4

TASKS

1. Ketorol. 2. Naloxone, mechanical ventilation, forced diuresis.

ANTIPSYCHOTIC MEANS. ANTIDEPRESSANTS. MEANS FOR TREATMENT OF MANIA

I. 1, 2, 4, 5, 6
II. 2, 3, 4, 6
III. 4
IV. 4
V. 1, 3, 5, 6, 7
VI. 1, 3, 4, 6
VII. 1, 2, 3, 5, 7
VIII. 3, 5, 6, 7
IX. 3

TASKS

1. chlorpromazine. 2. chlorpromazine

ANXIOLYTIC MEANS. SEDATED MEANS. PSYCHOSTIMULATING AND GENERALIZING AGENTS. NOOTROPICAL MEANS

I. 3, 4
II. 1, 3, 4, 5, 6, 9
III. 1, 3
IV. 1, 3, 5, 7

V. 1, 3, 5, 8
VI. 3
VII. 2, 4
VIII. 2
IX. 1, 2, 3, 5, 6
X. 2, 3, 5, 6, 7, 9

TASKS.

1. Strychnine. 2. Caffeine.

Drugs causing drug dependency

I. 5
II. 3
III. 4
IV. 2
V. 5
VI. 1
VII. 4
VIII. 2
IX. 3
X. 3
XI. 2
XII. 2
XIII. 2
XIV. 3
XV. 4
XVI. 5
XVII. 1
XVIII. 3
XIX. 3

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