Pharmacology of the respiratory system

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Treatment of respiratory diseases can be divided into:

- **Causal treatment** - when administering the drug we try to eliminate the cause of the disease, for example: in bacterial infections of the respiratory tract we give preparations containing an antibacterial agent
- **Symptomatic treatment** (supportive) – there is no known cause of the disease or available means used in etiotropic therapy do not eliminate the causes of the disease, for example: with a dry, coughing cough we use antitussica drugs.
- Sometimes symptomatic treatment is intended to support etiotropic treatment (with bacterial infections besides a chemotherapeutic agent, we use antipyretic drugs or anti-inflammatory drugs)

Causal treatment

- **Chemotherapeutics**
  - antibacterial
  - antimycotic
  - antiparasitic
- **Resuccitate drugs** - stimulating glomus caroticum and respiratory center in the extended core
- **Beta1 - adrenomimetics**

1. Cure drugs (*Analeptica*)

- Respiratory and vasomotor center stimulants in the extended core

DOKSAPRAM – stimulates the carotid body (glomus caroticum) and respiratory center in the extended core. Used to reverse depression of respiratory function mainly after anesthesia. In addition, it raises the blood pressure. Recognized as one of the best drugs to cure.

Psychoanaleptic- agents that stimulate the cortex and centers of the extended core

CAFFEINE - the most commonly used in the form of salt, as a solution for injection. It causes an increase in motor activity. Directly stimulates the respiratory center in the medulla, intensifies diuresis, stimulates the heart and relaxes the smooth muscle. In the system it undergoes partial demethylation to theophylline and theobromine.

TEOFILIN - the most commonly used in the form of aminophylline (a combination of theophylline and ethylene diamine). Diastolic muscle relaxes, in particular bronchial muscles - used in asthma bronchial. Also used in biliary and renal colic. It lowers the venous blood pressure. It stimulates the vasomotor center and the work of the heart (increased cardiac output).

Symptomatic treatment

- **Broncholytic agents**
- **Antitussives**
- **Expectorants**

1. **BRONCHOLITIC AGENTS**

- beta2-adrenomimetic drugs .

CLENBUTEROL - intended mainly for cattle and horses. Used in acute and subacute diseases of the respiratory system, running with a spastic state of the bronchi.

SALBUTAMOL - the oldest of this group, intravenous administration requires the control of potassium in serum (the possibility of hypokalemia)

TERBUTALINE - used mainly in humans

METHYLXANTHINES

Theophylline - is used in veterinary medicine as a broncholytics, used orally or parenterally in the form of salts as aminophylline (a combination of theophylline and ethylene diamine)).

Theophylline and its synthetic derivatives relax the smooth muscle of the bronchi by inhibiting the phosphodiesterase activity (the enzyme that degrades cAMP) and by blocking adenosine receptors. Theophylline also inhibits mast cell degranulation (decrease in the release of inflammatory mediators).

It is mainly used in asthma and chronic bronchitis. It has a fairly narrow safety margin.

Other drugs in this group are: *caffeine, diprophilin and pentoxifylline*

Parasympatholytic drugs

They compete with Ach (*ACETYLCHOLINESTERASE*) for muscarinic receptors, reduce hypersensitivity of the bronchial mucosa and antagonize the vagal bronchoconstriction controlled by the nerve.
Currently, broncholytics are used in the form of inhalation.

- **Atropine**
- **Ipratropium bromide**

2. Antitussives – recommended in dry, debilitating cough, cancer, in coughs of extrapulmonary origin

A. Centrally acting agents (depression of the coughing center and respiratory depression). They can be divided into opioid (narcotic) and non-opioid (non-narcotic)

opioid antitussives

CODEINE - a derivative of morphine, maximal concentration after administration of people after 45-60 min.

BUTORPHANOL - a medicine with the character of both an agonist and an opioid antagonist. Has a strong analgesic and antitussive effect. Antitussives work 100 times more strongly than codeine. It has a wide margin of safety. Used in attacks of dry cough. Used orally or parenterally. Use with cats cautiously.

DEXTROMETHORPHAN - a semi-synthetic derivative of opium, does not induce dependence and depression of the respiratory center, the potency is equal to codeine. The therapeutic effect appears already after 30 minutes after the administration of oral.

non-opioid drugs with central activity–

These include drugs used mainly in human medicine. They act less antitussive than opioid drugs.

Esters of organic acids

OXELADINE
OXOLAMINE
PENTOXYVERINE
GLAUCINUM

Fenothiazine derivatives

DIOMETOXANATE
PIPAZETAT
OXOMEMAZINE
ALIMENTAZINE

B. agents with peripheral action

Plant Sluices

Their weak antitussive effect consists in covering the mucous membrane against the influence of irritants. When taken orally, they also protect the mucous membrane of the stomach, stop reflex mucus secretion in the bronchi, which reduces the formation of cough stimuli.

We include here: mullein flower, marshmallow root.

3. Expectorant drug – they increase and liquefy the bronchial secretion and strengthen the cough reflex**.**

Based on the mechanism of action, we divide them into two groups:

A. Secretolytic drugs – the result of direct or indirect stimulation of the bronchial glands to release an increased amount of liquid mucus.

- **expectorants acting directly on the bronchial glands -** they are excreted by the glands of the bronchial mucosa, which stimulates the increased production of liquid secretion

- **potassium iodide -** oral administration
- **ammonium chloride -** oral administration

- Expectorants about reflex action

- they are mainly medicines of plant origin, after administration per os irritate the mucous membrane of the stomach, which in the reflex (through n. X to the emetic center) leads to increased secretion of bronchial mucus.

Ipecacuanha root

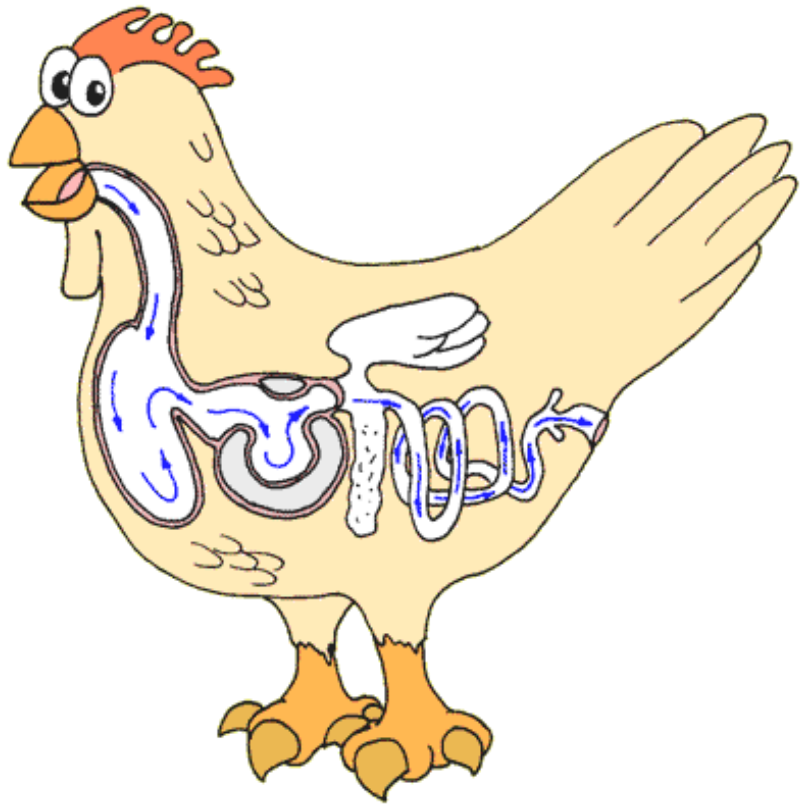
B. Mucolytics - these drugs reduce the content of mucoproteins in the airway inflammation

ACETYLOCYSTEIN - used to liquefy mucus in the case of invasive viscous with a high viscosity, in inflammation of the airways, sinuses.

BROMHEXINE - as a supportive medicine in acute and chronic inflammation of the bronchi with pathological production of mucus. Used in horses, cattle, pigs, dogs and cats. Administered orally and parenterally.

DEMBREXYNA - a bromhexine derivative, in horses also used as a secretolytic agent. Administered orally and intravenously.

Pharmacology of the digestive system



The division of drugs used in diseases of the digestive system

1. Vomiting drugs (emetica)

- it is used to empty the stomach in dogs, cats, pigs, and poisoning with non-corrosive substances

vomiting with peripheral action

- means that irritate the mucous membrane of the upper gastrointestinal tract and lead to vomiting

- **saturated solutions of table salt -** Served orally Vomiting appears after about 20-30 minutes**.**
- **extracts from the root of the vomit -** peripheral / central effects - also stimulate the vagus nerve

central emetic drugs

- **apomorphine -** a dopamine receptor antagonist (D2). Recommended for dogs. In cats, it can cause CNS stimulation. Administered parenterally (sc, im). Vomiting appears after 3-10min. In case of overdose naloxone is used.

- **xylazine -** agonist of alpha2 adrenergic receptors. It works particularly well with cats.

- **Antiemetics -** have a great use in veterinary medicine. Indications for their use are: long-lasting vomiting (uremia, ketoacidosis), vomiting following pharmacotherapy (as an unwanted treatment effect) and vomiting in infectious diseases
- **parasympatolytics -** anti-emetic are muscarinic agonists that can penetrate the blood-brain barrier (to the emetic center in the CNS).

Scopolamine - *inhibits vomiting associated with motion sickness, short duration of action, many side effects. It can not be used on cats because it causes agitation. Currently not recommended.*

- **antihistamines -** centrally acting antihistamines have an anti-emetic effect as a result of blocking H1 receptors

  Diphenhydramine - used orally
  Dimenhydrinate - used orally
  Prometasine - the action lasts up to 24 hours

Indications for the use of drugs in this group are vomiting on the background of motion sickness, post-operative vomiting, vomiting during chemotherapy in neoplastic diseases

neuroleptics - as antiemetics are used mainly:

- derivatives of phenothiazine (chlorpromazine, acepromazine)and
- derivatives of butyrophenone (including perferidol, haloperidol).

Neuroleptics are classified as so-called wide-acting antiemetics, because they block both the emetinic H1 receptor and D2 receptors in the post-reactive area. Injuries are caused by many factors,

- metabolic diseases,

- CNS disorders,

- poisoning.

D2 receptor antagonists–

metoclopramide and domperidone - the central action of these drugs is the blockade of D2 receptors in the chemoreceptor zone in the postrerema area. Drugs from this group also have peripheral antiemetic activity (increase gastrointestinal peristalsis) causing at the same time an increase in the muscle tension of the gastric cardia.

These drugs are used in dogs and cats.

5-HT receptor antagonism Serotonin receptor blockade inhibits vomiting induced by serotonin released in the gut under the influence of cytostatics or ionizing radiation. It is a new group of medicines designed to withstand vomiting caused by radio and cancer chemotherapy. They are also used to prevent nausea and vomiting of the post-operative period. We have it here:

- ondansetron
- granisetron
- tropisetron

Drugs that inhibit gastrointestinal motility

- **This group of drugs can be used as an aid in diarrheas.**

- **opioid - in dogs and cats, two drugs from this group were used:**

- **- diphenoxylate -** pethidine derivative, it also has antiseptic activity. It is used in both acute and chronic diarrheas. It penetrates the blood-brain barrier. Naloxone is administered when poisoning.

- **- loperamide -** pethidine derivative with no central effect. Affects the opioid receptors in the intestinal wall. It works long, 3 times stronger than diphenoxylate. Recommended for dogs. Served per os. It must not be used on cats**.**

Neutralizing drugs - reduce the acidity of gastric juice through the chemical binding of hydrochloric acid. They are used in inflammatory conditions of the mucous membrane, in hyperacids. Neutralizing drugs can cause the symptoms of anxiety: diarrhea - aluminum and magnesium preparations, constipation - calcium and bismuth preparations. You obstruct the absorption of other drugs. Patients with renal failure may accumulate in the magnesium and aluminum system

calcium, aluminum and magnesium salts

drugs are used mainly in small animals in cases of overbearing, in ruminants in the course of metabolic acidosis

Drugs affecting bowel motility

- These drugs are used to facilitate defecation or to reduce excessive intestinal motility, which can occur in the course of diarrhea.

- The drugs that are most often used in diseases of the digestive system in animals include laxatives and antidiarrheal medications

Laxatives

- osmotic

magnesium sulphate (bitter salt) and sodium sulphate (Gheruber salt) These salts are not absorbed from the digestive tract, given in a 3-4% solution increasing the osmotic content of the intestinal tract and retaining water in the intestinal lumen. Stretching the intestinal wall results in a reflexive contraction of the broth.

Lactulose - synthetic disaccharide. It is not digested and does not enter the digestive tract. Stops water in the intestines and works a laxative. It exerts osmotic activity in the small and large intestine

-irritating - they stimulate the convulsions of the submucosal nerves in the intestinal wall, which intensifies peristalsis. They are the drugs of choice in the treatment of constipation caused by the action of opioid analgesics and anticholinergics.

-We have it here:

-Dantrolen - Administered orally

-Castor oil - Administered orally

-Bisacodyl - Used in small animals per os and per rectum

anti-diarrheal agents - the use of these drugs is aimed at weakening or inhibiting excessive peristalsis and prolonging the time of maintaining the intestinal content of food. They are used in the symptomatic treatment of diarrhea.

- adsorption

activated carbon, kaolin, magnesium silicate, bentonite

-astringent drugs

Their action causes denaturation of proteins and mucus on the surface of the mucous membrane, which leads to a decrease in the amount of inflammation and mucus. Substances with astringency also limit the harmful effect on the mucous membrane of other substances

Tanninum

Bismuth salts

Preparations used in diseases of the gastrointestinal tract

- Menbuton Werfft
- Neopropiowet
- Spasmium comp.
- Suibicol Premix
- Clanohepar
- Sól gorzka
- Vetahepar

- Biolent Forte
- Carbo Medicinalis
- Effydral
- Enterogast
- Hydrodiar
- Magnesium sulfuricum
- Magnesium sulfuricum 20%
- Farmatan
- Olej Parafinowy
- Scanohepar
- Silitympakon