

Allergic diseases of the respiratory system

Allergic respiratory diseases include: allergic rhinitis , bronchial asthma and exogenous allergic alveolitis .

See the Allergies page for more information .

Allergic rhinitis

[ upravit vložený článek]

Rhinitis is an inflammation of the nasal mucosa characterized by two or more of the following symptoms:

- reduced nasal patency to obstruction
- secretion (rinorea)
- sneezing, itching
- headaches
- hyposmia, anosmia

In rhinitis, the entire HCD mucosa is affected - to a greater or lesser extent, the paranasal sinuses are always affected, and we speak of rhinosinusitis . Alergická rýma

Classification of rhinosinusitis

- according to the course of the disease:

1. acute
2. chronic

- allergic
- infectious

1. viral
2. bacterial
3. fungal

Allergic rhinitis

- persistent (year-round): allergens are dust, mites and molds
- intermittent: allergens are pollen, it occurs mainly during the flowering period of plants
- light
- moderate
- heavy

Symptoms and clinical picture

- watery secretion from the nose
- sneezing, itching
- impaired nasal patency
- eye / bronchial problems
- reddened, in the acute phase soaked mucosa

Therapy

- reduce contact with the allergen
- local corticoids (in severe cases even for a limited time systemically) and antihistamines
- immunotherapy

Infectious rhinitis

Viral rhinosinusitis

- watery secretion from the nose for 5-7 days
- therapy: decongestants (maximum 7 days)

Bacterial rhinosinusitis

- they are usually secondary to a viral infection
- they are characterized by blockade of the ostiomeatal unit (areas in the meatus nasi medius, where the

maxillary sinus , frontal sinus and ethmoidales anteriores mouth), if the paranasal sinuses are closed, bacterial sinusitis occurs

Acute bacterial rhinosinusitis

- within 12 weeks
- in children most often etmoiditis, in adults maxillary sinusitis
- manifests itself in pain and pressure in the affected cavity
- during rhinoscopy, pus flows from the middle passage
- Therapy : ATB , decongestants, puncture of the maxillary artery

Chronic bacterial rhinosinusitis

- lasts longer than 12 weeks
- similar to the acute symptoms, sometimes it can only manifest itself in worsening of chronic bronchitis or bronchial asthma

Therapy: local corticosteroids, Vincentka rinses, sea water, surgery

Fungal rhinosinusitis

- in patients with impaired immunity, long-term immunosuppressive therapy, diabetics
- clinically responds to bacterial infection, but does not respond to ATB treatment
- Therapy : systemic / local antifungal therapy, surgery

Other rhinosinusitis

- Professional
- Drug (Aspirin)
- Hormonal (pregnancy)
- Other

1. NARES (non-allergic rhinitis with eosinophilic syndrome)
2. Irritant
3. Food
4. Emotional
5. Atrophic

- Idiopathic - so-called vasomotor

Bronchial asthma

[ upravit vložený článek]

Asthma is a chronic inflammatory disease of the airways. These inflamed pathways, when exposed to various risk factors, become hyperreactive, obstructed, and have limited patency due to bronchoconstriction, the presence of mucus glands, and increased intensity of inflammation . The clinical manifestations are recurrent wheezing, shortness of breath , chest tightness and coughing, especially at night and early in the morning. The prevalence of asthma is constantly increasing, especially in children. Asthma is one of the most common chronic diseases.

In Europe, the prevalence is about 5% (with a variance of 10-12%), with 63% occurring before the age of 5.

Pathophysiology

The essence of asthma

- airway inflammation, which is present even when the disease is free of clinical symptoms;
- genetic, developmental and environmental influences;
- allergic eosinophilic inflammation , which induces airway remodeling, is usually present in childhood .

Bronchial changes (sometimes irreversible)

- smooth muscle hypertrophy , increased vascularization and angiogenesis, cellular inflammatory infiltration, collagen deposition, basement membrane thickening and decreased elasticity;
- dendritic cells , T regulatory lymphocytes , IL -4, IL-5 and IL-13 are used;
- in young children, due to the anatomical conditions, the airways are narrower and therefore obstructed more easily;
- the degree of chronicity and irreversibility is lower in children compared to adults and the possibility of successful treatment is better.
- The main risk group - atopsics (allergies in RA);
 - atopic dermatitis (40–60% risk of asthma), allergic rhinitis can be considered a pre-asthmatic condition ;
 - *atopic syndrome* is often spoken of in this sense .

Conditions of origin

- predisposition - family or personal (atopy);
- causal allergens - the more frequent and greater the exposure, the greater the risk;
- supporting effects - respiratory infections, immunodeficiency and immunological dysfunctions, passive smoking , environmental pollutants;
- triggering effects - allergens, infections, pollutants, physical or mental stress, sudden temperature changes, cold.

Clinical picture

- It exhibits conditions of difficulty breathing or exhaled dyspnea , often with wheezing or wheezing in the exhalation;
- it is typical in the second half of the night or after exertion;
- the child feels distress, chest tightness, lack of air;
- it is often accompanied by an irritating dry cough ;
- further: frequent episodes of wheezing without seasonal variability, cough or wheezing caused by exercise, night cough outside the period of respiratory infections, symptoms appear or worsen in the presence of animals, exposure to pollen, house dust, tobacco smoke, temperature changes, strong emotional experiences,...

Age aspects

Respiratory tract before and after an attack

- Asthma can occur at any age (purely theoretically, it cannot occur before age 1 - bronchial smooth muscle has not yet developed and can hardly be considered a chronic disease in the first year, similar to asthma at this age - recurrent obstructive bronchitis).
- Infant and toddler age (0-3 years) :
 - in half of the cases it starts before the age of 3 - childhood asthma - there are no typical symptoms - the child suffers from respiratory infections (mainly viruses), the common denominator is obstructive bronchitis ;
 - the most important indicator is the severity of the disease;
 - if the child wheezes during the last 3 months more days a week, after excluding other causes, we speak of a *persistent wheezing type of asthma* ;
 - in the case of intermittent manifestations, we further distinguish between *light and severe intermittent type* .
- Preschool and school age (3-6 years) :
 - school-age asthma and adolescence are no longer very different from the symptoms in adulthood (only the so-called acute triggers differ);
 - 1. in the meantime, the asthma is completely asymptomatic;
 - A - the problem is provoked by a cold - *asthma induced by viruses* ;
 - B - difficulty arises after greater exercise - *asthma induced by exercise* ;
 - 2. *allergen-induced asthma* or *the cause of asthma has not been determined* .
- adolescence - new problems: irregular drug use, smoking, change of doctor,

Diagnosis

- Anamnesis - information about family workload, relationship of symptoms to place, seasonal, life situation,...;
- clinical picture;
- physical examination - out of acute condition it is usually normal;
- functional lung examination (spirometry) - in cooperating children (over 4-5 years of age), it belongs to the basic procedures;
- positive skin tests with allergens , event. positivity of specific serum IgE antibodies ;
- FEV 1 may be normal, but small flow obstruction is found on the flow-volume curve. honor;
- unclear cases - histamine inhalation challenge test to assess bronchial reactivity;
- when obstruction is found, it is a good idea to perform a bronchodilation test to assess reversibility.

Differential diagnostics

- Acute viral respiratory infections, recurrent obstructive bronchitis , recurrent sinusitis , bronchiolitis , CF , VSV , heart failure , pulmonary embolization , GER (examined 24 hours pHmetry and bronchoscopy), bronchial stenosis, tracheomalacia , foreign body (often underestimated toxoflaxia), an inhalation, anatomical abnormalities are also a common cause of severe acute conditions;
- bronchoscopy is still wrongly considered an overly invasive examination;
 - indications - stridor , atelectasis , persistent wheezing, suspected foreign body, recurrent and persistent pulmonary infiltrates, unexplained cough, recurrent severe acute pain.

Classification of asthma

Video in English, definition, pathogenesis, symptoms, complications, treatment.

According to the severity of the symptoms, the degree of airway obstruction and its variability

- Intermittent:
 - occasional episodes of seizures, maximum 1 × per week, night no more than 2 × per month;
 - between attacks of normal function, spirometry (PEF, FEV1) over 80%, full vital activity.
- Persistent light:
 - symptoms several times a week, night problems several times a month;
 - spirometry (PEF, FEV1) between seizures still above 80% of values;
 - disruption of sleep and daily activities is already evident.
- Persistent moderate:
 - daytime seizures every day, night and several times a week;
 - the patient requires bronchodilators almost daily;
 - spirometry values at rest 60–80%.
- Persistent severe asthma:
 - permanent symptoms with significant reduction in physical activity, night problems;
 - on spirometry there is a state of permanent obstruction (values below 60%).

By level of control (GINA, 2006)

- Asthma under control;
 - asthma under partial control;
 - asthma under poor control;
- It is based on a detailed description of the symptoms, their frequency and severity (an important indicator - the consumption of relief bronchodilators);
 - completeness also includes evaluation of bronchial reactivity and lung function;
 - the aim is for the patient (school children, adolescents) and parents (young children) to be involved in the assessment.
 - Ongoing evaluation includes:
 - daily symptoms ;
 - nocturnal symptoms : record of the frequency of nocturnal symptoms - night and morning, feelings of chest tightness;
 - activity restriction : how it limits normal daily activities;
 - need for relief drugs : labeling the use of β_2 -agonists for acute disorders;
 - lung function : monitoring of lung function and bronchial reactivity;
 - spirometry - recording of the flow-volume curve reliably reveals even latent obstruction;
 - we evaluate the reversibility of obstruction by administering a bronchodilator;
 - asthma (even asymptomatic) should be min. spirometrically checked once a year;
 - inhalation provocation test with histamine or acetylcholine, serves to objectify bronchial reactivity;
 - use - for the diagnosis of asthma, for the evaluation of therapy, for assessment purposes;
 - orienteering PEF with an exhalation meter (peak flowmeter) - every asthmatic should have it;
 - standing, after a strong breath, a strong exhalation into the device (out of three attempts we record the best value), it is usually measured in the morning and in the evening;
 - the norm is the best value of the patient inhaled at rest;
 - an important value is the variability of daily values;
 - $IV = (PEF \text{ evening} - PEF \text{ morning}) / \text{average of these PEFs} \times 100$;
 - variability up to 20% expresses stabilized asthma.

According to ABR

1. Respiratory alkalosis ,
2. normal pH (muscle fatigue) - normal pH in an asthma attack is not normal !!
3. respiratory acidosis .

Therapy

- The main goal is to bring asthma under control so that it does not manifest itself in shortness of breath and does not restrict the child in normal activities.
- Asthma control means:
 - disappearance of chronic symptoms;
 - reduction of symptoms to isolated acute exacerbations;
 - no or minimal consumption of relief drugs;
 - stabilization of lung function, low variability of PEF;
 - normal physical performance.
- Pharmacotherapy + elimination of contact with allergens ev. allergen immunotherapy + climatic treatment (spa, stay by the sea, speleotherapy, rehabilitation, psychotherapy).
- *Education* of close children - we inform the family, the child, for school children the teacher should also receive information.
- *Environmental care* - optimal temperatures and humidity (19–20 ° C, 40–50% relative humidity), creation of allergen-free environment (bed treatment, pets), removal of harmful substances from the apartment (above the gas stove hood, parents smoking,...) .
- *Remediation of infectious foci* - recurrent HCD infections can often trigger or accompany asthma - in preschoolers, the verification of adenoid vegetation is a routine examination , always adenotomy if positive.
- *Specific allergen immunotherapy* (SAIT) - a major treatment intervention, especially in seasonal pollen asthma or asthma with mite allergy, it is actually a vaccination, the treatment lasts three years.

Pharmacotherapy

- We have two main groups of drugs: short-acting *relief drugs* that help with acute conditions and *preventive* , anti-inflammatory drugs for maintenance treatment, controlling asthma.
- Inhalation is preferred, and the route of inhalation is as important as the drug itself - it should be practiced with patients - whenever drug administration fails, control of the route of administration is necessary before dose adjustment, interval change or even medicine.

Rescue drugs

- Short-acting β 2-mimetics;
- other bronchodilators.

Preventive (controlling) drugs

- Inhaled corticosteroids ,
- antileukotrienes,
- long-term effective β 2-mimetics,
- retarded theophyllines,
- chromones,
- oral corticosteroids ,
- anti-IgE antibodies.

Physical therapy

- Endurance training is suitable for adult patients, 20-30 minutes a day, it can be combined with resistance training.
- Interval training is suitable for heavier patients.
- For children, any varied physical activity can be recommended to strengthen the overall fitness of the body.
- Appropriate exercise therapy can also reduce the number of seizures, because it increases the individual's resistance to cold and fatigue.
- In the case of post-exercise bronchospasm , we can use the refractory period.

Drugs used to treat asthma

For more information, see *Bronchial Asthma Therapy* .

If the drug does not have a picture of a pill, the drug is not currently registered on the Czech market.

- *short-acting β 2-agonists*
 - mechanism of action:

stimulate the sympathetic beta receptors , thereby causing bronchial dilatation,
reduce cholinergic reflection and plasma exudation,
increase mucociliary clearance, stabilize mast cell membranes,
 - they are used irregularly, as needed to suppress acute attacks, in shortness of breath,
 - they can also be used preventively against physical activity,
 - the effect lasts about 4 hours, preferably an inhalation form,
 - These include: salbutamol , fenoterol , terbutaline .
- *β 2-agonists with prolonged action*
 - the effect lasts for 12 hours or more, so they can be given twice a day,
 - use - for night attacks, prevention of post-exercise asthma, in combination therapy as a supplement to anti-inflammatory preventive therapy of more severe types of disease,
 - they can be given regularly for a long time, but only with the current anti-inflammatory steroid or non-steroidal treatment,
 - salmeterol , formoterol
 - oral: clenbuterol , procaterol .
- *Anticholinergics*
 - mechanism of action:

inhibit the action of acetylcholine on muscarinic receptors, suppress the bronchoconstriction thus induced and reduce vagal tone;
 - as an adjunct to treatment in an acute condition or where sympathomimetic treatment is contraindicated;
 - are suitable for children where symptoms are associated with irritating cough;
 - in our country there is only one representative of ipratropium bromide - aerosol, inhalers, nebulization solution;
 - alone, its effect is smaller - it can be combined with fenoterol or salbutamol.
- *Xanthines*
 - mechanism of action:

inhibition of phosphodiesterase and thus increase of cAMP concentration;
 bronchodilation, stimulation of the diaphragm and respiratory center;
 decreased vascular lung resistance and increased myocardial perfusion;
 NÚ: reduction of the lower esophageal sphincter tone → development of gastroesophageal reflux ;

- these include theophylline and aminophylline .
- Theophyllines with short-term effect
 - aminophylline po or inj., duration of action is 4-6 hours;
 - injection is possible for severe asthma attacks in combination with β_2 -agonists and corticosteroids - mostly during hospitalization;
 - be careful - if the child is already being treated with a retarded form of theophylline - to monitor plasma levels;
 - NÚ - tachycardia, palpitations , nausea , vomiting, headaches , convulsions ;
- Prolonged-acting theophyllines ;
 - the duration of effectiveness is 12-24 hours, they also contribute to anti-inflammatory activity;
 - in chronic persistent forms - only in combination with anti-inflammatory treatment;
 - again especially in nocturnal asthma;
 - as monotherapy are not administered for a long time.
- *Corticosteroids*
 - mechanism of action:

suppress the development of inflammation, reduce the infiltration of the bronchial wall by eosinophils, reduce plasma exudation and mucus secretion;
 - at daily doses up to 200 μg , they do not cause any side effects in most people;
 - NÚ (800 μg / day and more): growth retardation in children, effect on hypothalamic-pituitary-adrenal axis function, decrease in bone density;
 - slow onset of action;
 - we start the treatment with a higher dose, we reduce it after a few months;
 - beclomethasone , budesonide , ciclesonide , fluticasone ;
 - inhaled corticoids are given before meals, after administration we rinse our mouths (then we spit it out);
 - NÚ of inhaled corticoids - dysphonia (change of voice, hoarseness), oropharyngeal candidiasis . (rare)
- *Antileukotrienes*
 - mechanism of action:

suppresses the effect of post-inflammatory mediators, leukotrienes, released from mast cell membranes, eosinophils and others;

 - leukotrienes cause stronger bronchoconstriction than histamine (they are the strongest endogenous bronchoconstrictor), increase mucus secretion and vascular permeability, increase the amount of eosinophils in the walls of the bronchi;
 - leukotriene receptor antagonists: montelukast , zafirlukast - orally;
 - children from 3 years;
 - for the prophylaxis of all forms of persistent asthma, aspirin asthma (suppresses the response to ASA or NSA) and exerted by exertion;
 - dosage:
 - zafirlukast twice daily, its effect is reduced by erythromycin, theophylline or terfenadine;
 - montelukast once daily, drug interactions unknown.
- *Anti-IgE antibodies*
 - recombinant humanized monoclonal antibodies;
 - mechanism of action:

by binding to IgE, they reduce its levels in the body and at the same time prevent the binding of IgE to receptors on the surface of mast cells and basophils - thus preventing their degranulation with the subsequent release of mediators;

they also inhibit the release of newly formed IgE from B-lymphocytes;
 - difficult-to-treat asthma involving IgE antibodies;
 - by injection, to children older than 12 years - with us only in specialized centers so far !!!
- *Kromony*
 - disodium cromoglycate - stabilizes the membranes of histiocytes, basophils and eosinophils , thereby reducing the release of inflammatory mediators ;
 - administered 4 times a day (with long-term administration, the cooperation of patients and parents decreases);
 - originally applied in powder (Intal);
 - in mild to moderate forms of persistent asthma and in post-exercise asthma;
 - nedocromil sodium - indications similar, affects the chloride channels bb. → also reduces neurogenic sensory irritation, thus suppressing cough irritation;
 - its advantage is administration twice a day.

Combination therapy

- If asthma control already requires repeated doses of short-acting β_2 -agonists and increases in corticosteroid doses, then combination therapy is considered;
- borderline doses of inhaled corticoids;
 - for early and preschool children - 400-600 μg / day;
 - for school children - 800-1000 μg / day.

Inhalation systems

Inhalers Example of an inhaler

- Dosed aerosol inhaler - the most common, the dose is compressed in a container, after compression the dose of the substance is released;
 - the breath needs to be perfectly coordinated with the application of the substance;
 - children under the age of five are not able to apply it themselves;
 - the breath must be slow, after the beginning of the breath we press, after the end of the breath we hold for 5-10 s breath;
 - the most common mistakes - non-shaking, rapid breathing, late injection;
- inhalation attachments - to facilitate administration, in young children;
- breath-activated aerosol inhalers - no coordination with breath is required for inhalation;
 - there is a spring in the system which releases the required dose when inhaled;
- powder forms of anti-asthmatics - have been developed to avoid the use of CFCs and inhalation to be easier;
 - all are triggered by a breath;
 - the oldest was Spinhaler, where the capsule (Intal) was inserted, where it punctured and the powder reached the lungs with a breath;
 - Turbuhaler - a drug reservoir on a rotating disk, metering a dose;
 - Easyhaler etc.
- nebulizers - solution forms of bronchodilators, the drug is dissolved either in a liquid (solutions) or is dispersed in it (suspensions) from which an aerosol is formed - either ultrasonically or jet.

Corticosteroids systemically

- Per os - acute exacerbation of asthma - we give prednisone for 3-7 days;
 - long-term maintenance treatment of persistent asthma - only in the most severe forms;
- inj. - acute exacerbations - iv methylprednisone or hydrocortisone.

Treatment of asthma exacerbations

Exacerbation of asthma

- = Progressive worsening of dyspnoea, cough, wheezing, chest tightness or a combination of these symptoms;
- preschool child seeks sitting position, speaks in shorter sentences, breathes while speaking;
- symptoms worsen when moving;
- severe acute asthma - associated with general alteration, small child is restless, infant or toddler does not want to drink, is exhausted, older child is leaning forward, talking jerkily, breathing with wheezing turns into quiet breathing.

Therapy

Asthma spacer

- Inhalation of beta-2-agonists with rapid onset of action ev. + anticholinergics ; Suitable to use a professional or improvised aid - spacer . A tachypnoic patient inhales undisturbed drug only superficially (unable to coordinate breath).
 - + corticosteroids after ;
 - + in hypoxia of oxygen inhalation ;
- in the acute state we do not administer : inhaled corticoids, oral β_2 -agonists, oral theophyllines, antihistamines, sedatives, mucolytics, antibiotics !!!

Exogenous allergic alveolitis

[ upravit vložený článek]

Exogenous allergic alveolitis (or also hypersensitivity pneumonitis, farmer's lung, pigeon's lung) includes a group of immunologically conditioned diseases (type III hypersensitivity) with granulomatous inflammation in the bronchioles + alveoli. It is an interstitial pulmonary fibrosis caused by repeated contact with a certain allergen. The most endangered group are workers in plant and animal production after repeated exposures to moldy hay, straw and grain. Exogenous allergic alveolitis also occurs when working with moldy malt, furs, moldy cheeses, feathers and bird excrement. It is rare in children, it is most often caused by inhalation of organic dust from birds (pigeons, parrots, budgies).

Diagnostics

- History, laboratory signs of inflammation , precipitating antibodies (specific IgG) in serum against the inducing antigen ,
- Chest X -ray: reticulonodular drawing with mottled volatile infiltrates,
- BAL: usually lymphocytic alveolitis, ↓ CD4 / CD8,
- chronic phase: X-ray + HRCT image of interstitial pulmonary fibrosis / honeycomb lung; restriction, pulmonary diffusion capacity disorder, hypoxemia; lung biopsy .

Clinical picture

Acute

The acute form is reversible and develops within about 6 hours after intense antigen exposure. It expires within 48 hours. There is physically demonstrable crepitus above the lung bases. The following manifestations are characteristic:

- whooping cough , fever , chills, malaise, myalgia, headache .

Chronic

If antigen exposure persists, a chronic form of exogenous allergic alveolitis develops. Lower concentrations of the relevant antigen are also sufficient for repeated exposure. Irreversible interstitial lung fibrosis (restriction disorder) occurs. Symptoms:

- weight loss, fatigue, cough, shortness of breath and cyanosis , cor pulmonale , clubbed fingers , eventually respiratory failure.

Therapy

- Elimination of antigens - necessary permanent exclusion of the worker from exposure (for occupational diseases),
- corticoids ,
- oxygen therapy.
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Links

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