Allergic professional diseases of the airways and lungs

The category of professional allergic diseases includes **allergic rhinitis** and **asthma bronchiale**.

Occupational allergic rhinitis

- It is defined as an **inflammatory disease** of the nasal mucosa that occurs as a reaction to an airborne allergen occurring in the workplace. An estimated 15-20% of the population suffers from allergic rhinitis, the share of professional rhinitis cannot be estimated.
- Allergens are either "*common substances*" that are present in increased amounts in the workplace (flour in bakeries, grain dust...), or they are allergens ""specific to the given work environment"" (acid anhydrides in the production of plastics...). In general, they are either "high molecular weight" (proteins, grain dust, insect antigens, latex...) or "low molecular weight" (diisocyanates, anhydrides, rosin substances, ATB...).

Professional Exposure

Similar to asthma: flour processing (bakers, millers), grain handling (farmers), animal care, contact with disinfectants (medical workers), woodworking.

Etiopathogenesis

- Repeated contact with the allergen leads to **IgE dependent activation of mast cells' → vasodilatation'**, edema, nasal obturation.
- Mediators of inflammation stimulate afferent nerve endings → itching in the nose, **sneezing**.
- Accumulation of inflammatory cells is characteristic.

Pathology

Edematous mucosa with profuse serous exudation, the chronic form has a hyperplastic or atrophic character.

Clinical course

Acute

- **Itching and irritation** in the nose, sneezing and watery discharge, often accompanied by itching in the throat, eyes and ears. Asthma is often added to the symptoms.
- It is a type I reaction → symptoms appear within minutes, disappear quickly.

Chronic

- Unrecognized and untreated recurrent acute rhinitis can become chronic after months or years.
- The *feeling of stuffy nose* and thick mucus dominates, there may be chronic changes in the conjunctiva, lacrimation. Sneezing and itching are usually absent.

Investigative methods

- ENT examination,
- **intradermal skin tests** - a basic series of inhalation allergens (house dust, feathers, dust mites...),
- increased IgE in serum,
- certificate of professional specific IgE antigens,
- smears from the nasal mucosa – cytological analysis (*predominance of eosinophils*),
- **Rinomanometry** - measures the resistance of the nasal passages by quantitative measurement of nasal flow and pressure,
  - active anterior rhinomanometry is usually used,
  - is also used when assessing the response to provocation tests,
  - positive rhinoprovocation test – after contact with the allergen, nasal flow decreases by at least 40% and nasal resistance increases by 60%.
- Assessment of professionalism - we must demonstrate inhalation exposure to an allergenic substance in the workplace.
  - clinical picture and specific immunological response decide,
  - people often neglect this disease and go to the doctor only after a long time.

Differential diagnosis

- Especially rhinitises of other origins (allergic seasonal, year-round...), other pathologies in the nasal cavity

must also be considered.

Occupational bronchial asthma

- Asthma disease caused by *inhalation of harmful nox at work*,
- from classic asthma this is not different at all,
- estimate of the share of professionalism in asthma – 2-15%, the figure is probably '*significantly underestimated*, doctors often do not think about professionalism at all.
- Factors:
  - **high molecular weight** (animal and vegetable proteins),
  - **low molecular weight** (isocyanates, anhydrides, platinum salts),
  - **inhalation chemicals'** (chlorine, ammonia),
  - pharmacologically active substances (*insecticides*),
  - physical factors (**cold**).

Professional exposure

- The most common allergens:
  - **flour** (amylase) - millers, bakers, confectioners,
  - grain dust - silo workers, farmers,
  - '*urine and fur* of laboratory and farm animals - research laboratory workers, farmers, breeders,
  - disinfectants - health workers,
  - natural and synthetic fibers – textile industry,
  - **wood dust** - sawmills, furniture industry,
  - proteolytic enzymes – food industry, production of washing powders,
  - rosin fumes and other welding fumes – fine mechanics, welding,
  - isocyanates, acrylic resins, color pigments – chemical production.

Etiopathogenesis

- **Chronic inflammatory disease**, the main cells involved - **mast cells** and eosinophils,
  - inflammation increases the reactivity of the bronchi, **bronchospasm** (obstruction) occurs,
  - **mild asthma** - obstruction is not present between attacks, but there is **hyperreactivity**,
  - **severe asthma** - **obstruction** present even between attacks.

Types of occupational asthma

Immunological professional asthma

- occurs in a small number of exposed,
- after an initial symptom-free period, by inhaling substances that the worker previously tolerated well,
- a **specific immunological response** to the substance arises ,
- are caused by two types of substances, depending on which course is different,
  - **high molecular weight substances** – induce IgE response, starts quickly,
  - **low molecular weight substances** - unknown mechanism (probably type III or IV response), **onset later** (often only after returning from work), subsides after 24 h.

Irritation-induced asthma

The mechanism of formation is not entirely clear (probably the **release of neurotransmitters** plays a role). It occurs **after exposure to irritants** (dust, aerosol, vapors, smoke).

RADS (reactive airways dysfunction syndrome)

It is caused by short-term intensive exposure,

Reflex bronchoconstriction

Non-immunological response (without inflammation), when neuroreceptors are stimulated by cold, dust, aerosols, smoke.

Pharmacological bronchoconstriction

It is caused by inhalation of substances causing pharmacological bronchoconstriction, e.g. **organophosphates**.

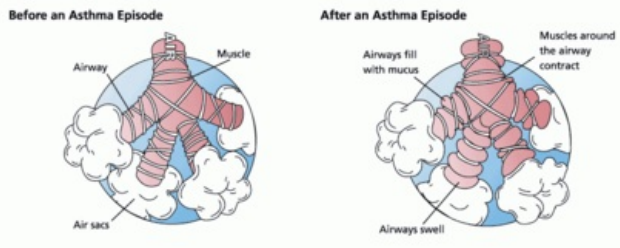
Pathology

Remodeling of the wall occurs - thickening of the wall of the bronchioles (muscle hypertrophy), high epithelium, many goblet cells , sometimes even squamous metaplasia , hyperplasia of goblet cells occurs .

Clinical picture

- A feeling of shortness of breath , wheezing with a maximum in expiration (often audible at a distance - distance phenomena).

- **Coughs** occur only at the workplace or in connection with work (after work).
- Often also **eye complications** , rhinitis...
- Symptoms get better on weekends and holidays.



Difference between normal and asthmatic bronchiole

Investigative methods

- **Spirometry** – obstructive ventilation disorder,
- **non-specific bronchoprovocation test** – with acetylcholine or histamine ,
  - we find nonspecifically that the bronchi are hyperreactive.
  - **Criteria of positivity**
    - decrease in FEV1 by 20%, MEF 25-75 by 30%, increase in resistance by 100%,
- Specific inhalation **bronchoprovocation tests** – we administer a specific substance that we suspect, either we administer commercially produced preparations or in an exposure booth (we make workplace conditions),
  - conditions for positivity are as for a non-specific test,
  - is potentially more dangerous (we administer an allergen, not the body's own substance...),
    - only in people who do not have obstruction at rest and during hospitalization.
- **Elimination test** – assessment of health status after long-term exclusion from exposure.
- **Re-exposure test** – after carrying out the previous one, we re-engage in the process and determine the state of health.
- **Skin tests** , certificate spec. IgE, BAL...

Differential diagnosis

It is necessary **to rule out other causes of obstruction** – tumors, foreign bodies, laryngeal nerve paresis... The basic problem is differentiating between occupational asthma and pre-existing work-exacerbated asthma.

Treatment

Exclusion from exposure, corticoids , β-2-mimetics , anticholinergics , **theophylline** , antiallergics .

Links

Resources

- BENEŠ, Jiří. *Studijní materiály* [online]. [cit. 24.02.2010]. <http://jirben.wz.cz>.

Literature used

- PELCLOVÁ, Daniela. *Nemoci z povolání a intoxikace.* 2. edition. Karolinum, 2006. pp. 207. ISBN 80-246-1183-X.