

Asthma bronchiale

MUDr. Vladimír Herout
Department of pulmonology,
University hospital Brno
Masaryk University, faculty of medicine



Definition?



Definition

- Asthma is a chronic inflammatory disorder of the airways connected with their structural changes. Chronically inflamed airways are hyperresponsive, they become obstructed and airflow is limited (by bronchoconstriction, mucus plugs, and increased inflammation) when airways are exposed to various risk factors.

COPD – definition (difference x astma)

- COPD (chronic obstructive pulmonary disease) is a lung disease that cause obstruction of the airways.
- Even with treatment, COPD **is not completely reversible** and usually worsens over time.

Symptoms

- Recurrent episodes of wheeze, dyspnoea, chest tightness, and cough, particularly at night or in the early morning.

Epidemiology

- one of the most common chronic diseases
- prevalence worldwide 1-18%
- most common especially in developed countries
 - Great Britain 10%
 - Czech Republic 8%

Epidemiology

- asthma predominantly occurs in boys in childhood, with a male-to-female ratio of 2:1 until puberty
- asthma prevalence is greater in females after puberty
- the majority of adult-onset cases diagnosed in persons older than 40 years occur in females

economic burden

- in the United States, for example, annual asthma care costs (direct and indirect) exceed US\$6 billion

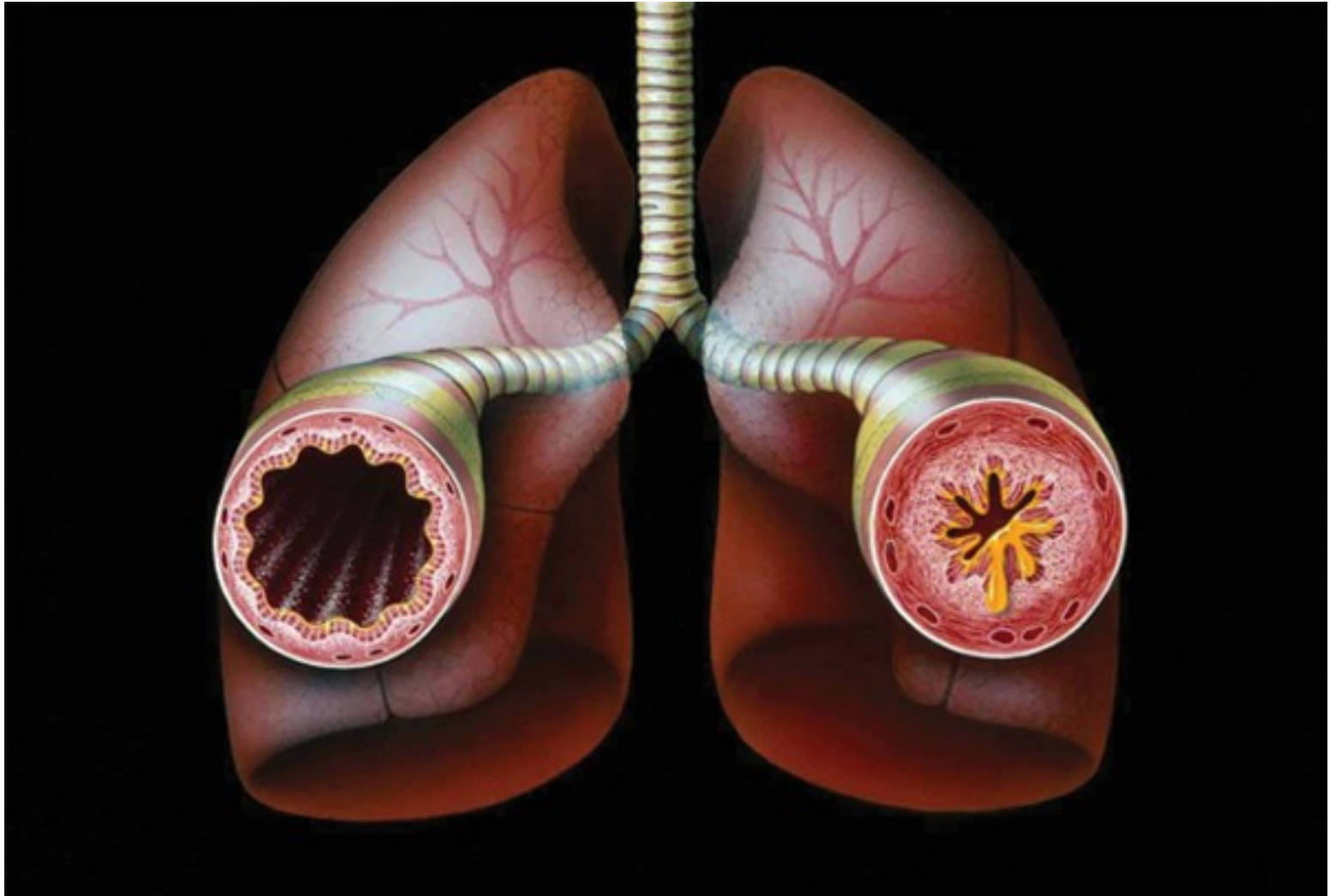


Etiology a pathogenesis

- genetic factors + exogenous influence (allergens, infection, tobacco smoke, ...)
- Main genetic predisposition factor for developing asthma is atopy (hyperproduction of IgE)

Etiology a pathogenesis

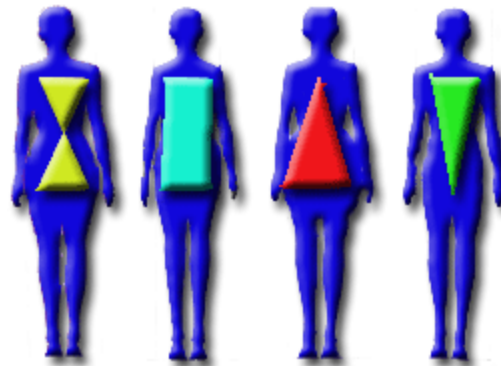
- **Stimuli that can cause asthma:**
 - early childhood infections
 - chemical exposure through air pollution
 - insufficient immune system development



Clinical symptoms

- Recurring episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning.

Phenotype



Definition

- Phenotypes result from the expression of an organism's genes as well as the influence of environmental factors and the interactions between the two.

Phenotype of asthma (curability)

good

- Eosinophilic asthma with allergy
 - Eosinophilic asthma without allergy
 - Non-eosinophilic asthma

bad

**What examination can we routinely use
to divide asthma according to
phenotype?**

Phenotype of asthma

- **Exhaled nitric oxide (FeNO)**
 - fractional exhaled nitric oxide (FeNO)
 - noninvasive marker of eosinophilic airway inflammation
 - FeNO level is normal in well-controlled asthma

Phenotype of asthma

- **Induced sputum**

- produced for diagnostic tests by aerosol administration of a hypertonic saline solution

- eosinofilia
 - neutrofilia
 - paucigranulocytic phenotype of asthma

Phenotype of asthma

- **Bronchoscopy**

- BAL

- Bronchial biopsy

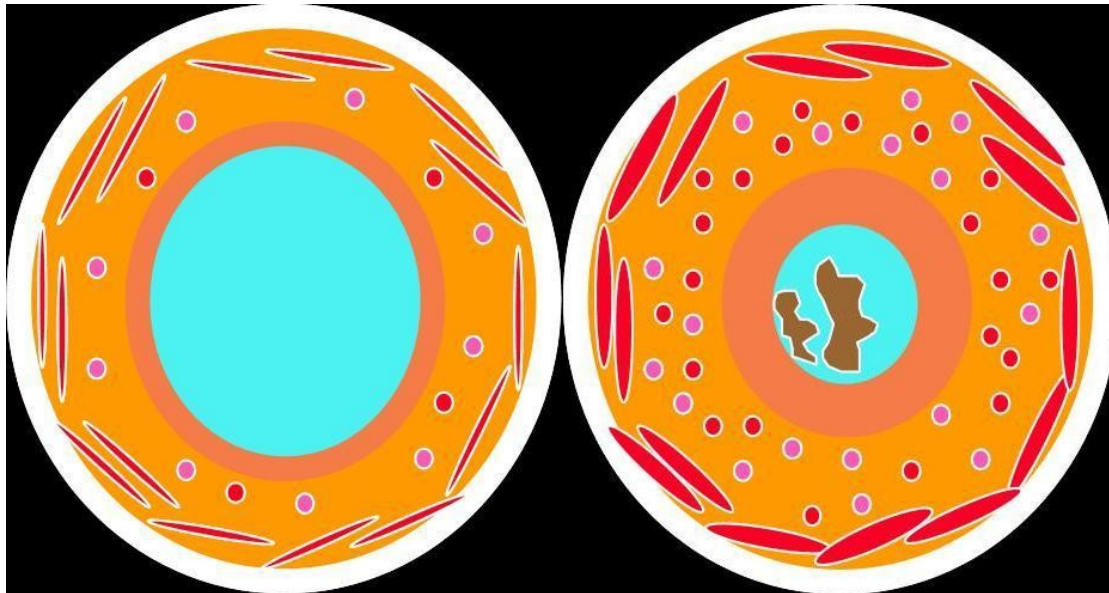
- »

thickened basement membrane

- »

cell infiltration in submucosa

smoothmuscle hypertrophy

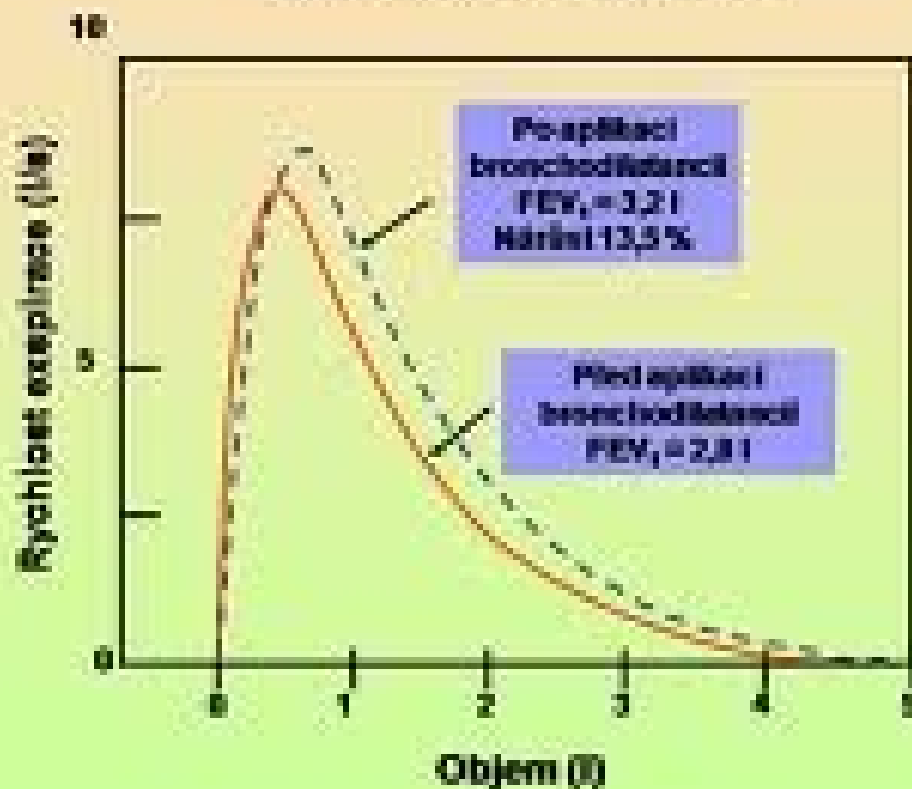


Diagnosis

- Medical history
- Spirometry (measurements of lung function)
 - evidence of the bronchial obstruction, its reversibility and variability
 - normal spirometry does not exclude asthma bronchiale

- **Reversibility of bronchial obstruction**
 - **Positive bronchodilatation test** - 12% or more improvement in FVC or FEV₁ after administration of bronchodilator (salbutamol...)

Bronchodilatační test: Diagnóza podílu reverzibilní obstrukce u astmatu



- **Measurements of bronchial hyperreactivity (bronchoconstriction test)**
 - for patients with symptoms consistent with asthma, but normal lung function
 - measurements of airway responsiveness to metacholine and histamine
 - (an indirect challenge test such as inhaled mannitol, or exercise challenge)

Treatment - history

- 1969: beta-2 agonists
- 1974: inhaled corticosteroids

- There is now good evidence that the clinical manifestations of asthma—symptoms, sleep disturbances, limitations of daily activity, impairment of lung function, and use of rescue medications—can be controlled with appropriate treatment.

Non-farmacological treatment

- Identify and reduce exposure to risk factors
 - strategies for avoiding common allergens and pollutants



Farmacological treatment

Medications in two broad categories:

- Quick relief of symptoms
 - bronchodilatators
- Long term control of persistent asthma
 - antiinflamantory and preventive

- Inhaled medications are preferred because it deliver drugs directly to the airways where they are needed, resulting in potent therapeutic effects with fewer systemic side effects.

Quick relief therapy

- **RABA** (rapid-acting beta-2 agonists)
 - SABA (short-acting beta-2 agonists)
 - fenoterol, salbutamol, terbutalin
 - formoterol (LABA – long acting beta-2 agonists)
- **SAMA**(short-acting muscarinic antagonist)
 - ipratropiumbromid
- i.v. theofyllin, systemic corticosteroids



Long term control therapy

- Inhaled corticosteroids
- LABA (long acting beta-2 agonists)
- Antileukotriens
 - montelukast, zafirlukast
- Retarded theofyllins
- Systemic corticosteroids
- Anti-IgE (omalizumab)



- First choice therapy of persistent asthma is **inhaled corticosteroids**.

Asthma Classification of asthma by level of control

- The goal of asthma care is to achieve and maintain control of the clinical manifestations of the disease for prolonged periods.

Asthma Classification of asthma by level of control

Characteristics	Daytime symptoms	Limitation of activities	Nocturnal symptoms	Need for reliever/rescue inhaler	Lung function (FEV1, PEF)	exacerbations
Controlled (All of the following)	2 or less/week	None	None	2 or less/week	Normal	None
Partly controlled (Any measure presented)	More than 2/week	Any	Any	More than 2/week	under 80% predicted	1 and more/year
Uncontrolled	3 or more features of partly controlled asthma					

DCA = Difficult-to-control asthma

- **Difficult-to-control asthma (DCA) can be described as an inability to reach satisfactory asthma control after 6 months of appropriate antiasthmatic therapy (including high doses of inhaled corticosteroids) and patient compliance to this therapy is good.**

National Center for Severe Asthma in the Czech Republic

- Establish in 2006
- 8 centers in Czech rep.
- <http://www.tezke-astma.cz>

Severe asthma

1. Controlled – only with intensive treatment

2. Uncontrolled

- bad compliance
- persistent comorbidities – gastro-oesophageal refluxive disease, rhinosinitis
- DCA

Managing of severe asthma exacerbation

- oxygen
- nebulised beta-2-mimetics
- nebulised ipratropium bromide
- i.v. corticosteroids
- magnesium i.v.
- NIV
- intubation, ventilation

Differential diagnosis

- COPD
- Foreign body
- Vocal cord dysfunction
- Heart failure - „Cardiac asthma“

- Onemocnění průdušnice
 - stenóza
 - cizí těleso
- Tracheobronchomalacie
- Onemocnění průdušek
 - akutní bronchitida
 - Bronchiolitida
 - ...

Prognosis

- good
- 5 % difficult-to-control asthma (DCA)

Questions?

Asthma Control Test™



Know your asthma score - ACT now

1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?

All of the time <input type="radio"/>	Most of the time <input type="radio"/>	Some of the time <input type="radio"/>	A little of the time <input type="radio"/>	None of the time <input type="radio"/>	Score <input type="text"/>
---------------------------------------	--	--	--	--	----------------------------

2. During the past 4 weeks, how often have you had shortness of breath?

More than once a day <input type="radio"/>	Once a day <input type="radio"/>	3 to 6 times a week <input type="radio"/>	Once or twice a week <input type="radio"/>	Not at all <input type="radio"/>	Score <input type="text"/>
--	----------------------------------	---	--	----------------------------------	----------------------------

3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?

4 or more nights a week <input type="radio"/>	2 or 3 nights a week <input type="radio"/>	Once a week <input type="radio"/>	Once or twice <input type="radio"/>	Not at all <input type="radio"/>	Score <input type="text"/>
---	--	-----------------------------------	-------------------------------------	----------------------------------	----------------------------

4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?

3 or more times per day <input type="radio"/>	1 or 2 times per day <input type="radio"/>	2 or 3 times per week <input type="radio"/>	Once a week or less <input type="radio"/>	Not at all <input type="radio"/>	Score <input type="text"/>
---	--	---	---	----------------------------------	----------------------------

5. How would you rate your asthma control during the past 4 weeks?

Not controlled at all <input type="radio"/>	Poorly controlled <input type="radio"/>	Somewhat controlled <input type="radio"/>	Well controlled <input type="radio"/>	Completely controlled <input type="radio"/>	Score <input type="text"/>
---	---	---	---------------------------------------	---	----------------------------

Get your results