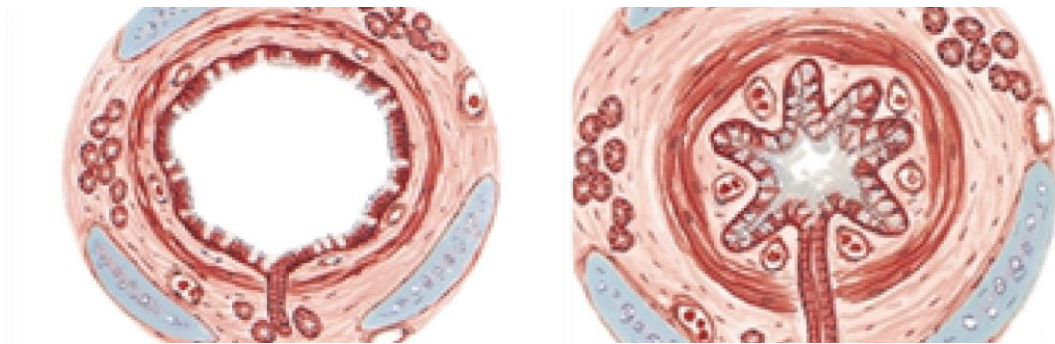


Asthma bronchiale

COPD

Pharmaceutical care



Timeline:

1. Asthma bronchiale (AB)

2. COPD (Chronic obstructive pulmonary disease)

- **Case reports**
- Etiology, symptoms, therapy, AB / COPD differences
- Inhalation systems - types, theory, images
- Inhalation systems - **practical demonstrations**, training

CASE REPORTS

1. Case report – ASTHMA

Patient: Kateřina, year of birth 1983

Personal history: **bronchial asthma**, non-smoker, not allergic to any drugs/medicines, she does not perform self-monitoring of asthma

Previously used only **inhalation salbutamol**, she has worsening of the problem, salbutamol had to be used **up to 6 times a week**, started **waking up at night once a week** because of dyspnea (shortness of breath) attacks. That's why her **treatment was changed** today.

Kateřina

- Medical history:
 - Miflonid 400 inh. plv. 1-0-1
 - Ventolin Inhaler N 1 to 2 breaths **when needed**



Prescription analysis

Miflonid 400 inh. plv.

- 1-0-1
- active substance: **budesonide**
- corticosteroid anti-inflammatory agent, **high first pass effect** of drug residues after absorption (local effect)
- **Mechanism of action:** **Reduction of cytokines** that activate eosinophils, inhibition of induction of COX-2 inhibits the formation of vasodilating PGE2, PGI2 and spasmogenic leukotrienes, thus reducing the migration of inflammatory elements into the bronchial tissue

Ojedinělá pomůcka umožňující snadný nádech účinné látky ⁽¹⁾

Troji kontrola pacientem

Pacient slyší rotaci kapsle...

Aerolizer®
Miflonid®

Silný protizánětlivý účinek ^{2,3}
Prášková inhalační forma
Umožňuje individuální dávkování
(inh. cps 200 a g. 400 a g)

Miflonid
Málokdy působí pro 1 hodinu⁴ budesonid

...konečně si oddechněte... NOVARTIS

Prescription analysis

Ventolin inhaler N

- 1 to 2 breaths when needed
- active substance: **salbutamol**
- Beta β 2 sympathomimetic, **short-acting (SABA)**,

Dosage:

- acute therapy: 100-200 μ g (1-2 breaths) No more than 8 breaths per 24 hours (**800 μ g**), 4 times a day
- chronic therapy: up to 200 μ g 4 times a day, each 6 hours
- the onset of action is **within 5-10 minutes**, duration of effect **up to 6 hours**
- **Dosage only when needed !!**

salbutamol had to be used up to 6 times a week, started waking up at night once a week

Asthma Severity Chart

	INTERMITTENT	MILD PERSISTENT	MODERATE PERSISTENT	SEVERE PERSISTENT
SYMPTOMS	2 or less days per week	More than 2 days per week	Daily	Throughout the day
NIGHTTIME AWAKENINGS	2 x's per month or less	3 – 4 x's per month	More than once per week but not nightly	Nightly
RESCUE INHALER USE	2 or less days per week	More than 2 days per week, but not daily	Daily	Several times per day
INTERFERENCE WITH NORMAL ACTIVITY	None	Minor limitation	Some limitation	Extremely limited
LUNG FUNCTION	FEV1>80% predicted and normal between exacerbations	FEV1>80% predicted	FEV1 60 – 80% predicted	FEV1 less than 60% predicted



Adverse reactions: (Miflonid) - especially oropharyngeal candidiasis (candidosis) ➡ to take **before a meal and then rinse mouth with water** ... and **spit out** - not to get a systemic effect

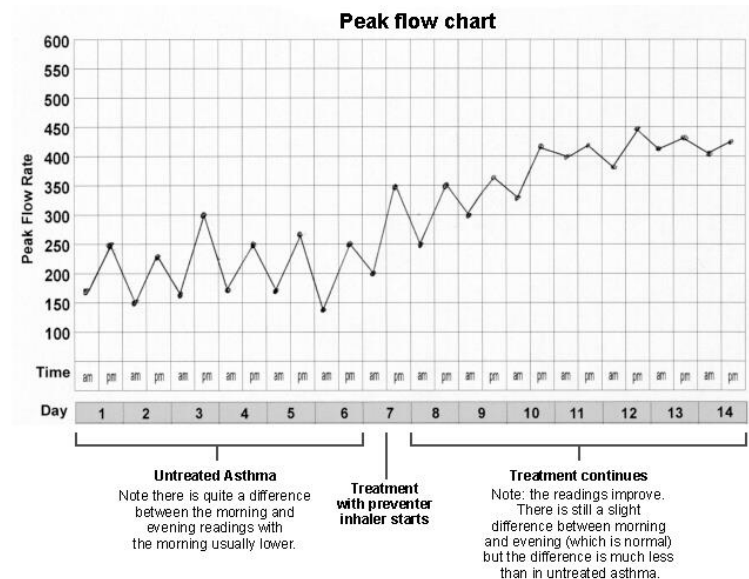
- Hoarseness (chrapot), dry mouth, reddening in the throat, pharyngeal irritation

Self-monitoring AB

- By measuring the **PEF (peak expiratory flow)**, by **expirometer**, monitoring asthma symptoms,
- especially when **introducing a new drug**
- PEF values are recorded daily

- For our patient, self-monitoring can be recommended due to the **newly introduced drug**

Peak flow meter



2. Case report - COPD

- **Patient:** Martin, year of birth 1958
- **Laboratory values:** blood pressure 130/84, pulse 102, now temperature 37.8°C
- **Personal history:** COPD, arterial hypertension, hypercholesterolaemia; indicates that he **smoked 25 cigarettes a day** (since his 18 years of age), currently smokes 10-15 cigarettes a day
- He says: he's cold, he starts coughing more often, coughing at night.

Medical history

- Spiriva 1 – 0 – 0
- Ventolin Every 4-6 hours as needed
1 breath
- Indap 2,5mg 1 – 0 – 0
- Sortis 10mg 0 – 0 – 1

Medical history:

Spiriva 1-0-0 - S: ***Tiotropium bromide***, anticholinergic-
bronchodilators;

MA: selective antagonism of cholinergic **M3** receptors -
prevention of bronchoconstriction

→ D: ok - inhalation once a day at the same time of day

Ventolin (every 4-6 hours as needed) - S: ***Salbutamol***

IS: bronchodilators, antiasthmatic, betasympatomimetic

MA: agonist activity on **$\beta 2$** receptors - induction of
bronchodilation

→ D: ok - inhalation in an acute case

Indap 2.5mg 1-0-0 S: *Indapamide*;

IS: antihypertensive, diuretic

MI: inhibition of transport $\text{Na}^+ / \text{Cl}^-$ in the distal renal tubule

→ D: ok: once a day in the morning (hypertension controlled)

Sortis 10mg 0-0-1 - S: *Atorvastatin*;

IS: hypolipidemic

MU: inhibition of HMG-CoA reductase -
inhibition of cholesterol synthesis

→ D: ok - once a day, regardless of the time of day and food intake

Differences from AB treatment

- **In the treatment of COPD**, anticholinergics, β 2 agonists, methylxanthines, inhaled corticosteroids, mucolytics, ATBs are used
- Habit-breaking is important for smokers!
- **in the treatment of AB:**
- immunoprophylactics, anti-leukotrienes, H1-receptor antagonists (allergies) are used

Acute exacerbation of COPD

Basic Clinical Symptoms:

- worsening of dyspnoea
- sputum increase
- the **purulent character** of sputum

Additional clinical signs:

- High temperature, **fatigue** (weariness)
- chest pain, chest tightness
- **hemoptysis**
- fluid retention

- **Cold / or exacerbation?** can hardly be recognized
!!

Therapy of acute exacerbation

- **Increased dose or frequency** of bronchodilators administered
- **Bronchodilator inhalation:** anticholinergics, beta 2 agonists (inh.), Methylxanthines
- **Systemic Corticosteroids:** Prednisone, Prednisolone, Hydrocortisone
- **Antibiotics** in symptomatic infections
- **Mucolytics**
- **Oxygen therapy** - monitoring of respiratory insufficiency
- **Healing bronchoscopy** - suction of mucous plugs
- **Ventilation support**, treatment of associated diseases

Therapy of cold, elevated temperature and cough

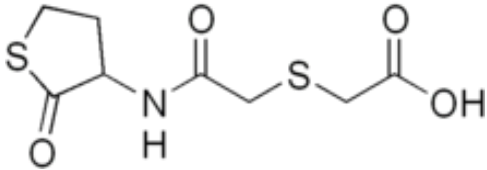
- **Antitussics** are contraindicated in COPD! (cough has a protective role in COPD)
- neopioid analgesics (**paracetamol**) for colds and elevated temperature.
- For cough - expectorancia (**erdostein, ambroxol, bromhexin, N-acetylcysteine**)
- KI NSAID

If we suspect acute COPD exacerbation, we will send to the doctor !!!

To facilitate coughing, we recommend a suitable **mucoytic agent**

Worsening can be caused by **bacterial, viral infections** or **other factors** whose diagnosis and causal treatment **belongs to the doctor's hands!**

Erdosteine – No.1



- a muco-modulating agent that acts through its **active metabolites**
- The metabolites in the structure contain two bound **sulfhydryl groups** that are released in hepatic biotransformation and **attack disulfide bridges** that bind to each other glycoprotein fibers of bronchial secretion
- **increases the fluidity of the mucus** and facilitates its expectoration from the upper and lower respiratory tract.
- a mucolytic agent with **antioxidant action** and the ability to influence the **rheological properties of mucus**
- an ancillary drug in the therapy of respiratory diseases with mucus formation or expectoration, acute and chronic bronchitis and chronic obstructive pulmonary disease (COPD)

Cigarette cessation/substitution therapy

OTC medicines with nicotine: **NiQuitin, Nicorette** ... etc.

- in the form of chewing gums, lozenges (pastilles), patches, sublingual tablets, inhalers

ADR: tachycardia, hypertension, dry mouth, nausea



Cigarette cessation/habit-breaking therapy

Drugs – prescription needed- **do not contain nicotine:**



Bupropion (~~Zyban~~, Wellbutrin, Elontril)

- selective **inhibitor of neuronal reuptake of catecholamines** (noradrenaline and dopamine) released by nicotine
- supression of craving and withdrawal symptoms

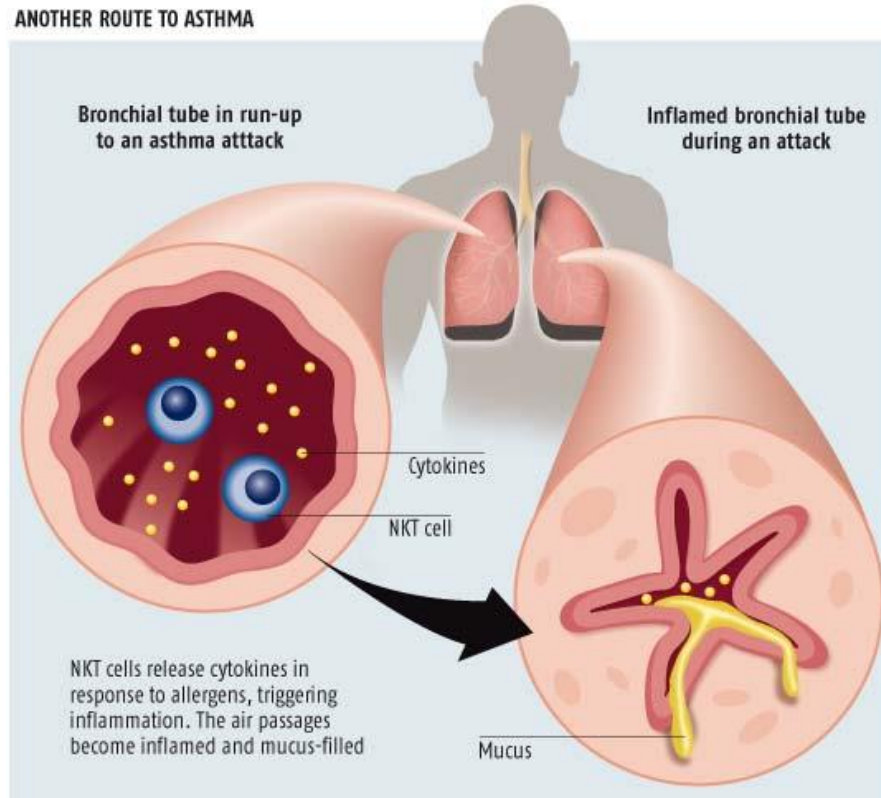
Vareniclin (*Champix*)

- partial nicotinic receptor agonist
- Risk of suicide?



THEORY

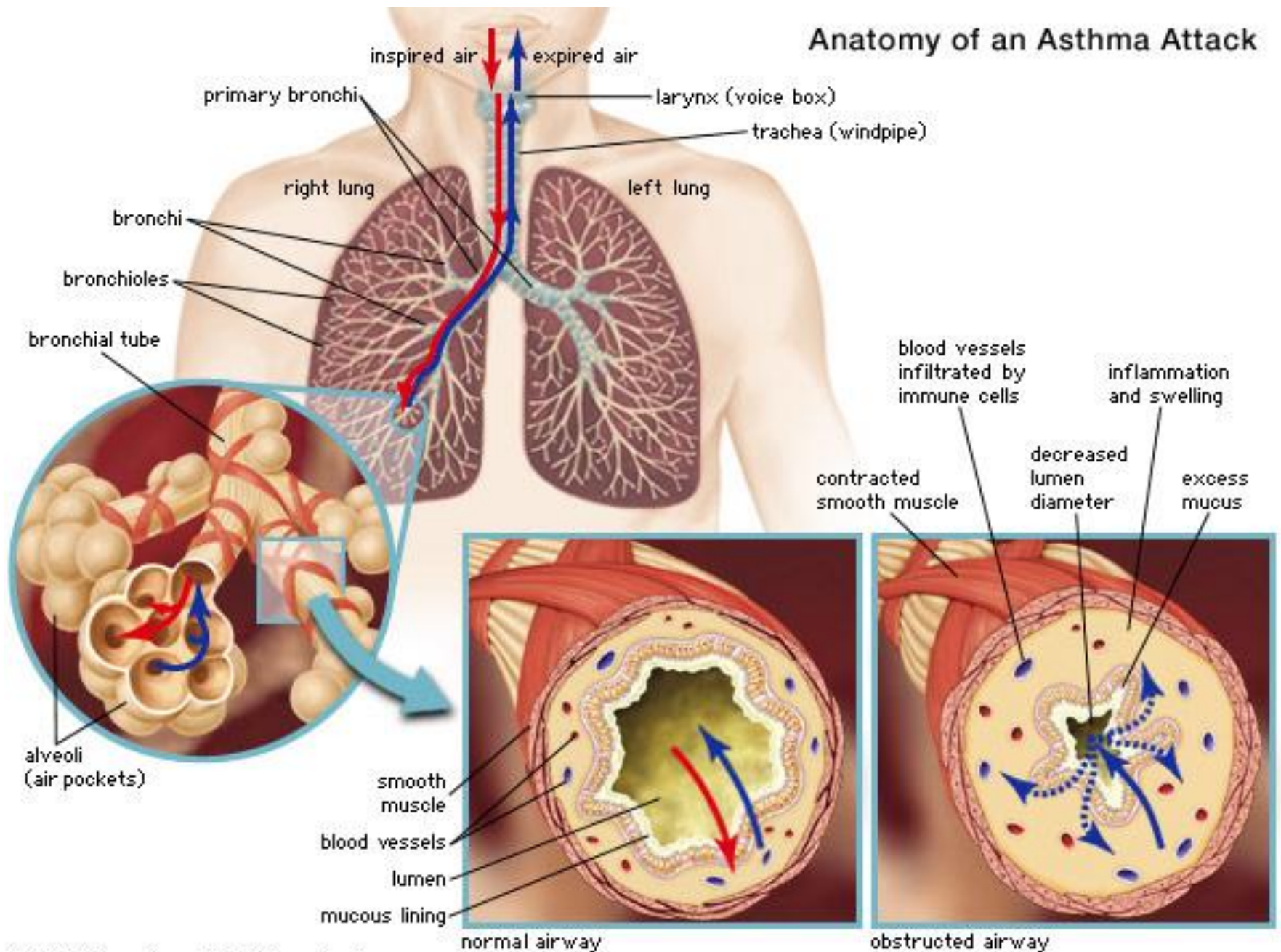
AB/COPD



1. Asthma bronchiale

- Worldwide incidence of **1-18% of the population** (unknown in the Czech Republic, children 8%)
- **Chronic inflammatory disease** of the respiratory tract
- **Bronchial hyperreactivity**
- Complete / partially reversible **airway obstruction = asthmatic attacks/episodes**
- **mediators of inflammation are produced** that increase the bronchial reactivity (eosinophils)
- Most patients **compensated by therapy**
- severe acute condition lasting several hours to **days = status asthmaticus**

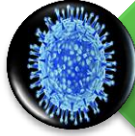
Anatomy of an Asthma Attack



Triggering factors



Allergens



Infections (viruses)



Environment



Changes of the weather



Physical activity

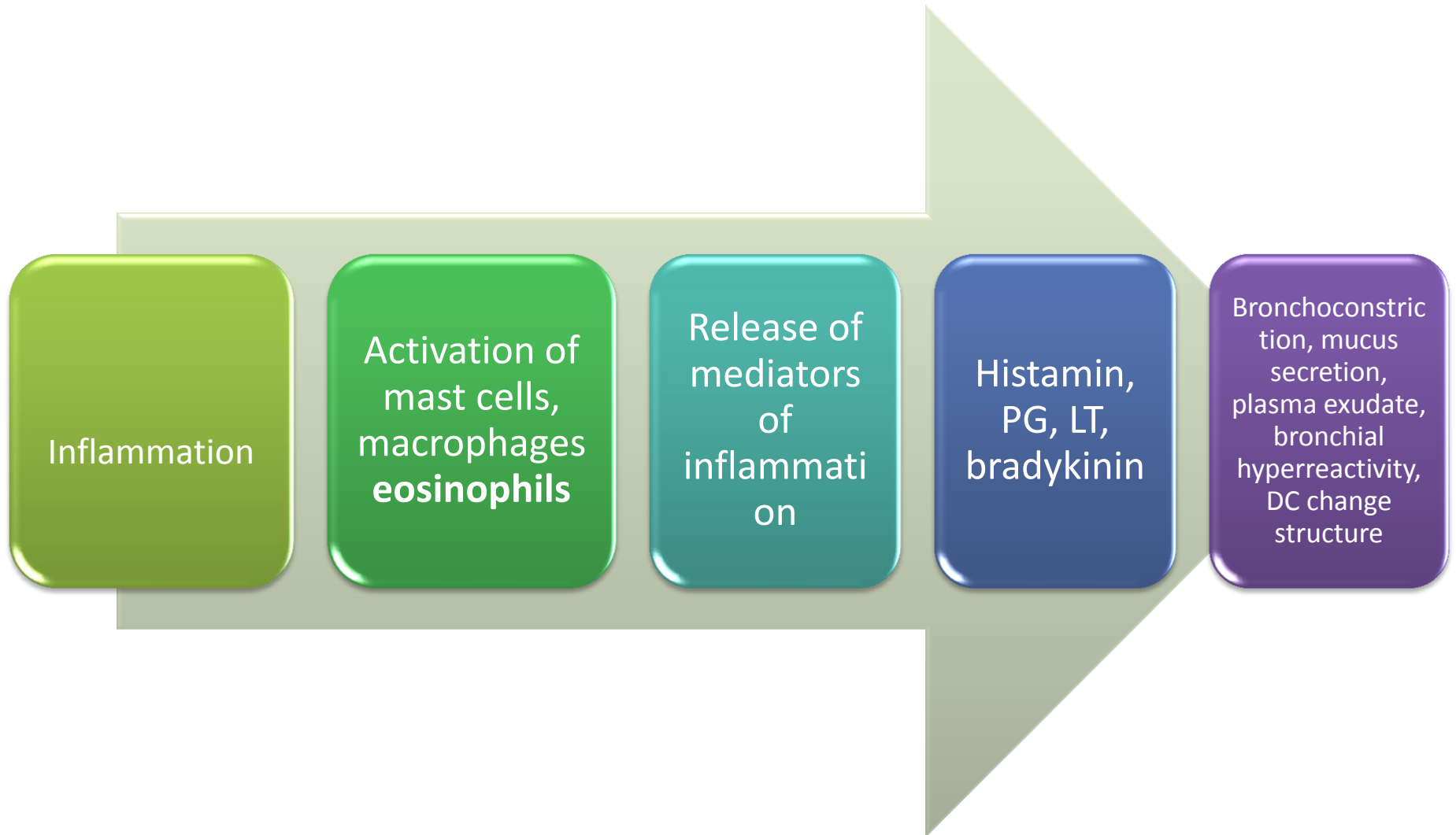


Food



Emotions

Etiopathogenesis od AB



Predisposition to Asthma

- A necessary **combination** of **genetic predisposition** and **external influences**
- **Polygenic** heredity
- Low **birth weight**
- Mother - a **smoker**
- **Infection** in childhood

- **Atopic terrain** (x COPD)

Division of AB by intensity / difficulty

Table. Diagnosis of Asthma

Components of Severity	Intermittent		Mild Persistent		Moderate Persistent	
	0-4 yrs	5-11 yrs	0-4 years	5-11 years	0-4 years	5-11 years
Symptoms	<2 days per week		3-6 days per week		Daily	
Nighttime awakenings	0	0-2 per month	1-2 per month	3-4 per month	3-4 per month	> 1 per week but not nightly
SABA use for symptom control	0-2 days per week		3-6 days per week		Daily	
Interference with activity	None		Minor limitation		Some limitation	
Lung function: FEV ₁ or PF % predicted ¹	N/A	> 80%	N/A	> 80%	N/A	60%-80%
FEV ₁ /FVC	N/A	> 85%	N/A	> 80%	N/A	75%-80%
Exacerbations requiring OCS	0-1 per year		>2 per 6 months	>2 per year	>2 per 6 months	>2 per year
Step for initiating therapy	Step 1		Step 2		Step 3	

Key: FEV₁ — forced expiratory volume in 1 second; FVC — forced vital capacity; PF — peak flow; OCS — oral corticosteroids; SABA — short-acting beta-agonists

Source: NHLBI, National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, 2007

Asthma - therapy

Indicator	Asthma under control	Asthma under partial control	Asthma under insufficient control
Symptoms during the day	no	more often than twice a week	three or more indicators under partial control
Restriction of activities	no	any	
Night symptoms, awakening	no	any	
Need for Relief Medication	no	more often than twice a week	
Pulmonary function (PEF, FEV1)	no	< 80 %	
Exacerbace	no	1 or more / year	

Clinical manifestations of asthma

- **Cough (unproductive)** (x COPD)
- **Dyspnoea (night, early morning)**
- **Chest pressure**
- **Wheezing** during breathing

- Prodromal symptoms before attack (itchy under the chin, anxiety)

- Symptoms disappear after administration of **β 2-mimetics** (dg .)

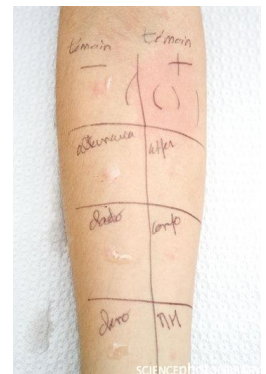
Diagnostics

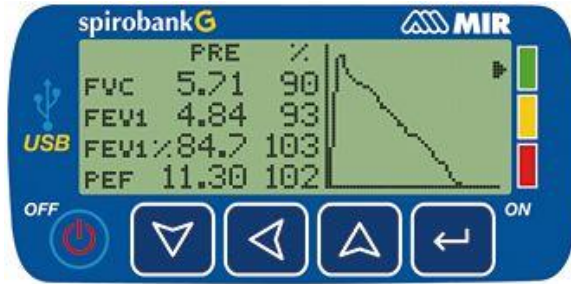
Anamnesis of symptoms

- Functional diagnostics - **spirometry**
 - Vital lung capacity - VC
 - Reduced Power Capacity - FEV1 (Forced expiratory volume - exhaled volume)
 - **Normal VC, 80% reduced FEV1**

Allergological examination

- **Skin Prick test**
 - It is necessary to evaluate in the context of clinical manifestations
 - Asthma in children - frequent **allergic etiology**
 - Specific IgE antibodies

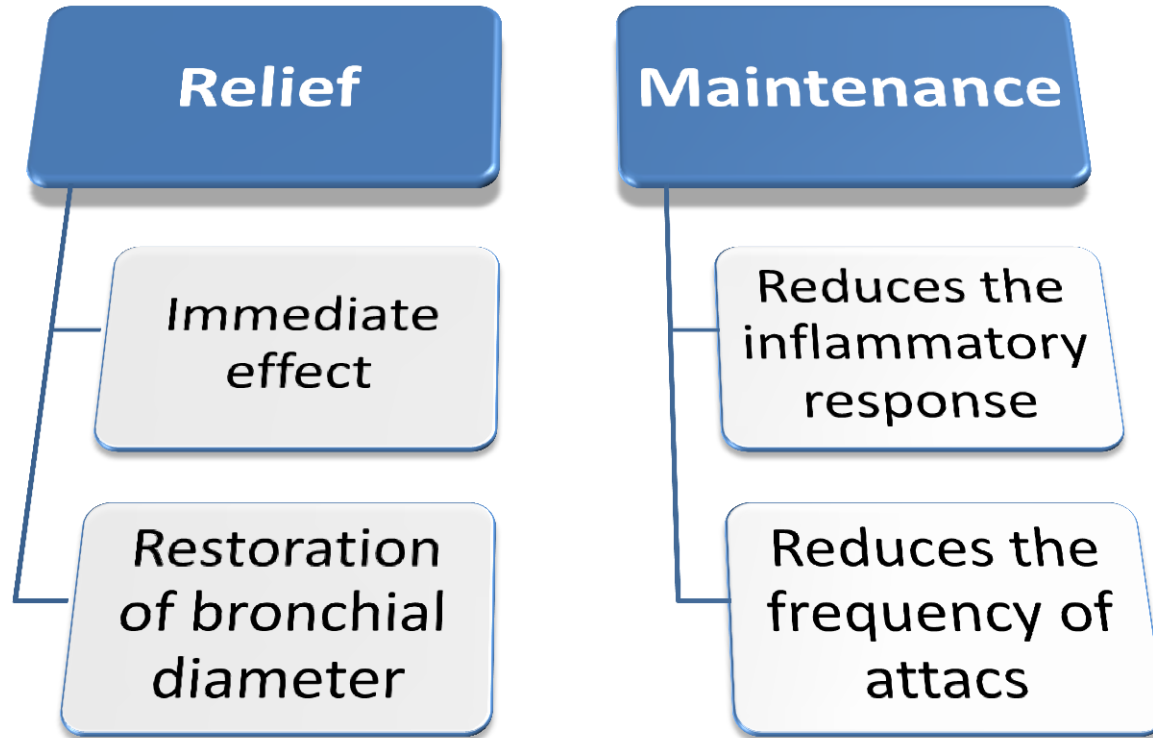




Peak flow meter



Asthma therapy



Individual therapy settings

A) Relief therapy AB

- Relief therapy inhalation
 - Anticholinergic (**ipratropium**) **SAMA**
 - (**tiotropium** and others) **LAMA** first-line drugs for COPD
 - The short acting β -mimetic **SABA** (**salbutamol, terbutaline, fenoterol**)
- p.o. xanthine derivatives (**theophylline, aminophylline**)
- p.o. $-\beta_2$ mimetics
- p.o. **systemic corticosteroids** (rescue medication, increased bronchial sensitivity to β -mimetics)

LAMA – Long
Acting Muscarinic
Antagonist

SABA – Short
Acting Beta
Agonist

B) Maintenance therapy AB

- **Inhaled corticosteroids**
- **Long-term beta2mimetics (LABA)**
 - **formoterol, salmeterol, indacaterol**
- Leukotriene receptor antagonists
 - **montelukast (Singulair), zafirlukast (Accolate)**
- Cromones **nedocromil (Tilade)** mast-cell stabilization, more expensive, rarely used
- **Theophylline** with long-term effect - PDE inhibitors
- Systemic corticosteroids
- Allergen vaccines
- Biological treatment - Anti-IgE antibodies (**omalizumab-Xolair**)

LABA – Long
Acting Beta
Agonist

Inhaled corticosteroids

- **Basic maintenance treatment**
- Treatment of persistent asthma
- Monotherapy, or in combination with ALT, LABA
- Locally anti-inflammatory agents
- Prevention of irreversible remodeling of the bronchial tree
- **beclomethasone, budesonide, fluticasone, mometasone,**
- **ciclesonide (Alvesco)** - deesterified in the lungs for the active substance

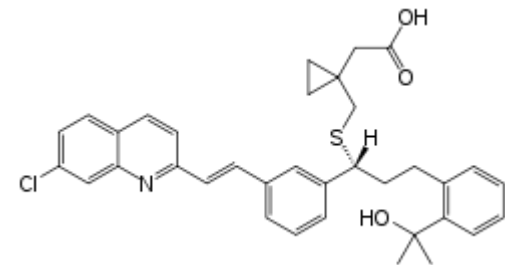
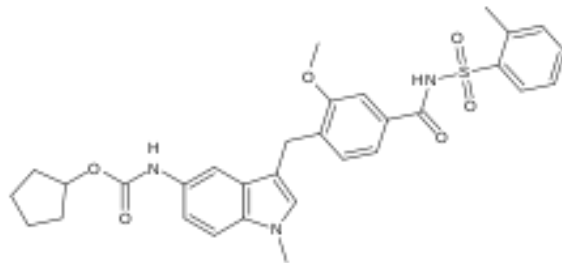
fluticason/salmeterol (Seretide)

budesonid/formoterol (Symbicort) and generics

fluticason/vilanterol (Relvar) ...

Receptor antagonists for leukotrienes

- Acute effects on bronchospasm
- **Anti-inflammatory effect**
- Glucocorticoids "saving" drugs
- Therapy in children (also against allergic symptoms - rhinitis, atopic eczema)
- Zafirlukast (Accolate), **montelukast (Singular)**

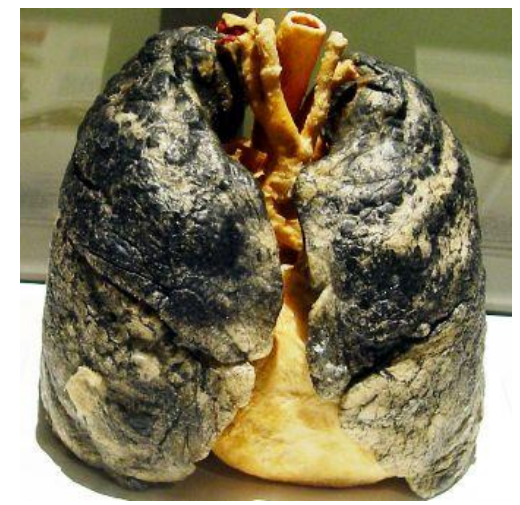
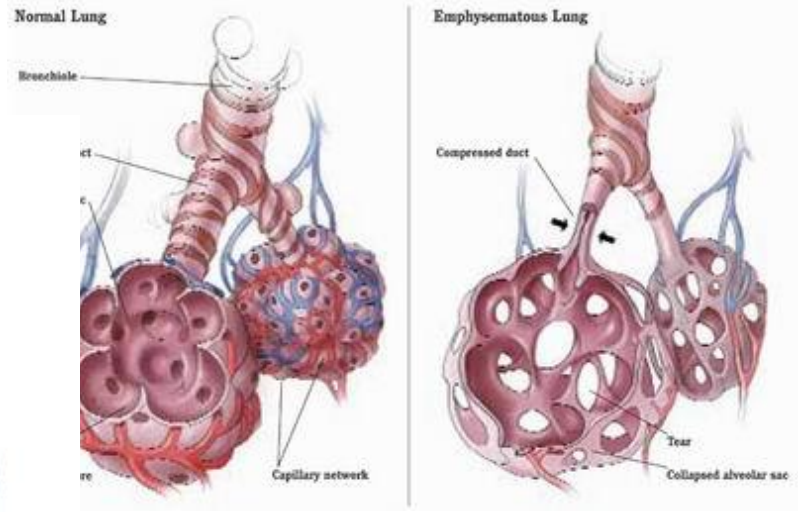
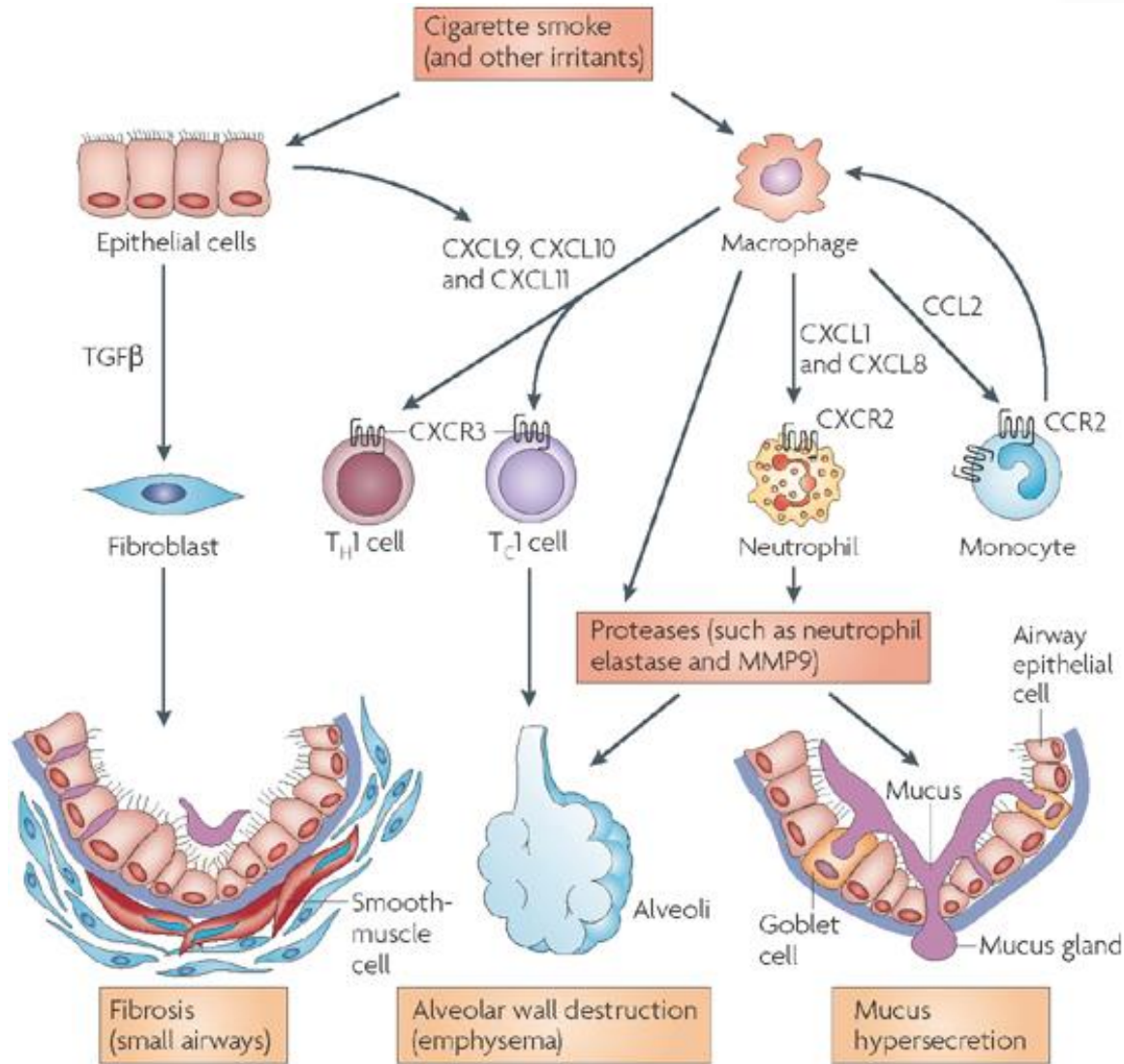


How to choose appropriate anti-asthmatic drug

	Level 1	Level 2	Level 3	Level 4
Short-term inhaled β2-SM	X	X	X	X
Degranulation Blockers		X		
Inhal. glucocorticoid.		X	X	X
Antileukotrienes			X	X
Xantines			X	X
β2-SM – p.o.			X	X
β2-SM – long acting			X	X
Anticholinergic inhalation			X	X
p.o. glucocorticoids				X

2. COPD

- One of the **most common causes of death**
- The incidence is about **7.7%**, in the Czech Republic it is 700 - 800 thousand patients
- **!!!! Smoking** (20-25% of smokers will have COPD)
- **Environmental pollution** (Si, Cd, oxidants ... bricks production, asbestos production, coal mines)
- **Infections** (repeated in childhood ... most commonly viral)
- **nutrition, poverty**
- **increased inflammatory response to risk factors**
- restricting airflow in the bronchi (bronchial obstruction) that is **not completely reversible**
- imbalance between proteases and antiproteases in lungs - **pulmonary emphysema**



Symptoms

- Chronic bronchitis
- Long-term **mucus expectoration** (morning coughing)
- **Dyspnoea** with a tendency to progression
- Limitation of ability to increase **physical activity**
- stadium III, IV. - cachexia, **muscular atrophy**

- Dg: Forced expiratory volume (FEV1) - **incomplete obstruction reversibility**
- Depending on the severity of the symptoms of stages GOLD I to IV

Therapy

- Regular aerobic **physical activity** - rehabilitation
- Removal of **chemicals**
- **Smoking cessation, habit-breaking**
- Vaccination against influenza, pneumococcus
= **prevention of infection**



Pharmacotherapy - symptomatic

- Oxygen - **Long-term Home Oxygen Therapy**
- **Surgery** - bulectomy (removal of bullous emphysema, lung transplantation)
- Causal COPD therapy does not exist

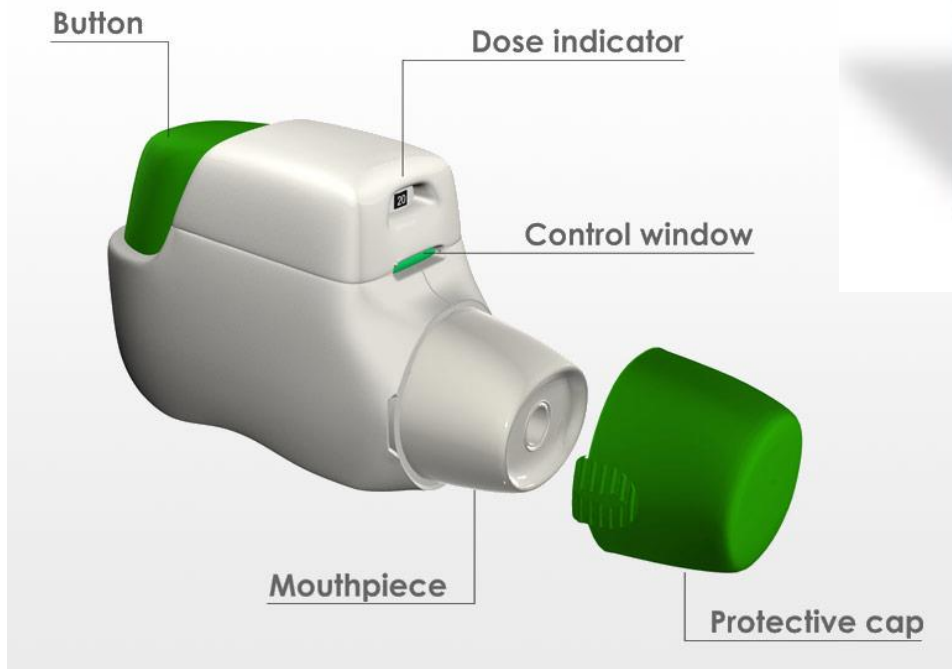
Therapy

- Long-term beta2mimetics from II. stage
- **formoterol, salmeterol** (Twice a day)
- **indacaterol (Onbrez)** (once a day) referred to as ULABA
- **olodaterol**
- Long-acting anticholinergics (LAMA) from II. stage
- **tiotropium (Spiriva)**
 - improvement of VC of lungs, static functions
 - increasing tolerance of effort
- **aclidinium (Bretaris, Brimica komb.)**
- **umeclidinium (Incruse, Anoro komb.)**
- **glycopyrronium (Seebri, Ultibro komb)**
- **Inhalation corticosteroids from III. stage**
- Long-term p.o. the theophylline derivatives (drugs of 3rd line..)



Bretaris genuair (aclidinium bromid)

- competitive, selective muscarinic receptor antagonist (**anticholinergic**) with longer residence times in M3 receptors than in M2 receptors
- **2x daily**
- Powder for inhalation



Seebri Breezhaler (glykopyrronium-bromid)

- a long-acting muscarinic receptor antagonist (anticholinergic) for maintenance bronchodilator COPD **once daily**
- Parasympathetic innervation is the major bronchoconstrictive nervous system in the airway and cholinergic tone is a key reversible component of airway obstruction in COPD
- blocks the bronchoconstriction effect of acetylcholine on the smooth muscle cells of the airway, thereby causing airway dilation
- rapid onset of action



ONCE DAILY
ultibro[®]
breezhaler[®]
indacaterol maleate/glycopyrronium bromide
inhalation powder

GOLD Therapy at Each Stage of COPD

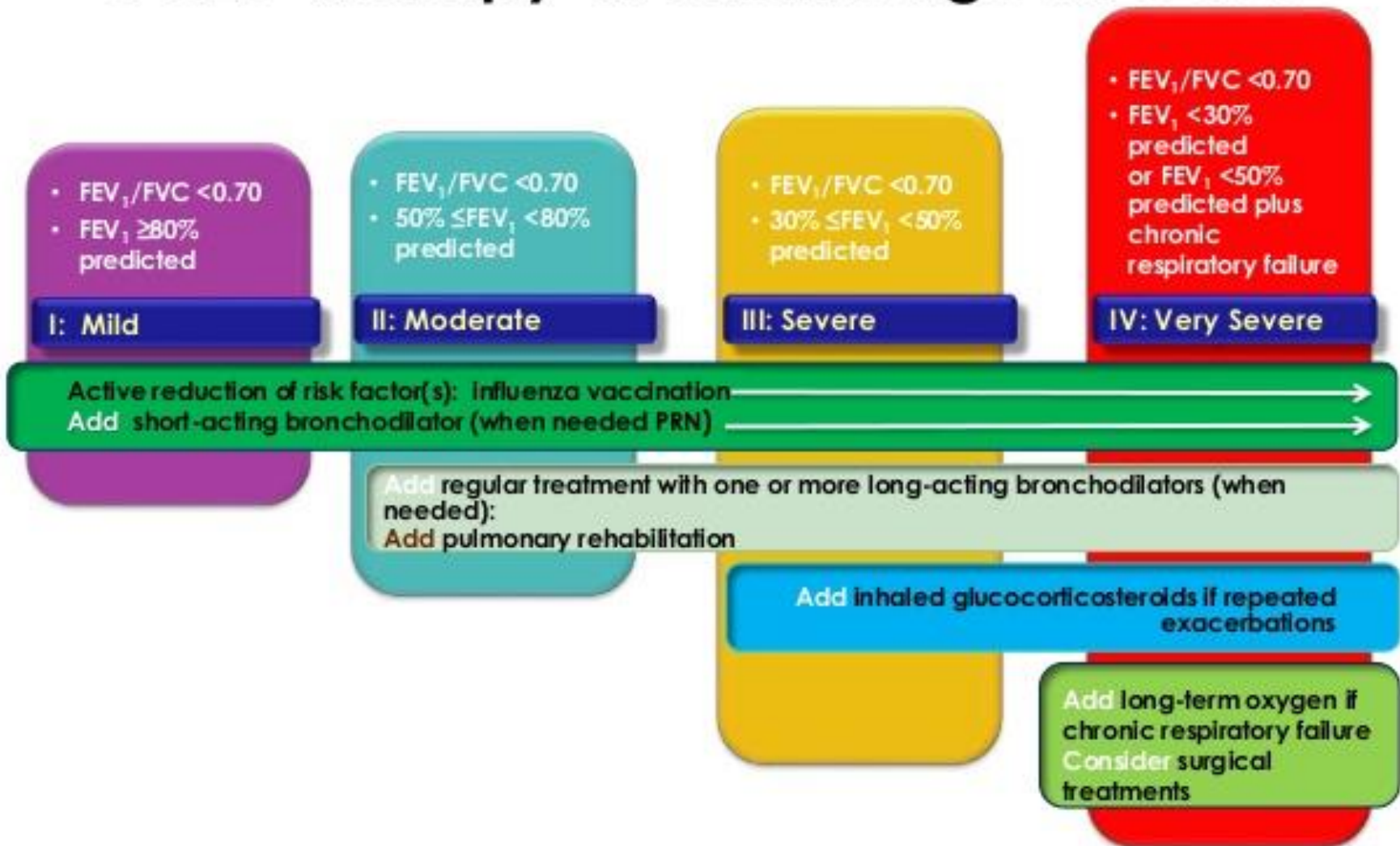


TABLE 4. A COMPREHENSIVE APPROACH TO THE MANAGEMENT OF COPD

	Asthma	COPD
Age of onset	Usually <40 years	Usually >40 years
Smoking history	Not causal	Usually >10 pack years
Sputum production	Infrequent	Often
Allergies	Often	Infrequent
Disease course	Stable (with exacerbations)	Progressive worsening (with exacerbations)
Spirometry	Often normalizes	May improve but never normalizes
Clinical symptoms	Intermittent and variable	Persistent

COPD = chronic obstructive pulmonary disease

This information was originally published in Can Respir J 2007;14(suppl B):5B-32B.

Response of asthma and COPD to drug therapy

Léková skupina	Astma	CHOPN	Poměr AB : CHOPN
beta ₂ -agonisté	+++	+	AB > CHOPN
kortikosteroidy	+++	+	AB > CHOPN
kromony	++	-	AB > CHOPN
antihistaminika	+	-	AB > CHOPN
cysteinylové antileukotrieny	+	-	AB > CHOPN
teofyliny	+	+	AB = CHOPN
antibiotika	-	+	AB < CHOPN
anticholinergika	+	++	AB < CHOPN
mukolytika	-	+	AB < CHOPN

Škála účinnosti: +++ výrazná, ++ střední, + slabá, - žádná

INHALATION DEVICES

For proper and effective inhalation therapy, it is imperative that the patient knows/does the **proper technique of inhalation**



Inhalation therapy

- Local effect
- Different ways of use (application)
- A necessary explanation of the correct inhalation technique
- **Up to 41% of patients do not have the right technique of inhalation**
- Changing from CFC to HFA increases the effect of KS
- (CFC - chlorofluorocarbon = freon propellant, HFA - hydrofluoroalkane)

Inhalation drugs - Benefits


- The drug acts **directly on the airways** , where it reaches **high concentrations** that are practically unattainable in other routes of administration
- **Very fast onset of action** (comparable to i.v.)
- Only a **small amount of drug is absorbed** into the systemic circulation - a **minimum of ADR**

General principles of correct inhalation (1)

- When aerosol is inhaled, **shake before use**, not necessary when using powder dosage forms
- Before applying the drug **deeply breathe out**
- **Intensive, deep, and rapid inhale** (breathing in) **is required** to deliver the drug to its place of action - the bronchi (and beyond)

General principles of correct inhalation (2)

- **hold one's breath** after application for 10 seconds
- Exhale (breathe out), best by nose
- If inhalation is repeated, **wait 30-60 seconds**

- After inhaled corticosteroids (ICS), **rinse the mouth with water** or clean the teeth to prevent the possibility of oral candidiasis
- ADR: candidiasis (5-10%), hoarseness (30%), cough (IKS)
- **1. β 2-SM**  **2. ICS**



Candidiasis (IKS):

- characteristic white coating that is **painful and burning**
blisters may develop,
- **Occurrence:** skin, mucous membrane

- Local therapy (rinses - **nystatin, clotrimazole**)
- Systemic therapy (~~ketocazole~~, **fluconazole, itraconazole**)

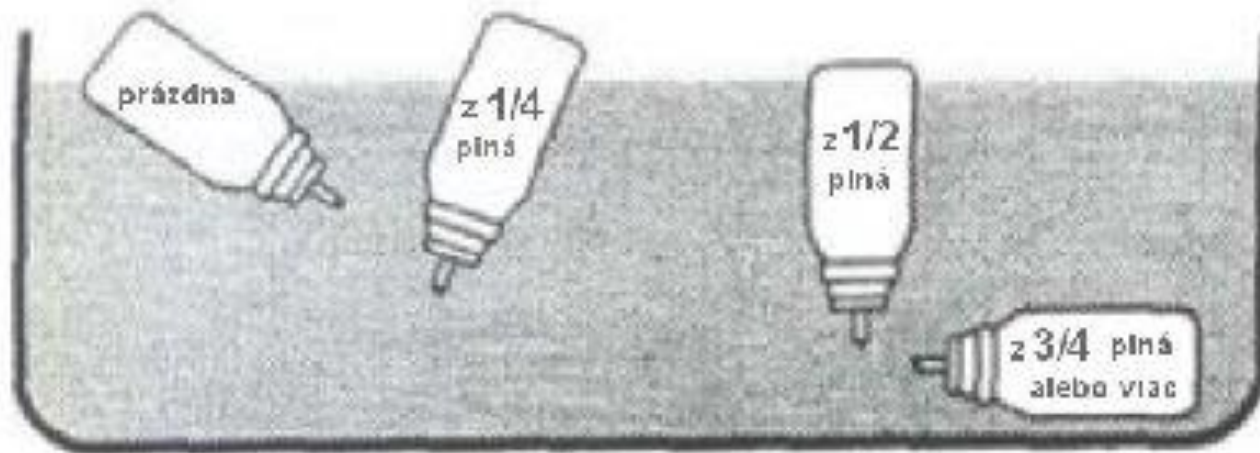
1. Inhalers (MDI, metered dose inhalers)

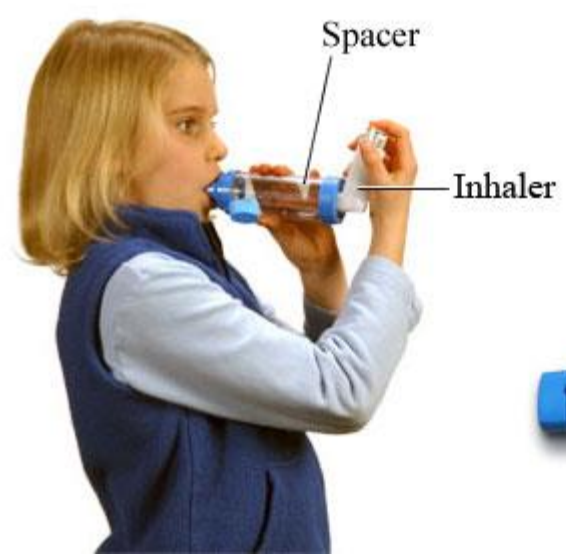
- **Liquid vehicle**
- **Freons** are replaced by hydrofluoroalkane (HFA)
 - do not cause local mucus cooling
- **Shake** before use
- It is necessary to **synchronize the breath (inhalation) with the pressing the inhaler**
- Patients (children) can use spacer, aerochamber
- **"N"** water base, no need to shake

- **Ventolin N, Ecobec, Ecosal**
- **Berodual N**



How do I know the empty pressure vessel at the inhaler?





Inhaler



Spacer



a) Dosing aerosol + Spacer

Spacer is an **inhalation extension** that increases the effect of the metered aerosol because:

- **increases the amount of medicine** that gets into **your lungs**
- reduces the amount of drug stored in the mouth
- **co-ordination** of breath and pressing **is not required**

Disadvantages of the inhalation adapter:

- is too big
- necessary regular cleaning



b) Inhalation extension with mask (aerochamber)



Procedure:

- Remove the cap, **shake the inhaler**, and insert it into the extension.
- **Put the mask on your face** so that it covers your mouth and nose.
- Breathing from the extension must be **slow and quiet**.
- Press the dispenser container once and inhale several times and exhale.
- Remove the attachment from the face. If you are taking another dose, wait for at least 30 seconds.

b) Aerochamber



Device shown is not actual size

2. Easi-breathe (BAI, breath-actuated inhalers)

- The **dose is released by inhaled air**
- Automatic application
- eliminate the issue of hand-inhalation coordination, respectively hand-brain coordination
- **Sufficient FEV1 is required** (forced expiratory volume in 1 second)

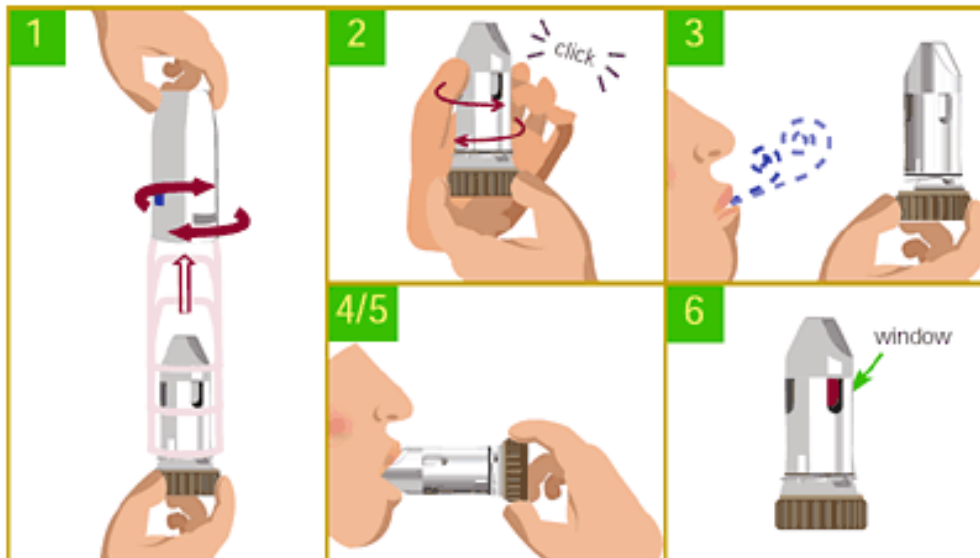
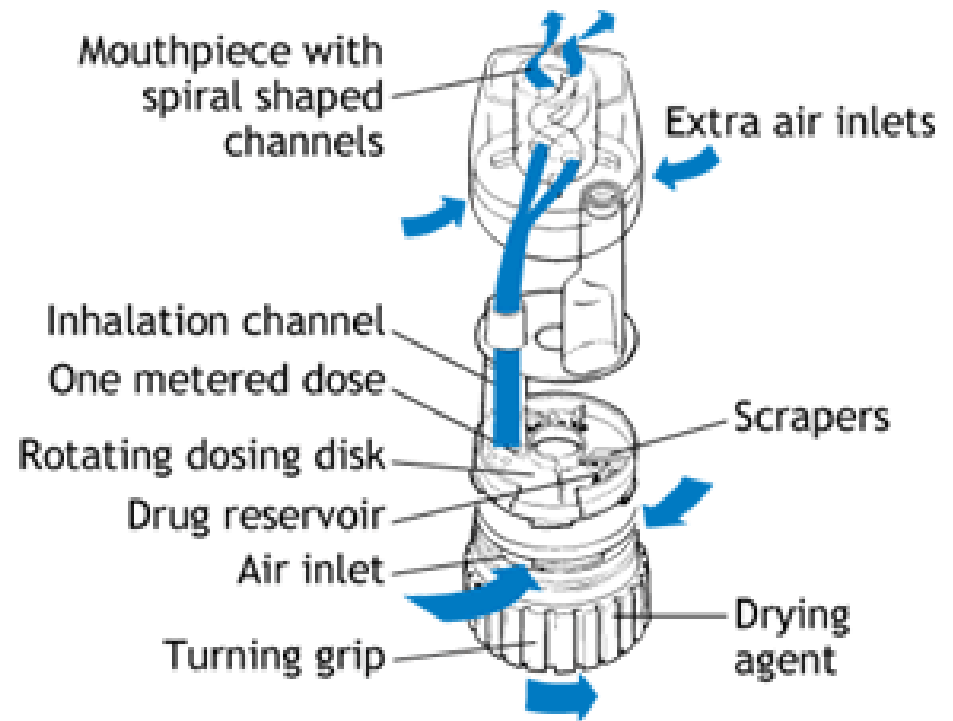
- **Ecosal Easi-Breathe**
- **Beclazone Easi-Breathe**



3. Turbuhaler (DPI, dry powder inhalers)

- Active substance in **powder form**
- It is released from the container after **turning**
- **small inspiration (inspiration) needed**

- **Pulmicort Turbuhaler, Symbicort Turbuhaler, Bricanyl Turbuhaler**

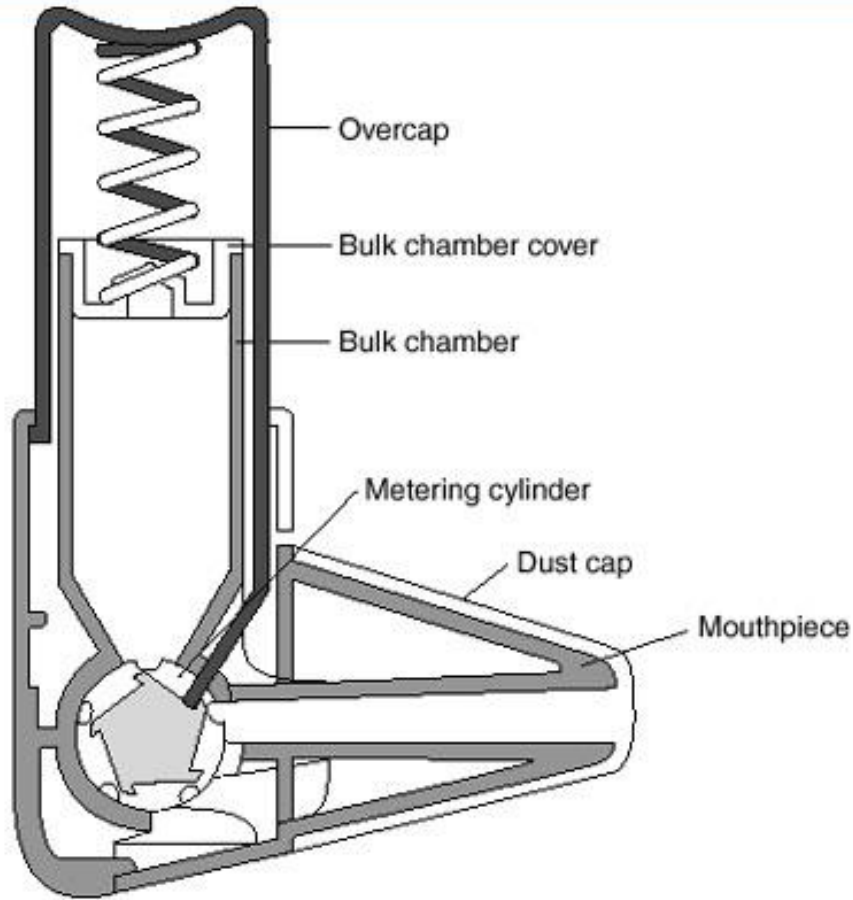


4. Easyhaler

- Applied substance in **powder form**
- Simple operation
- **Shake before use**
- Dose release after **pressing the dispenser**
- It is possible to inhale the dose several times

- **Buventol Easyhaler, Giona ...**
- **Formoterol Easyhaler**
- **Beclomet Easyhaler**





Source: Clin Drug Invest © 2002 Adis International Limited



5. Diskus

- Less number of doses (60-28)
- Doses pre-prepared in a **blister (powder form)**
 - compact shape
 - dry, never breathe in
 - **dose counter** to zero (last 5 red)

Seretide Diskus, Flixotide Diskus

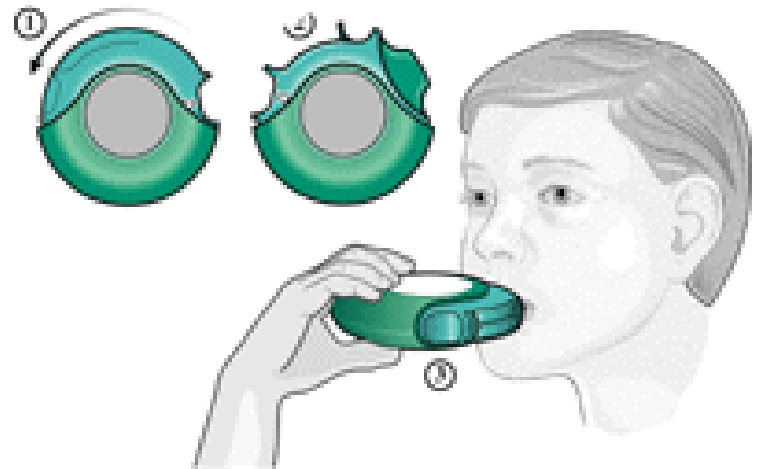


Figure 1: Diskus

6. Aerolizer (spinhaler)

- **Patient inserts capsules** filled with a dose of the drug
- **Spines in the applicator** will disrupt the packaging and allow the inhalation of the powder
- It is necessary to manipulate with each dose

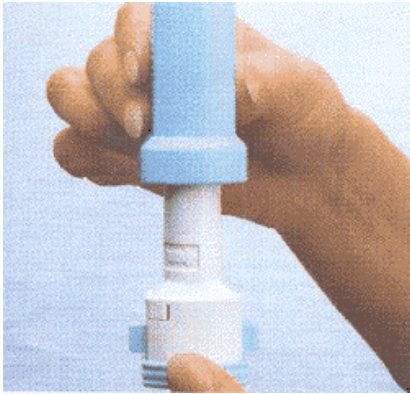
- **Miflonid, Foradil**
- **Onbrez, Seebri (Breezhaler)** applicator included in the package
- **Spiriva (HandiHaler)** applicator extra

The form is titled "POUKAZ NA LÉČEBNOU A ORTOPEDICKOU POMŮCKU" (Referral for Therapeutic and Orthopedic Aids). It includes the following sections:

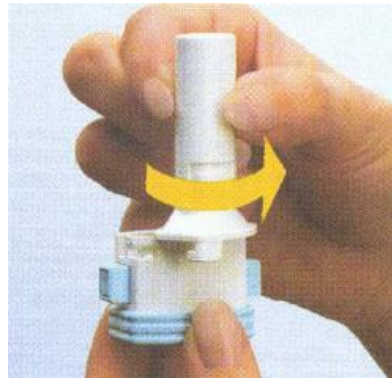
- Top Section:** "Kód pojistovny" (Insurance Code) and "Ev.č." (Serial Number).
- Patient Information:** "Příjmení a jméno" (Surname and Name), "Číslo pojistěnce" (Insurance Number), "f." (Address), and "Bydliště (adresa)" (Residence).
- Medical Aid Information:** "DRUH A OZNAČENÍ POMŮCKY" (Type and Designation of Aid), "oprava - úprava pomůcky" (Repair - adjustment of aid), and "Pomůcka nová / repasovaná" (New aid / repaired aid).
- Table:** A table with columns for "Sk" (Category), "Kód" (Code), "Počet" (Quantity), and "Cena" (Price).
- Signature and Date:** "Dne:" (Date), "Místo pro záznamy zdravotní pojistovny" (Place for health insurance records), "Datum:" (Date), "razítko zdravot. zařízení, jméno a podpis lékaře" (Stamp of the medical facility, name and signature of the doctor), and "razítko výdejce" (Stamp of the dispenser).



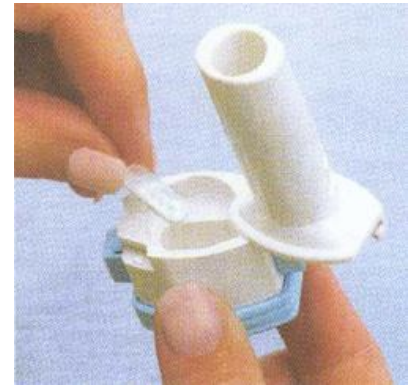
Aerolizer (spinhaler)



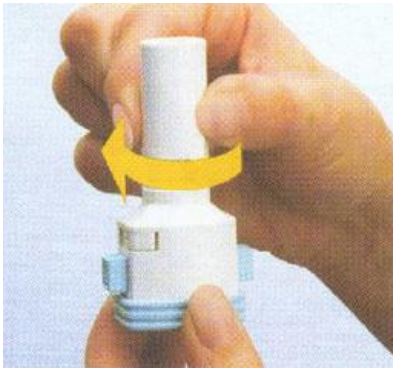
Remove the applicator cover



Hold the applicator base firmly and turn the mouthpiece



Remove the capsule from the blister and put it in the basement



Turn the mouthpiece back against direction of the arrow until it fits with a clear click



Press both brown buttons. The capsule is opened.



Take a deep breath, close your lips and inhale deeply.

7. Respimat

- SMI - **soft mist inhaler**
- The drug solution is transferred to the **mist in the applicator head**
- **Inhalation of mist formed**
- Synchronization with breath needed
- **Two doses** should always be inhaled



Spiriva Respimat, Spiolto respimat (tiotropium + olodaterol)



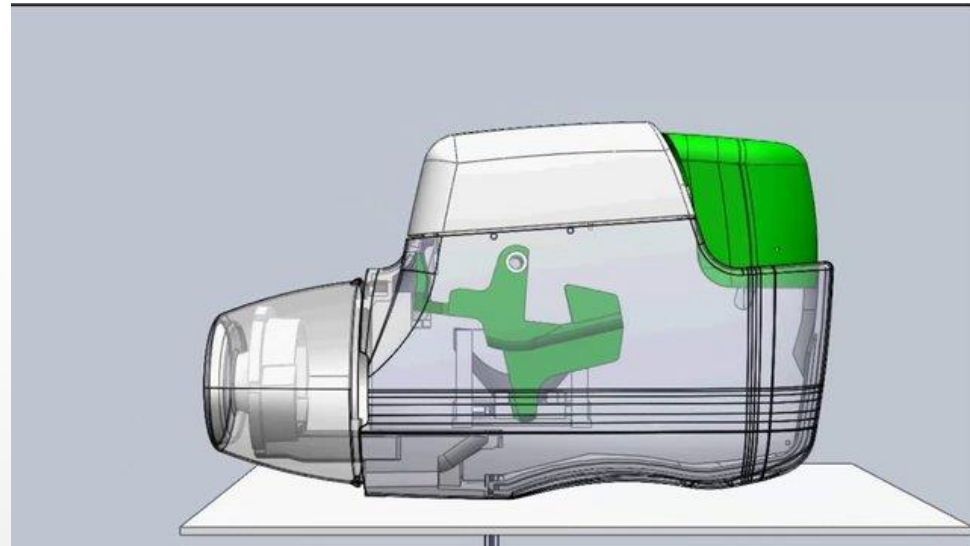
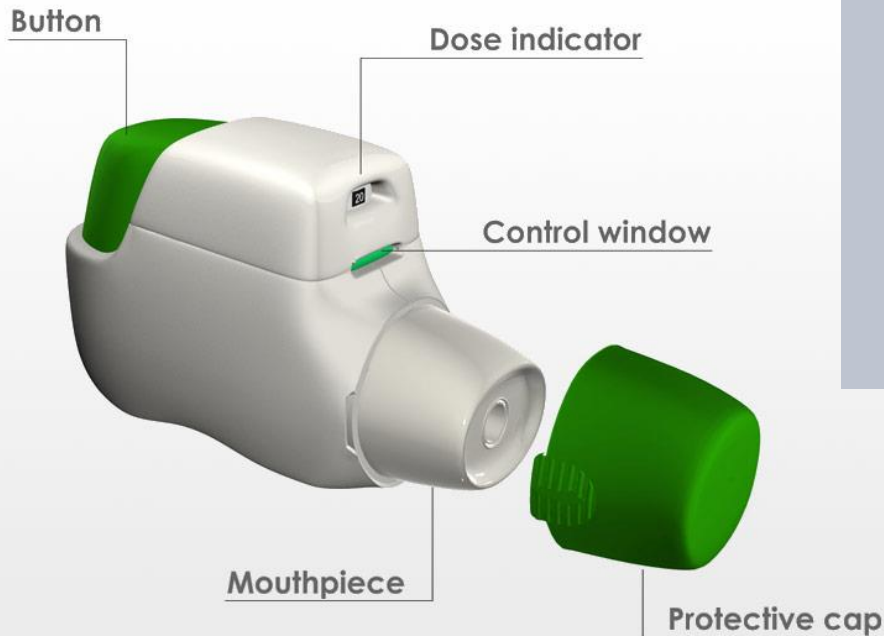
New powder inhalers



Genuair

Bretaris (aclidinium bromid)

- Powder for inhalation



Genuair

Bretaris (aclidinium bromid)

- Powder for inhalation

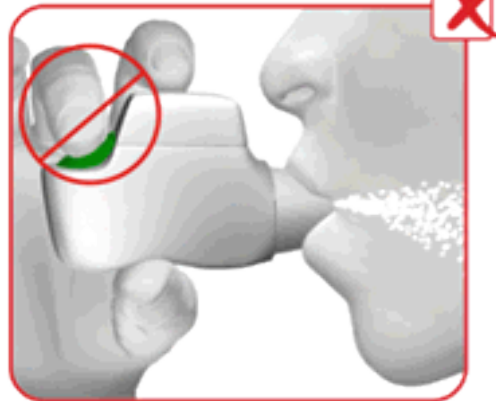
ATTENTION: DO NOT HOLD THE GREEN BUTTON DOWN WHILE YOU ARE INHALING.

CORRECT



IMAGE 6

INCORRECT



Dose indicator goes down by intervals of 10: 60, 50, 40, 30, 20, 10, 0.

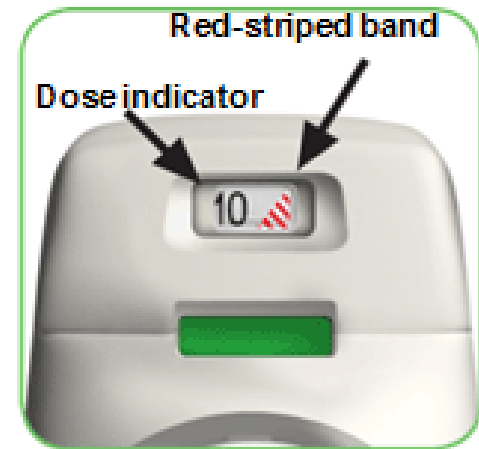
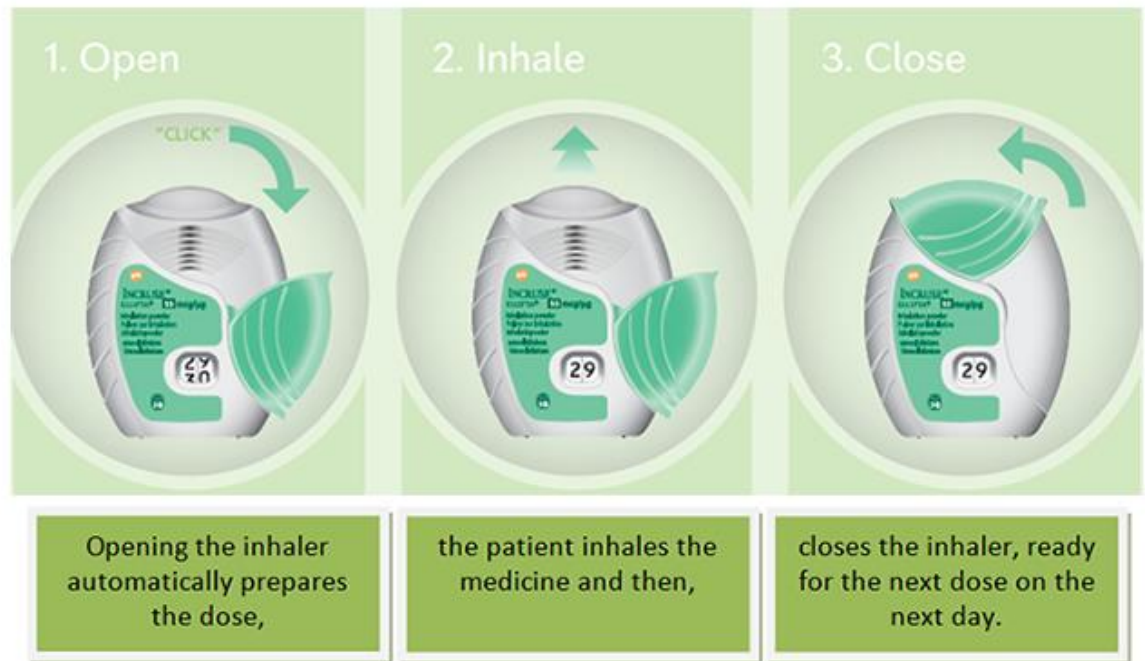
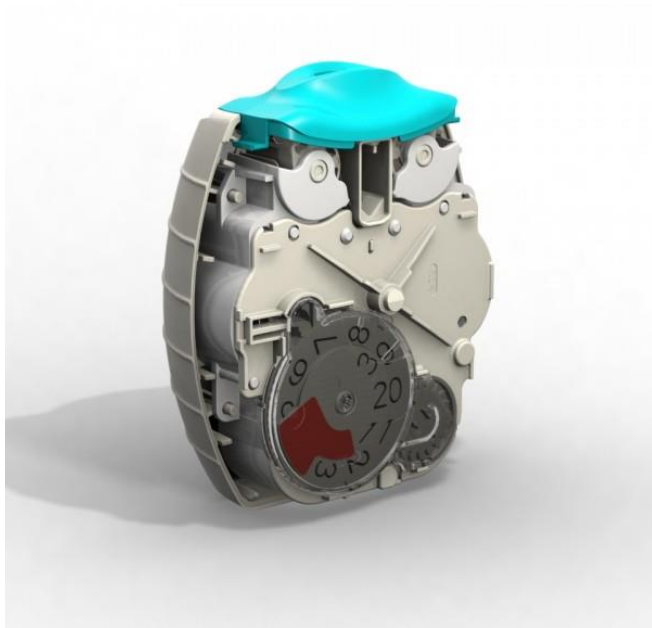


IMAGE A

Ellipta (GSK)



Ellipta (GSK) Relvar, Revinity, Anoro, Leventair, Incruse vilanterol, umeclidinium...

Only open the cover once you are ready to take a dose. If you open and close the cover without inhaling the medicine, the dose will be lost.

Click



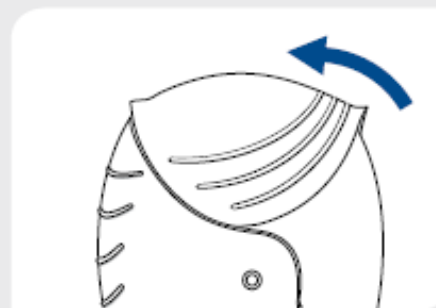
- Slide the cover down until you hear a 'click'
- While holding the inhaler away from your mouth, breathe out as far as is comfortable

Inhale



- Put the mouthpiece between your lips, and close your lips firmly around it
- Take one long, steady, deep breath in and hold this breath for at least 3-4 seconds

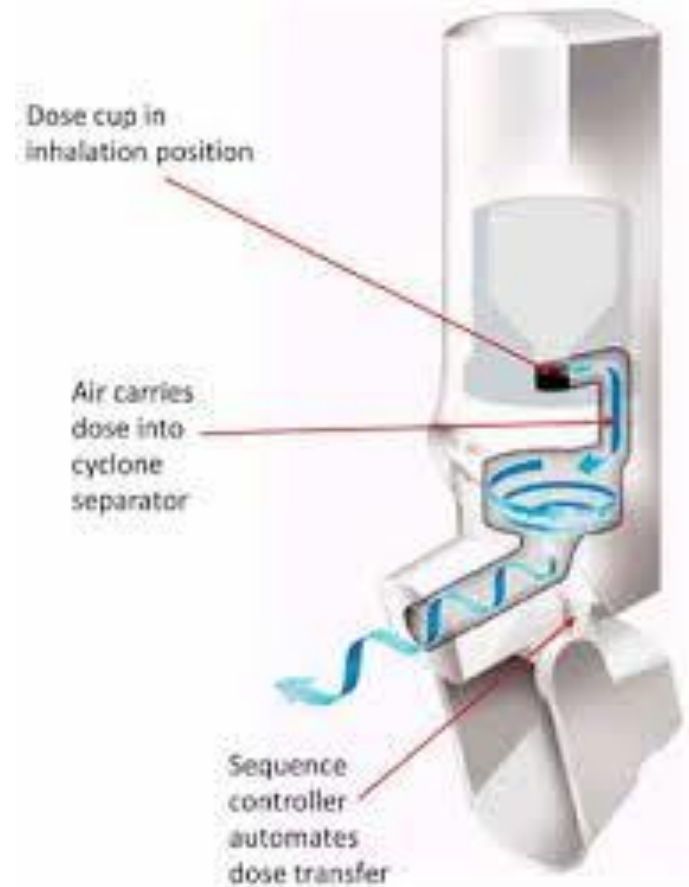
Close



- Remove the inhaler from your mouth and breathe out slowly and gently
- Slide the cover upwards as far as it will go to cover the mouthpiece

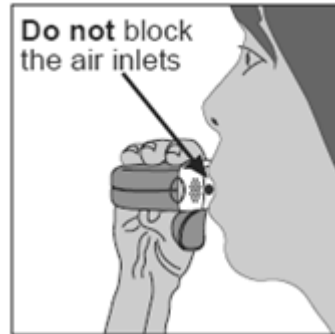
Spiromax (Teva)

Duoresp 160/320 (budesonid /formoterol)



Forspiro (Sandoz)

Airflusan (salmeterol/fluticason)



Protective cap

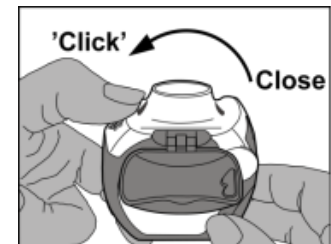
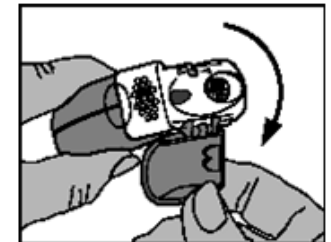
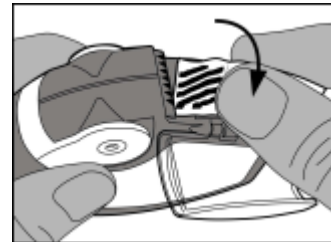
Side chamber: The foil strip collects here for removal.

Dose counter: When you open the protective cap you can check how many doses are left.



White lever: Only use this lever when you are ready to take a dose

Air inlets either side of the mouthpiece



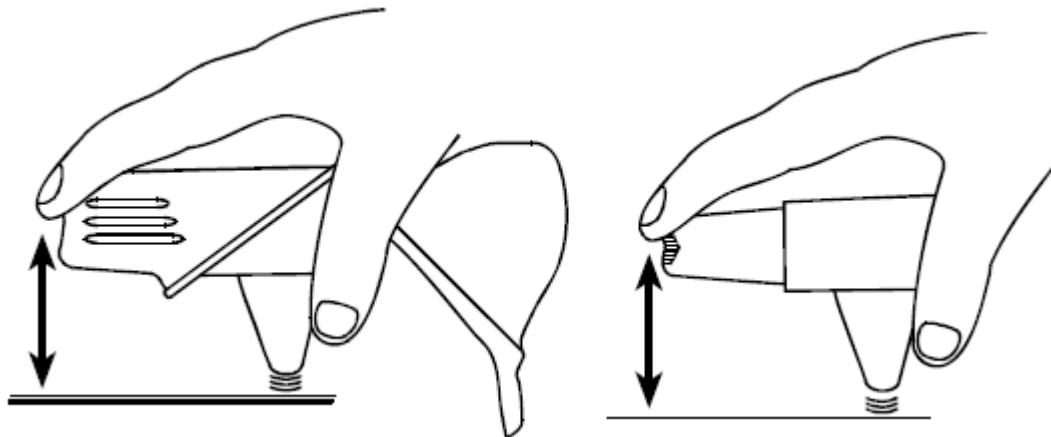
Cleaning of applicators

- Different **depending on the type** of construction
- Remove everything you can
- Rinse with **lukewarm or hot water**

- **Let it dry** in the air
- Dry by the hair dryer
- Do not dry with a dry cloth - **static electricity is generated**

but dry powder forms, e.g. **Easyhaler**

- Clean mouthpiece at least once a week **with dry cloth**, do not use water, Easyhaler **powder is sensitive to moisture**
- If the inhaler is accidentally pushed or pushed more than once, **remove the powder from the mouthpiece** by tapping against the table or palm



Non-compliance of patients with AB - the role of pharmacist

Cases	%
He does not understand the instructions for use	33, 0 %
He thinks another dose is better for him	24, 8 %
He thinks another drug is better for him	13, 3 %
He thinks he's already cured	10, 5 %
He forgot to use the medicine	5, 7 %
He thinks the cause of his illness is a cure	4, 7 %
He feels resistance to the drug	3, 8 %
He thinks the medicine damages him at work	1, 0 %
The patient has lost or is physically unavailable	1, 0 %
Various other causes	2, 2 %

„Ten Commandments“ of asthma treatment

(dle MUDr. Milan Teřl, PhD., FN Plzeň)

1. Each asthma patient should **be informed about the chronic course** of the disease and know the **difference between the preventive and maintenance medication**
2. Each should be equipped with both types of **prevention and relief**
3. Whenever possible, **the inhalation form** is preferred
4. Effect of preventive drugs **is not immediate**
5. The relief medication **should be used exceptionally** - except SMART (Single Maintenance and Reliever Therapy) - fixed combination
6. **Type of drug** to choose **by type of patient** - **skill, age, vision, experience, intelligence, socio-economic status**
7. All inhalation drugs should preferably be in the **same or similar system**
8. Prescription = **presentation of the inhalation technique, dispensing in the pharmacy = verbal instructions**
9. **Do not drop off treatment/drugs** without consulting your doctor (even during pregnancy)
10. **Compliance** and inhalation monitoring **regularly**