Asthma

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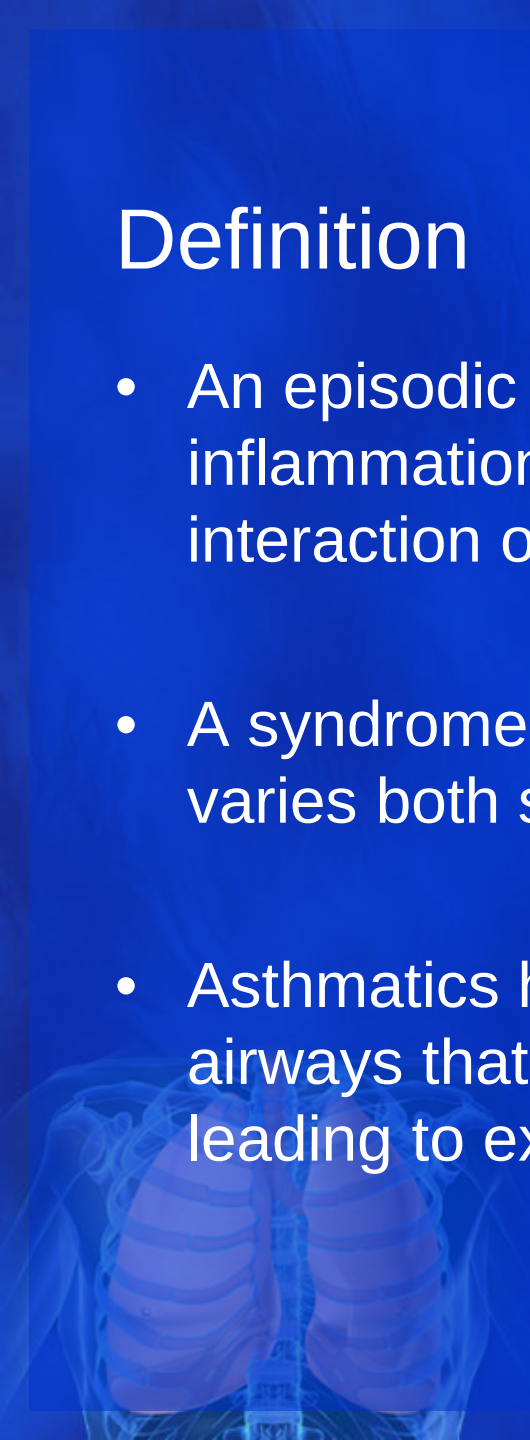
Which of the following statements about asthma is true?

- A. In childhood, asthma is seen more in girls than boys.
- B. Airway function is best in the am
- C. Thinning of the basement membrane is characteristic of asthma.
- D. A diurnal variation in peak flow (PEFR) >20% is supportive of asthma
- E. Atopic asthma is very common in infants.
- F. A decline in FEV1 >20% with inhaled Methacholine is diagnostic of asthma.

Definition

- An episodic disease that is caused by a widespread inflammation of the airways resulting from a complex interaction of cells, mediators and cytokines
- A syndrome characterized by airflow obstruction that varies both spontaneously and with treatment
- Asthmatics harbor a special type of inflammation in the airways that makes them more responsive to triggers leading to excessive narrowing and reduced airflow



Some facts

- Asthma affects 26 million people in the US, including 17 million adults
- $15 billion annual cost of asthma hospitalization &ER visits
- 3000-4000 asthma-related deaths annually in USA
- Globally affects ~300 million people; ~10-12% of adults and 15% of children
- Asthma can present at any age with a peak age of 3 years

Major risk factors for asthma deaths are:

1. Poorly controlled disease with frequent use of bronchodilator inhalers

2. Lack of corticosteroids therapy

3. Previous admissions to the hospital with near-fatal asthma

TABLE 8-1

RISK FACTORS AND TRIGGERS INVOLVED IN ASTHMA

RISK FACTORS

Endogenous Factors	Environmental Factors
Genetic predisposition	Indoor allergens
Atopy	Outdoor allergens
Airway hyperresponsiveness	Occupational sensitizers
Gender	Passive smoking
Ethnicity?	Respiratory infections
	Obesity?
	Early viral infections?

TRIGGERS

Allergens
Upper respiratory tract viral infections
Exercise and hyperventilation
Cold air
Sulfur dioxide
Drugs (β-blockers, aspirin)
Stress
Irritants (household sprays, paint fumes)

Etiology

Atopy:

- Major risk factor for asthma
- Patients with asthma have other atopic diseases (allergic rhinitis" in 80% of asthmatic & atopic dermatitis)
- Not all atopic individual will become asthmatics as other environmental or genetic factors play a role
- Allergens that lead to sensitization are usually proteins that have protease activity (commonest are derived from **house dust mites**, **cat and dog fur**, **cockroaches**, **grass and tree pollens**, and **rodents**)

Intrinsic asthma (ia) :

- 10% of asthma patients (minority) have negative skin test results & normal serum IgE level
- Nonatopic patients (ia) show later onset of asthma (**Adult-onset asthma**)
- Commonly have nasal polyps and may be ASA-senstive
- Usually have more severe, persistent asthma
- Recent evidences for increased local production of IgE in the airways ?may be common IgE-mediated mechanism

Genetic consideration:

- > 100 genes of potential interest in asthma which gives a sheer number of gene abnormalities that correlates positively with presence of asthma
- **Evidence suggest that severity of asthma is also genetically determined**
- Single nucleotide polymorphism of various candidate genes indicate that asthma is POLYGENIC. This observation suggest that the interaction of many genes is important
- **In general, inherited predisposition for airways hyperresponsiveness and atopy (2 key features in asthmtics)**

Environmental factors:

- The increasing prevalence of asthma in developing countries over the past few decades also indicates the importance of environmental mechanisms interacting with a genetic predisposition

- Obesity is an independent risk factor for asthma, particularly in women, but the mechanism are unknown

- Indoor air pollution may be more important than outdoor, with exposure to nitrogen oxides from cooking stoves and passive tobacco smoke.

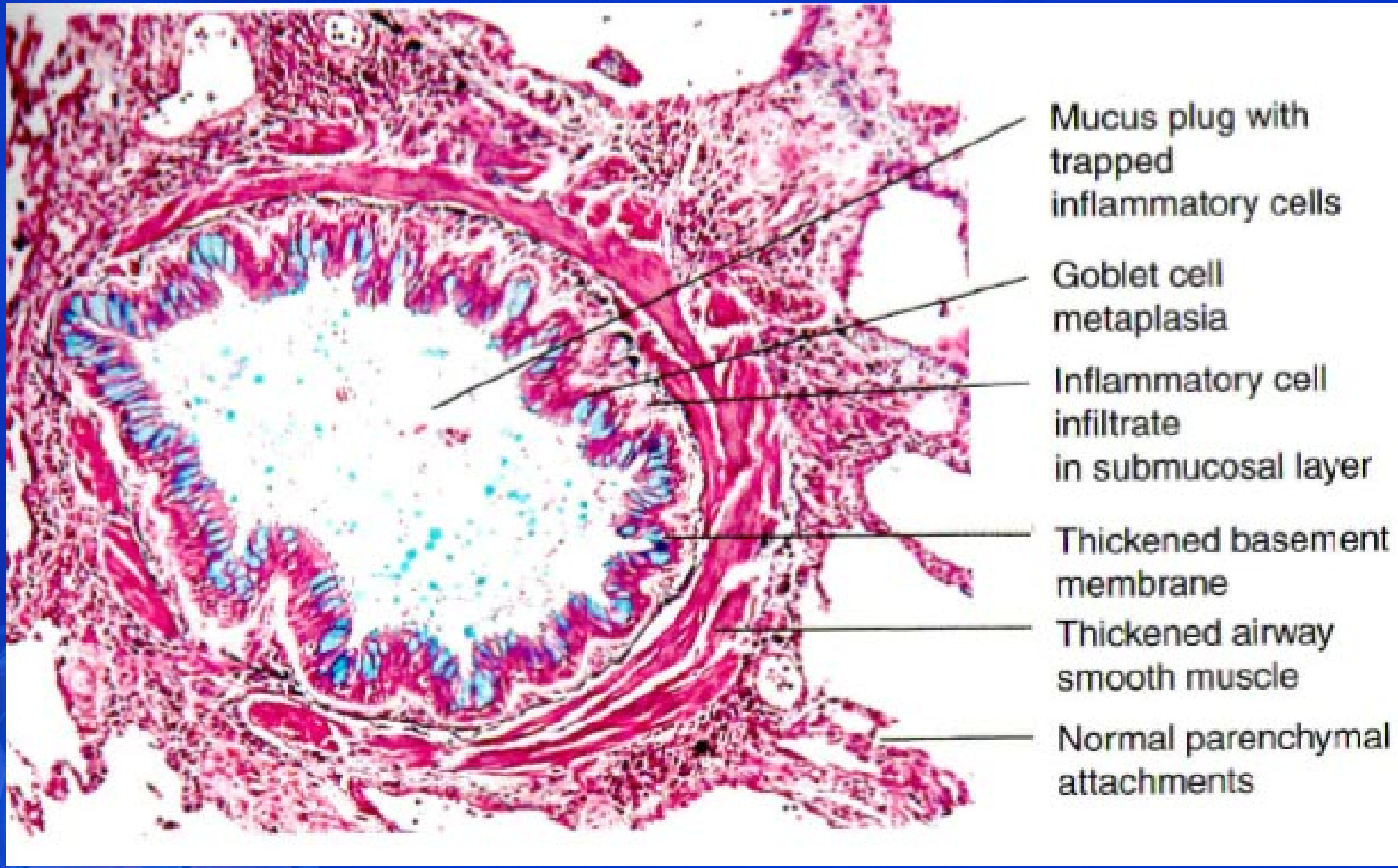
Pathogenesis

- Asthma is associated with a specific inflammation of the mucosa of the lower airways. One of the main aims of treatment is to reduce this inflammation
- Airway mucosa is infiltrated with activated Eosinophils, T-lymphocytes and there is activation of mast cells
- The degree of inflammation is poorly related to disease severity .
- Inflammation is reduced by use of ICSs
- Respiratory mucosal inflammation from trachea to terminal bronchioles but with a predominance in the bronchi (cartilginous airways)

All of these cells are associated with Asthma except:

- 1. Eosinophils
- 2. TH2 cells
- 3. TH1 cells
- 4. Mast Cells
- 5. Neutrophils

Small airway in fatal asthma



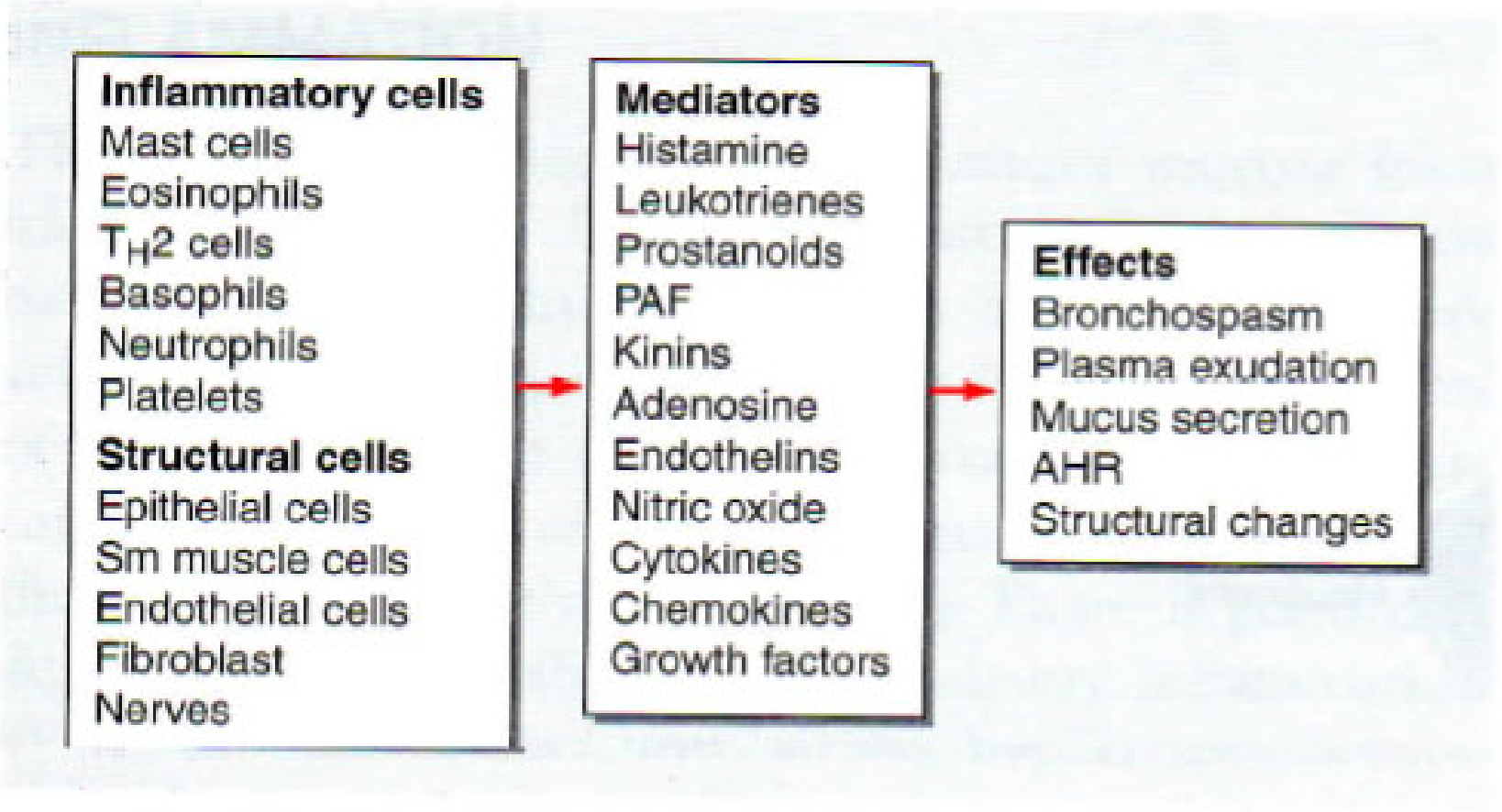


FIGURE 8-4

Many cells and mediators are involved in asthma and lead to several effects on the airways. AHR, hyperresponsiveness; PAF, platelet-activating factor.

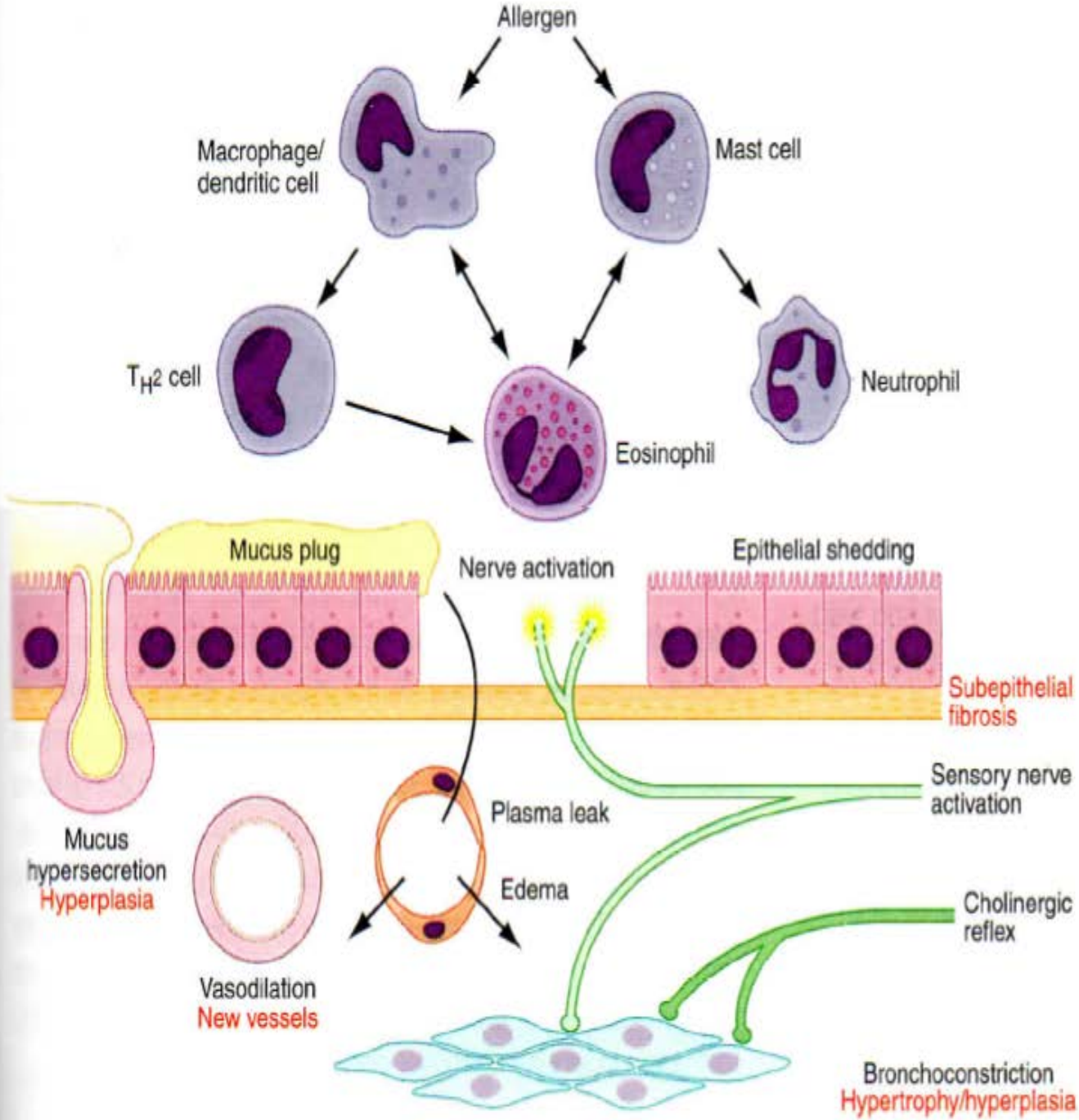


FIGURE 8-3

The pathophysiology of asthma is complex, with participation of several interacting inflammatory cells, resulting in acute and chronic inflammatory effects on the airway.

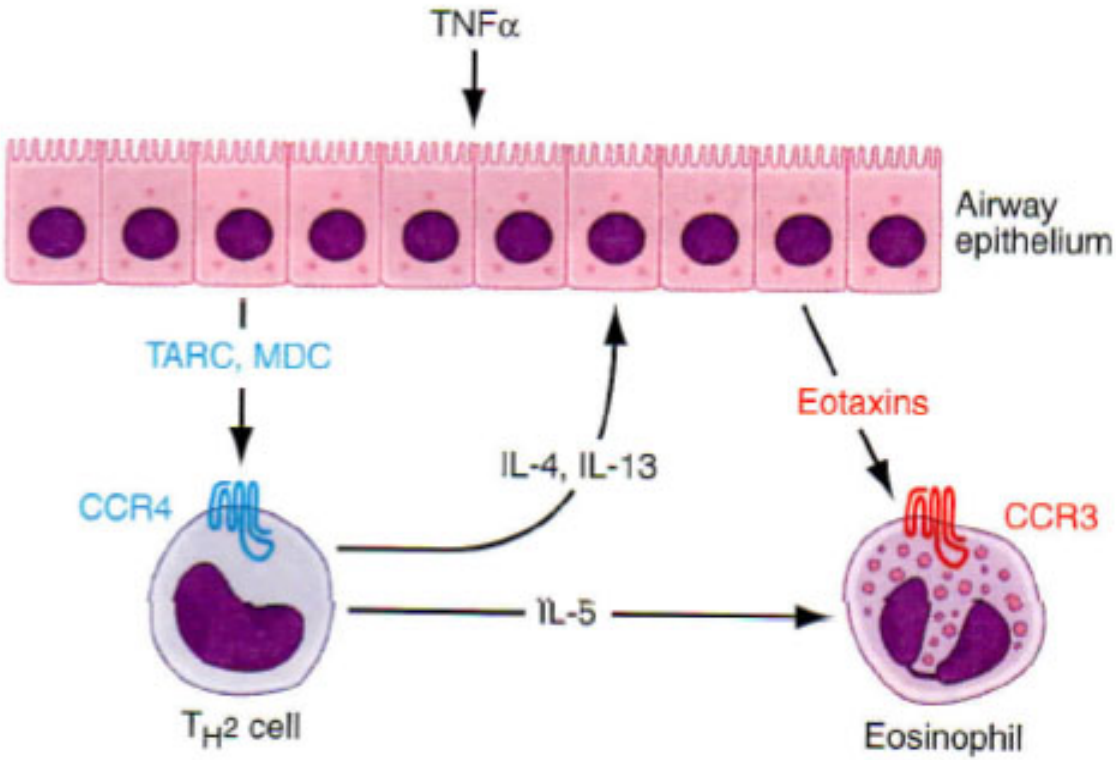


FIGURE 8-5

Chemokines in asthma. Tumor necrosis factor α (TNF α and other triggers of airway epithelial cells release thymus and activation-regulated chemokine (TARC, CCL17) and macrophage-derived chemokine (MDC, CCL22) from epithelial cells, which attract T_H2 cells via activation of their CCR4 receptors. These promote eosinophilic inflammation directly through the release of interleukin 5 (IL-5) and indirectly via the release of IL-4 and IL-13, which induce eotaxin (CCL11) formation in airway epithelial cells.

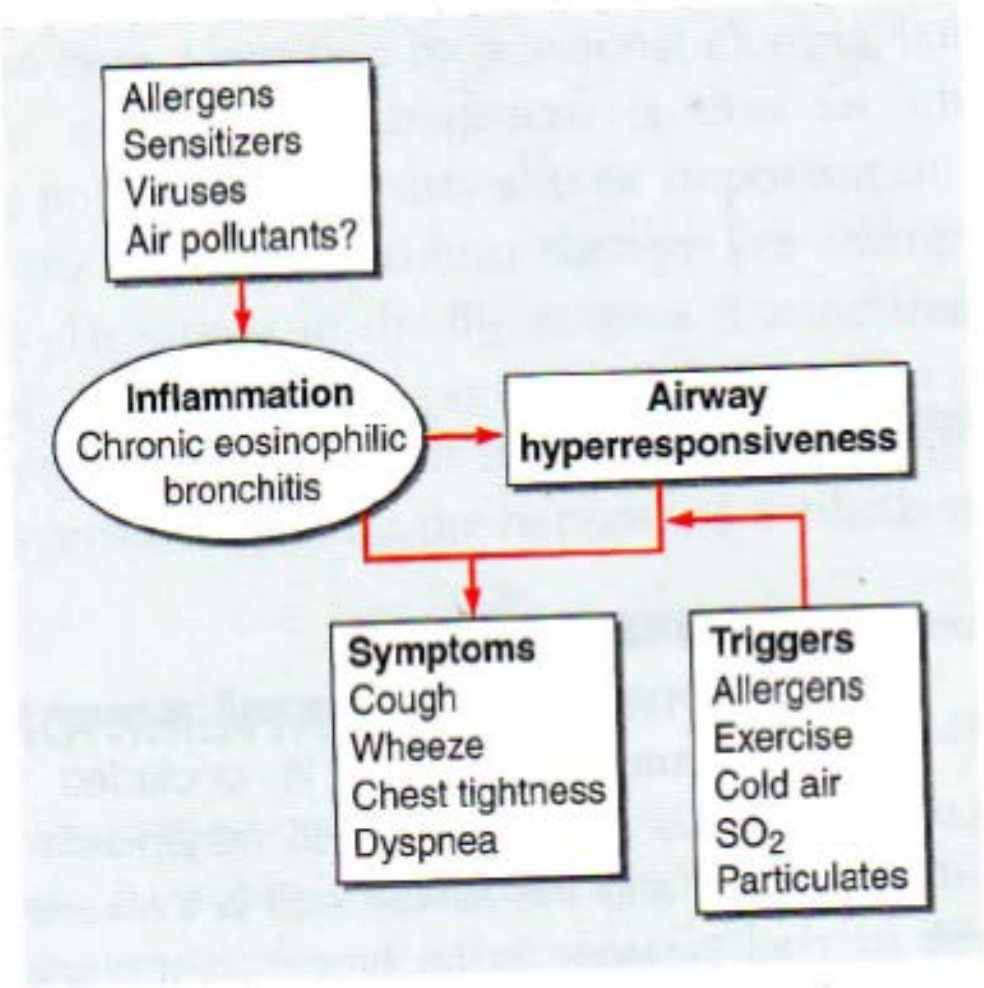


FIGURE 8-2
Inflammation in the airways of asthmatic patients leads to airway hyperresponsiveness and symptoms.

Clinical Features

- Wheezing
- Dyspnea
- Cough
- Symptoms may be worse ay night
- Pt typically awake in the early morning hours
- Some pts with increased mucous production
- Prodromal symptoms may precede an attack (itching under the chin, discomfort between the scapula & inexplicable fear (impeding doom)

Certain historic features lessen the prior probability of asthma

- Lack of improvement following anti-asthmatic medications
- Onset of symptoms after age 50
- Concomitant symptoms such as chest pain, syncope, lightheadedness, or palpitations
- History of cigarette smoking – In patients with >20 pack-years of smoking, the likely diagnosis shifts toward COPD , although the two diseases can co-exist.

Diagnosis

- Pulmonary function testing:

1. Simple spirometry is suggestive with FEV1, FEV1/FVC ratio, and PEF.

2. Reversibility confirmed by 12% and 200 mL increase in FEV1 or FVC 15 min after inhaled SABA

3. May show increased airway resistance, TLC & RV

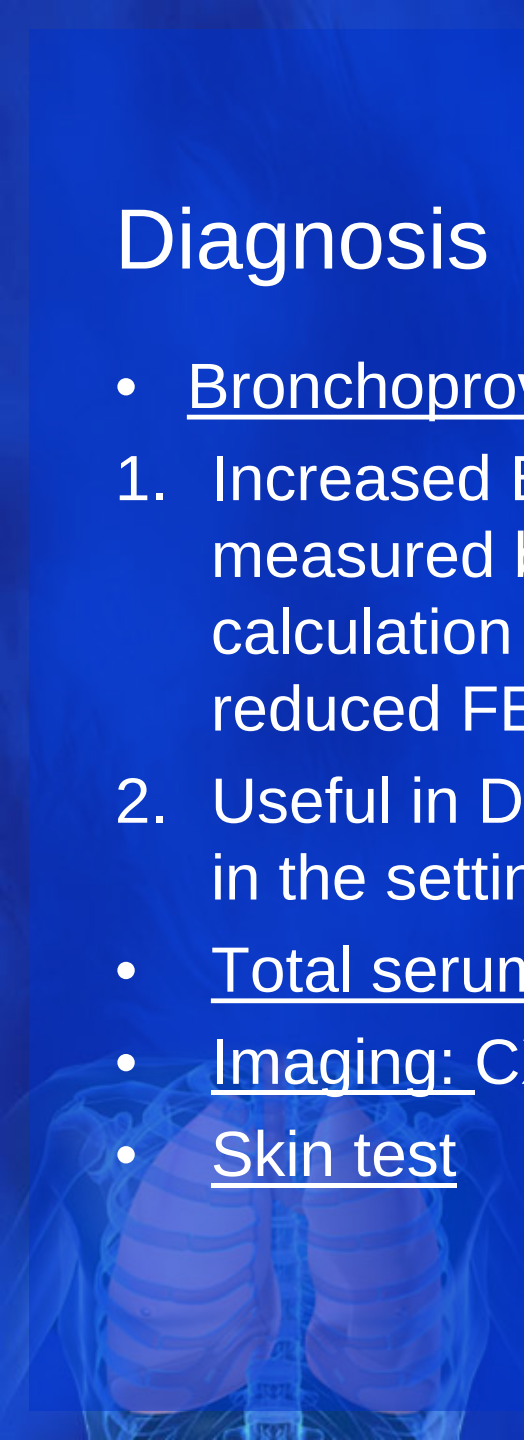
4. DLCO usually normal

Diagnosis

- Bronchoprovocation testing:

1. Increased Bronchial hyperresponsiveness (BHR) measured by methacholine or histamine challenge with calculation of the Provocation concentration (PC) that reduced FEV1 by 20% (PC_{20})
2. Useful in DDx of ch. cough & when diagnosis is in doubt in the setting of normal PFTs

- Total serum IgE level
- Imaging: CXR , CT chest in severe (difficult to control)
- Skin test



AIMS of asthma therapy

- Achieve and maintain control of symptoms
- Maintain normal activity levels, including exercise
- Maintain pulmonary function as close to normal as possible
- Prevent asthma exacerbation
- Avoid adverse effects of asthma medications
- Prevent asthma mortality

A 32 year old caucasian female with long standing persistant asthma, FEV1/FVC 65%, FEV1 65%, wakes 2x per week due to cough, uses her rescue inhaler 5 x per week. She is on fluticasone 44mcg 2 puffs bid and her rescue inhaler. What would you next?

- A. Increase fluticasone to 110 mcg-2 puffs bid
- B. Increase fluticasone and add monteleukast
- C. Make no medication changes.
- D. Add Salmeterol 50micrograms inhaled bid

Short-term objectives:

- Control of immediate symptoms
- Response to falling peak flow rate measurements

Long-tem objectives:

- Disease prevention (implement strategies to avoid serious exacerbations of acute bronchospasm)

4 components to be addressed:

1. Careful assessment of symptoms & objective monitoring by office spirometry and home PEFR
2. Hence, bronchodilator and anti-inflammatory agents tailored to patients needs and relies upon #1
3. Avoidance of exposure to allergens (outdoors & indoors) and irritants (smoke from cigarettes & wood-burning stoves, strong odors and cleaning solutions)
4. Patient education can be a powerful tool (monitoring lung function, avoidance of provocative agents, decisions regarding medications)

Initial asthma treatment by severity of the disease

Mild intermittent asthma
- Severity: Symptoms <2×/wk; nocturnal symptoms <2×/mo; FEV_1 and PEFR >80% predicted; PEFR variability <20%.
- Treatment: Inhaled short-acting β-agonist prn.

Mild persistent asthma
- Severity: Symptoms >2×/wk and <1×/d; nighttime symptoms >2×/mo; FEV_1 and PEFR >80% predicted; PEFR variability between 20% and 30%.
- Treatment: Begin anti-inflammatory therapy; ICSs (low dose) are preferred, or consider an LT pathway modifier. Use short-acting β-agonist prn for quick relief, but increased use means need for additional controller therapy.

Moderate persistent asthma
- Severity: Daily symptoms and daily use of rescue β-agonist; >2 exacerbations/wk and 1 nighttime exacerbation/mo; FEV_1 and PEFR between 60% and 80% predicted; PEFR variability >30%.
- Treatment: Increase ICS dose or add long-acting β-agonist; if symptoms still persist, may increase dose of ICS, add LT pathway modifier, or consider theophylline; continue short-acting β-agonist for acute relief.

Severe persistent asthma
- Severity: continuous symptoms; limited physical activity; frequent exacerbations; frequent nighttime symptoms; FEV_1 and PEFR <60% predicted; PEFR variability >30%.
- Treatment: ICSs, long-acting β-agonist, theophylline, and oral corticosteroids.

Components of severity		Classification of asthma severity (≥12 years of age)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment Normal FEV_1/FVC: 8 to 19 years 85 percent 20 to 39 years 80 percent 40 to 59 years 75 percent 60 to 80 years 70 percent	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3 to 4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not more than 1x on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV_1 between exacerbations • FEV_1 >80 percent predicted • FEV_1/FVC normal	• FEV_1 ≥80 percent predicted • FEV_1/FVC normal	• FEV_1 >60 but <80 percent predicted • FEV_1/FVC reduced 5 percent	• FEV_1 <60 percent predicted • FEV_1/FVC reduced >5 percent
Risk	**Exacerbations requiring oral systemic glucocorticoids**	**0 to 1/year (see footnote)**	**≥2/year (see footnote)**		
		Consider severity and interval since last exacerbation			
		Frequency and severity may fluctuate over time for patients in any severity category			
		Relative annual risk of exacerbations may be related to FEV_1			
Recommended step for initiating treatment		Step 1	Step 2	Step 3	Step 4 or 5
				And consider short course of oral systemic glucocorticoids	
		In two to six weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

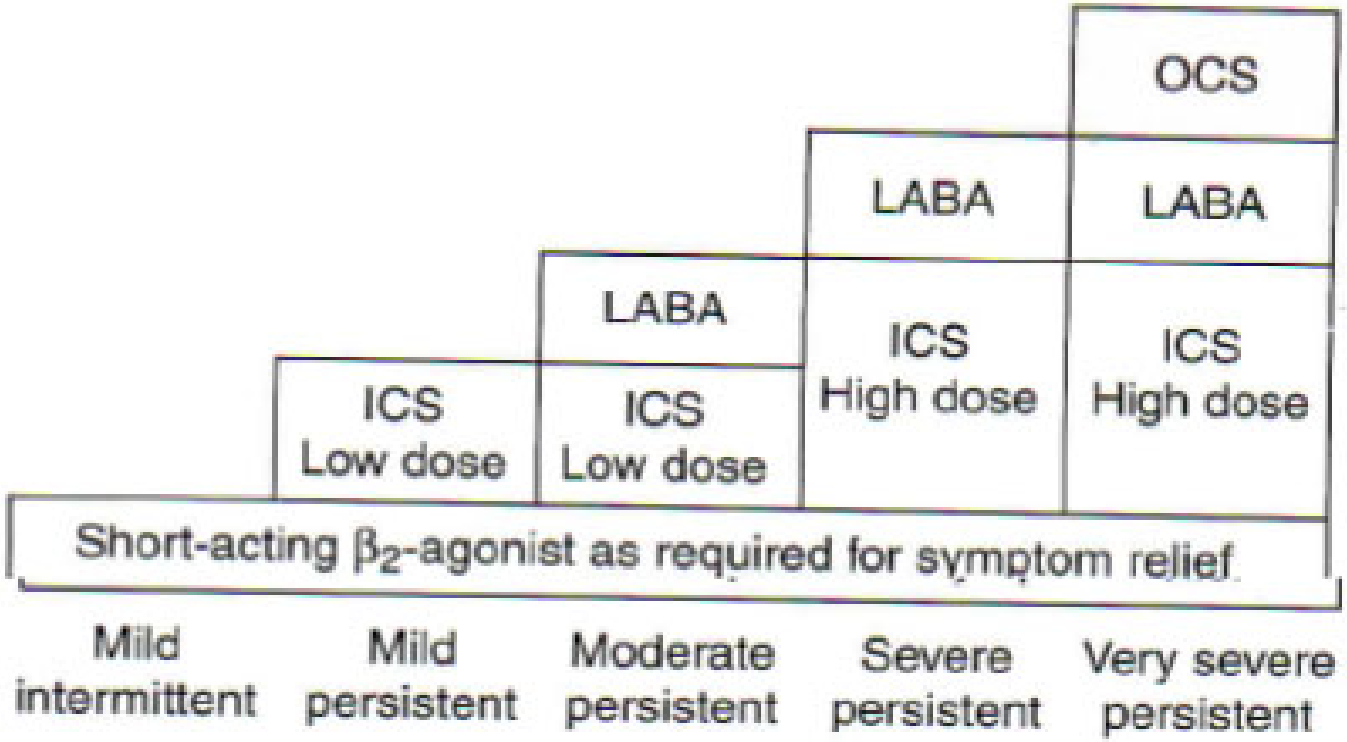


FIGURE 8-7

Step-wise approach to asthma therapy according to the severity of asthma and ability to control symptoms. ICS, inhaled corticosteroid; LABA, long-acting β_2-agonist; OCS, oral corticosteroid.

Questions for monitoring asthma care

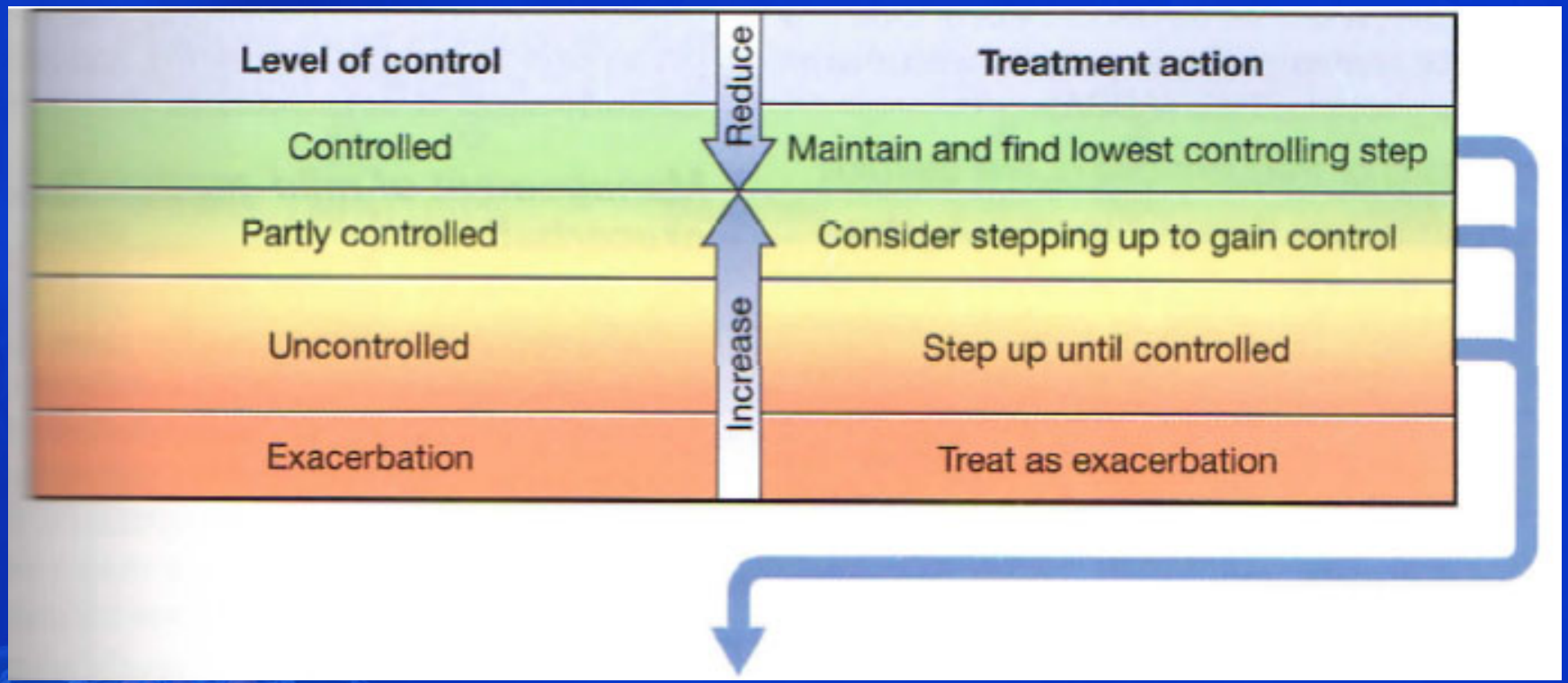
1. Has your asthma awakened you at night ?
2. Have you needed more reliever medications than usual?
3. Have you needed any urgent medical care?
4. Has your peak flow been below your personal test?
5. Are your participating in your usual physical activity ?
6. PLEASE show me how you use your medicine ?

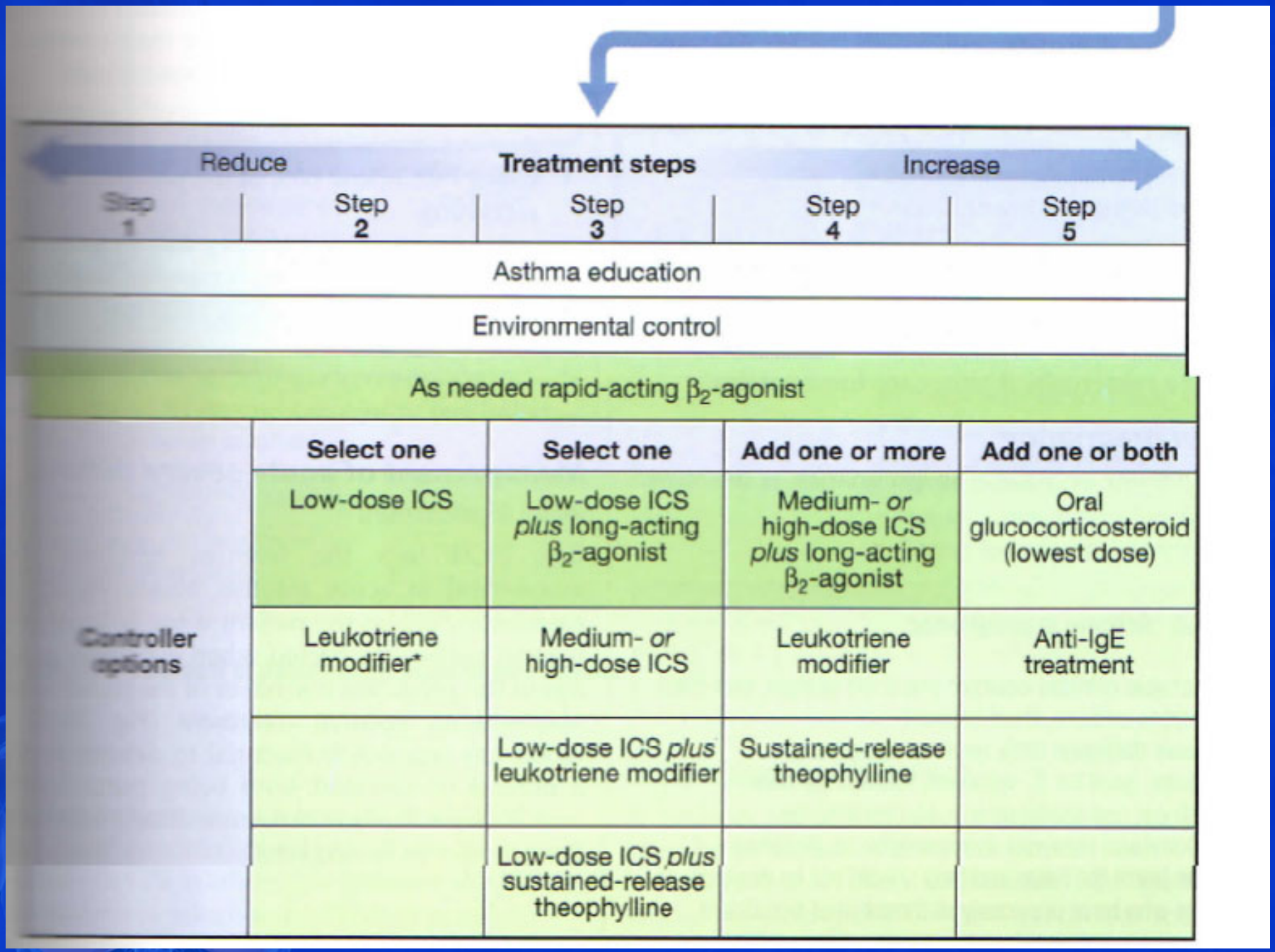
Table 3—*Levels of Asthma Control*

Controlled
- All of the following:
  1) No daytime symptoms or <1×/wk
  2) Limitations of activities: none
  3) Nocturnal awakening: none
  4) Need for reliever (rescue) medication: ≤2×/wk
  5) FEV_1 or peak flow: normal
  6) Exacerbations: none

Partly controlled
- Any measure present, in any week:
  1) Symptoms >2×/wk
  2) Limitations of activities: any
  3) Nocturnal awakening: any
  4) Need for reliever (rescue) medication: >2×/wk
  5) FEV_1 or peak flow: <80% predicted or of personal best (if known)
  6) Exacerbations: one or more a year

Uncontrolled
- Three or more features of partly controlled asthma present in any week
- An exacerbation in any 1 week makes a poorly controlled asthma week


Level of control
Treatment action
Reduce
Controlled
Maintain and find lowest controlling step
Partly controlled
Consider stepping up to gain control
Increase
Uncontrolled
Step up until controlled
Exacerbation
Treat as exacerbation


Reduce
Treatment steps
Increase
Step 1
Step 2
Step 3
Step 4
Step 5
Asthma education
Environmental control
As needed rapid-acting β_2-agonist
Controller options
Select one
Low-dose ICS
Leukotriene modifier*
Select one
Low-dose ICS *plus* long-acting β_2-agonist
Medium- *or* high-dose ICS
Low-dose ICS *plus* leukotriene modifier
Low-dose ICS *plus* sustained-release theophylline
Add one or more
Medium- *or* high-dose ICS *plus* long-acting β_2-agonist
Leukotriene modifier
Sustained-release theophylline
Add one or both
Oral glucocorticosteroid (lowest dose)
Anti-IgE treatment

New Criteria of Actual Control

- 1.<2 day time symptoms per week.
- 2. No nocturnal symptoms
- 3. <2 x per week usage of rescue inhaler
- 4. No limitation to daily activity
- 5. Normal lung function

MEDICATIONS FOR ASTHMA

Antiiflammatory Agents (Corticosteroids)

Capable of reducing airway inflammation and thus:

- Improving lung function
- Decreasing bronchial hyperreactivity
- Reducing symptoms
- Improving overall quality of life

Suppress a number of pathways of ch. Inflammation in asthma as inflammatory genes are regulated by proinflammatory transcription factors (Nuclear factor kB, activator protein-1)

Corticosteroids

Corticosteroids act to Suppress the action of the proinflammatory transcription factors, & they act by :

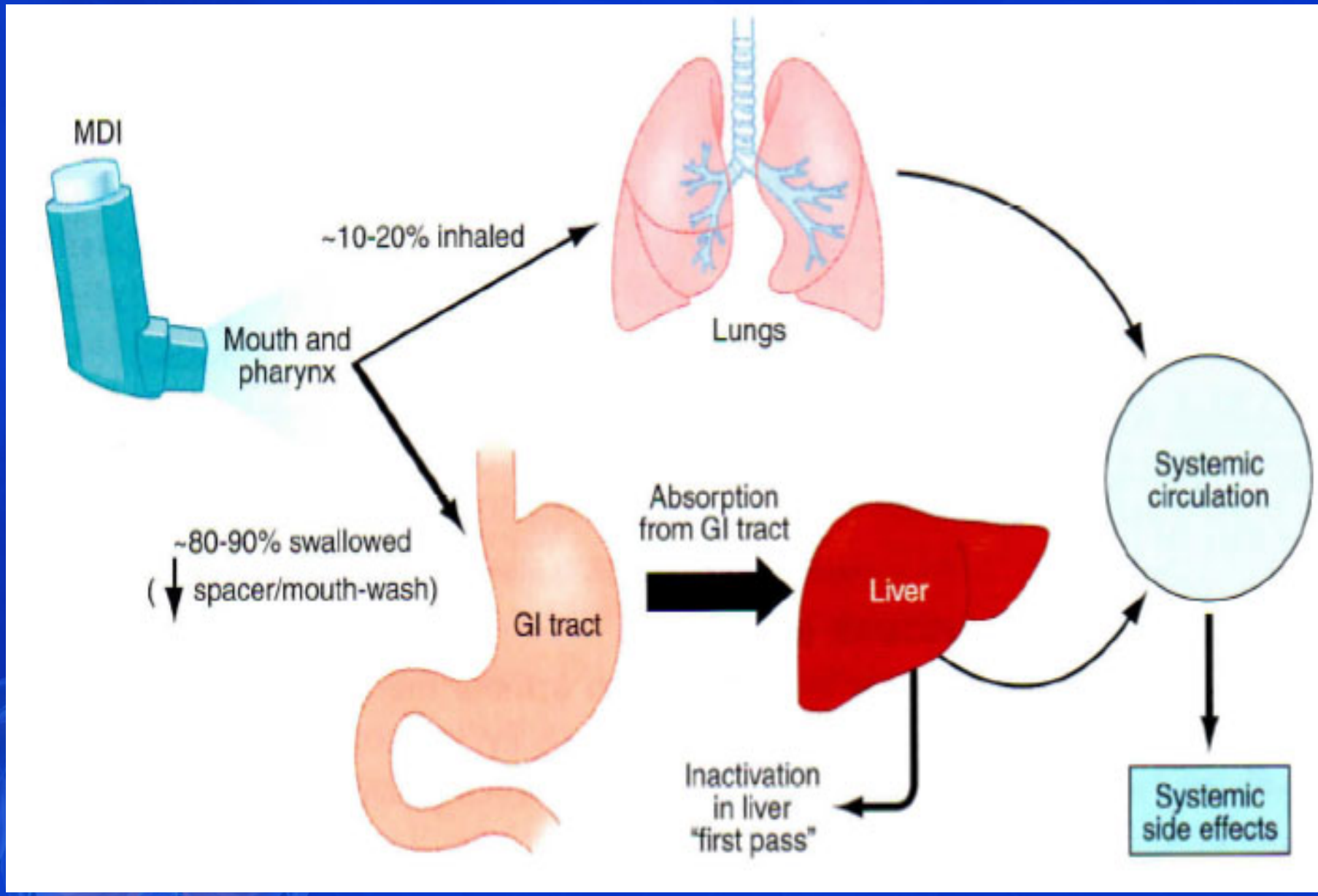
- Preventing the migration & activation of inflammatory cells
- Interfering with production of PGs and LTs
- Reducing microvascular leakage
- Enhancing the action of β_2-adrenergic receptors on airway smooth muscle

Corticosteroids

- Oral, parenteral or inhaled
- (oral steroids) in Acute exacerbation unresponsive to bronchodilator.
- 40-60mg/d until pt respond then slowly taper
- Poorly controlled asthma requires daily or every-other-day maintenance therapy (10-15 mg/d)
- IV steroids are effective within 4-6 h of administration
- Massive IV bolus ≥ 500mg is no more effective than (60-80)

Inhaled Corticosteroids (ICSs):

- Safe and effective in moderate-severe asthma
- Active smoking impairs the efficacy of ICS in mild asthma
- Beclomethasone, triamcinolone, flunisolide, fluticasone and budesonide
- Dose-response curve for ICSs is flat
- High doses contributes marginally to efficacy
- Long-term use associated with a good safety profile
- HIGH doses>1000µg/d may cause hypophyseal-pituitary-adrenal axis
- Local adverse effects: hoarseness, dysphonia, cough, oral candidiasis


MDI
~10-20% inhaled
Mouth and pharynx
Lungs
Systemic circulation
~80-90% swallowed
(spacer/mouth-wash)
GI tract
Absorption from GI tract
Liver
Inactivation in liver "first pass"
Systemic side effects

Bronchodilators

- Inhaled short-acting β_2-adrenergic (SABA) agonists are the treatment of choice for exacerbation

- Metered-dose inhaler, dry-powder capsule and compressor-driven nebulizers

BUT…

- Regularly scheduled doses of SABA have been associated with diminished control of asthma & heightened bronchial reactivity
- Excessive β_2-adrenergic use linked to increased mortality

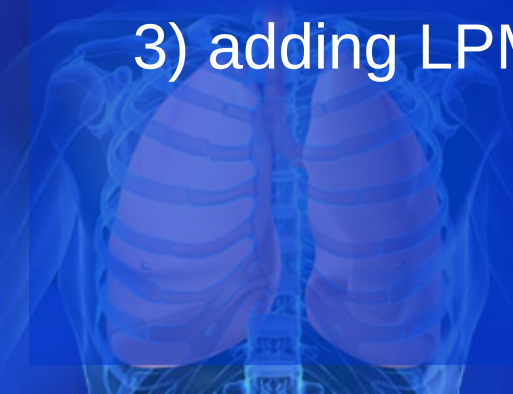
Effects of β_2-adrenergic agonists

- Relaxation of airway smooth muscle
- Inhibition of mast cell mediator release
- Inhibition of plasma exudation and airway edema
- Increased mucocilliary clearance
- Increased mucous secretion
- Decreased cough
- NO effect on chronic inflammation

LABAs

- May be helpful for long-term maintenance therapy
- Used to control night symptoms
- Should NOT be used a single agent to treat asthma (has been associated with asthma mortality)
- Studies has shown a benefit to adding LABA to a moderate-dose ICS >rather than:

1) doubling ICS dose,
2) adding theophylline,
3) adding LPM



Single inhaler maintenance / reliever therapy

- New strategy used in moderate-severe asthma
- Budesonide/Formoterol used as a reliever instead of SABA while continuing maintenance therapy as twice daily
- Improves asthma control
- Significant reduction in severe exacerbations
- NOT used with Salmeterol or Indacaterol because of cumulative side-effects

Theophylline

- Effective bronchodilator & has anti-inflammatory properties
- Needs close monitoring especially in elderly
- Therapeutic level 8-15 µg/mL
- GI toxicity at levels 20-30 µg/mL
- Serious cardiac arrhythmias and seizures ≥ 30 µg/mL

Inhaled Anticholinergics

- Ipratropium
- May be useful in combination with β-agonists for a severe acute exacerbation of asthma
- May be tried as a substitute bronchodilator, when there is side effects of β-agonists
- But slower onset of action 30-60 min for a maximal effect
- Should be coupled with ICSs

LT pathway modifiers (LPMs)

2 subclasses :

1. 5-lipoxygenase inhibitors (inhibit cysteinyl LTs & LTB4)
2. LTD4 receptor antagonists (LTC4, LTD4, LTE4)

Which prevents:

- Allergen-induced asthma
- Exercise-induced asthma
- Aspirin-induced bronchospasm
- Allergic rhinitis

LPMs

- use of antihistamines with LPMs provides more complete protection to allergen challenge
- Reduces exacerbation rates & the need for steroid bursts

Omalizumab

- Monoclonal antibody that inhibits the binding of IgE to mast cells by forming complexes with circulating free IgE
- Effective in atopic asthma
- Reduction of free IgE leads to a down-regulation of basophil & mast cell receptors
- No serious side effects
- Twice a month injection

Table 2—*When to Consider Allergen Immunotherapy*

- When maximum therapy with inhaled bronchodilators and corticosteroids is not effective
- Other triggers treated or ruled out
- Exposure avoidance to aeroallergens is not possible
- Atopy is confirmed by
  - Exposure provokes symptoms for a narrow spectrum of allergens
  - Confirmation by skin tests or serum-specific IgE (RAST testing)

Relative contraindications:

- Severe asthma with abnormal PFTs
- Patients not able to comply with therapy
- Patients taking β-blockers
- Patients with immune deficiency, immunologic disease, or malignancy
- Pregnancy (maintenance injections may be continued during pregnancy)
- Young children (<5 y)

ATS workshop consensus for definition of severe/refractory asthma

- one or both major criteria and 2 minor criteria

Major criteria:

To achieve control to level of mild-moderate persistent asthma:

1. Treatment with continuous or near continuous (≥50 percent of year) oral glucocorticoids
2. Treatment with high-dose inhaled glucocorticoids:
   Beclomethasone >1260 mcg/day
   Budesonide >1200 mcg/day
   Fluticasone >880 mcg/day

Minor criteria

1. Requirement for additional daily treatment with a controller medication, eg, LABA, theophylline, or LPMs
2. Asthma symptoms requiring SABA use on a daily or near daily basis
3. Persistent airflow limitation (FEV1 <80% predicted; diurnal peak expiratory flow variability >20%)
4. One or more urgent care visits for asthma/yr
5. Three or more oral glucocorticoid bursts per year
6. Prompt deterioration with ≤25 percent reduction in oral or inhaled glucocorticoid dose
7. Near-fatal asthma event in the past

Asthma Action Plan

For: _____ Doctor: _____ Date: _____

Doctor's Phone Number _____ Hospital/Emergency Department Phone Number _____

GREEN ZONE

Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
(80 percent or more of my best peak flow)

My best peak flow is: _____

Take these long-term control medicines each day (include an anti-inflammatory).

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Before exercise ❒ _____	❒ 2 or ❒ 4 puffs _____	5 minutes before exercise

YELLOW ZONE

Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____
(50 to 79 percent of my best peak flow)

First

Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.

_____ (short-acting beta$_2$-agonist)

❒ 2 or ❒ 4 puffs, every 20 minutes for up to 1 hour
❒ Nebulizer, once

Second

If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
❒ Continue monitoring to be sure you stay in the green zone.

-Or-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

❒ Take: _____ (short-acting beta$_2$-agonist) ❒ 2 or ❒ 4 puffs or ❒ Nebulizer

❒ Add: _____ (oral steroid) mg per day For _____ (3–10) days

❒ Call the doctor ❒ before/ ❒ within _____ hours after taking the oral steroid.

RED ZONE

Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____
(50 percent of my best peak flow)

Take this medicine:

❒ _____ ❒ 4 or ❒ 6 puffs or ❒ Nebulizer
(short-acting beta$_2$-agonist)

❒ _____ mg
(oral steroid)

Then call your doctor NOW. Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

DANGER SIGNS

- **Trouble walking and talking due to shortness of breath**
- **Lips or fingernails are blue**

- **Take ❒ 4 or ❒ 6 puffs of your quick-relief medicine AND**
- **Go to the hospital or call for an ambulance _____ NOW!**
(phone)

See the reverse side for things you can do to avoid your asthma triggers.

How to avoid triggers

Allergens

❒ Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or feathers.

The best thing to do:

- Keep furred or feathered pets out of your home.

If you can't keep the pet outdoors, then:

- Keep the pet out of your bedroom and other sleeping areas at all times, and keep the door closed.
- Remove carpets and furniture covered with cloth from your home. If that is not possible, keep the pet away from fabric-covered furniture and carpets.

Dust Mites

Many people with asthma are allergic to dust mites. Dust mites are tiny bugs that are found in every home—in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items.

Things that can help:

- Encase your mattress in a special dust-proof cover.
- Encase your pillow in a special dust-proof cover or wash the pillow each week in hot water. Water must be hotter than 130° F to kill the mites. Cold or warm water used with detergent and bleach can also be effective.
- Wash the sheets and blankets on your bed each week in hot water.
- Reduce indoor humidity to below 60 percent (ideally between 30—50 percent). Dehumidifiers or central air conditioners can do this.
- Try not to sleep or lie on cloth-covered cushions.
- Remove carpets from your bedroom and those laid on concrete, if you can.
- Keep stuffed toys out of the bed or wash the toys weekly in hot water or cooler water with detergent and bleach.

Cockroaches

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

The best thing to do:

- Keep food and garbage in closed containers. Never leave food out.
- Use poison baits, powders, gels, or paste (for example, boric acid). You can also use traps.
- If a spray is used to kill roaches, stay out of the room until the odor goes away.

- **Indoor Mold**
  - Fix leaky faucets, pipes, or other sources of water that have mold around them.
  - Clean moldy surfaces with a cleaner that has bleach in it.

- **Pollen and Outdoor Mold**

  What to do during your allergy season (when pollen or mold spore counts are high):
  - Try to keep your windows closed.
  - Stay indoors with windows closed from late morning to afternoon, if you can. Pollen and some mold spore counts are highest at that time.
  - Ask your doctor whether you need to take or increase anti-inflammatory medicine before your allergy season starts.

Irritants

- **Tobacco Smoke**
  - If you smoke, ask your doctor for ways to help you quit. Ask family members to quit smoking, too.
  - Do not allow smoking in your home or car.

- **Smoke, Strong Odors, and Sprays**
  - If possible, do not use a wood-burning stove, kerosene heater, or fireplace.
  - Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

Other things that bring on asthma symptoms in some people include:

- **Vacuum Cleaning**
  - Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
  - If you vacuum, use a dust mask (from a hardware store), a double-layered or microfilter vacuum cleaner bag, or a vacuum cleaner with a HEPA filter.

Other Things That Can Make Asthma Worse

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).