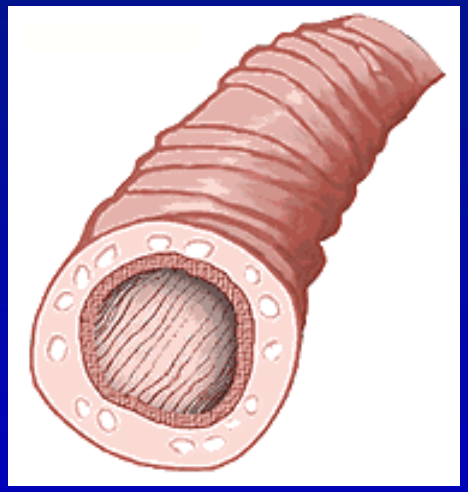
Obstructive Airway Disease

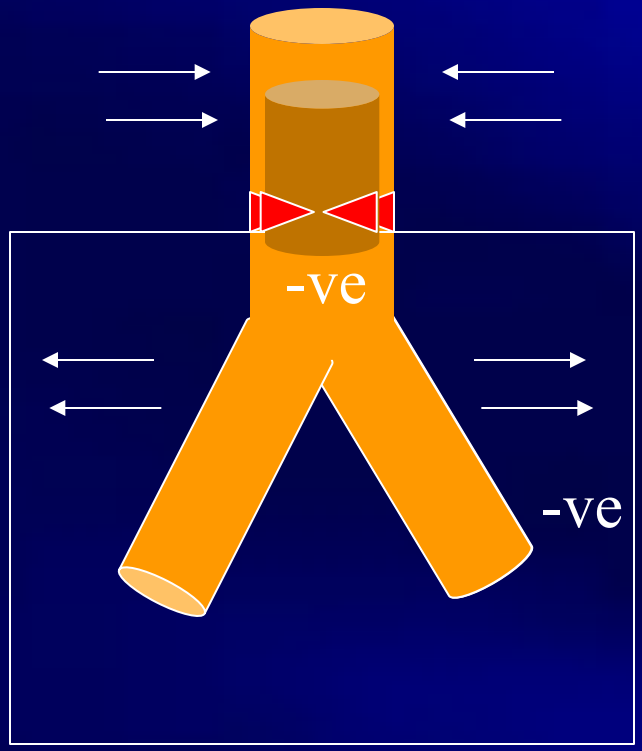


Dr. Khalid Al-Mobaireek

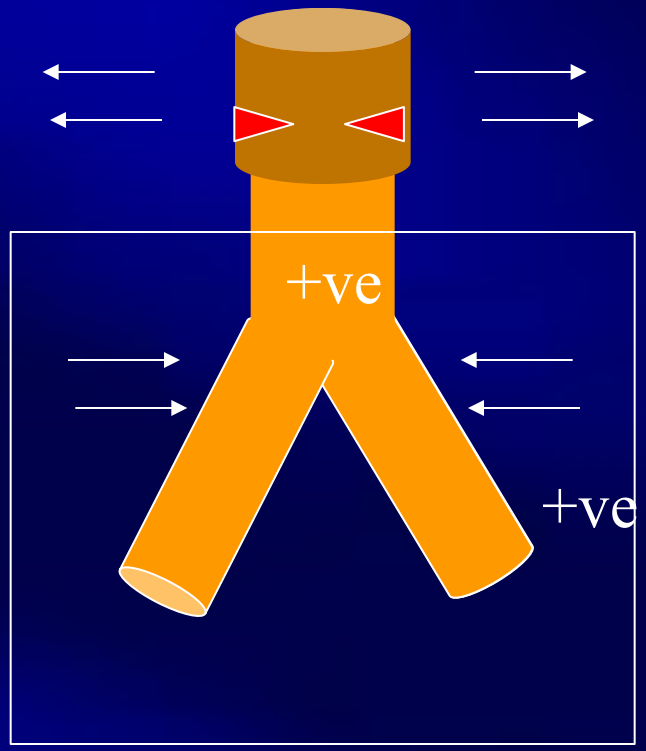
King Khalid University Hospital

Obstructive airway Disease:

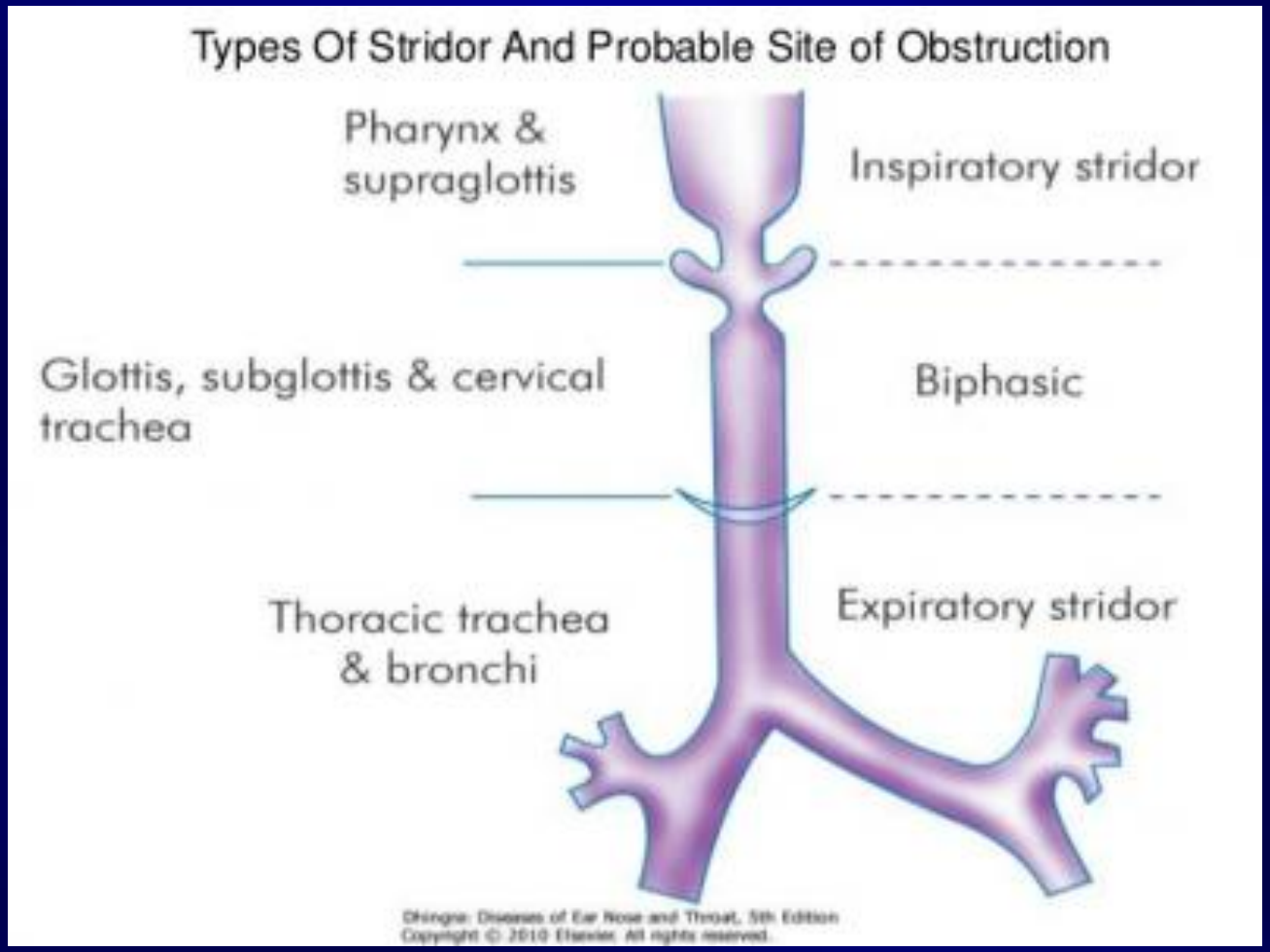
- Physiological:
  - Reversible = Asthma
  - Irreversible: Bronchiectasis
- Anatomical:
  - Upper
  - Lower



Inspiration

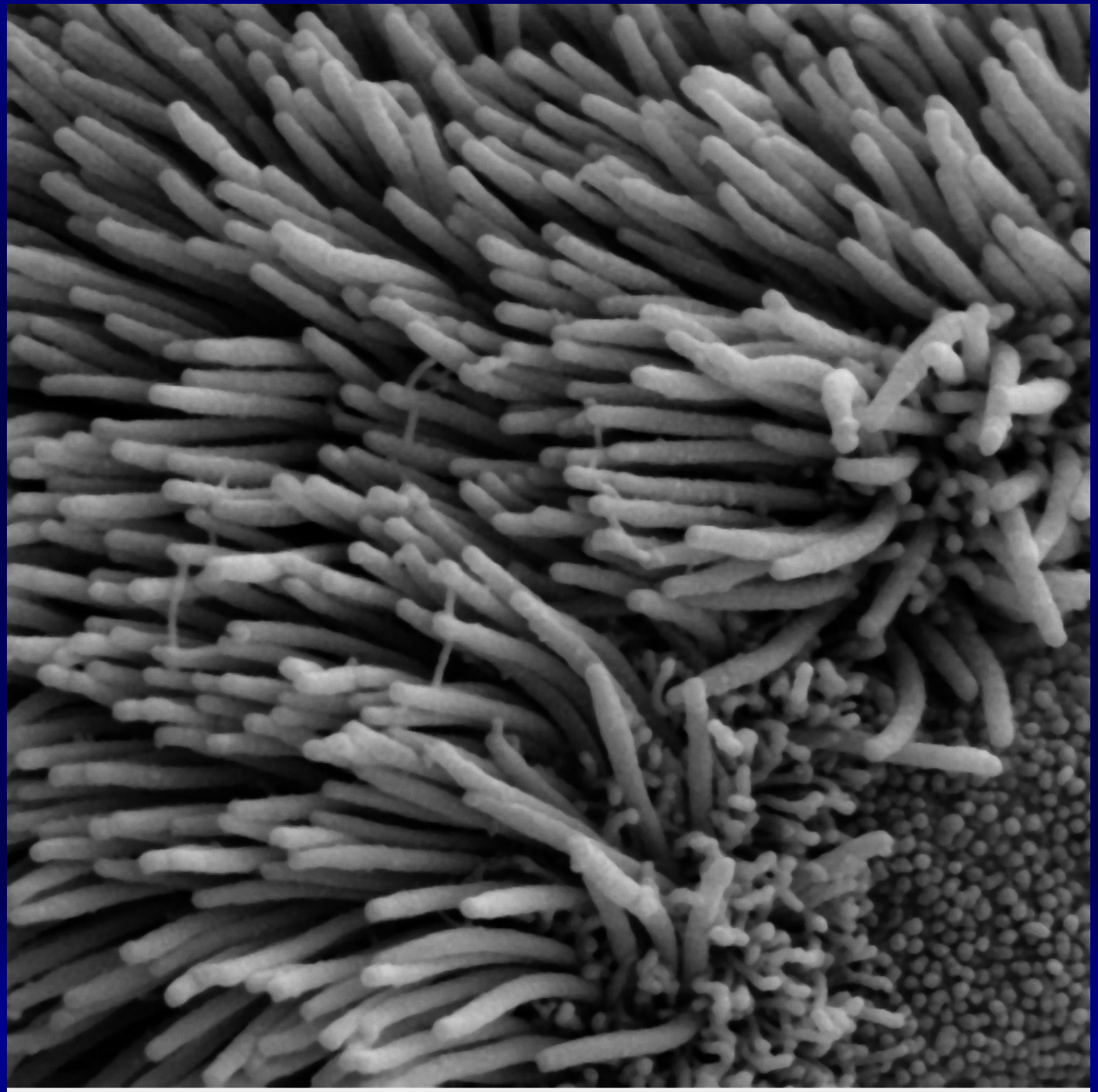


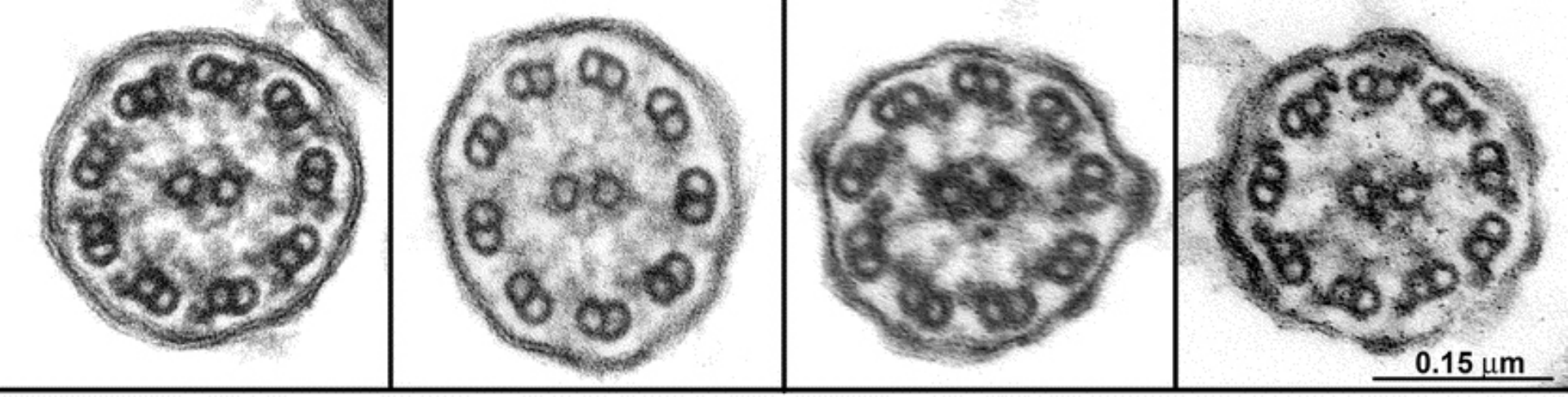
Expiration


Types Of Stridor And Probable Site of Obstruction
Pharynx & supraglottis
Inspiratory stridor
Glottis, subglottis & cervical trachea
Biphasic
Thoracic trachea & bronchi
Expiratory stridor

Bronchiectasis

- Localized:
  - Anatomical
    - Airway: Internal, External,
    - Parynchymal
- Diffuse:
  - Aspiration
  - Mucociliary clearance: PCD, CF
  - Immune deficiency
  - Congenital
  - Post-infectious: Pertusis, TB, adenovirus..





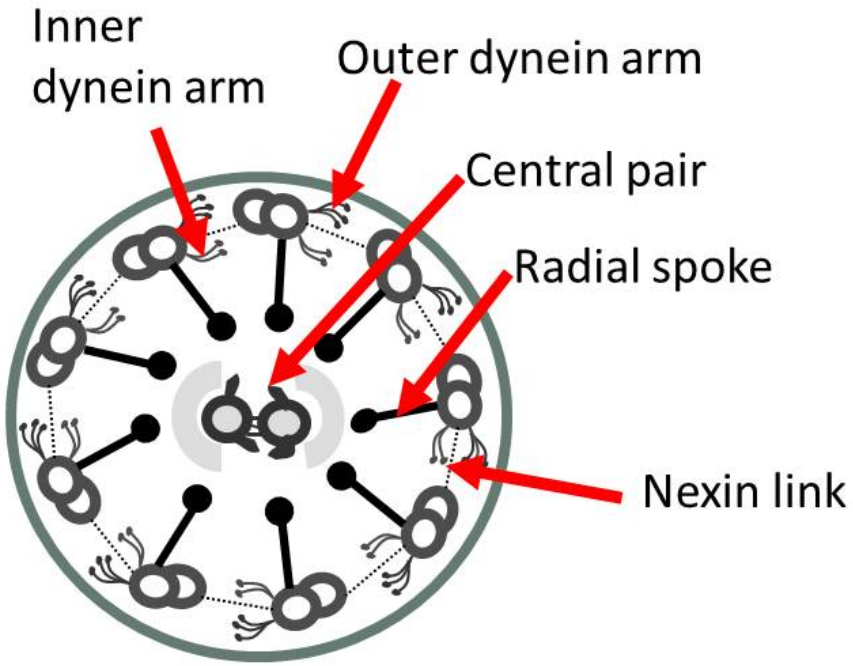
Normal

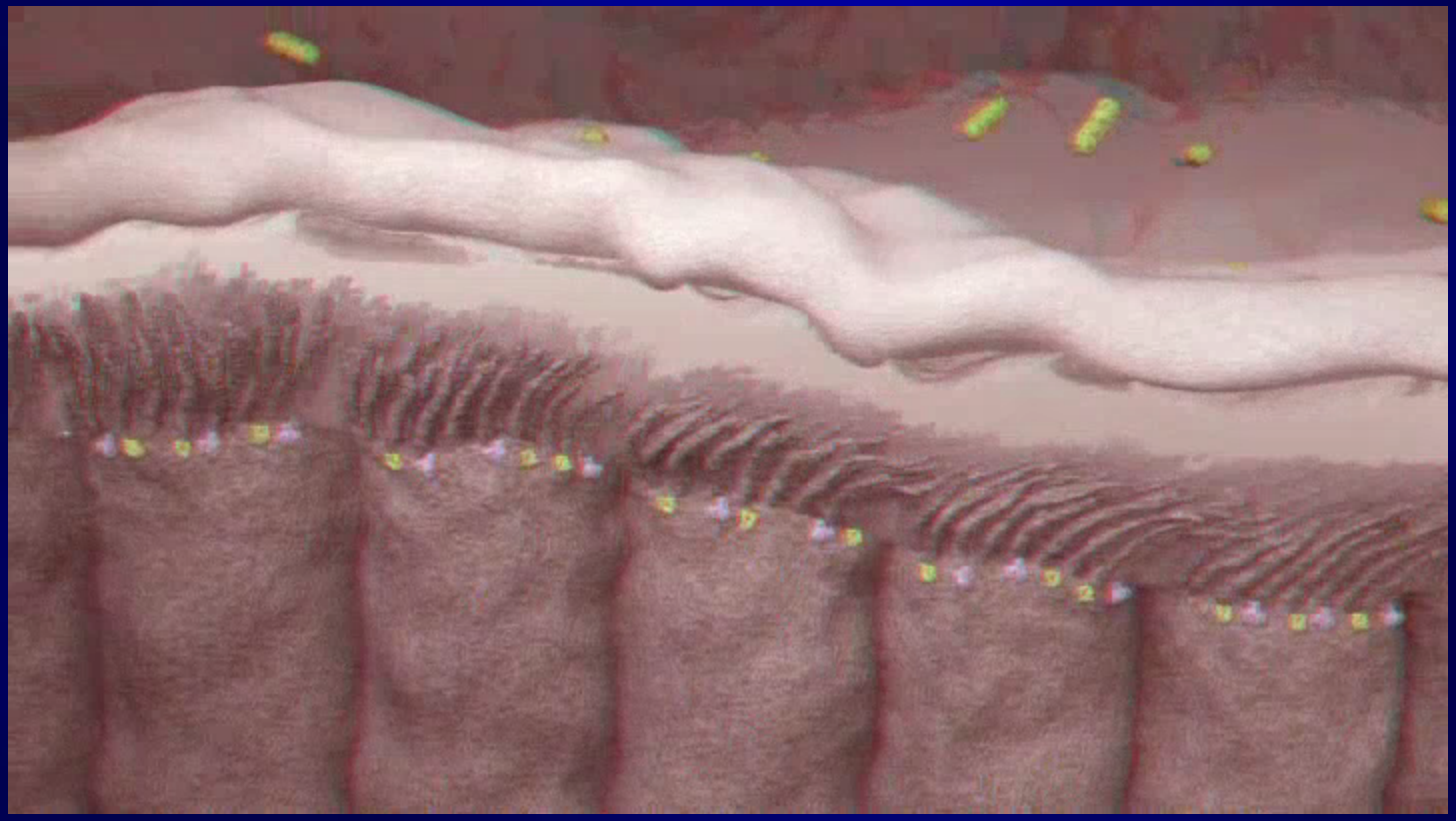
Both Arms Absent

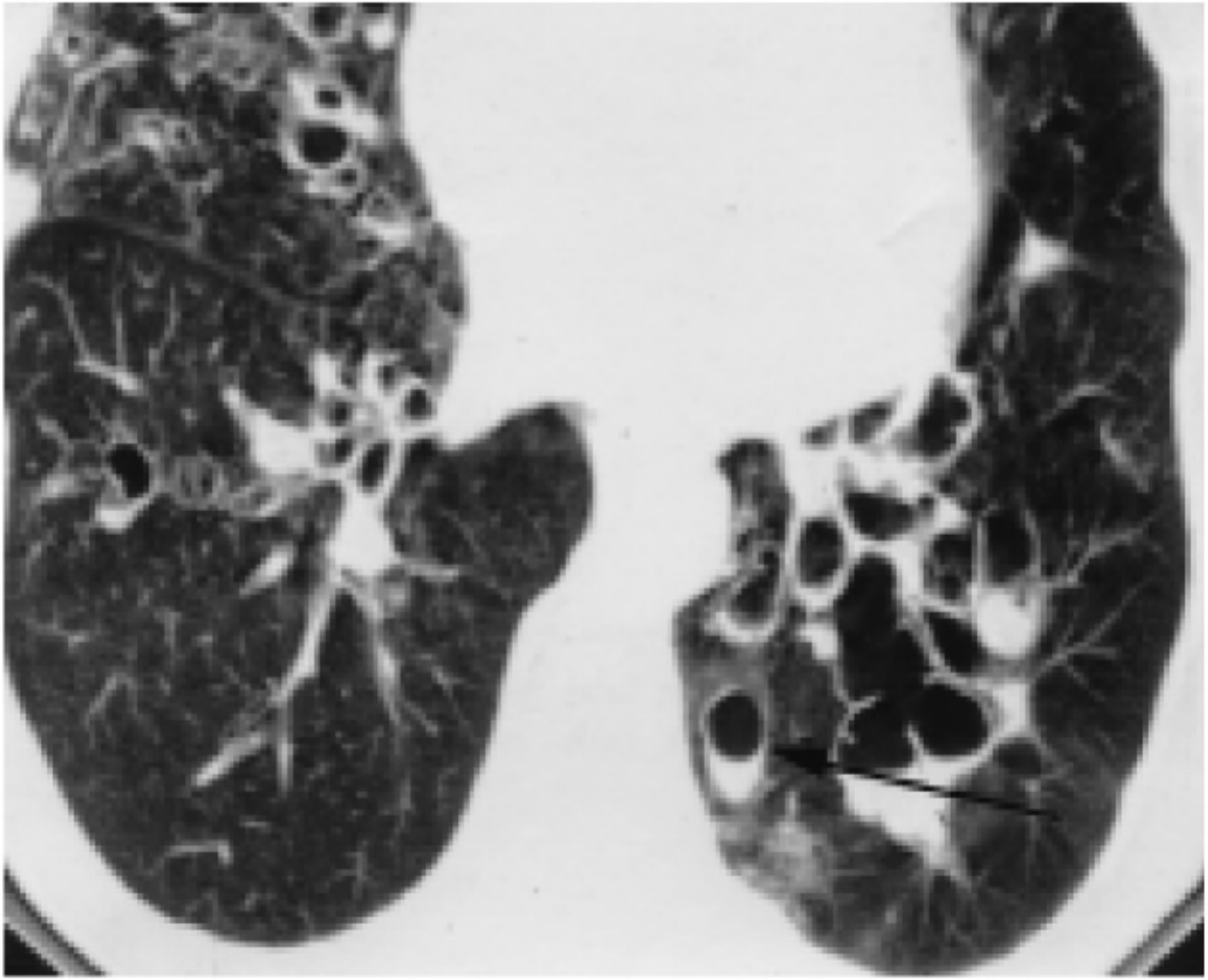
Absent ODA

Absent IDA

Nose cilia cross-section





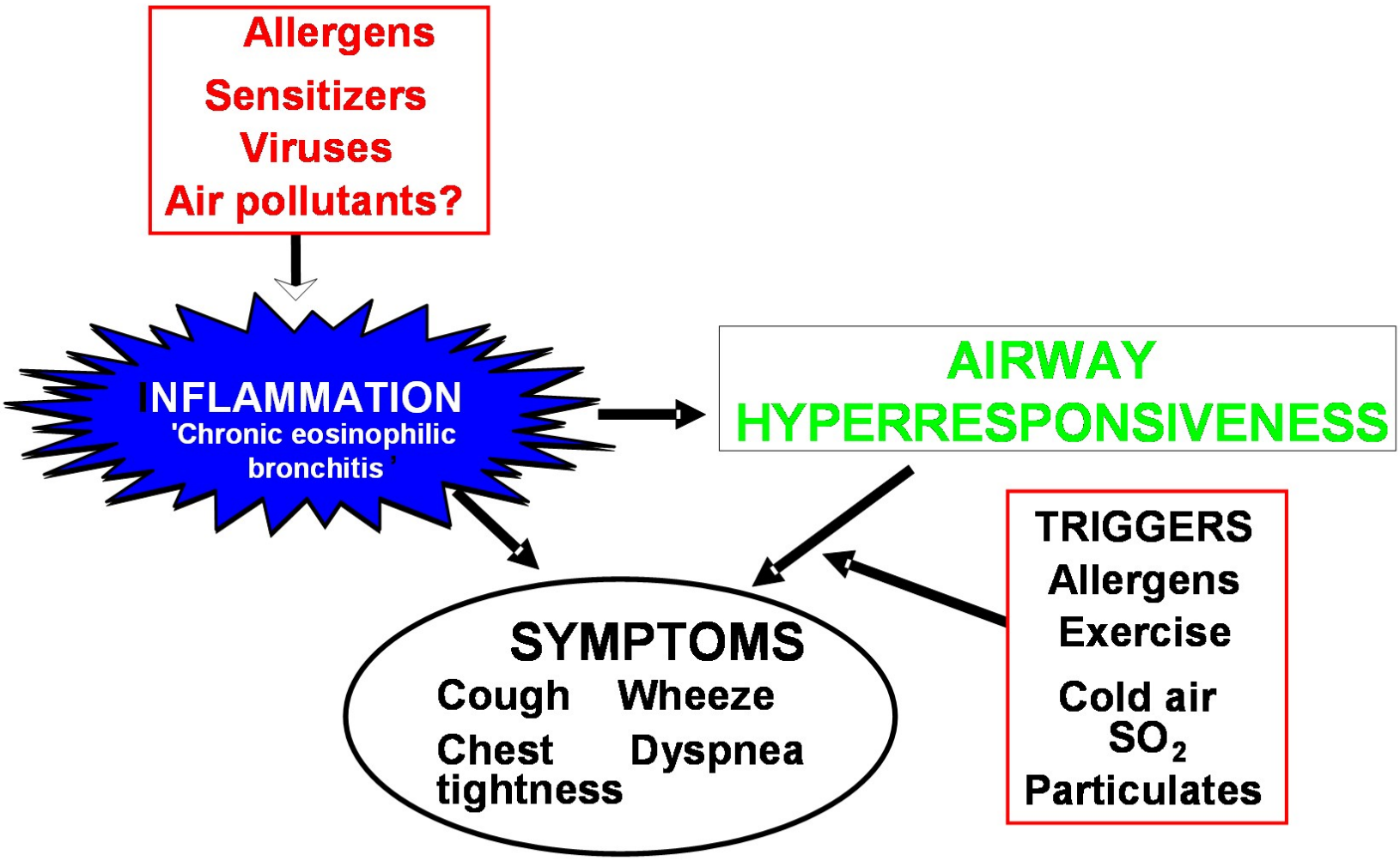


Definition of Asthma

- A chronic **inflammatory** disorder of the airways
- Many cells and cellular elements play a role
- Chronic inflammation is associated with airway hyperresponsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing
- Widespread, variable, and often reversible airflow limitation

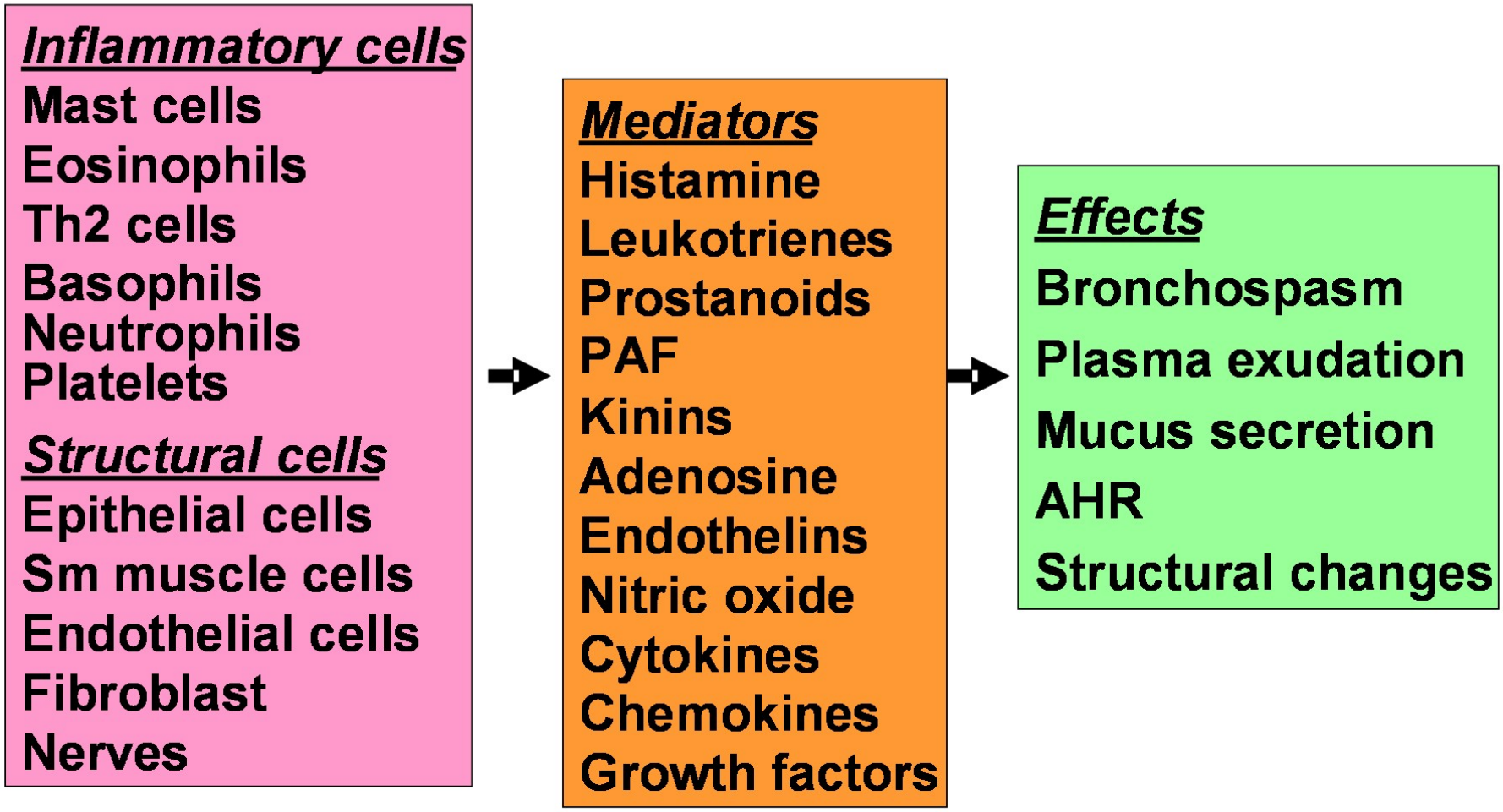

Bronchospasm
Edema, Mucus
Hyperresponsiveness
INFLAMMATION

Asthma Inflammation: Cells and Mediators

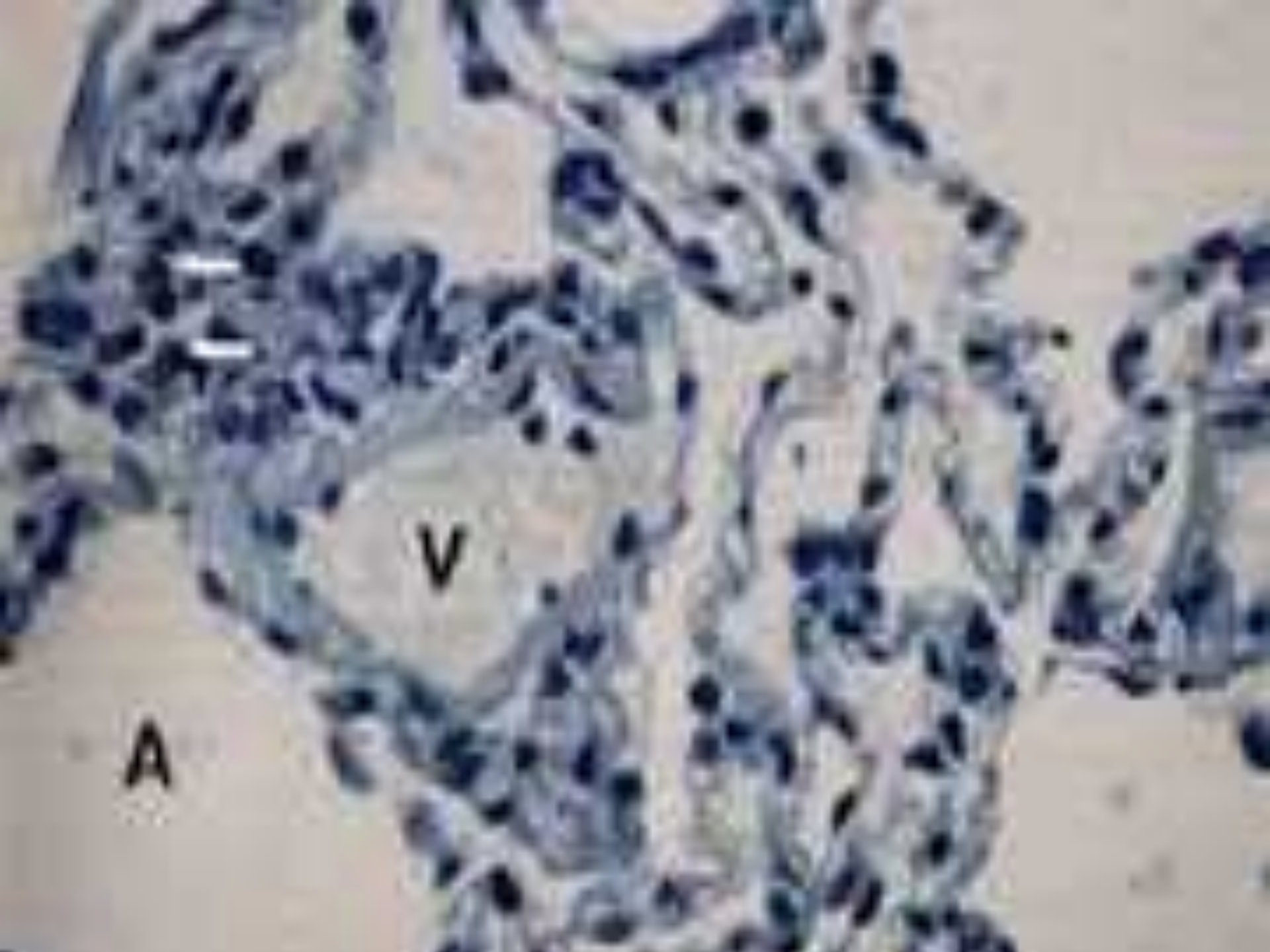


Source: Peter J. Barnes, MD

Asthma Inflammation: Cells and Mediators

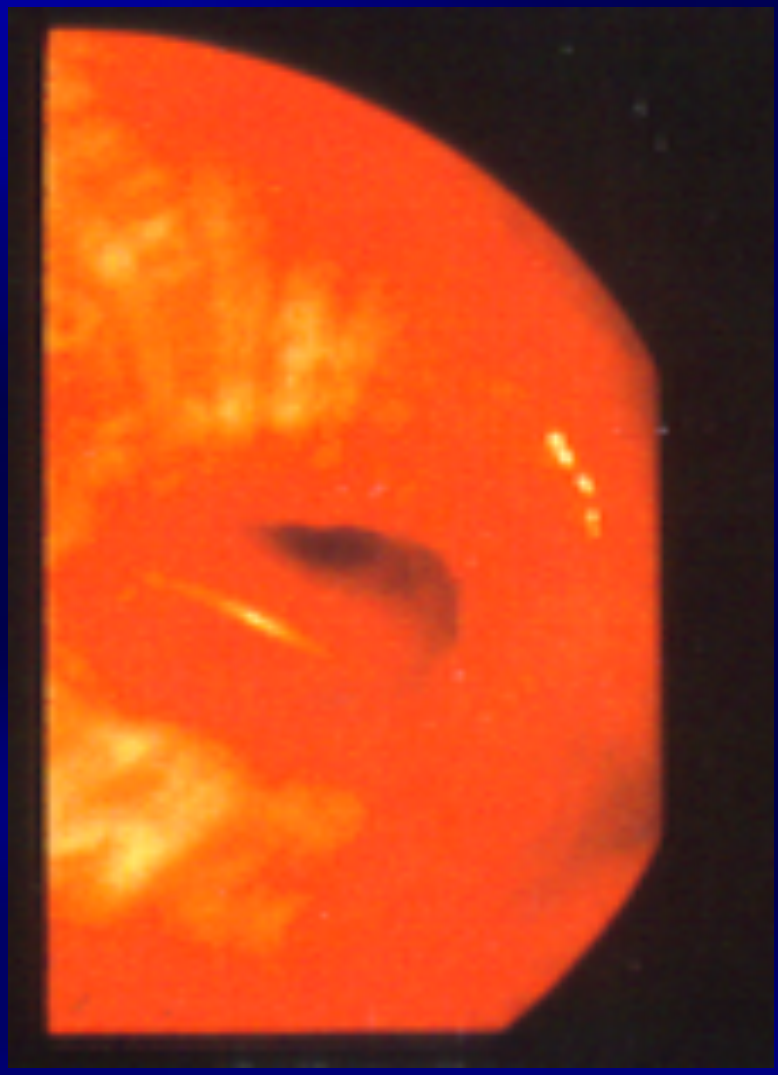


Source: Peter J. Barnes, MD

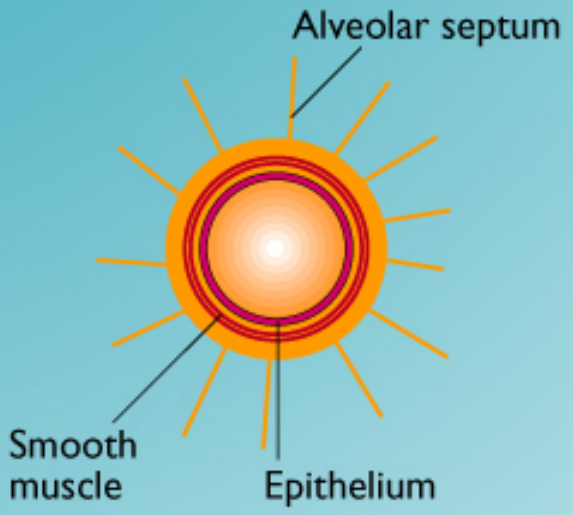

V
A

NORMAL

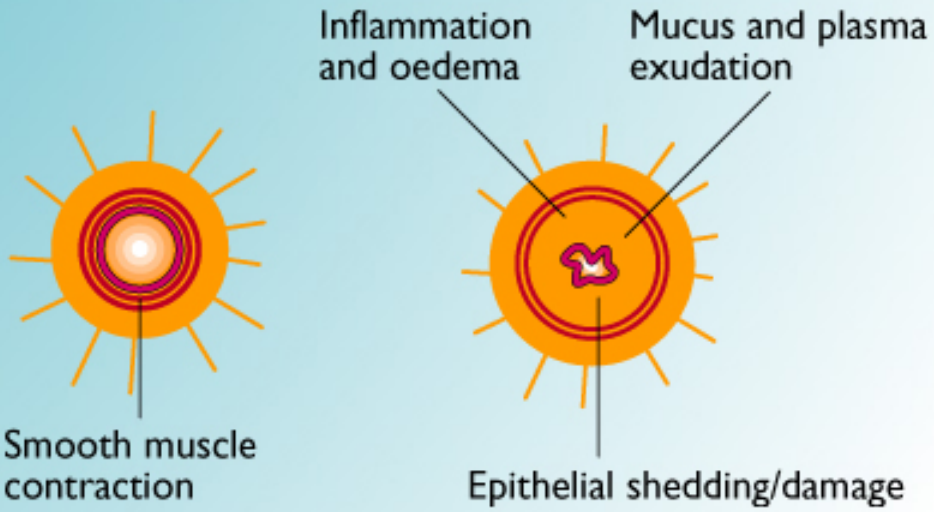
ASTHMA



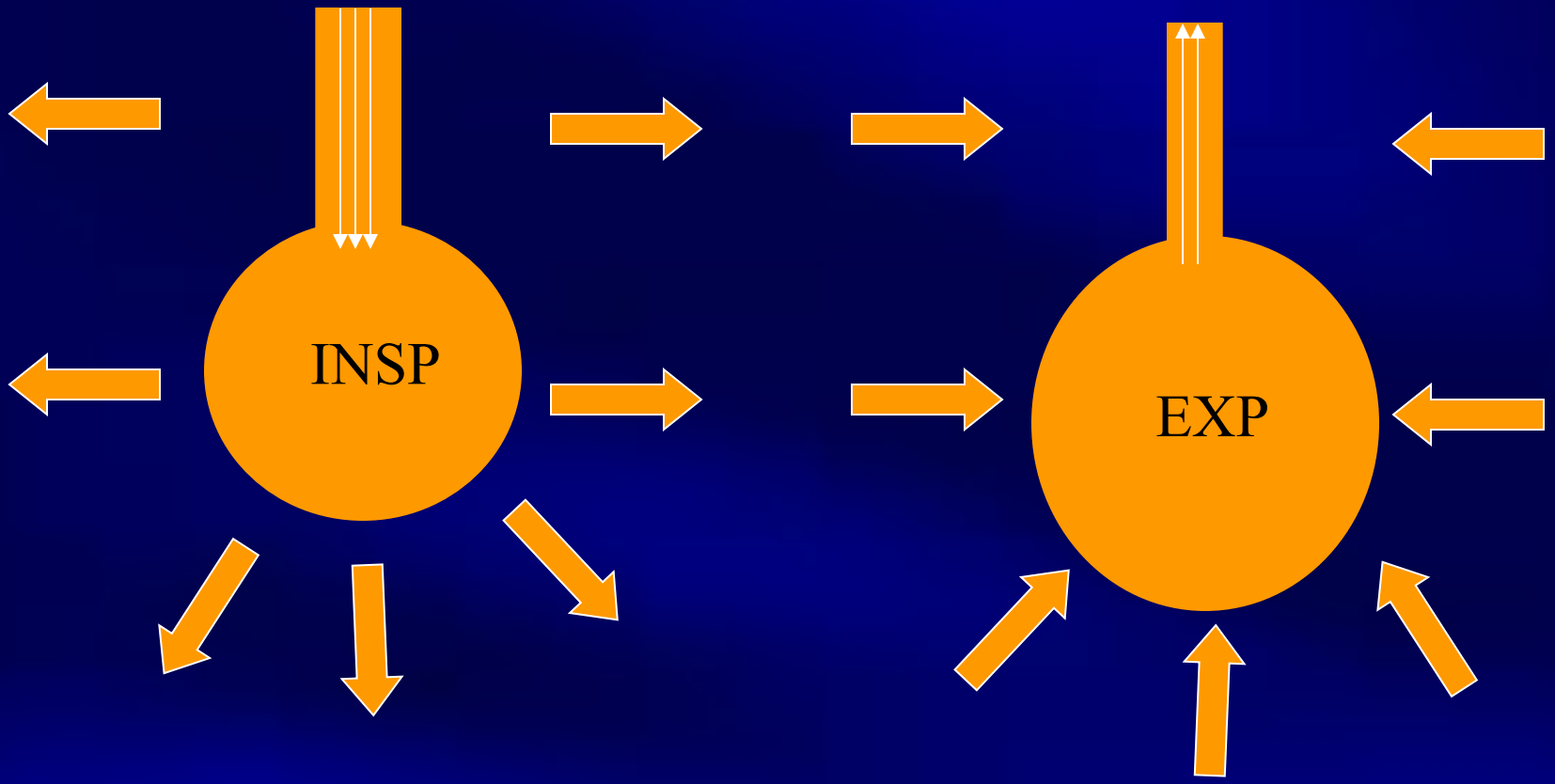
Healthy Airway



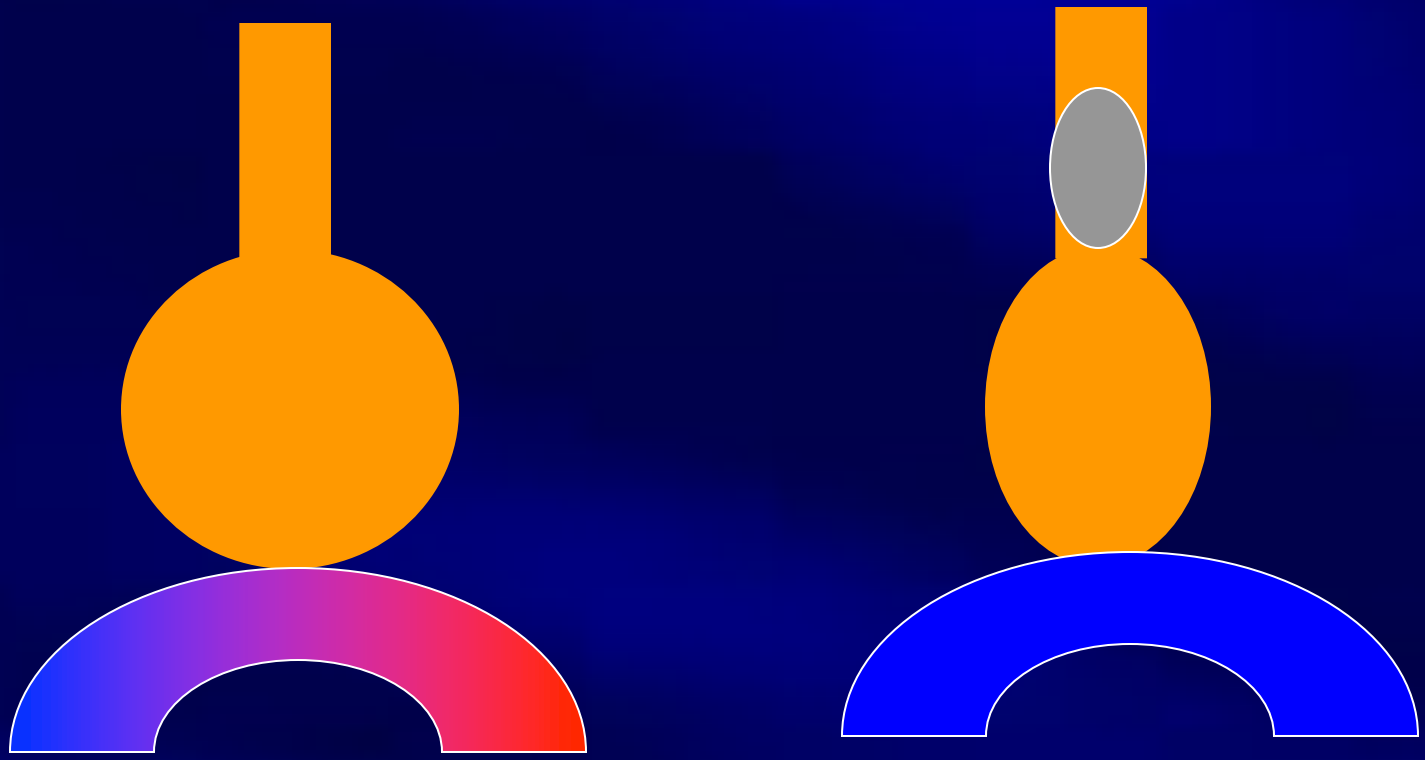
Asthmatic Airway



AIR TRAPPING



Ventilation Perfusion (V/Q) Mismatch



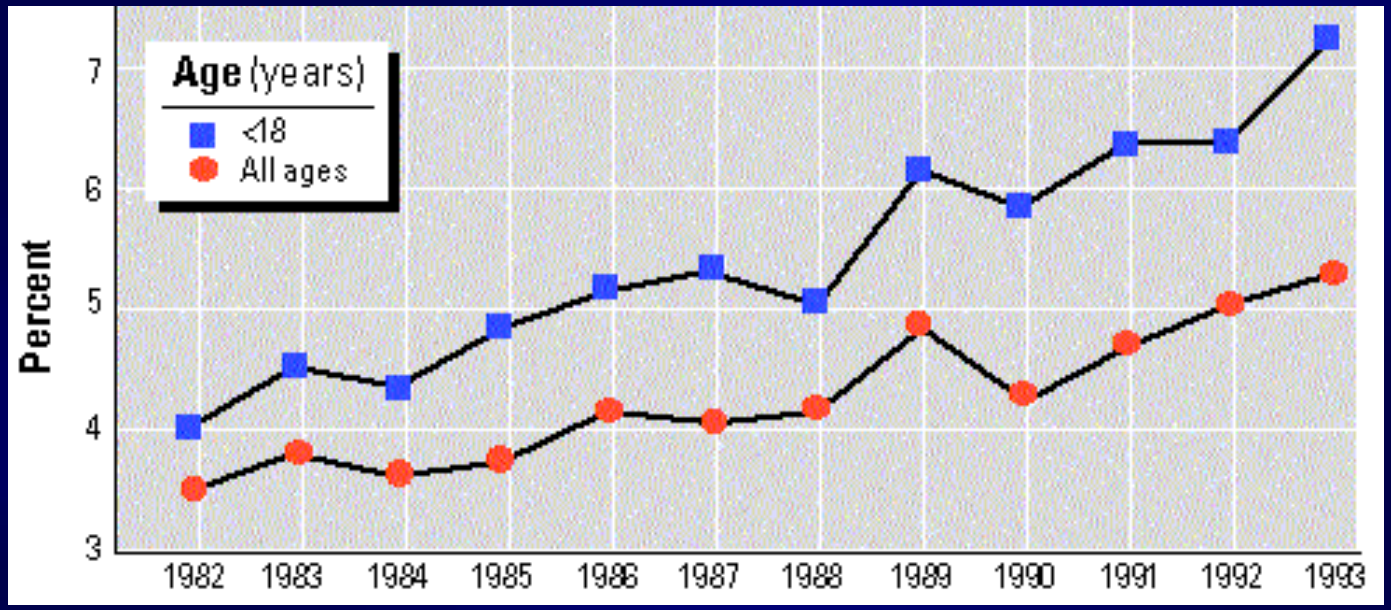
Burden of Asthma

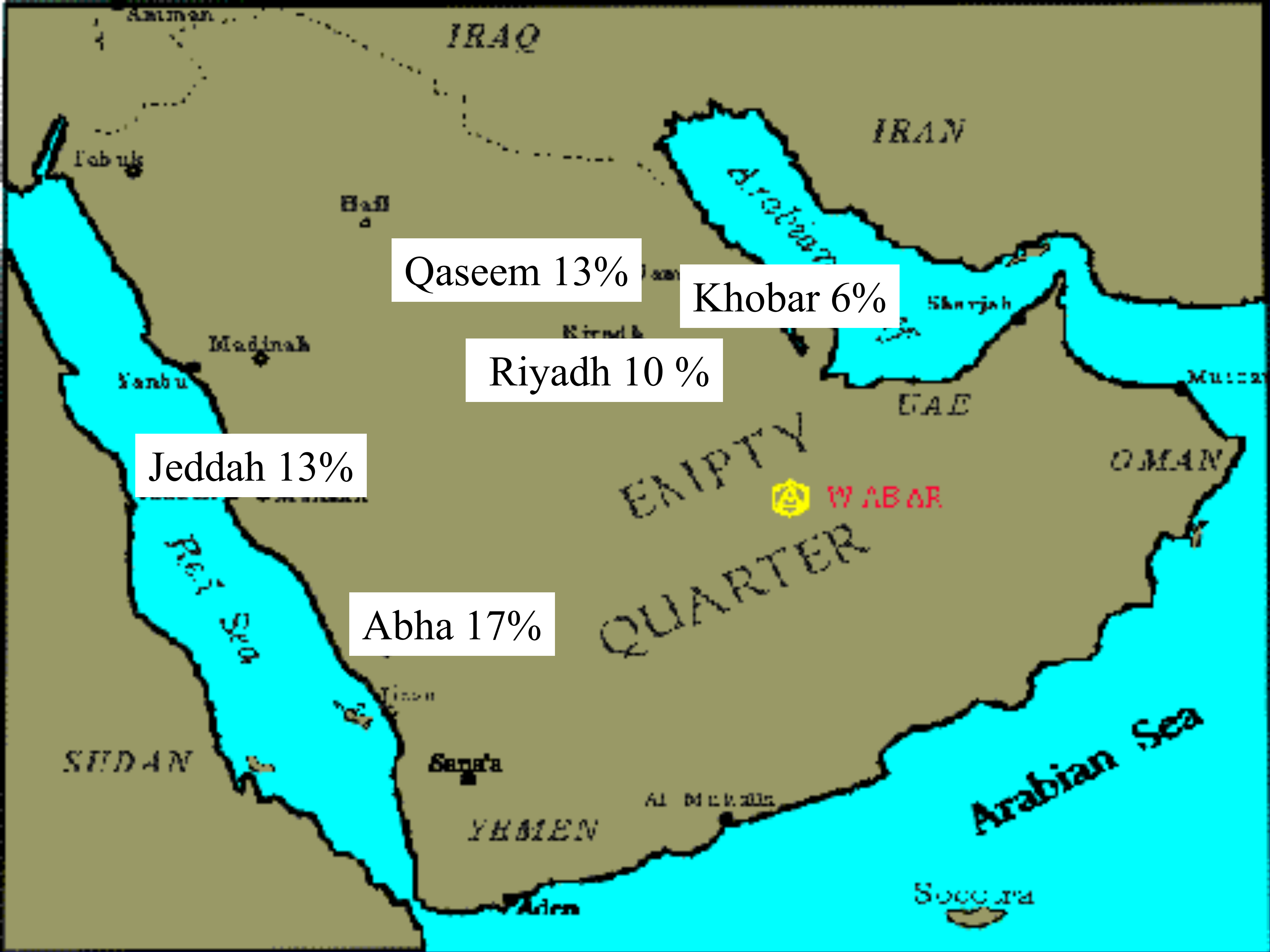
- Asthma is one of the most common chronic diseases worldwide with an estimated 300 million affected individuals
- Prevalence increasing in many countries, especially in children
- A major cause of school/work absence

Asthma Prevalence

10 - 15%

Asthma Prevalence





IRAQ
IRAN
Tabuk
Qaseem 13%
Khobar 6%
Sharjah
Madinah
Riyadh 10 %
Yanbu
UAE
Jeddah 13%
EMPTY
QUARTER
WABAR
OMAN
Red Sea
Abha 17%
SUDAN
Sana'a
YEMEN
Arabian Sea
Aden

Factors that Influence Asthma Development and Expression

Host Factors

- Genetic
  - Atopy
  - Airway hyperresponsiveness
- Gender
- Obesity

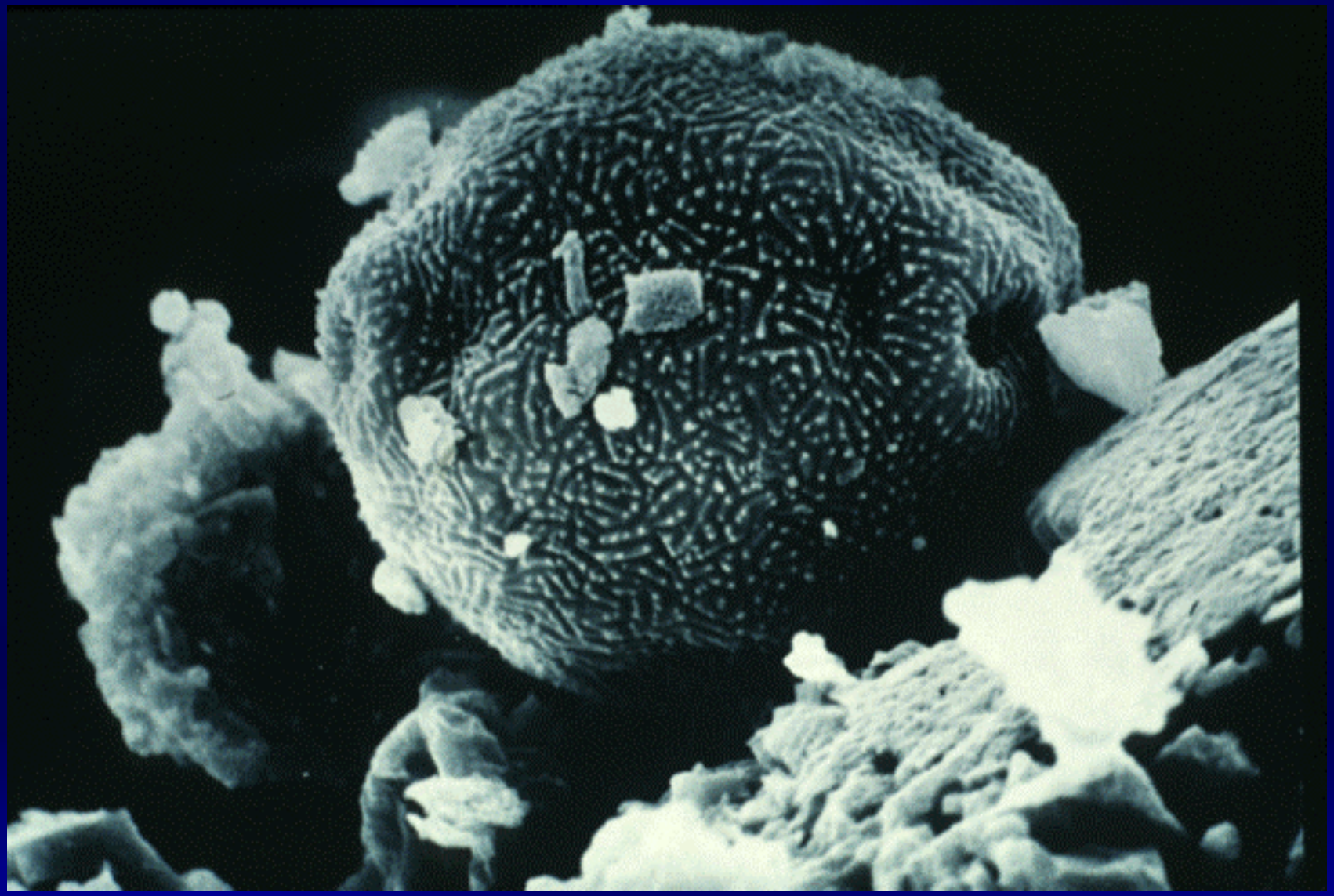
Environmental Factors

- Indoor allergens
- Outdoor allergens
- Occupational sensitizers
- Tobacco smoke
- Air Pollution
- Respiratory Infections
- Diet

Environmental Allergens and Childhood Asthma

- Dust mites
- Furry pets
- Molds
- Cockroaches
- **Cigarette Smoking**

POLLENS



Management of Chronic Asthma

History

- Symptoms (cough, wheeze, SOB)
- Onset, duration, frequency and severity
- Activity and nocturnal exacerbation
- Previous therapy
- Triggers
- Other atopies
- Family history
- Environmental history, SMOKING
- Systemic review

Physical Examination

- Growth parameter
- ENT
- Features of atopy
- Chest findings
- PEF

Investigations

- Pulmonary Function Test
- Chest X ray in some.
- Allergy testing in some

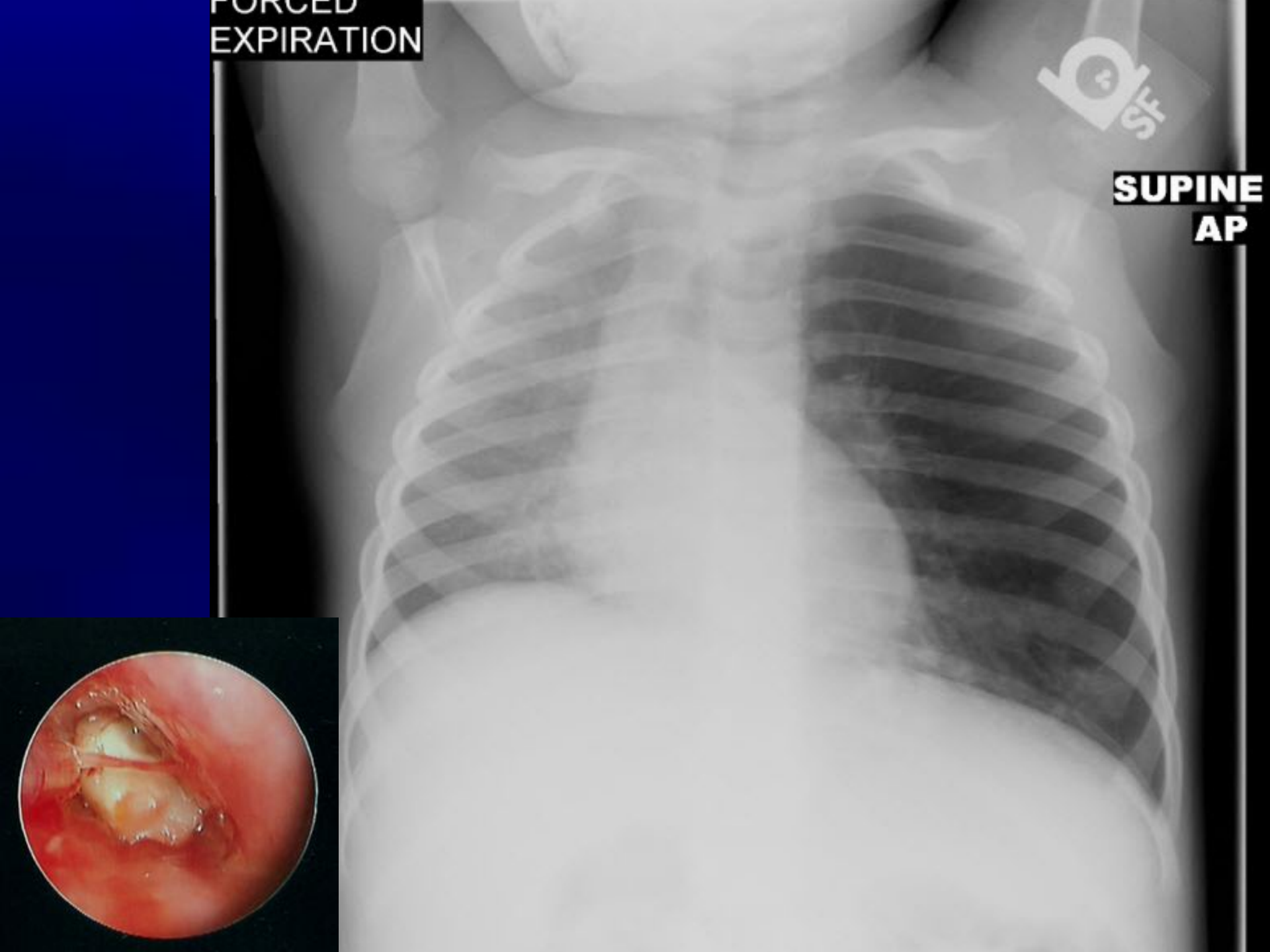

L


L
SRV
Erect

Skin Testing

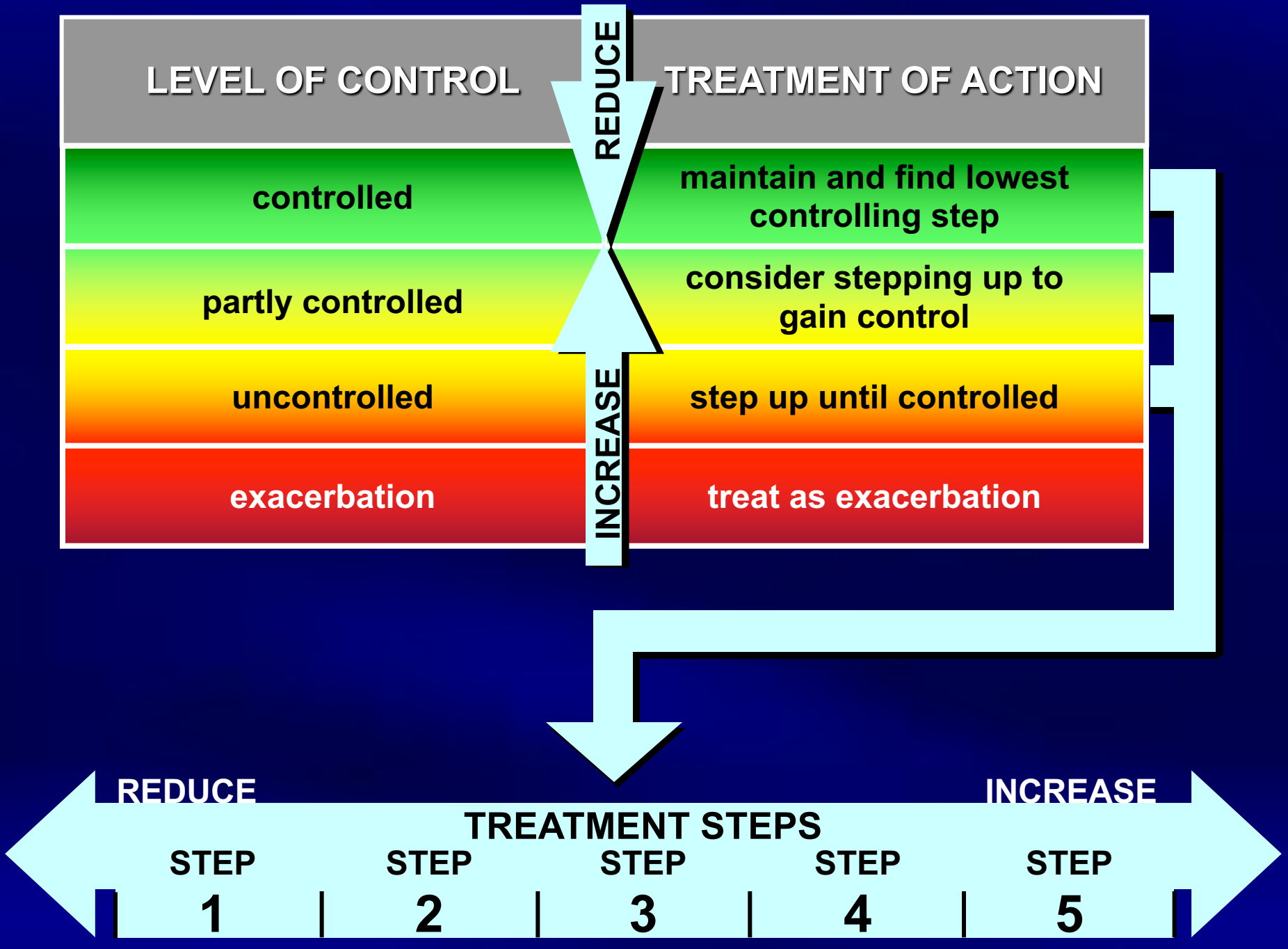
Differential Diagnosis

- Recurrent aspiration
- Bronchiolitis
- Cardiac failure
- Bronchopulmonary Dysplasia
- Inhaled foreign body
- Bronchiectasis
- Gastroesophageal Reflux
- Primary Ciliary Dyskinesia
- Cystic Fibrosis
- Vocal cord dysfunction/ Hyperventilation
- Structural anomalies: Tracheomalacia/ Bronchomalacia..etc.


FORCED
EXPIRATION
SUPINE
AP

Levels of Asthma Control

Characteristic	Controlled (All of the following)	Partly controlled (Any present in any week)	Uncontrolled
Daytime symptoms	None (2 or less / week)	More than twice / week	3 or more features of partly controlled asthma present in any week
Limitations of activities	None	Any	
Nocturnal symptoms / awakening	None	Any	
Need for rescue / "reliever" treatment	None (2 or less / week)	More than twice / week	
Lung function (PEF or FEV_1)	Normal	< 80% predicted or personal best (if known) on any day	
Exacerbation	None	One or more / year	1 in any week


LEVEL OF CONTROL
TREATMENT OF ACTION
REDUCE
INCREASE
controlled
maintain and find lowest controlling step
partly controlled
consider stepping up to gain control
uncontrolled
step up until controlled
exacerbation
treat as exacerbation
REDUCE
INCREASE
TREATMENT STEPS
STEP 1
STEP 2
STEP 3
STEP 4
STEP 5

REDUCE ← **TREATMENT STEPS** → INCREASE

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
asthma education				
environmental control				
as needed rapid-acting ß2-agonist	as needed rapid-acting ß2-agonist			
CONTROLLER OPTIONS	SELECT ONE	SELECT ONE	ADD ONE OR MORE	ADD ONE OR BOTH
	low-dose ICS*	low-dose ICS *plus* long-acting ß2-agonist	medium- *or* high-dose ICS *plus* long-acting ß2-agonist	oral glucocorticosteroid (lowest dose)
	leukotriene modifier**	medium- *or* high-dose ICS	leukotriene modifier	anti-IgE treatment
		low-dose ICS *plus* leukotriene modifier	sustained-release theophylline	
		low-dose ICS *plus* sustained-release theophylline		

*inhaled glucocorticosteroids
** receptor antagonist or synthesis inhibitors

Treatment objectives

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

Treatment strategy

1. Develop Patient/Doctor Partnership
2. Identify and Reduce Exposure to Risk Factors
3. Assess, Treat and Monitor Asthma
4. Manage Asthma Exacerbations
5. Special Consideration

Pharmacological therapy

- **Relievers**
  - Inhaled fast-acting β_2-agonists
  - Inhaled anticholinergics
- **Controllers**
  - Inhaled corticosteroids
  - Inhaled long-acting β_2-agonists
  - Inhaled cromones
  - Oral anti-leukotrienes
  - Oral theophyllines
  - Oral corticosteroids

Why don't patients comply with treatment?

Intentional

- Feel better
- Fear of side effects
- Don't notice any benefit
- Fear of addiction
- Fear of being seen as an invalid
- Too complex regimen
- Can't afford medication

Unintentional

- Forget treatment
- Misunderstand regimen / lack information
- Unable to use their inhaler
- Run out of medication

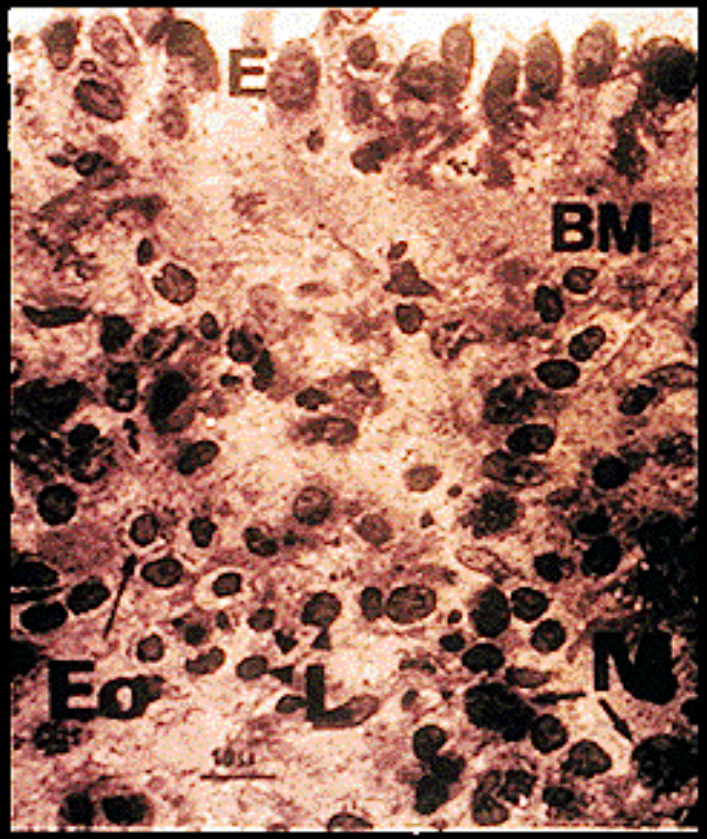
Cromolyn Sodium

- Non-steroidal anti-inflammatory
- Weak action on Early and late phases
- Slow onset of action
- If no response in 6 weeks change to ICS
- Side effects: Irritation

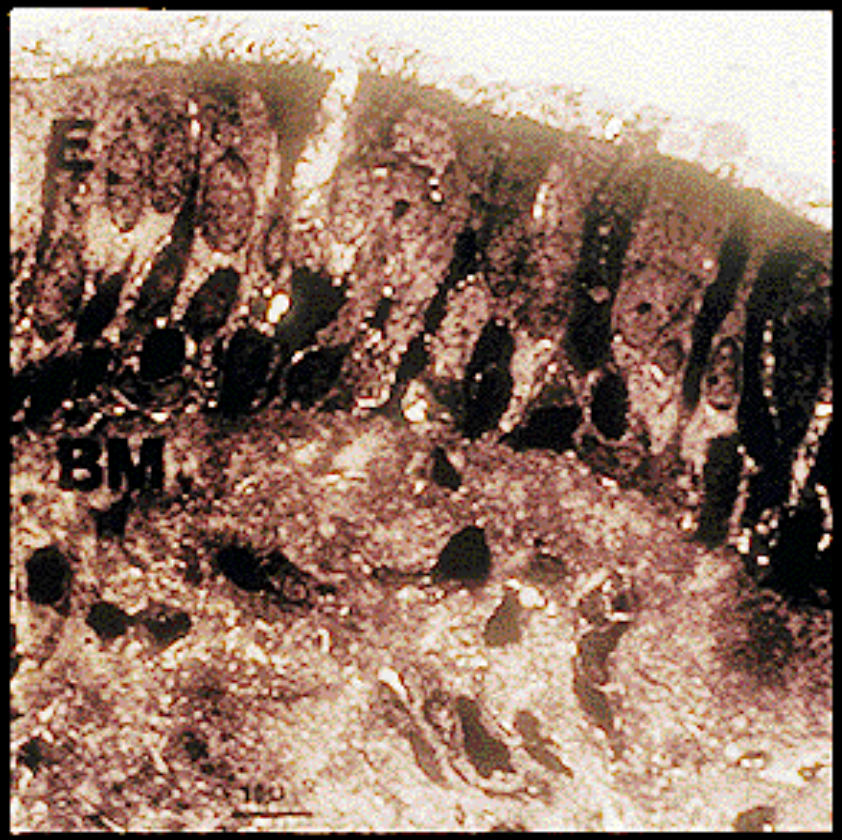
Amni Visnage, also known as khellin, from which the cromone for DSCG was derived

Inhaled Corticosteroids

- Effective in most cases
- Safe especially at low doses
- The anti-inflammatory of choice in asthma



Asthmatic



Steroid-treated asthmatic

Laitinen LA

Inhaled Steroids
Side Effects

- Growth: No significant effect at low to moderate doses.
- Bones: not important
- HPA axis: No serious clinical effect (high doses)
- Alteration of glucose and lipid metabolism: Clinical significant is unclear (high doses)
- Cataract: No increase risk
- Skin: Purpura, easily bruising, dermal thinning
- Local side effects

Nebulizers

MDI and spacer

Dry powder inhalers

MANAGEMENT OF ACUTE ASTHMA

Assessment: History

- Symptoms
- Previous attacks
- Prior therapy
- Triggers

Physical examination:

Signs of airway obstruction:

- **Fragmented speech**
- **Unable to tolerate recumbent position**
- **Expiration > 4 seconds**
- **Tachycardia, tachypnea and hypotension**
- **Use of accessory muscles**
- **Pulsus paradoxus > 10 mmhg**
- **Silent hyperinflated chest**
- **Air leak**

Physical examination:

Signs of tissue hypoxia:

- Cyanosis
- Cardiac arrhythmia and hypotension
- Restlessness, confusion, drowsiness and obtundation

Physical examination:

Signs of Respiratory muscles fatigue:

- Increase respiratory rate
- Respiratory alterans (alteration between thoracic and abdominal muscles during inspiration)
- Abdominal paradox (inward movement of the abdomen during inspiration)

Investigations:

- Peak expiratory flow rate
- Pulse oxymetry
- ABG
- CXR

ONLY IN FEW CASES

The First Hour

Oxygen

- Hypoxemia is common
- It worsens airway hyperreactivity
- Monitor saturation

Inhaled β2 agonist

Every 20 minutes in the first hour

Assess after each nebulizer

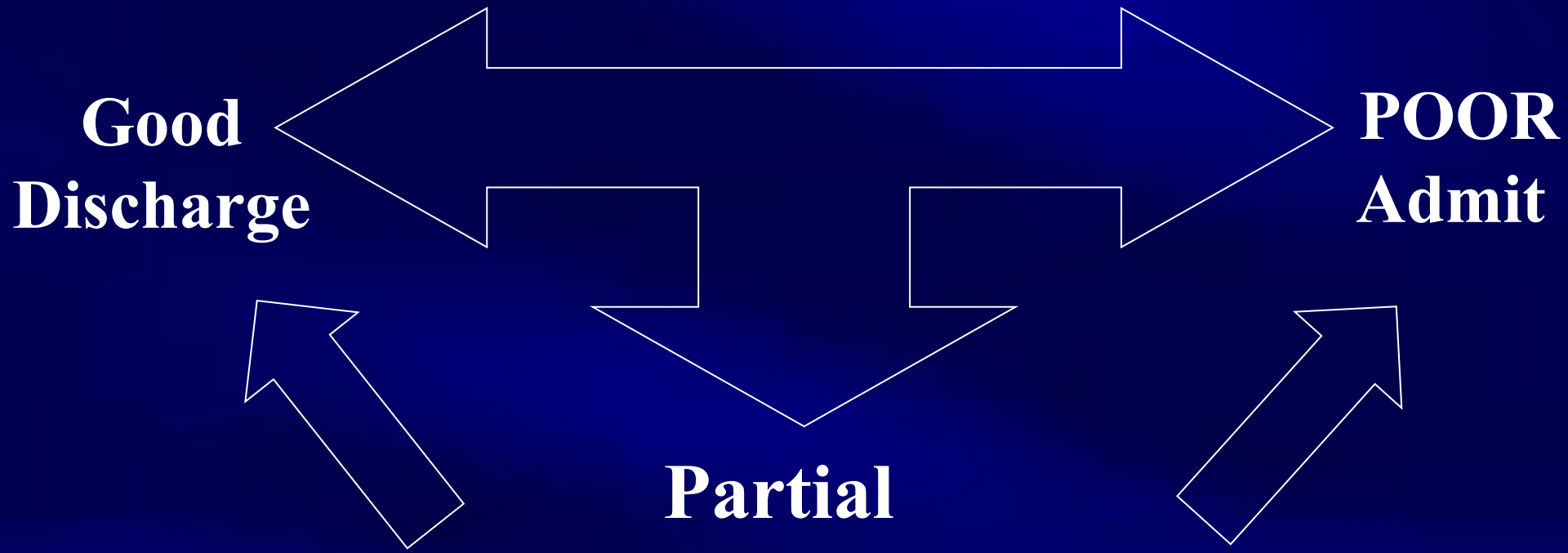
Steroids

- If not responding to the βagonist
- If severe in the beginning
- If on PO prednisone or high dose inhaled steroids.
- Previous severe attacks

Ipratropium Bromide

- Anti-cholinergic
- For severe cases
- Along with β2 agonist

Response to the first hour



Discharge

- Follow up
- Give inhaled β2 agonist
- Steroids
- When to come back?