Diseases of the Respiratory System

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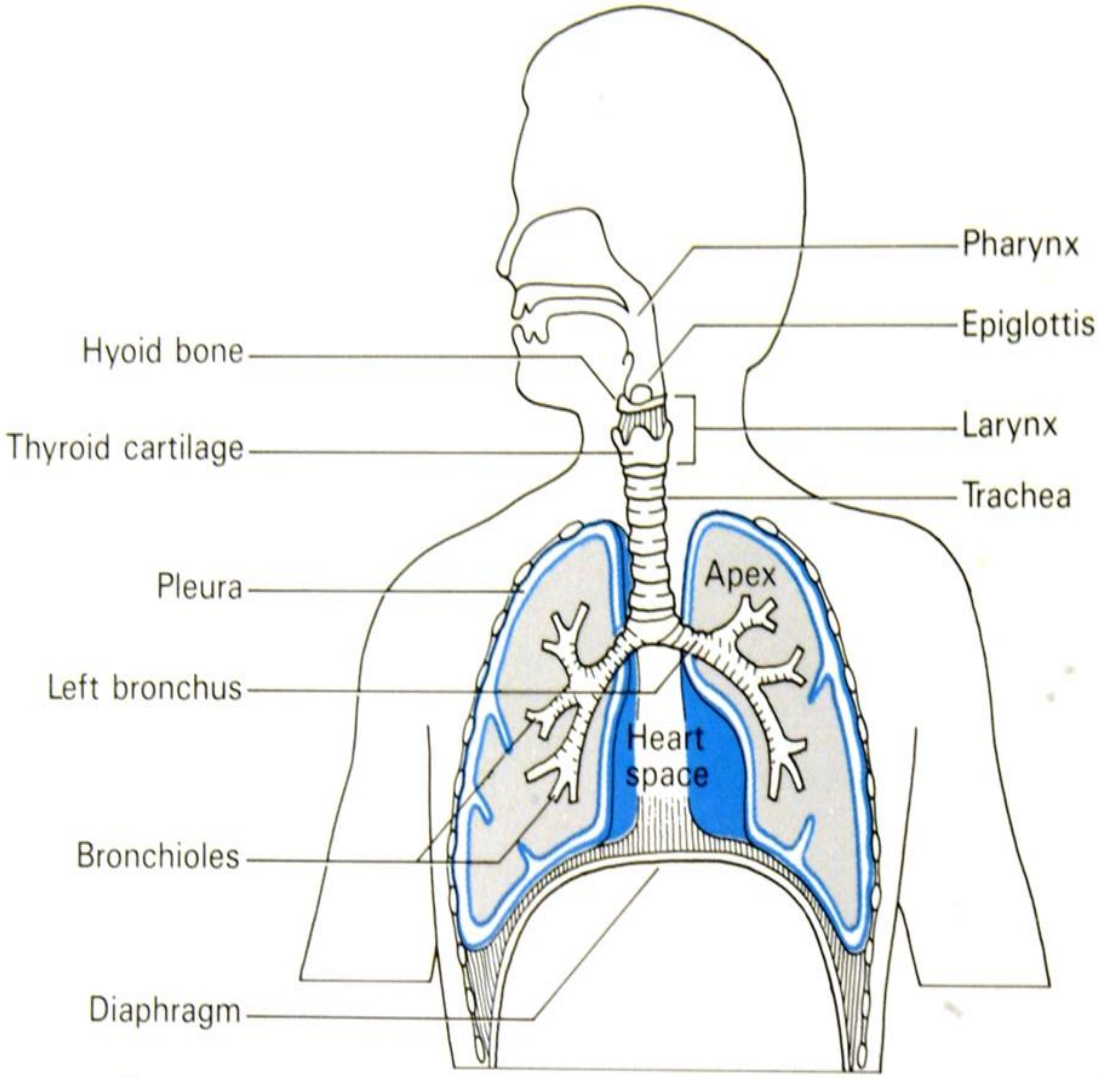
Diseases of the Respiratory System

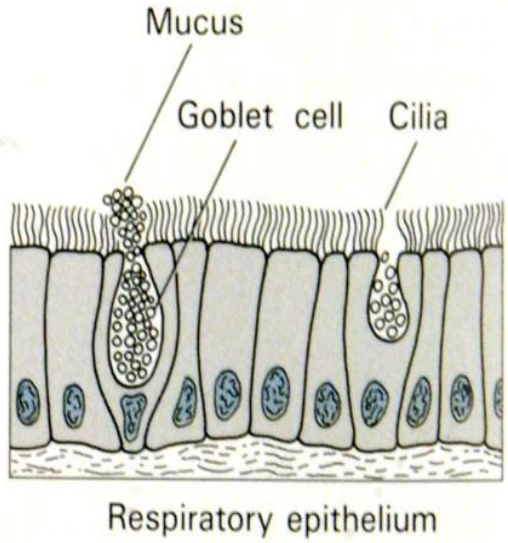
Lecture 1
2018

Review of the normal Anatomy and Histology of the Respiratory System

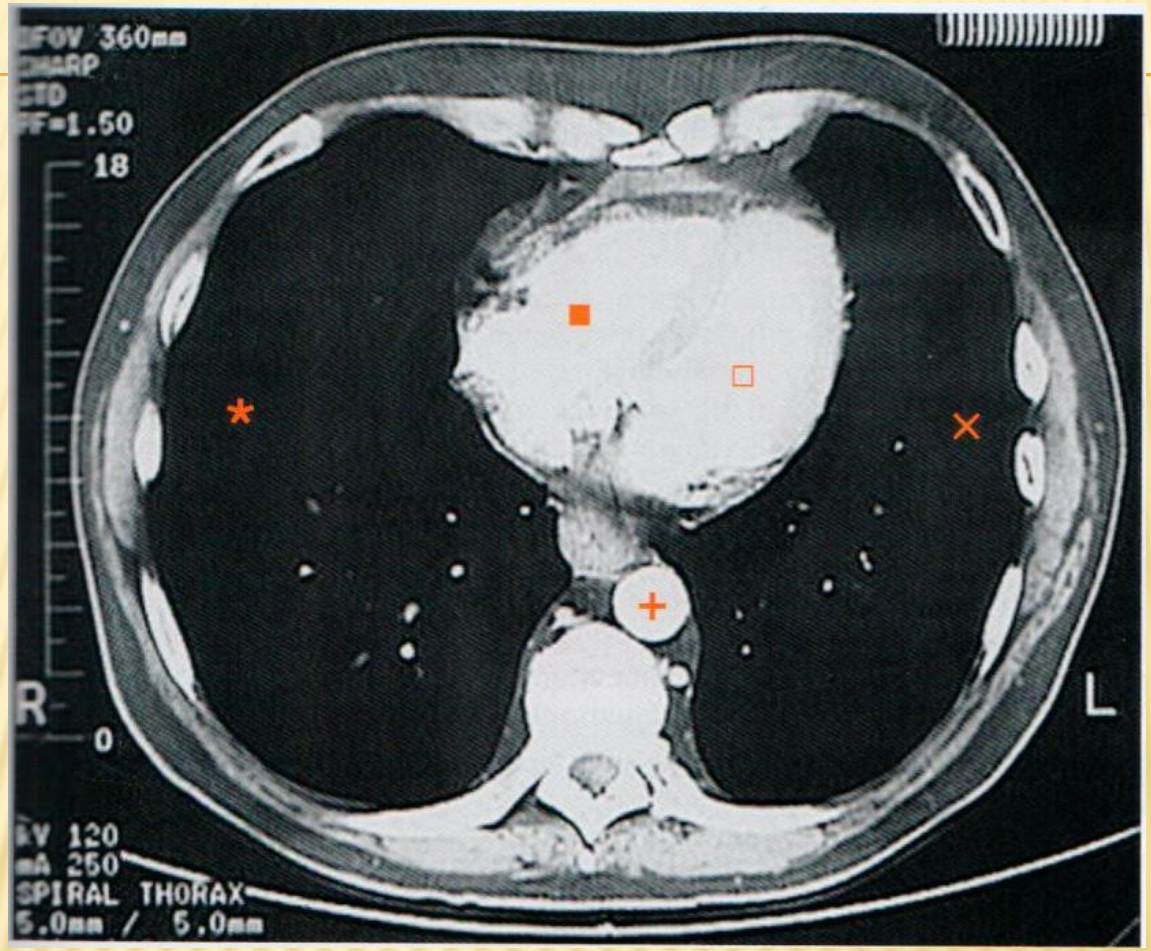
Bronchial asthma

Diseases of Lung



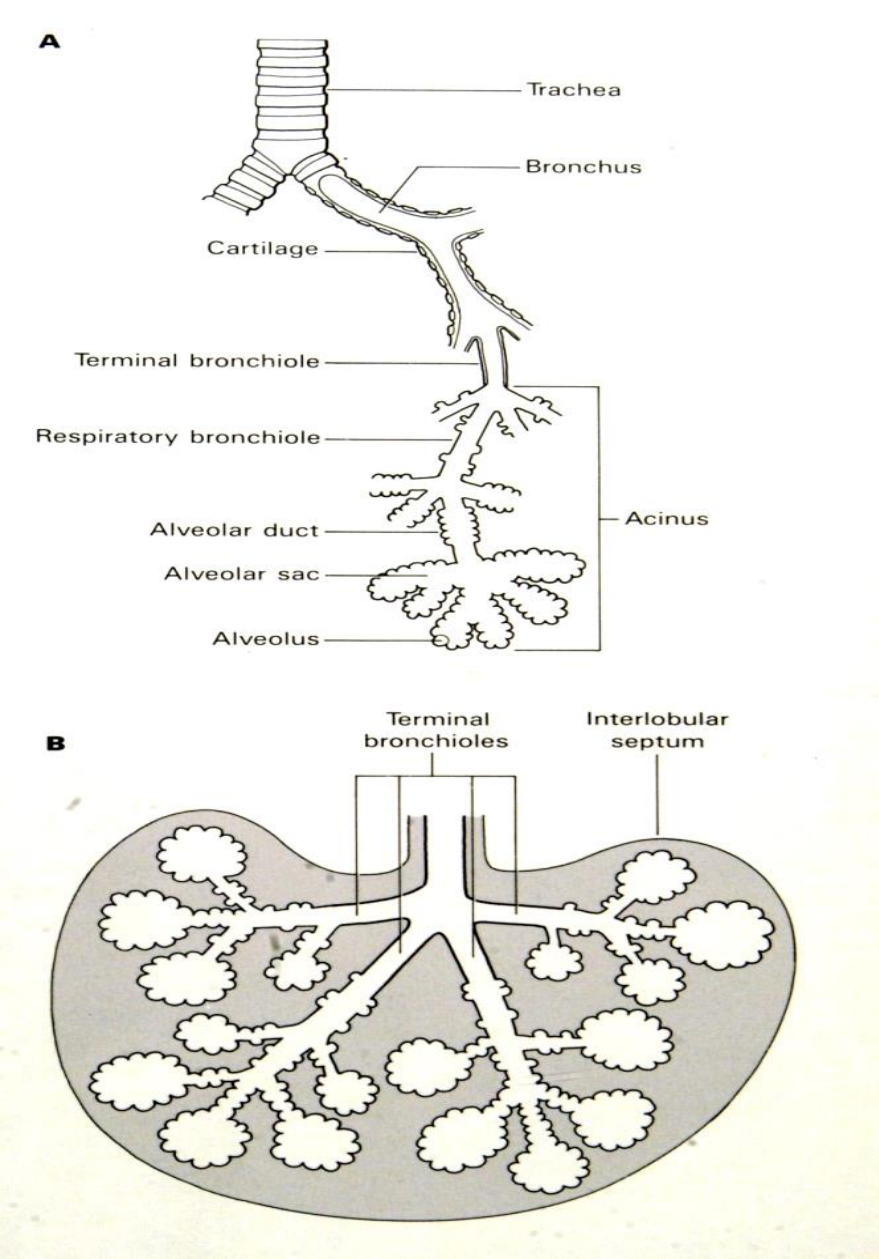


THE RESPIRATORY SYSTEM



NORMAL LUNG, CT IMAGE

Diseases of Lung



THE LOWER RESPIRATORY TRACT

Normal adult lung

Diseases of the Respiratory System

Chronic Obstructive Pulmonary Diseases (COPD) including Bronchial Asthma

BRONCHIAL ASTHMA

OBJECTIVES

- Define bronchial asthma (BA)

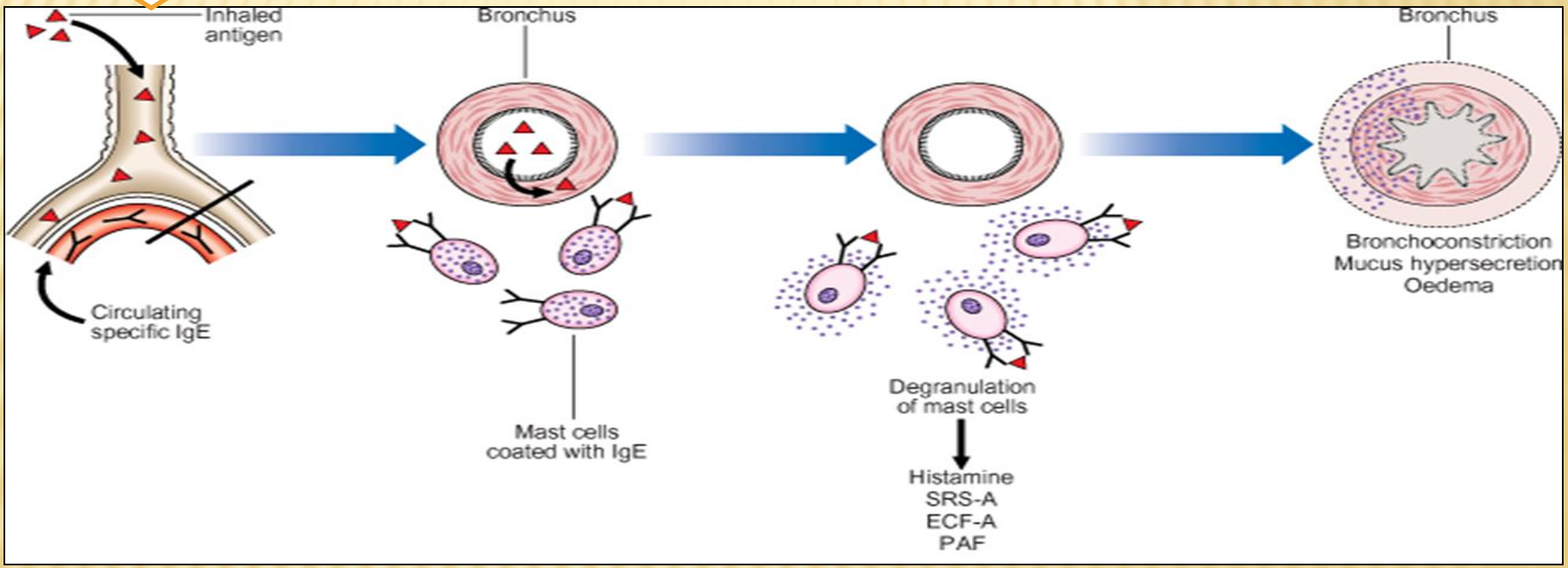
BA is an episodic, reversible bronchoconstriction caused by increased responsiveness of the tracheobronchial tree to various stimuli.

- Understand the pathogenesis
- Understanding the morphological changes
- Know the manifestation and clinical coarse of BA
- List the complications of BA
- Define status asthmaticus
- Know the prognosis and prevention of BA

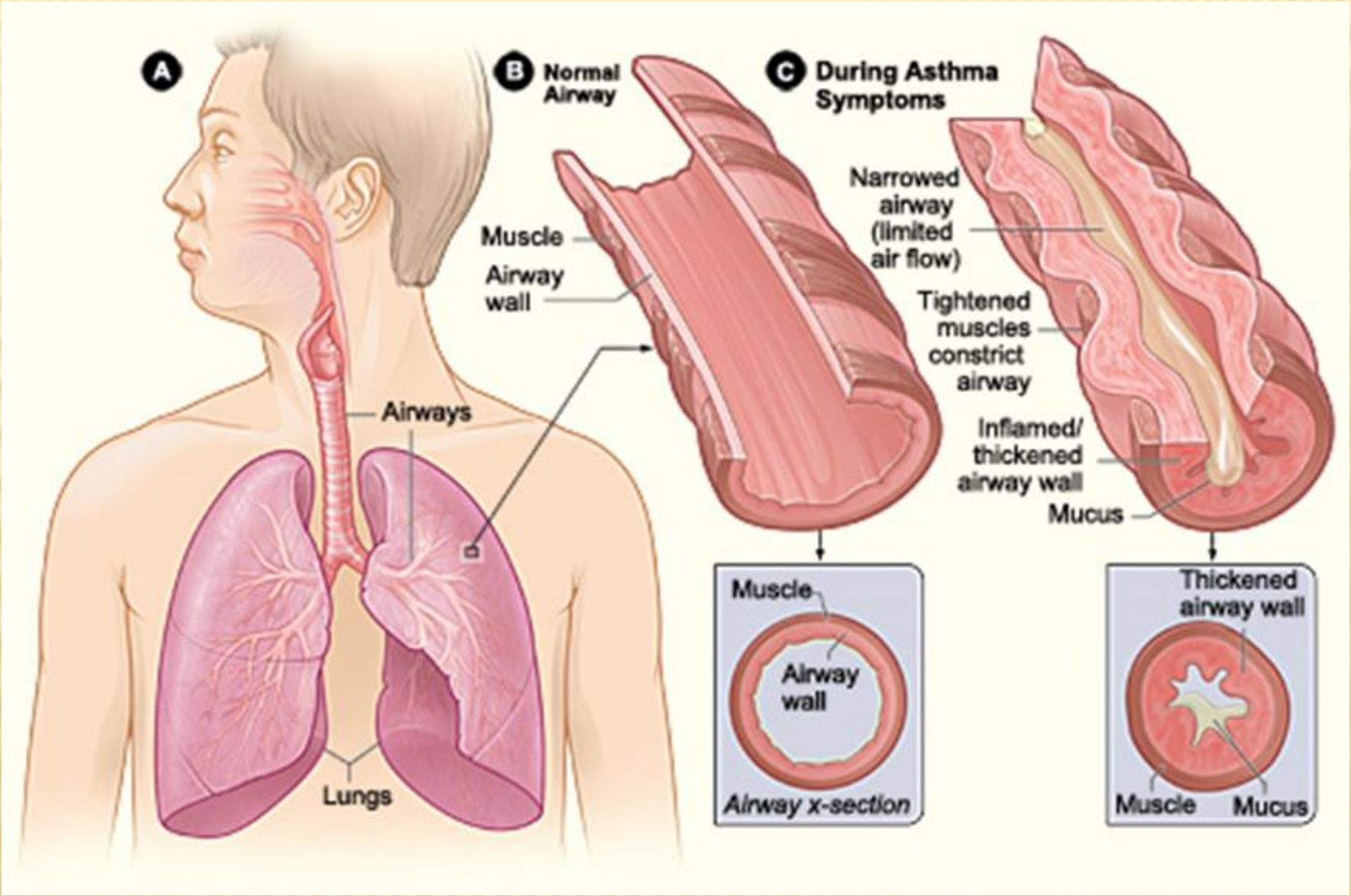
- Extrinsic asthma:
  - Type 1 Hypersensitivity reaction, IgE
  - Childhood
  - Viral infection
  - family Hx of allergy
- Intrinsic asthma:
  - BA associated with, aspirin, exercise, cold induced.
  - No Hx of allergy

PATHOGENESIS OF ALLERGIC ASTHMA

Pollen dust, virus, animal fur, sand bacteria

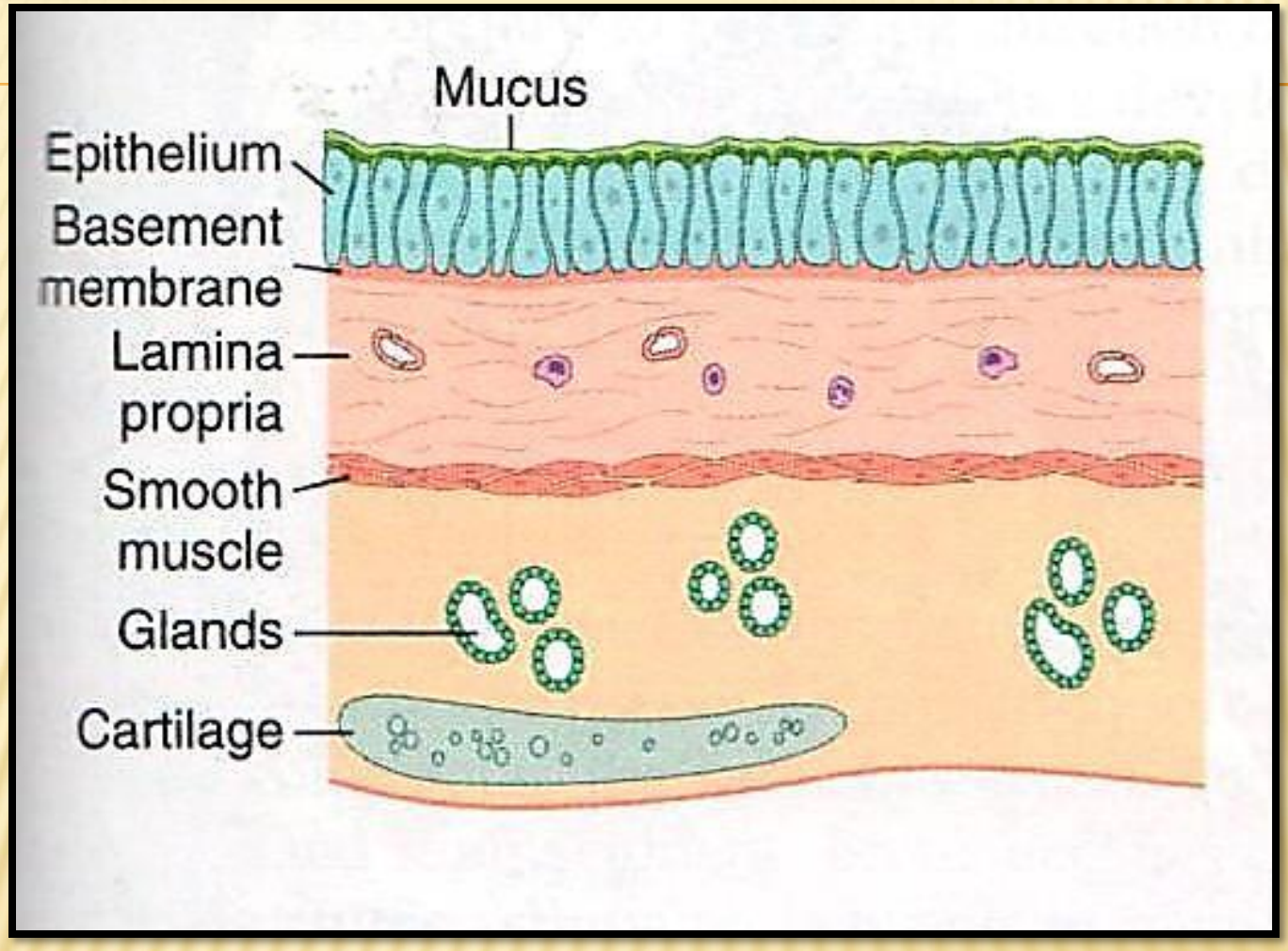


Morphological changes Of BA



Morphological changes Of BA

Bronchitis in an asthmatic patient. Note the presence of congested mucosa and mucoid secretions.



BRONCHIAL AIRWAY IN NORMAL LUNG

Morphological changes Of BA

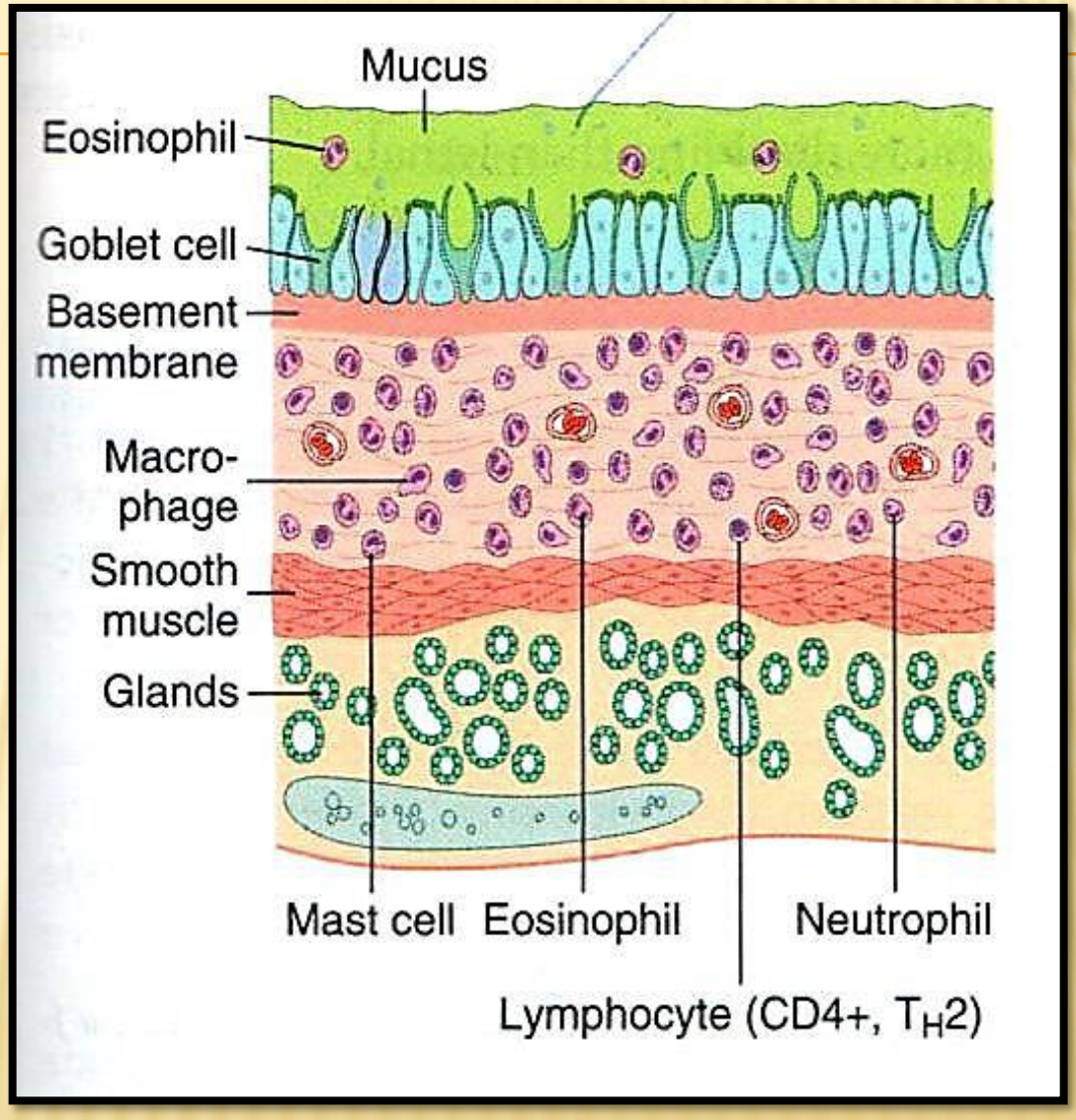
Thick Basement Membrane.
Sub-basement membrane fibrosis (airway remodeling)

Edema and inflammatory infiltrate in bronchial wall.

Submucosal glands increased.

Hypertrophy of the bronchial wall muscle.

Mucous contain Curschmann spirals, eosinophil and Charcot-Leyden crystals.

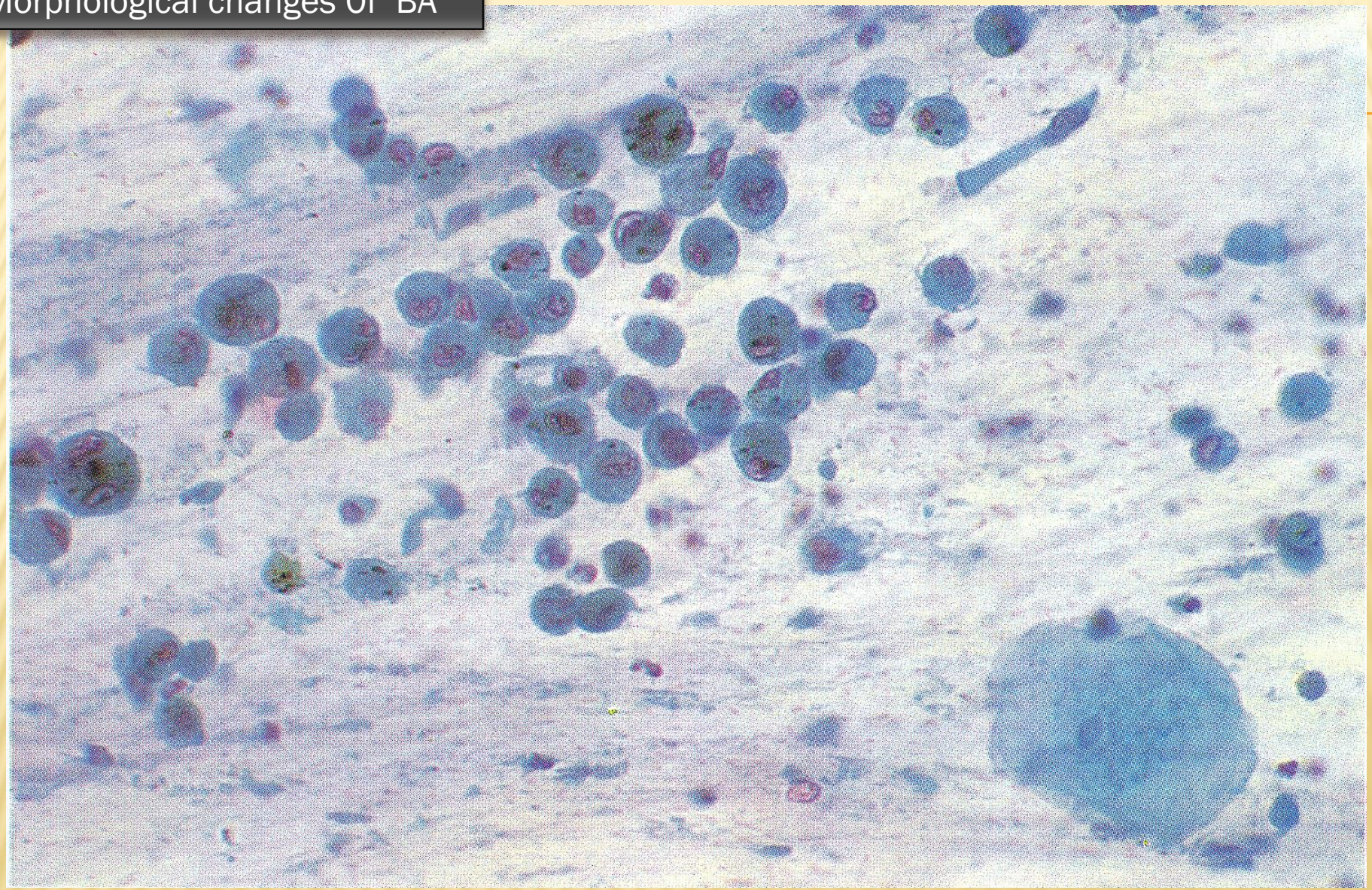


Bronchial airway in asthma patient

Morphological changes Of BA

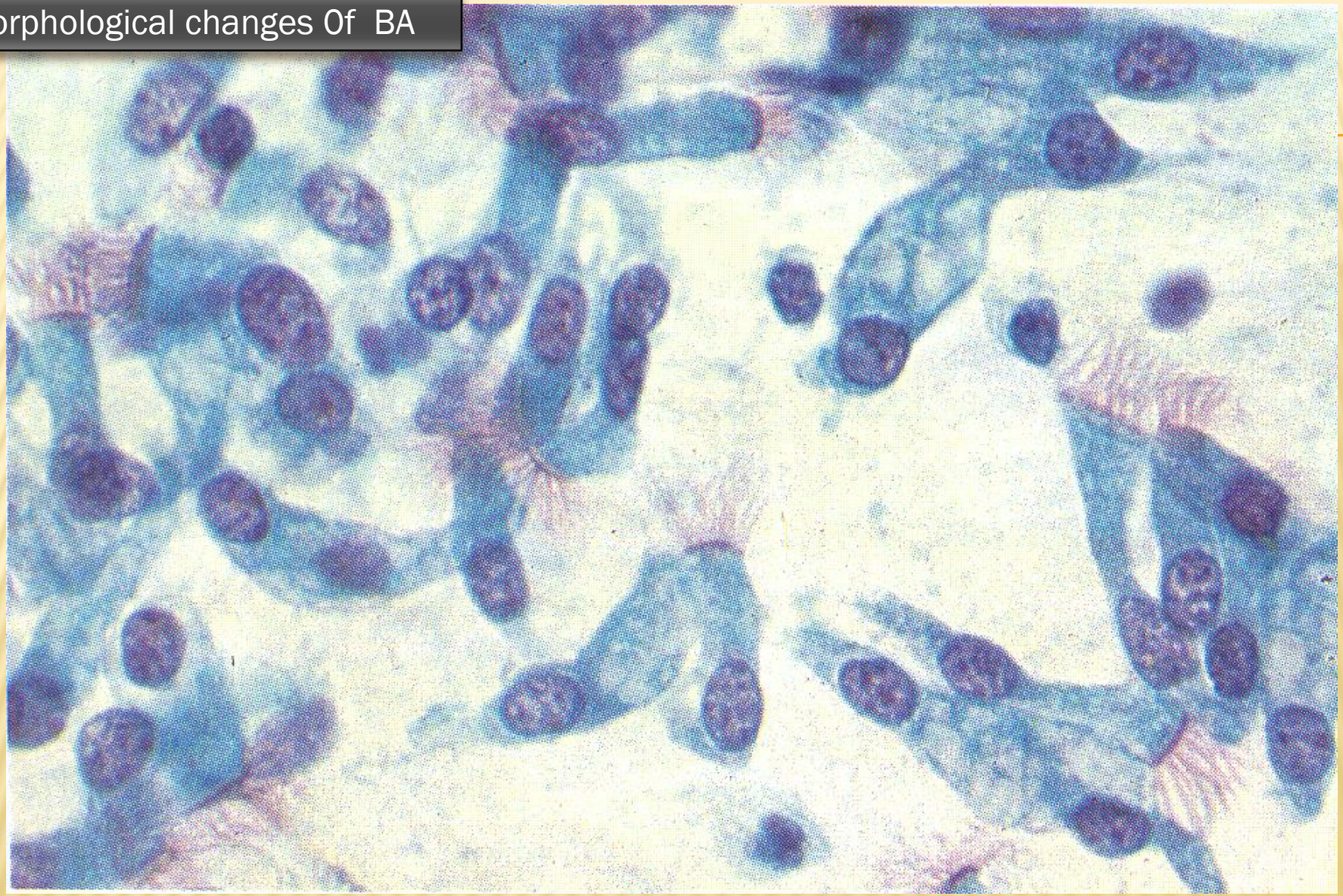
BRONCHIAL BIOPSY SPECIMEN FROM AN ASTHMATIC PATIENT SHOWING SUB-BASEMENT MEMBRANE FIBROSIS, EOSINOPHILIC INFLAMMATION AND SMOOTH MUSCLE HYPERPLASIA

Morphological changes Of BA



Composition of satisfactory specimen : Sputum

Morphological changes Of BA

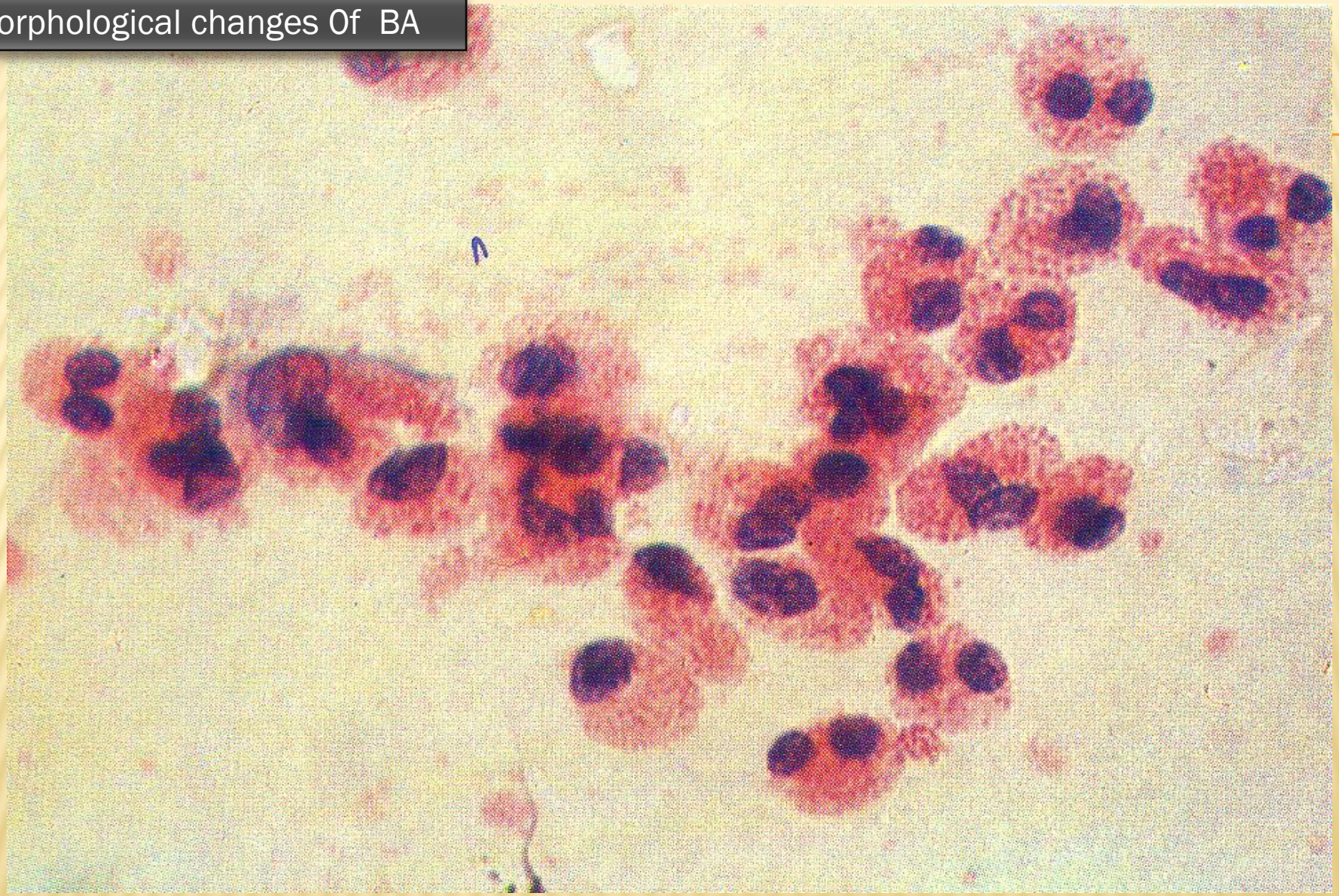


Ciliated columnar cells

Morphological changes Of BA

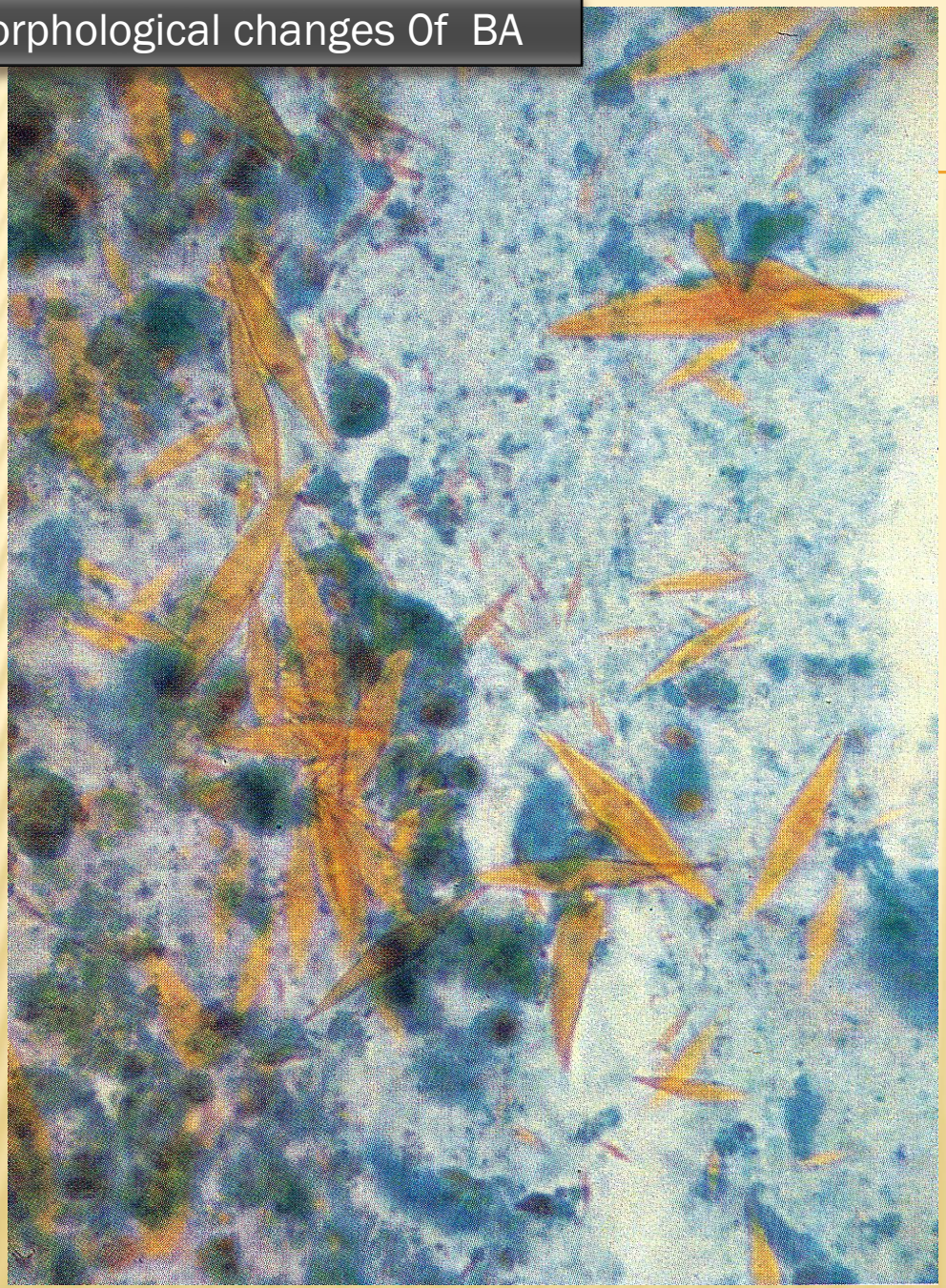
Curschmann’s spiral : Sputum

Morphological changes Of BA



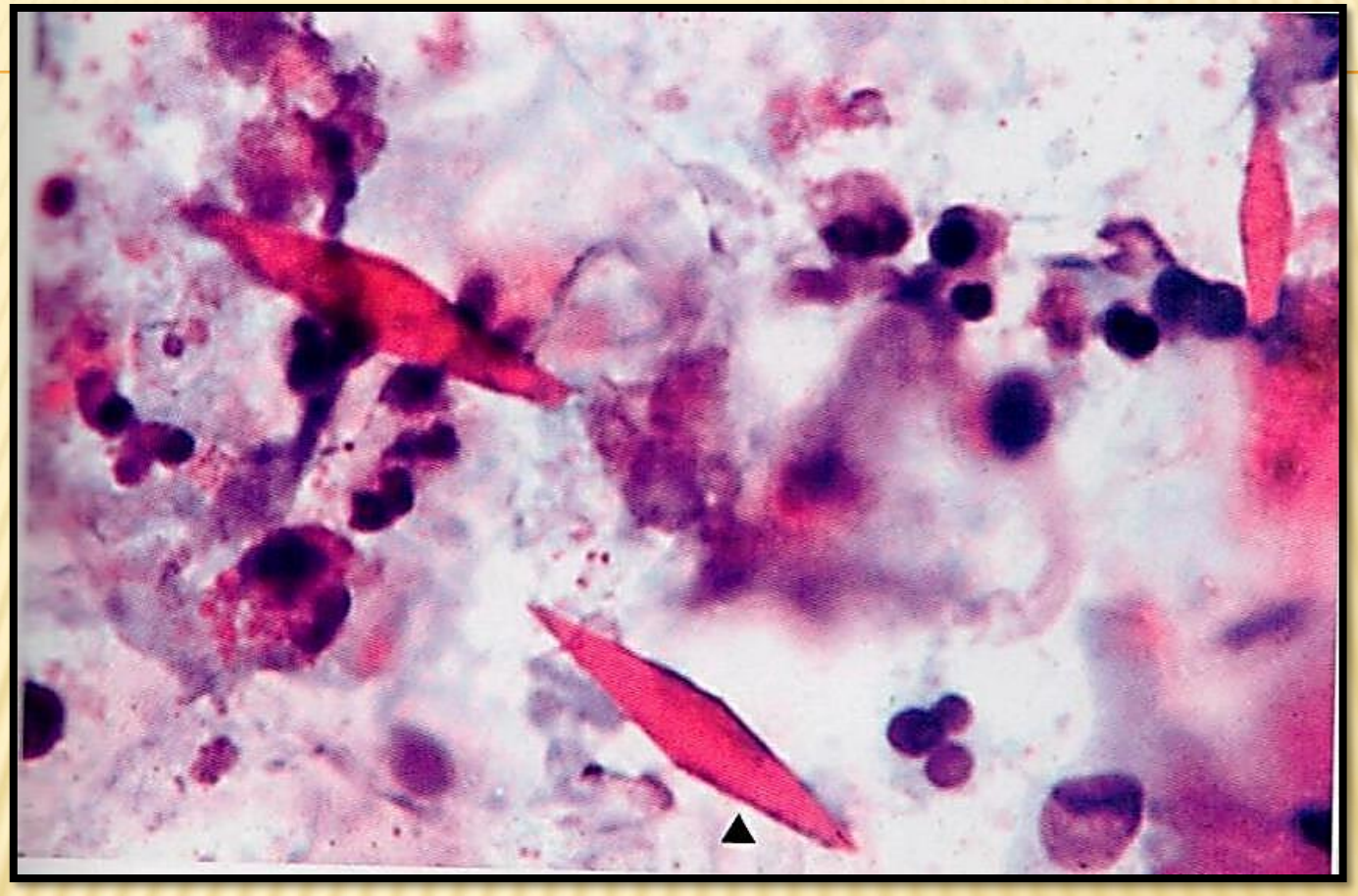
Eosinophils from a case of Bronchial Asthma

Morphological changes Of BA



Bronchial asthma : Charcot – Leyden Crystals

Morphological changes Of BA



Bronchial Asthma, microscopic

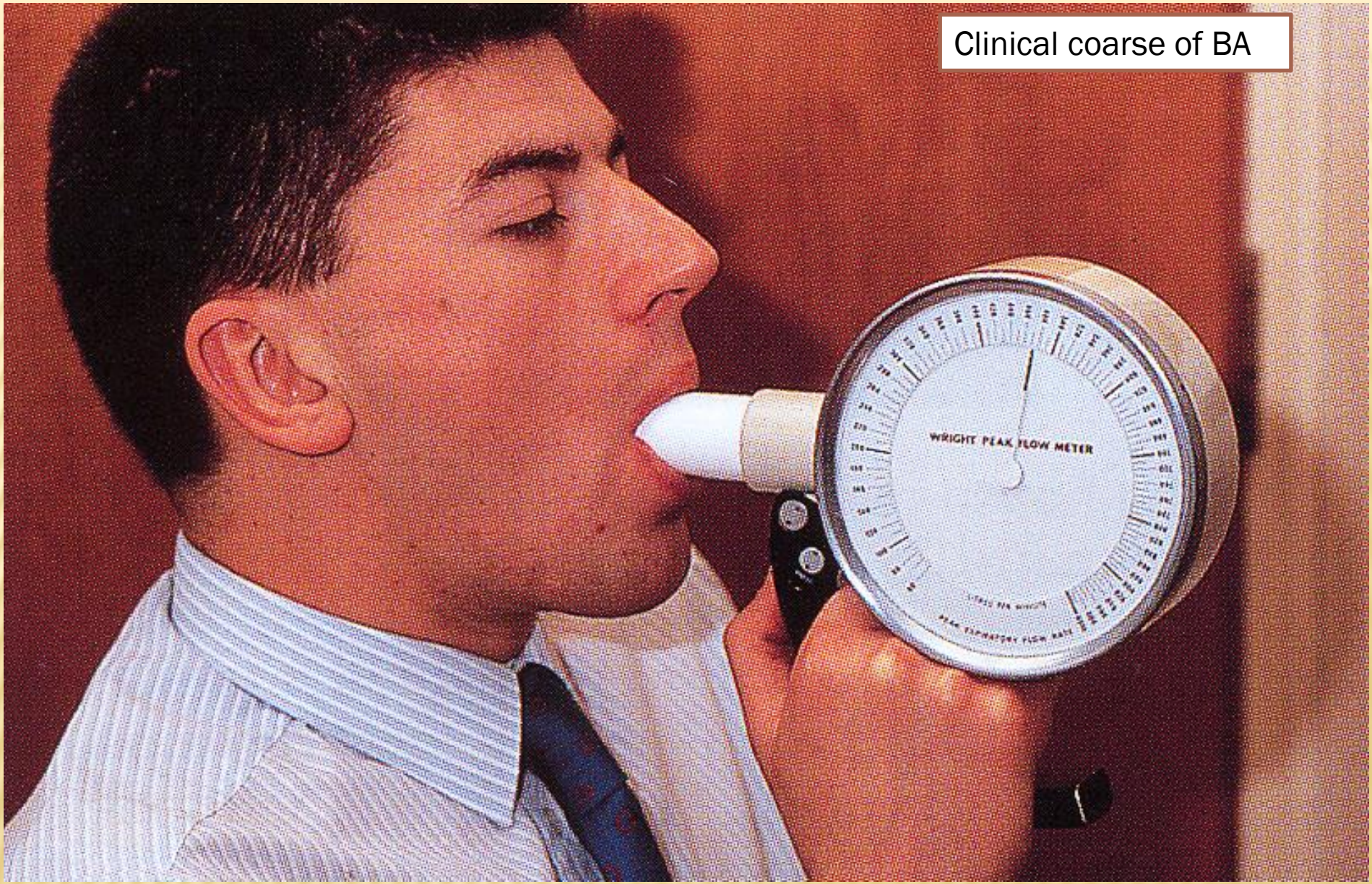
Skin prick testing in a patient with asthma.

IgE mediated type I hypersensitivity reaction to inhaled allergens

CLINICAL FEATURES

- manifestations vary from occasional wheezing to paroxysms of dyspnea and respiratory distress.
- In a classic asthmatic attack there is **dyspnea, cough, difficult expiration, progressive hyperinflation of lung and mucous plug in bronchi**. This may resolve spontaneously or with treatment.
- Nocturnal cough
- Increased anteroposterior diameter, due to air trapping and increase in residual volume
- Status asthmaticus – Overinflated lungs with sever obstruction and air trapping leading to severe cyanosis and persistent dyspnea, may be fatal

Clinical coarse of BA



The range of presentation in asthma. This patient was found incidentally to have a degree of reversible airways obstruction during a routine medical examination.

Status asthmaticus

This patient presented as a medical emergency with acute severe breathlessness and diagnosed as a case of status asthmaticus (Overinflated lungs because of sever obstruction and air trapping) which required immediate intensive care including intermittent positive-pressure ventilation.

COMPLICATIONS OF ASTHMA

- **Airway remodeling:**
  - some persons with long standing asthma develop permanent structural changes in the airway with s*ub*-basement membrane fibrosis, hypertrophy of muscle and progressive loss of lung function that increase airflow obstruction and airway responsiveness.
- **Superimposed infection** i.e. pneumonia
- **Chronic bronchi**tis
  - i.e. Asthmatic bronchitis: chronic bronchitis with superimposed asthma
- **Emphysema, pneumothorax and pneumomediastinum**
- **Bronchiectasis**
- **Respiratory failure**
  - requiring intubation in severe exacerbations i.e. status asthmaticus
- In some cases **cor pulmonale and heart failure** develop.

PROGNOSIS

- Remission- approximately 50% of cases of childhood asthma resolve spontaneously but may recur later in life; remission in adult-onset asthma is less likely.

- Mortality- death occurs in approximately 0.2% of asthmatics. Mortality is usually (but not always) preceded by an acute attack and about 50% are more than 65 years old.

PREVENTION

- Control of factors contributing to asthma severity.
  - Exposure to irritants or allergens has been shown to increase asthma symptoms and cause exacerbations.
- Skin test
  - results should be used to assess sensitivity to common indoor allergens.
  - All patients with asthma should be advised to avoid exposure to allergens to which they are sensitive.

ASTHMA: SUMMARY

EPISODIC ATTACKS OF BRONCHOCONSTRICTION (REVERSIBLE)

Types

- Extrinsic asthma: Type 1 Hypersensitivity reaction, IgE, viral infection, childhood, family Hx of allergy.
- Intrinsic asthma: BA associated with, aspirin, exercise, cold induced. No Hx of allergy

Morphology

- Hypertrophy of bronchial smooth muscle & hyperplasia of goblet cells e eosinophils, thickened BM
- Mucous plug e Curschmann spirals & Charcot-Leyden crystals.
- Remodeloing with sub-basement membrane fibrosis and hypertrophy of muscle layer

Complication

- Superimposed infection
- Chronic bronchitis
- Pulmonary emphysema
- Status asthmaticus (Overinflated lungs with sever obstruction and air trapping)