

CLASSIFICATION OF PULMONARY DISEASES

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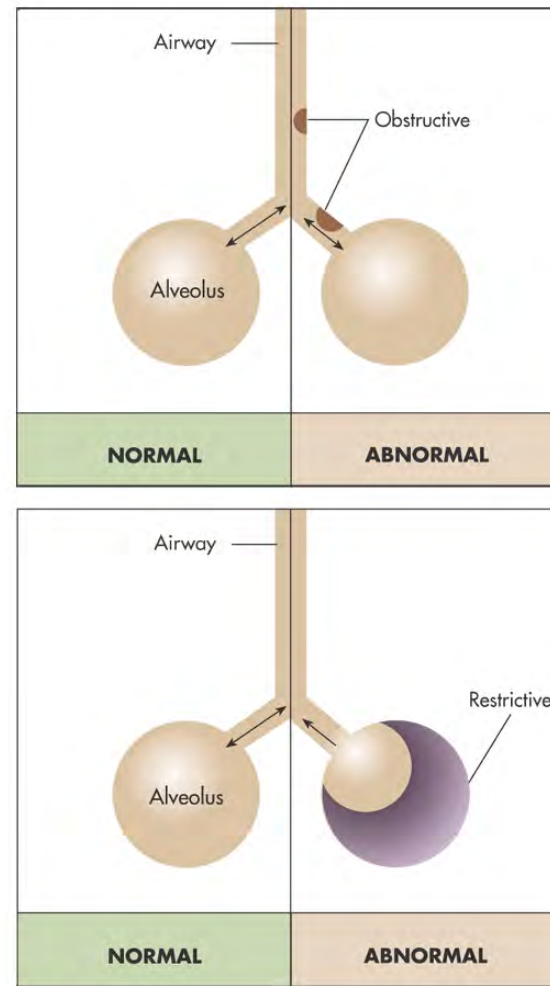
Classification of Pulmonary Diseases



- Pulmonary function testing provides basis for classifying pulmonary diseases into two major categories
 - Obstructive
 - Restrictive
 - *Combined

Obstructive Lung Diseases

- Primary problem is increased airway resistance
 - Airway radius can be reduced by:
 - Bronchospasm
 - Excessive secretions
 - Edema
 - Tumors



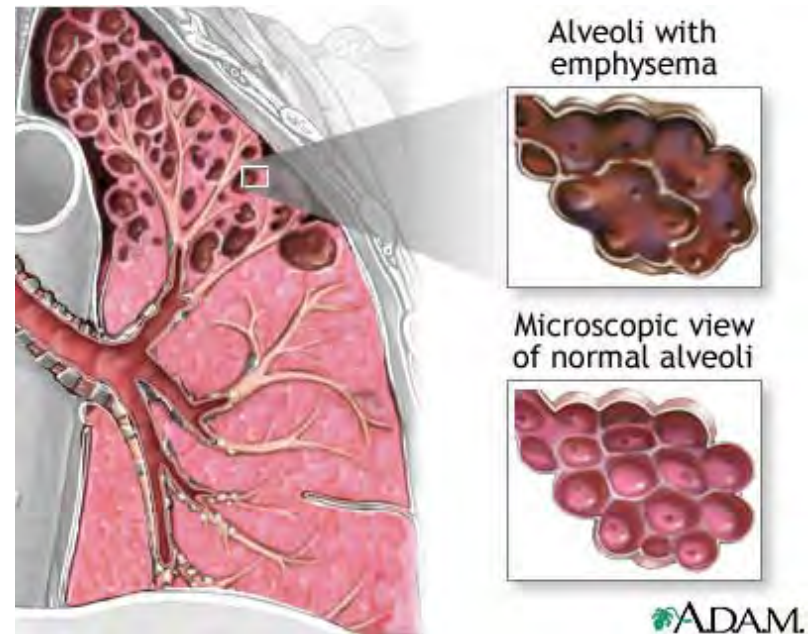
Common Obstructive Lung Diseases



- Chronic Obstructive Pulmonary Disease
 - Emphysema
 - Chronic bronchitis
 - Bronchiectasis
- Asthma
- Cystic Fibrosis
- Acute bronchitis

Emphysema-”Air Trapping”

- Morphologically defined
- Air spaces distal to terminal bronchioles abnormally increase in size
 - ▣ Centrilobular- respiratory bronchioles mainly affected
 - ▣ Panlobular- alveolar involvement
- Primary cause – cigarette smoking
 - ▣ Genetic: alpha-1 antitrypsin deficiency
 - Alpha-1 inhibits proteases in blood from damaging tissue
 - Deficiency causes gradual destruction of alveolar walls

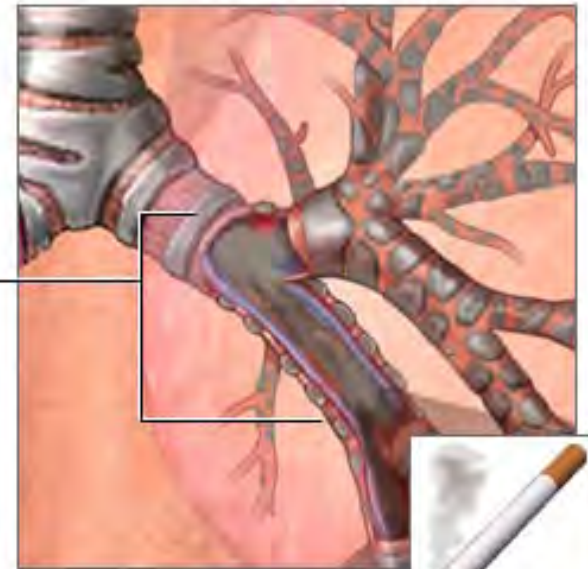


Chronic Bronchitis

- Clinically defined
 - ▣ Productive cough on most days for at least 3 months for 2 or more years
 - Exclude other diseases
- Primary cause – cigarette smoking
- Chronic inflammation of the bronchial walls
 - ▣ Mucus gland hypertrophy
 - ▣ Increase in leukocytes and lymphocytes
 - ▣ Decreased ciliated epithelial cells



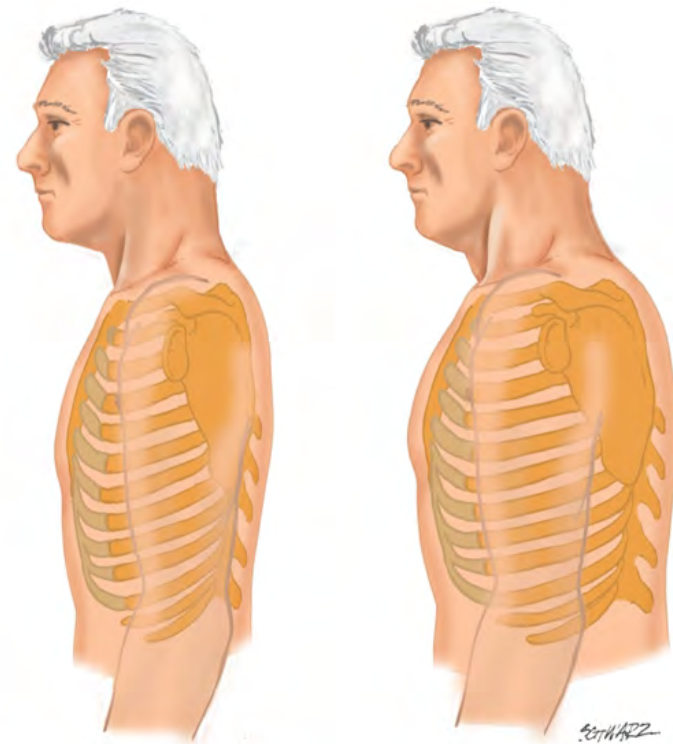
Inflamed primary and secondary bronchi



Chronic bronchitis is caused most often by exposure to airborne pollutants such as cigarette smoke

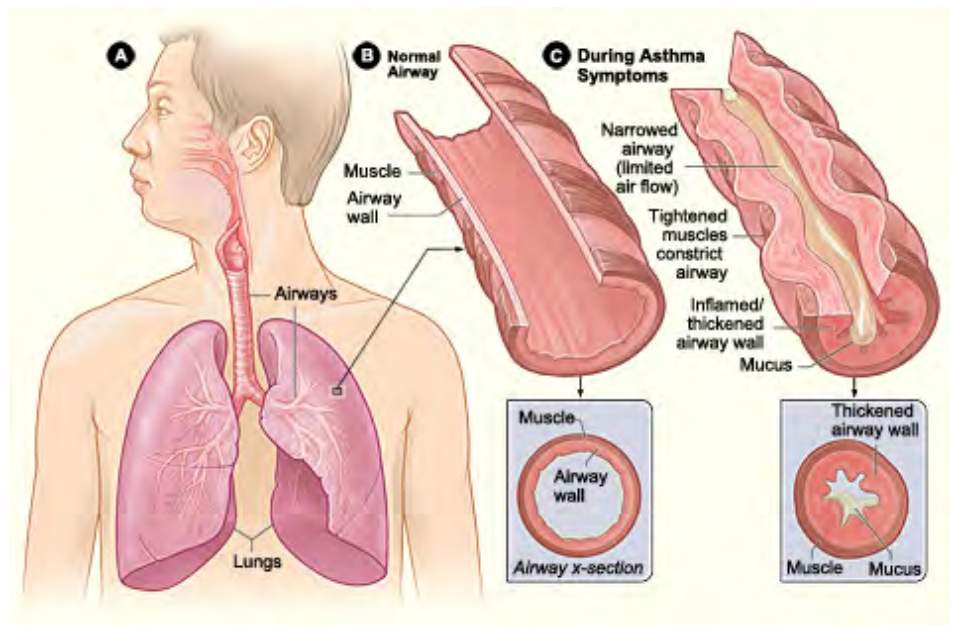
Assessment

- Chronic airway obstruction can lead to hyperinflation of lungs
 - ▣ Increased AP diameter
- Patients have difficulty with *exhalation*
 - ▣ Prolonged expiratory phase
 - ▣ Often “purse lips”



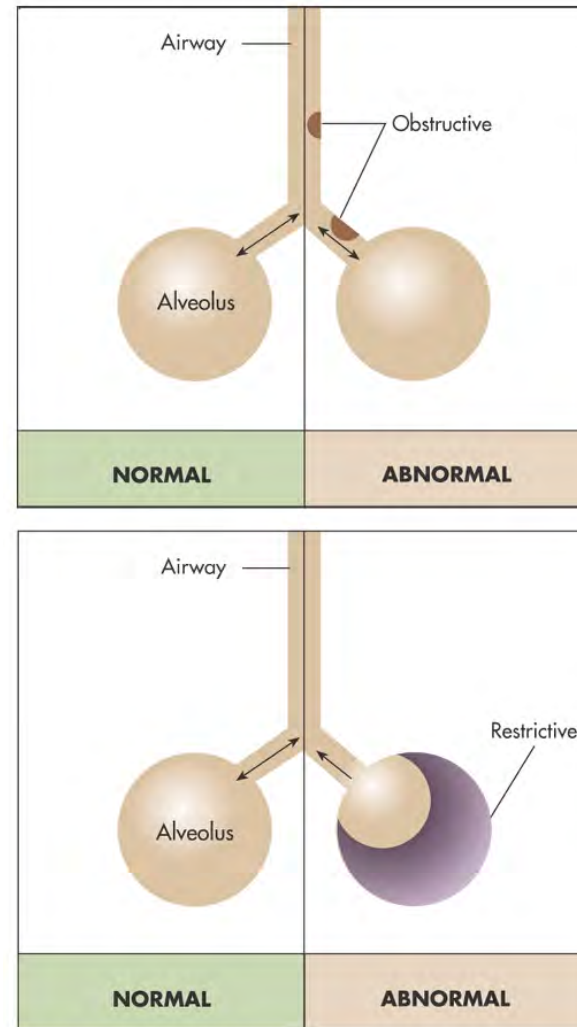
Hyper-reactive Airways Disease Asthma

- Chronic inflammatory disorder of the airways
- Variable airflow obstruction – at least partially reversible



Restrictive Lung Diseases

- Primary problem is reduced lung and or thoracic compliance
 - “Stiff lungs”
 - Anatomy affected: lung parenchyma and or chest wall
 - Decreased lung volumes and capacities



Restrictive Pathologies

Restrictive Lung Diseases

- ❑ Pulmonary fibrosis
- ❑ Alveolar inflammation
 - ❑ ARDS
- ❑ Pulmonary edema
- ❑ Thoracic wall abnormalities
 - ❑ Kyphoscoliosis
- ❑ Neuromuscular diseases

Pulmonary fibrosis



Assessment



- Patients cannot take deep breaths
 - ▣ Decreased inspiratory capacity
- Typically breathe rapid and shallow
- Other manifestations depend on cause of pulmonary restriction

Predicted Normal Values

- Primary factors affecting predicted values
 - ▣ Age
 - ▣ Gender
 - ▣ Height
 - ▣ Race or ethnic origin



Table 18-4 Severity of pulmonary impairments based upon % of the predicted normal value or standard deviations of the mean predicted normal value

Degree of Impairment	% Predicted	Standard Deviations Below Mean
Normal	80–120%	< 1 SD
Mild	65–79%	1–2 SD
Moderate	50–64%	2–3 SD
Severe	35–49%	> 3 SD
Very Severe	< 35%	

Standard Spirometric Values

- FVC: forced vital capacity
- FEV₁: volume exhaled in 1st second of FVC
- FEV_{1%}: ratio of FEV₁ / FVC
 - ▣ Normally 75-85%

- *Spirometry cannot measure RV

Interpretation



- Normal
- Obstructive
 - $FEV_{1\%} < 70$
- Restrictive
 - $TLC < 80\%$ of predicted

