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
- 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

- Pulmonary fibrosis
- Alveolar inflammation
  - ARDS
- Pulmonary edema
- Thoracic wall abnormalities
  - Kyphoscoliosis
- Neuromuscular diseases
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
Standard Spirometric Values

- **FVC**: forced vital capacity
- **FEV\textsubscript{1}**: volume exhaled in 1\textsuperscript{st} second of FVC
- **FEV\textsubscript{1\%}**: ratio of FEV\textsubscript{1} / FVC
  - Normally 75-85%

- *Spirometry cannot measure RV*
Interpretation

- Normal
- Obstructive
  - FEV\(_1\%\) < 70
- Restrictive
  - TLC < 80% of predicted