



The Human Body  
in Health and Illness

*Barbara Herlihy*

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**Chapter 22:**  
**Respiratory System**

# Lesson 22.1 Objectives

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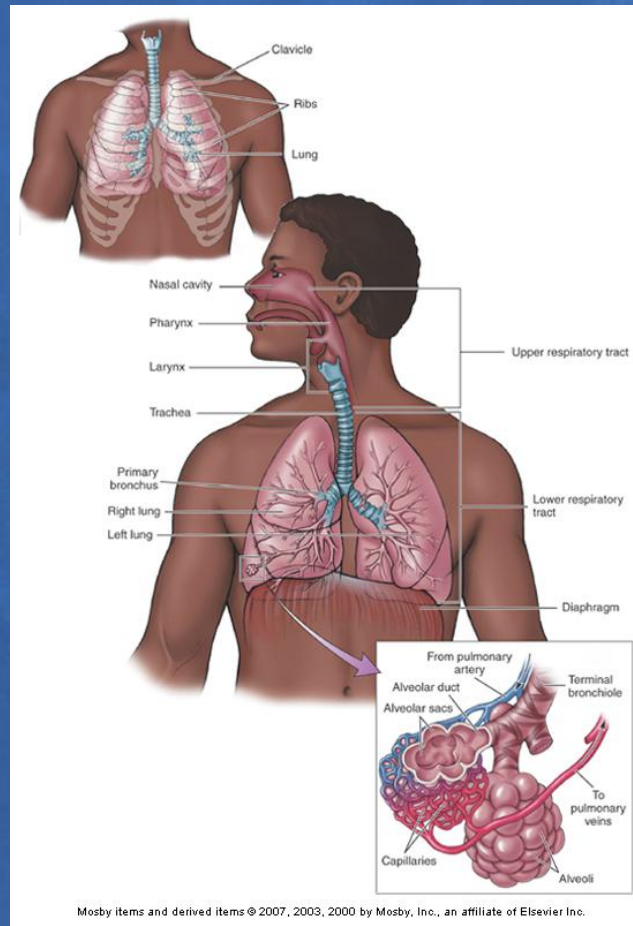
- Describe the structure and functions of the organs of the respiratory system.
- Trace the movement of air from the nostrils to the alveoli.
- Describe the role of pulmonary surfactants.

# Structure: Organs of the Respiratory System

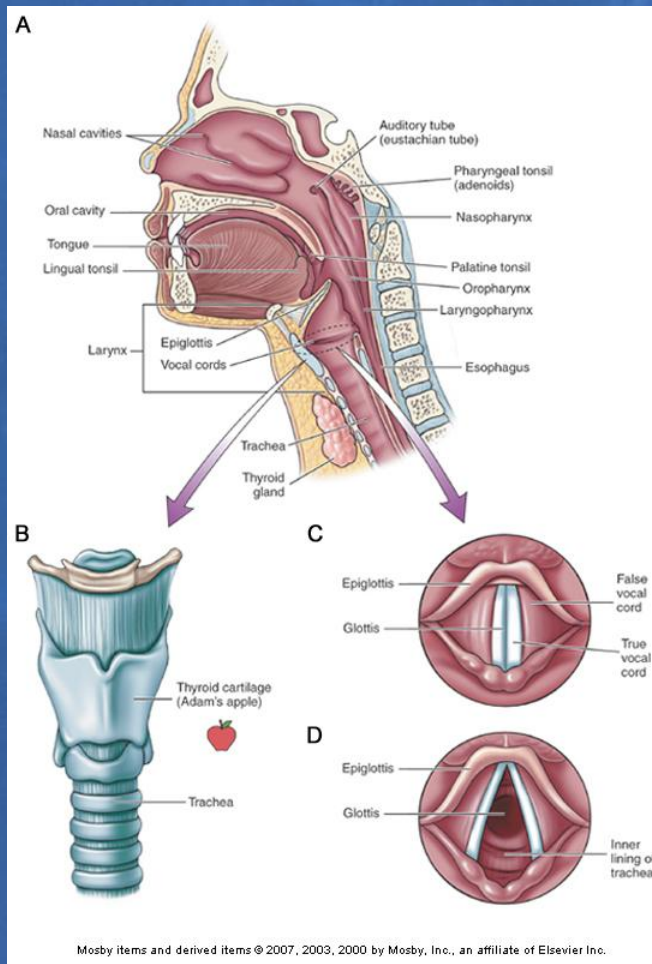
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- Upper respiratory tract: respiratory organs located outside chest cavity
- Lower respiratory tract: organs located inside the chest cavity

# Structure: Organs of the Respiratory System (cont'd.)



# Upper Respiratory System



# Upper Respiratory System (cont'd.)

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- **Nose:** external portion forms part of the face
- **Nasal cavities:** internal portion of the nose
  - **Nasal septum:** partition between right and left halves of the nasal cavities
  - **Nostrils:** two openings in the nasal cavities through which air enters; also called nares
  - **Olfactory organs:** receptor cells for the sense of smell
  - **Nasal conchae:** three bony projections on the lateral walls of the nasal cavities
  - **Paranasal sinuses:** drainage openings

# Upper Respiratory System (cont'd.)

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- Pharynx: conducts food to esophagus and air to larynx
  - Nasopharynx: upper
  - Oropharynx: middle
  - Laryngopharynx: lower

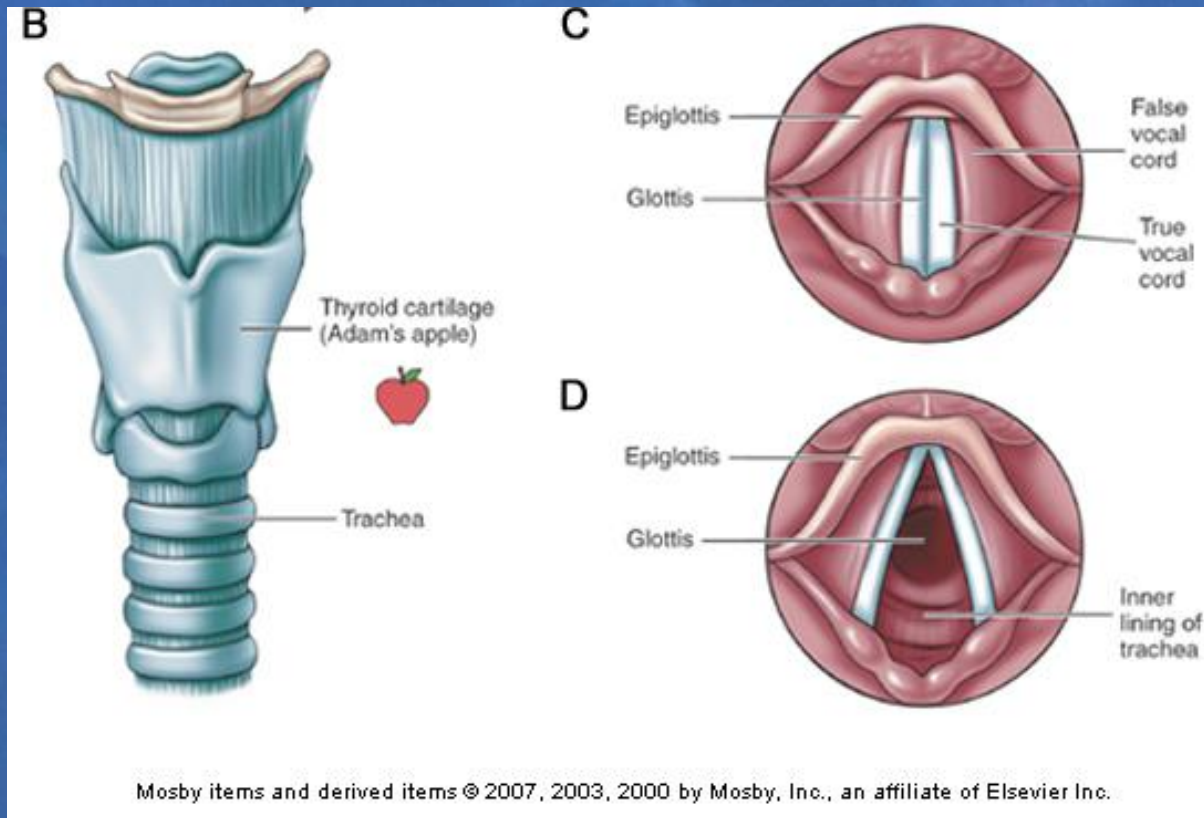
# Upper Respiratory System (cont'd.)

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- Larynx: voicebox; triangular structure of cartilage, muscles, and ligaments
  - Thyroid cartilage
  - Epiglottis
  - Vocal cords
  - Glottis
- Three functions:
  - Passageway for air
  - Produce sound
  - Prevents objects from entering breathing structures



# Upper Respiratory System (cont'd.)

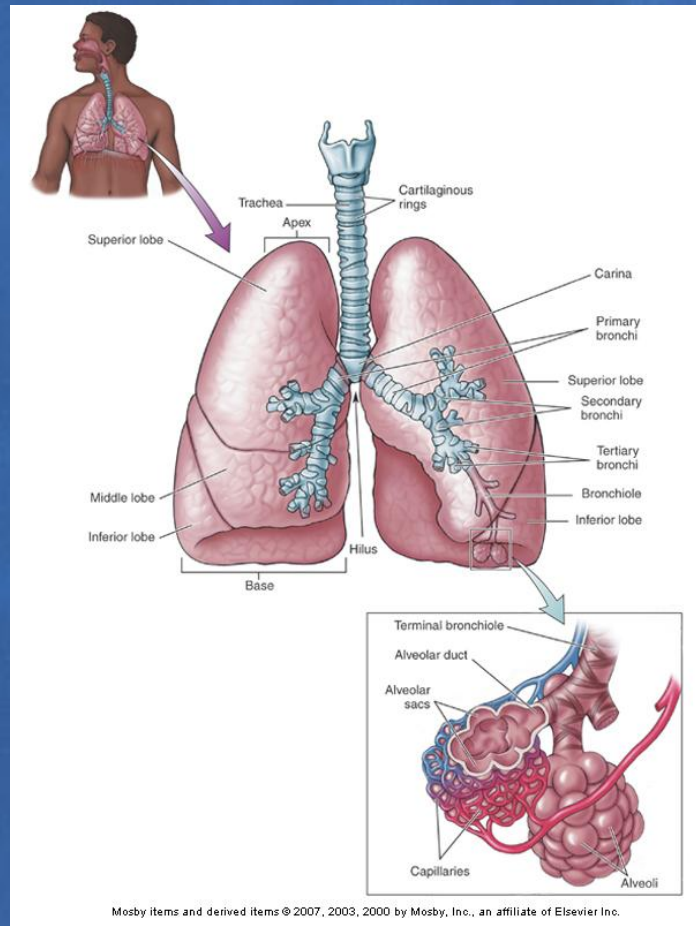


# Upper Respiratory System (cont'd.)

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- Trachea: windpipe; splits into left and right bronchi in thoracic cavity
  - Carina: point at which trachea splits at the manubriosternal junction

# Lower Respiratory System



# Lower Respiratory System (cont'd.)

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- Bronchial tree:
  - Bronchi
  - Bronchioles
  - Alveoli

# Lower Respiratory System (cont'd.)

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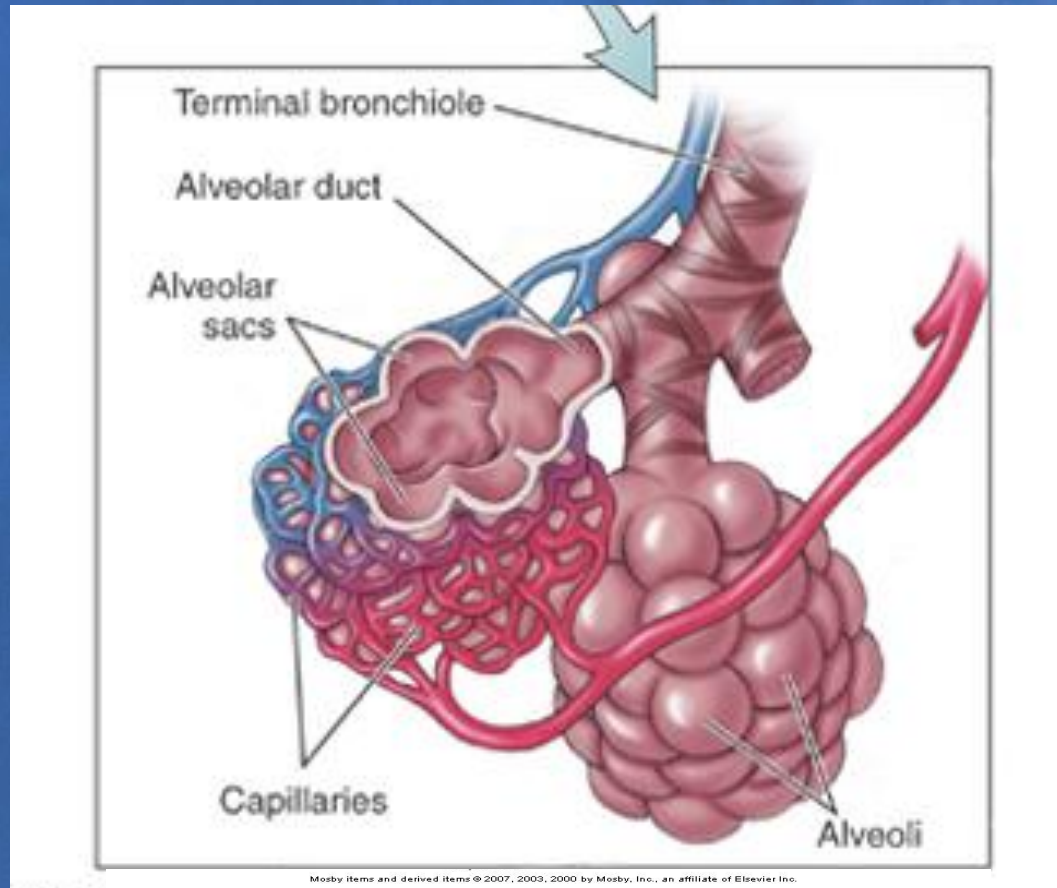
- Bronchi: formed from lower trachea dividing into two parts, left and right bronchi
  - Primary bronchi: enter lungs at the hilus, branch into secondary bronchi
  - Secondary bronchi: branch into smaller tertiary bronchi
  - Tertiary bronchi

# Lower Respiratory System (cont'd.)

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- **Bronchioles:** smaller tubes formed from repeated division of bronchi; regulate flow of air to the alveoli
- **Alveolar ducts:** formed from the division of bronchioles
- **Alveoli:** small grape-like structures at the end of the alveolar ducts; tiny air sacs

# Lower Respiratory System (cont'd.)



# Lower Respiratory System (cont'd.)

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- Lungs: large, soft, cone-shaped organs; occupy most of the thoracic cavity
- Right lung: three lobes
  - Superior
  - Middle
  - Inferior
- Left lung: two lobes
  - Superior
  - Inferior



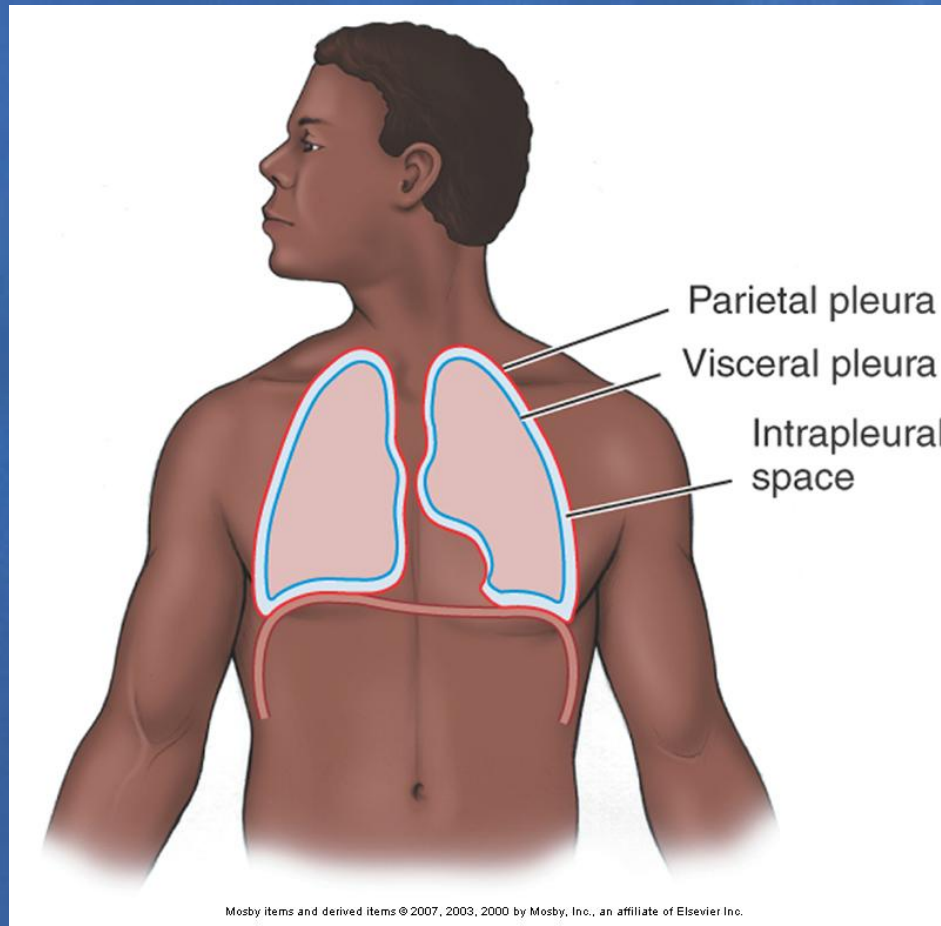
# Lower Respiratory System (cont'd.)

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- Pleura: continuous serous membrane
  - Visceral pleura
  - Parietal pleura
- Pleural cavity: space between visceral pleura and parietal pleura

# Lower Respiratory System (cont'd.)

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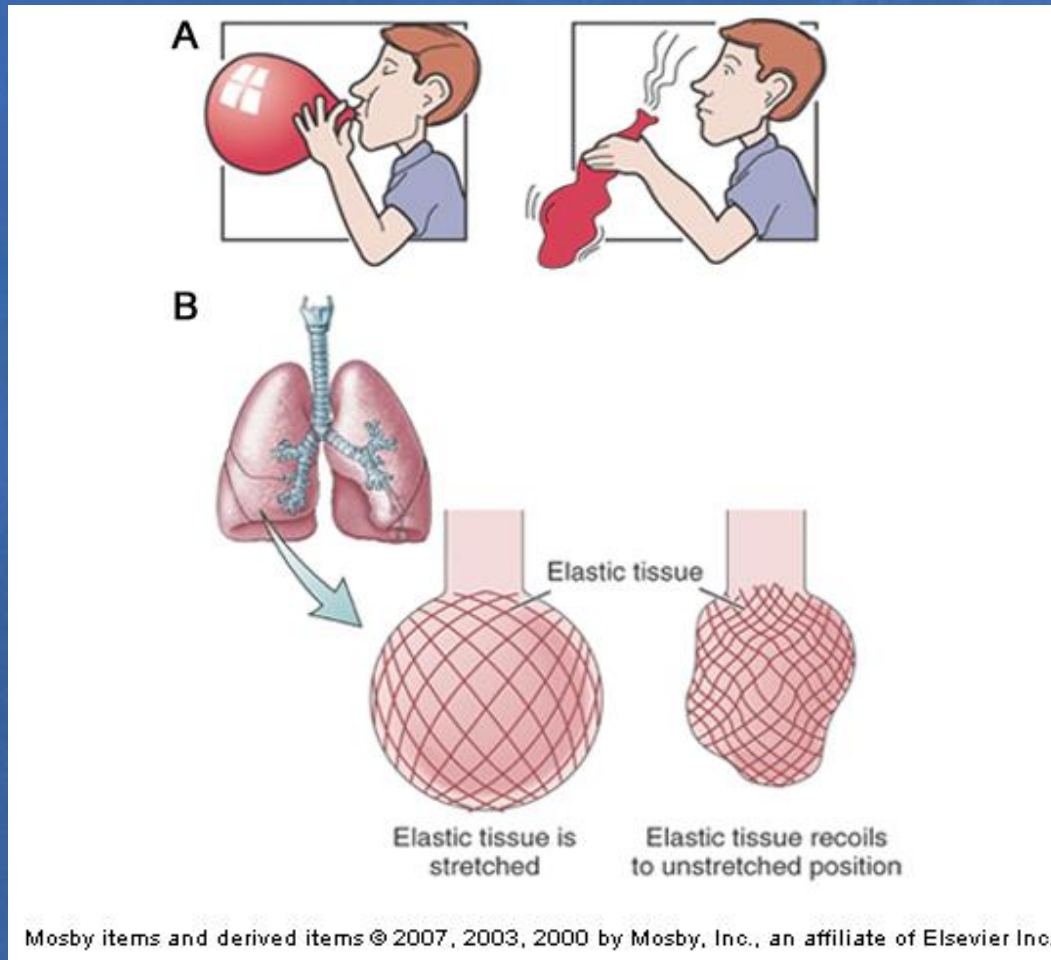
# Collapsed and Expanded Lungs

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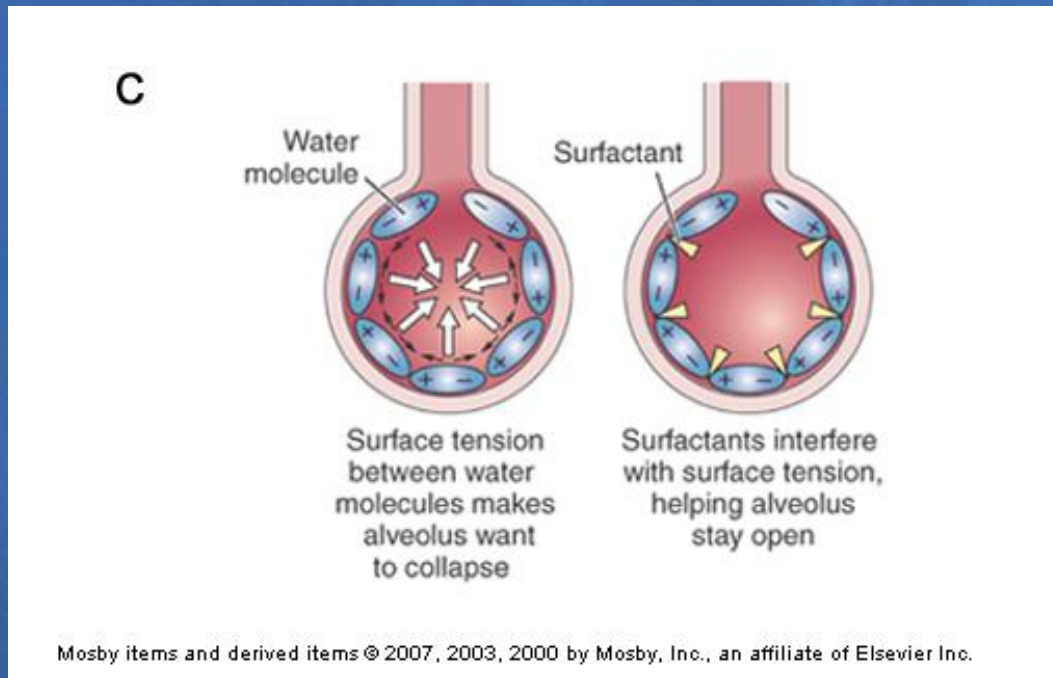
- Lungs collapse because of:
  - Elastic recoil
  - Surface tension

# Collapsed and Expanded Lungs

(cont'd.)



# Collapsed and Expanded Lungs (cont'd.)



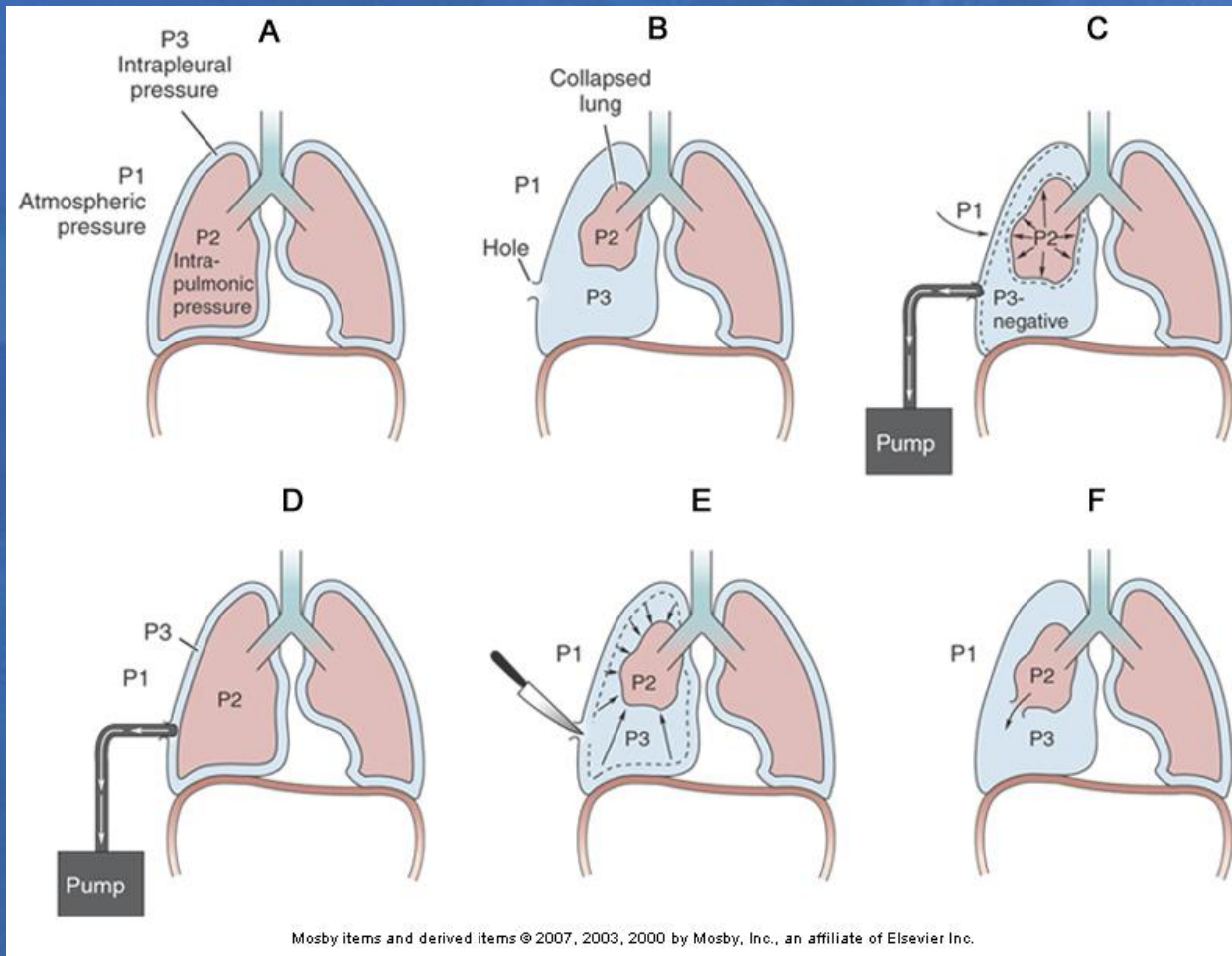
# Collapsed and Expanded Lungs

(cont'd.)

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- Lungs expand due to negative pressure within the intrapleural space
  - Atmospheric pressure
  - Intrapulmonic pressure
  - Intrapleural pressure

# Collapsed and Expanded Lungs (cont'd.)



# Common Respiratory Terms

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- Apnea: temporary cessation of breathing
- Dyspnea: difficult or labored breathing
- Tachypnea: rapid breathing
- Eupnea: normal, quiet breathing
- Orthopnea: difficulty in breathing that is relieved by a sitting-up position



# Common Respiratory Terms (cont'd.)

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- Cheyne-Stokes respirations: irregular breathing pattern characterized by a series of shallow breaths that gradually increase in depth and rate
- Kussmaul breathing: increase in rate and depth of respiration stimulated by acidosis
- Cyanosis: bluish color of the skin or mucous membrane due to a low concentration of oxygen in the blood

# Common Respiratory Terms (cont'd.)

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- Hypoxia: abnormally low concentration of oxygen in the tissues
- Hypoxemia: abnormally low concentration of oxygen in the blood
- Hypercapnia: abnormally high concentration of carbon dioxide in the blood
- Hypocapnia: abnormally low concentration of carbon dioxide in the blood