University of Basra
College of Nursing
fundamentals of nursing lecture

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Oxygenation and perfusion

FACTORS ESSENTIAL TO NORMAL FUNCTIONING OF THE RESPIRATORY SYSTEM

- **Integrity of the airway system to transport air to and from lungs**
- **Properly functioning alveolar system in lungs**
  - **Oxygenates venous blood**
  - **Removes carbon dioxide from blood**
- **Properly functioning neurological system**
- **Properly functioning cardiovascular and hematological systems**
  - **Carry nutrients and waste to and from body cells**

UPPER AIRWAY

- Functioning: warm, filter, humidify inspired air
- Components
  - nose
  - pharynx
  - larynx
  - epiglottis

LOWER AIRWAY

- Functioning: conduction of air, mucocilliary clearance, production of pulmchionary surfactant
- Components

✓ Trachea

✓ Right and left mainstem bronchi

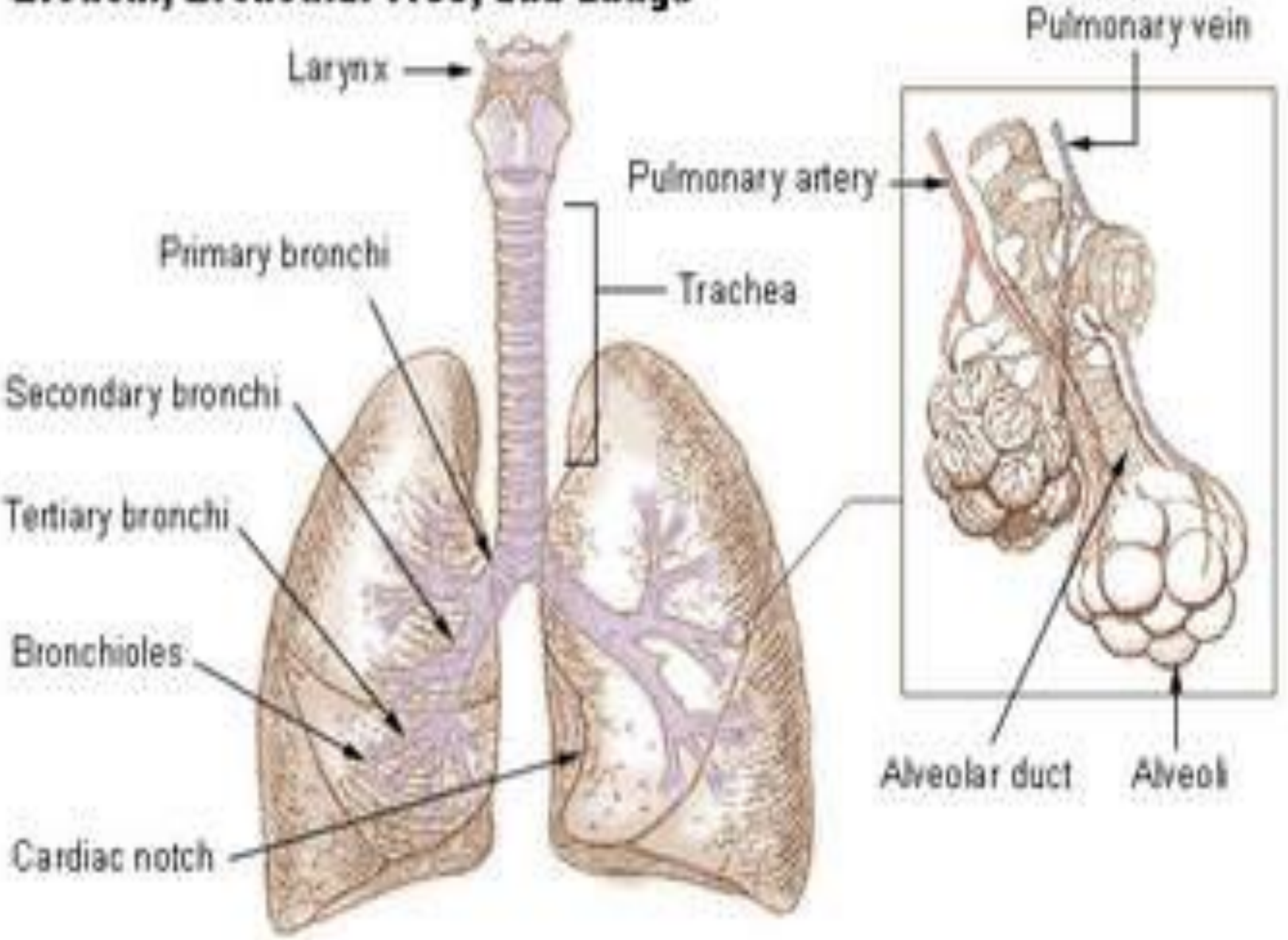
✓ Segmental bronchi

✓ Terminal bronchioliles

ANATOMY OF THE LUNGS

- Main organs of respiration
- Extend from the base of the diaphragm to the apex above the first rib
- The right lung has three lobes; the left lung has two
- The lungs are composed of elastic tissue(alveoli, surfactant, pleura)

Bronchi, Bronchial Tree, and Lungs



PULMONARY VENTLATION

- inspiration: the active phase of ventilation
  - Involves movement of muscles and the thorax to bring air into the lungs

- Expiration: the passive phase on ventilation
  - Movement of air out of the lungs

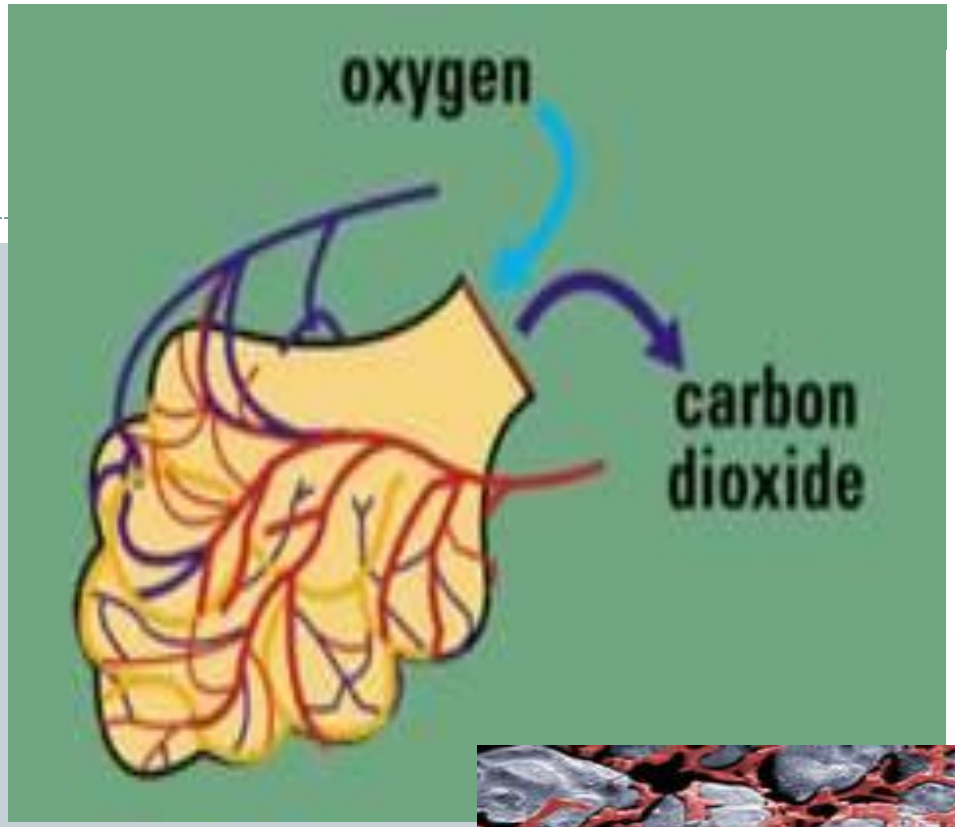
PROCESS OF VENTILATION

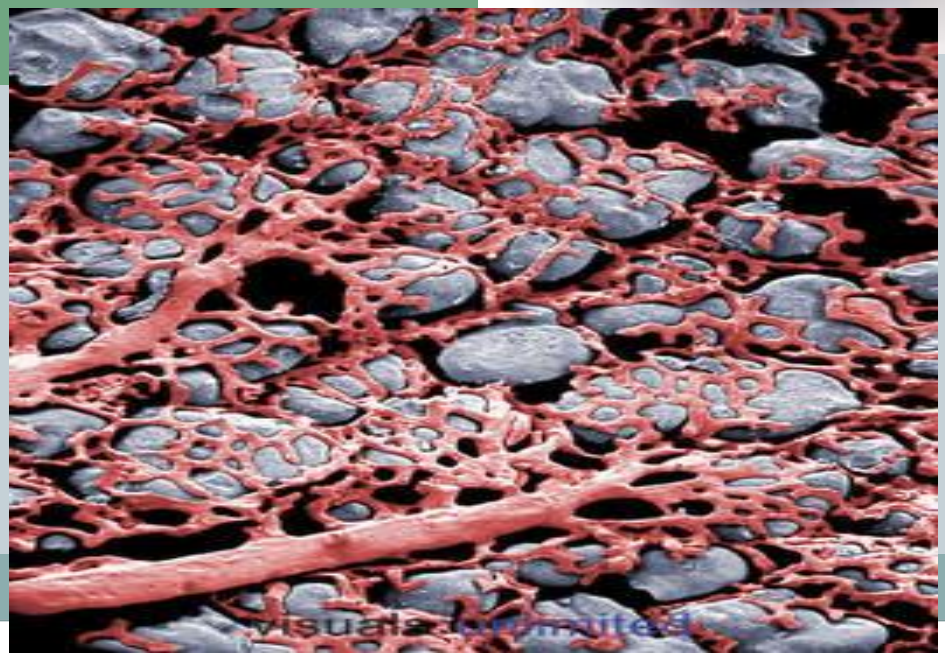
- The diaphragm contracts and descends, lengthening the thoracic cavity.
- The external intercostal muscles contract, lifting the ribs upward and outward.
- The sternum is pushed forward, enlarging the chest from front to back
- Increased lung volume and decreased intrapulmonic pressure allow air to move from an area of greater pressure(outside lungs) to lesser pressure(inside lungs)
- The relaxation of these structures results in expiration

GAS EXCHANGE(RESPIRATION)

- Refers to the intake of oxygen and release of carbon dioxide
- Made possible by respiration and perfusion
- Occurs via diffusion(movement of oxygen and carbon dioxide between the air and blood)

(gaseous exchange between alveoli and capillaries. You tube)


oxygen
carbon
dioxide



FACTORS INFLUENCING DIFFUSION OF GASES IN THE LUNGS

- Change in surface area available (removal of lung tissue)
- Thickening of alveolar-capillary membrane
- Atelectasis (https://www.youtube.com/watch?v=A2ndx07uORc) (https://www.youtube.com/watch?v=_jKLfjkVO1E)
- Partial pressure(reduced oxygen)
- Solubility and molecular weight of the gas

Transport of respiratory gases

- Oxygen is carried in the body via plasma and red blood cells
- Most oxygen (97%) is carried by red blood cells in the form of oxyhemoglobin
- Hemoglobin also carries carbon dioxide in the form of carboxyhemoglobin
- Internal respiration between the circulation blood and tissue cells must occur

Blood Gases

- Respiratory center is in the medulla in the brainstem.
- Stimulated by increased carbon dioxide in blood stream.
- The stimulation causes increase in the rate and depth of respiration.
- Chronic disease can cause this mechanism to become desensitized.
- Arterial blood gas(ABG) can be measured with a blood test from the arteries.

Alteration in respiratory function

- Hypoxia: inadequate amount 09f oxygen available to the cells.
- Dyspnea: difficulty breathing
- Hypoventilation: decreased rate or depth of air movement into the lungs.

Cardiovascular system

- Vital for exchange of gases(cardiac cycle)
- Composed of the heart and the blood vessels
- The heart is a cone shaped, muscular pump, divided into four hollow chambers

- The upper chambers, the atria(singular, atrium), receive blood from the veins (the superior and inferior vena cava and the left and right pulmonary veins)

- The lower chambers, the ventricles, force blood out of the heart through the arteries (the left and right pulmonary arteries and the aorta).

Alterations in the cardiovascular system

- Dysrhythmia or arrhythmia
- Myocardial ischemia
- Angina
- Myocardial infarction
- Heart failure

Factors affecting cardiopulmonary functioning and oxygenation

- Level of health
- Developmental considerations
- Medications considerations
- Lifestyle considerations
- Environmental considerations
- Psychological health considerations

Respiratory functioning in the older adult

- Bony landmark are more prominent due to loss subcutaneous fat.
- Kyphosis contributes to appearance of leaning forward.
  https://www.youtube.com/watch?v=9D4qWWc9MKc
  https://www.youtube.com/watch?v=RytFcnkphJs
- Barrel chest deformity may result in increased anteroposterior diameter.
- Tissues and airways become more rigid; diaphragm move less efficiently.
- Older adults have an increased risk for disease, especially pneumonia.

Guidelines for obtaining a nursing history

- Determine why the patient needs nursing care
- Determine what kinds of care is needed to maintain a sufficient intake of air
- Identify current or potential health deviations.
- Identify actions performed by the patient for meeting respiratory needs.
- Make use of aids to improve intake of air and effects on patient's lifestyle and relationship with others.

Breath sounds

- Vesicular: low-pithed, soft sound during expiration heard over most of the lungs
- Bronchial: high-pitched and longer, heard primarily over the trachea
- Bronchvesicular: medium pitch and sound during expiration, heard over the upper anterior chest and intercostal area.
- These are the normal breath sounds.

Abnormal(adventitious) lung sounds

- Crackles: intermittent sounds occurring when air moves through airway that contain fluid, making popping sounds.

  - classified as fine, medium, or coarse

- Wheezes: continuous sounds heard on expiration and sometimes on inspiration as air pass through airways constricted by swelling, secretions, or tumors. Sound musical and squeaky.

Common diagnostic methods to assess cardiopulmonary function

- Cardiac coronary catheterization
- Cardiac exercise stress testing
- Echocardiogram
- Endoscopic studies
- Holter monitor
- Lung scan
- Skin tests
- radiography

Promoting proper breathing

- Deep breathing
- Using incentive spirometry
- Pursed-lip breathing
- Diaphragmatic breathing

Promoting comfort

- Positioning
- Maintaining adequate fluid intake
- Providing humidified air
- Performing chest physiotherapy
- Maintaining good nutrition
- Pacing physical activities

Administering inhaled medications

- Bronchodilators: open narrowed airways
- Nebulizers: disperse انتشار fine particles of liquid medication into the deeper passages of the respiratory tract.
- Meter-dose inhalers: deliver a controlled dose of medication with each compression of canister
- Dry powder inhalers: breath-activated delivery of medications

Oxygen delivery systems

- Nasal cannula
- Nasopharyngeal catheter
- Transtracheal catheter
- Simple mask
- Partial rebreather mask
- Nonrebreather mask
- Venturi mask
- tent