

Project: Ghana Emergency Medicine Collaborative

Document Title: Basic Life Support

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Objectives

- To understand the physiology of the:
 - Cardiovascular system
 - Respiratory System
 - Cerebrovascular System
- Understand how to perform effective CPR in both Adults and children
- Solidify the team approach to resuscitation

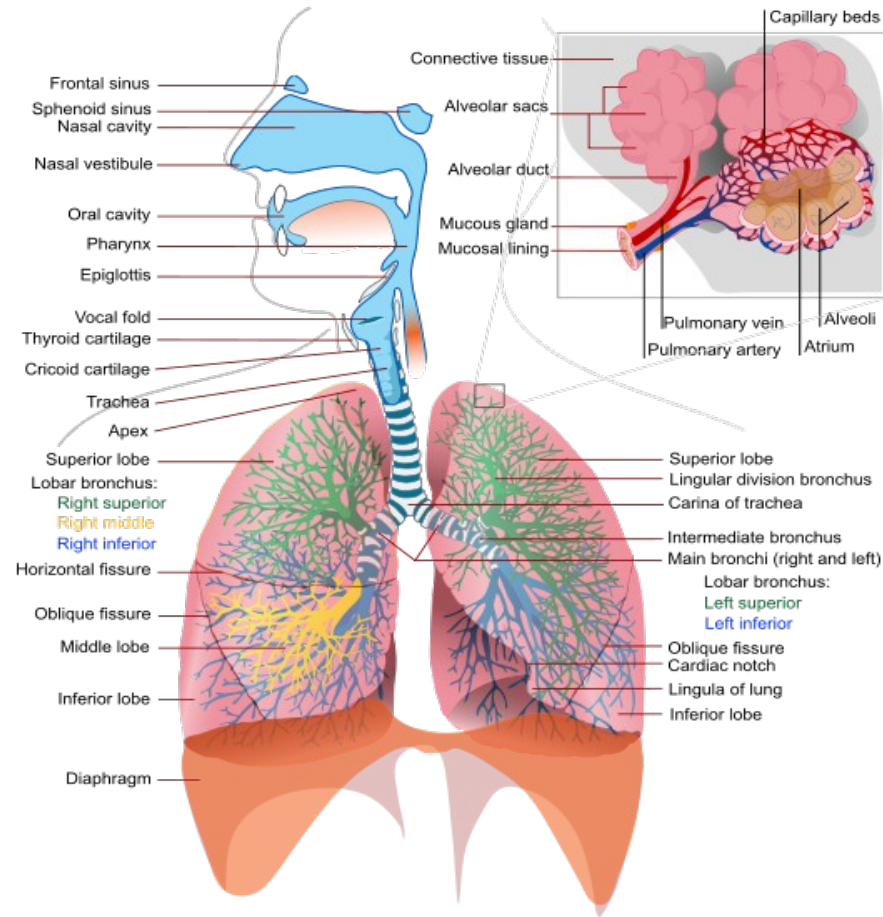
Anatomy and Physiology

- In order to best perform CPR and to detect impending cardiovascular emergencies, a good understanding of the basic physiology is important
- We will discuss the respiratory, cardiovascular, cerebrovascular systems

Respiratory System

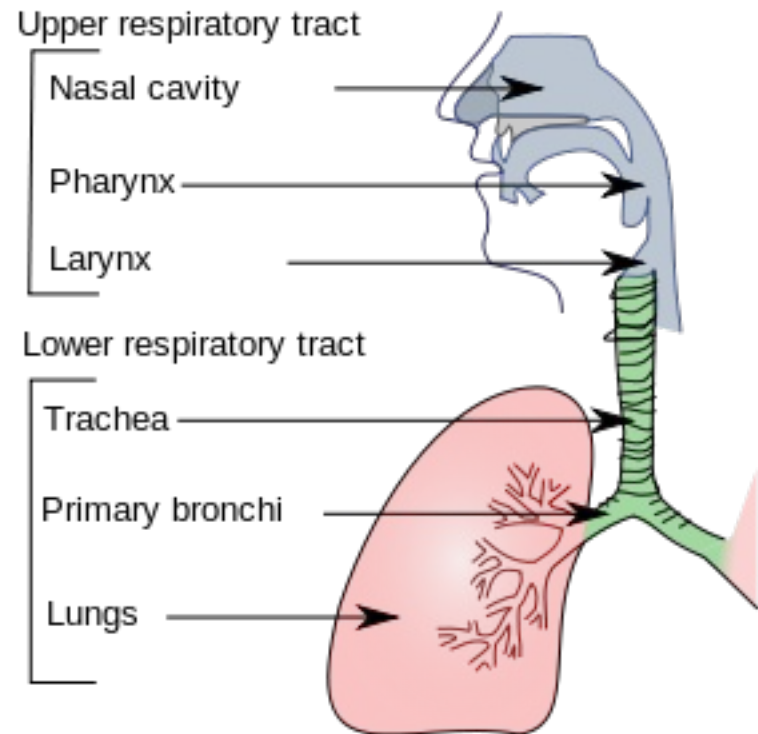
- The respiratory system has four components:
 1. The airways that conduct the air between the outside and inside
 2. The alveoli
 3. The neuromuscular component
 4. The vascular component

Respiratory System



Respiratory System

- Upper Airway
 - Nose & Mouth
 - Pharynx
 - Larynx
- Lower Airway
 - Trachea: windpipe
 - Bronchi: Right and Left
 - Bronchioles: branches of the bronchi that end at the alveoli



Respiratory System

- Alveoli :
 - Place where the exchange of oxygen and carbon dioxide occurs
- Neuromuscular Component includes:
 - Brain center for respiration
 - Nerves to and from the muscles of respiration
 - Muscles of respiration

Respiratory System

- There are two functions of the respiratory system
 1. To deliver oxygen to the blood from the air
 2. To eliminate carbon dioxide from the blood to the air
- In the average person there is a match between the ventilation (volume of breaths x rate) and the perfusion of blood to the lungs

Respiratory System

- During CPR the blood flow to the lungs is reduced to 20%-33% of its normal volume
- So much less ventilation is needed to remove carbon dioxide and provide oxygen.
- During CPR the respiratory rate should be 8-10 breaths per minute
- Each breath should last roughly 1 second

Cardiovascular System

- Has a great many functions but two of it's primary functions are:
 1. Delivery of carbon dioxide rich blood from the body to the lungs
 2. Delivery of oxygen rich blood from the lungs to the body and brain
- During normal conditions the relative oxygen and carbon dioxide concentrations remain constant

- This constant control is performed by the coordinated effort of the respiratory center of the brain, the respiratory system and the cardiovascular system
- The brain senses the concentration of carbon dioxide in the blood:
 - If this level rises then there are increase signals sent to the respiratory muscles to increase depth and rate

Respiratory System

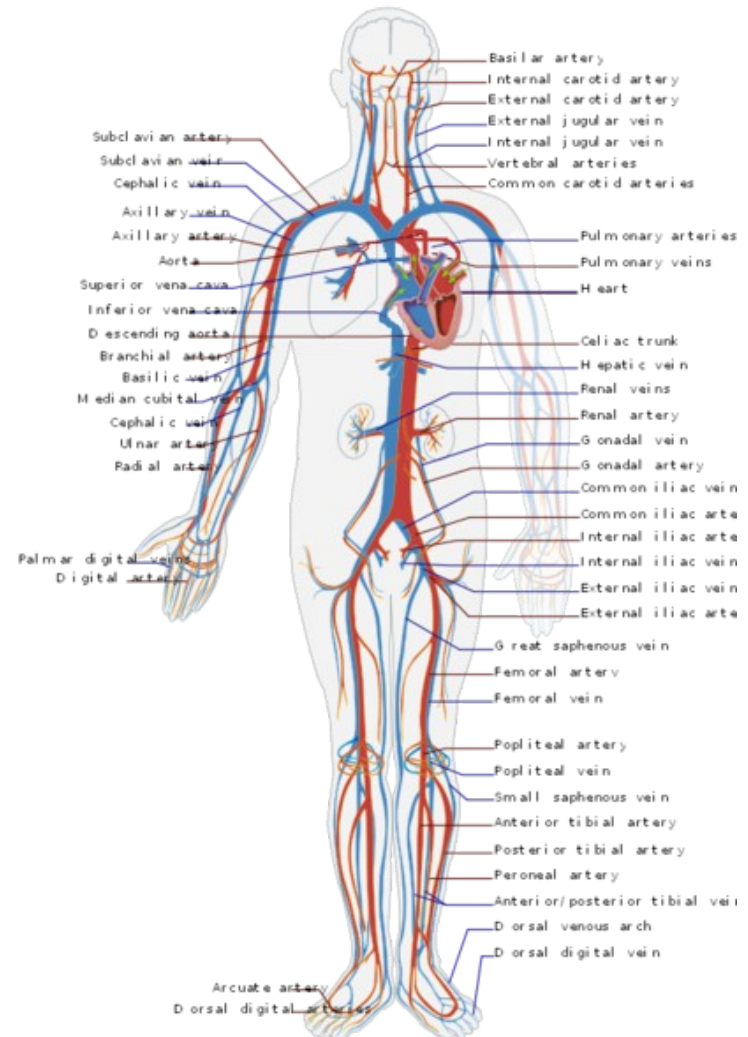
- Once the levels of carbon dioxide are reduced to the “normal” range. Then the signals from the brain, decrease accordingly
- The key respiratory muscle is the diaphragm
 - During inspiration the muscle plunges toward the abdomen
 - Decreases the intra-thoracic pressure
 - Allows air to flow from outside into the lungs because of the pressure difference

Respiratory System

- So when the respiratory effort of a patient does not match the need, this is referred to as Respiratory failure
- When there is no respiratory effort, that is termed respiratory arrest

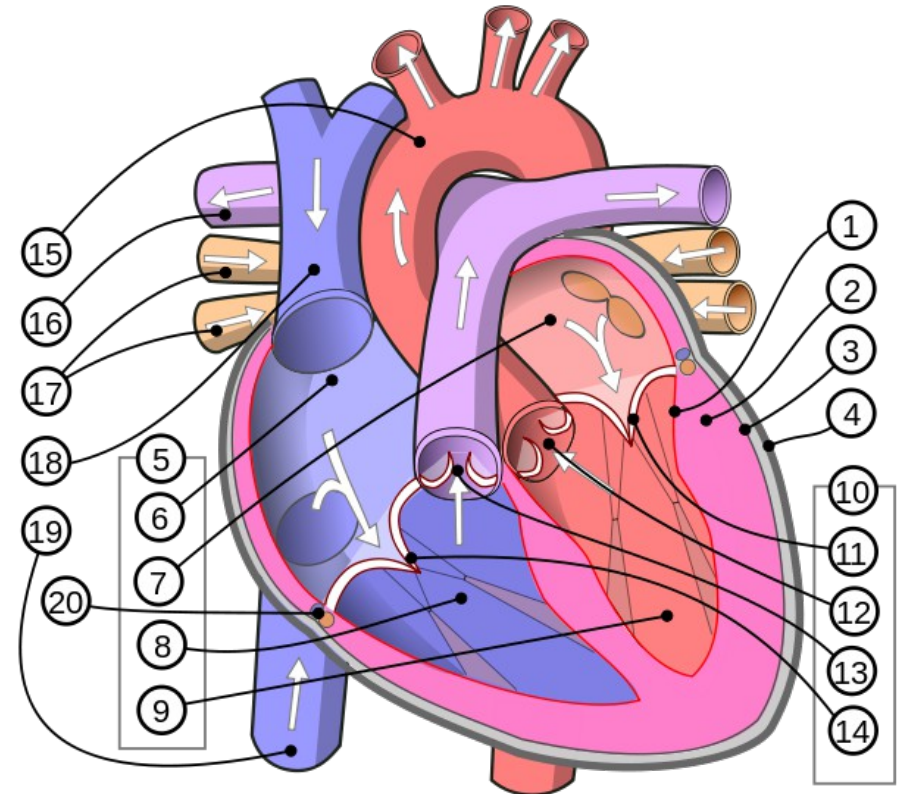
Cardiovascular System

- Major Components:
 - Heart
 - Arteries
 - Capillaries
 - Veins



Cardiovascular System

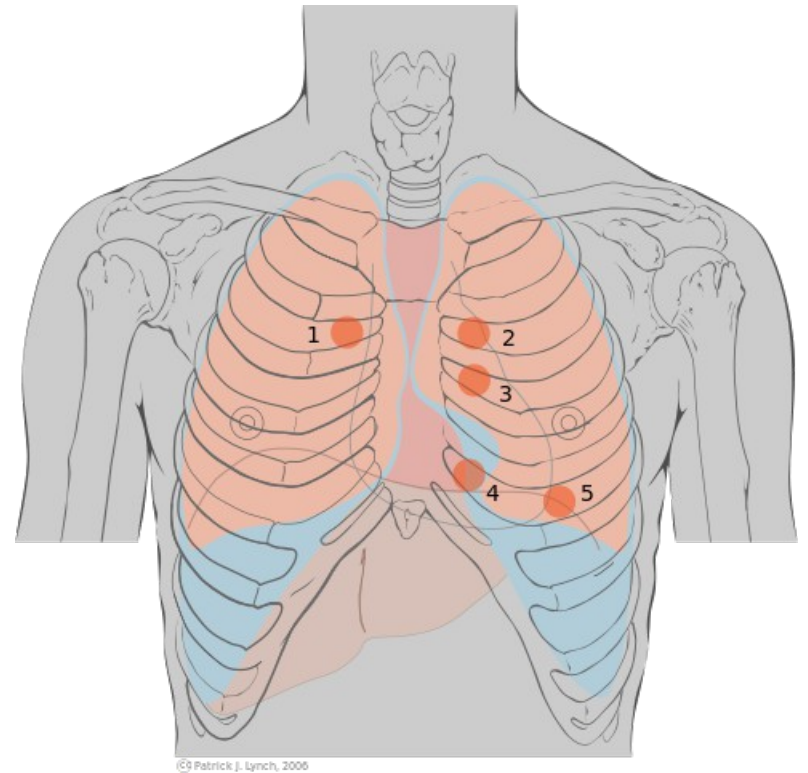
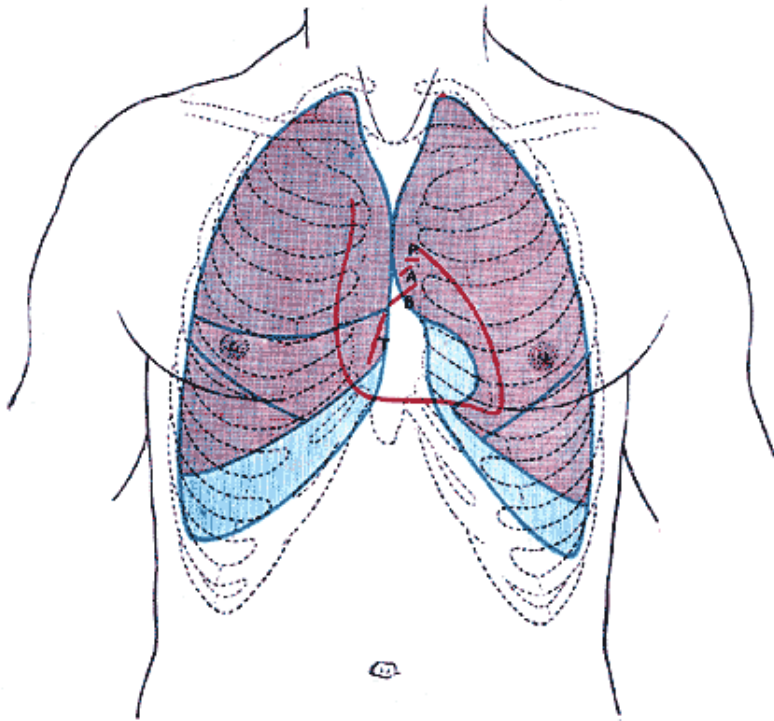
- Right Atrium
 - Receives blood returning from the body
- Right Ventricle
 - Sends this blood to the lungs
- Left Atrium
 - Receives blood from the heart
- Left Ventricle
 - Pumps blood through the aorta to the body



Cardiovascular System

- So during a cardiac arrest, the goal is to mimic normal cardiac activity
- This is achieved through chest compressions
- Find the xiphoid process and go two finger breadths above onto the chest. Place your palms on this location and begin compression.
- Goal is for 100 cycles per minute
- Effective compressions are smooth, regular and have minimal interruption

Cardiovascular System



Interdependence

- So with all these different parts there has to be some sort of coordination
- This falls to the Cerebrovascular system
- The brain, spinal cord and an expansive network of nerves control most functions
- Specialize sensors in the brain control cardiac function, vascular function and respiratory function
- So any damage to these areas of the brain can then lead to Respiratory or Cardiac arrest.

Interdependence

