**Cardiovascular System**

**Introduction**

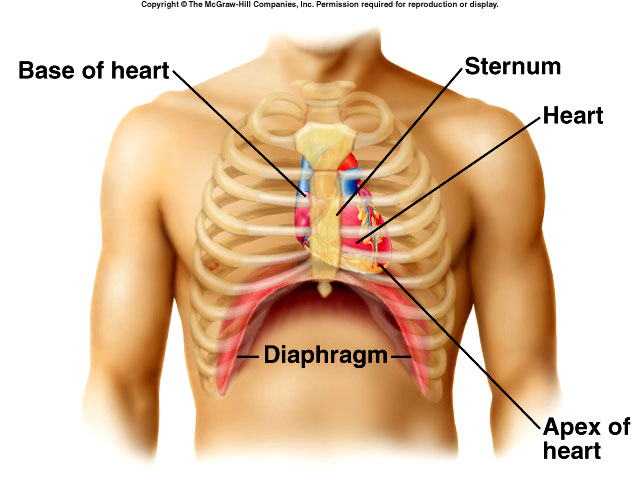
* The cardiovascular system consists of:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Functions**

1. Heart - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Blood vessels - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

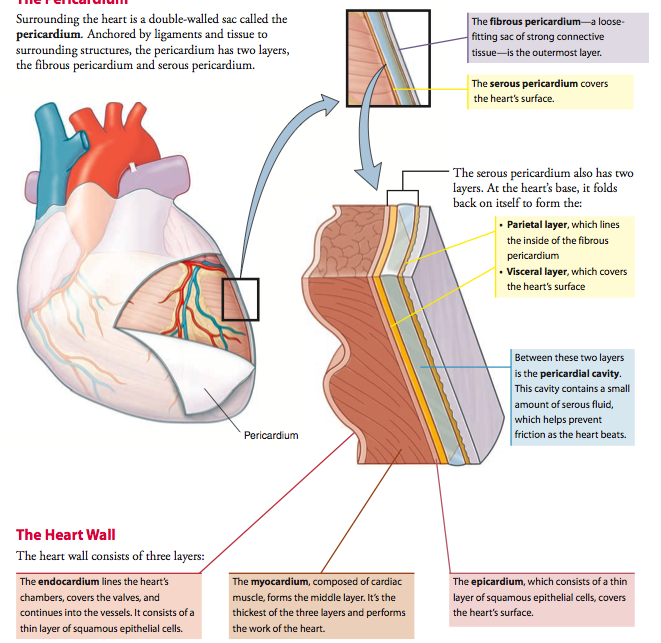
* + Systemic Circuit – connects the \_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Delivers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Removes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Pulmonary Circuit – connects the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs
      * Carbon dioxide out
      * Oxygen in

**Location of Heart**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to sternum
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to lungs
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to vertebral column
* Lies upon diaphragm

**Coverings of Heart**

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ encloses the heart.
* Two layers:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - Outer, tough connective tissue
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - Covers the heart’s surface
    - Parietal layer – lines the inside of the fibrous pericardium
    - Visceral layer – covers the heart’s surface
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Cavity
  + Between parietal & visceral layer of the serous pericardium
  + Contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as heart moves.

****

**Wall of the Heart**

* Three Layers
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Forms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ protective covering, secretes serous fluid.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Cardiac muscle, contracts to pump blood from the heart chambers.
  + \_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_\_**
    - Forms protective inner lining of the chambers and vessels.

**Heart Structures**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Structure** | **Location** | **Characteristics** | **Receives blood from:** | **Function** |
| **Atria** |  |  |  |  |
| **Ventricles** |  |  |  |  |
| **Septum** |  |  | N/A |  |

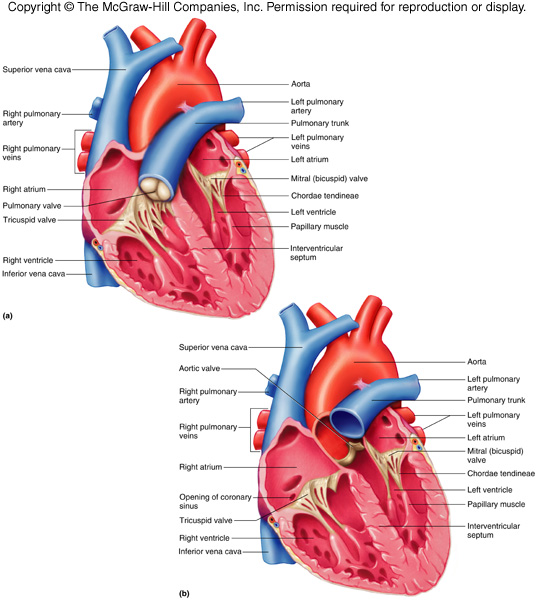
**Heart Chambers**

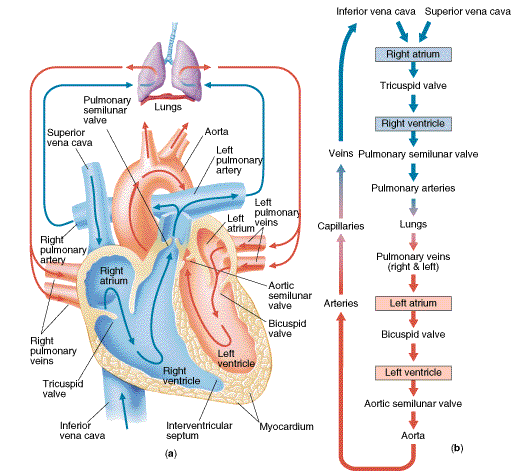
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + receives blood from inferior & superior vena cava
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + receives blood from right atrium
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + receives blood from pulmonary veins
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + receives blood from left atrium

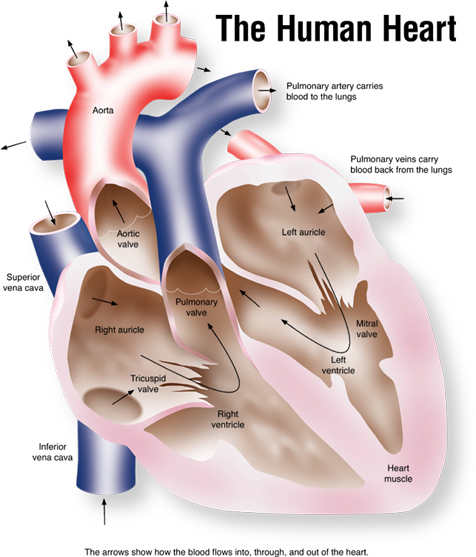
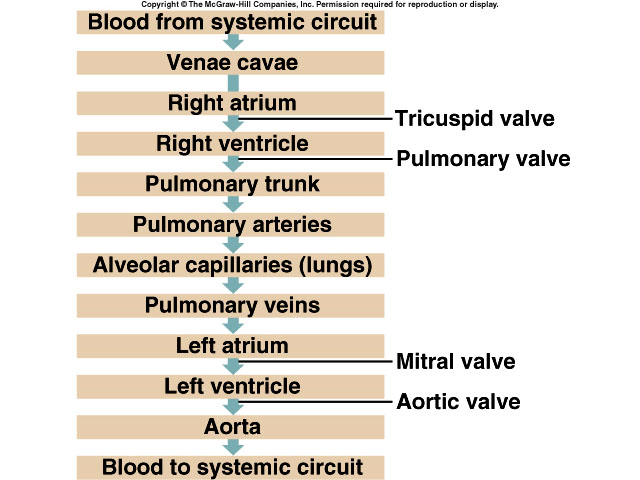
**Heart Valves**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Valve** | | **Location** | **Structure** | **Function** |
| **Atrioventricular (A-V) Valves** | **Tricuspid valve** |  |  |  |
| **Bicuspid valve** |  |  |  |
| **Semilunar Valves** | **Pulmonary valve** |  |  |  |
| **Aortic valve** |  |  |  |

**Pathway of Blood Through the Heart**

****

****

****

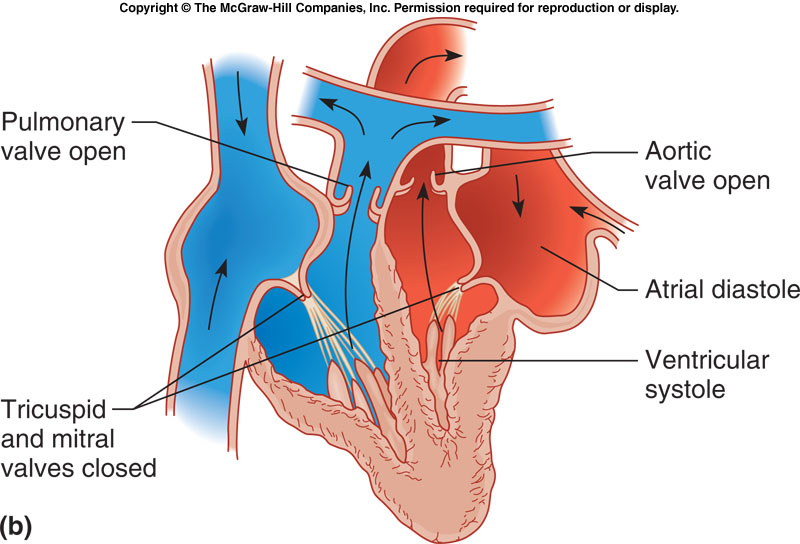
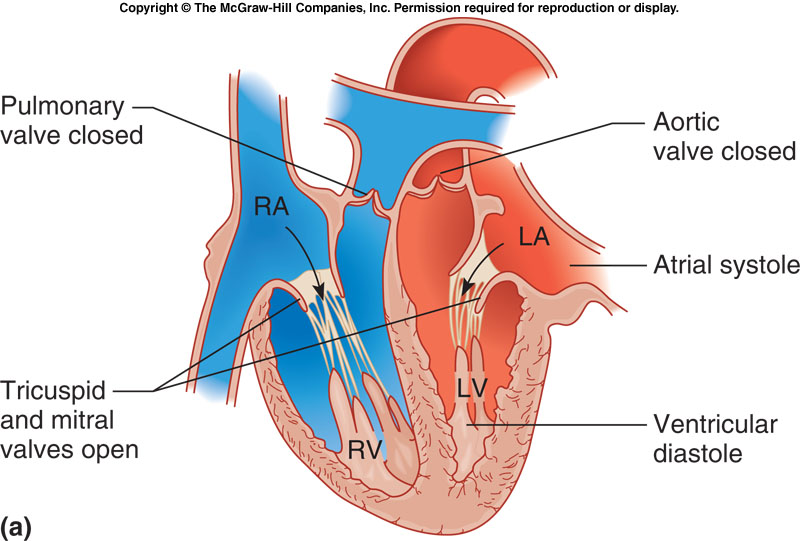
**The Cardiac Cycle**

**The Cardiac Cycle**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - the events associated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* One cardiac cycle lasts 0.8 seconds
* Described as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the 4 heart chambers
  + During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ), chambers fill with blood
  + During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ), chambers expel blood
* Both atriums will contract at same time while the ventricles relax then vice versa.

**Cardiac Cycle**

* Atrial Systole/Ventricular Diastole
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_ of blood flows \_\_\_\_\_\_\_\_\_\_\_\_\_ from atriums into ventricles
  + Atrium \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forcing remaining \_\_\_\_\_\_\_\_\_ of blood into ventricles
  + Ventricular pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Ventricular Systole/Atrial diastole
  + A-V valves \_\_\_\_\_\_\_\_
  + Atria \_\_\_\_\_\_\_\_\_\_\_\_ & blood begins to flow into \_\_\_\_\_\_\_\_\_\_\_
  + Ventricular pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_ valves open
  + Ventricles contract forcing blood into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_

****

**Heart Sounds**

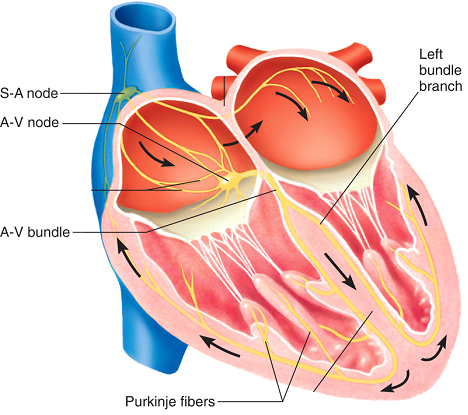
* \_\_\_\_\_\_\_\_
  + First heart sound
  + Occurs during ventricular \_\_\_\_\_\_\_\_\_\_\_\_\_ (contraction)
  + A-V valves \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_
  + Second heart sound
  + Occurs during ventricular \_\_\_\_\_\_\_\_\_\_\_\_ (relaxation)
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ valves closing
* \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Abnormal heart sound due to valve damage
  + Some blood leaks back through the valve when it closes

**Cardiac Conduction System**

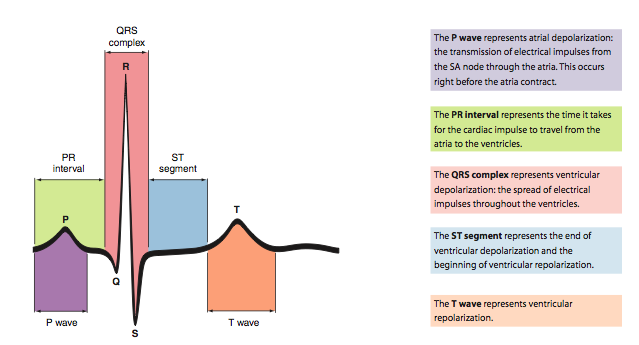
* The heart does not require stimulation from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to initiate a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Three crucial parts:
  + **Sinoatrial (SA) Node**
    - Small bundle of cells in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Capable of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the will cause the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - AKA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + **Atrioventricular (AV) Node**
    - Small bundles of cells that can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Continue the electrical signal down into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + **His-Purkinje System**
    - Group of fibers that carry the electrical impulse through the \_\_\_\_\_\_\_\_\_\_\_\_, causing them to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Pathway of Electrical Impulse**

1. \_\_\_\_\_\_\_\_\_\_\_ - stimulates contraction of the \_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_ - impulse slows to allow atria to contract
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - branches into left and right
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - stimulate contraction of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

****

**Electrocardiogram**

* Measurement of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ created by the heart
* Used to assess heart’s ability to conduct impulses
  + \_\_\_\_\_\_\_\_\_\_– atrial depolarization and contraction
  + \_\_\_\_\_\_\_\_\_\_– ventricular depolarization and contraction
  + ****\_\_\_\_\_\_\_\_\_\_– ventricular repolarization and relaxation

**Blood Vessels & Paths of Circulation**

**Blood Vessels**

|  |  |  |
| --- | --- | --- |
| **Blood Vessel** | **Branches into** | **Function** |
| **Arteries** |  |  |
| **Veins** |  |  |
| **Capillaries** | N/A |  |

**Path of Circulation: ---- Arteries ---- Arterioles ---- Capillaries ---- Venules ---- Veins ----**

***Highway Analogy: ---- 4-lanes ----- 2 lanes ---- 1 lane ---- 2 lanes --- 4 lanes ---***

**Arteries and Arterioles**

|  |  |  |
| --- | --- | --- |
|  | **Structure** | **Extra Info** |
| **Arteries** |  |  |
| **Arterioles** |  |  |

***\*NOTE: All arteries carry \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ blood except for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that carries \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.***

**Pulse**

* Only felt in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Spurt of high pressure blood passing along the arteries when the left ventricle contracts
* Can be felt at superficial arteries
* Also known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Pulse Rate/Heart Rate**

* Measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( \_\_\_\_\_\_ )
* Average resting adult: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Well-trained athletes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - exceeds normal range
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - below normal range

**Blood Pressure**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - force the blood exerts against the inner walls of the \_\_\_\_\_\_\_\_\_\_\_\_\_
* Blood Pressure
  + \_\_\_\_\_\_\_\_\_\_\_\_\_ when ventricles \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_ when ventricles \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - maximum pressure (ventricle contracts)
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - minimum pressure (ventricle relaxes)
* Normal BP
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_blood pressure (>120/80)
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_ blood pressure (<90/25)

**Factors That Influence Blood Pressure**

* Heart Action
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - volume of blood discharge from left ventricle each heartbeat
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - volume of blood discharged per minute (mL/bpm)
  + Cardiac output = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Cardiac output increases = BP \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Cardiac output decreases = BP \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Blood Volume
  + Consists of formed elements and plasma
  + Blood volume decreases = BP \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Veins and Venules**

|  |  |  |
| --- | --- | --- |
|  | **Structure** | **Extra Info** |
| **Veins** |  |  |
| **Venules** |  |  |

***\*NOTE: All arteries carry \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ blood except for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that carries \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.***

**Venous Valves**

* Allows blood to flow to the heart, but prevents backflow of blood to capillaries.

**Venous Blood Flow**

* Not a direct result of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Dependent on:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - muscles surrounding leg veins aid in venous return
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - change in pressure in the thoracic cavity as a result of the diaphragm contracting for inhalation aids in moving blood
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Capillaries**

|  |  |  |
| --- | --- | --- |
|  | **Structure** | **Extra Info** |
| **Capillaries** |  |  |