## The Circulatory System Notes

### The Circulatory System (= The Cardiovascular System) A transport system that moves fluids through the body by the pumping of a muscular heart. Fluids distribute \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and remove metabolic wastes like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

### Parts of the Circulatory System

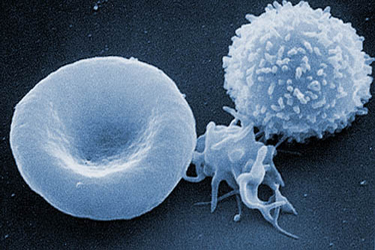
# Blood Contains:

* 1. Red blood cells
* major job =
* contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* mature cells lack a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to maximize space for hemoglobin

(increases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ )

* 1. White blood cells
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* work with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to defend against infection
* larger than RBCs, but able to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  1. Platelets (cell fragments)
* release \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a plasma protein that forms a net-like clot over   
  injury.

\*All of the above cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

[](http://www.abc.net.au/science/photos/whatis/answer4.htm)

* 1. Plasma ( \_\_\_\_\_\_\_\_\_ of blood volume).

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that contains water,

proteins, dissolved gases, salts, nutrients, hormones, and metabolic wastes.

# Types of Blood Vessels

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* carry blood \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* usually carry blood with oxygen (except in pulmonary system).
* have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so they can stretch as blood is pumped in
* branch into small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* carry blood \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* usually carry blood that does not have oxygen (except in pulmonary system).
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so blood moves by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ around veins.
* thinner so can \_\_\_\_\_\_\_\_\_\_\_\_\_ to hold blood (\_\_\_\_\_ of our blood is stored in veins)
* \_\_\_\_\_\_\_\_\_\_\_ keep blood flowing in 1 direction
* branch into small \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

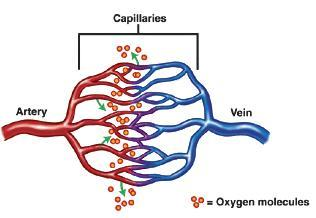
* smallest vessels → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* connect \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (one cell thick) allow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

* only those needed are open at any given time \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Route of blood flow:

heart → arteries →



## C. The Heart

An organ made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, divided into 4 chambers for collecting and pumping blood.

The R side collects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and pumps it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The L side pumps \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Anatomy of the heart:

septum - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2 atria (upper \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ), atrium = singular

2 ventricles (lower \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ )

aorta (largest artery)

superior vena cava, inferior vena cava (large veins)

pulmonary artery, pulmonary vein ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

SA node ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ) in upper R atrium wall

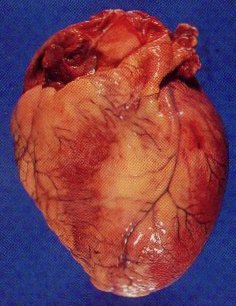
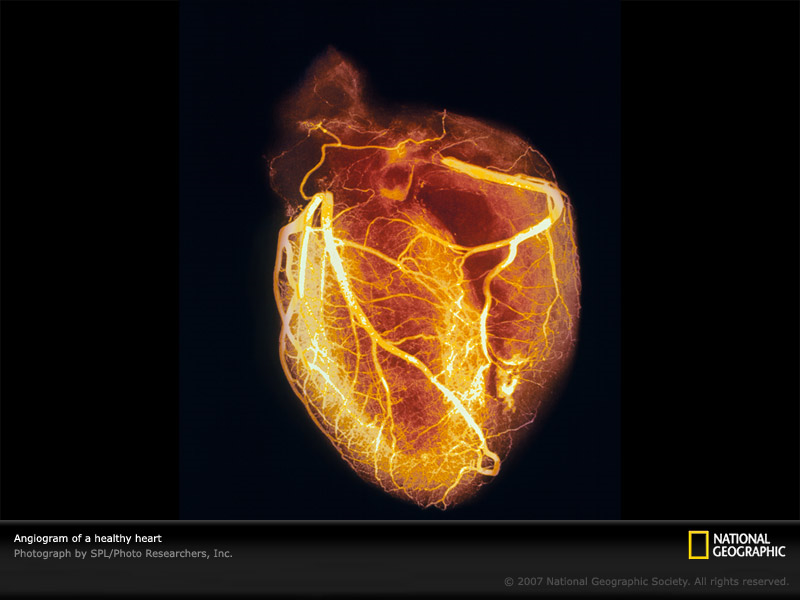
AV node in base of R atrium

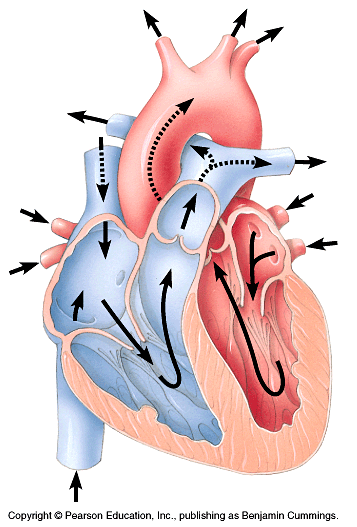
4 valves:

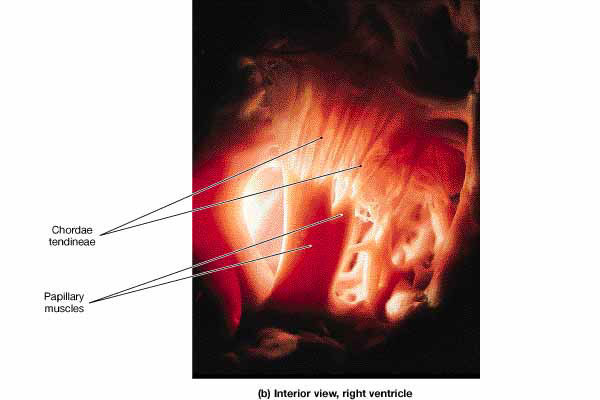
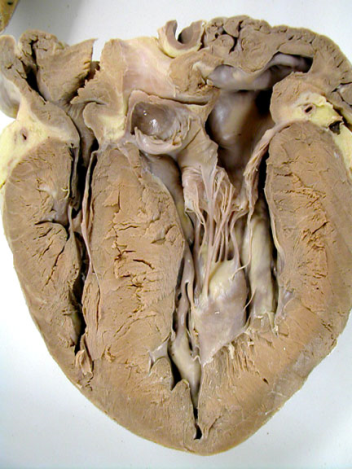
AV valves – control blood flow from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

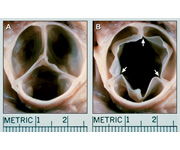
semilunar valves – control blood flow from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Diagram of the Heart**

** **



**    
 AV valve showing tendons**

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**Semilunar valve closed and open**

**III. Functions of the cardiovascular system**

= to oxygenate all cells using two pathways: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

# Pulmonary circuit: the path of blood from R side of the heart (O2 poor), to lungs, back to the heart with O2 rich blood.

Deoxygenated blood \_\_\_\_\_\_\_\_\_\_\_

→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (CO2 is released, O2 diffuses in)

* O2 rich blood enters \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

→

# Systemic circuit: path of blood from the heart to the body (with O2) and back to the heart (with no O2).

Oxygenated blood in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

→ thru AV valve

* out semilunar valve
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (away from heart) transport blood to the heart, head and arms, abdomen, and legs.
* capillaries in body ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ )
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (going back to heart)
* blood from the upper body returns to he heart thru \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;

from the lower body returns thru the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**The Pulmonary and Systemic Circuits Diagram:**



**IV. Control of Heartbeat and Blood Pressure**

**A. The Cardiac Cycle**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (pacemaker) sets the rate for contraction of all cardiac   
 muscle cells.

1. SA node in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ generates an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

making both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ contract in unison.

1. Impulse is passed to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (base of R atrium). Impulses are

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to ensure blood in atria has emptied completely into ventricles.

1. Impulse in AV node causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - drives blood into arteries.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ during contraction to prevent backflow of blood.
3. Heart sounds (“lub-dup”) come from the recoil of blood against \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Rate is controlled by two sets of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ surrounding the pacemaker – one speeds heartbeat up, the other slows it down.
5. Also controlled by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (epinephrine, the “fight or flight” hormone),

and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – an increase in \_\_\_\_\_\_\_\_ raises heart rate by

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**B. Pulse Rate and Blood Pressure**

1. Pulse Rate

When blood surges into arteries their elastic walls stretch, but almost immediately snap back. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Blood Pressure = the pressure of blood against the wall of a blood vessel.

* + when ventricles contract, blood flows thru arteries increasing pressure inside

= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + when ventricles relax the pressure is lowest = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + when blood enters capillaries it encounters so much resistance that the pumping of the heart doesn’t have much affect anymore.

3. BP is measured by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (= a blood pressure cuff)

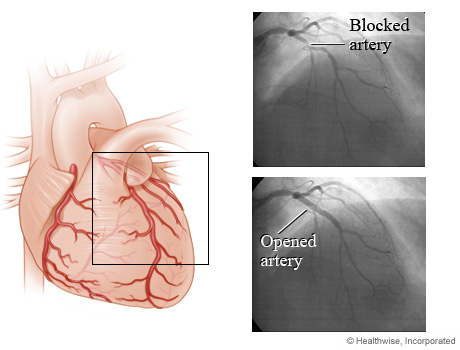
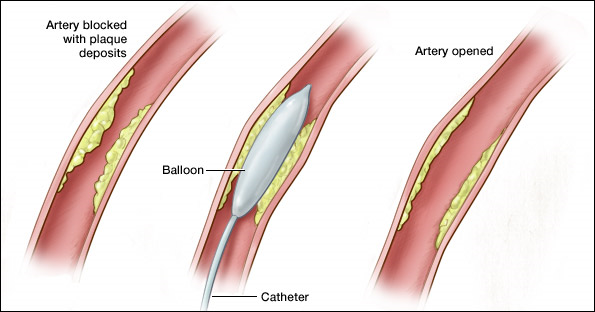
### V. Fitness and Heart Rate

* Blood pressure and heart rate increase when a person moves from reclining to standing to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* They also increase with increase in activity to supply additional oxygen to cells.
* Hearts of people who are physically fit pump a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so increases in heart rate and BP will be smaller in fit people than in non-fit people undergoing the same activity.
* Fit people also require less time for their heart rate and BP to return to normal after exercising = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**VI. Cardiovascular Disease**

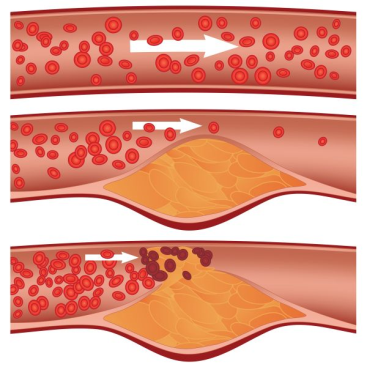
More than \_\_\_\_\_\_\_\_\_ of health related deaths in US come from this.

1. Heart attacks - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** due to lack of oxygen from **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.   
   Causes **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = pain that shoots down L arm/chest.

Blocked and opened coronary artery. Balloon angioplasty to open blocked artery.

1. Stroke - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** due to a small **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Results in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
   **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. Signs of stroke include numbness in hands/face, difficulty speaking, etc.
2. Atherosclerosis – an accumulation of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** . This begins in early adulthood but does not appear until later in life. Associated with **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  
   **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

    
 How plaque builds up in an artery. Ultrasound of an artery showing plaque.

1. Hypertension = **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. Blood moves thru the arteries with a higher than normal pressure ( **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** ). Associated with atherosclerosis, **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 Plaque build-up leads to high blood pressure.