

# **Circulatory System**

## **Functions**

1. Pump
2. Blood transport system around body
3. Carries O<sub>2</sub> and nutrients to cells, carries away waste products
4. Lymph system – returns excess tissue fluid to general circulation

## **Structure – Circulatory system involves:**

- Heart
- Arteries
- Veins
- Capillaries
- Blood and lymph are part of circulatory system

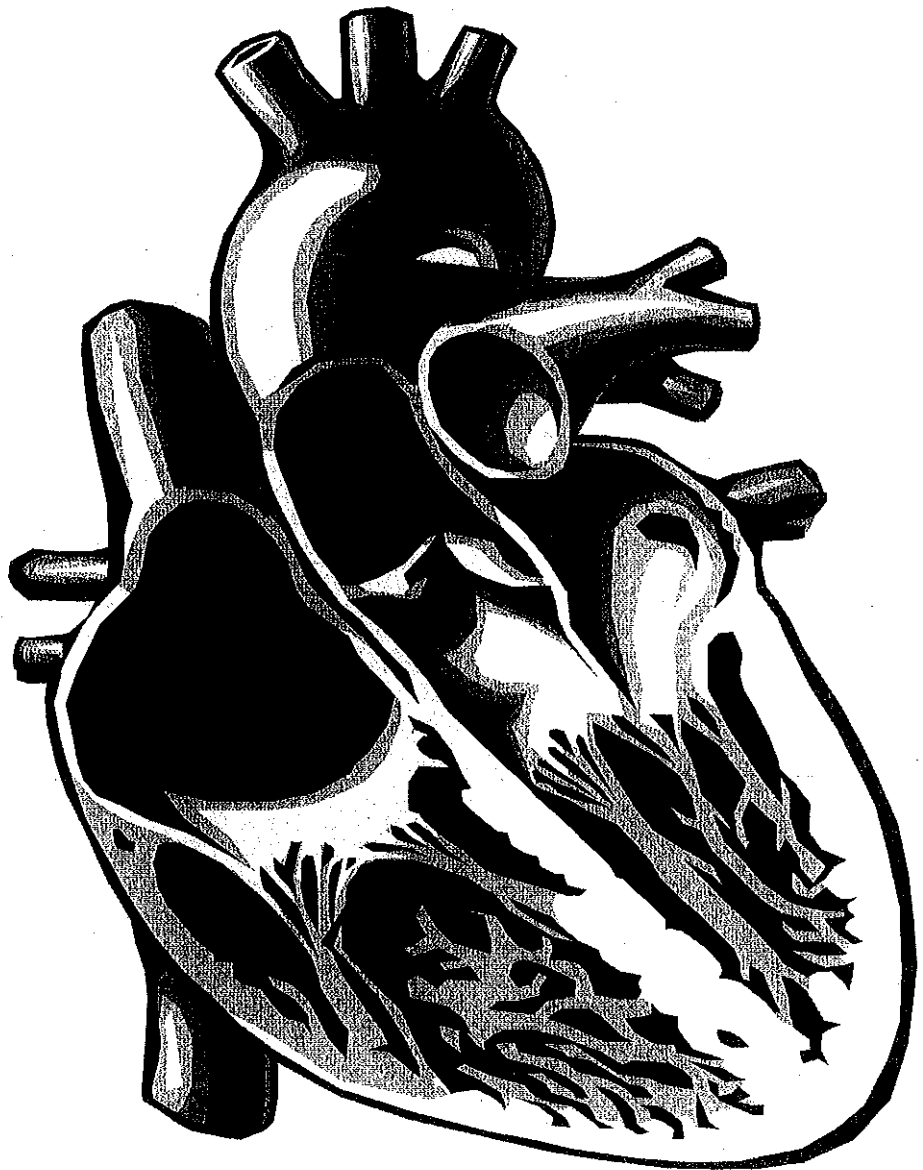
## **Major Blood Circuits**

- General (Systemic) circulation
- Cardiopulmonary circulation

## The Heart

Label the following structures of the heart:

1. right atrium
2. left atrium
3. right ventricle
4. left ventricle
5. septum
6. mitral valve
7. tricuspid valve
8. superior vena cava
9. inferior vena cava
10. aorta
11. myocardium
12. endocardium
13. pericardium



*Appendix MD08.01B*

## **As the Blood Flows**

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**Deoxygenated Blood from Body Tissue →**

**Superior/inferior vena cava →**

**Right Atrium →**

**Tricuspid Valve opens →**

**Right Ventricle →**

**Pulmonic Valve ≡ Pulmonary Artery →**

**Both Lungs →**

**CO<sub>2</sub> - O<sub>2</sub> exchange Alveolar via Pulmonary Veins →**

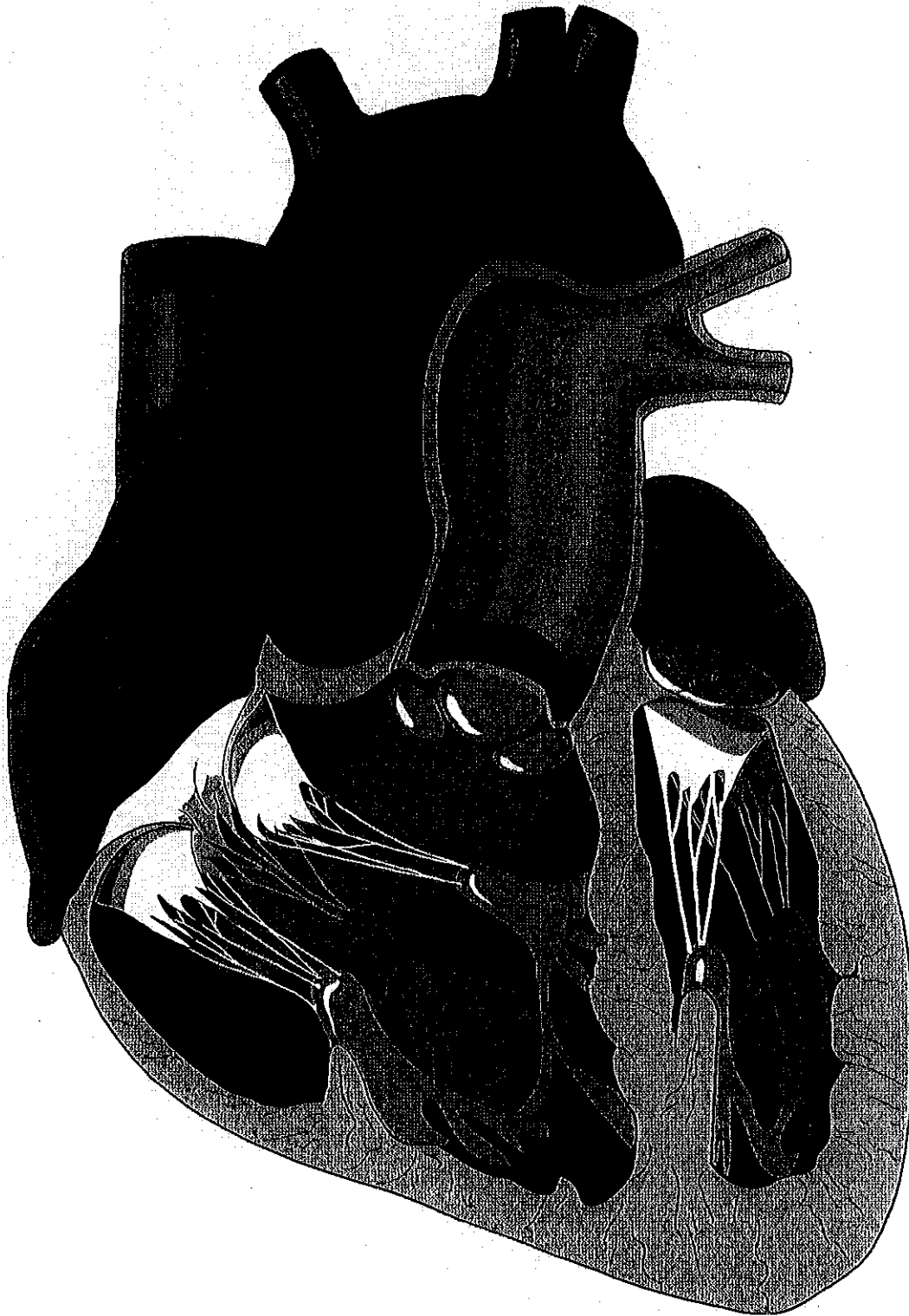
**Left Atrium →**

**Mitral Valve Opens →**

**Left Ventricle →**

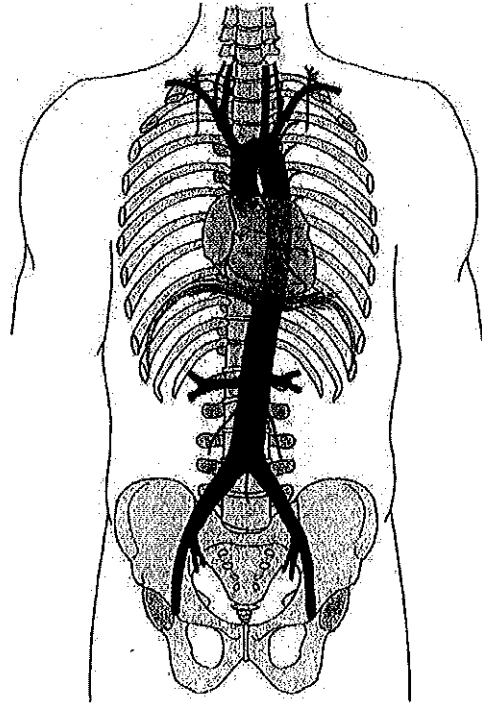
**Aortic Valve Opens →**

**Aorta - Transporting Oxygenated Blood to Body  
Cells**



## The Heart

- Muscular organ
- Size of a closed fist
- Weighs 12-13 oz
- Location – thoracic cavity
- APEX – conical tip, lies on diaphragm, points left
- Stethoscope – instrument used to hear the heartbeat



## Structure

- ◆ Hollow, muscular, double pump that circulates blood
- ◆ At rest = 2 oz blood with each beat, 5 qts./min., 75 gallons per hour
- ◆ Ave = 72 beats per minute
- ◆ 100,000 beats per day
- ◆ PERICARDIUM – double layer of fibrous tissue that surrounds the heart
- ◆ MYOCARDIUM – cardiac muscle tissue
- ◆ ENDOCARDIUM – smooth inner lining of heart

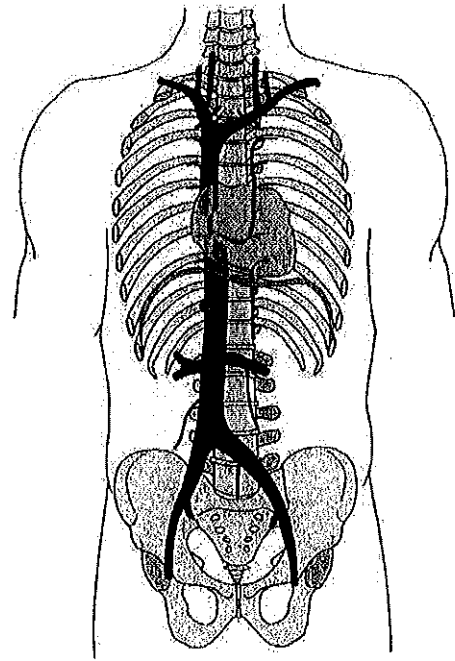
- SEPTUM – partition (wall) that separates right half from left half

- Superior vena cava and inferior vena cava – bring deoxygenated blood to right atrium

- Pulmonary artery – takes blood away from right ventricle to the lungs for O<sub>2</sub>

- Pulmonary veins – bring oxygenated blood from lungs to left atrium

- Aorta – takes blood away from left ventricle to rest of the body



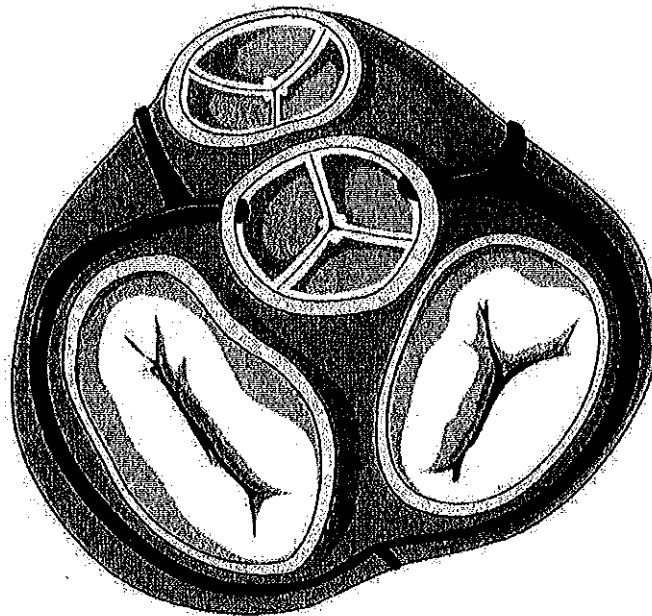
## **Chambers and Valves**

- SEPTUM divides into R and L halves
- Upper chambers – RIGHT ATRIUM and LEFT ATRIUM
- Lower chambers – RIGHT VENTRICLE and LEFT VENTRICLE
- Four heart valves permit flow of blood in one direction

TRICUSPID VALVE – between right atrium and right ventricle

BICUSPID (MITRAL) VALVE – between left atrium and left ventricle

Semilunar valves are located where blood leaves the heart - PULMONARY SEMILUNAR VALVE and AORTIC SEMILUNAR VALVE



# PHYSIOLOGY OF THE HEART

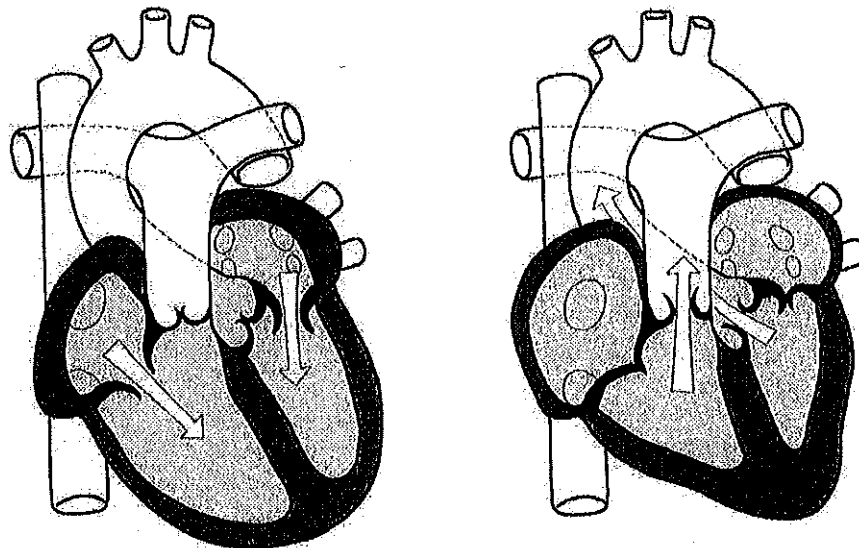
The heart is a double pump. When the heart beats...

## Right Heart

Deoxygenated blood flows into heart from vena cava ➡ right atrium ➡ tricuspid valve ➡ right ventricle ➡ pulmonary semilunar valve ➡ pulmonary artery ➡ lungs (for oxygen)

## Left Heart

Oxygenated blood flows from lungs via pulmonary veins ➡ left atrium ➡ mitral valve ➡ left ventricle ➡ aortic semilunar valve ➡ aorta ➡ general circulation (to deliver oxygen)





## Blood Supply to the Heart – from CORONARY ARTERIES

Heart Sounds = lubb dupp

### **Control of Heart Contractions**

#### SA (sinoatrial) NODE = PACEMAKER

- Located in right atrium
- SA node sends out electrical impulse
- Impulse spreads over atria, making them contract
- Travels to AV Node

#### AV (atrioventricular) NODE

- Conducting cell group between atria and ventricle
- Carries impulse to bundle of His

#### BUNDLE OF HIS

- Conducting fibers in septum
- Divides into R and L branches to network of branches in ventricles (Purkinje fibers)

#### PURKINJE FIBERS

- Impulse shoots along Purkinje fibers causing ventricles to contract

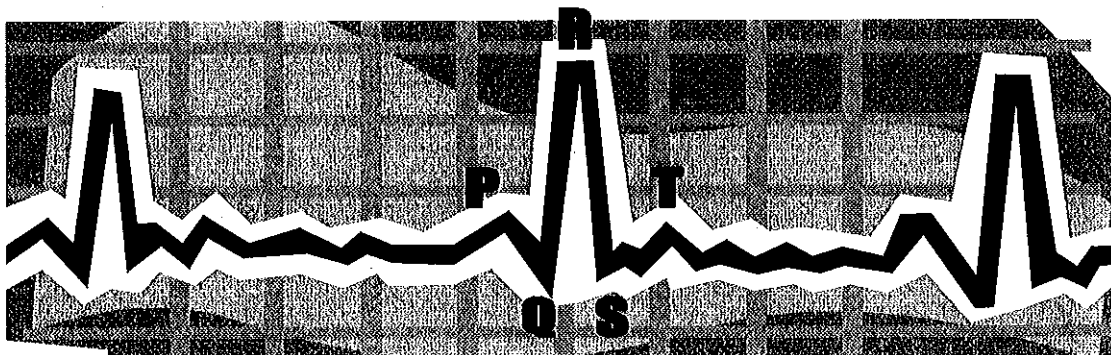
## ELECTROCARDIOGRAM (EKG or ECG)

Device used to record the electrical activity of the heart.

SYSTOLE = contraction phase

DIASTOLE = relaxation phase

Baseline of EKG is flat line



P = atrial contraction

QRS = ventricular contraction

T = ventricular relaxation

HOLTER MONITOR – 24 hour EKG