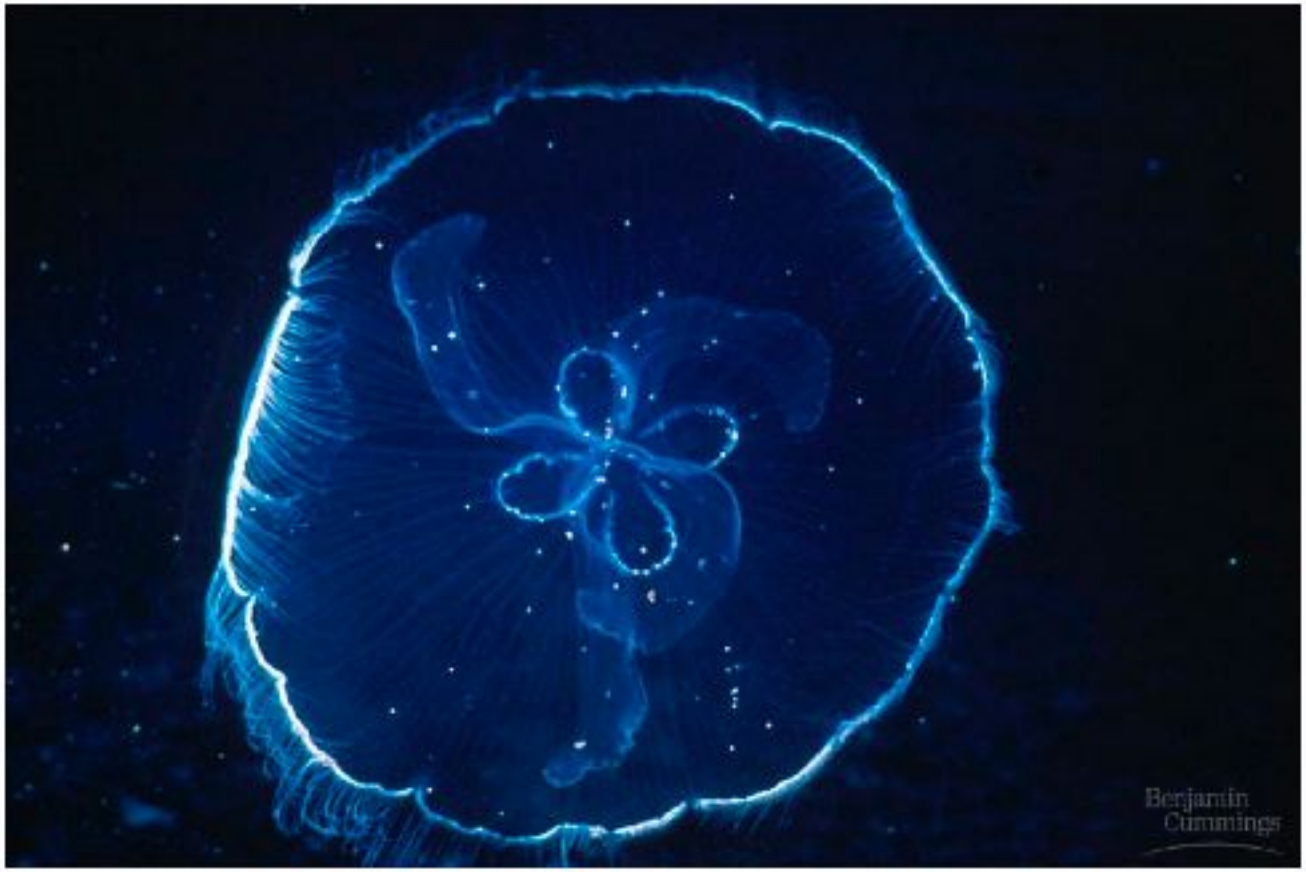
Circulation in animals

Bio 11

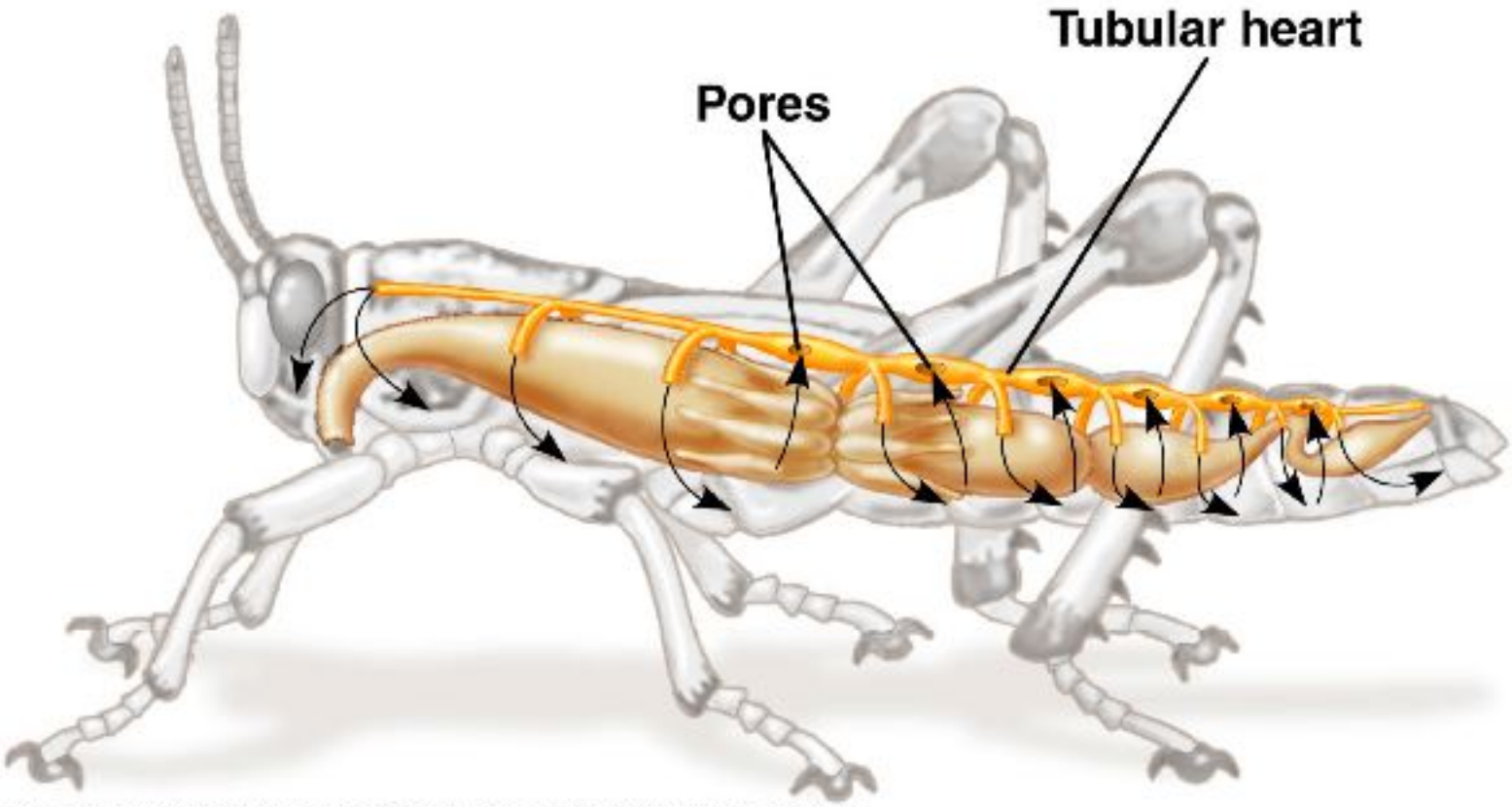
Circulatory systems in animals

- Blood
- Blood vessels
- heart

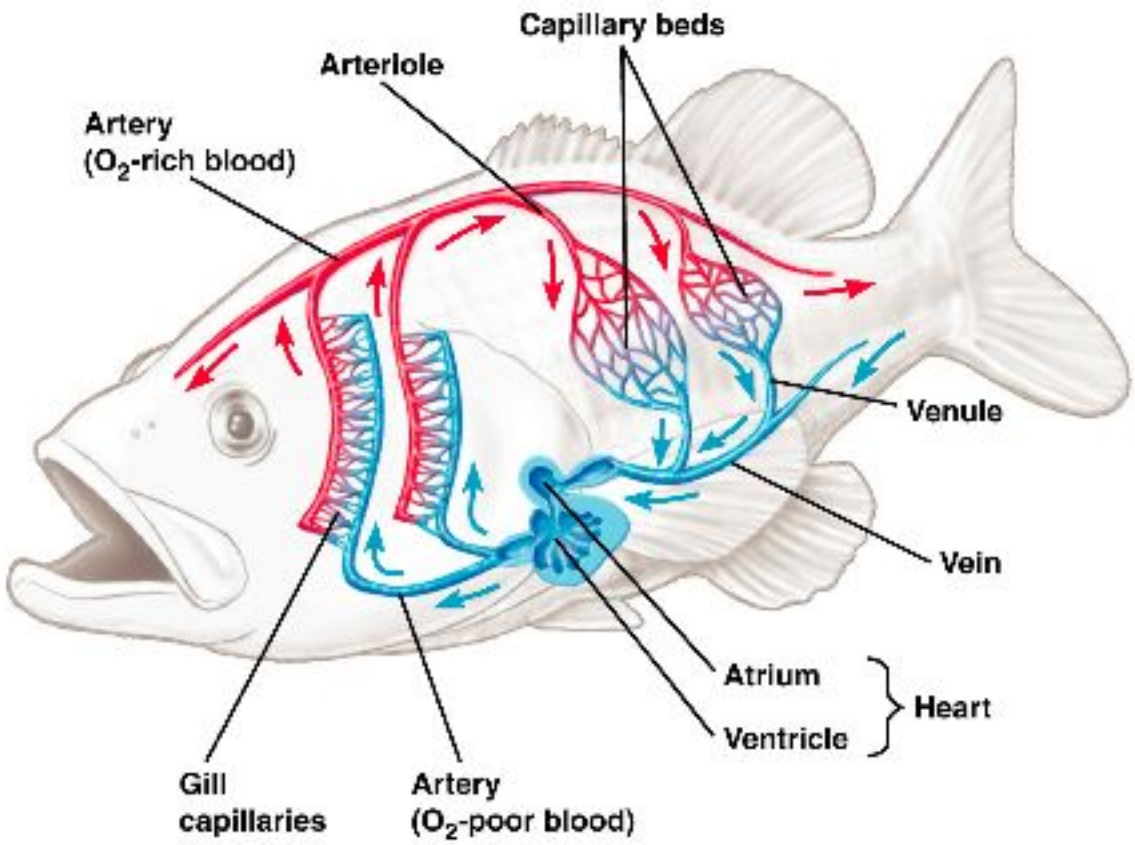
Exception to the rule gastrovascular cavity and sponges



Open circulatory system



Closed circulatory system



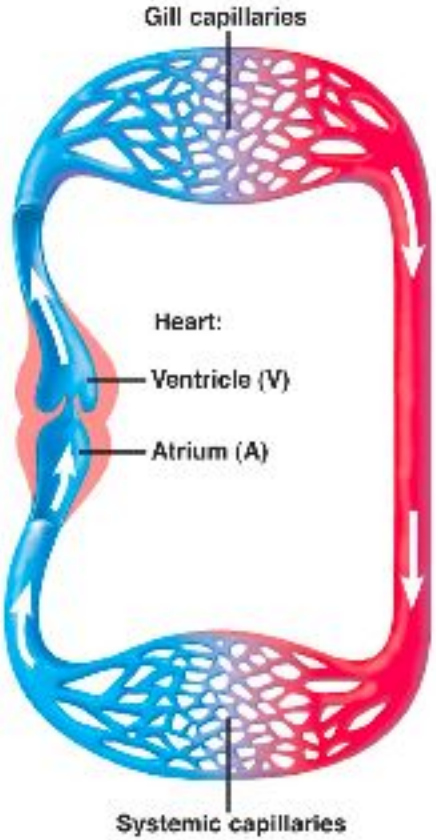
Roles of the circulatory system

- Transportation of oxygen and carbon dioxide
- Nutrients from the digestive system
- Waste and toxic substances
- Distributes hormones
- Regulates body temp
- Prevents blood clots
- Immune system

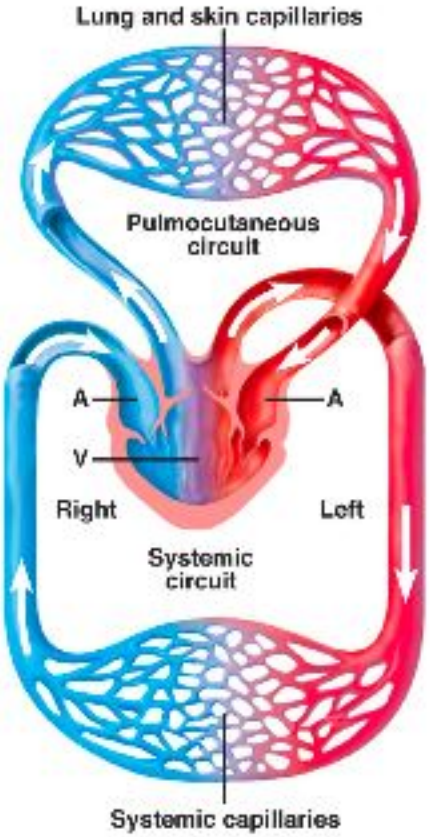
Vocabulary

- Atrium
- Ventricle
- Arterioles
- Capillary beds
- Venules
- Veins

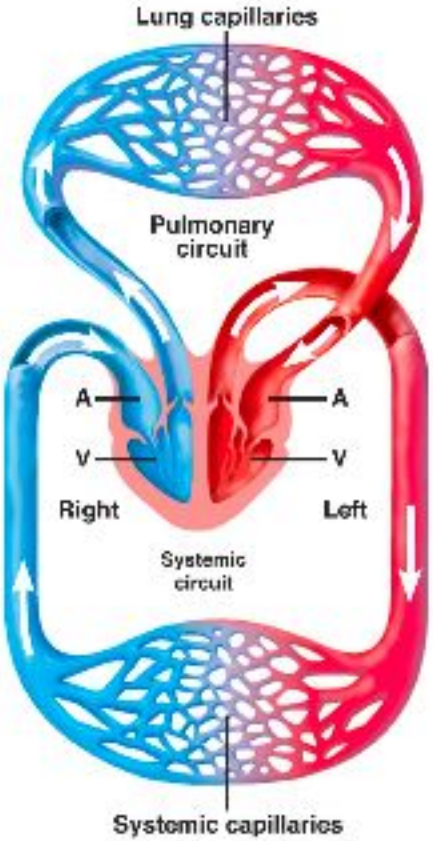
Evolution of the circulatory system - fish



Evolution of the circulatory system - amphibian



Evolution of the circulatory system - bird or mammal



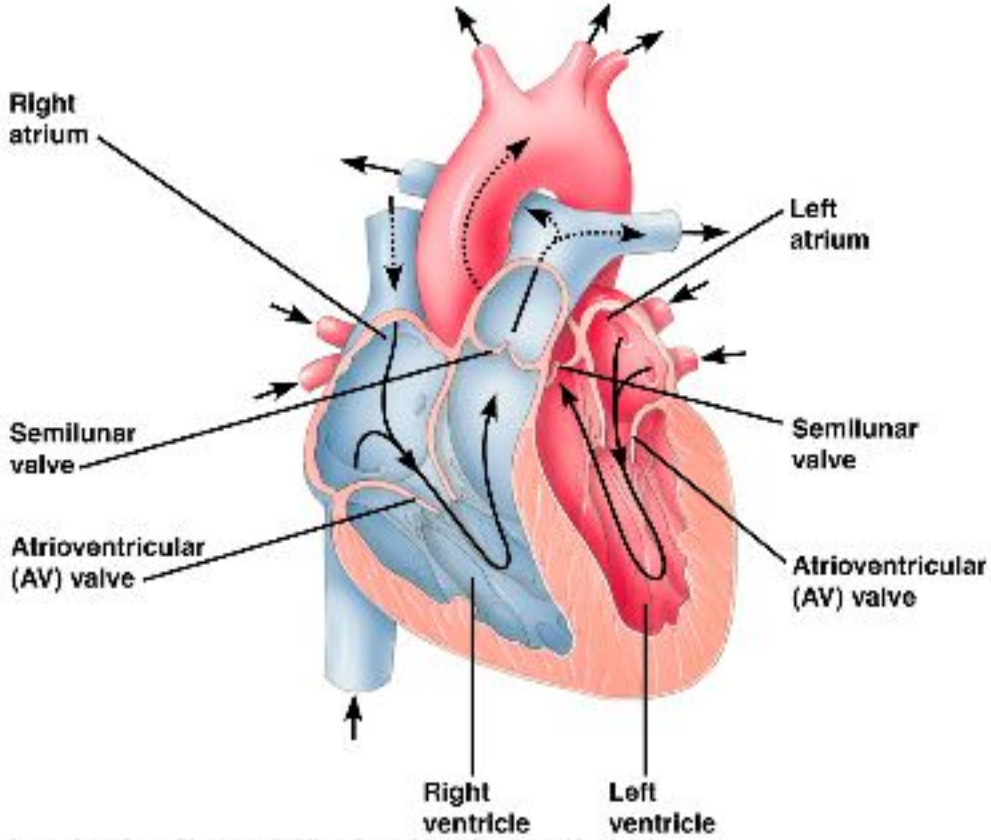
Human heart

- Right side of the heart (smaller side) is for pulmonary circulation.
- Left side of the heart (larger side) is for systemic circulation.
- Cardiac cycle -alternating contractions of the atria and ventricles
- Systolic pressure - ventricle contractions
- Diastolic pressure - resting

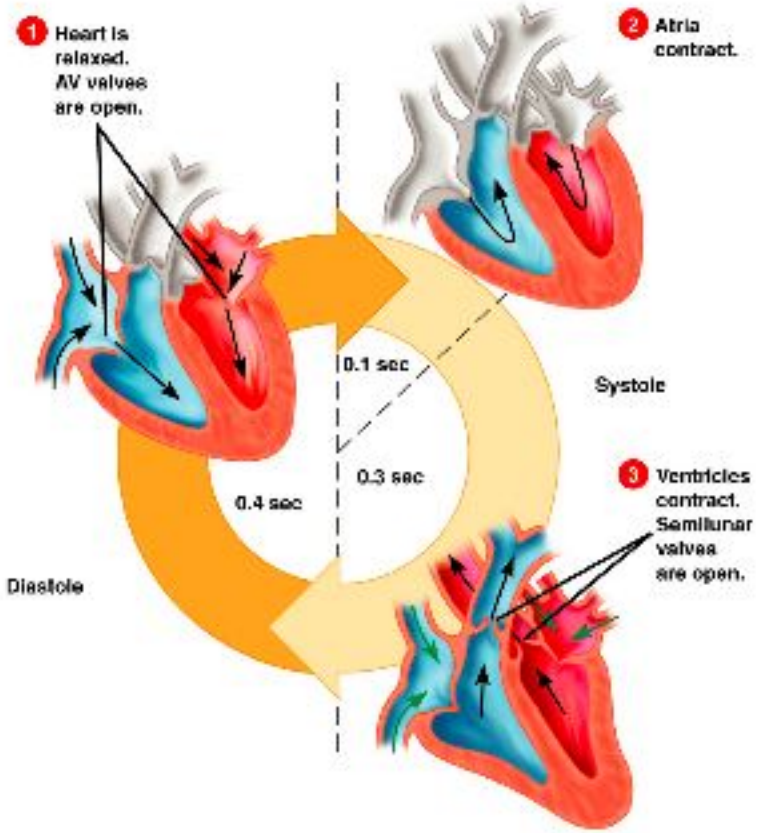
Human heart

- Atrioventricular valves
- Semilunar valves

Human heart


Right atrium
Left atrium
Semilunar valve
Semilunar valve
Atrioventricular (AV) valve
Atrioventricular (AV) valve
Right ventricle
Left ventricle

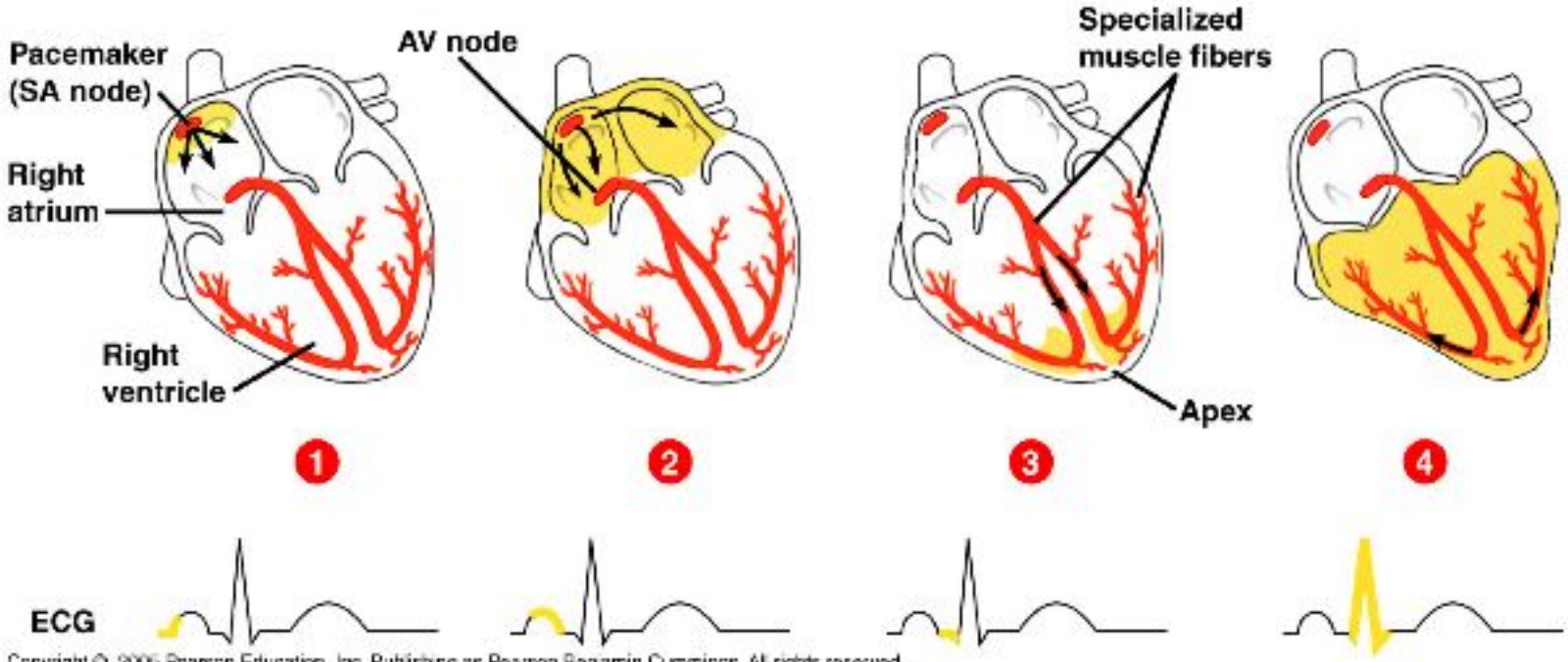
Cardiac cycle



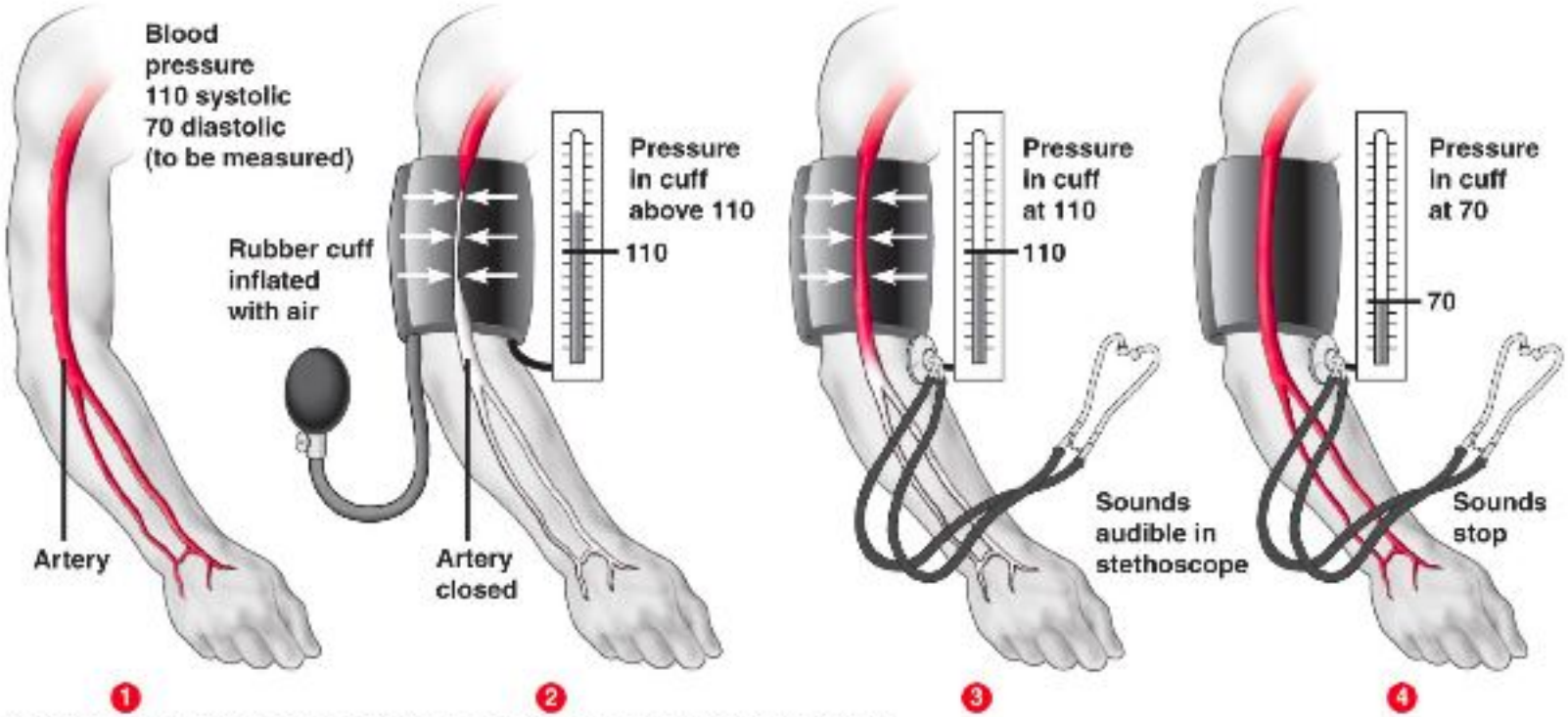
Pacemaker

- Sinoatrial (SA) node
- Atrioventricular (AV) node delays the signal 0.1sec.
- Fibrillation - uncoordinated heartbeat.

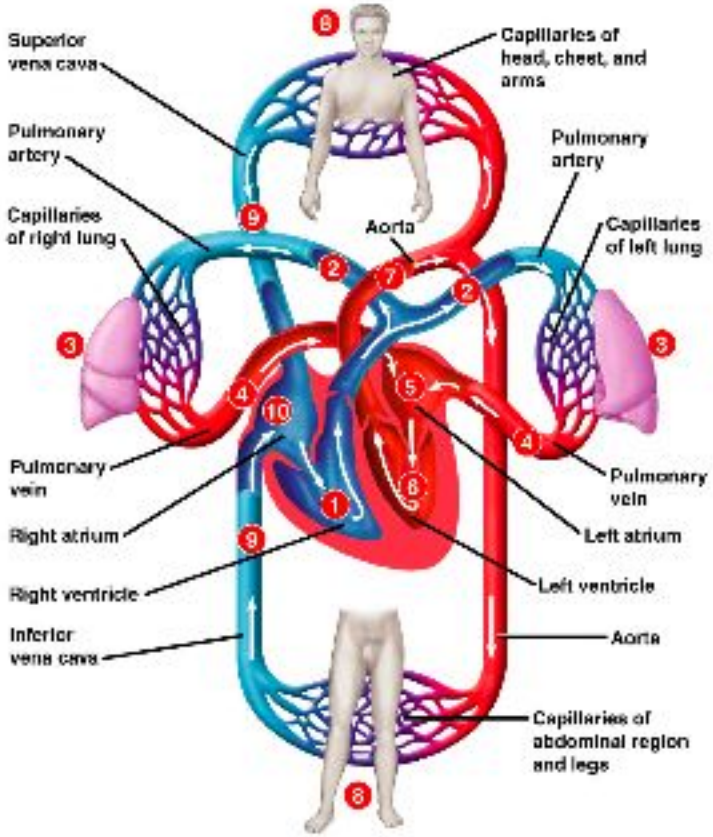
Pacemaker



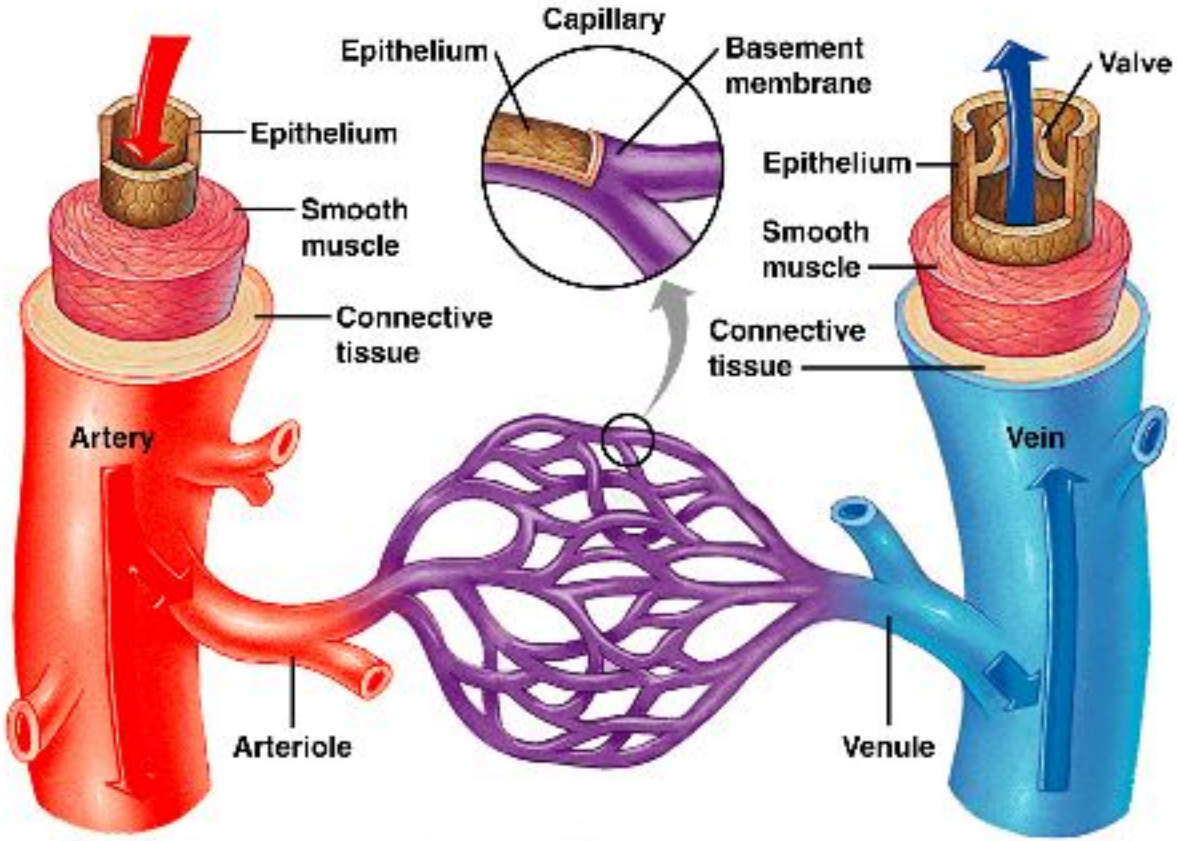
Blood pressure



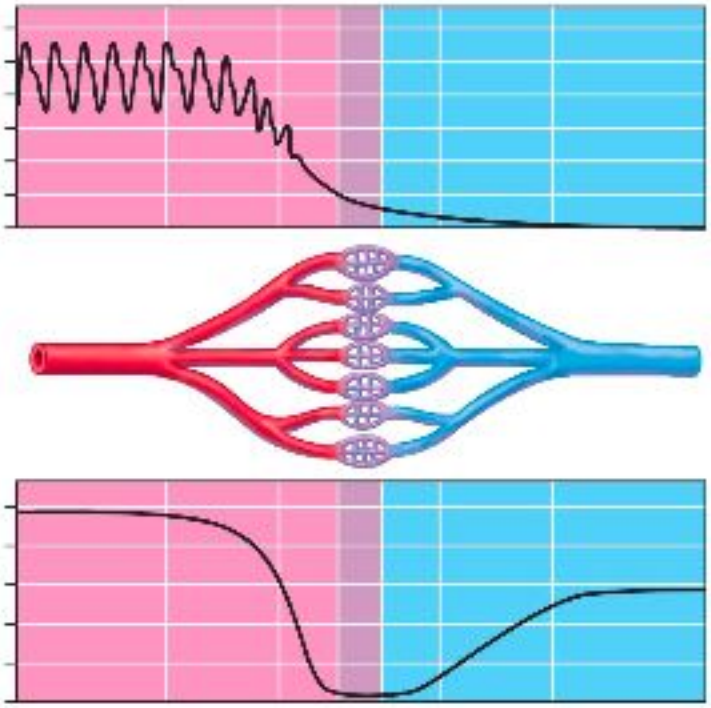
Overview of human circulation



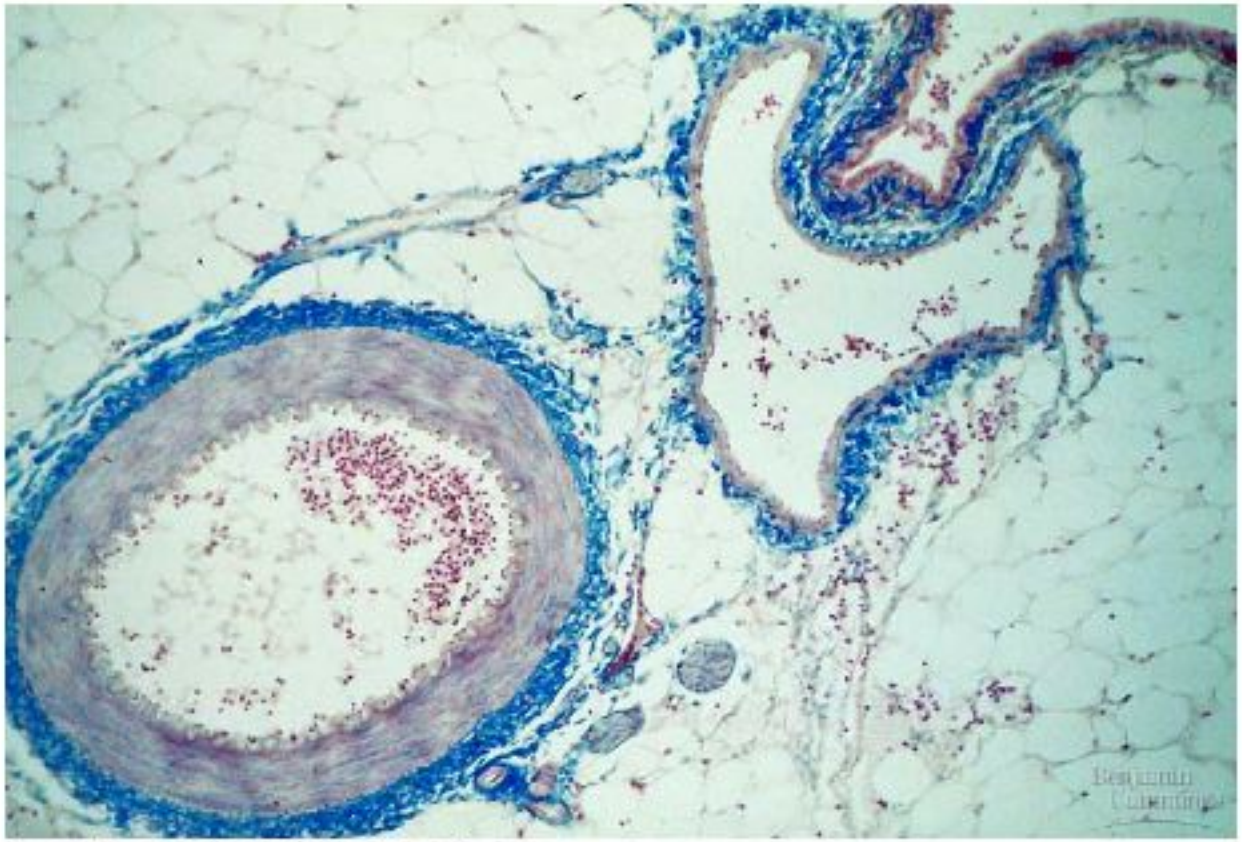
Structure and function of blood vessels



Blood pressure in the various vessels



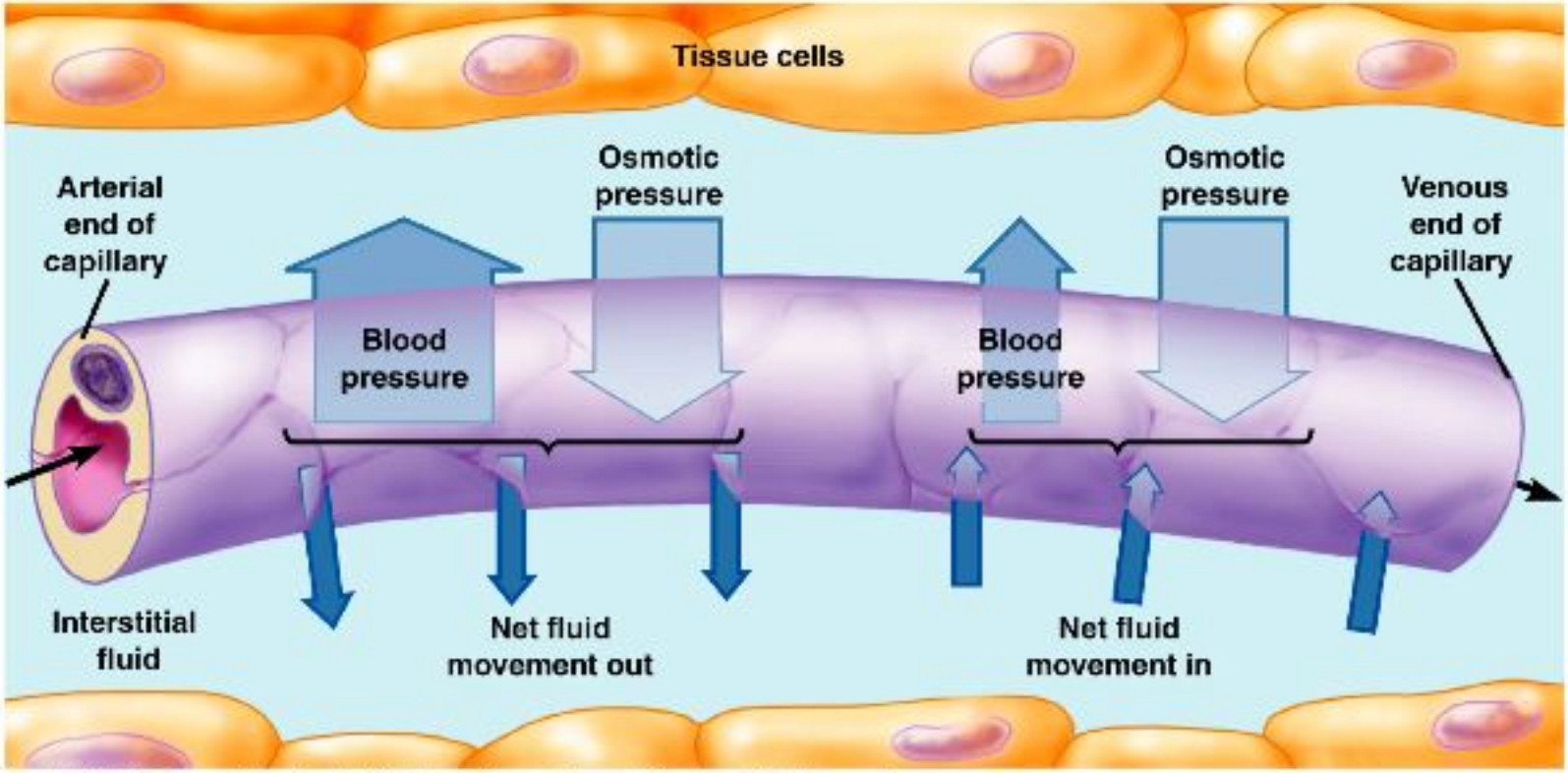
Structure and function of blood vessels



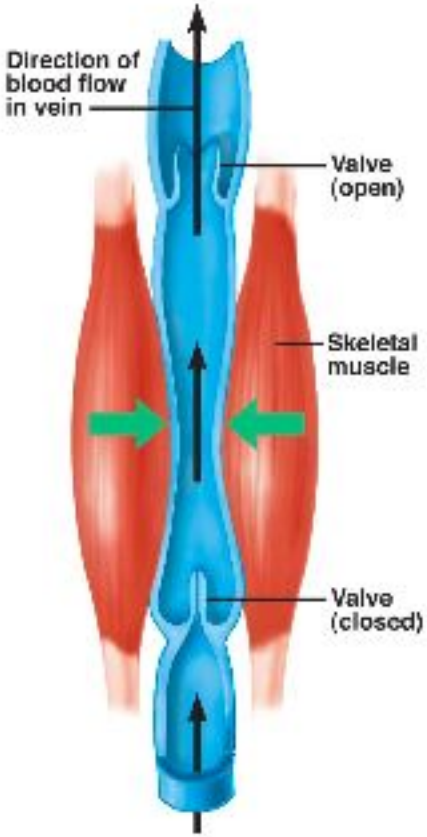
capillaries

- Capillaries leak due to the high pressure they are under.
- Interstitial fluid bathes the cells.
- Because of the diameter of the capillaries cells are single file.
- Capillaries also pick up the waste products.

Movement in and out of capillaries



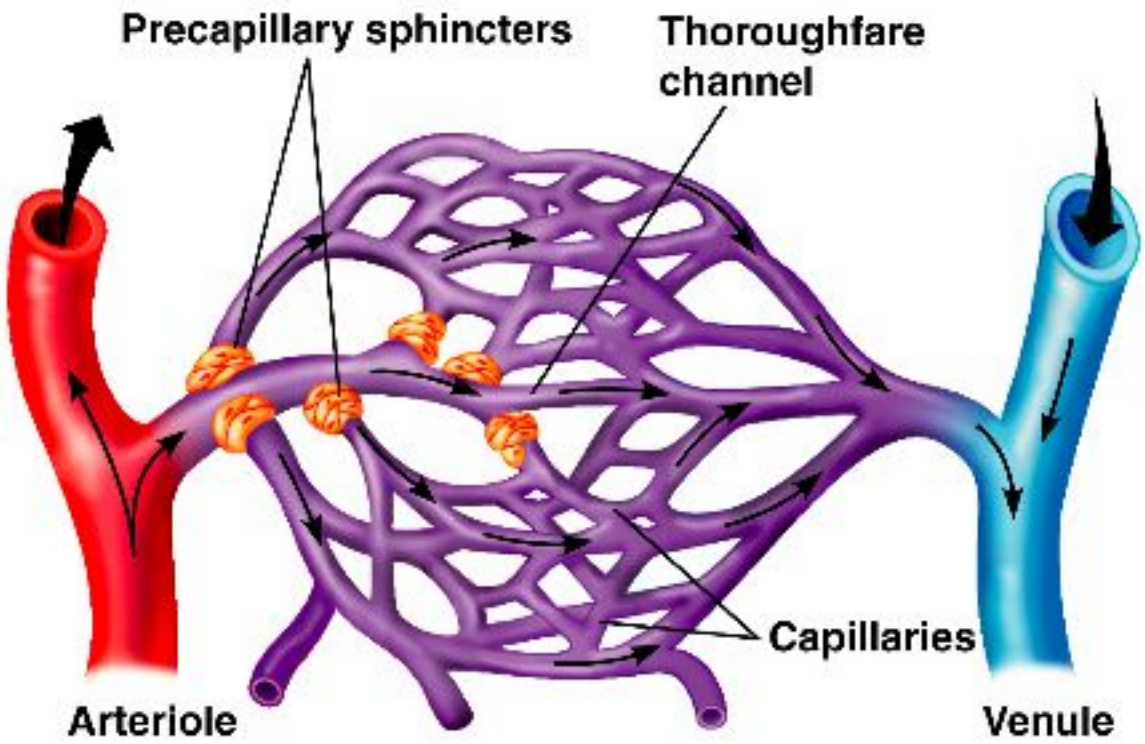
Pumping blood in veins-due to small muscular wall



Regulating blood flow in capillaries

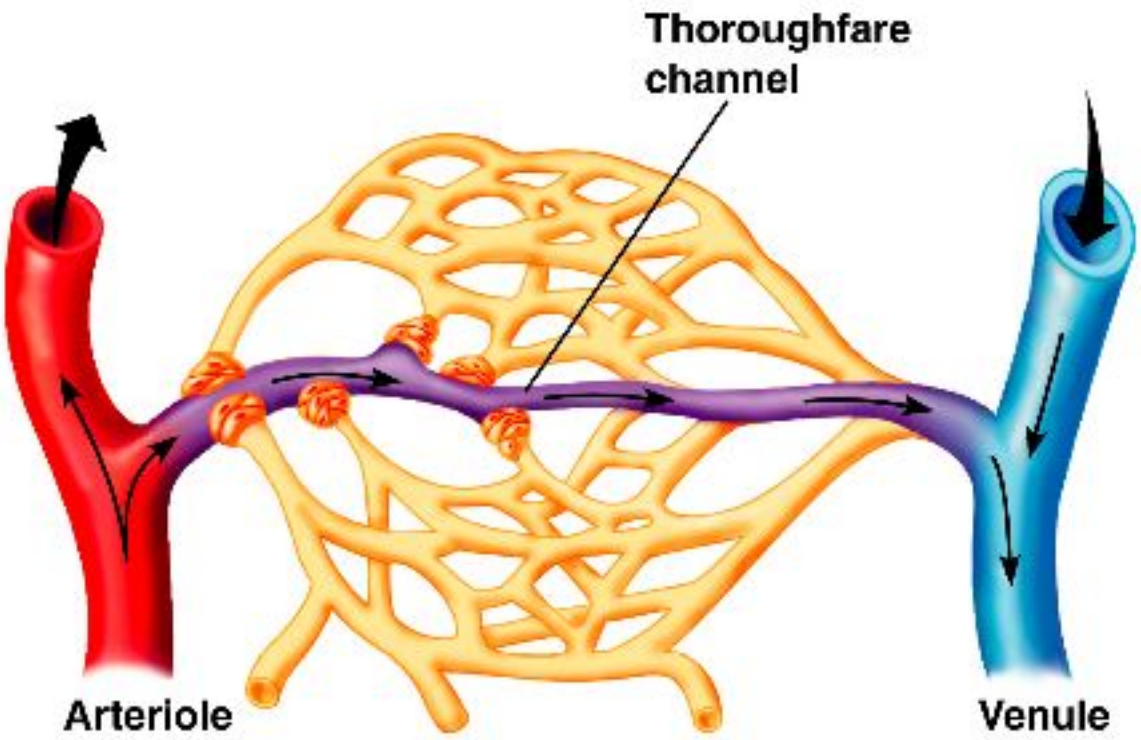
- Not all capillaries have blood in them.
- Open and close in response to the need of the tissue.

Sphincters relax



1 Sphincters relaxed

Sphincters contracts

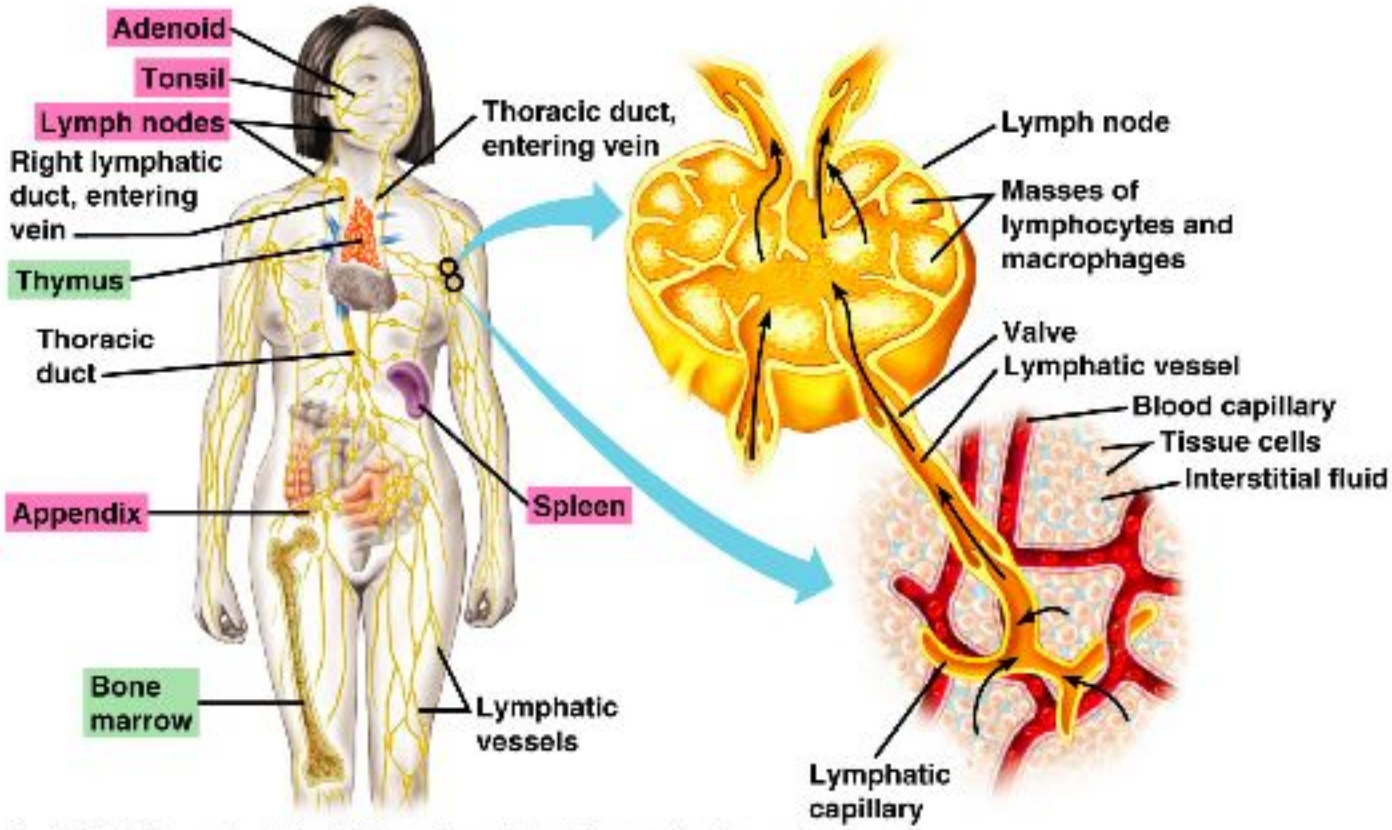


2 Sphincters contracted

Lymph system

- Closely associated with circulatory system.
- Removes excess fluid leaking from capillaries
- Transports fats
- Important in the immune system.

Lymph system

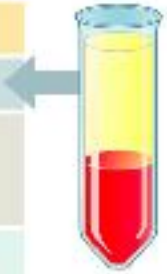


Blood

- Plasma
- Cells (45% of the total blood volume)

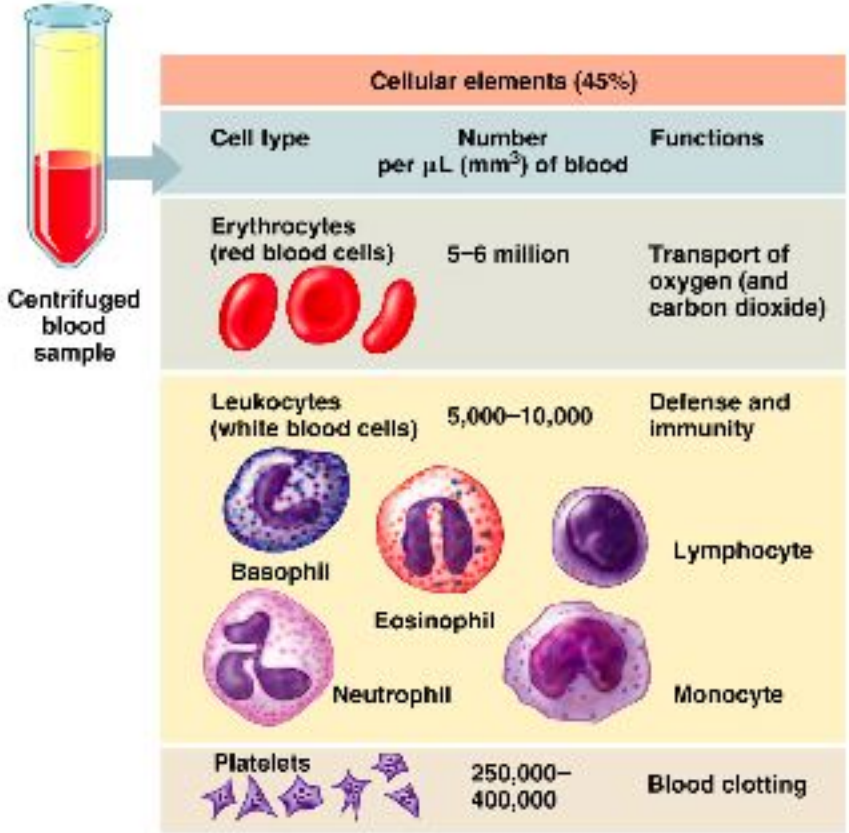
Plasma

Plasma (55%)	
Constituent	**Major functions**
Water	Solvent for carrying other substances
Salts (ions)	Osmotic balance, pH buffering, and nerve and muscle function
Sodium	
Potassium	
Calcium	
Magnesium	
Chloride	
Bicarbonate	
Plasma proteins	Osmotic balance and pH buffering
Fibrinogen	Clotting
Immunoglobulins (antibodies)	Immunity
Substances transported by blood	
Nutrients (e.g., glucose, fatty acids, vitamins)	
Waste products of metabolism	
Respiratory gases (O_2 and CO_2)	
Hormones	

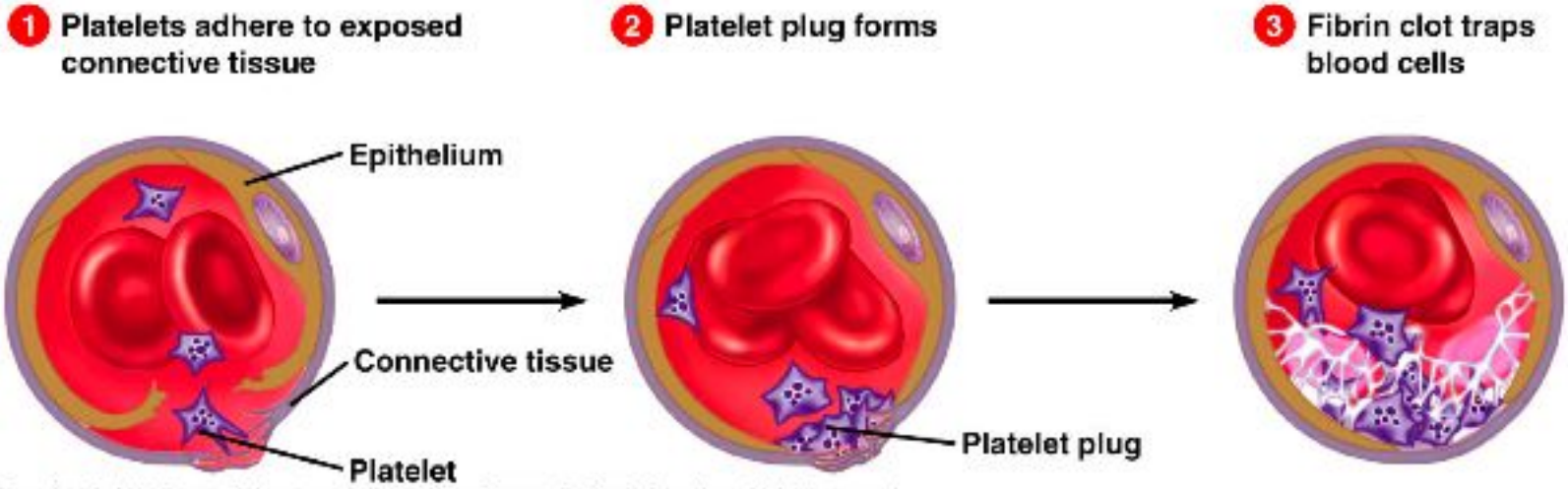


Centrifuged blood sample

Cellular elements

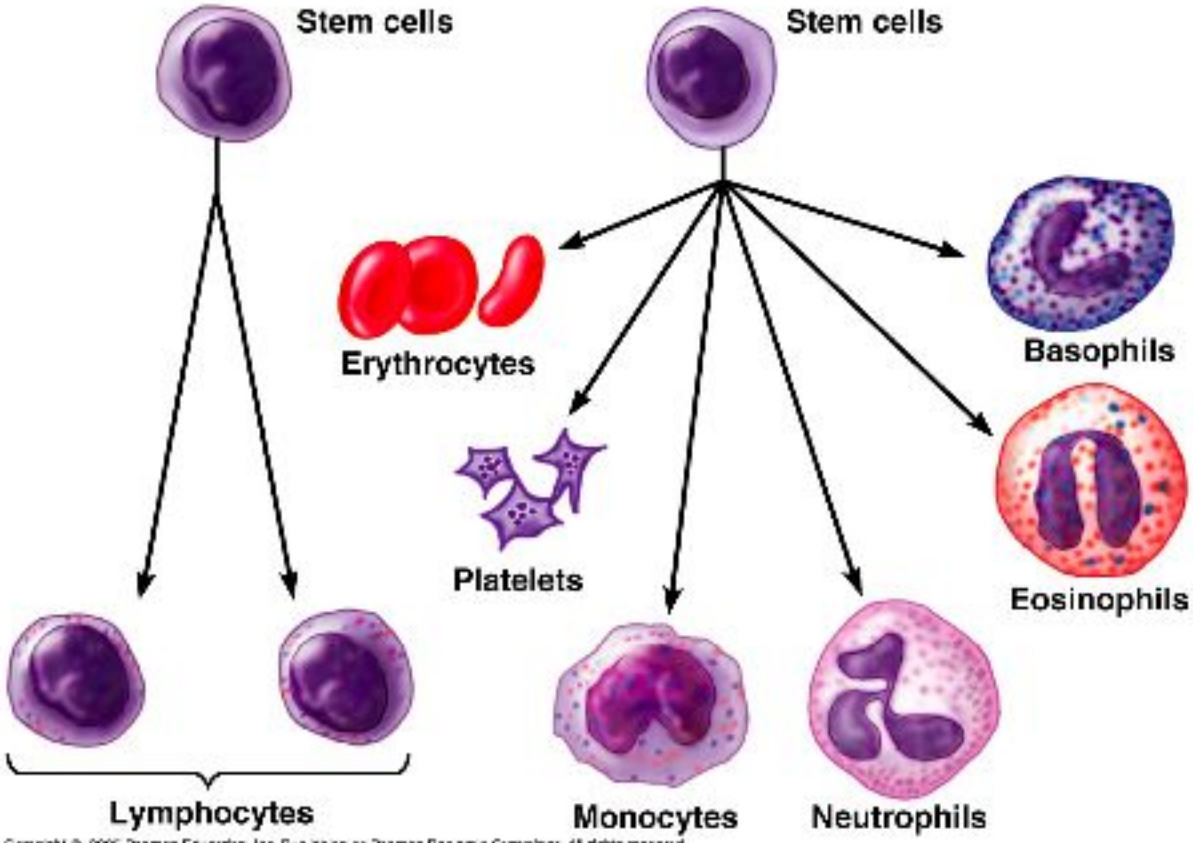


Blood clotting



Clot forms

Stem cells


Stem cells
Stem cells
Erythrocytes
Basophils
Platelets
Eosinophils
Lymphocytes
Monocytes
Neutrophils