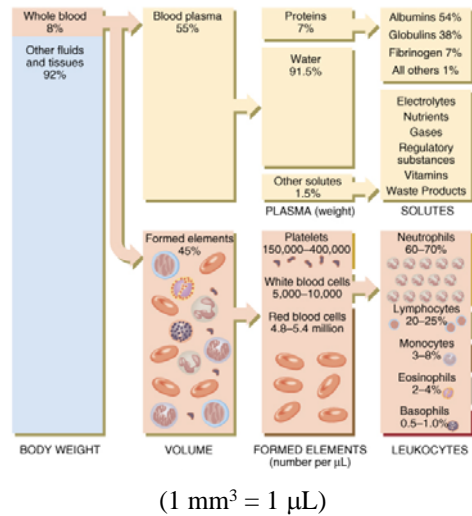
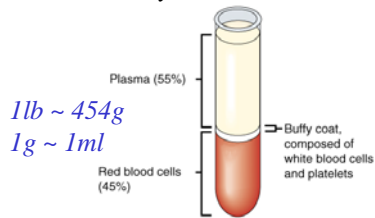


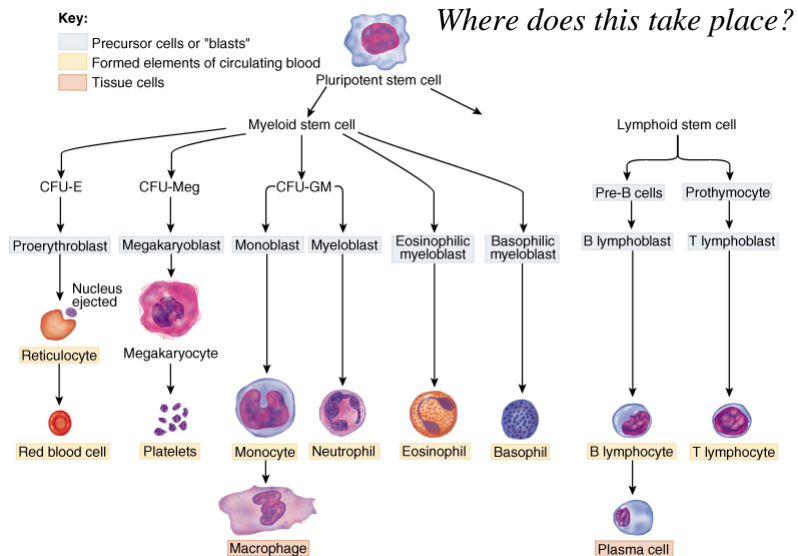
Whole Blood and the Hematocrit

What is the likely cause of a WBC count of 34K, in which most of the WBCs are lymphocytes?

How much water has been lost if a 12 lb infant decreases its weight by 0.5 lb due to dehydration?



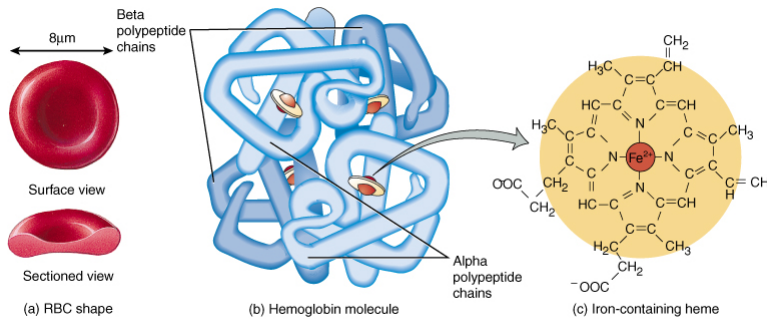
Hematopoiesis



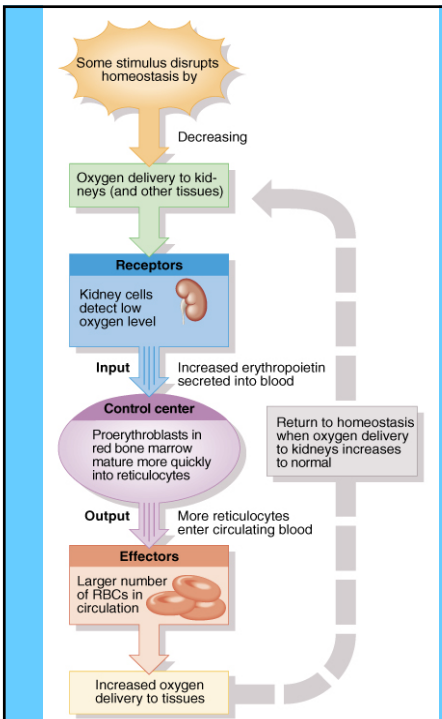
RBCs and Hemoglobin

*How many RBCs in 1 mm³ of blood? How many oxygen gas molecules may be carried by **one** RBC? How many oxygen gas molecules may be carried by 1 mm³ of blood?*

What are the special structural characteristics of erythrocytes?



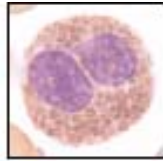
Homeostatic Mechanism to Maintain Blood Oxygen Carrying Capacity



What is the term that means low oxygen level in the tissues?

Identify the hormone and target tissue in this mechanism.

Types of White Blood Cells



(a) Eosinophil



(b) Basophil

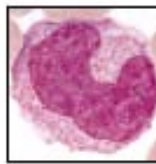


(c) Neutrophil

Which of these cells is/are phagocytic?



(d) Small lymphocyte

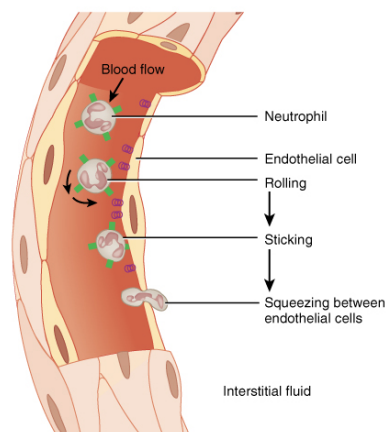




(e) Monocyte

Which of these cells provide life-long immunity?

WBCs comprise what percentage of whole blood?

Diapedesis & Phagocytosis in WBCs



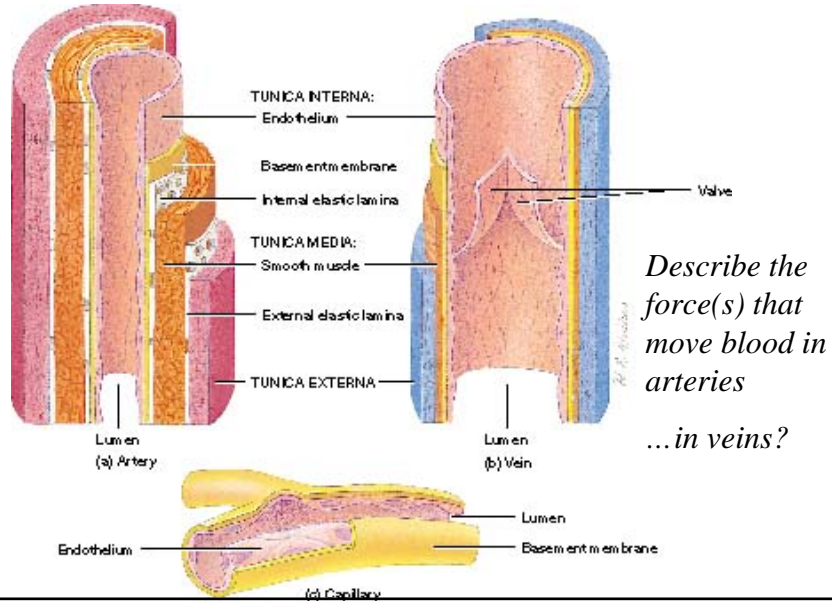
Key:
 Selectins on endothelial cells
 Integrins on neutrophil

WBCs roll along endothelium, stick to it & squeeze between cells.

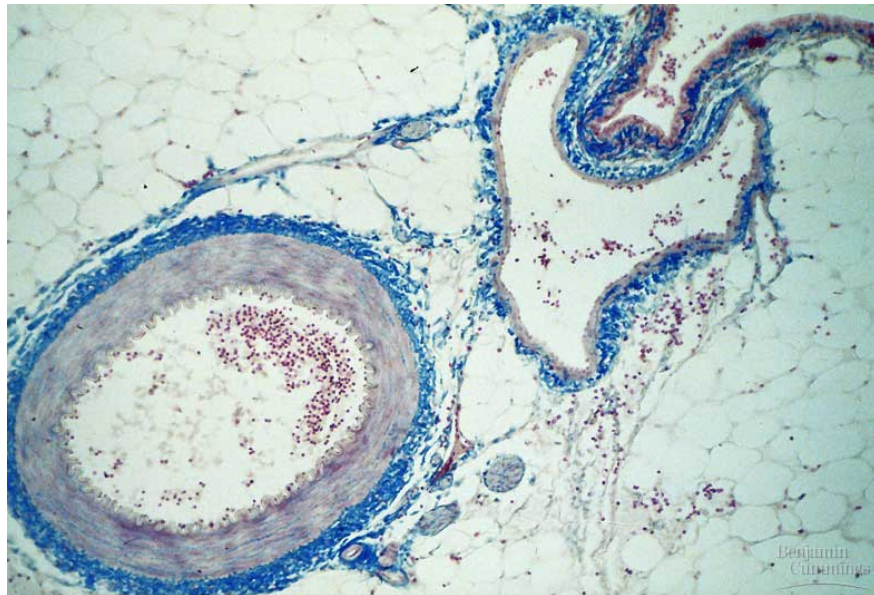
*Neutrophils & macrophages exhibit **positive chemotaxis**. What does this mean?*

List some examples of materials that these cells phagocytize.

Anatomy of Blood Vessels



*Describe the force(s) that move blood in arteries
...in veins?*



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Capillary Construction

(a) Continuous capillary formed by endothelial cells

(b) Fenestrated capillary

(c) Sinusoid

Most capillaries in the body are of the type known as ____.

In most of the brain and spinal cord, the endothelial cells of continuous capillaries are “welded” together by ____.

Fenestrated capillaries are found in close association with transport epithelia. Name at least one organ in which you would find fenestrated capillaries. List at least one location of sinusoids.

Capillary Exchange

(a) Exchanges across Capillary Wall

(b) Detailed view of capillary exchange mechanisms.

List some examples of plasma proteins.

What is the force that causes water and dissolved substances to leave the capillary?

How is most of this water returned to the blood?

Plasma proteins generally cannot cross the capillary wall

Plasma membrane

Endothelial cell

Cytoplasm

Water-filled pore

Plasma

Lipid-soluble substances pass through the endothelial cells

O_2 , CO_2

Exchangeable proteins

Na^+ , K^+ , glucose, amino acids

Small water-soluble substances pass through the pores

Exchangeable proteins are moved across by vesicular transport

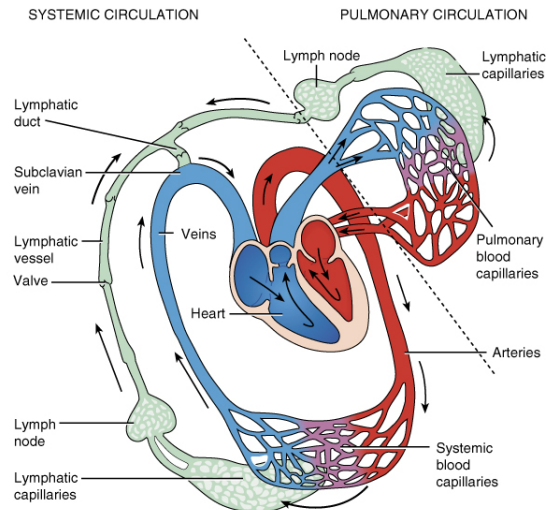
Scheme for Lymphatic Circulation

In what way(s) is the lymphatic circulatory system different than the blood circulatory system?

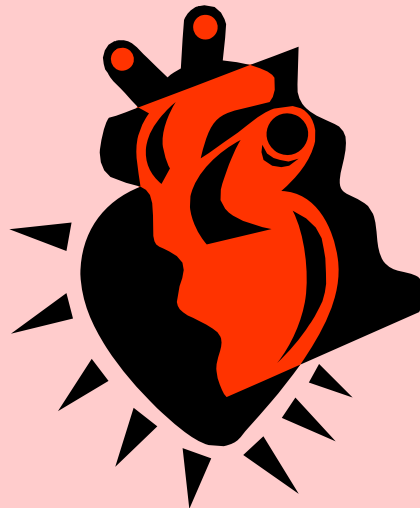
What is the name for the fluid in lymphatic vessels?

Why is this fluid emptied into veins and not arteries?

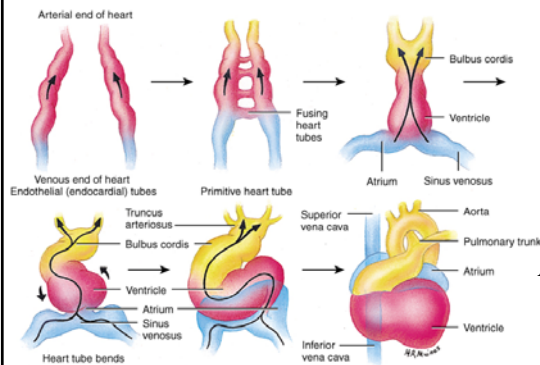
...which veins?



The Heart



Embryonic Development of the Heart

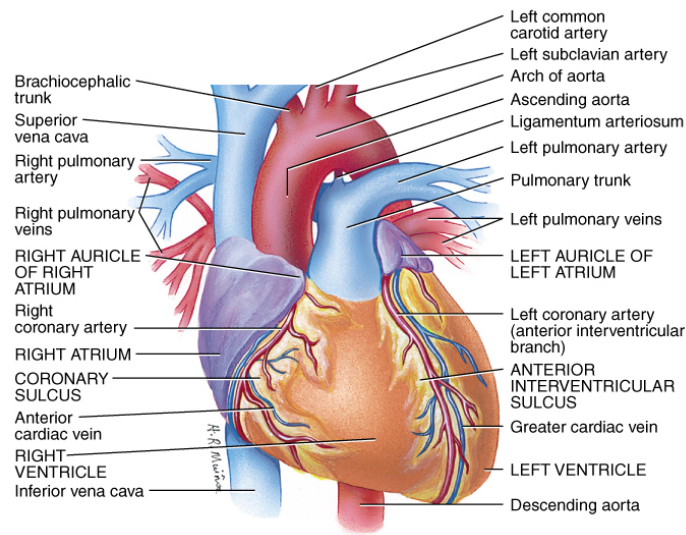


Name the embryonic germ layer from which the heart develops.

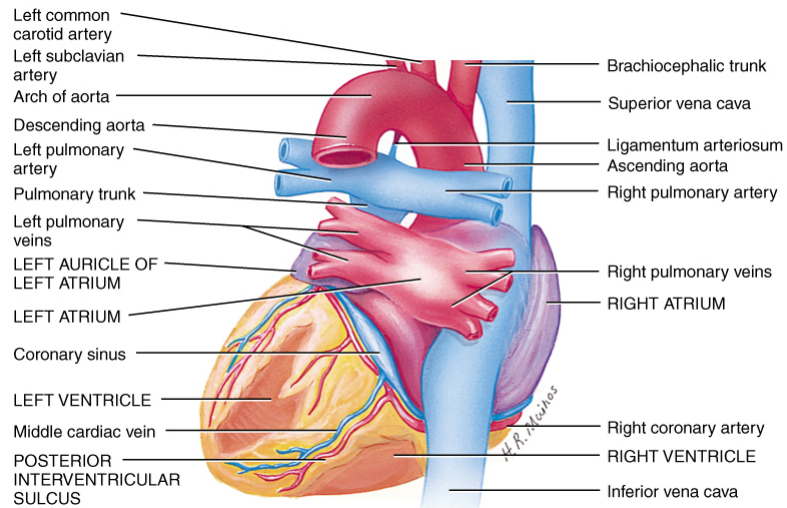
When does the myocardium begin demonstrating intrinsic rhythmicity?

Name the heart structure(s) that enable a separation of oxygenated and deoxygenated blood.

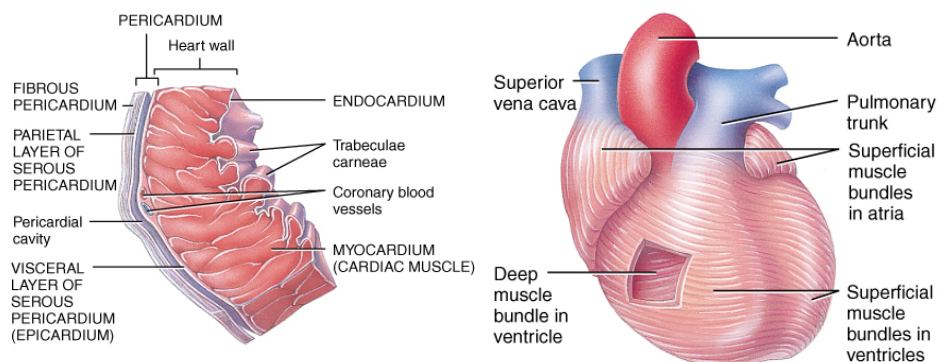
Surface Anatomy of the Heart (anterior view)



Surface Anatomy of the Heart (posterior view)



Structure of the Heart Wall

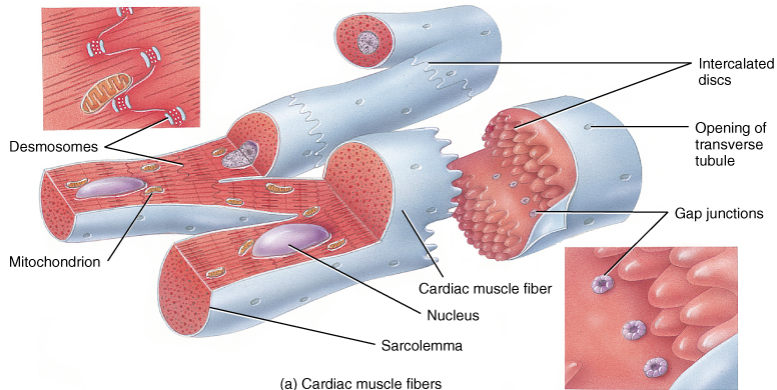


Describe the substance normally found in the pericardial cavity.

Describe the movement of the atria during contraction. ...the ventricles.

*Describe the tissue construction of each of the three layers of the heart wall. How are **endocardium** and **endothelium** related?*

Cardiac Muscle Tissue (review)



(a) Cardiac muscle fibers

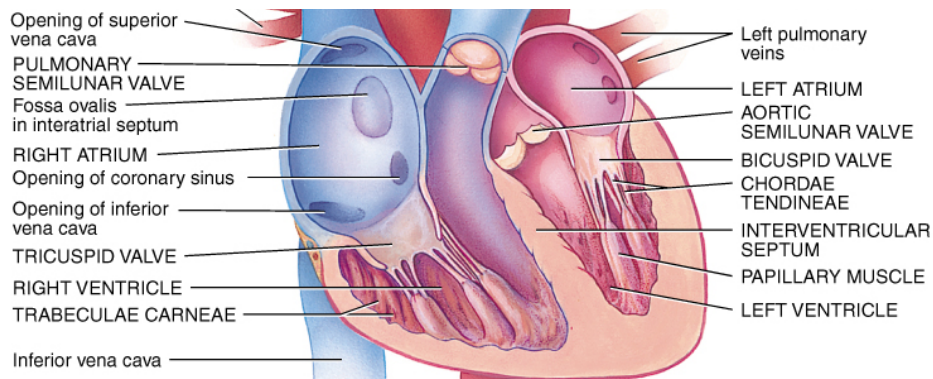
What two types of intercellular junctions are found at intercalated disks?

How is the function of gap junctions different from the function of transverse tubules?

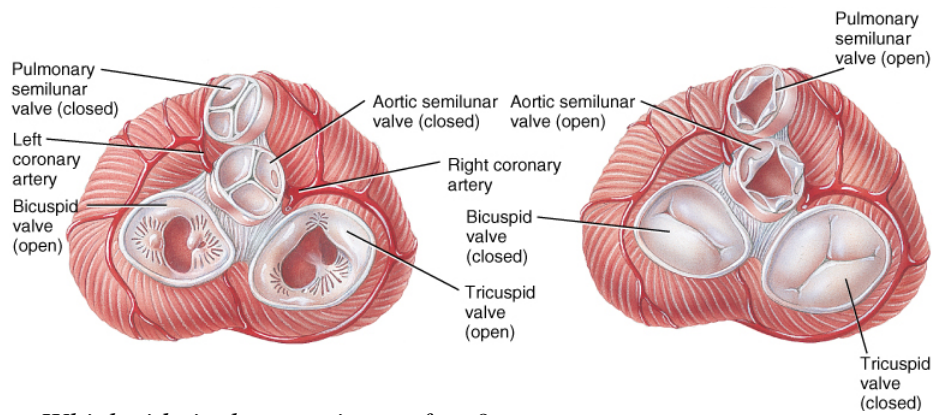
Internal Anatomy of the Heart

Why are structures of the right heart colored blue in this figure?

What is the function of the coronary sinus? ... of papillary muscles?



Skeleton of the Heart and Valve Function

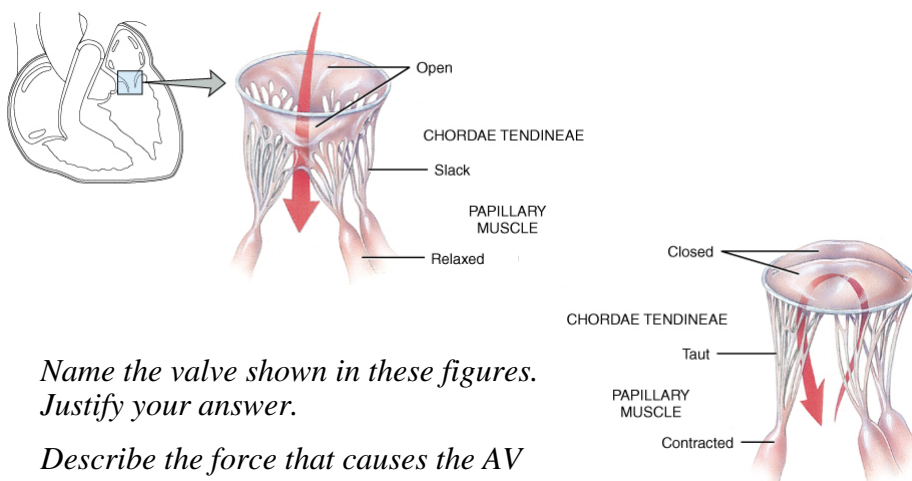


Which side is the anterior surface?

What are the ventricles doing in each figure?

What are the functions of the skeleton of the heart?

Valve Function (cont'd)



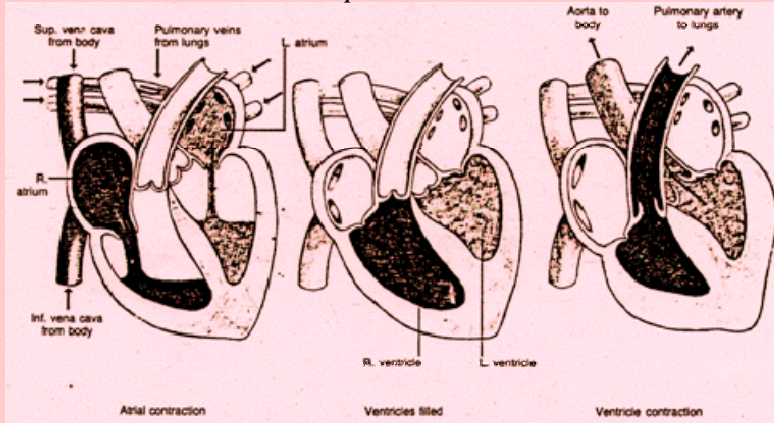
*Name the valve shown in these figures.
Justify your answer.*

Describe the force that causes the AV valves to close.

The Cardiac Cycle

Differentiate between systole and diastole. When is the systolic pressure created? ...the diastolic pressure?

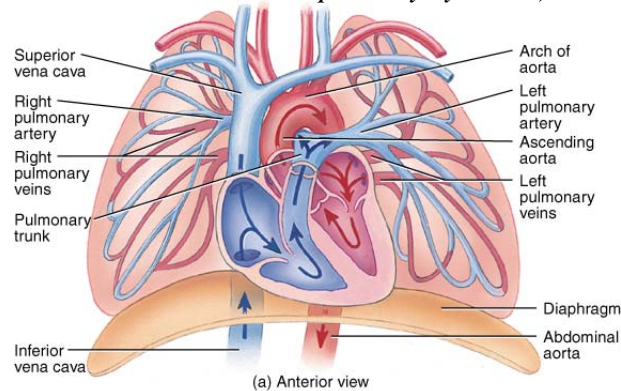
*What factors determine **end-diastolic volume**, and how is this related to cardiac output?*



The Pulmonary Circuit

Describe the pathway of one RBC from the heart, through the pulmonary circuit, and back to the heart.

Where does gas exchange occur? (Describe the structures in both the cardiovascular and respiratory systems.)



The Systemic Circuit

Describe the structure and function of portal circulation, including the example shown in this figure.

Do the lungs receive a portion of the systemic cardiac output? Why or why not?

Why does fetal circulation allow mixing of blood between the two circuits?

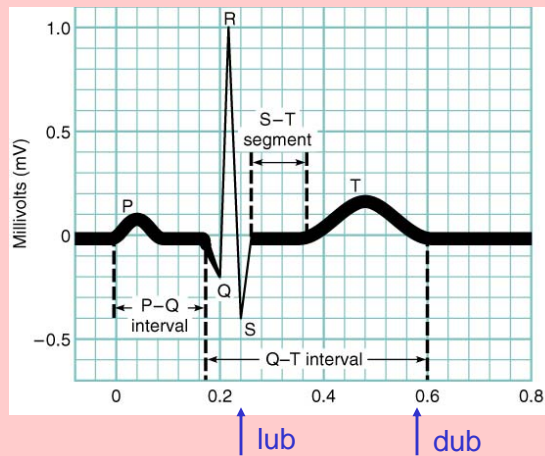
Anatomy of the Cardiac Conduction System

What is the appropriate stimulus for cardiac muscle contraction?

What cells make up the cardiac conduction system?

Where does ventricular contraction begin? Why?

ECG Recording



How many cardiac cycles are represented in this ECG recording?

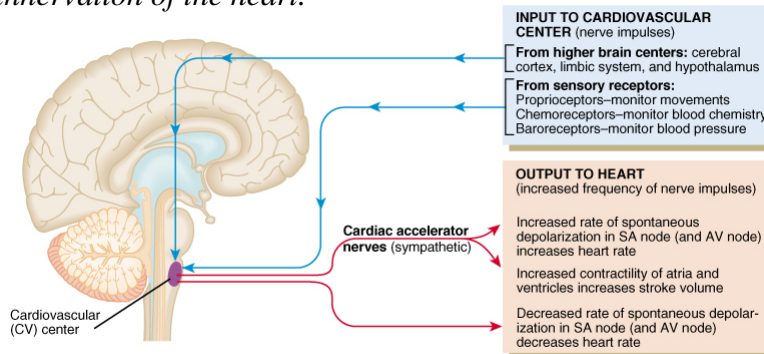
Describe the electrical events corresponding to each wave of the ECG.

*Label the mechanical events (including **when** they happen) related to each wave of the ECG.*

Regulation of Heart Function

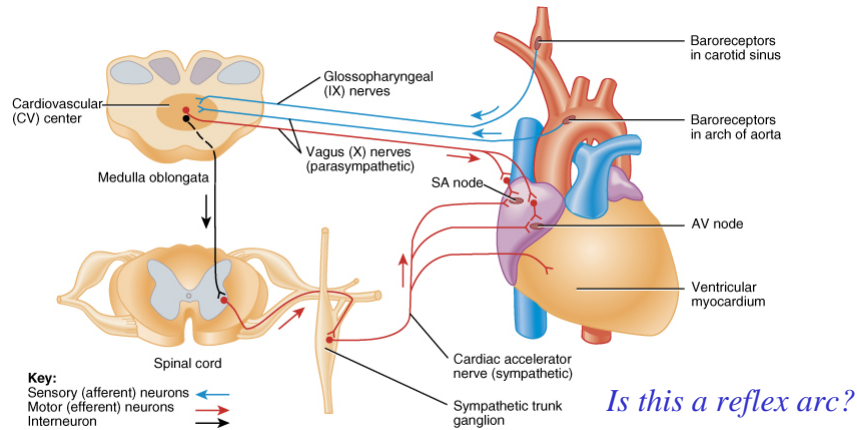
Does this figure describe intrinsic or extrinsic regulation of heart function?

Identify and label the nerve that would supply Parasympathetic innervation of the heart.



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The Heart as an Effector in Blood Pressure Regulation



Concept Map: Cardiac Output

