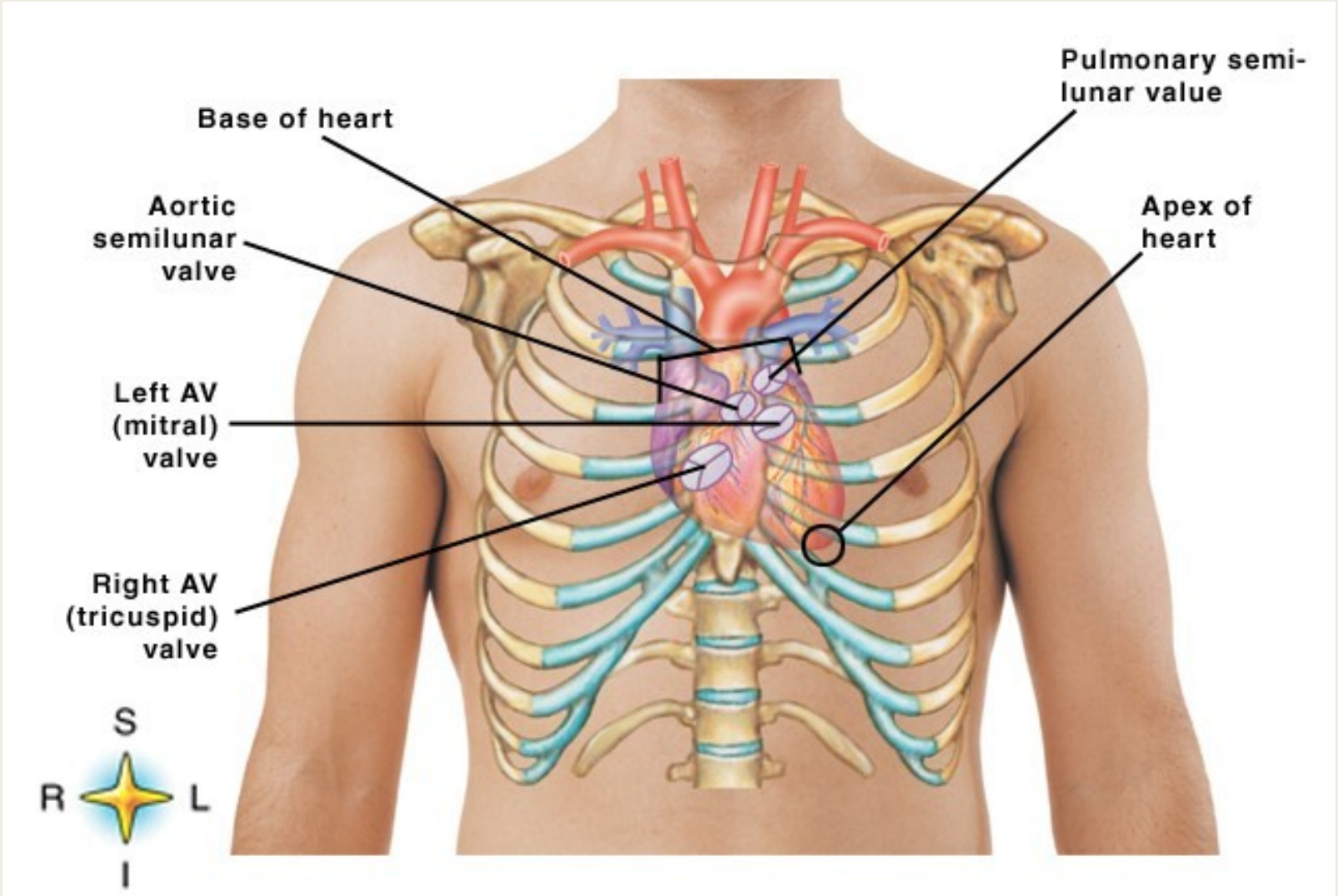
CARDIOVASCULAR SYSTEM

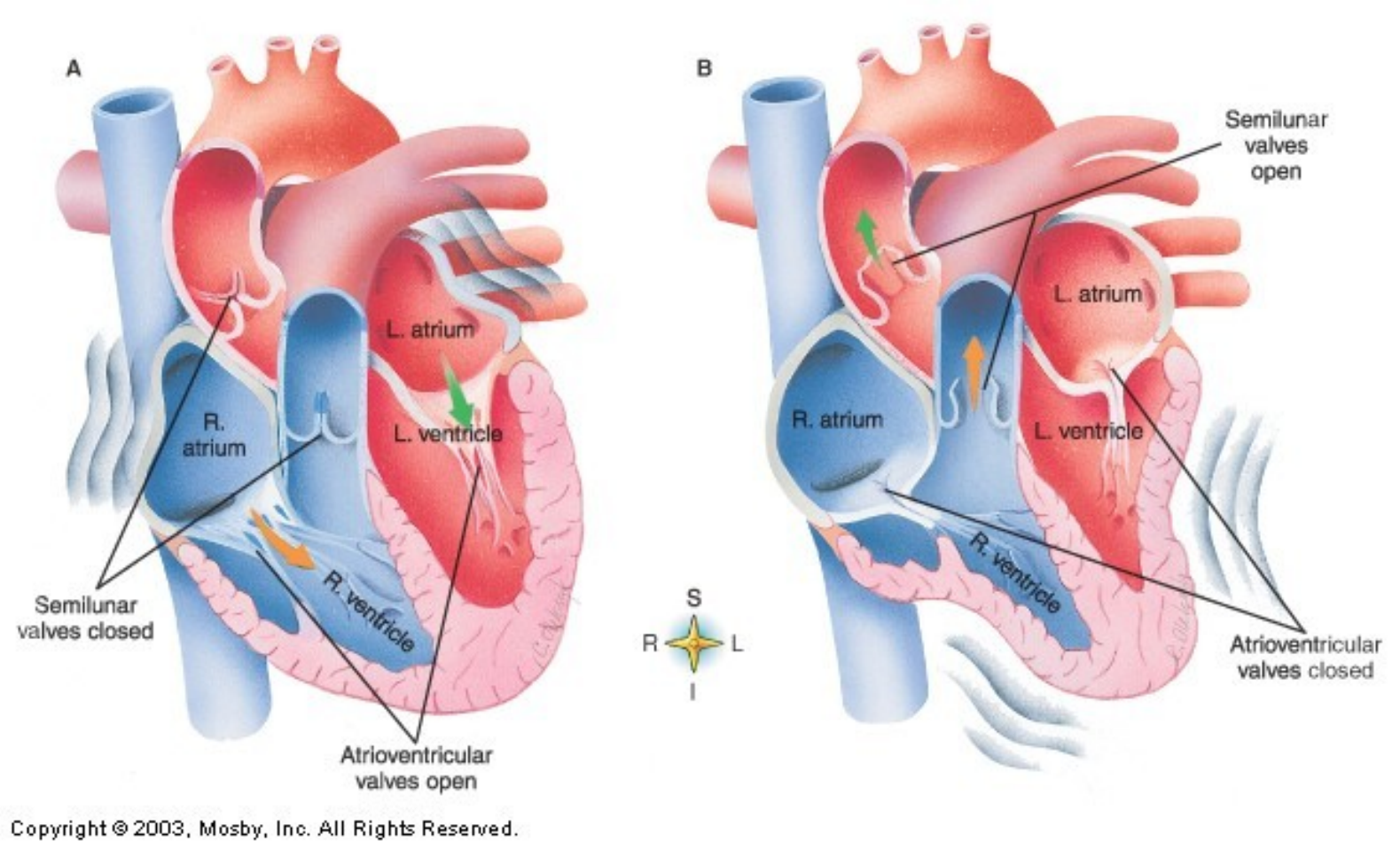
Heart

- Located in the mediastinum
  - *Behind sternum*
  - *Between 2nd and 6th ribs*
  - *Between T5-T8*
- Apex – base of heart
  - *Located at the 5th intercostal space*

Heart



Chambers & Valves



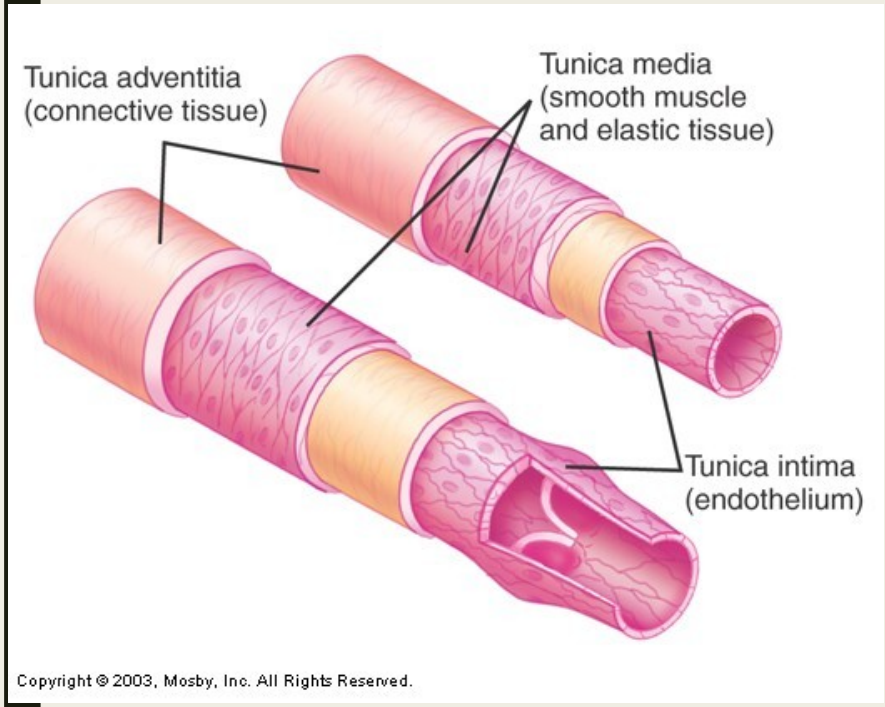
Trace the blood flow through the heart

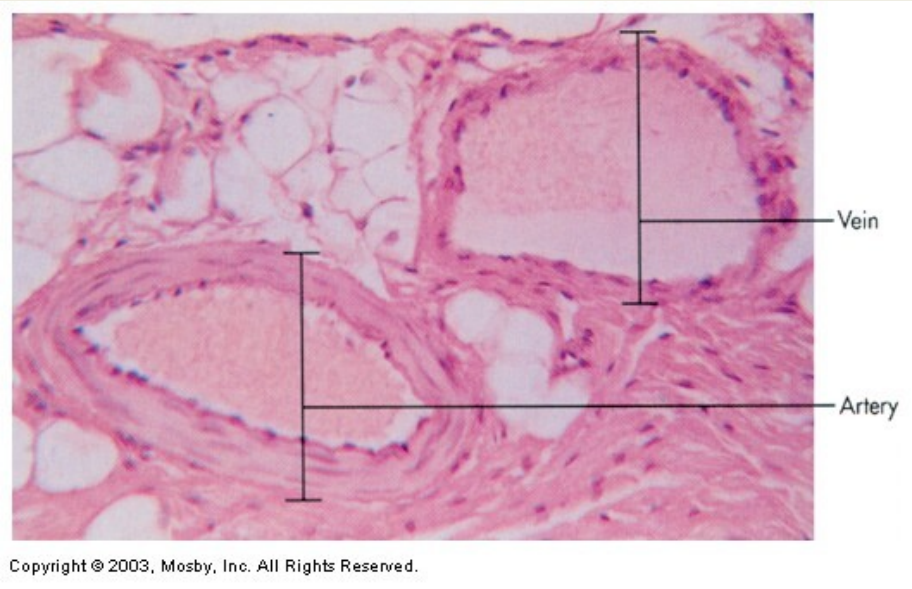
Structure of Blood Vessels

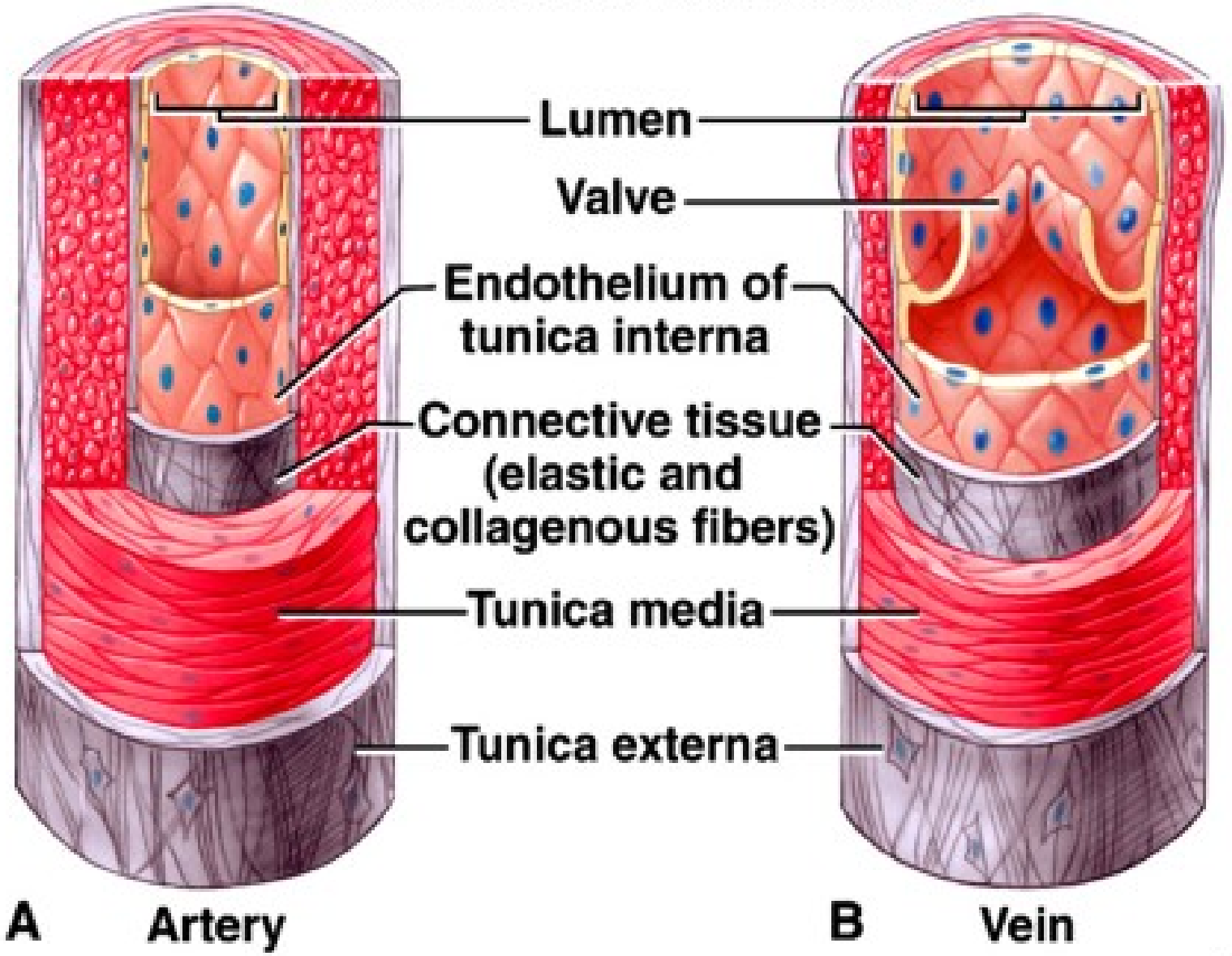
- **Tunica adventitia** - outermost layer
  - *Fibrous connective tissue*
  - *Holds vessels open; prevents tearing of vessels walls during body movements*
  - *Larger in veins than arteries*
- **Tunica media** – middle layer
  - *Smooth muscle and elastic CT*
  - *Helps vessels constrict and dilate*
  - *Larger in arteries*

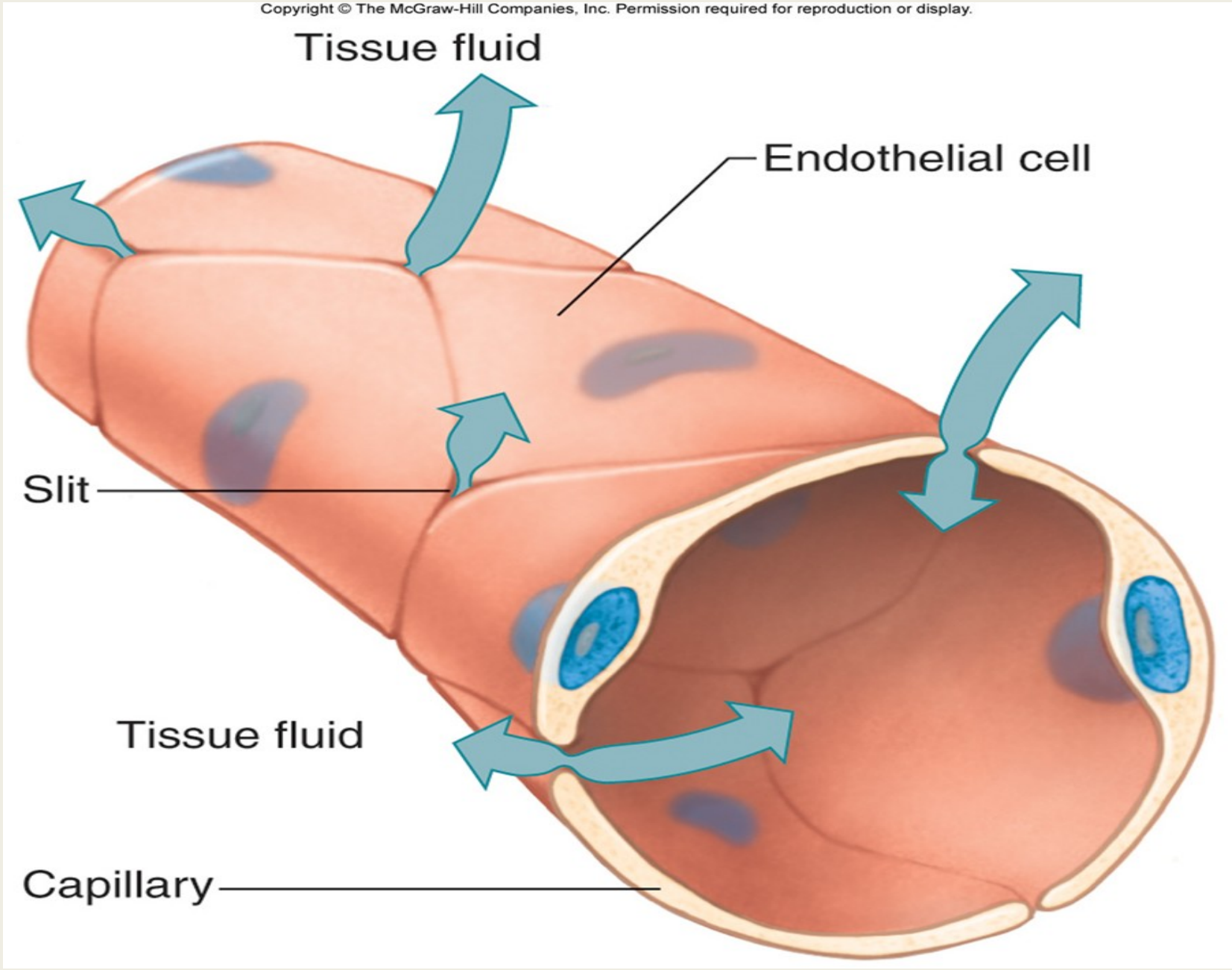
Structure of Blood Vessels

- **Tunica intima** – innermost layer
  - *Composed of endothelium*
  - *Semilunar valves present in veins*
  - *One cell thick in capillaries*









Differences Between Blood Vessel Types

- Walls of **arteries** are the thickest
- Lumens of **veins** are larger
- Skeletal muscle “milks” blood in veins toward the heart
- Walls of capillaries are only one cell layer thick to allow for exchanges between blood and tissue

Movement of Blood Through Vessels

- Most arterial blood is pumped by the heart
- Veins use the milking action of muscles to help move blood

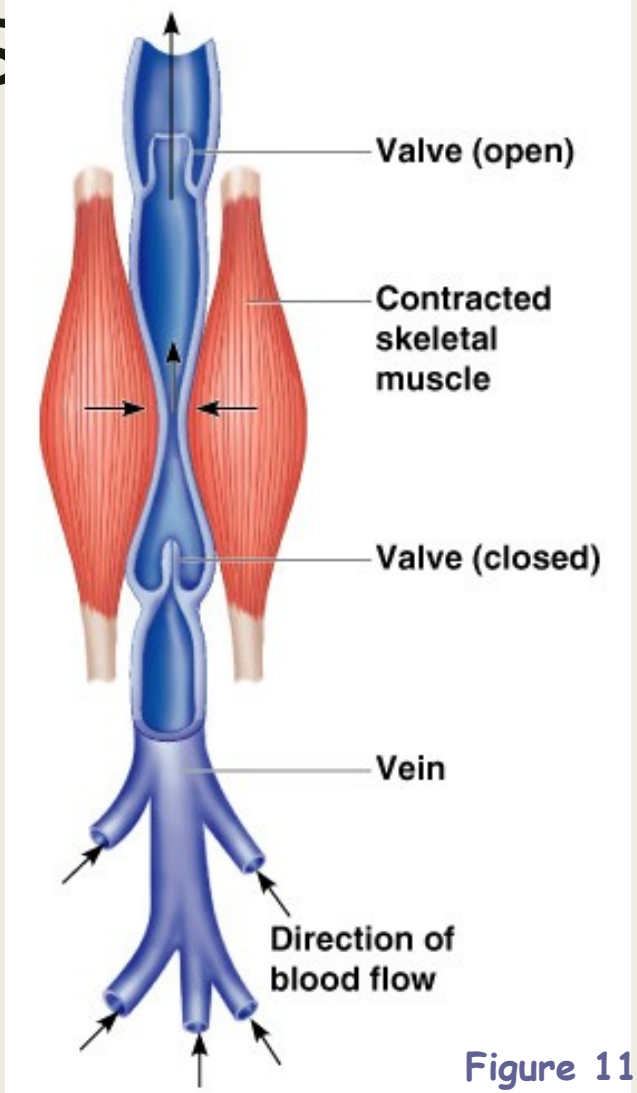


Figure 11.9

Capillary Beds

- Capillary beds consist of two types of vessels
  - *Vascular shunt – directly connects an arteriole to a venule*

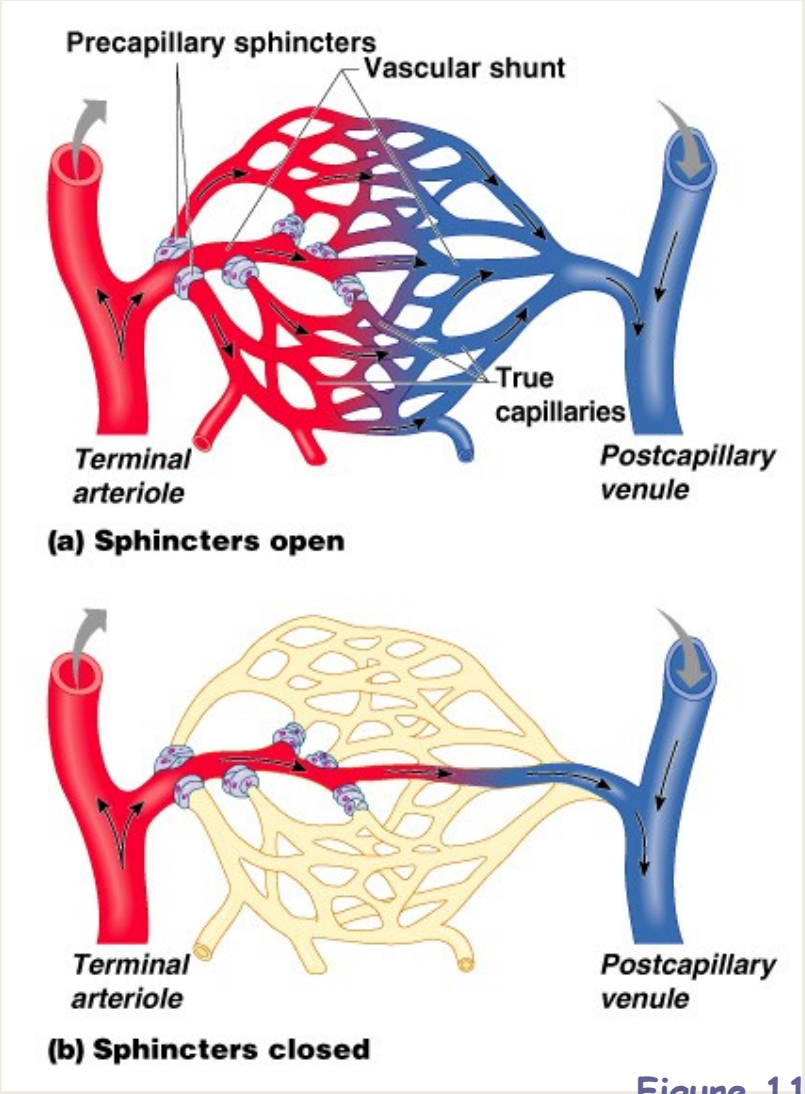


Figure 11.10

Capillary Beds

- True capillaries – exchange vessels
  - Oxygen and nutrients cross to cells
  - Carbon dioxide and metabolic waste products cross into blood

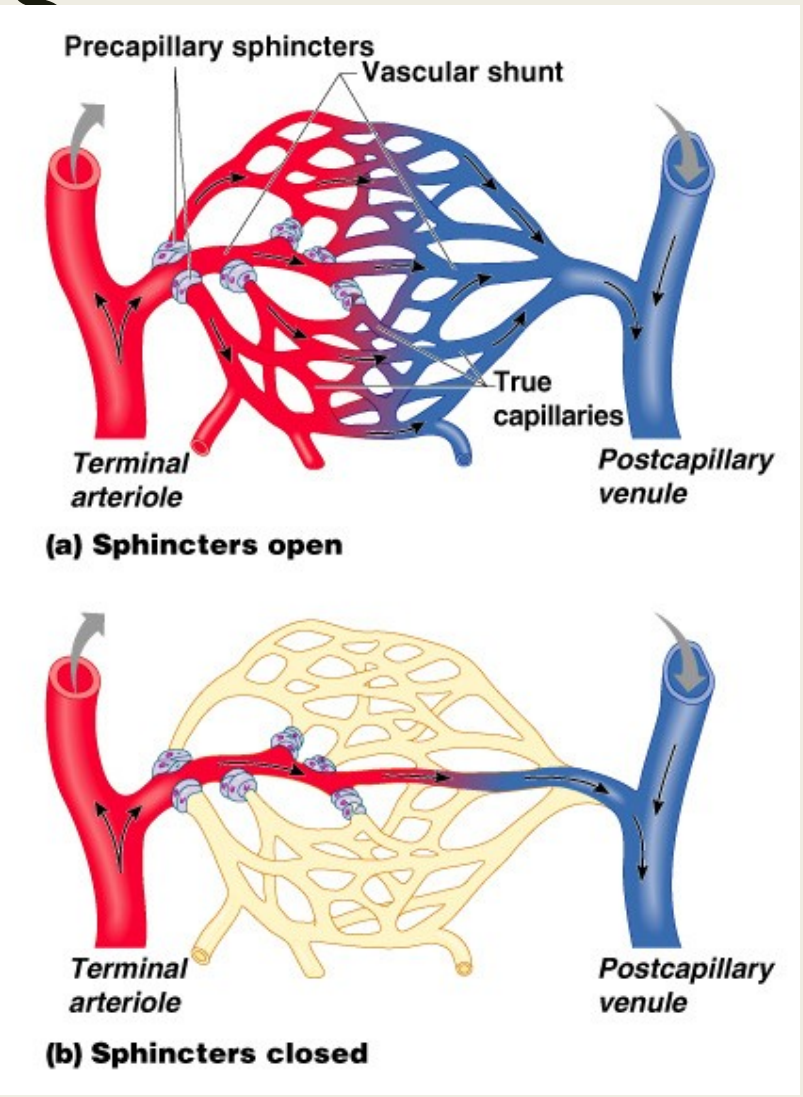


Figure 11.10

Diffusion at Capillary Beds

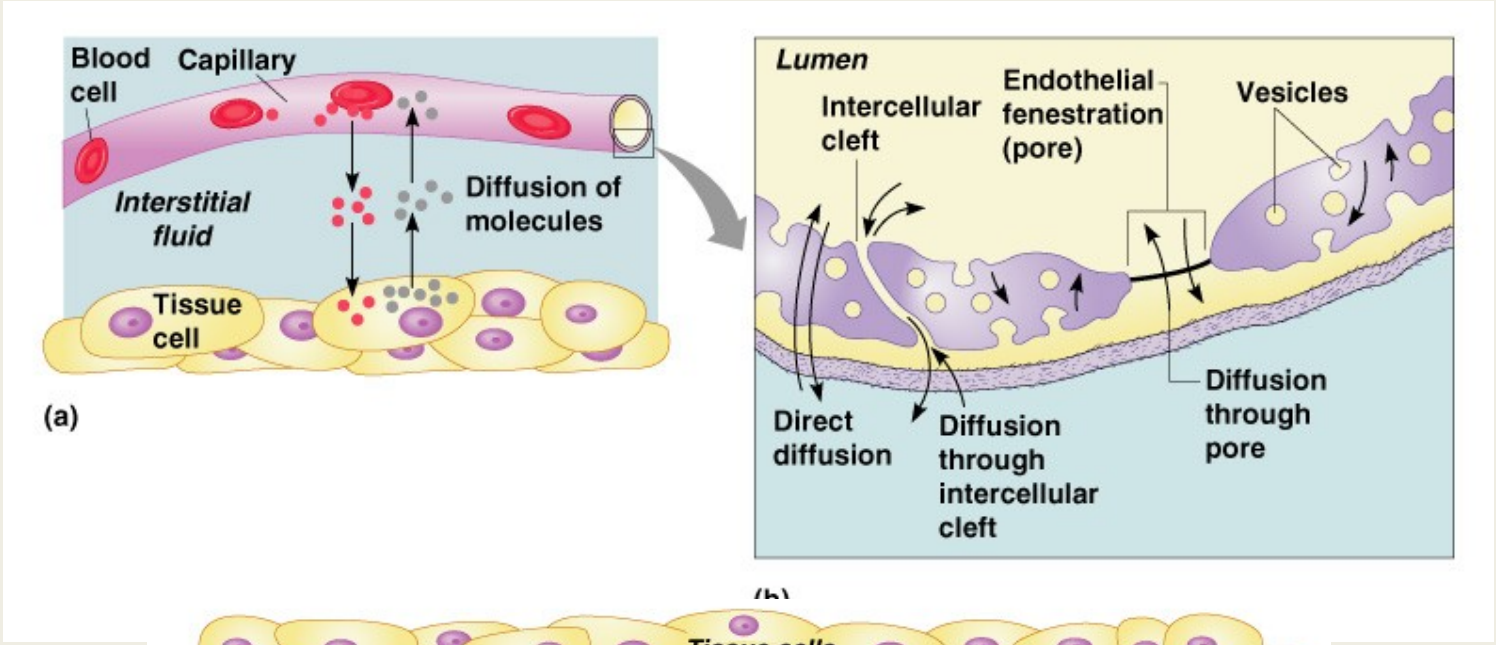
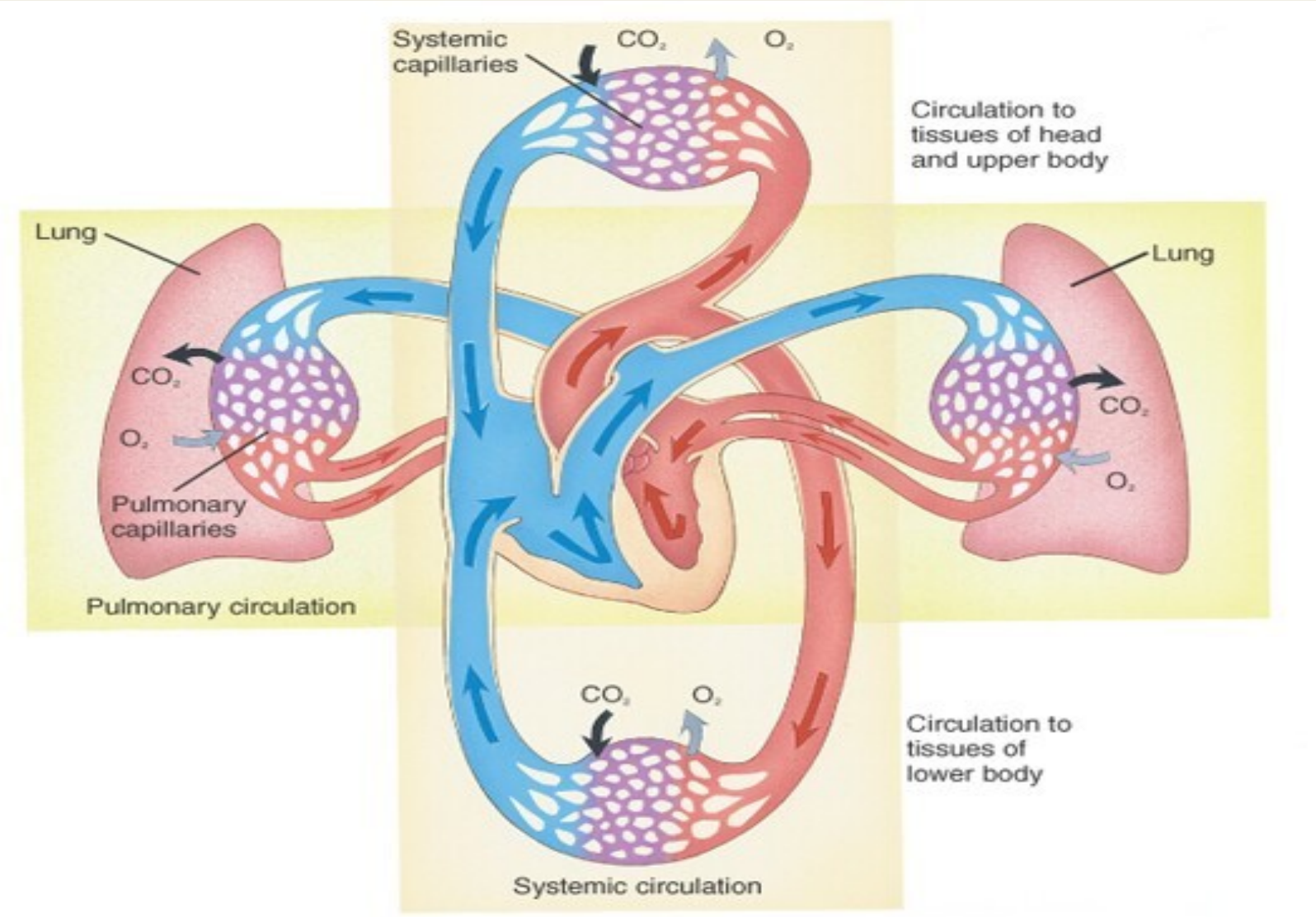


Figure 11.20

Circulatory Routes



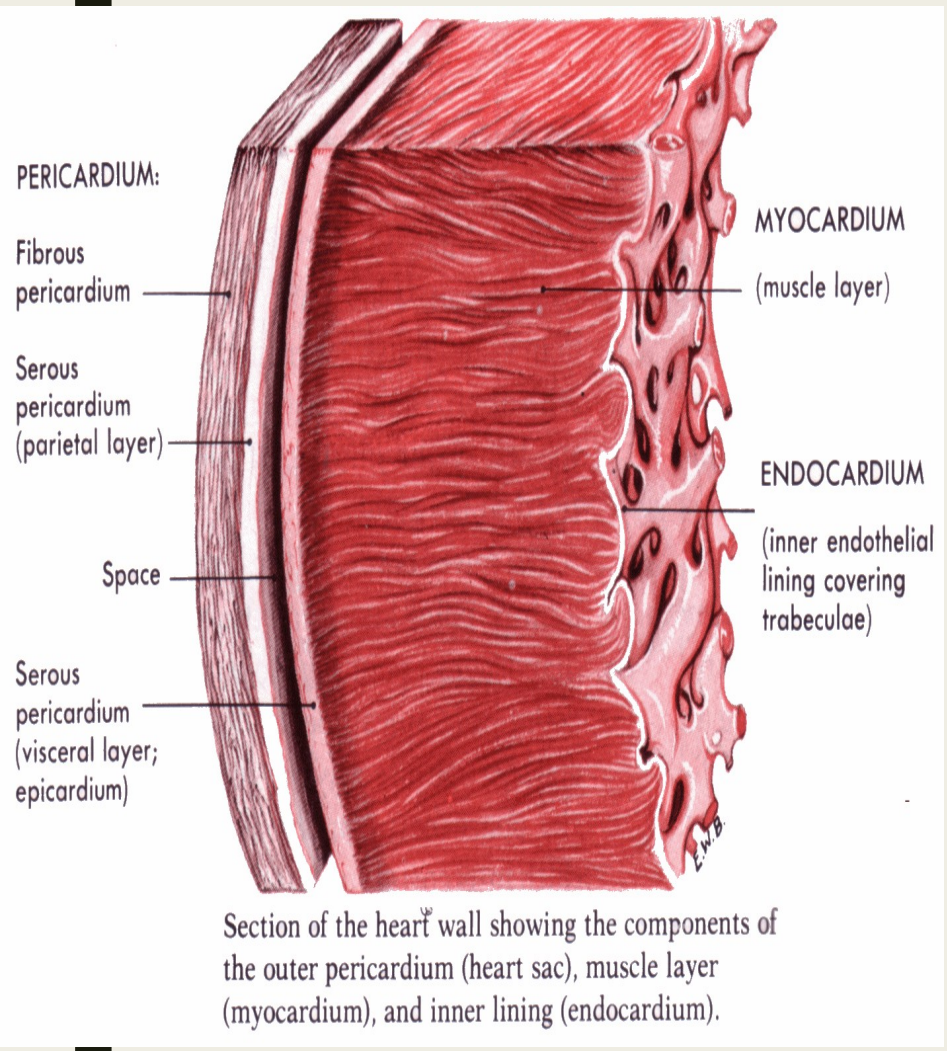
Functions of Heart

- Transports blood to the heart and lungs, back to the heart and all other body parts.
- Transports nutrients, oxygen, and hormones.
- Removes waste
- Provides immunity through antibodies
- Maintains body temp and electrolyte balance. (sodium ,potassium ,calcium)

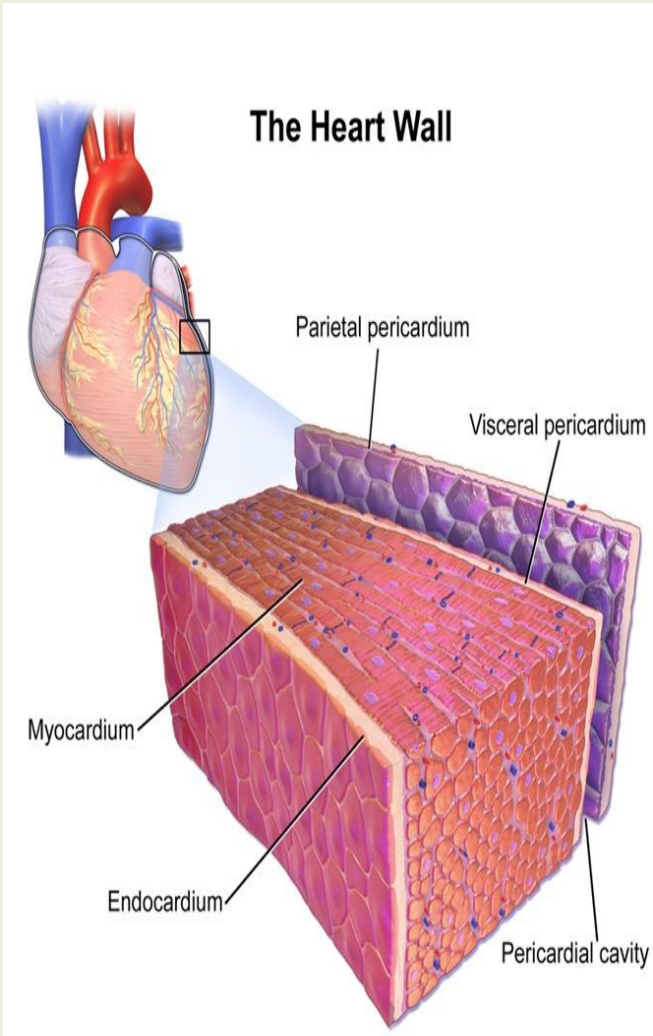
Differences of Blood and Lymph:

Differences Between Blood and Lymph	
Blood	*Lymph*
1. It consists of plasma, erythrocytes, leucocytes and platelets.	1. It consists of plasma and leucocytes (lymphocytes most abundant).
2. It is red in colour due to the presence of haemoglobin in erythrocytes.	2. It is colourless as haemoglobin is absent.
3. Its plasma has more proteins, calcium and phosphorus.	3. Its plasma has fewer proteins and less calcium and phosphorus.
4. Glucose concentration is less in blood.	4. Glucose concentration is higher in lymph.
5. Amount of CO_2 and other metabolic wastes is normal.	5. Amount of CO_2 and other metabolic wastes is much more.
6. It carries materials towards and away from the tissue, therefore, it acts as a "vehicle".	6. It transfers materials from the blood to the body cells and vice- versa, therefore, it acts as "middle man".

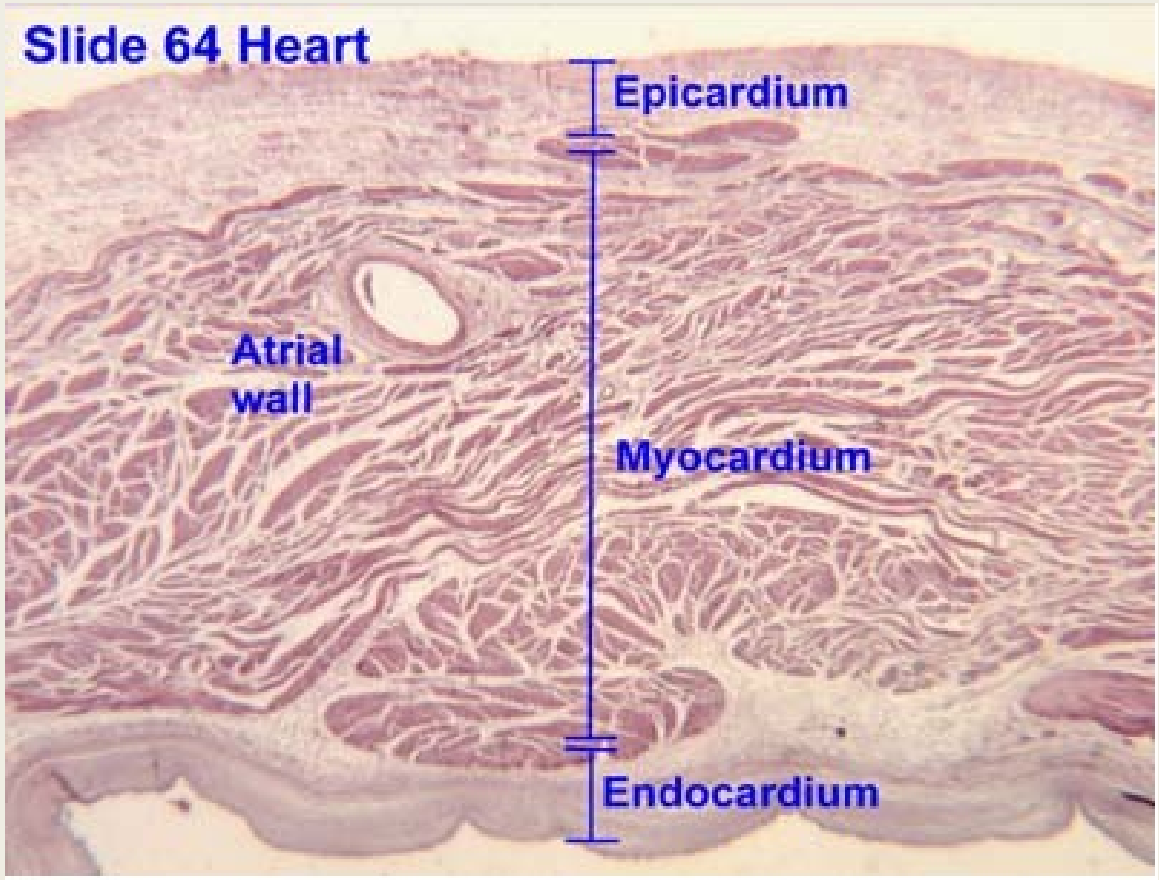
Histology of Heart



Section of the heart wall showing the components of the outer pericardium (heart sac), muscle layer (myocardium), and inner lining (endocardium).



Epicardium
(outer layer)
Myocardium
(middle layer)
Endocardium
(inner layer)


Slide 64 Heart
Epicardium
Atrial wall
Myocardium
Endocardium