Blood Vessels

Cardiovascular System - Part III

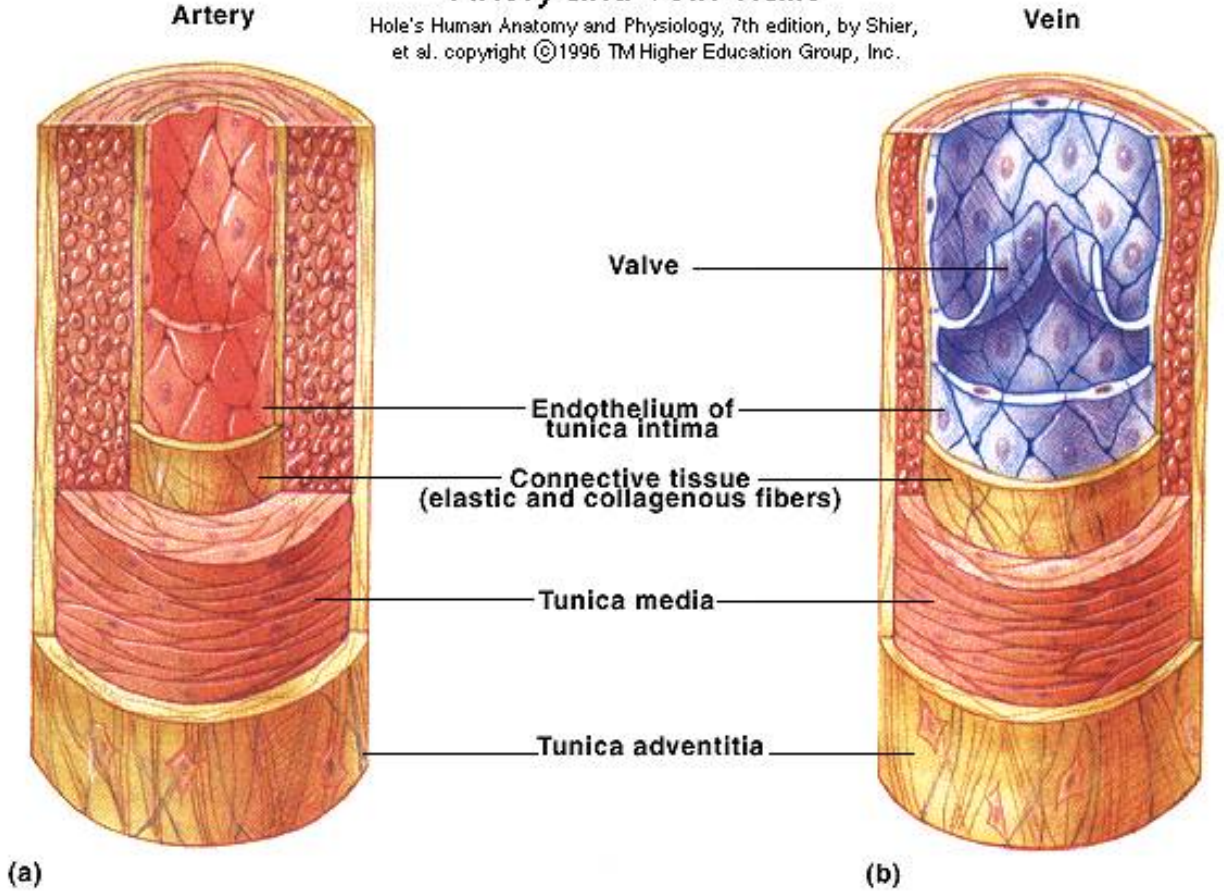
Three Main Types of Blood Vessels

- Arteries
  - Carry blood away from the heart
- Capillaries
  - Diffusion occurs between blood and tissues/interstitial fluids
- Veins
  - Return blood to heart

Vessel Walls

- Arteries & Veins contain three layers within their walls:
  - Tunica Intima
    - Innermost layer
    - Endothelial lining with connective tissue & elastic fibers
      - Contains the internal elastic membrane in arteries
  - Tunica Media
    - Middle layer
    - Smooth muscle
      - Contains the external elastic membrane in arteries
  - Tunica Externa
    - Outermost layer
    - Connective tissue

Artery and Vein Walls



Arteries vs. Veins

Arteries:

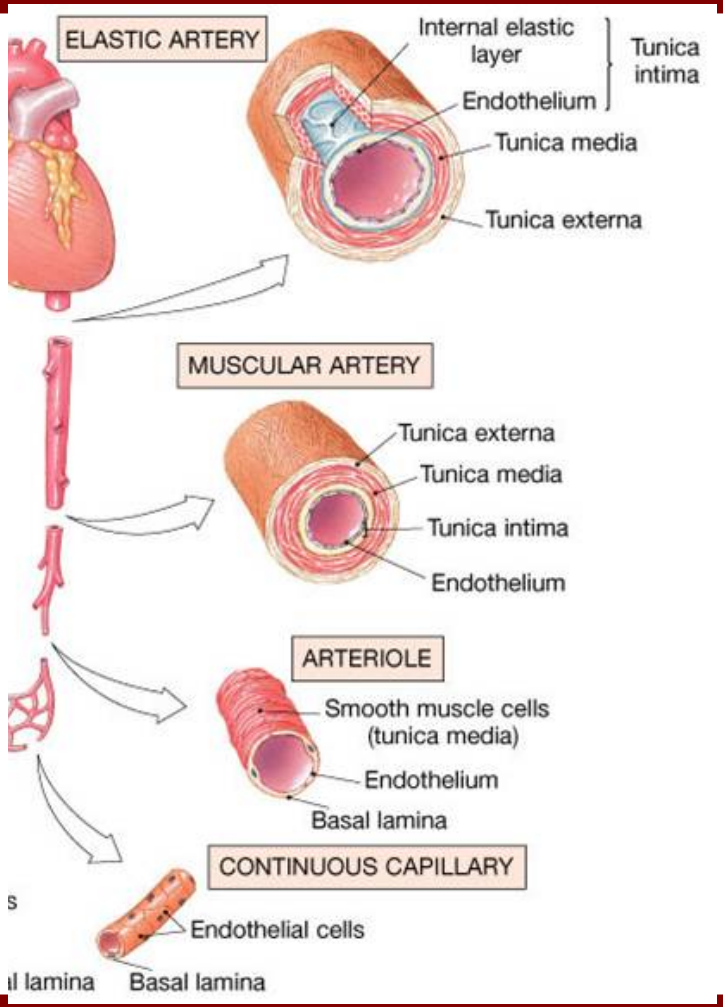
- Carry blood away
- Thicker tunica media
- Constricted lumen
  - vasoconstriction
  - vasodilation
- Retain cylindrical shape
- Able to handle a lot of pressure

Veins:

- Return blood
- Thicker tunica externa
- Distorted
- Cannot handle too much pressure; will collapse or tear
- Contain valves

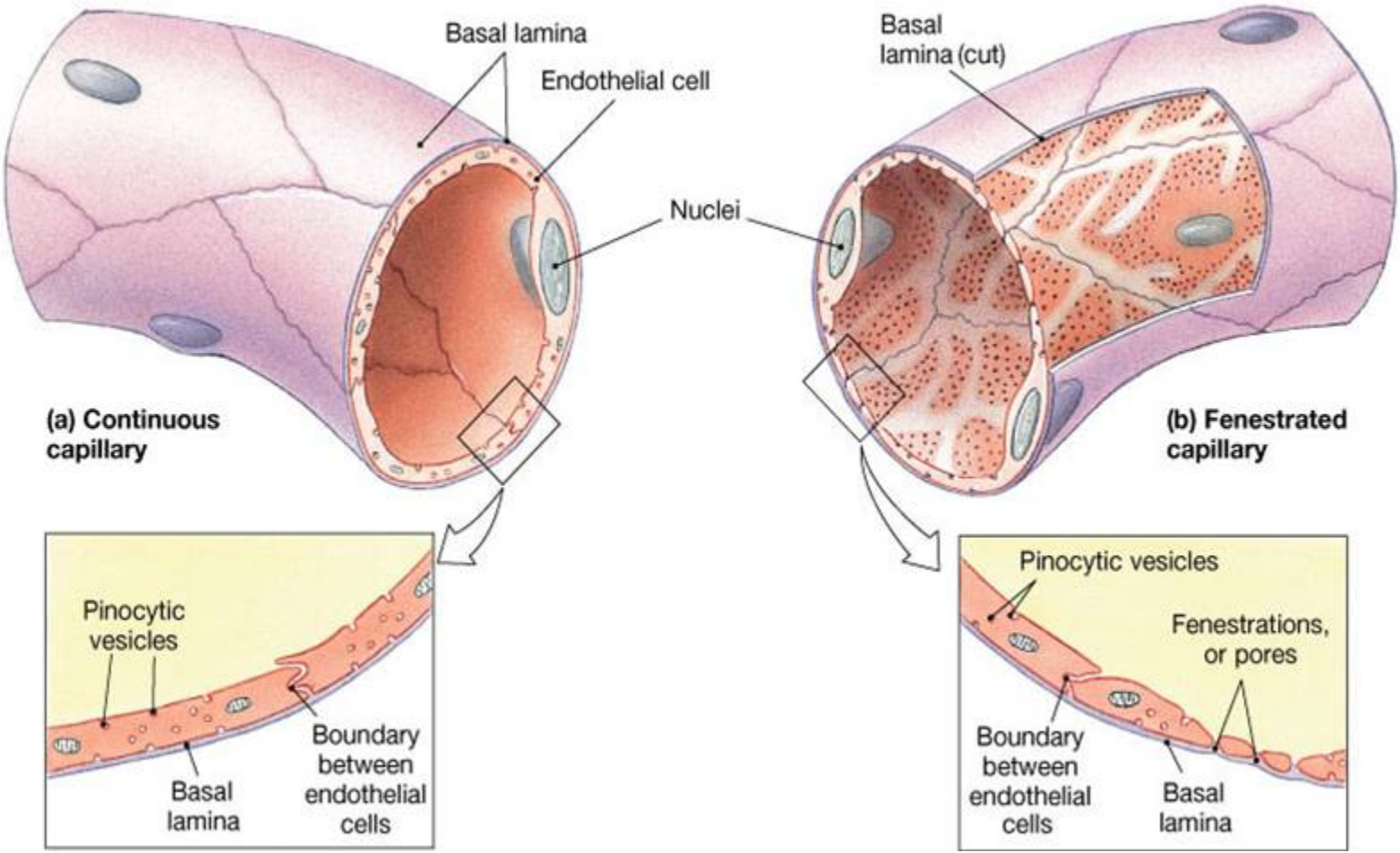
Arteries

- Elastic Arteries:
  - Large vessels
  - Aorta, pulmonary trunk, & other major arteries
- Muscular Arteries:
  - Branch from the elastic arteries
  - Distribute blood to skeletal muscle & organs
- Arterioles:
  - Tissues


ELASTIC ARTERY
Internal elastic layer
Tunica intima
Endothelium
Tunica media
Tunica externa
MUSCULAR ARTERY
Tunica externa
Tunica media
Tunica intima
Endothelium
ARTERIOLE
Smooth muscle cells (tunica media)
Endothelium
Basal lamina
CONTINUOUS CAPILLARY
Endothelial cells
Basal lamina

Capillaries

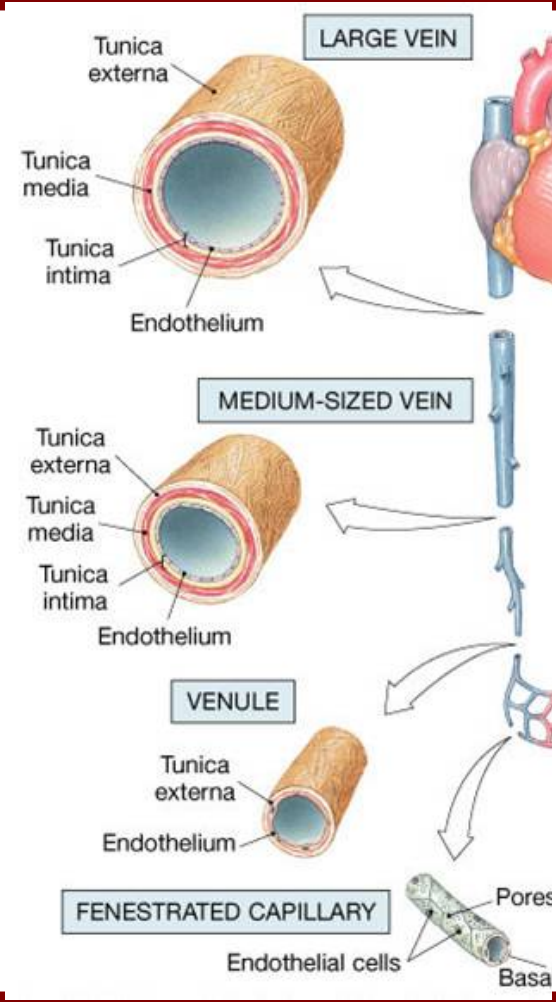
- Continuous Capillaries:
  - Exchange of interstitial fluid
- Fenestrated Capillaries:
  - Pores in the cell
  - Exchange of interstitial fluid & plasma
- Sinusoidal Capillaries:
  - Irregularly shaped fenestrated capillaries


Basal lamina
Endothelial cell
Nuclei
Basal lamina (cut)
(a) Continuous capillary
(b) Fenestrated capillary
Pinocytic vesicles
Basal lamina
Boundary between endothelial cells
Pinocytic vesicles
Fenestrations, or pores
Boundary between endothelial cells
Basal lamina

Veins

- Venules:
  - Collect blood from capillary beds
- Medium Sized Veins:
  - Collect blood from muscles and organs
- Large Veins:
  - Vena Cava

All veins have valves that are directed in the direction of blood flow


LARGE VEIN
Tunica externa
Tunica media
Tunica intima
Endothelium
MEDIUM-SIZED VEIN
Tunica externa
Tunica media
Tunica intima
Endothelium
VENULE
Tunica externa
Endothelium
FENESTRATED CAPILLARY
Pores
Endothelial cells
Basa

Circulatory System