

Blood Vessels – Chapter 14

- Both arteries and veins are formed of 3 concentric layers – Tunica interna, Tunica Media and Tunica Externa. Tunica Interna has epithelium and connective tissue. Tunica media is formed of smooth muscle fibers and Tunica externa is formed of connective tissue. For an artery and vein of similar size, arteries have thicker walls than veins.
- Elastic arteries → Muscular arteries → Arterioles → Capillaries → Venules → medium sized vein → Large Veins
- Arterioles lack tunica externa and have only endothelium and smooth muscle fibers (tunica media).
- Capillaries have only endothelium.

3 Types of Capillaries

- Continuous Capillaries are present in all organs. Allow small molecules like O₂, CO₂ and glucose to pass through.
- Fenestrated Capillaries are present in organs like kidneys, small intestine, endocrine organs and choroid plexus of brain. Rapid passage of small molecules but large particles retained.
- Sinusoids or Discontinuous Capillaries are present in organs like liver, spleen, and bone marrow. Allow large molecules like albumins and blood cells to pass through

Pathways of Capillary Fluid Exchange

- Water and solutes can exchange between blood in capillaries and tissue fluid outside by
- Fenestration pores
- Diffusion through endothelial cells
- Transcytosis across endothelial cells
- Intercellular clefts

The Skeletal Muscle Pump

- **Venous Flow** - Veins have valves in them to check backflow of blood. Working skeletal muscles act like pumps and press veins to push blood towards heart.
- Arteries = 120mm, Arterioles = 60mm, Capillaries = 25mm, Veins = 0 – 10mm
- In arteries, Systolic pressure is 120mm/Hg and diastolic pressure is 80mm/Hg.

Arteries of Brain

- Brain receives blood supply from pairs of Internal carotid and vertebral arteries.
- Vertebral arteries pass through foramen magnum and merge to form Basilar artery. Basilar artery supplies blood to cerebellum, Pons and inner ear.
- 2 anterior cerebral arteries and 2 middle cerebral arteries arise from internal carotids.
- Circle of Willis or The cerebral arterial circle is formed around pituitary gland and optic chiasm.
- Anterior Communicating a joins anterior cerebral aa.
- Posterior Communicating aa join Posterior cerebral aa to internal carotid aa.

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Portal System

- **Hypophysial Portal System:** a couple of veins collect blood from capillary beds in hypothalamus and supply it to a second capillary bed in anterior pituitary gland. It delivers releasing hormones of hypothalamus directly to anterior pituitary gland.
- **Hepatic Portal System** consist of hepatic portal vein collects blood from capillary beds in stomach, intestine, pancreas and spleen and deliver it to 2nd capillary bed in liver.
- Splenic vein collects blood from spleen and also Inferior mesenteric vein and pancreatic vein join it.
- Superior mesenteric vein collects blood from small intestine and main parts of colon.
- Splenic vein and Superior mesenteric veins join to form HPVein.
- Hepatic portal vein receives gastric veins from stomach.

Recap Blood Vessels

1. Both arteries and veins have 3 layers -----, -----, and ----- in their walls.
2. Arterioles lack ----- and have only endothelium and smooth muscle fibers.
3. Capillaries have walls made of only ---- and ----lack continuous wall.
4. ----- capillaries have small pores and exchange material faster.
5. Cerebral Circle of Willis is formed around pituitary gland by branches of -- --and----arteries.
6. Blockage of a coronary artery or its branch causes death of myocardium leading to ----- .
7. Skeletal muscle pumps help in flow of blood in ----- .
(arteries/veins/capillaries)
8. Arterial system has one but venous system has 2 -----blood vessels.
9. -----artery carries blood to arm, shoulder and head.
10. -----trunk supplies blood to liver, stomach, duodenum and spleen.
11. ----- vein collects blood from intestines, stomach, pancreas and spleen and delivers it to liver.