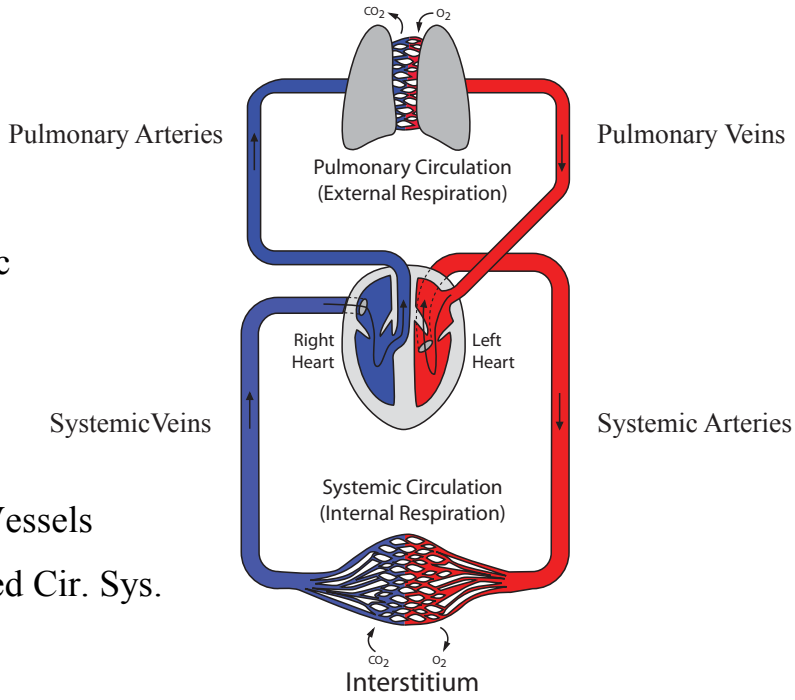
The Cardiovascular System: Vessels and Routes

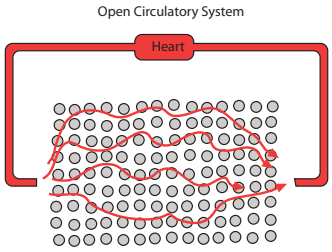
1. Overview of Blood Circulation

   A. Classification Models

      i. Arterial / Venous

      ii. Pulmonary / Systemic





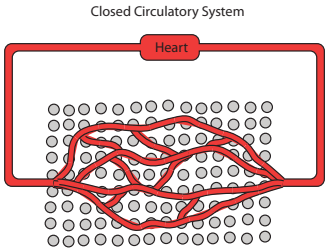
2. Overview of Blood Vessels

   A. Open vs. Closed Cir. Sys.

   B. Lumen

   C. Organs

   D. Vasa Vasorum



3. Naming of Blood Vessels

   A. By Organ / Region Supplies (Examples)

      • Renal Artery • Internal Jugular Vein.

   B. By Location (Examples)

      • Subclavian • Axillary Artery • Brachial Artery

   C. Vessels to Learn (Pull out "Human Vessel" handout)

IMPORTANT NOTE. The downloadable handout on human vessels are to be mastered by the student independent of lecture. *Start immediately* as there representation on the exam will not be incidental! Note also that there are *Practice Sheets* to be downloaded. Coloring book is an excellent resource for labeling.

3. Detailed Look at Major Vessel Types

A. Arteries

i. Trunks

a. Aorta

b. Pulmonary Trunk

ii. Tissue Layers

a. Tunica Interna

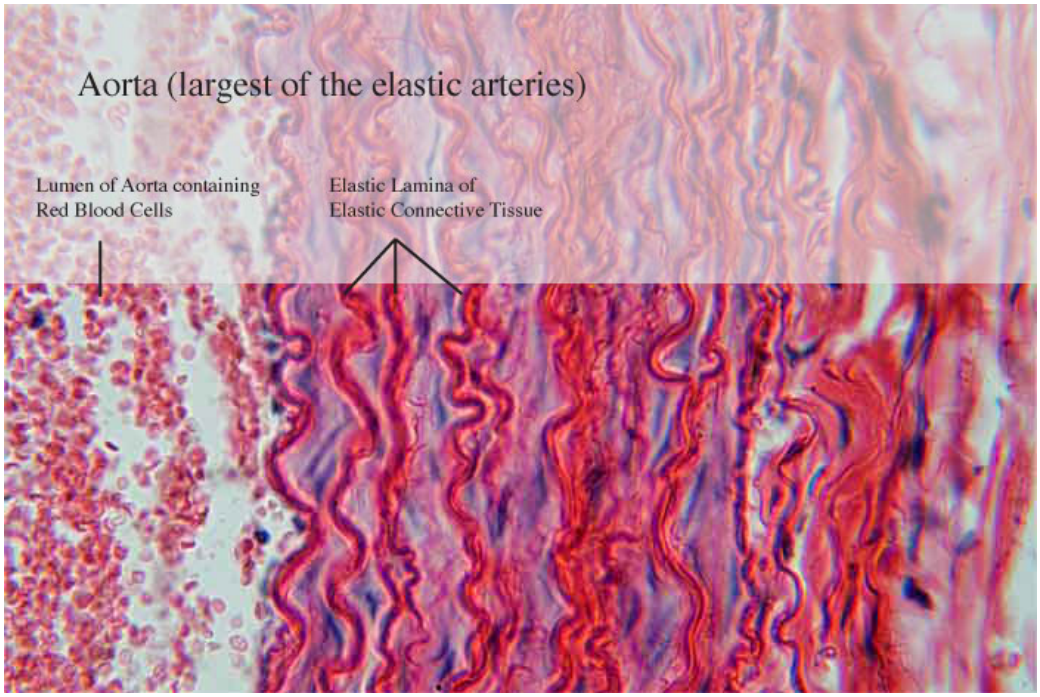
- Endothelium
- Intermal Elastic Lamina (Elast. Con. Tis.)

b. Tunica Media

- Relative Representation of Smooth Muscle vs Elastic C.T,

c. Tunica Externa

- Irregular Dense Connective Tissue



iii. Pulse

a. Elastic Recoil

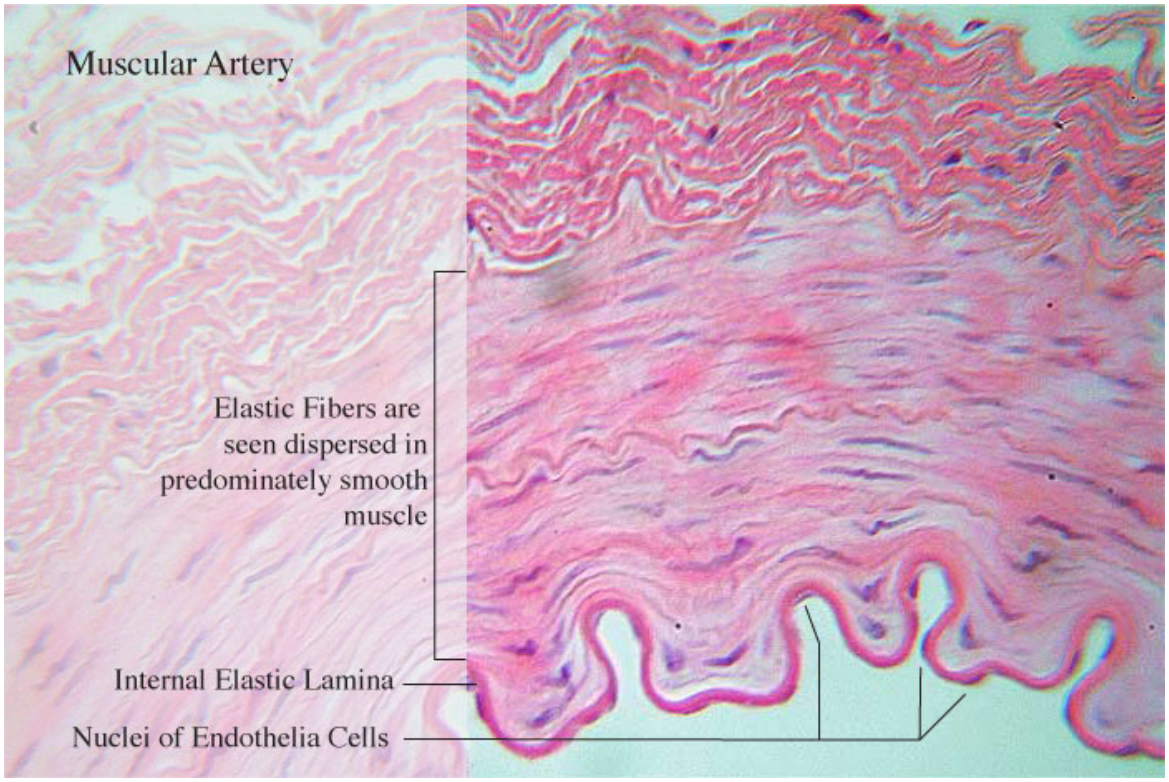
b. Pressure Wave

iv. Lumen Size Adjustment

a. Vasoconstriction

- Sympathetic Stimulation of Vasomotor Fibers

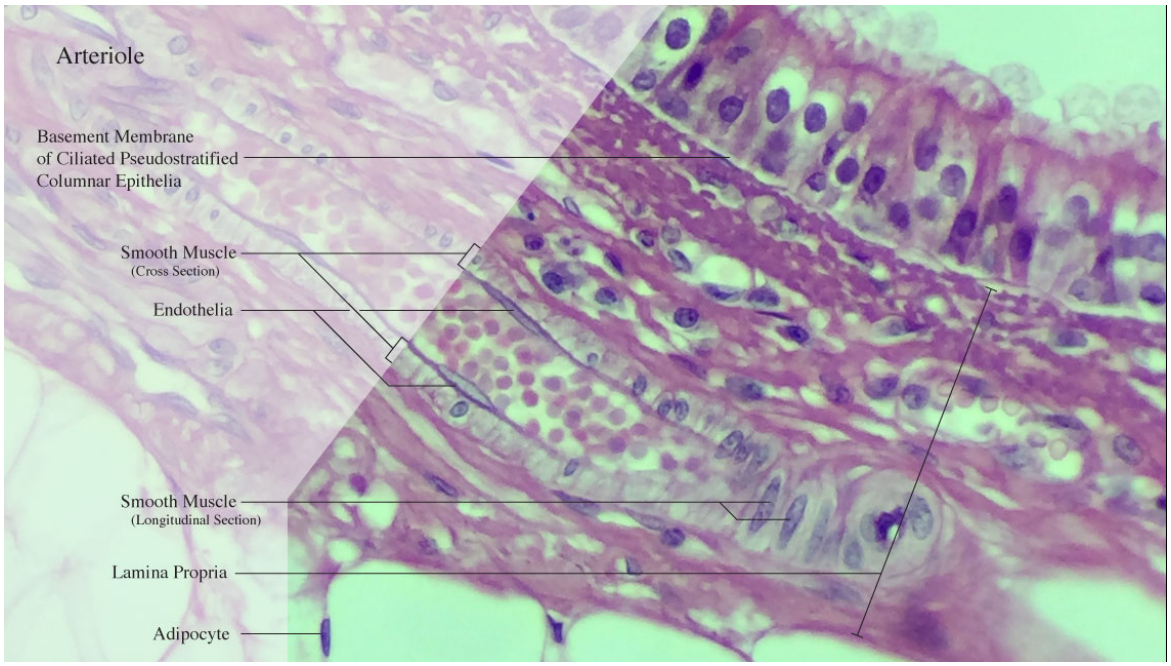
b. Vasodilation



B. Arterioles

i. Histology

a. Vasodilation and Vasoconstriction



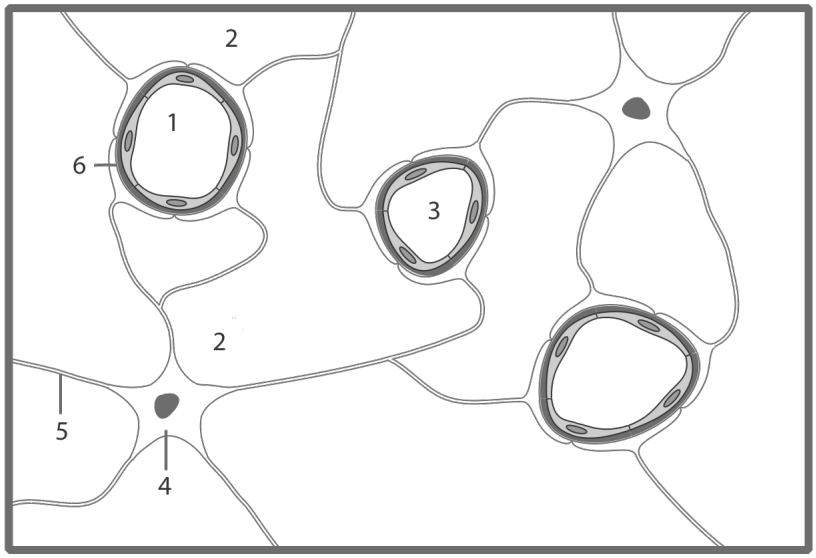
C. Capillaries

i. Capillary Types

a. Highly Selective Fluid Barriers

- Blood-Brain Barrier

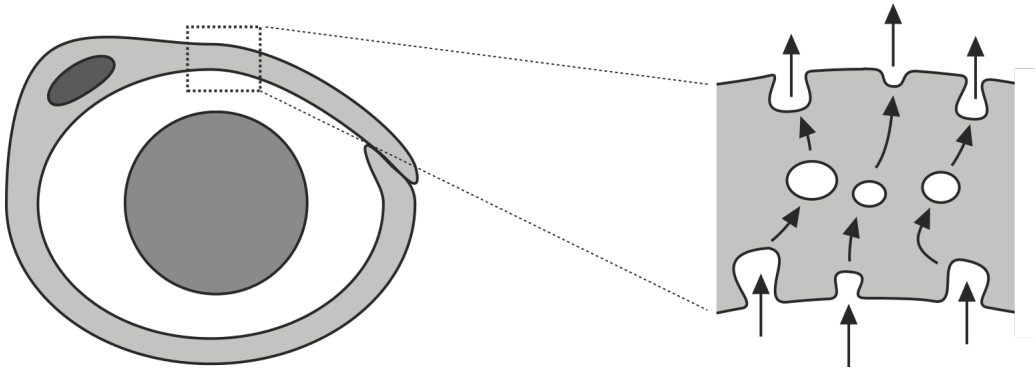
1. Endothelia
2. Interstitial Fluid
3. Plasma
4. Astrocyte
5. Cytoplasmic Extention
6. Basement Membrane



- Blood-Testis Barrier

b. Continuous Capillaries

- Muscle Tissues
- Pinocytosis



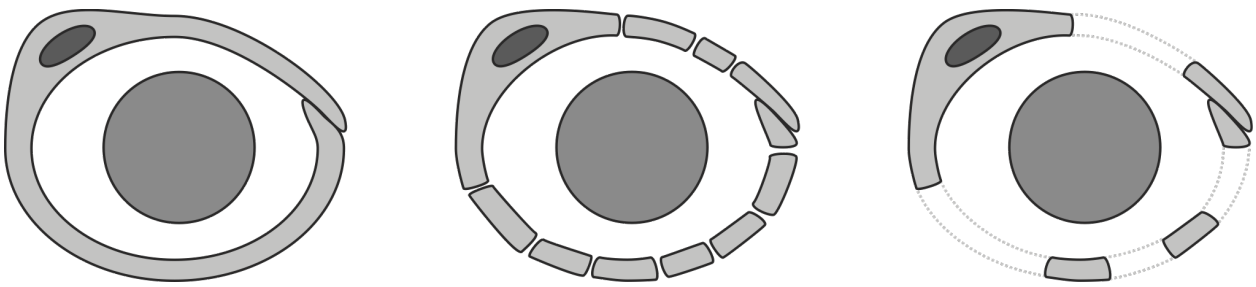
c. Fenestrated Capillaries

- Kidney
- Endocrine Glands
- Intestines

d. Discontinuous Capillaries (Sinusoids)

- Spleen
- Liver
- Bone Marrow (Red)

Three Capillary Types



ii. Capillary Blood Flow

a. Microcirculation of the Blood

- Metarteriole
- Proximal (Arteriole) End
- Distal (Venous) End

b. Precapillary Sphincter

- Autoregulation

D. Venules

E. Veins

i. General Characteristics

a. Tunica Interna

b. Elastic Tissue

c. Smooth Muscle

d. Tunical Externa

e. Vasa Vasorum

f. Flap Valves

g. Skeletal Muscle Pump

h. Veins as a Blood Reservoir

4. Fluid and Blood Movements and Return

   A. Capillary Exchange – (*Pull out your Downloadable Handout on Capillary Exchange)*

      i. Blood Hydrostatic Pressure (BHP)

      ii. Blood Osmotic Pressure (Colloid Osmotic Pressure)

      iii. Effective Filtration Pressure

   Important Exam Note: Have a very clear idea of how blood returns to the heart (ie, milking, capillary Exchange, the place of blood pressure)

   B. Venous Return

      i. Milking

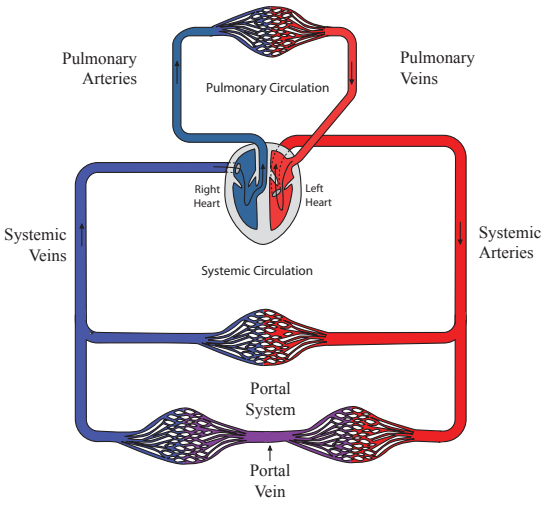
5. Venous Portal Systems *(Pull out downloadable handout)*

   A. Hepatic Portal System – *Know downloadable handout !!*

      i. Hepatic Portal Vein

   B. Hypothalamic-Hypophyseal Portal System

      • Illustration in handout



6. Blood Flow

   A. Blood Pressure

   B. Resistance

      i. Blood Viscosity

      ii. Blood Vessel Length and Peripheral Resistance

      iii. Blood Vessel Radius

7. Influences on Arterial Blood Pressure

A. Cardiac Output (CO)

i. Calculations:
Stroke Volume = End-Diastolic Volume - End-Systolic Volume
Cardiac Output = Stroke Volume X heart rate

B. Blood Volume

C. Peripheral Resistance

Blood Pressure = Cardiac Output X Peripheral Resistance

8. Control of Blood Pressure - *(Pull out downloadable handout on "Neuro/Endocrine Control of Blood Pressure")*

A. Cardio-acceleratory center (CAC)

and cardio-inhibitory center (CIC)

B. Vasomotor Center

- *Vasomotor Tone*
- Vasoconstriction
- Vasodilation
- Vessel Constriction
- Blood Reservoirs

C. Baroreceptors

i. Location

a. Carotid Sinus

b. Aorta

ii. Effect on Cardioregulatory Center

iii. Vasomotor Center

D. Chemoreceptors

i. Carotid Bodies

ii. Aortic Bodies

E. Chemicals

i. Epinephrine and Norepinephrine

9. **Parting Comment on Vessels** – Historically, some students do well on the heart and immune system (coming up next), but poorly on the vessels. And it is clear that the primary issue is time devoted to this important subject. Please budget sufficient time to the mastery of the vessels, and the anatomy and physiological concepts presented here. STUDY HARD ! ! !