

Herlihy's The Human Body in Health and Illness 7th edition

Chapter 18 Anatomy of the Blood Vessels and Special Circulations

LESSON 18.1

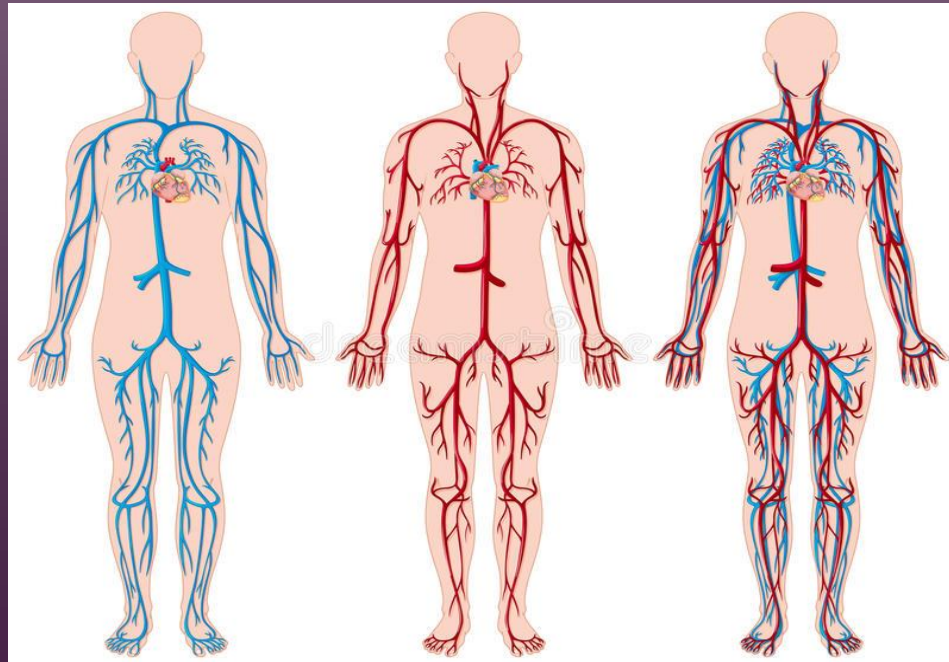
ANATOMY OF THE BLOOD VESSELS

1. DESCRIBE THE PULMONARY AND SYSTEMIC CIRCULATIONS.
2. DESCRIBE THE STRUCTURE AND FUNCTION OF ARTERIES, CAPILLARIES, AND VEINS, INCLUDING:
 - LIST THE THREE LAYERS OF TISSUE FOUND IN ARTERIES AND VEINS.
 - EXPLAIN THE FUNCTIONS OF CONDUCTANCE, RESISTANCE, EXCHANGE, AND CAPACITANCE VESSELS.
3. LIST THE MAJOR ARTERIES OF THE SYSTEMIC CIRCULATION THAT ARE BRANCHES OF THE ASCENDING AORTA, AORTIC ARCH, AND DESCENDING AORTA.

LESSON 18.1

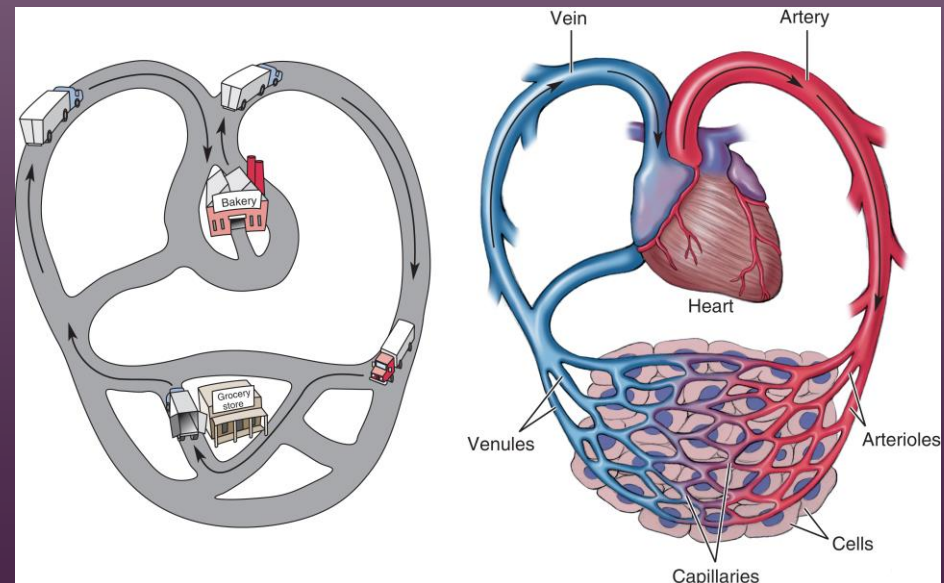
ANATOMY OF THE BLOOD VESSELS, CONT'D

4. LIST THE MAJOR VEINS OF THE SYSTEMIC CIRCULATION.
5. DESCRIBE THE FOLLOWING SPECIAL CIRCULATIONS: BLOOD SUPPLY TO THE HEAD AND BRAIN, HEPATIC CIRCULATION, AND FETAL CIRCULATION.
6. EXPLAIN PULSE AND ITS USE AS AN ASSESSMENT TOOL.



CIRCLES, CIRCUITS, AND CIRCULATION

- The blood vessels are a connected hollow tubes that begin and end in the heart.
- The heart and blood vessels form a circuit.
- This arrangement ensures a continuous one-way movement of blood.



CIRCLES, CIRCUITS, AND CIRCULATION

- **The pulmonary circulation**
 - carries blood from the right ventricle of the heart to the lungs and back to the left atrium of the heart.
- **The circulatory system**
 - the heart pumps the blood from the heart to the rest of the body, delivering oxygen to the tissues and returning unoxygenated blood to the heart.
- **The systemic circulation**
 - is the larger circulation
 - it provides the blood supply to the rest of the body.
 - The systemic circulation carries oxygen and other nutrients to the cells and picks up carbon dioxide and other waste.

TYPES OF BLOOD VESSELS

- ARTERIES

- Blood vessels that carry blood away from the heart
- The large arteries repeatedly branch into smaller and smaller arteries
- The smallest arteries are called **arterioles**

- CAPILLARIES

- Blood flows from the arterioles into the capillaries
- The smallest and most numerous of all the blood vessels

- VEINS

- Blood flows from the capillaries into the veins
- Veins are blood vessels that carry blood back to the heart
- The smallest veins are called **venules**

BLOOD VESSEL WALLS: THE LAYERED LOOK

- Blood vessels, except the capillaries, have three layers, or tunics.

1. TUNICA INTIMA

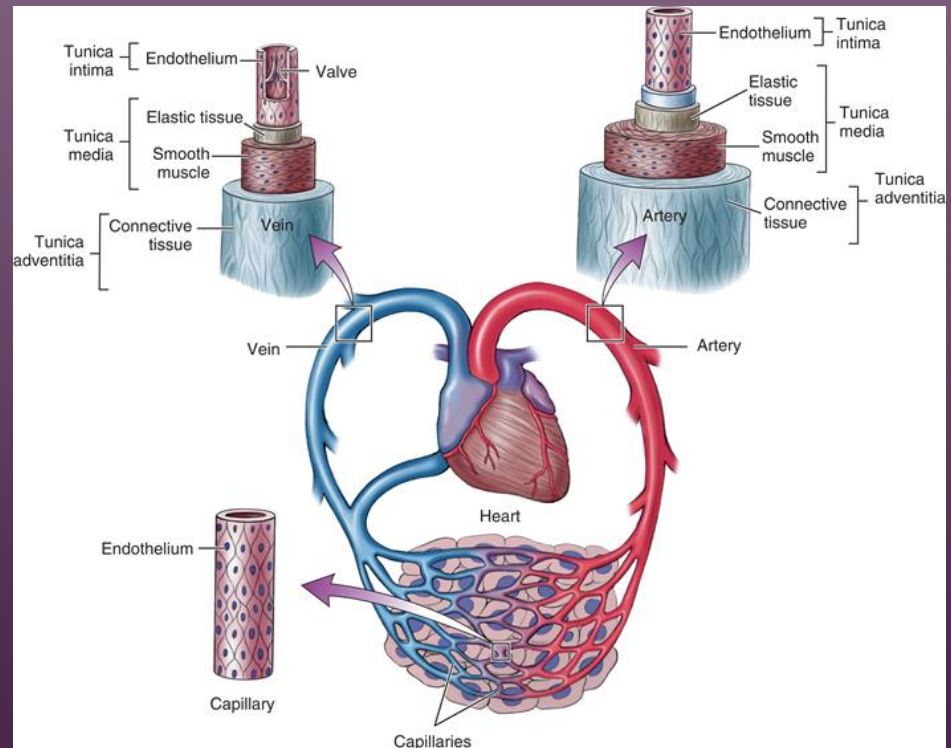
- Endothelium

2. TUNICA MEDIA

- Elastic tissue and smooth muscle

3. TUNICA ADVENTITIA

- Connective tissue



BLOOD VESSELS: WHAT THEY DO

- **ARTERIES:**

- Are thick, tough, and elastic because they have to withstand high pressure.

- **ARTERIOLES:**

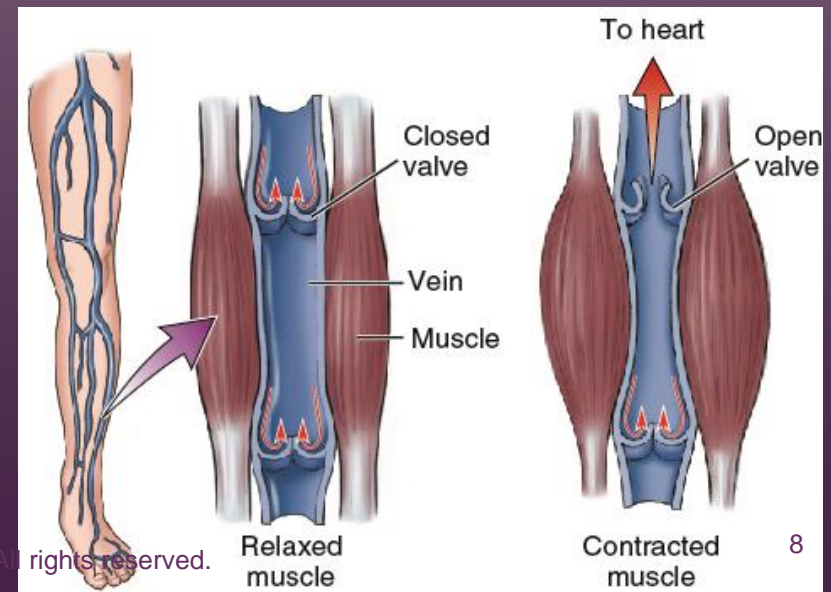
- Can contract and relax to control the radius of the vessel, hence their name, resistance vessels. The smaller the radius of the vessel, the greater the resistance.

- **CAPILLARIES:**

- single layers allow for exchange of nutrients and waste at the cellular level, hence their name, exchange vessels.

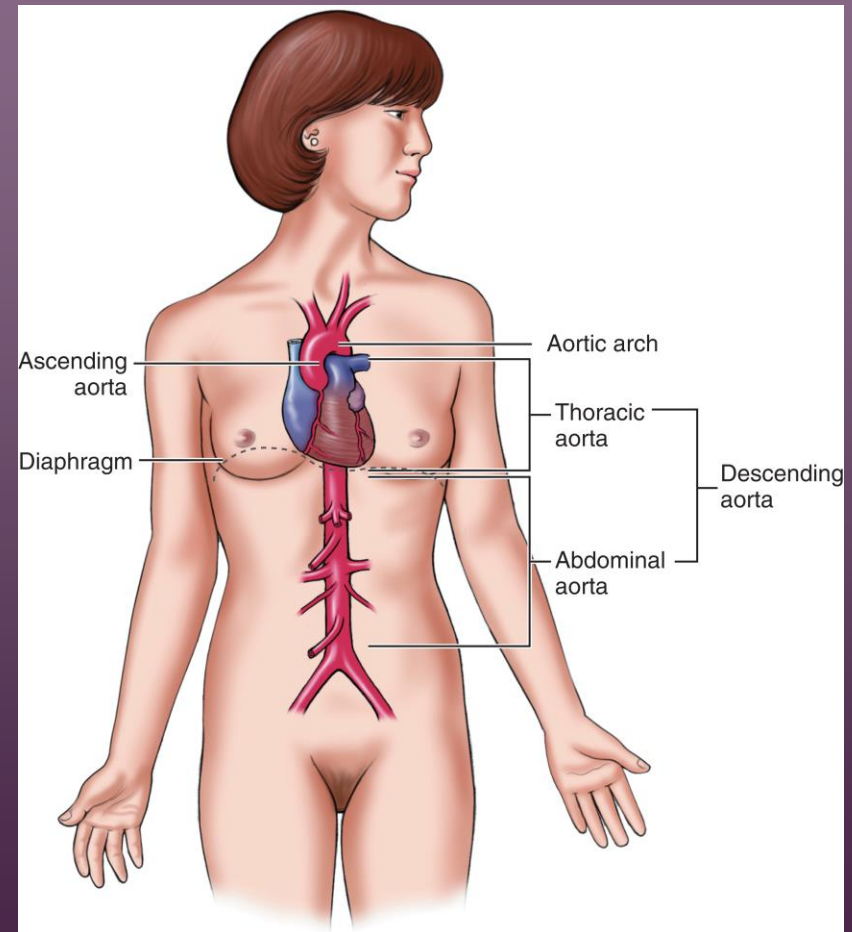
- **VEINS AND VENULES:**

- Temporarily “store” much blood and return it to the heart, hence their name, capacitance or storage vessels.



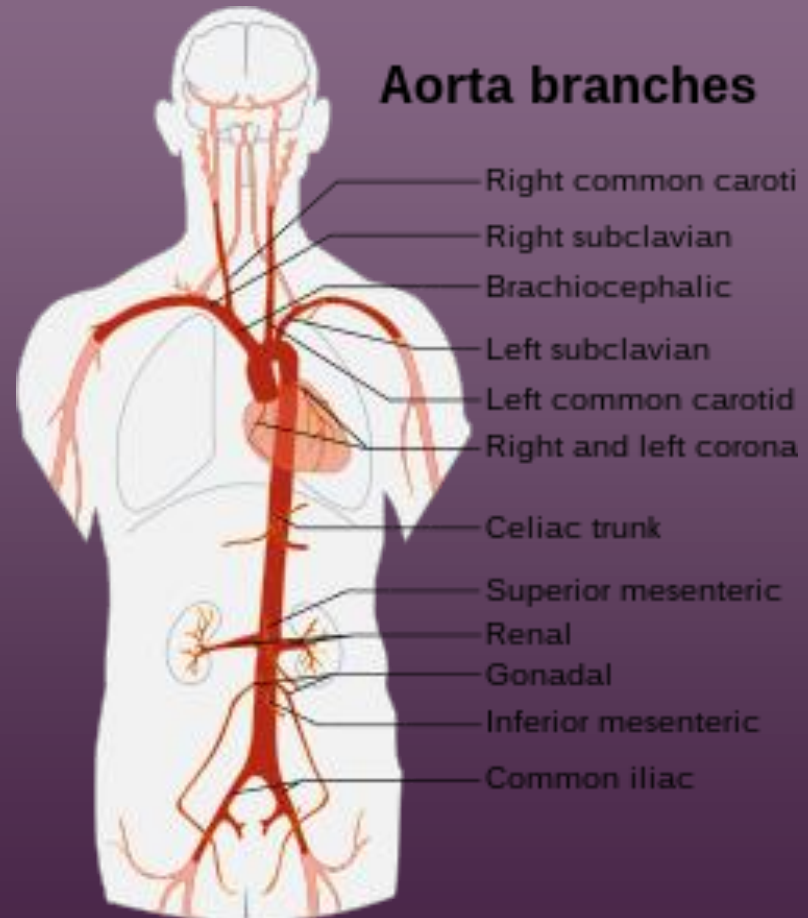
NAMING THE AORTA: TWO SYSTEMS

- All arteries branch off the aorta, directly or indirectly.
- Aorta: path it follows as it courses through the body
 - Ascending
 - Arch
 - Descending
- Aorta: location within the body cavities
 - Thoracic
 - Abdominal



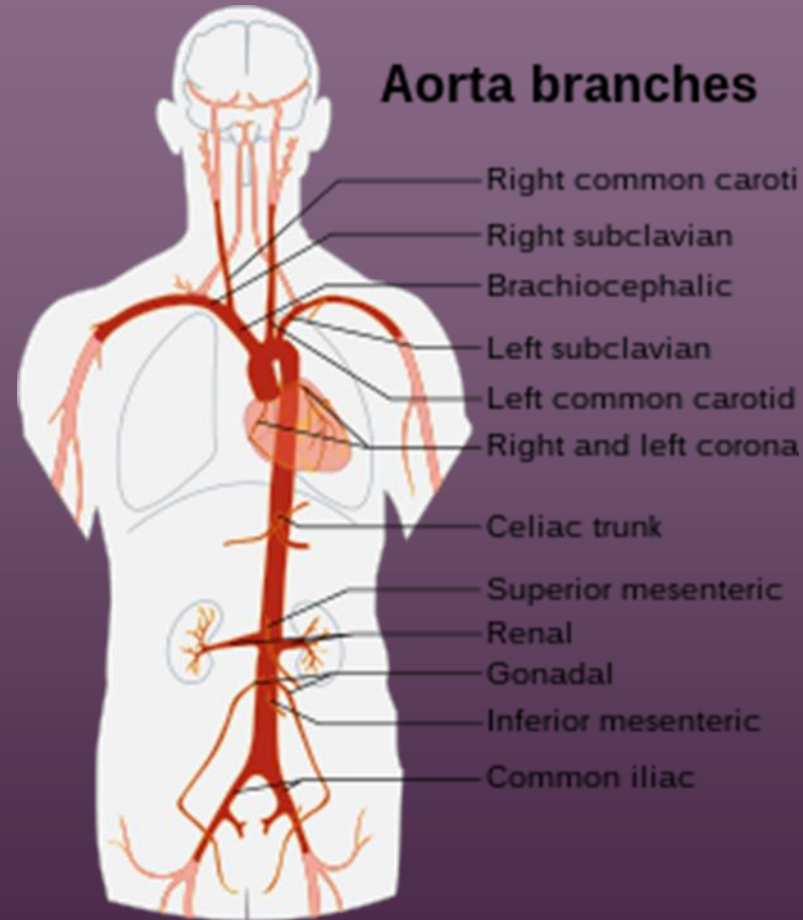
BRANCHES OF AORTA: ASCENDING AND ARCH

- Ascending aorta
 - Left and right coronary arteries
- Aortic arch
 - Brachiocephalic
 - Left common carotid
 - Left subclavian artery



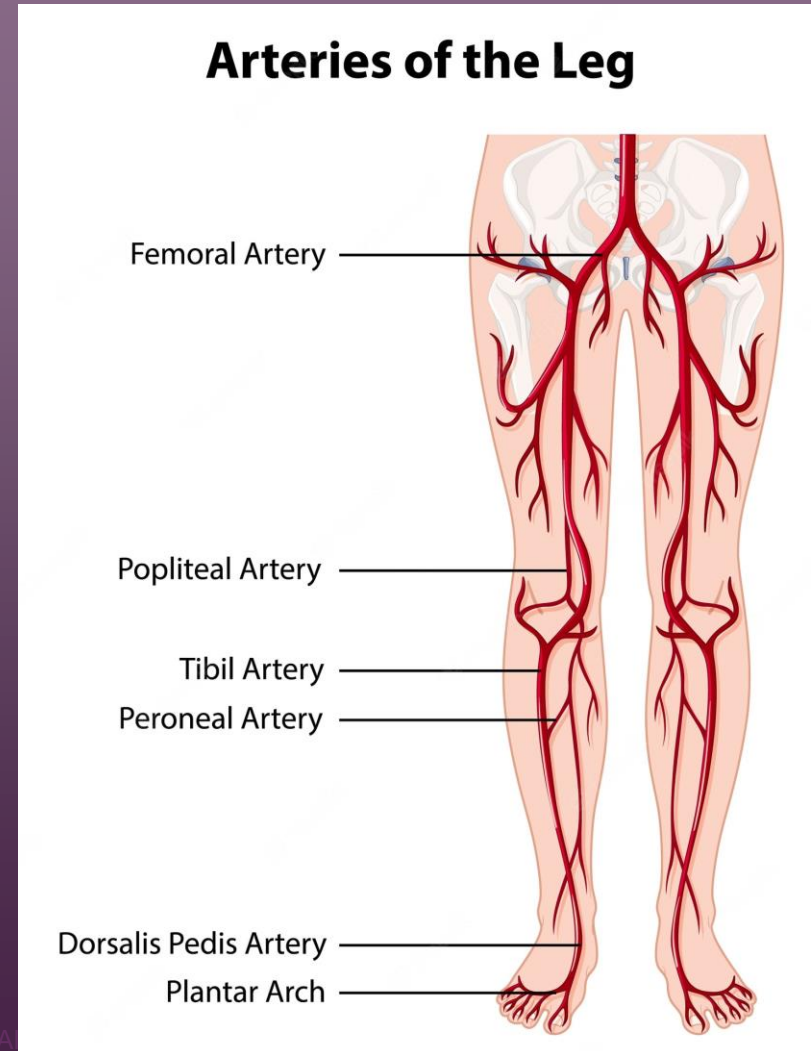
BRANCHES OF THE AORTA: DESCENDING

- THORACIC
 - INTERCOSTAL
 - OTHER ARTERIES
- ABDOMINAL
 - CELIAC TRUNK
 - MESENTERIC ARTERIES
 - RENAL ARTERIES
 - COMMON ILIACS



MAJOR ARTERIES OF THE LOWER EXTREMITIES

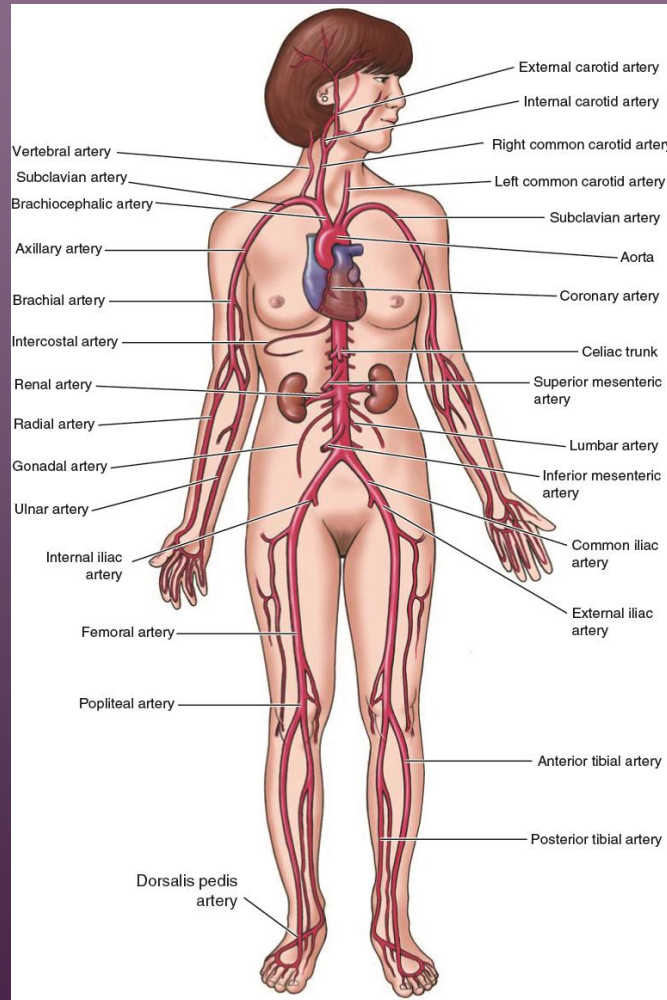
- EXTERNAL ILIAC
- FEMORAL
- POPLITEAL
- ANTERIOR AND POSTERIOR TIBIAL
- DORSALIS PEDIS



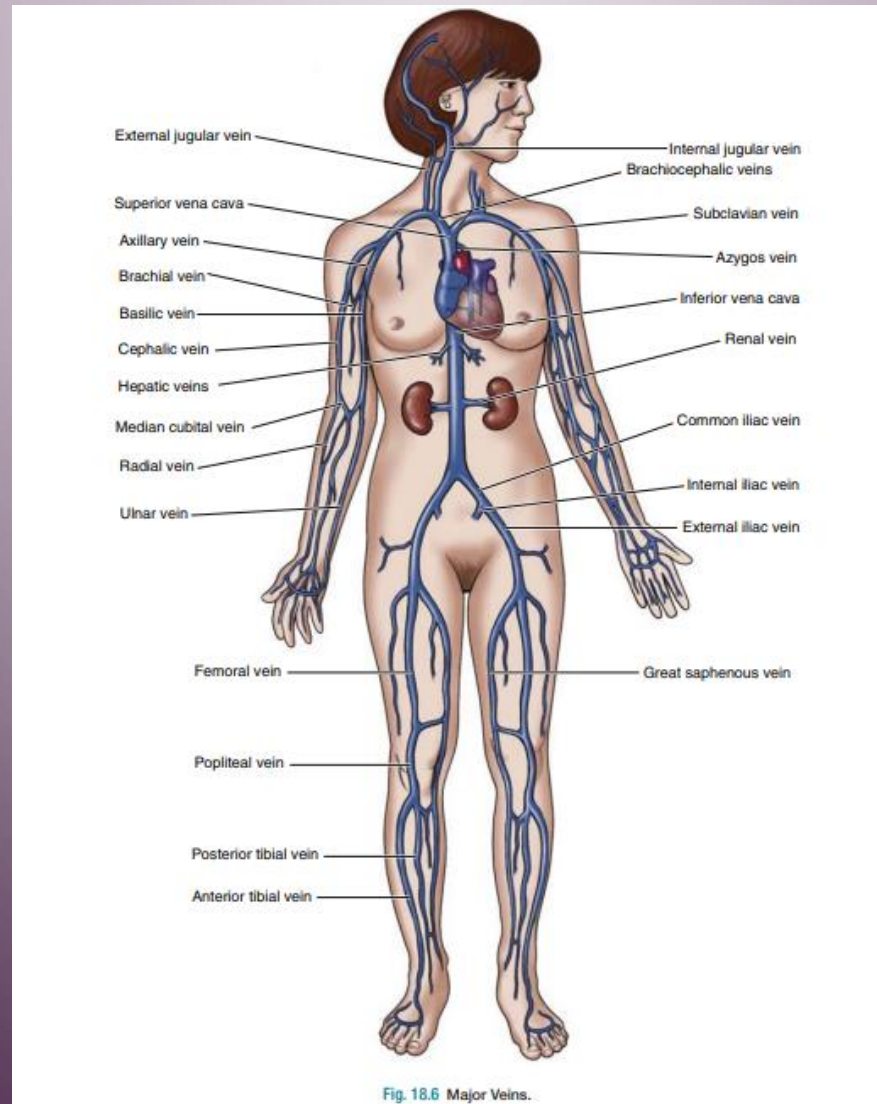
MAJOR VEINS OF THE SYSTEMIC CIRCULATION

- SUPERIOR VENA CAVA (SVC)
 - DRAINS HEAD, SHOULDERS, UPPER EXTREMITIES
- INFERIOR VENA CAVA (IVC)
 - DRAINS ALL REGIONS BELOW DIAPHRAGM

MAJOR ARTERIES OF THE SYSTEMIC CIRCULATION

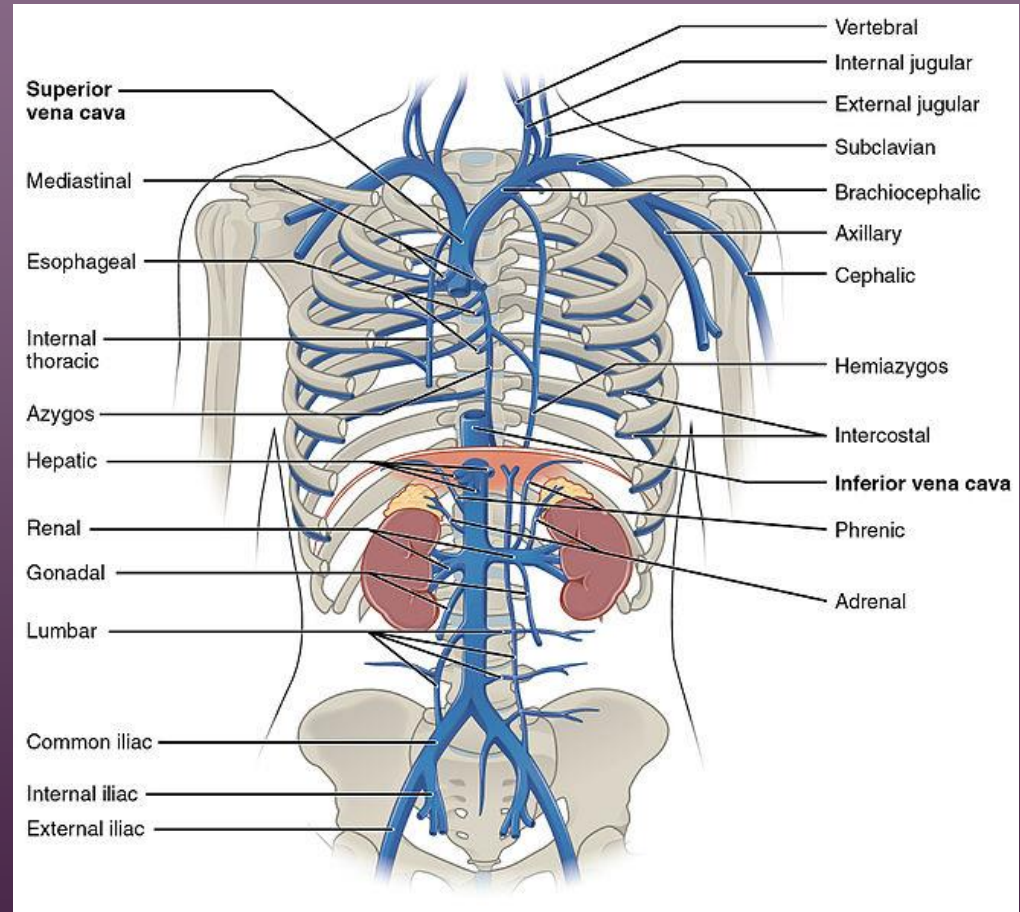


MAJOR VEINS OF THE SYSTEMIC CIRCULATION



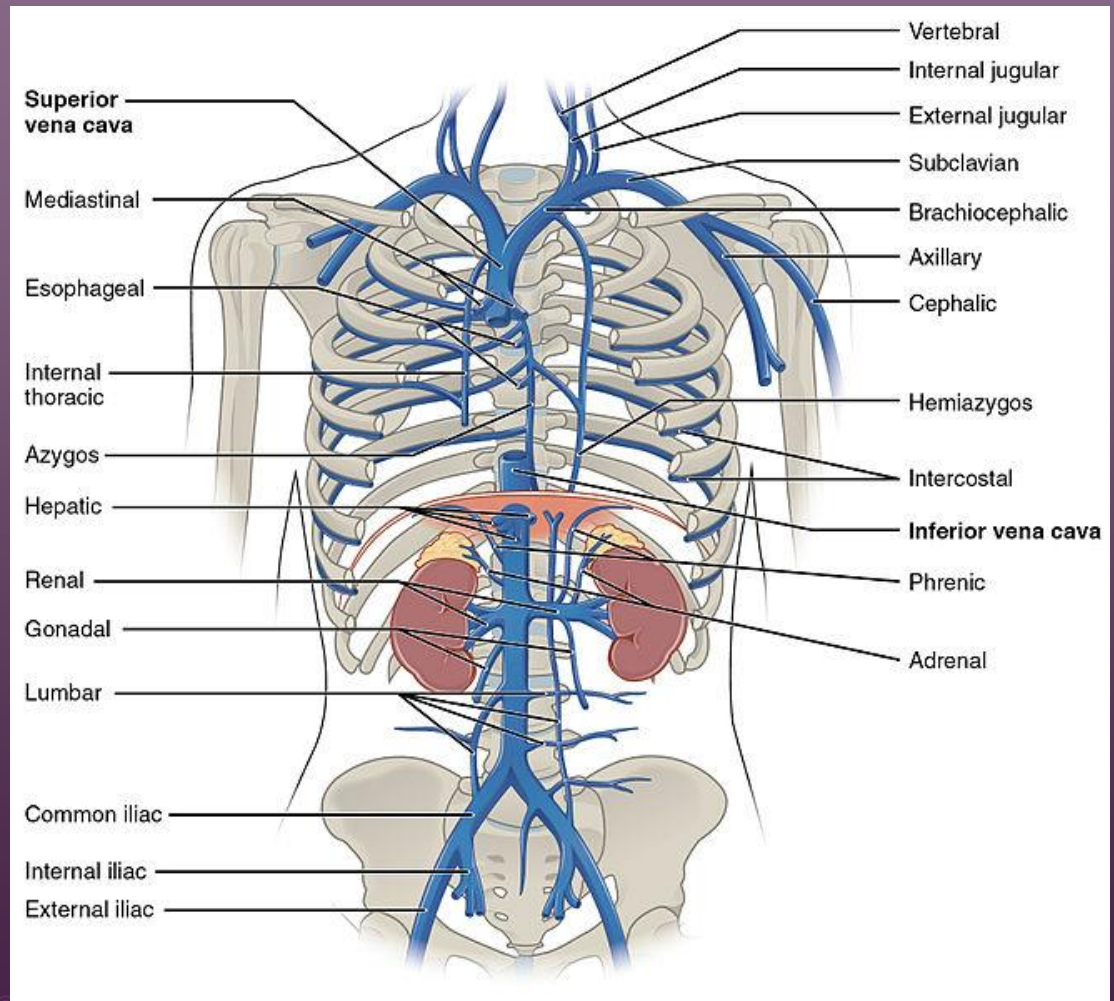
VEINS THAT EMPTY INTO THE SUPERIOR VENA CAVA

- BASILIC AND CEPHALIC
- BRACHIAL
- AXILLARY
- SUBCLAVIAN
- BRACHIOCEPHALIC
- JUGULARS (DRAIN BRAIN)



VEINS THAT EMPTY INTO THE INFERIOR VENA CAVA, CONT'D

- TIBIAL, PERONEAL
- POPLITEAL
- FEMORAL, SAPHENOUS
- EXTERNAL ILIAC
- COMMON ILIAC
- RENAL
- HEPATIC

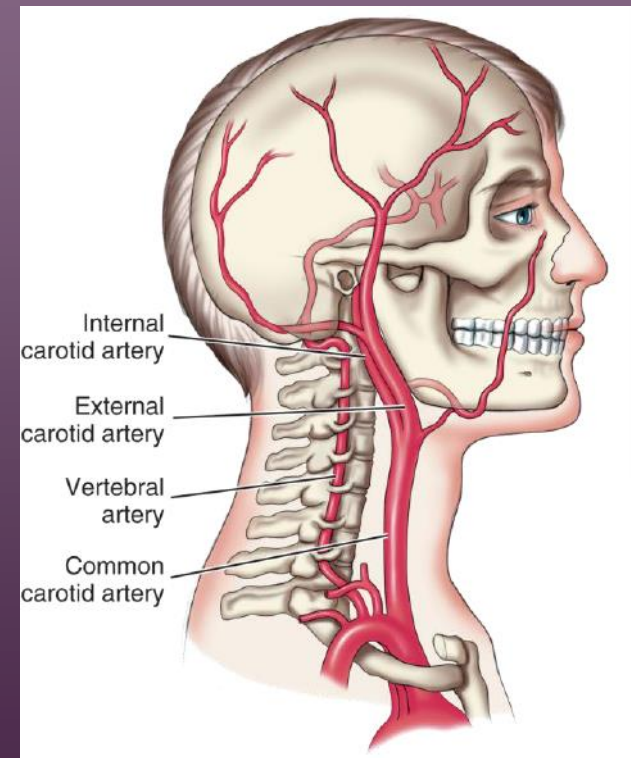


SPECIAL CIRCULATIONS

- Typically, an organ is nourished with blood delivered by a large artery and drained by a large vein that empties into the vena cava. However, some organs have a different arrangement of blood vessels. These are called special circulations.
- Blood supply to the head and brain
- Blood supply to the liver and hepatic portal circulation
- Fetal circulation
 - Umbilical blood vessels
 - Ductus venosus
 - Foramen ovale
 - Ductus arteriosus

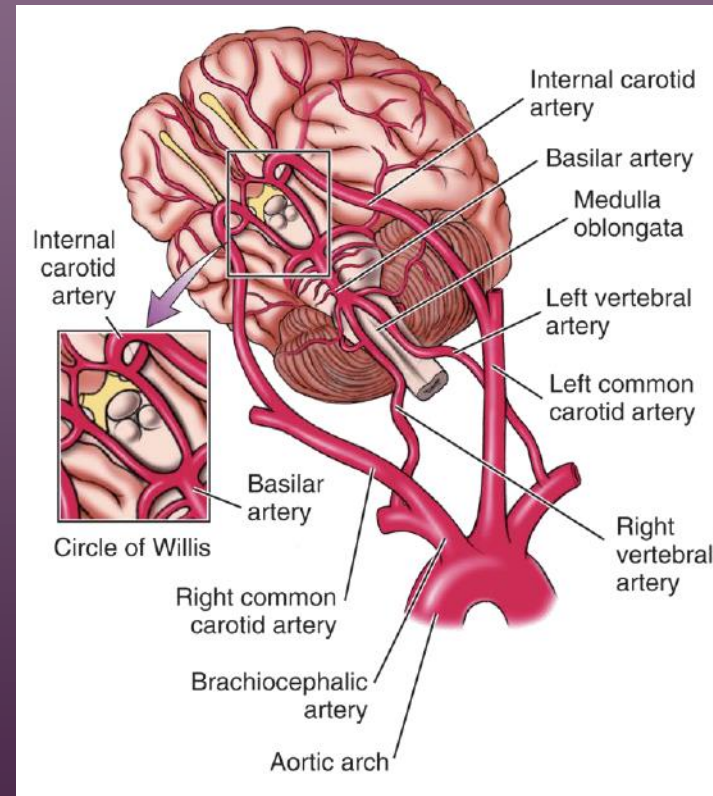
BLOOD SUPPLY TO HEAD AND BRAIN

- CAROTID ARTERIES
 - RIGHT AND LEFT COMMON CAROTID
 - EXTERNAL AND INTERNAL CAROTID
- VERTEBRAL ARTERIES
 - RIGHT AND LEFT VERTEBRAL
- CIRCLE OF WILLIS



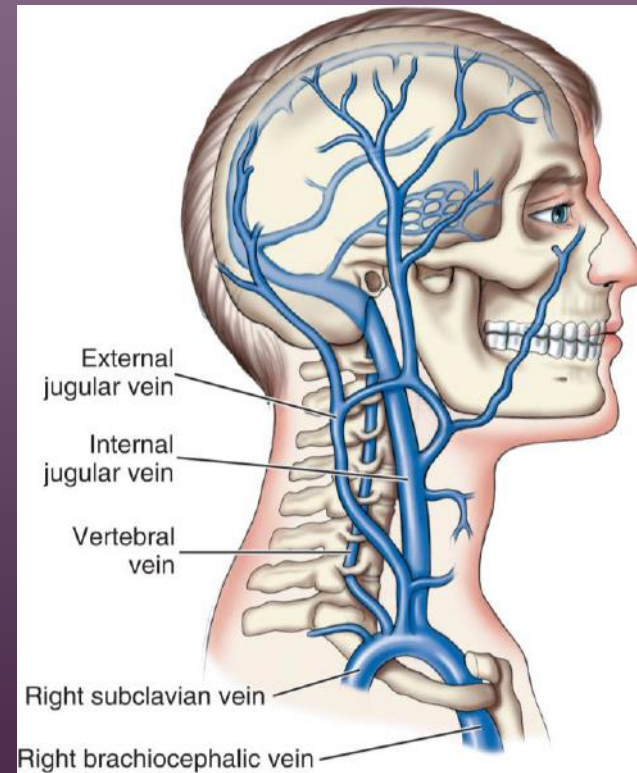
BRAIN'S BLOOD SUPPLY: CIRCLE OF WILLIS

- Found in base of brain
 - Left and right internal carotid arteries
- Vertebral arteries
 - Basilar artery
- The Circle of Willis is the joining area of several arteries at the bottom (inferior) side of the brain. At the Circle of Willis, the internal carotid arteries branch into smaller arteries that supply oxygenated blood to over 80% of the cerebrum.



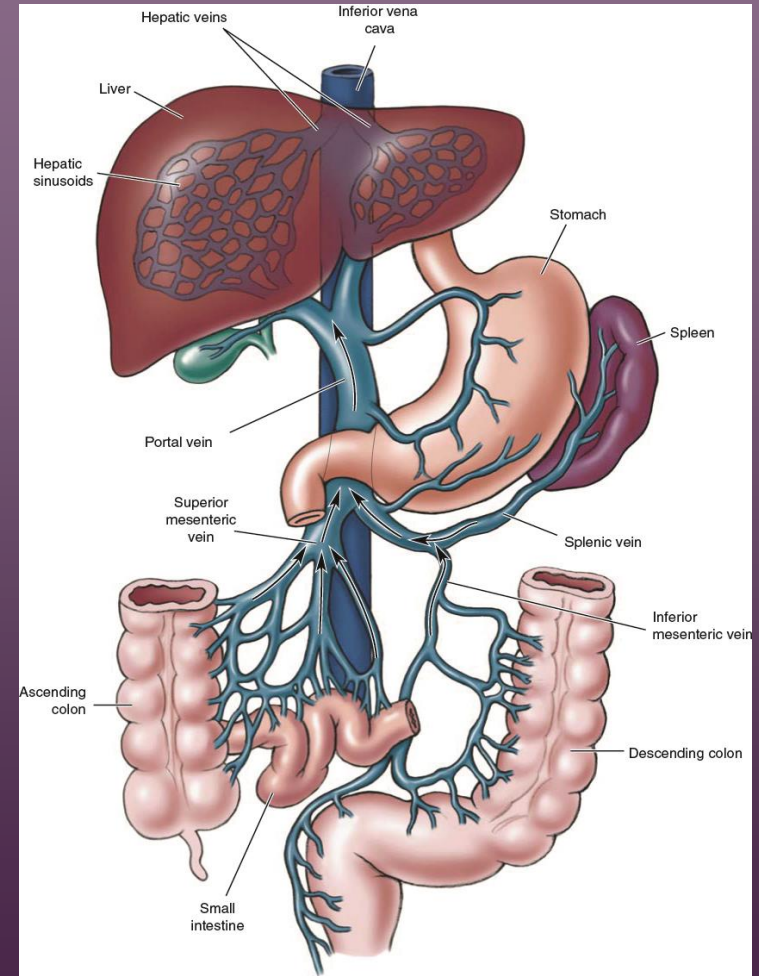
VENOUS DRAINAGE OF HEAD AND BRAIN

- External and internal jugular veins
- Vertebral veins
- Subclavian veins



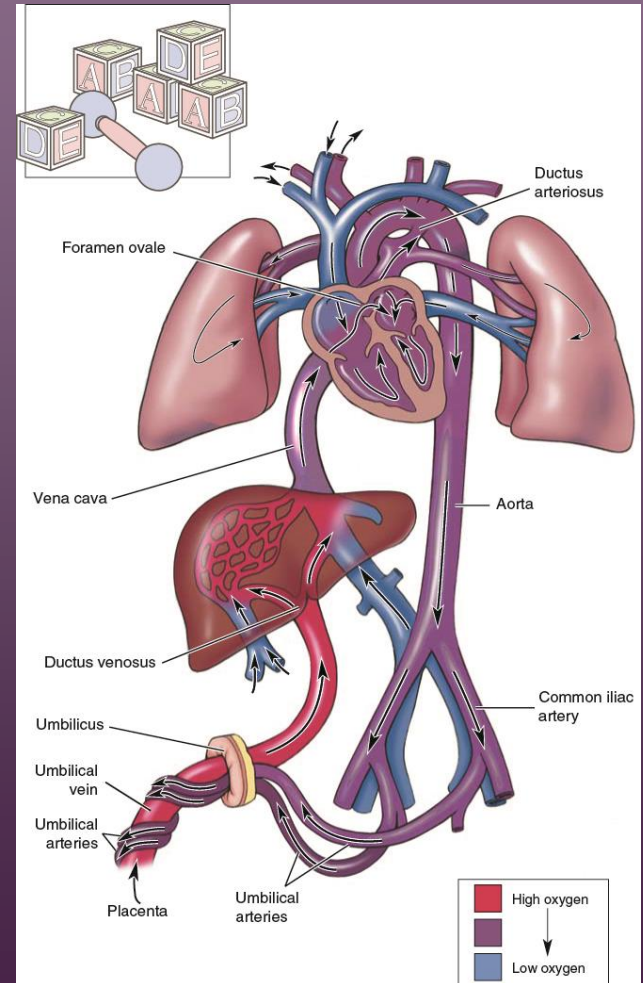
SPECIAL CIRCULATION: LIVER

- **Portal vein** carries unoxygenated blood from organs of digestion
- **Hepatic vein** carries blood from liver to IVC
- **Hepatic artery** carries oxygenated blood to liver



FETAL CIRCULATION: HEART MODIFICATION

- Umbilical blood vessels
- Ductus venosus
- Foramen ovale
- Ductus arteriosus

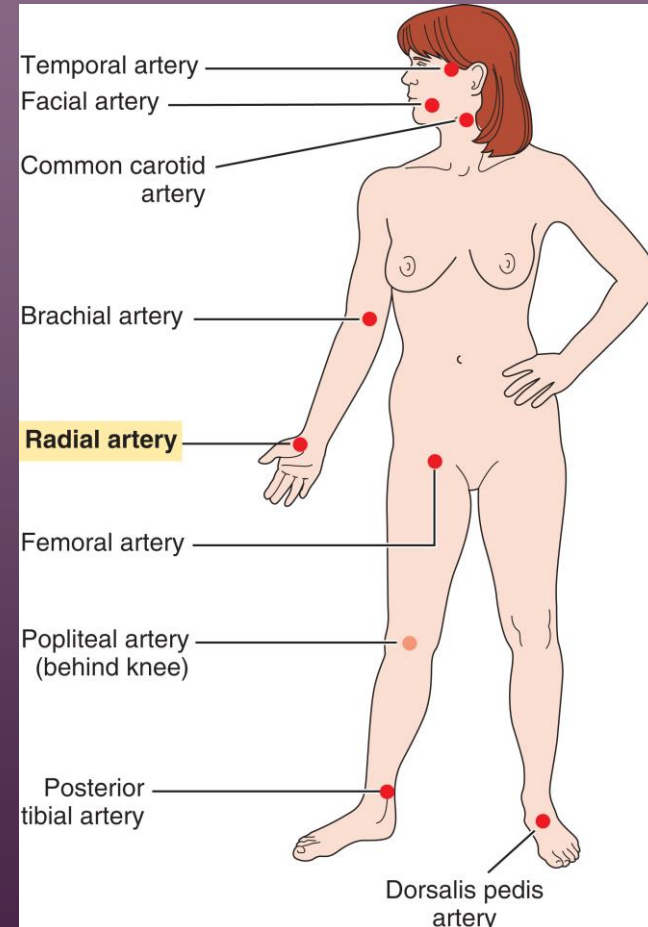


FETAL CIRCULATION: PERIPHERY

- UMBILICAL VEIN BRINGS OXYGENATED BLOOD FROM PLACENTA TO FETUS
- DUCTUS VENOSUS BYPASSES FETAL LIVER TO DELIVER BLOOD TO IVC
- TWO UMBILICAL ARTERIES BRING BLOOD FROM FETUS TO PLACENTA

ASSESSMENT AT PULSE POINTS

- HEART RATE
- RHYTHM
- STRENGTH
- ADEQUACY OF BLOOD FLOW



QUESTIONS?