CARDIAC FUNCTION AND CIRCULATORY SYSTEM

PTA1010

LEARNING OBJECTIVES:

- 1. Identify **circulatory system anatomy and function** of the various structures within the cardiovascular system.
- 2. Identify anatomy and function of the various structures within the **lymphatic system**.
- 3. Define some common pathologies of the circulatory system

TERMS TO KNOW:

- Mediastinum
- Atria/ ventricles
- Capillaries
- Circle of Willis
- Anastomosis
- Interstitial spaces
- Lymph
- Lymphedema
- Angion
- Hemorrhage
- Ischemia
- Peristalsis
- Sentinel node
- Watersheds
- Heart murmur
- Arteriosclerosis
- Atherosclerosis ischemia
- Thrombus
- Thrombophlebitis
- Embolism
- Aneurysm

- Located in the mediastinum, size of a closed fist,
  3.5" to the L of manubrium, and 5th intercostal space.

- Made up of 4 chambers 2 atria, 2 ventricles
- A-V valves separate the atria and ventricles: **Tricuspid (R); Mitral (L)**

Semilunar Valves:

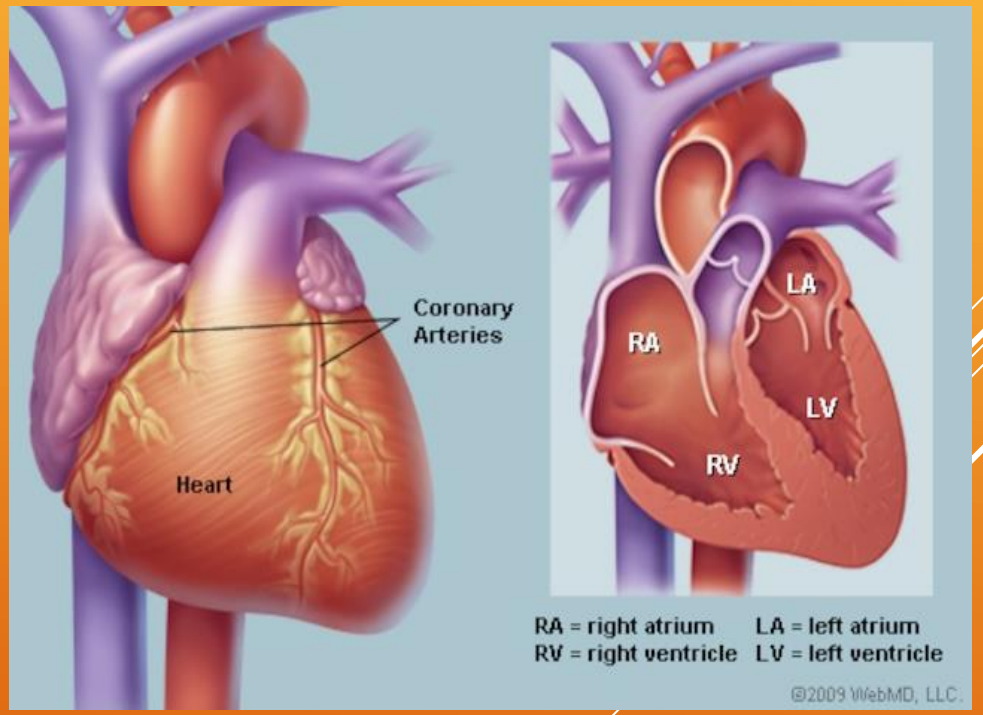
- **Pulmonic valve** prevents backflow to the R ventricle as blood exit via the pulmonary arteries to the lungs
- **Aortic valve** prevents backflow from the L ventricle as blood exits to the body

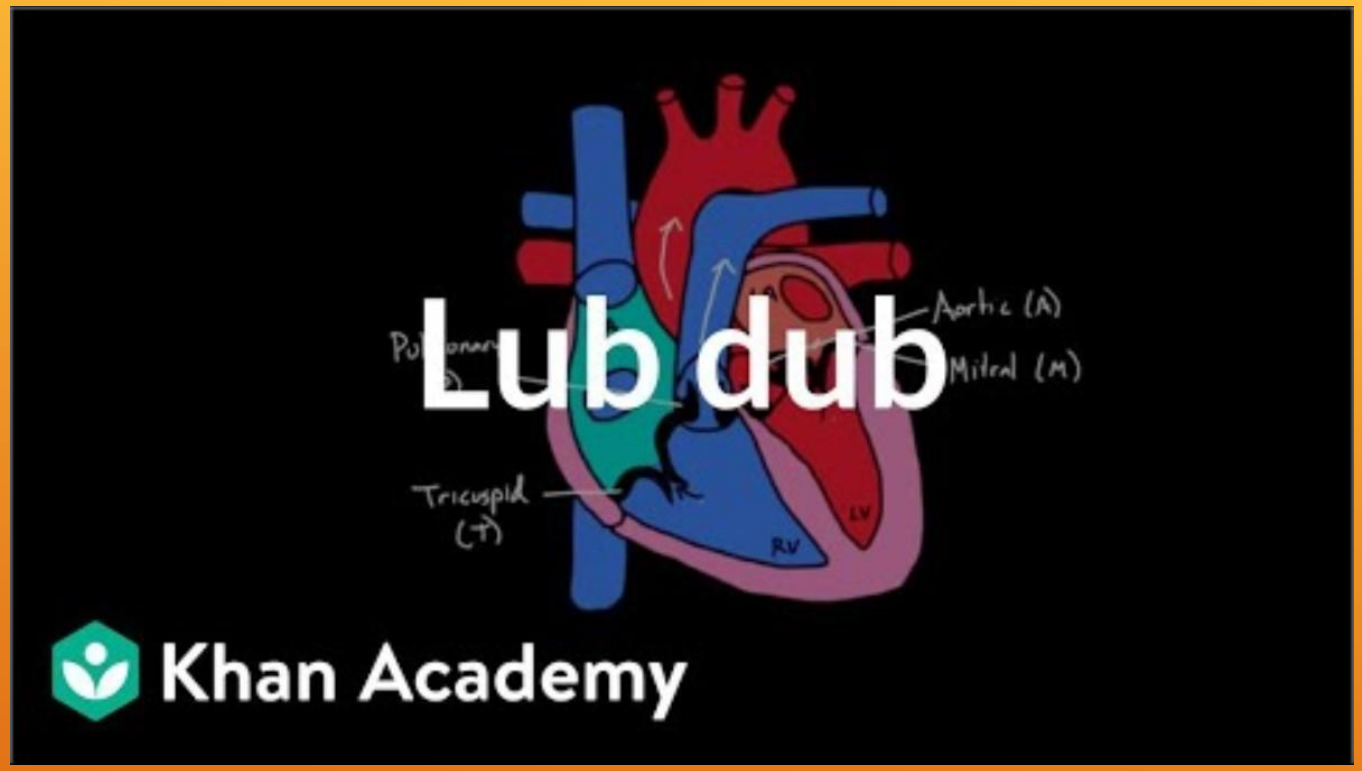
HEART IS: 2 WAY SYSTEM

LUB-DUB OR CARDIAC CYCLE

***LUB =S_1,**
forms the "lub" of "lub-dub" and is composed of components M_1 (mitral valve closure) and T_1 (tricuspid valve closure

****DUB =S_2,**
forms the "dub" of "lub-dub" and is composed of components A_2 (aortic valve closure) and P_2 (pulmonary valve closure)




Lub dub
Aortic (A)
Mitral (M)
Tricuspid
(T)
RV
LV
Khan Academy

TYPES OF BLOOD VESSELS

- **Arteries:** carry blood **away** from the heart

  carry oxygenated blood (except pulmonary arteries)

  Walls have 3 layers**: Thicker** than veins due to pressure- more elastic

- **Veins:** carry blood **toward** the heart

  deoxygenated blood (except for pulmonary veins)

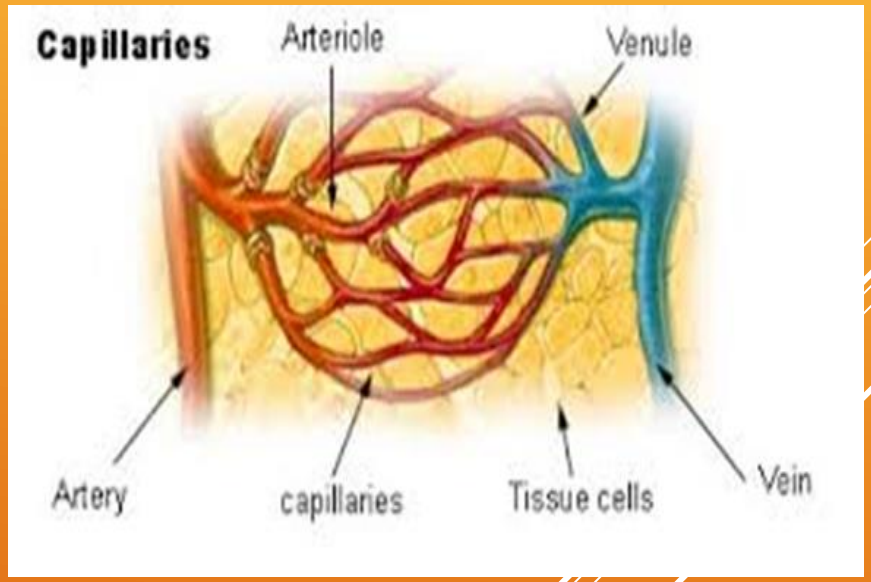
  Veins have **valves** to prevent backflow

- **LUMEN:** opening for blood passage smaller in arteries larger in veins

- **Anastomosis**: joining of similar vessels for alternative circulation

- Entire goal of CV system is to get blood into the capillaries for diffusion to take place.

- **Oxygen transport system**



CAPILLARIES: ONE ENDOTHELIAL CELL LAYER THICK

PULSES:

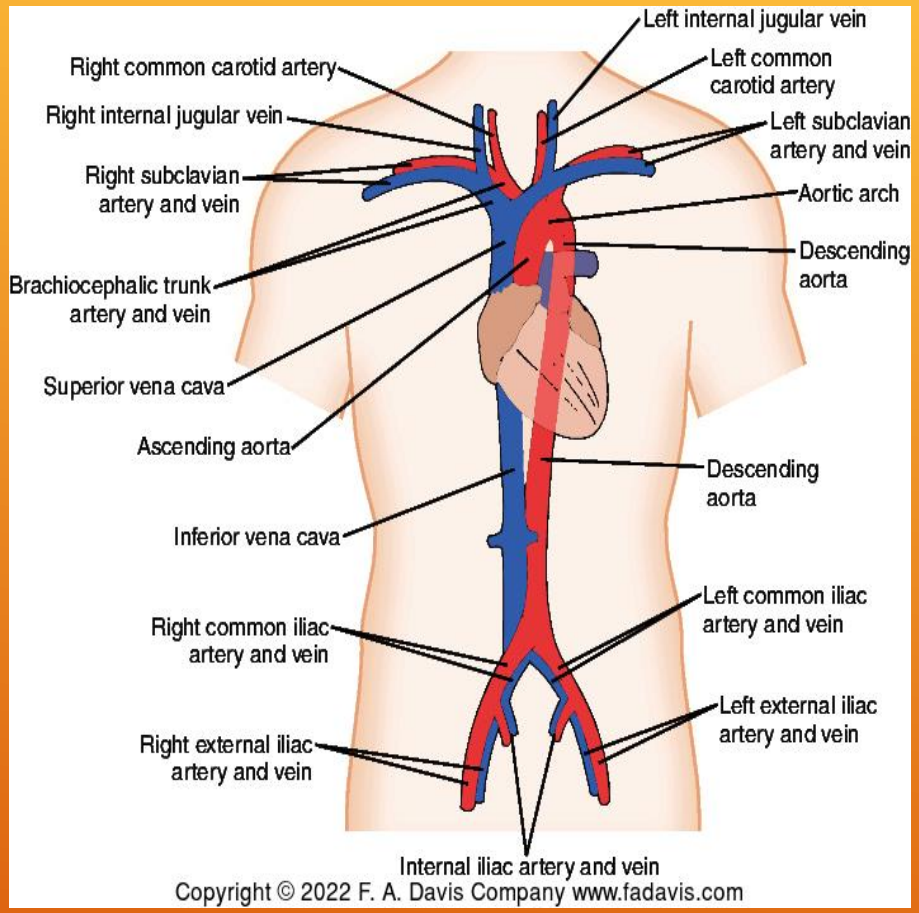
- Temporal
- Carotid
- Apical
- Brachial
- Radial
- Femoral
- Popliteal
- Dorsalis pedis
- Posterior Tibialis

- Normal HR Adult= @ 72 beats/min
  60-100 beats/min
- Pediatric= 120 beats/min
- Tachycardia= >100 beats/min
- Bradycardia= < 60 beats/min

Normal BP= less than 120 for systolic
less than 80 for diastolic

Prehypertension = 120-139
80-89mm Hg

Hypertension = > 140
90-100mmHg


Left internal jugular vein
Right common carotid artery
Left common carotid artery
Right internal jugular vein
Left subclavian artery and vein
Right subclavian artery and vein
Aortic arch
Descending aorta
Brachiocephalic trunk artery and vein
Superior vena cava
Ascending aorta
Descending aorta
Inferior vena cava
Left common iliac artery and vein
Right common iliac artery and vein
Left external iliac artery and vein
Right external iliac artery and vein
Internal iliac artery and vein
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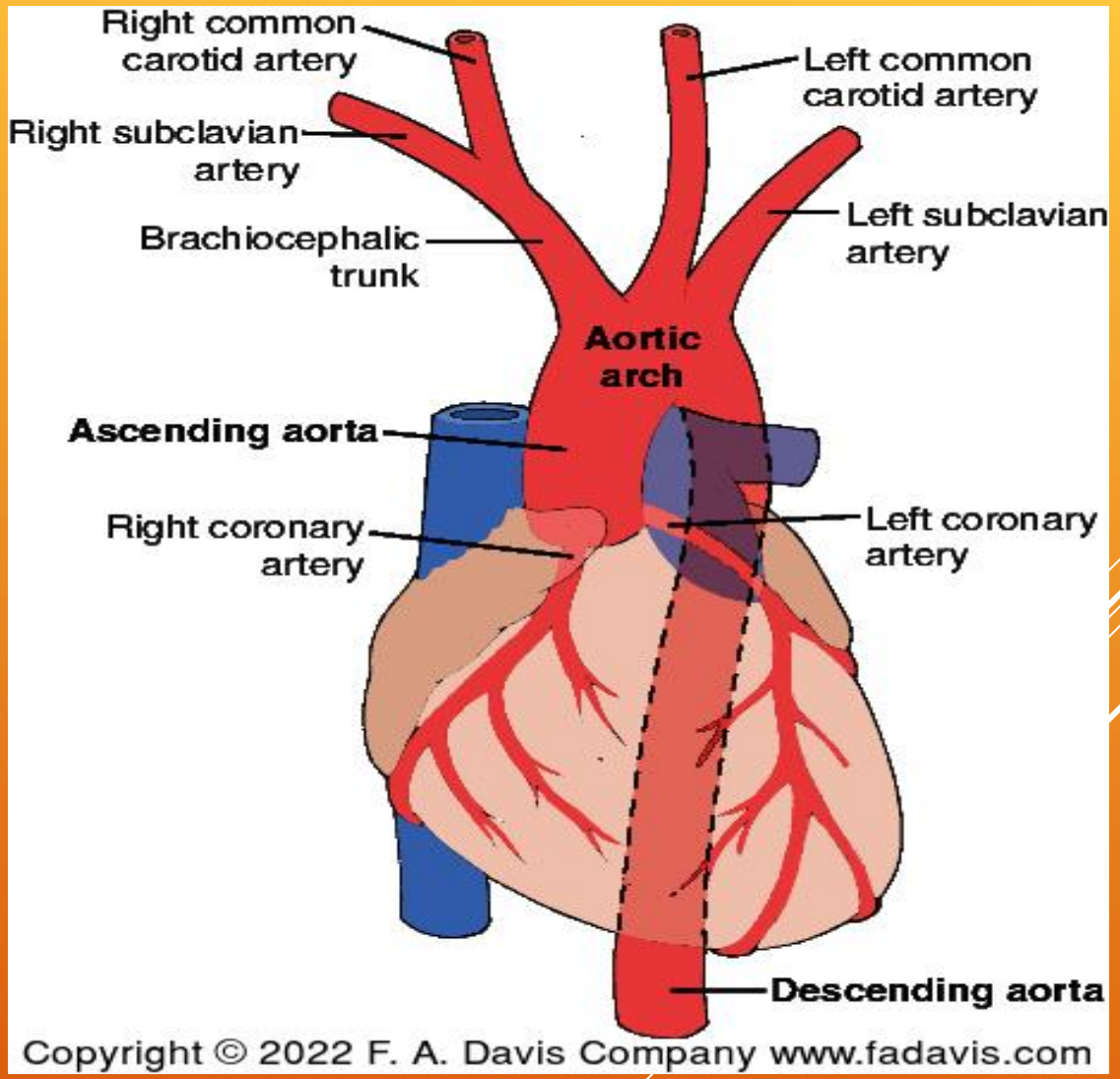
Right common carotid artery
Left common carotid artery
Right subclavian artery
Left subclavian artery
Brachiocephalic trunk
Aortic arch
Ascending aorta
Right coronary artery
Left coronary artery
Descending aorta
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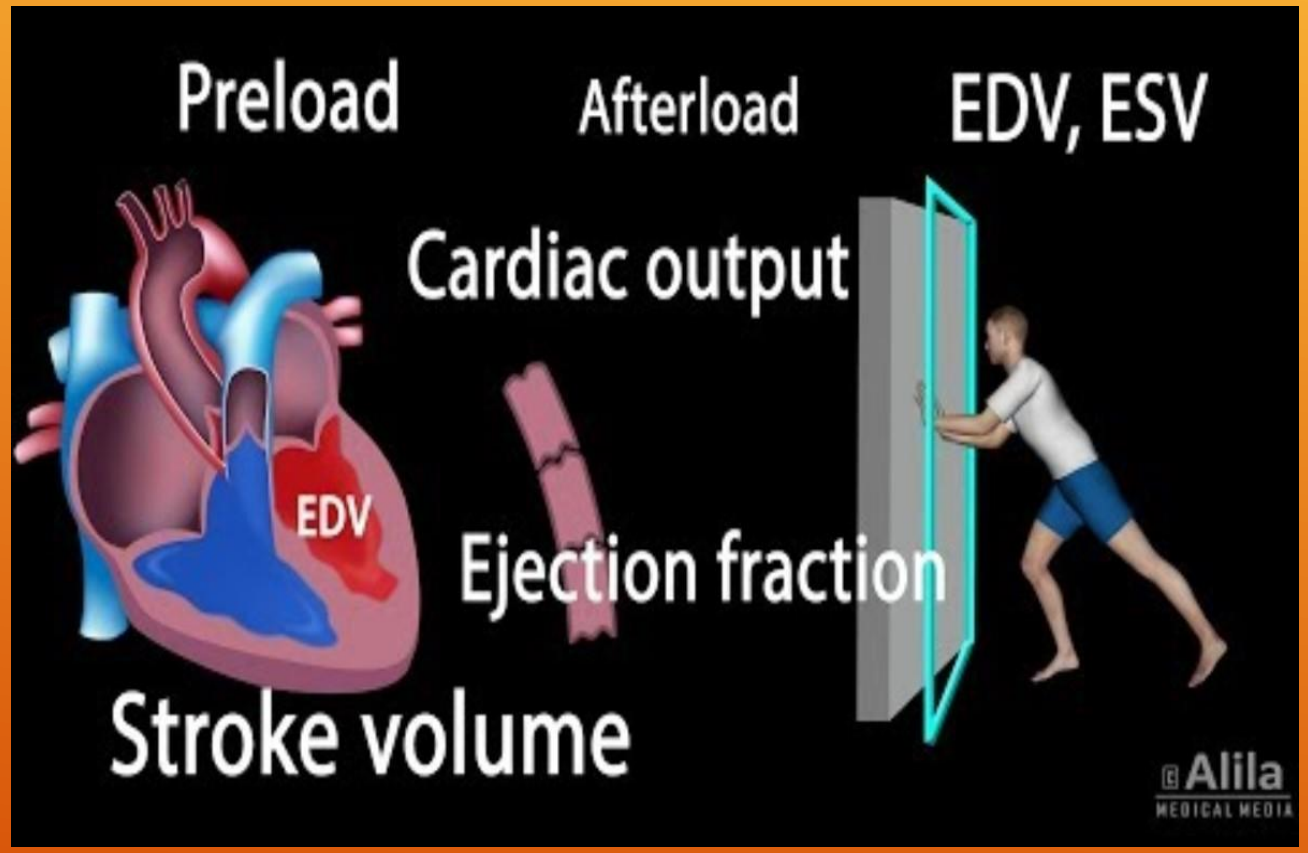
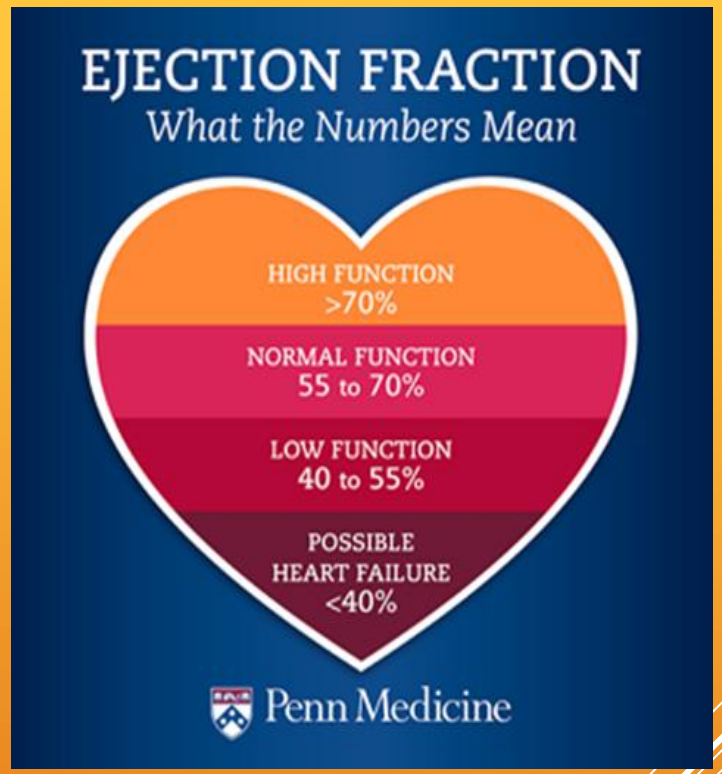
BLOOD FLOW:

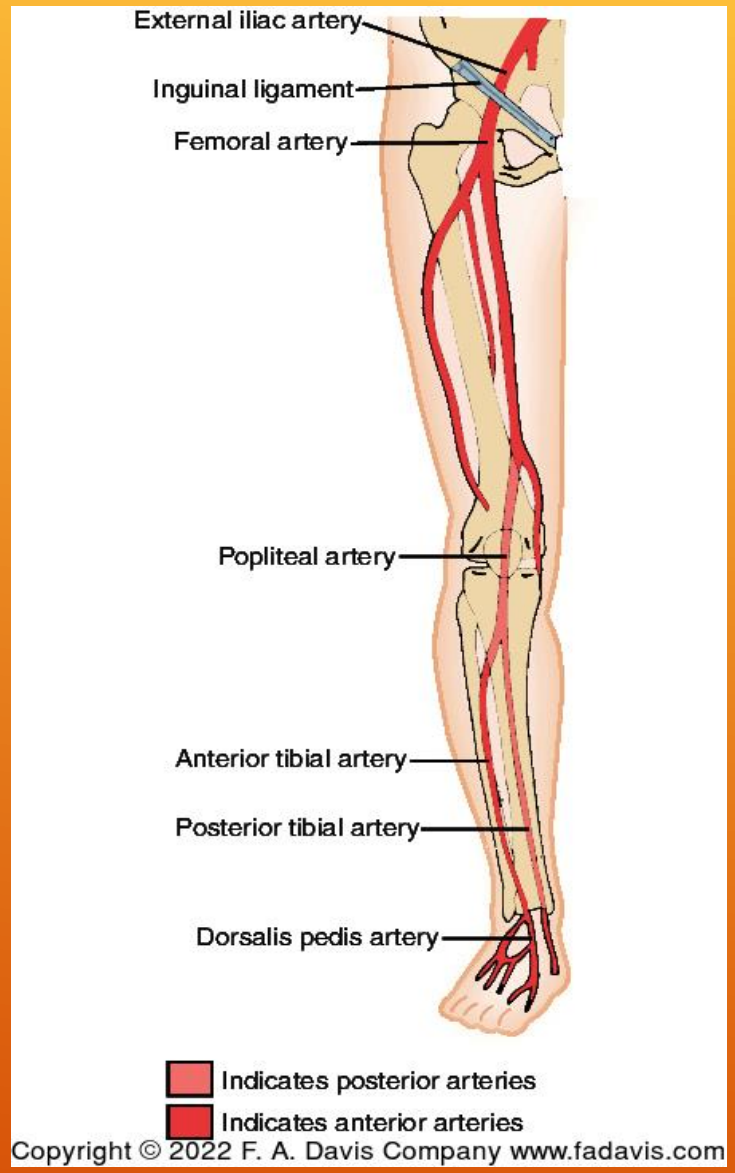
Cardiac Output

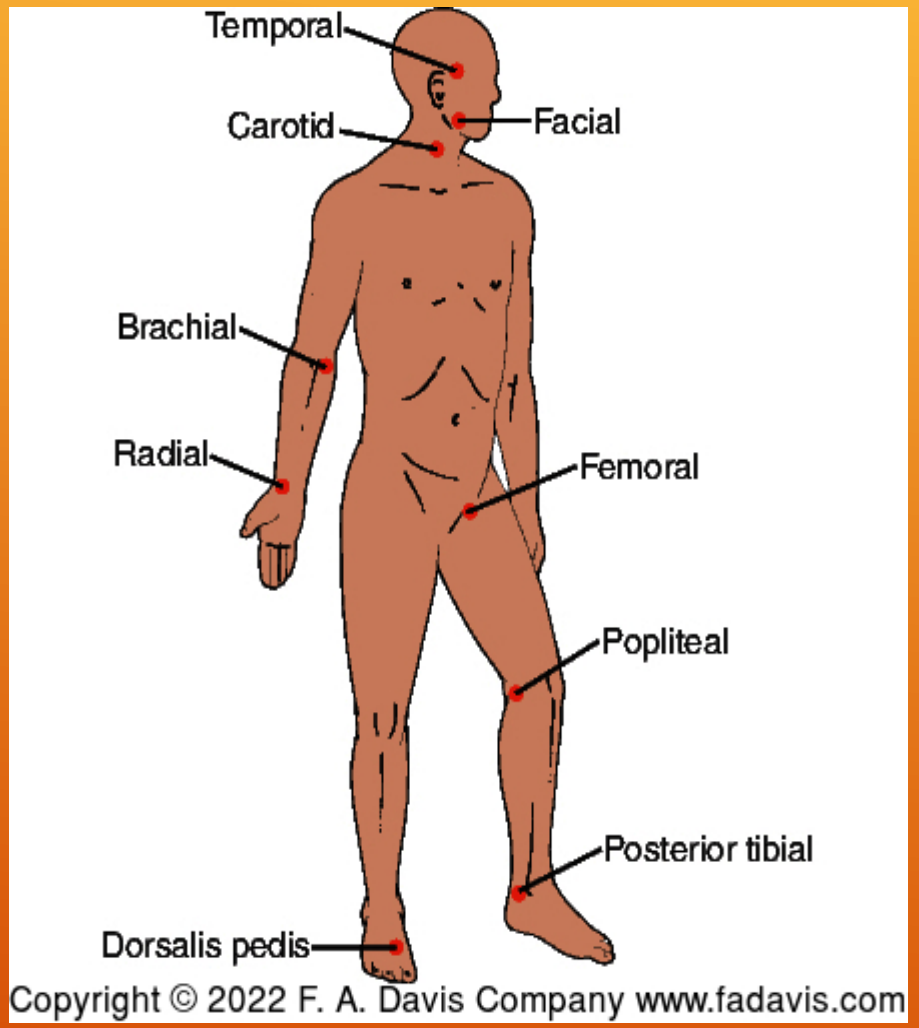


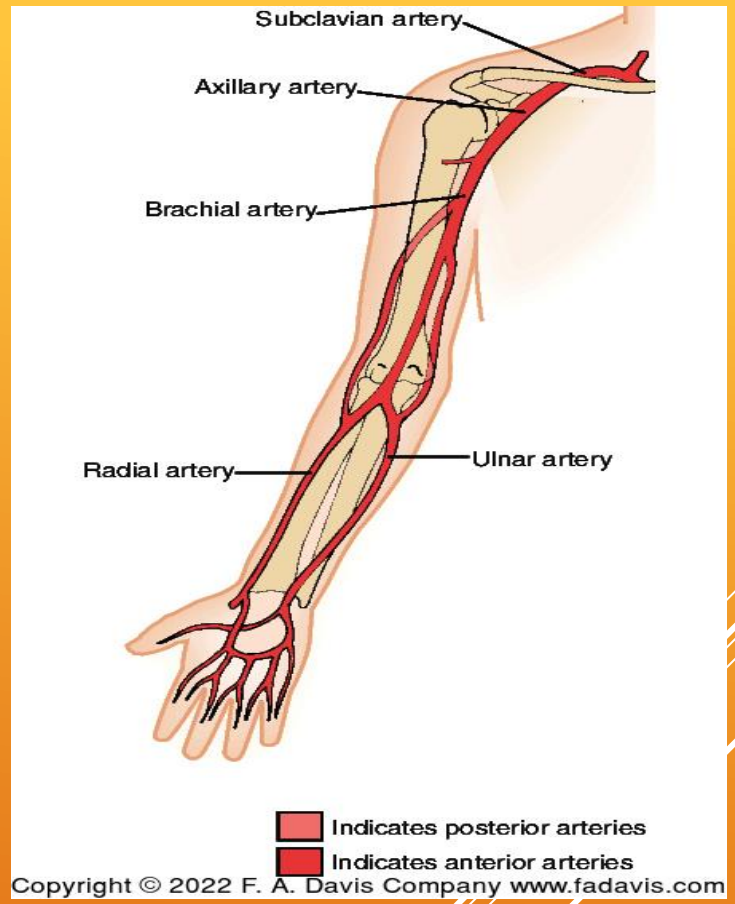


CARDIAC OUTPUT= HR X SV
STROKE VOLUME= LEFT VENTRICLE
EJECTION FRACTION % SV/EDV
NORMAL= 55-75%

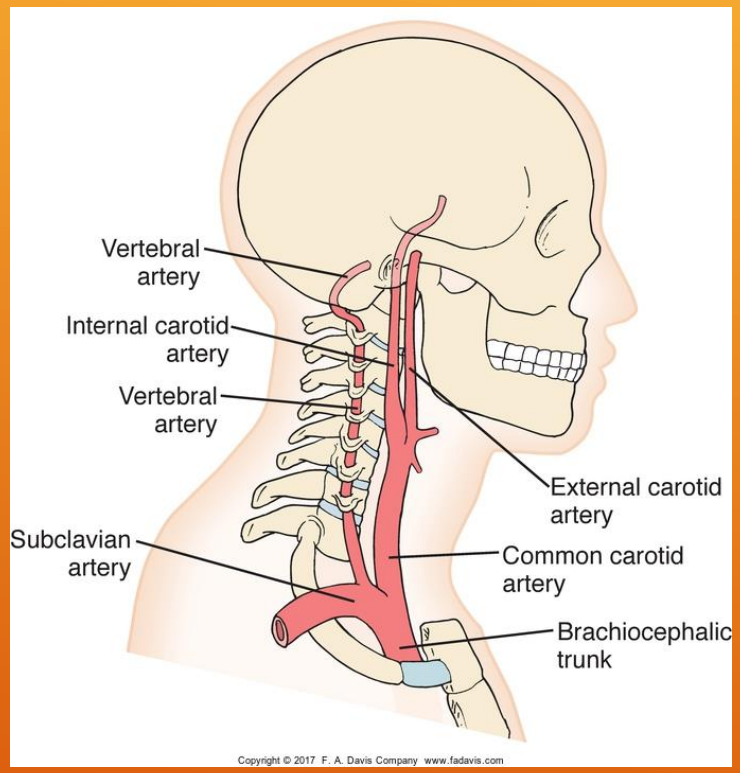
Pulses and Path of Circulation

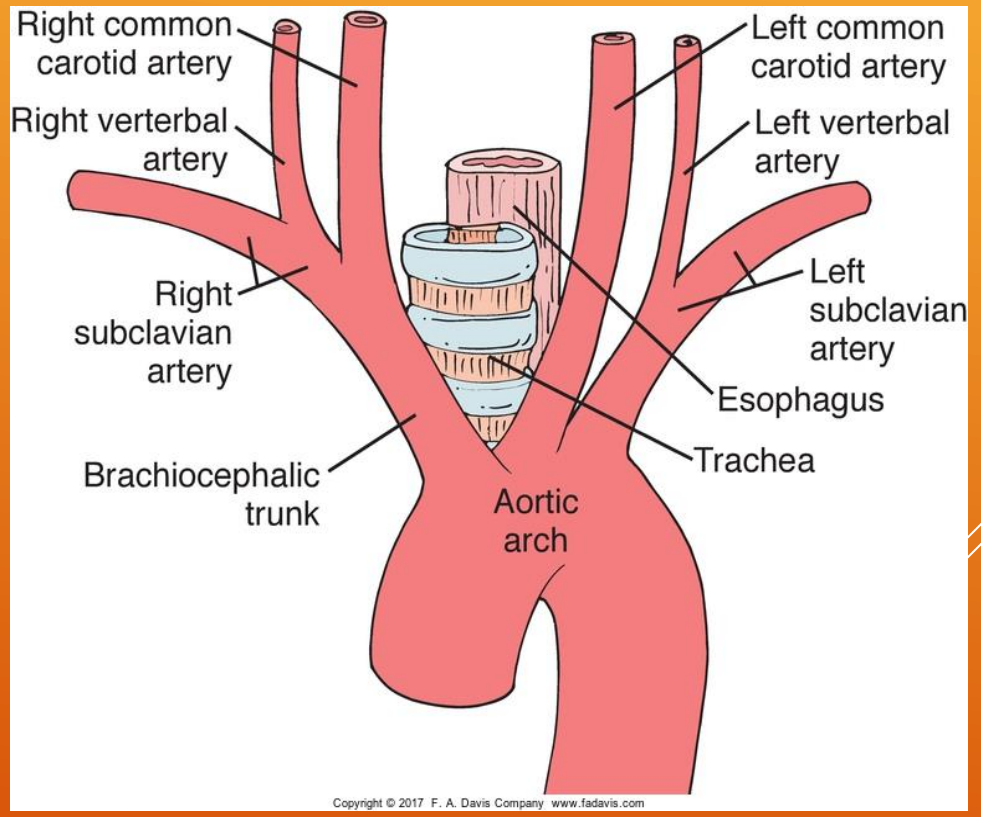


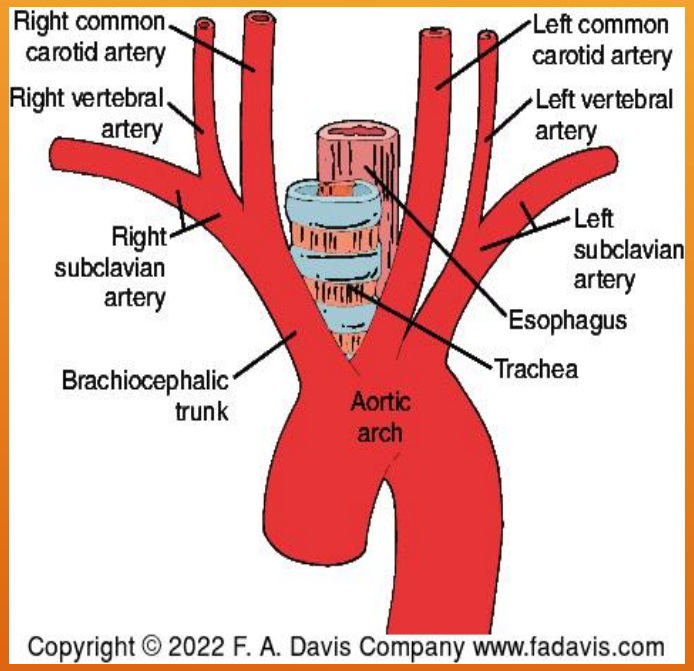


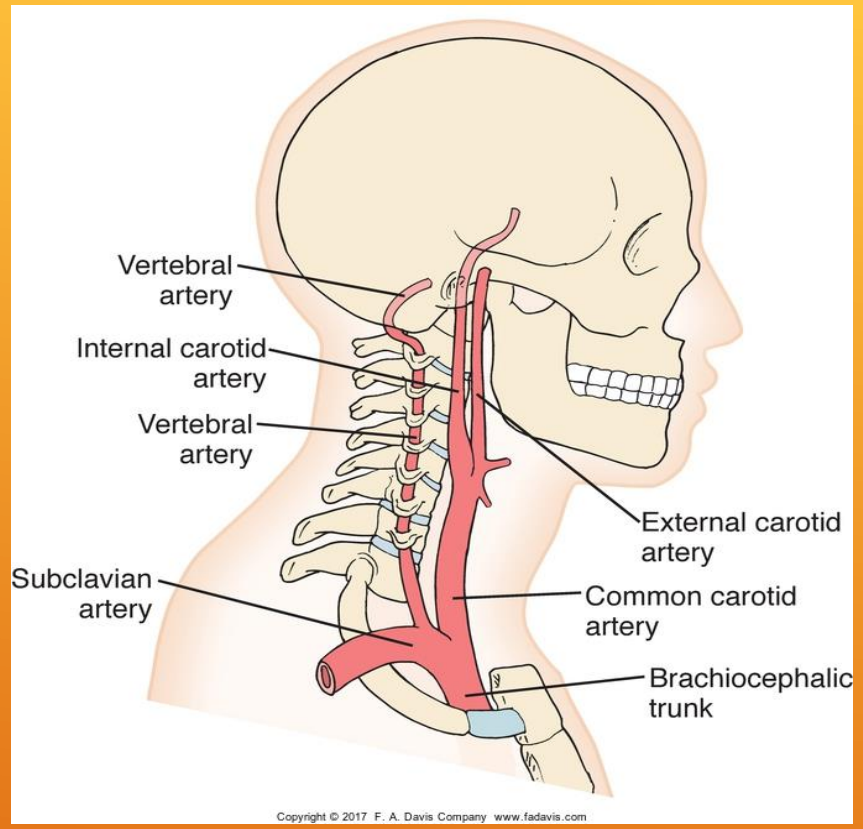


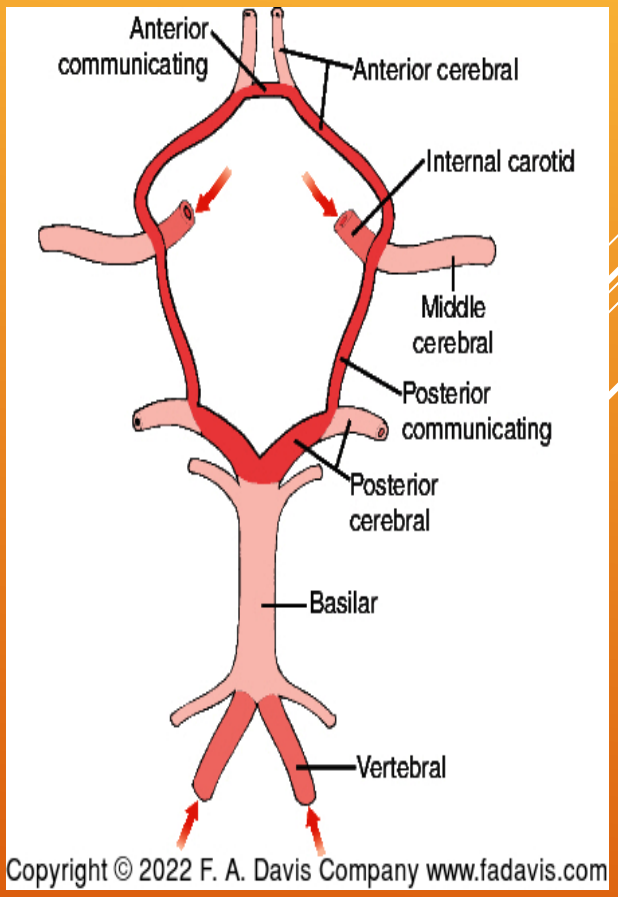
CEREBRAL BLOOD FLOW TO HEAD AND UE







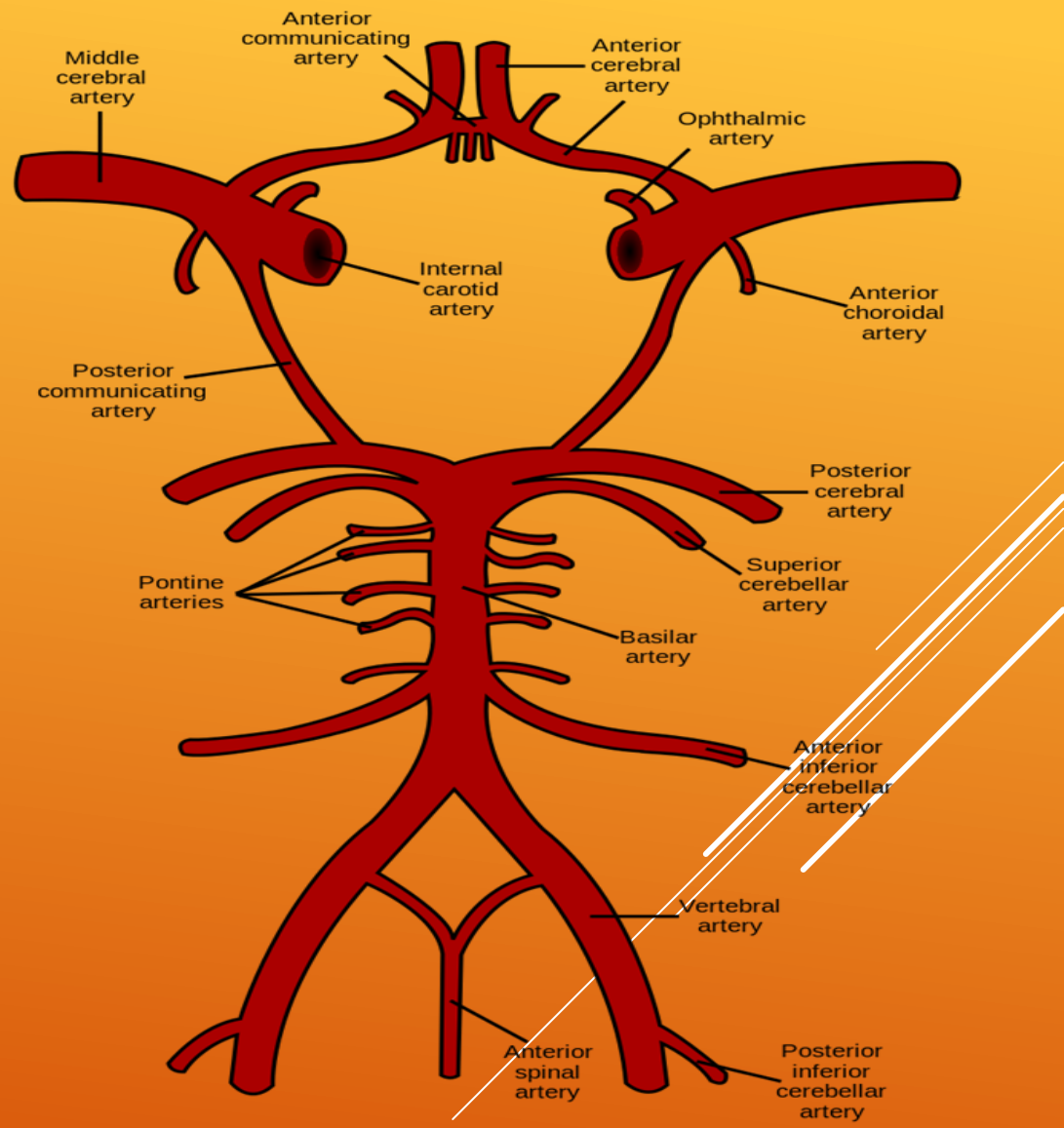




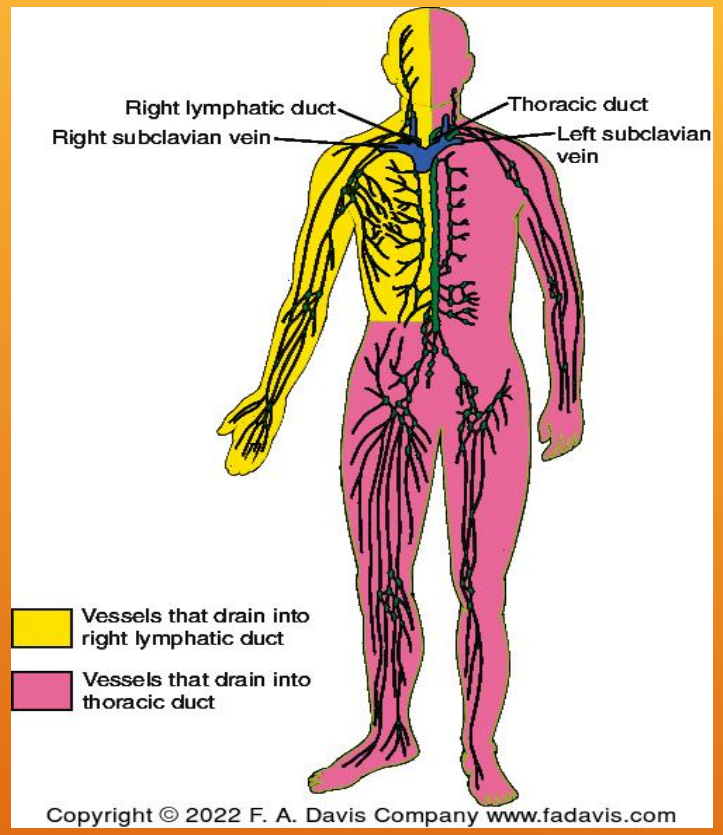
CIRCLE OF WILLIS: CEREBRAL CIRCULATION

https://www.khanacademy.org/science/health-and-medicine/circulatory-system-diseases/stroke/v/cerebral-blood-supply-part-1

- **Cerebrum:**
  - middle cerebral
  - anterior cerebral
  - posterior cerebral
- **Cerebellum:**
  - superior cerebellar
  - anterior inferior cerebellar
  - posterior inferior cerebellar
- **Brainstem:**
  - pontine branches
  - anterior spinal



WWW.KHANACADEMY.ORG/SCIENCE/HEALTH-AND-MEDICINE/CIRCULATORY-SYSTEM-DISEASES/STROKE/V/CEREBRAL-BLOOD-SUPPLY-PART-2



- Lymphatic system is linked to the cardiovascular and immune systems
- 2 liters of lymph flow into blood circulation daily (10%)
- **Lymph vessels drain the interstitial spaces**

LYMPHATIC SYSTEM: ONE WAY OPEN SYSTEM

LYMPH DRAINAGE

- Collects lymph from the body
- Filters lymph through nodes
- Detects and fight infection
- Returns lymph to bloodstream

Aided by:

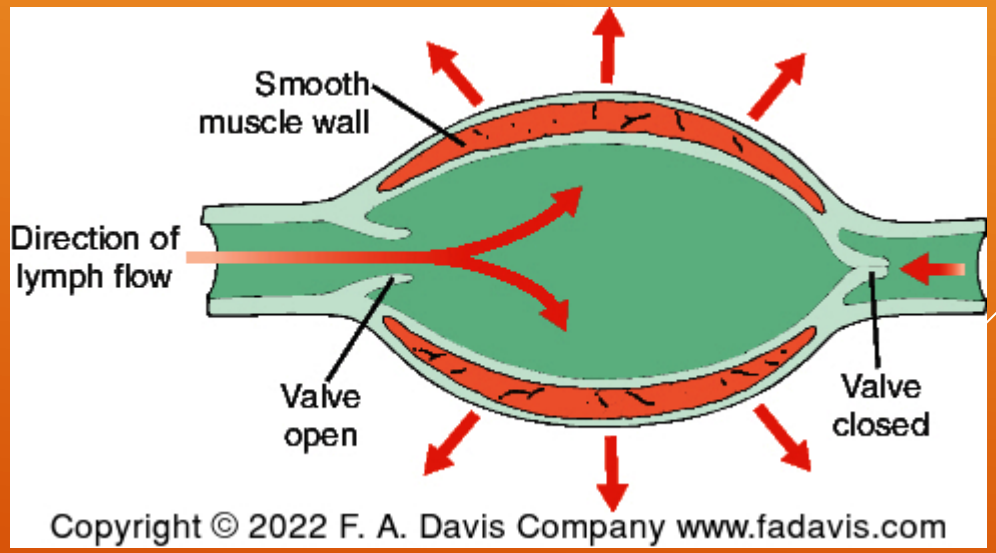
Pulsatile movement

Skeletal muscles (exercise)

Diaphragm

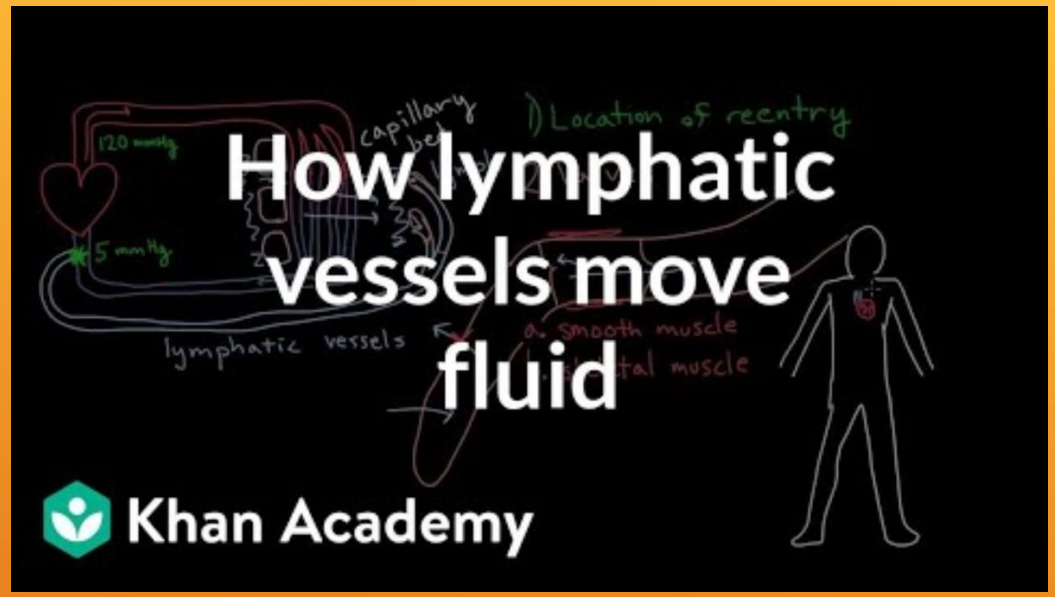
Posture

Gravity



LYMPH DRAINAGE

- Pulsatile movement
- Skeletal muscles (exercise)
- Diaphragm
- Posture
- Gravity



CARDIOVASCULAR RESPONSES TO EXERCISE

- ↓ peripheral arterial resistance w/ exercise
- ↑ cardiac output
- ↑ peripheral venous pressure
- ↑ BP due to increased cardiac output

- Cerebral hemorrhage
- Epidural bleed: artery
- Subdural bleed: vein
- Congestive Heart Failure
- Heart murmur: whooshing, or back flow
- Arteriosclerosis: “hardening
- Atherosclerosis: fatty deposits
- Cerebrovascular Accident: CVA
- Phlebitis, thrombus, thrombophlebitis,
- Aneurysm
- Thoracic Outlet Syndrome: brachial plexus compression or subclavian artery/vein

COMMON PATHOLOGIES: