

University of Cihan-Sulaimaniya
College of Science
Department of ANS
Second year students



Human Anatomy

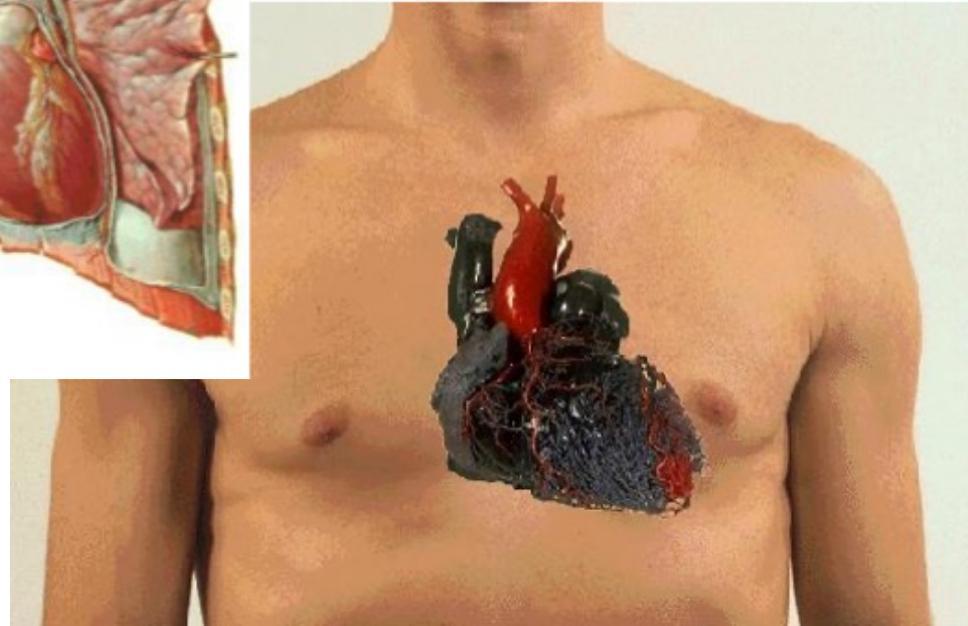
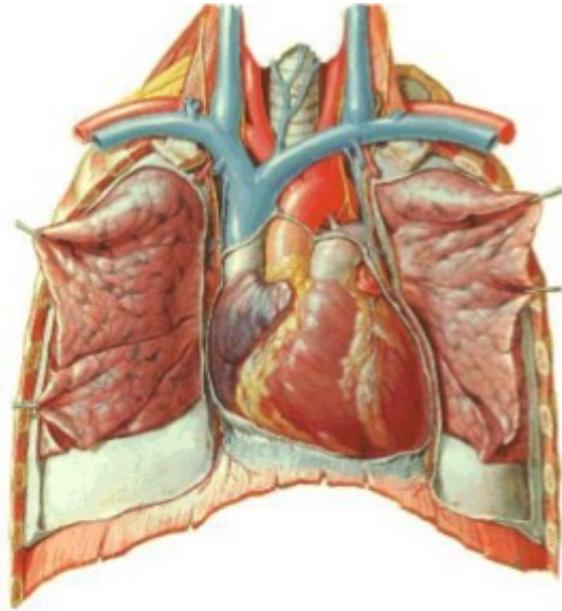
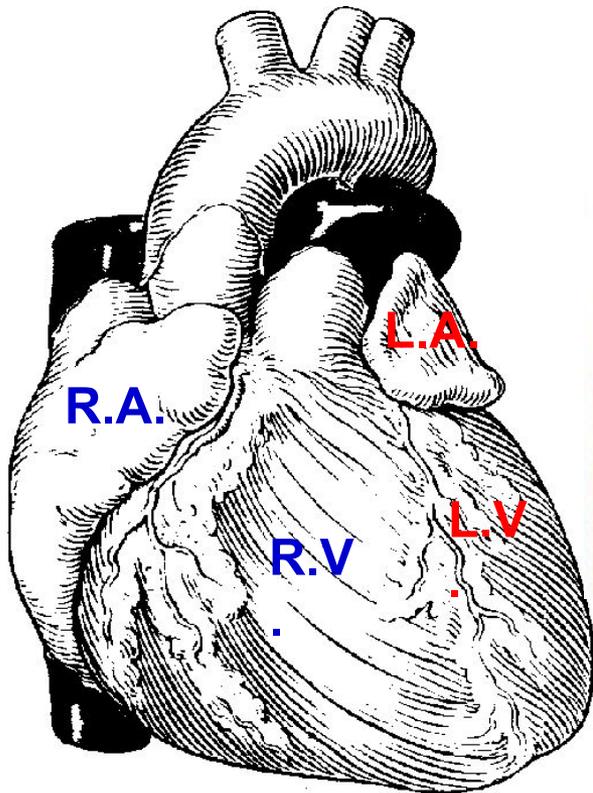
Week Seven

Cardiovascular system

9 - 11 - 2024

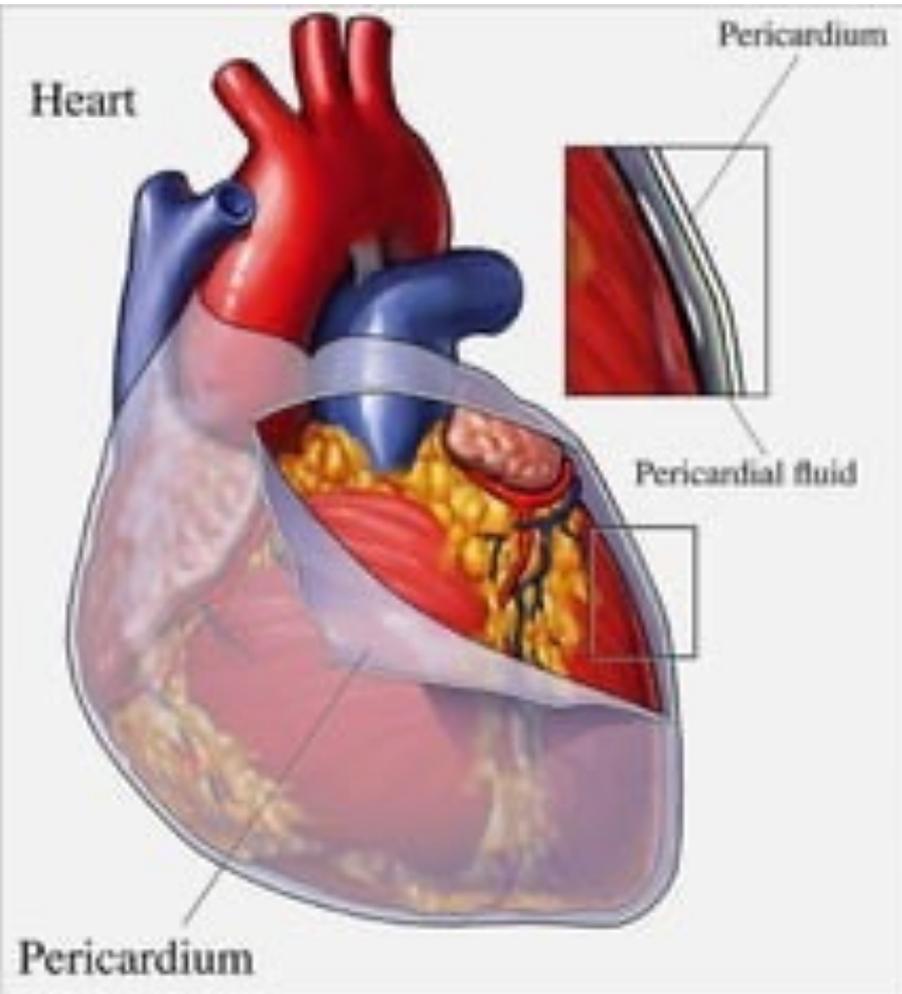
The **heart** is a conical hollow muscular organ situated in the middle mediastinum and is enclosed within the pericardium. It is positioned posteriorly to the body of the sternum with one-third situated on the right and two-thirds on the left of the midline.

The heart is laid on its right side



Pericardium

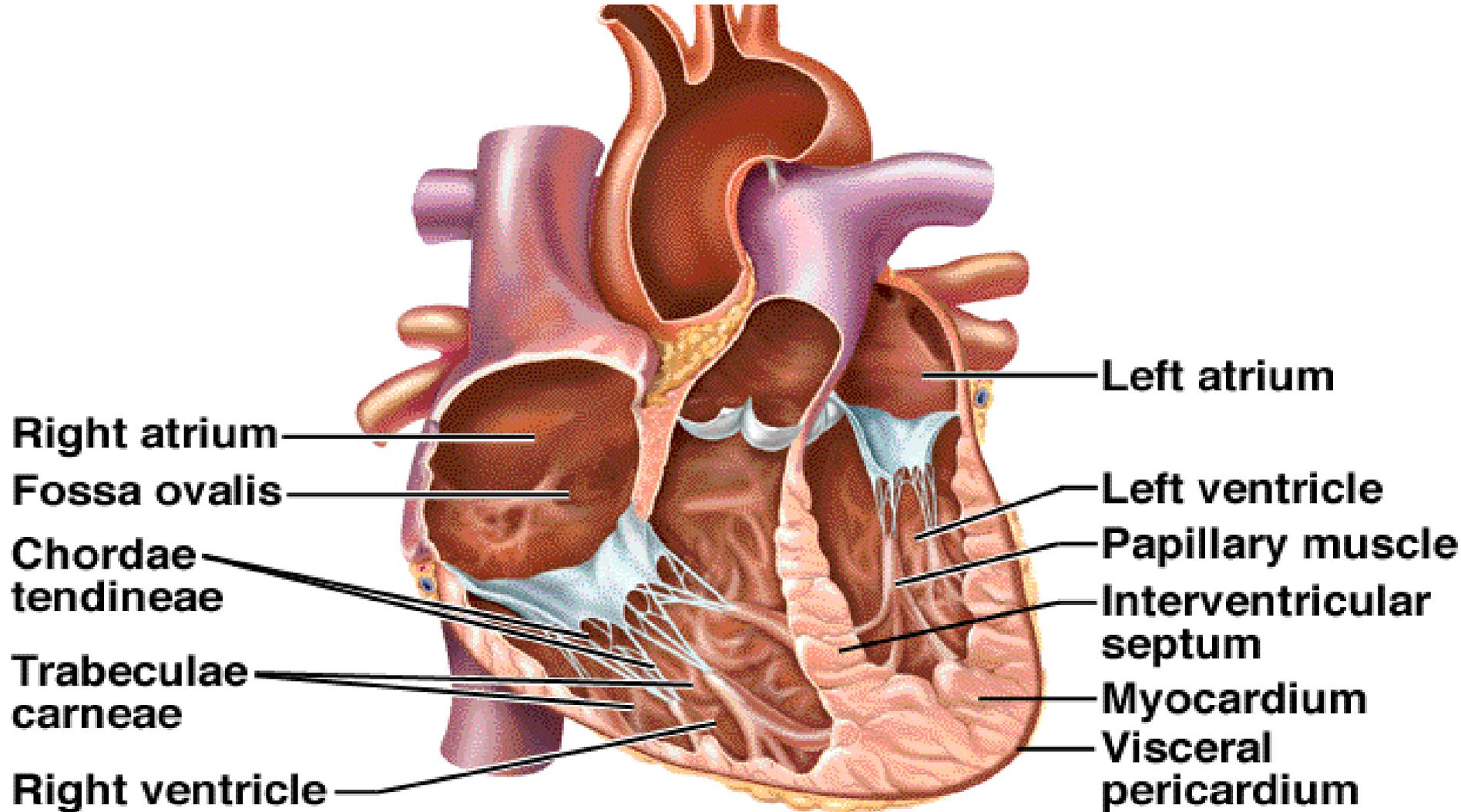
Is the outermost layer of fibroserous sac that encloses the heart and the roots of the great vessels



Epicardium

The visceral serous pericardium, also known as the epicardium, covers the myocardium of the heart and can be considered its serosa.

Gross anatomy of the heart



Original Impulses from S-A Node

The electrical impulses are normally generated by a group of specialized pacemaker cells at *sinoatrial (SA) node*.

Sinus-Atrial node (SA node)



Atria



Atrial-ventricular node (AV node)

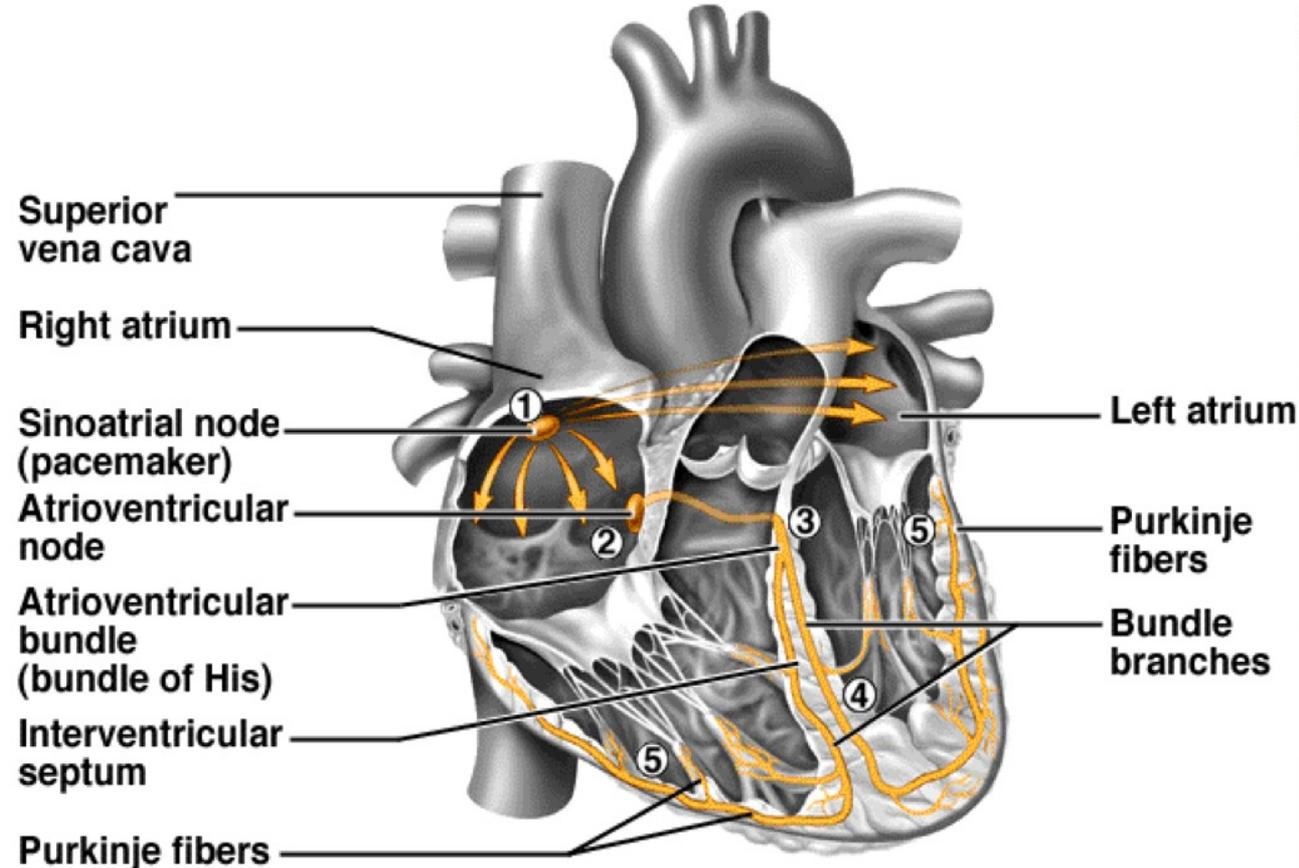


Ventricles

Auto-rhythm

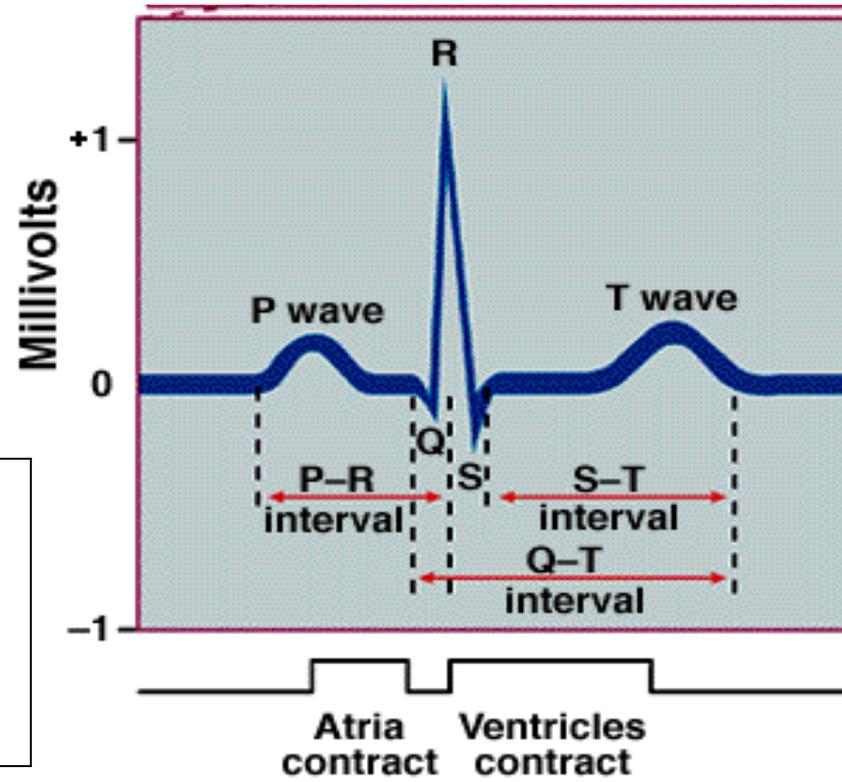
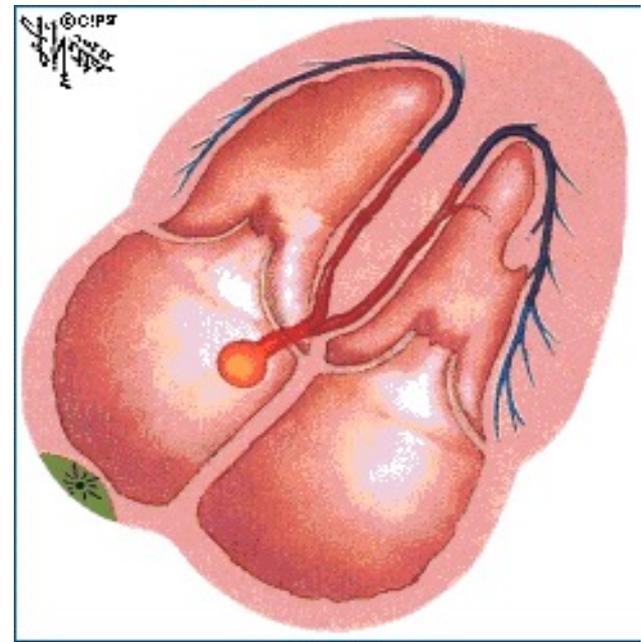
SA node

Located in the right atrial wall, just inferior to the entrance of the superior vena cava.



Applications of ECG

- 1) Measure automaticity
HR, rhythmicity, pacemaker
- 2) Measure conductivity
pathway, reentry, block
- 3) Reveal hypertrophy
- 4) Reveal ischemic damages
location, size, and progress



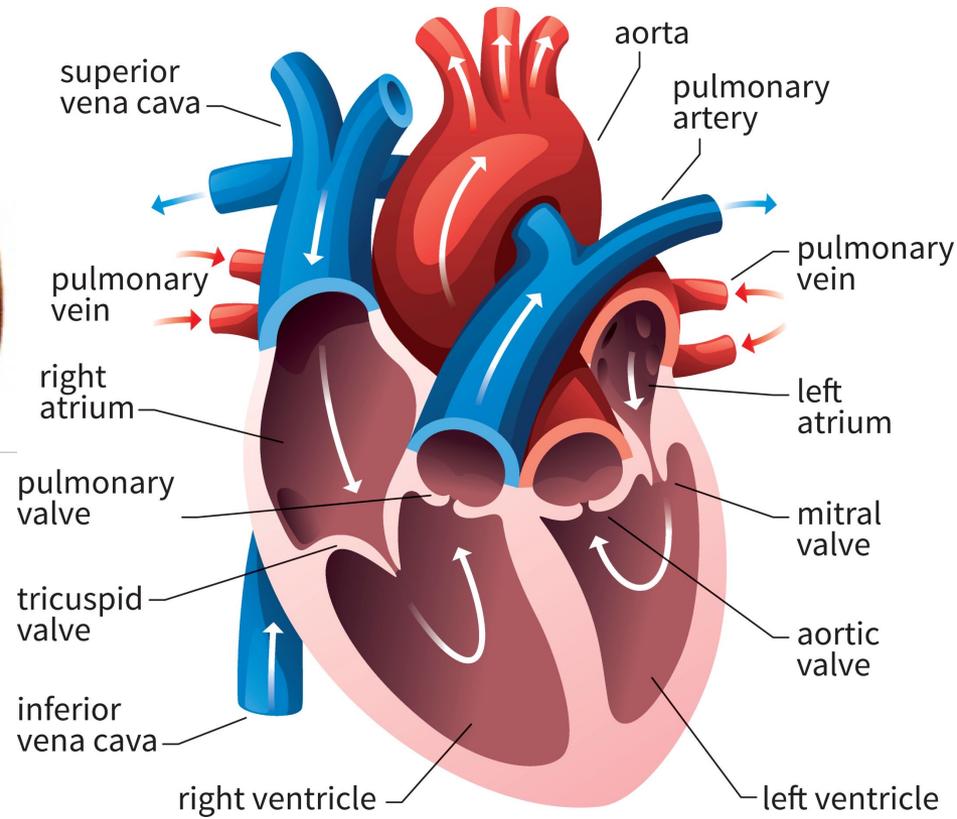
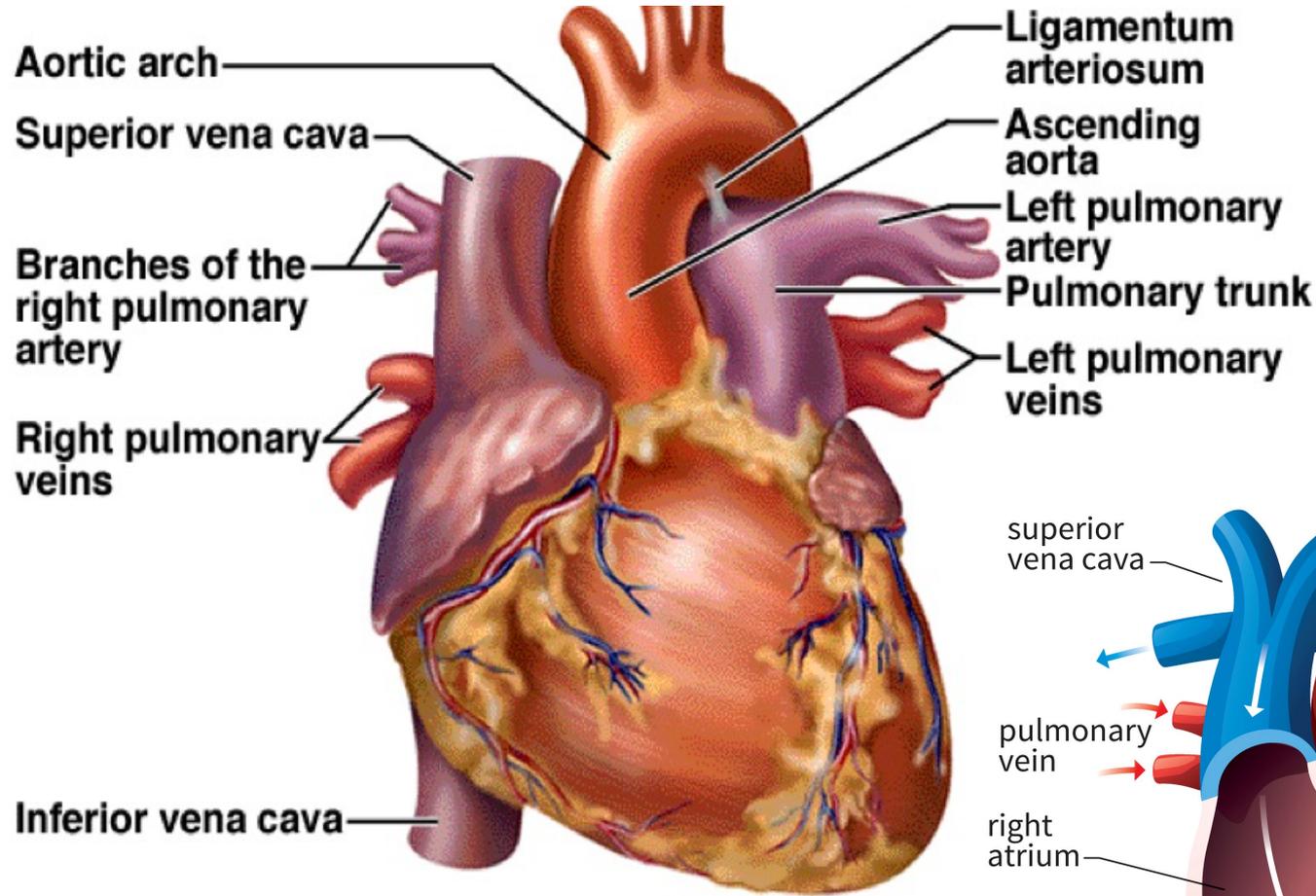
Bradycardia

Slow heart rate (< 60 beats/min)

Tachycardia

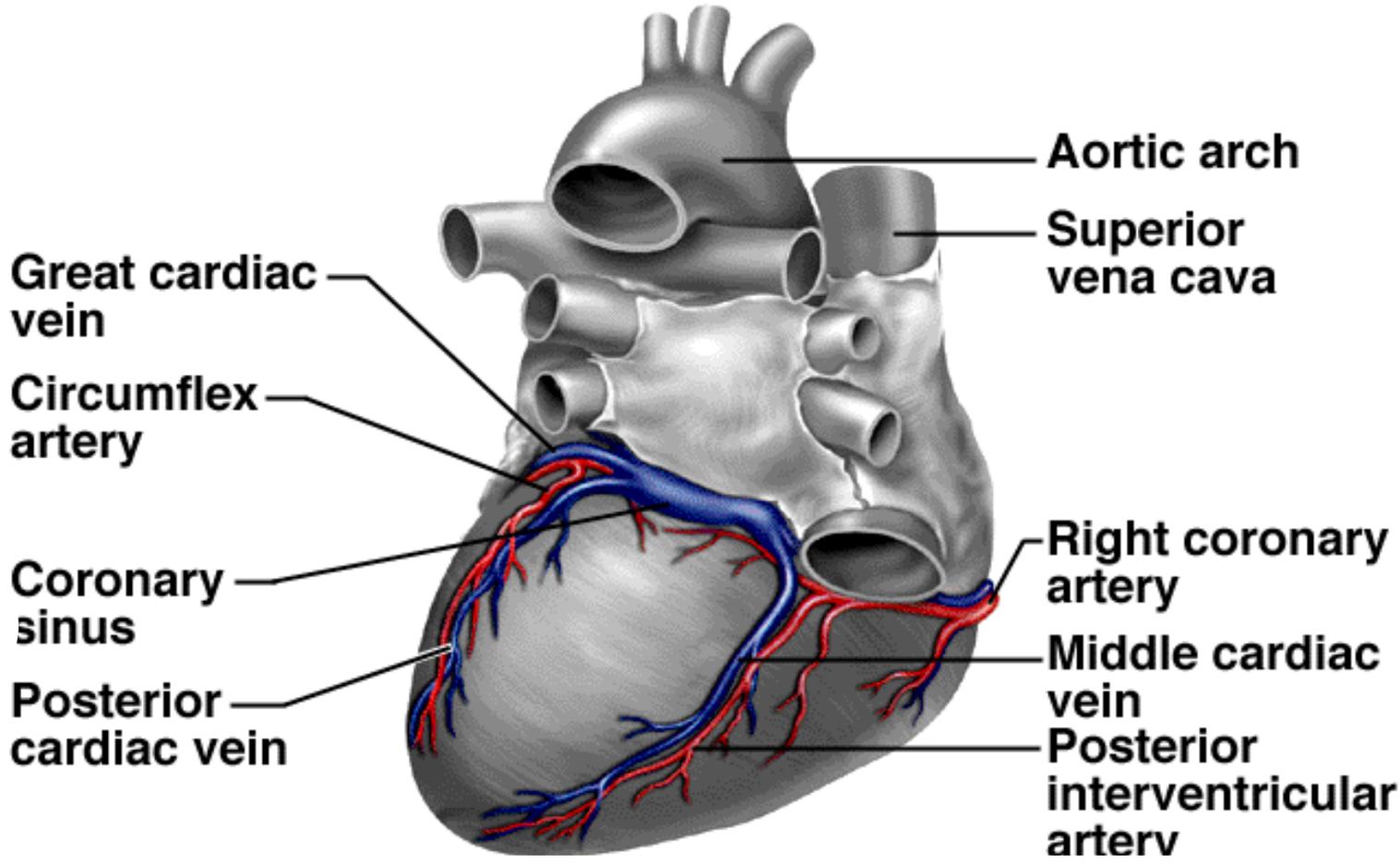
Fast heart rate (> 100 beats/min)

Major blood vessels of the heart

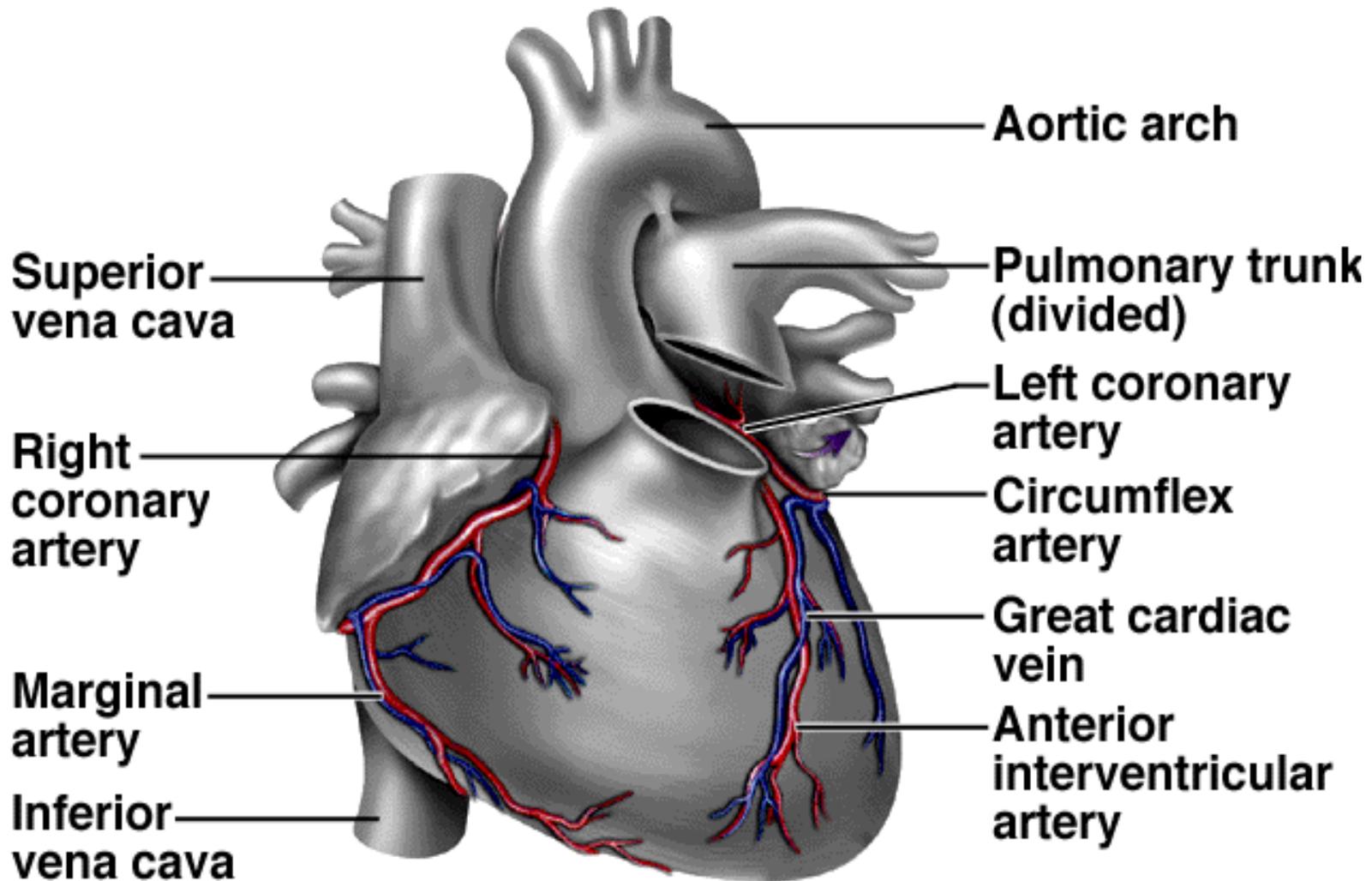


The cardiac muscles get nutrients from coronary circulation.

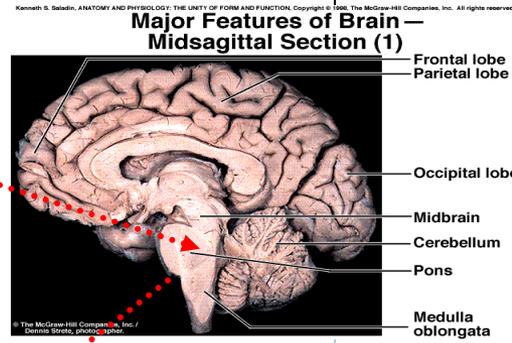
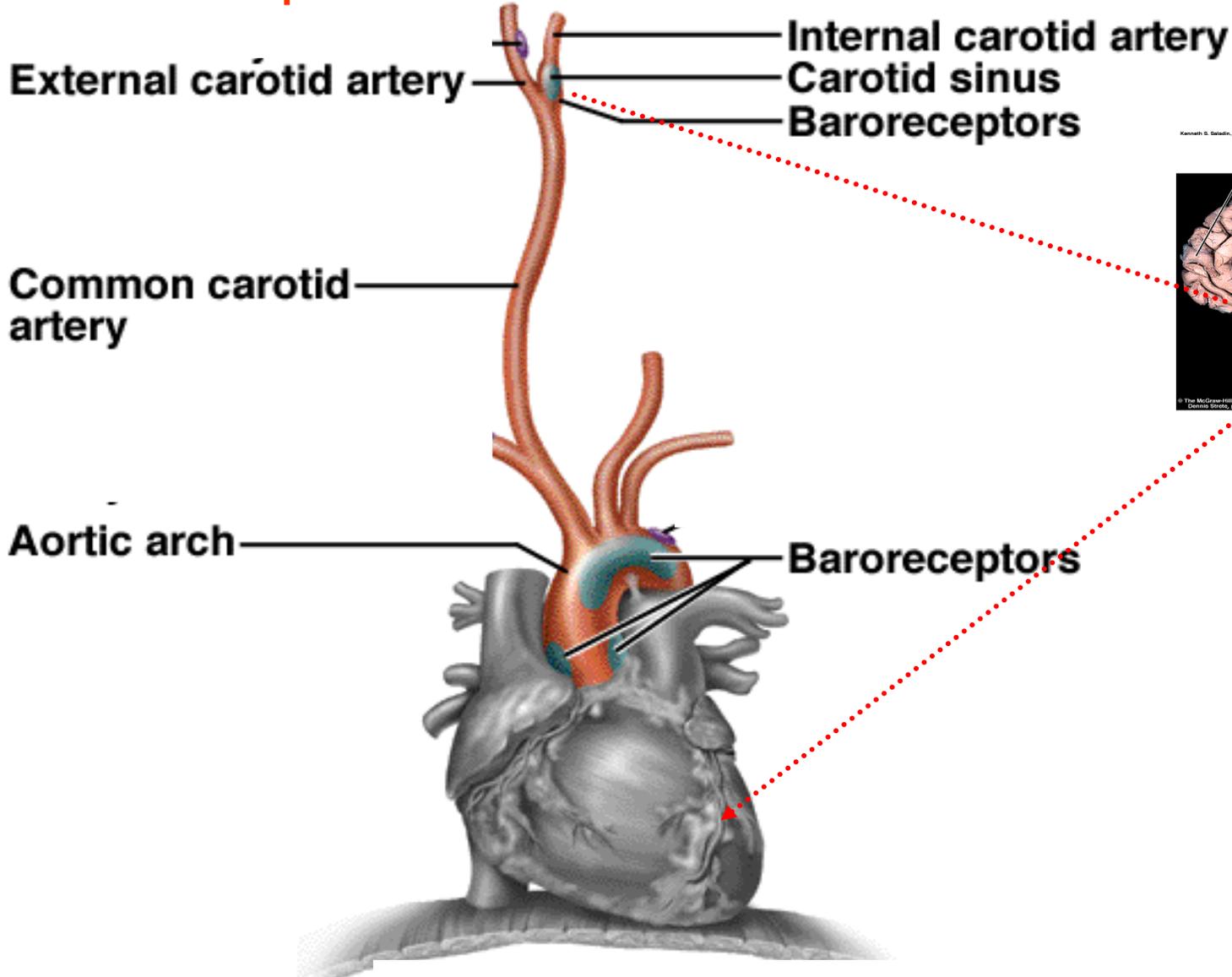
Coronary Vessels — Posterior Aspect



Coronary Vessels — Anterior Aspect



Baroreceptors



- Stimulated by increase in arterial pressure (stretch)
- Regulate the heart when blood pressure (BP) increases or drops
- Involved in short term regulation of BP

Chemoreceptor Reflex

Carotid body

Chemoreceptors

Internal carotid a
Carotid sinus
Baroreceptors

Common carotid
artery Chemoreceptors

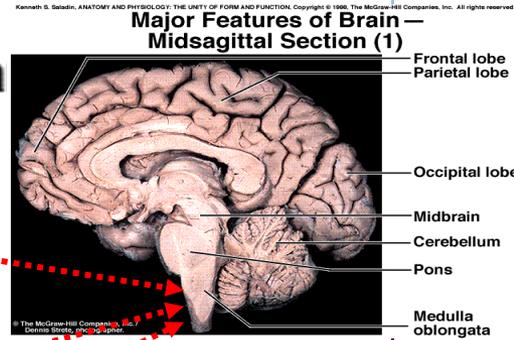
Aortic body

Right subclavian
artery

Aortic arch

Aortic body

Chemoreceptors



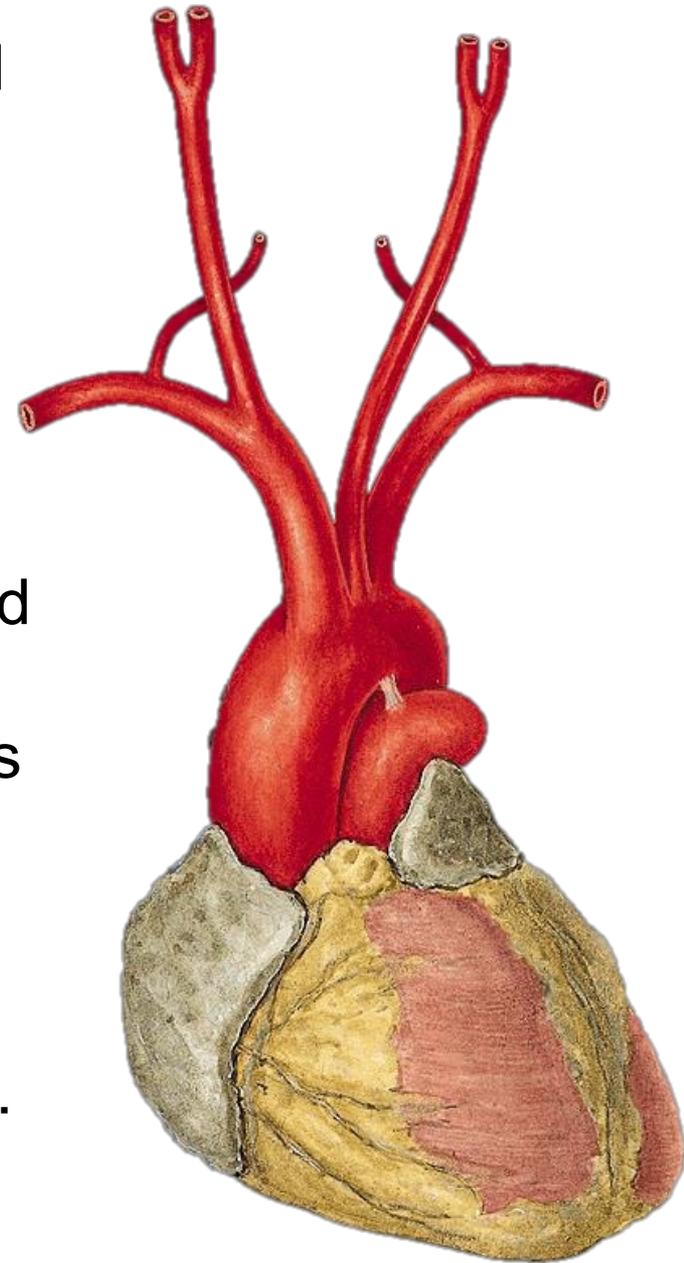
Stimulated by \downarrow oxygen, \downarrow pH, or \uparrow CO₂

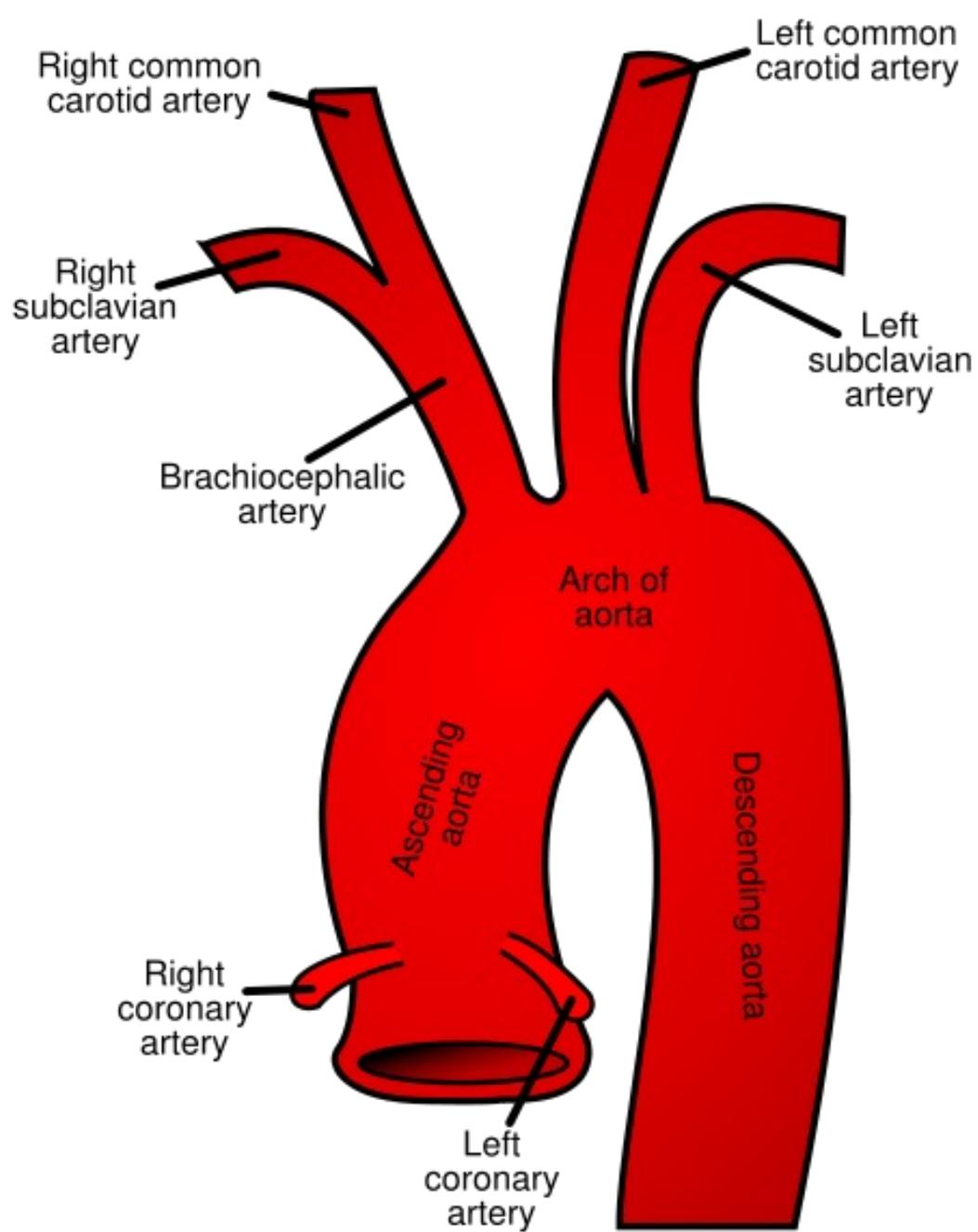
Less important in regulating cardiac function

systemic circulation

At the arch of the aorta, 3 branches extend upward;

1. The brachiocephalic artery, quickly divides into the right subclavian artery that supplies blood to the right arm and upper torso and the right common carotid artery that supplies the head and neck.
2. The left common carotid artery supplies the head and neck.
3. The left subclavian artery supplies the left arm and upper torso. 'Subclavian' means it is located below the clavicle... or collarbone

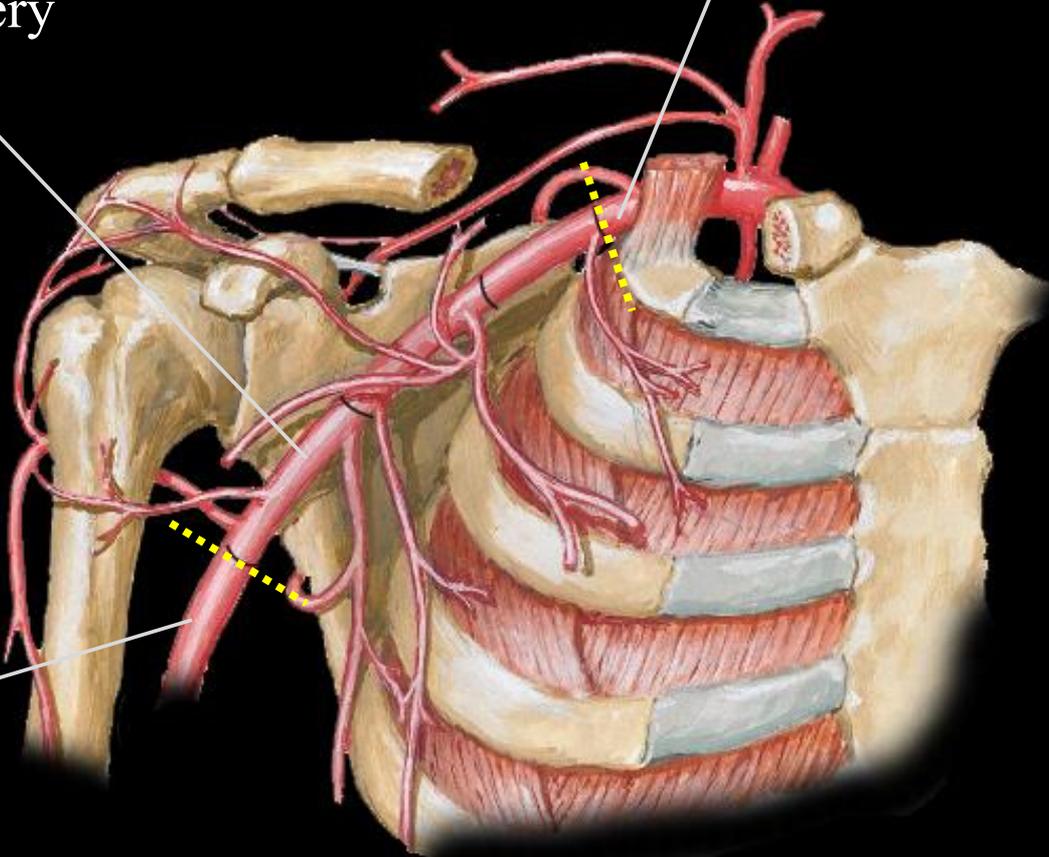




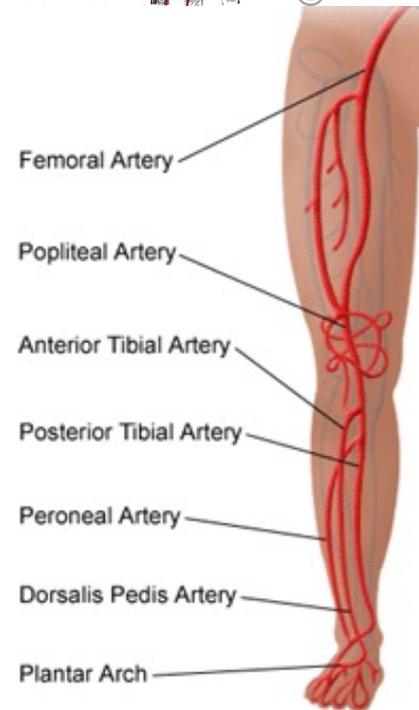
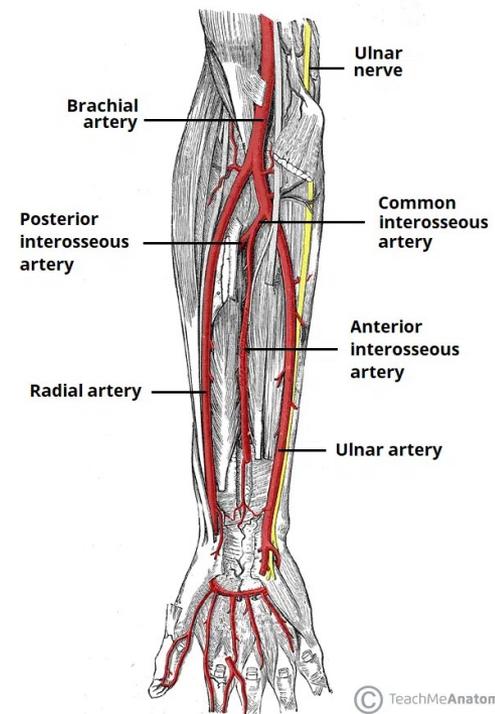
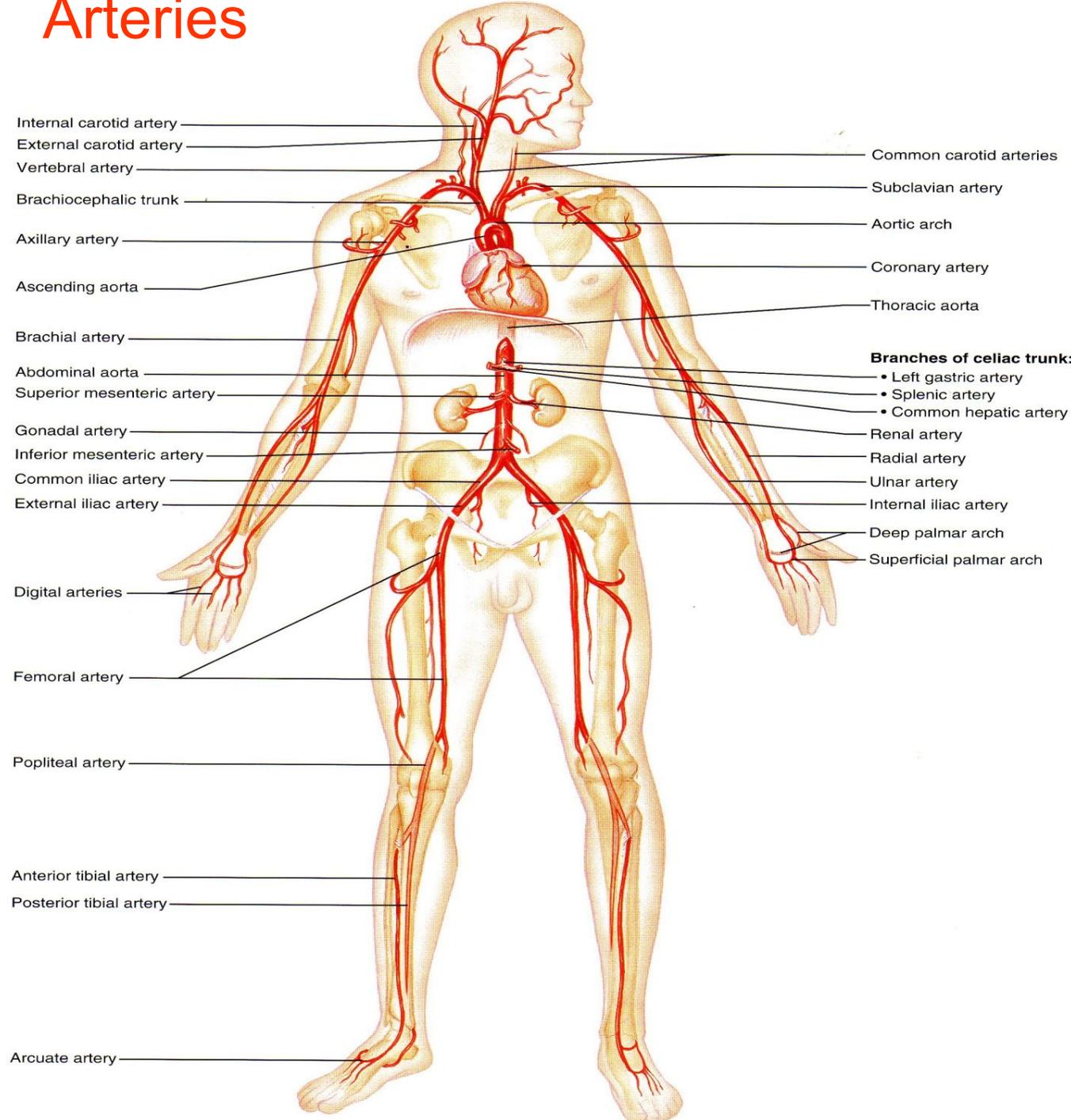
Subclavian artery

Axillary artery

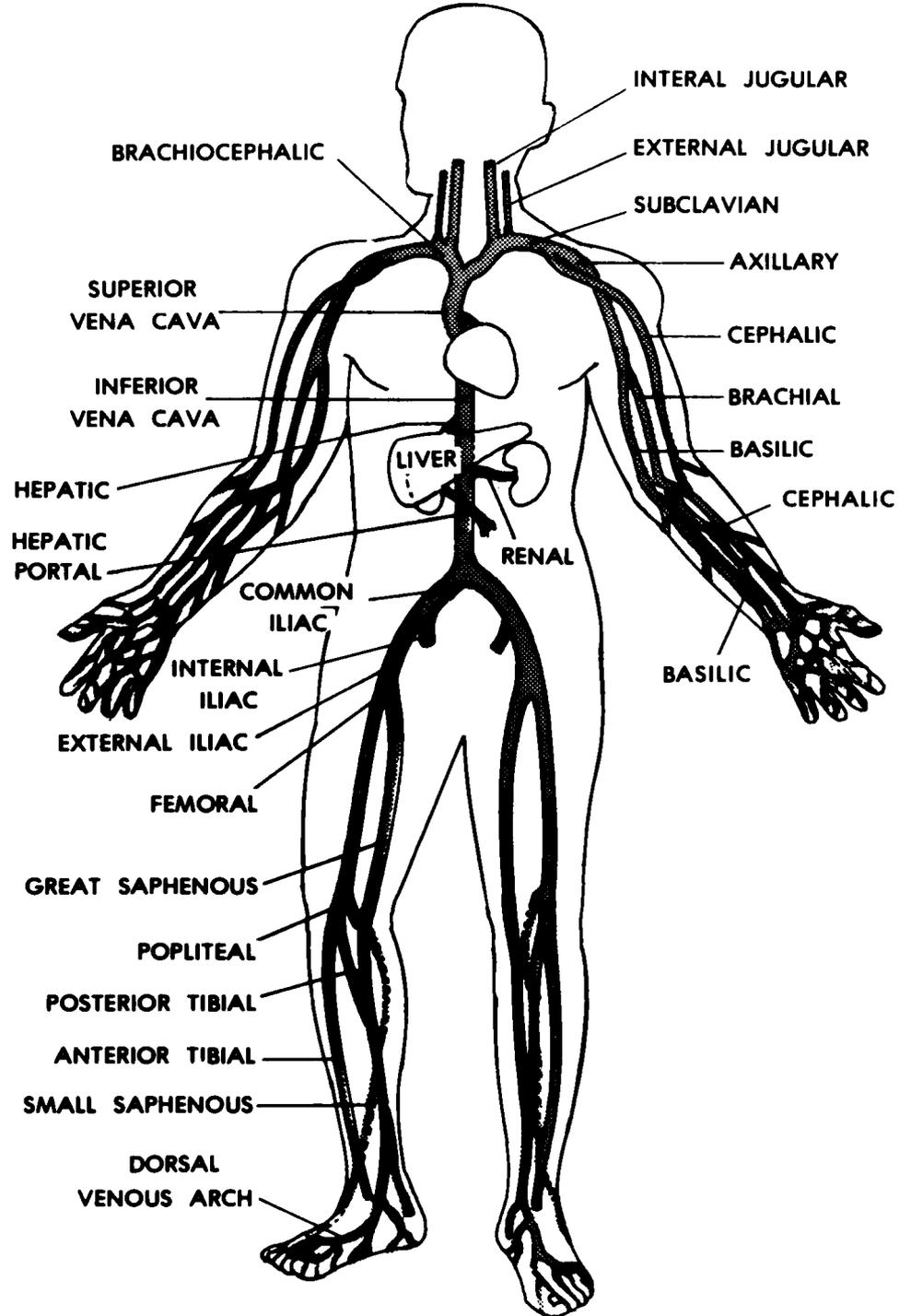
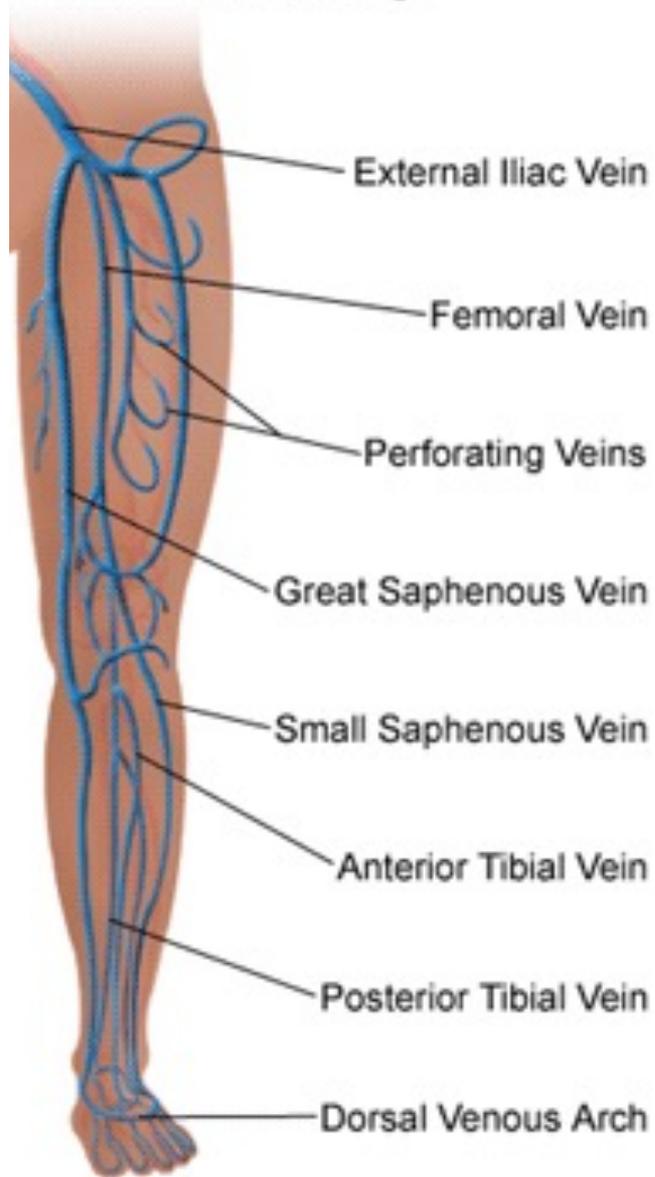
Brachial artery *

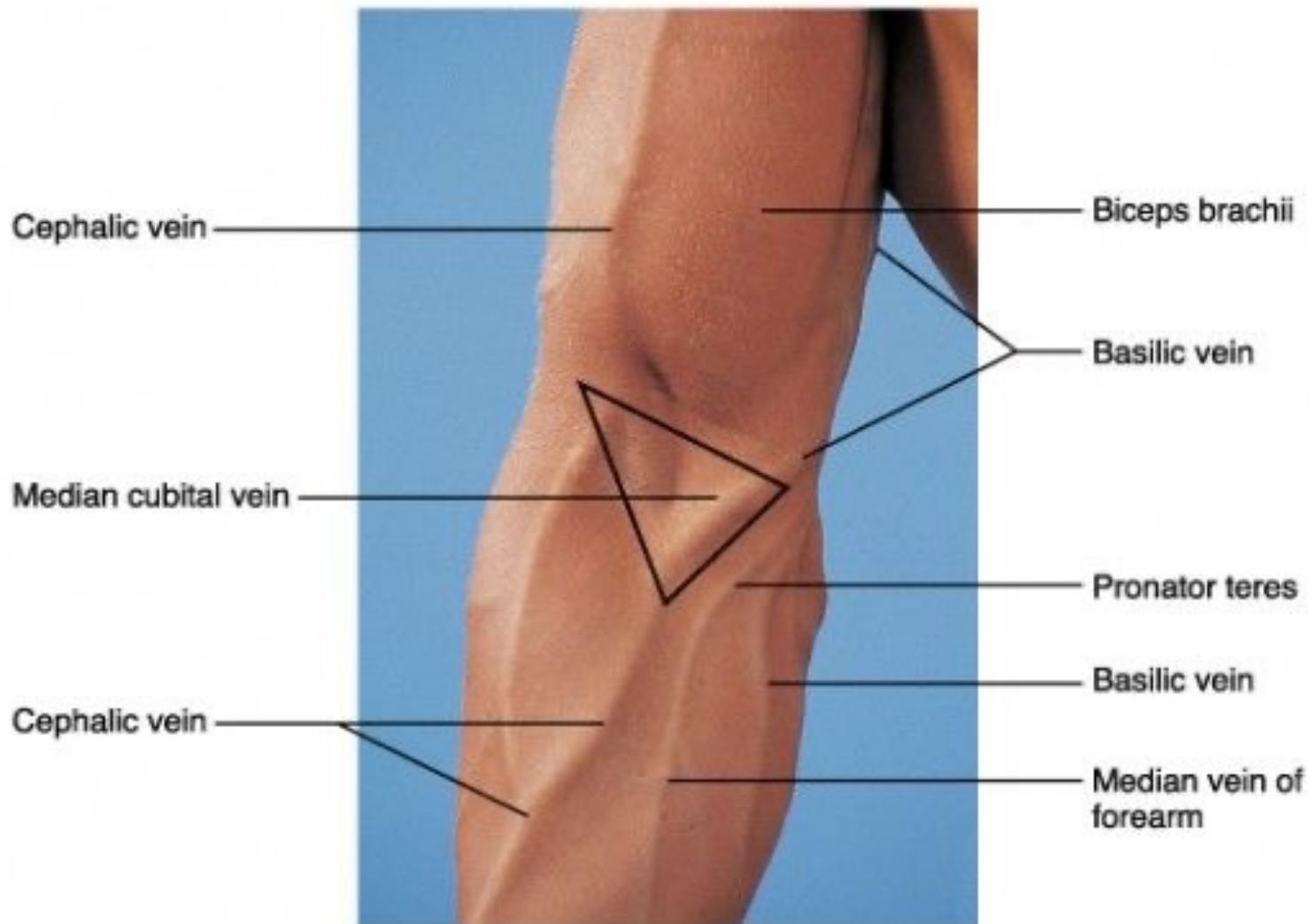


Arteries



Main Veins





Copyright © 2001 Benjamin Cummings, an imprint of Addison Wesley Longman, Inc.

LYMPHATIC SYSTEM

Between the cells of the body are spaces filled with fluid. This is the interstitial (or tissue) fluid, often referred to as intercellular fluid.

There are continuous exchanges between the intracellular fluid, the interstitial fluid, and the plasma of the blood.

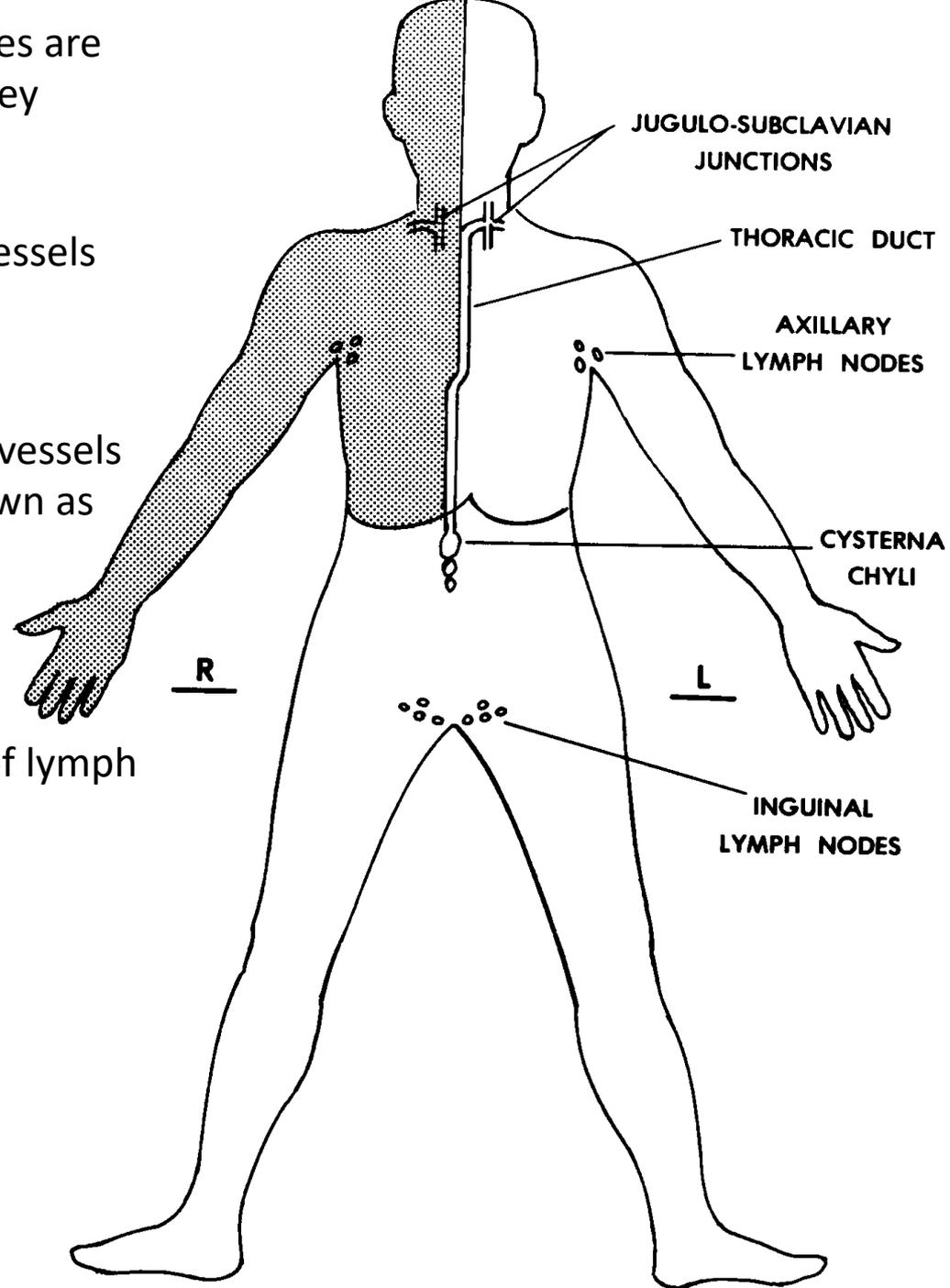
The lymphatic system returns to the bloodstream the excess interstitial fluid, which includes proteins and fluid derived from the blood.

a) **Lymphatic Capillaries.** Lymphatic capillaries are located in the interstitial spaces. Here, they absorb the excess fluids.

b) **Lymph Vessels.** A tributary system of vessels collects these excess fluids (lymph)

c) **Lymph Nodes.** Along the way, lymphatic vessels are interrupted by special structures known as lymph nodes.

d) **Tonsils.** Tonsils are special collections of lymphoid tissue, very similar to a group of lymph nodes.



Anesthetic Considerations

Cardiac anesthesiologists are required to understand physiology, pathology, pharmacology, [internal medicine](#), [intensive care medicine](#), [cardiology](#), and cardiac surgery perform to their extensive duties such as [airway management](#), [mechanical ventilation](#), [respiratory care](#), and CPR (including post-resuscitation care).

General anesthesia is typically administered via inhaled anesthetic gases (e.g., sevoflurane, isoflurane, or desflurane) combined with intravenous (IV) medications (e.g., propofol, fentanyl).

The most frequently used narcotics in cardiac surgery are sufentanil, fentanyl, and remifentanil

Balanced general anesthesia, by definition, consists of four principal components: hypnosis (loss of consciousness), [amnesia](#), analgesia, and muscle relaxation.

Regional anesthesia, such as epidural or spinal anesthesia, may be used as an adjunct to general anesthesia, though it is rarely used alone in cardiovascular surgery due to the depth of anesthesia required.

Local anesthesia involves injecting an anesthetic directly at the surgical site to numb the area. Typically used in minor procedures, such as pacemaker or defibrillator placements, or for vascular access insertion.

Adverse side effect of anesthesia

- 1. Hypotension (Low Blood Pressure)**
- 2. Bradycardia (Slow Heart Rate)**
- 3. Arrhythmias (Irregular Heartbeats)**
- 4. Myocardial Depression (Reduced Heart Muscle Function)**
- 5. Decreased Oxygen Supply to the Heart (Myocardial Ischemia)**
- 6. Pulmonary Hypertension (Increased Blood Pressure in the Lungs)**
- 7. General anesthesia can impair the autonomic nervous system's control over the cardiovascular system, leading to reduced responsiveness to physiological demands and stress.**
- 8. Increased Risk of Blood Clots**
- 9. Postoperative Hypertension**
- 10. Cardiac Arrest**