

Physics of Medical Devices

Fourth lecture

Electrocardiograph I

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Fourth Stage

Department of medical physics

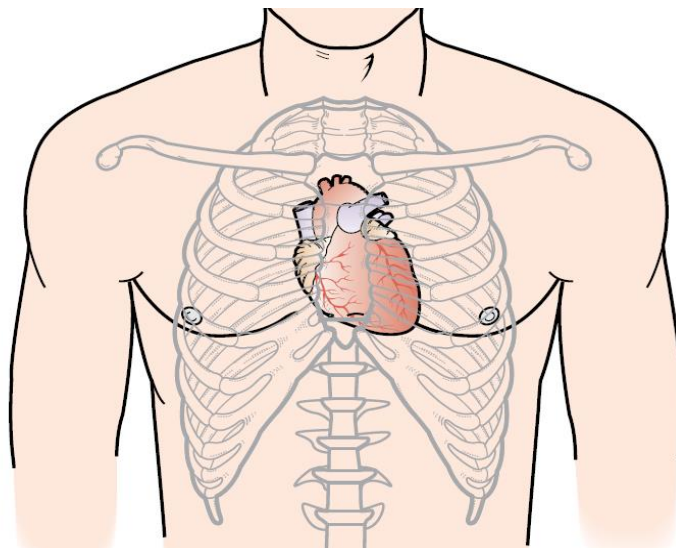
Al-Mustaqbal University-College

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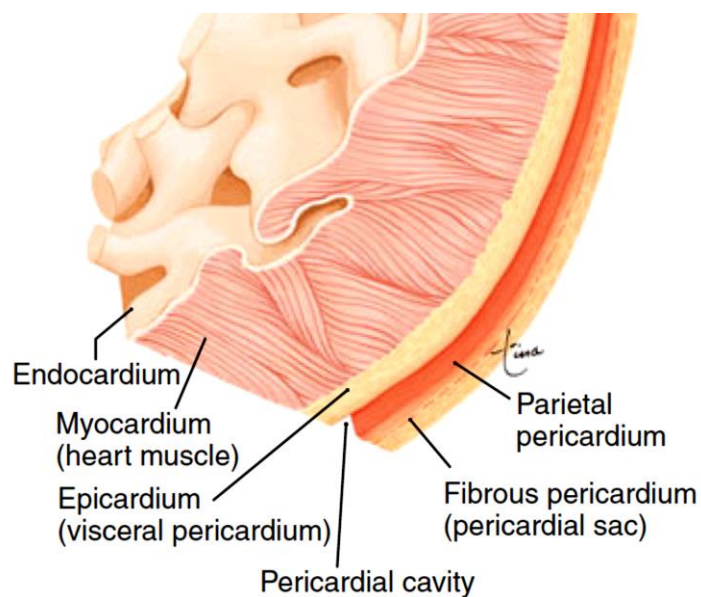
The heart and potential source

Anatomy of the Heart

- ❖ **The heart**, a fist-sized muscular organ located in the mediastinum, is the central structure of the cardiovascular system.
- ❖ **It is protected** by the bony structures of the sternum anteriorly, the spinal column posteriorly, and the rib cage.
- ❖ **The heart is roughly conical**, with the base of the cone at the top of the heart and the apex (the pointed part) at the bottom.



Location of the heart

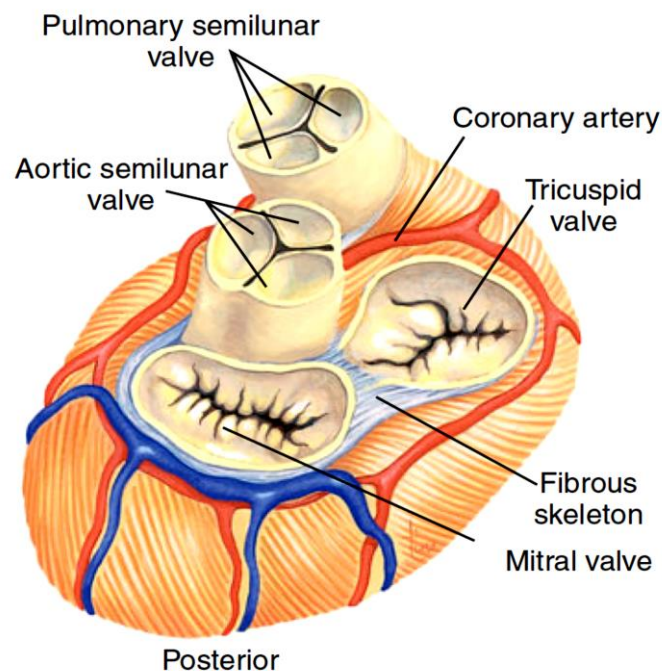


Layers of the heart

Heart Valves:

Properties of Heart Valves

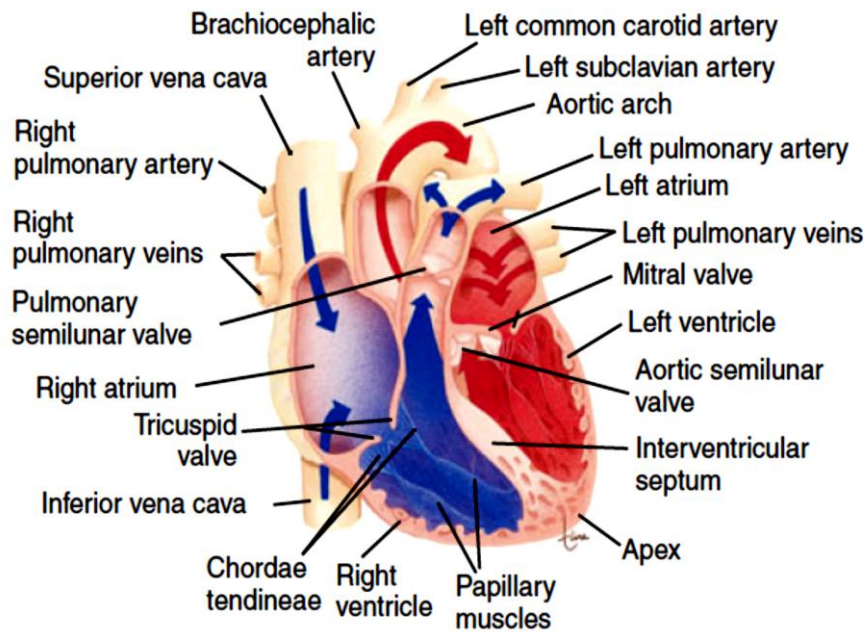
- Fibrous connective tissue prevents enlargement of valve openings and anchors valve flaps.
- Valve closure prevents backflow of blood during and after contraction.



Superior view with atria removed

Heart Chambers and Great Vessels

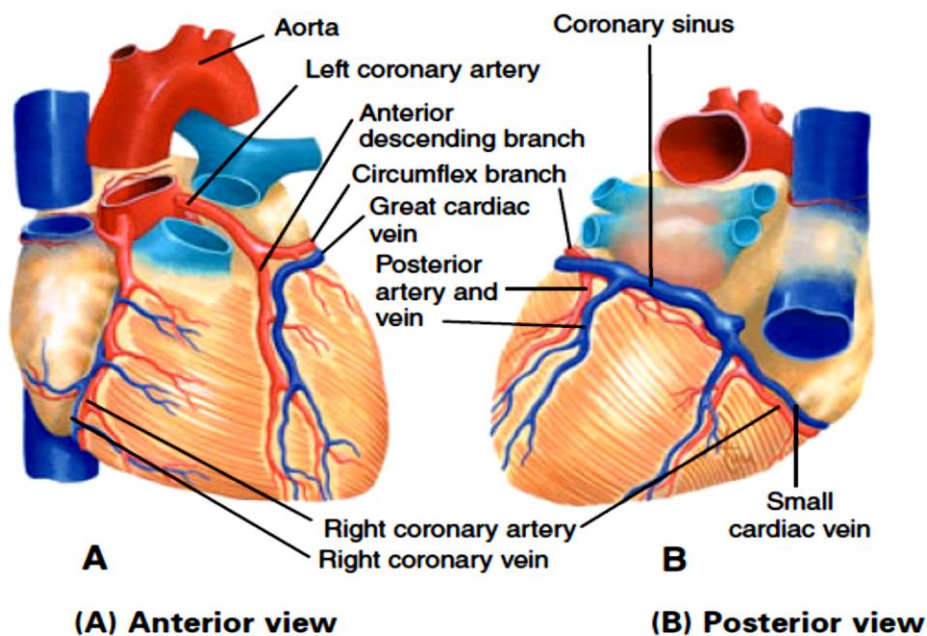
- ✓ The heart is a hollow muscle with an internal skeleton of connective tissue that creates four separate chambers.
- ✓ The superior chambers of the heart are the **right and left atria**.
- ✓ Their primary function is to collect blood as it enters the heart and to help fill the lower chambers.
- ✓ The more thickly muscled lower chambers of the heart are the **ventricles**.



Heart—Anterior section (arrows show direction of blood flow)

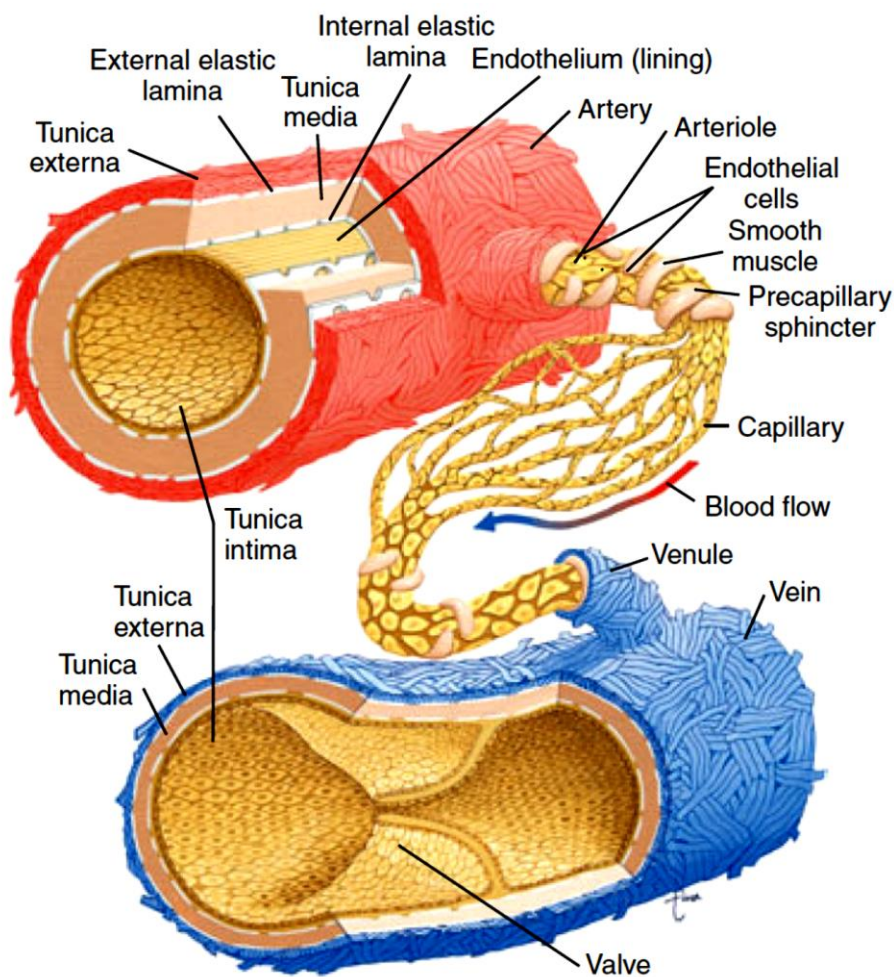
Coronary Arteries and Veins

- ✓ The coronary arteries and veins provide blood to the heart muscle and the electrical conduction system.
- ✓ The left and right coronary arteries are the first to branch off the aorta, just above the leaflets of the aortic valve.



Anatomy of the Cardiovascular System

- ❖ The cardiovascular system is a **closed system** consisting of **the heart** and all the **blood vessels**.
- ❖ **Arteries** and **veins** are connected by smaller structures that transport substances needed for cellular metabolism to body systems and remove the waste products of metabolism from those same tissues.
- ❖ **Arteries carry blood away from the heart** and, with the exception of the **pulmonary arteries**, transport **oxygenated blood**.
- ❖ **Veins move blood toward the heart**. With the exception of the **pulmonary veins**, they carry blood that is **low in oxygen** and **high in carbon dioxide**.



Blood vessels—Cross-section