



Department of Anesthesia Techniques

كلية المستقبل الجامعة
قسم تقنيات التخدير



المرحلة الاولى ٢٠٢٢-٢٠٢٣

Anatomy

Lecture :Anatomy of the heart

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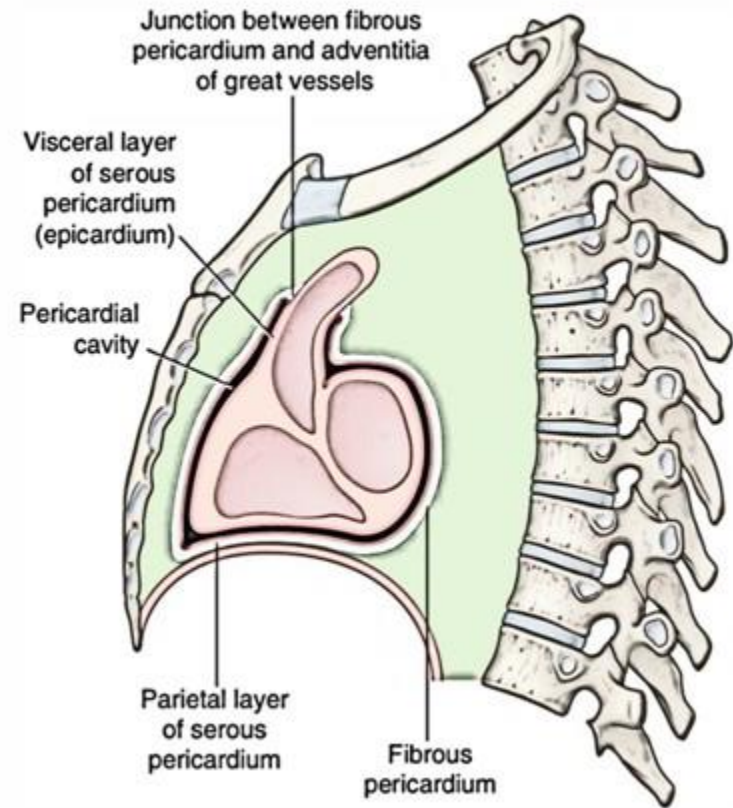
Dr. Ali Hussein Al-nasrawi •

Anatomy of the heart

Anatomy of the Heart

Pericardium

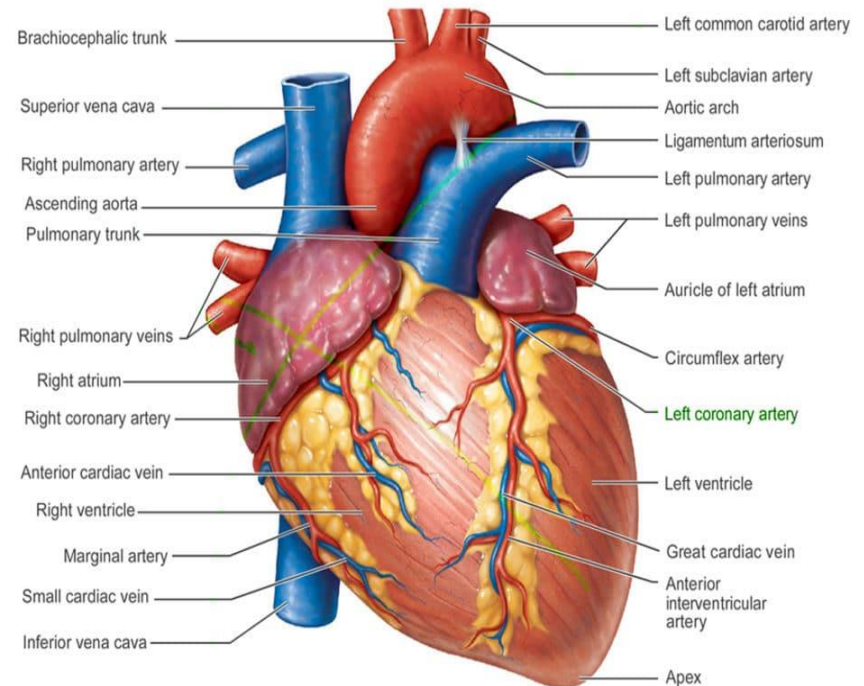
The pericardium is a fibrous sac that encloses **the heart** and the roots of **the great vessels**. The pericardium lies within the middle mediastinum, **posterior to the body of the sternum** and **the 2nd to the 6th costal cartilages**. Nerve supply is by the phrenic nerve.



Anatomy of the Heart

Heart

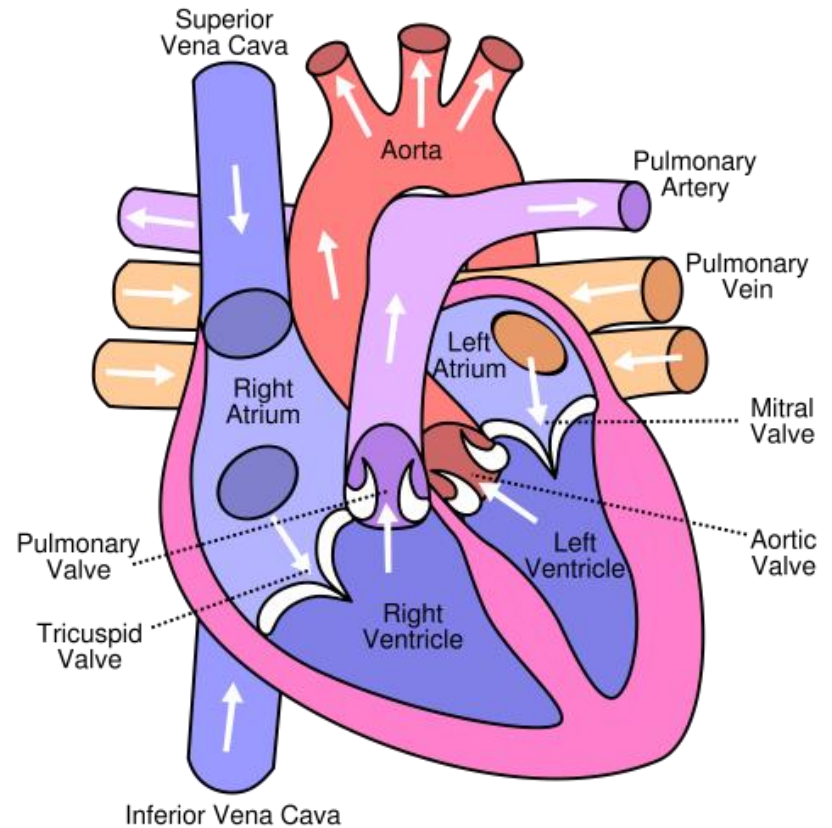
The heart is a hollow muscular organ that is **pyramid shaped** and lies within the pericardium in the mediastinum. It is connected **at its base** to the **great blood vessels** and lies free within the Pericardium. The heart has three surfaces: sterno costal (**anterior**), diaphragmatic (**inferior**), and a base (**posterior**). It also has an **apex**, which is directed downward, forward, and to the left.



Anatomy of the Heart

Chambers of the Heart

The heart is divided by **vertical septa** into **four** chambers: the **right and left atria** and the **right and left ventricles**. The walls of the heart are composed of **cardiac muscle** called the **myocardium** and covered with **pericardium** and the **epicardium**; and lined internally with a layer of **endothelium** called the **endocardium**.



Anatomy of the Heart

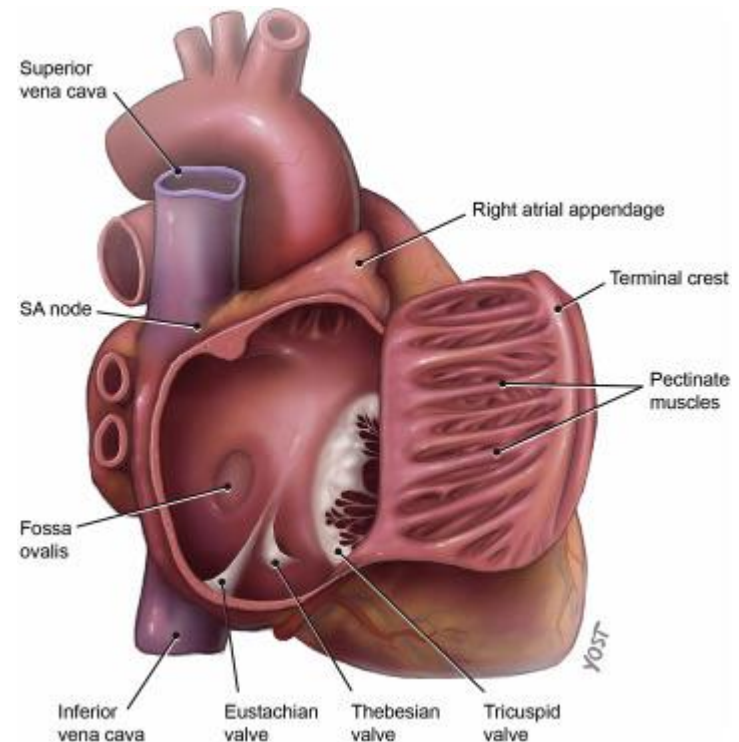
Right Atrium

The **right atrium** consists of a main cavity and a small outpouching called the **auricle**.

The right atrium receives 1. the **superior vena cava** which open into the upper part of the right atrium, it returns the blood to the heart from **the upper half of the body**.

2. The **inferior vena cava** opens into the lower part of the right atrium. It returns the blood to the heart from the **lower half of the body**.

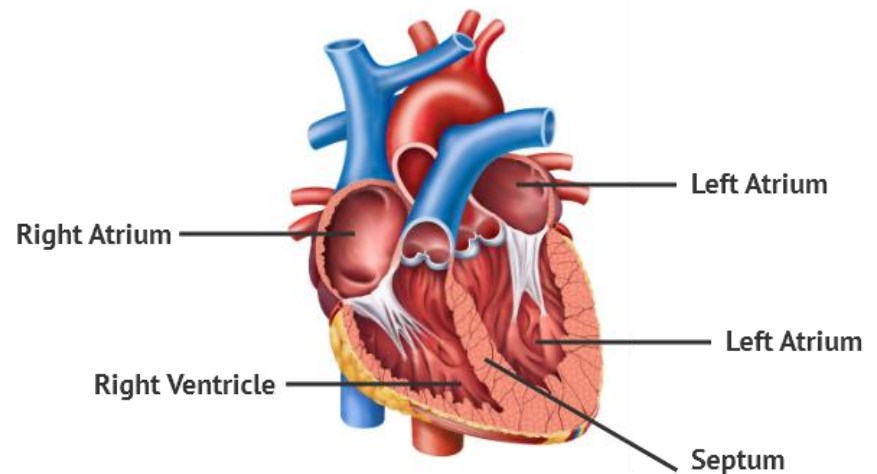
3. The **coronary sinus** drains most of the blood from the heart wall .



Anatomy of the Heart

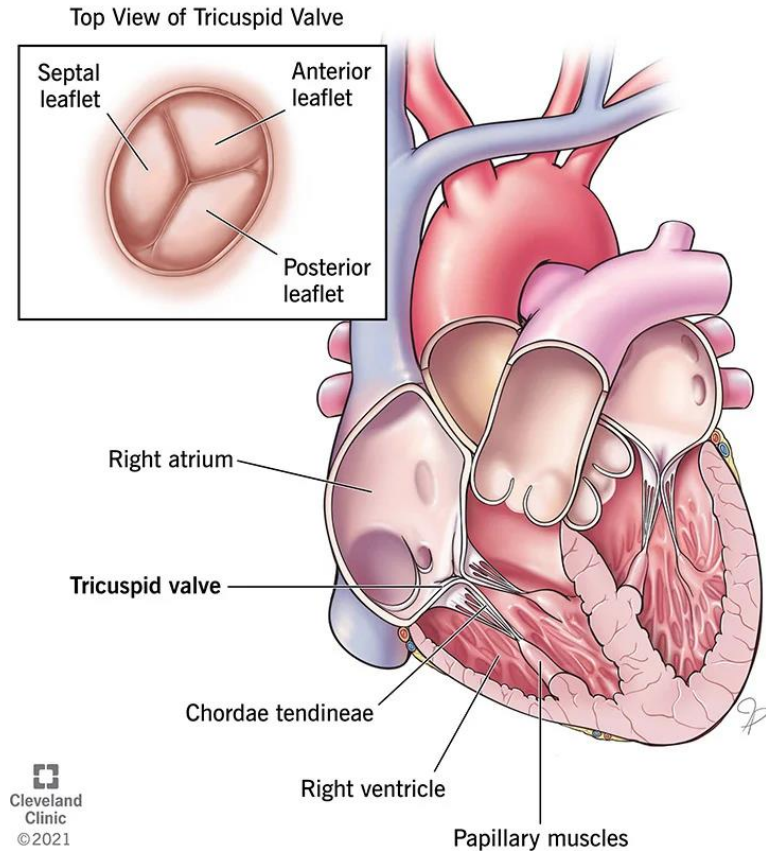
Right Ventricle

The right ventricle communicates with the right atrium through the **atrioventricular orifice** and with the pulmonary trunk through the **pulmonary orifice**. Near the pulmonary orifice, the cavity of the right ventricle becomes funnel shaped and referred to as the **infundibulum**.



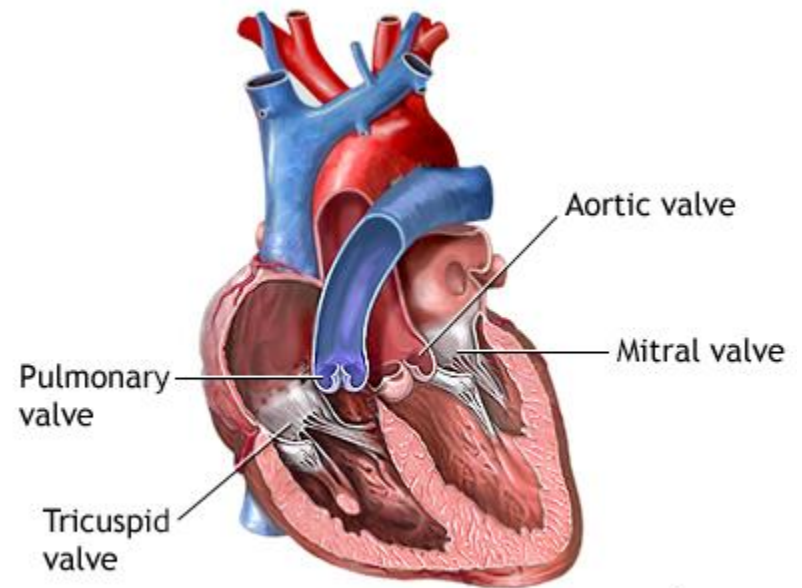
Anatomy of the Heart

The **tricuspid valve** guards the atrioventricular orifice, it consists of three cusps : **anterior, septal**, and **inferior** (posterior) cusps. The bases of the cusps are attached to the fibrous ring of the skeleton of the heart, whereas their free edges are attached to the **chordae tendineae**. The chordae tendineae connect the cusps to the **papillary muscles**.



Anatomy of the Heart

The **pulmonary valve** guards the pulmonary orifice and consists of three semilunar cusps the curved lower margins and sides of each cusp are attached to the arterial wall. The open mouths of the cusps are directed upward into the pulmonary trunk.

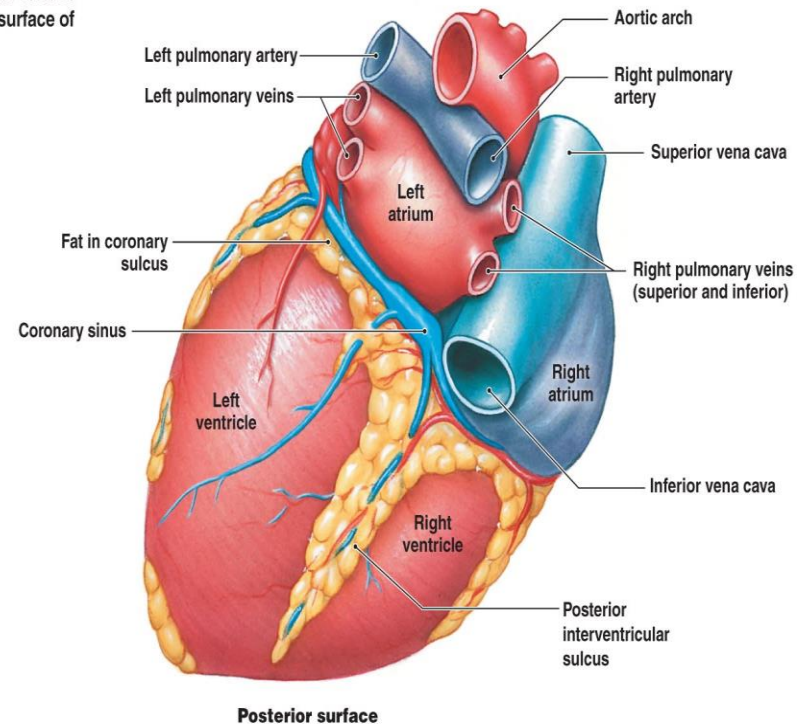


Anatomy of the Heart

Left Atrium

Similar to the right atrium, the left atrium consists of a main cavity and a left auricle. The four pulmonary veins open through the posterior wall and have no valves. The left atrioventricular orifice is guarded by the **mitral valve**.

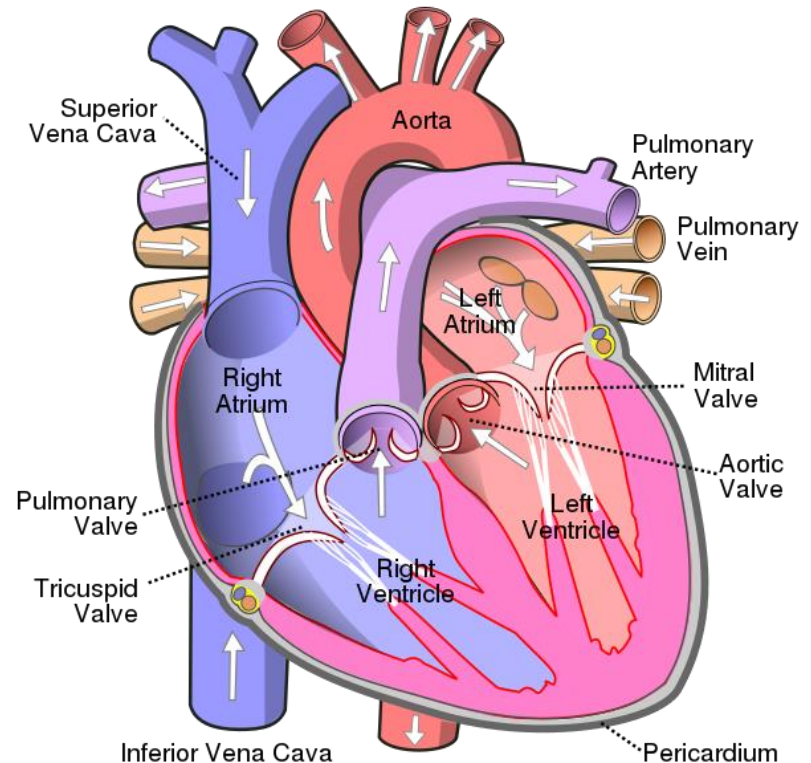
A diagrammatic view of the posterior surface of the heart



Anatomy of the Heart

Left Ventricle

The left ventricle communicates with the left atrium through the **atrioventricular orifice** and with the aorta through the **aortic orifice**. The walls of the left ventricle are three times thicker than those of the right ventricle

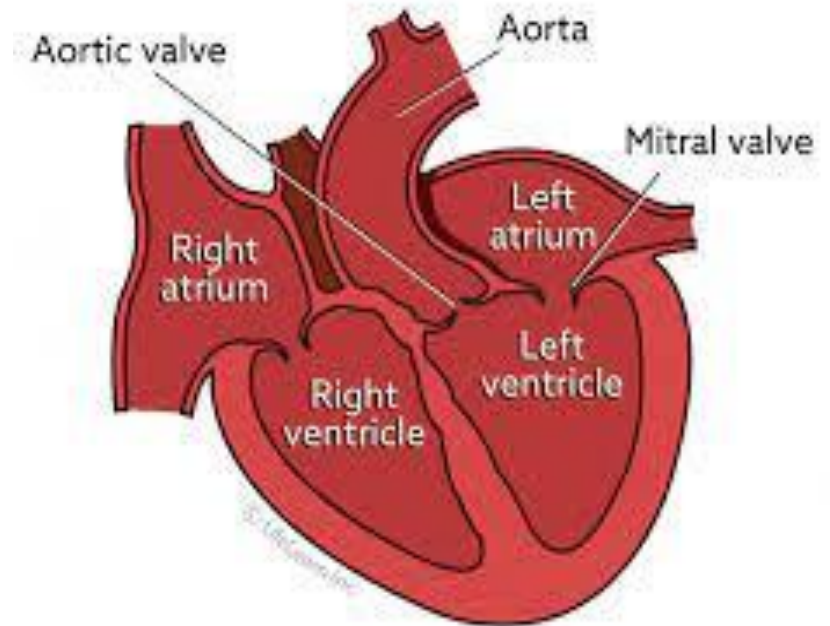


Anatomy of the Heart

The part of the ventricle below the aortic orifice is called the **aortic vestibule**.

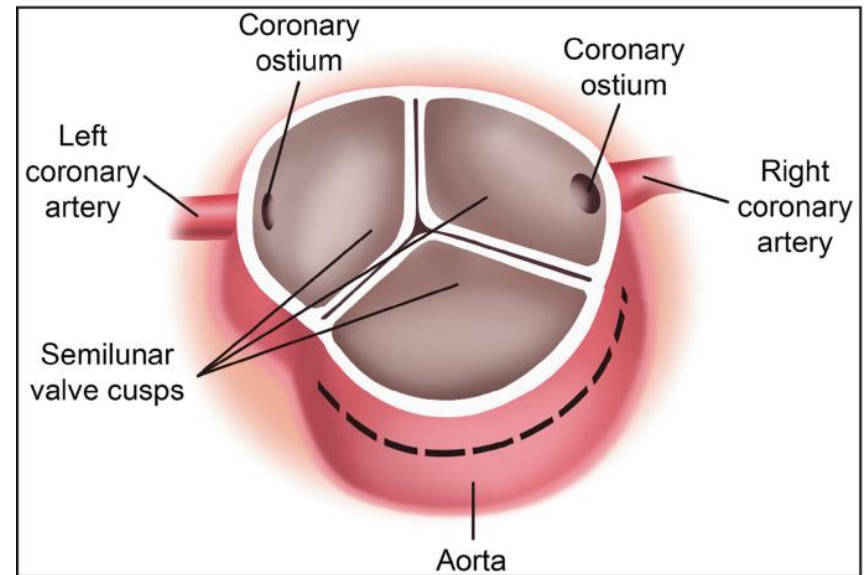
The mitral valve

It guards the atrioventricular orifice. It consists of two cusps, one anterior and one posterior. The attachment of the chordae tendineae to the cusps and the papillary muscles is similar to that of the tricuspid valve.



Anatomy of the Heart

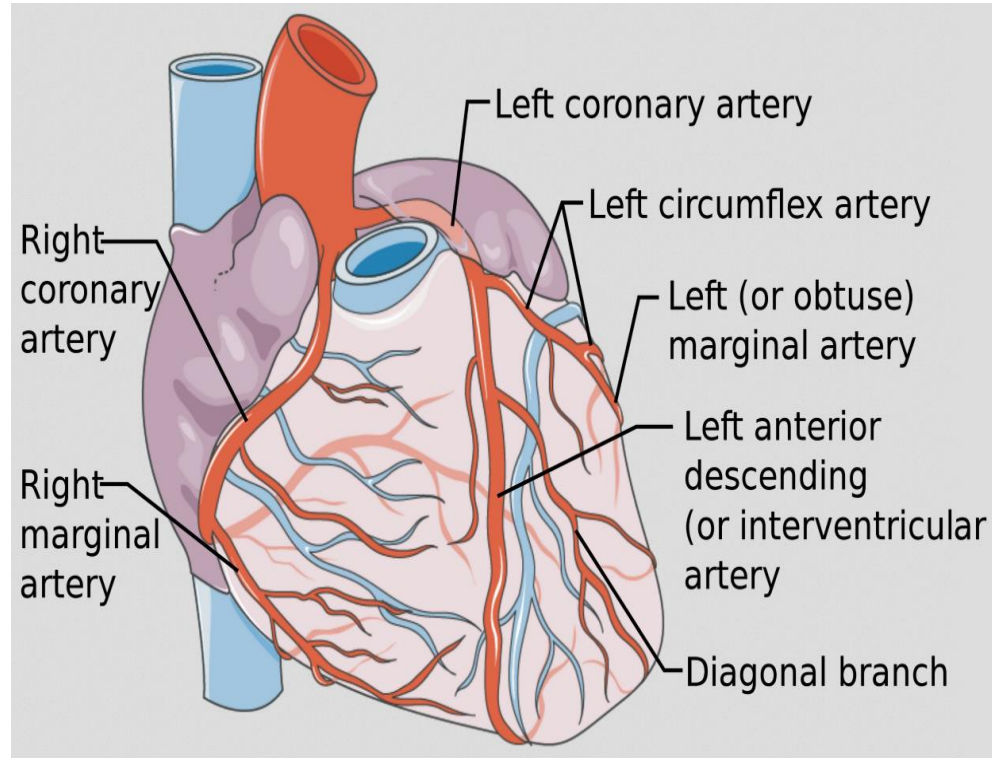
The aortic valve guards the aortic orifice and is precisely similar in structure to the pulmonary valve. One cusp is situated on the anterior wall (right cusp) and two are located on the posterior wall. Behind each cusp, the aortic wall bulges to form an **aortic sinus**. The anterior aortic sinus gives origin to the **right coronary artery**, and the left posterior sinus gives origin to the **left coronary artery**.



Anatomy of the Heart

The Arterial Supply of the Heart

The arterial supply of the heart is provided by the **right and left coronary arteries**, which arise from the **ascending aorta** immediately above the **aortic valve**. The coronary arteries and their major branches are distributed **over the surface of the heart** within subepicardial connective tissue.



The Thoracic Cavity L3

The right coronary artery supplies all of the right ventricle the variable part of the poster third of the intraventricular septum, the right atrium and part of the left atrium, and the sinoatrial node and the atrioventricular node and bundle. The LBB also receives small branches.

The left coronary artery supplies most of the left ventricle, the anterior two thirds of the ventricular septum, most of the left atrium, the RBB, and the LBB.

Anatomy of the Heart

The right coronary artery supplies all of the right ventricle, the variable part of the posterior third of the interventricular septum, the right atrium, and part of the left atrium, and the sinoatrial node and the atrioventricular node and bundle. The LBB also receives small branches.

The left coronary artery supplies most of the left ventricle, the anterior two thirds of the ventricular septum, most of the left atrium, the RBB, and the LBB.

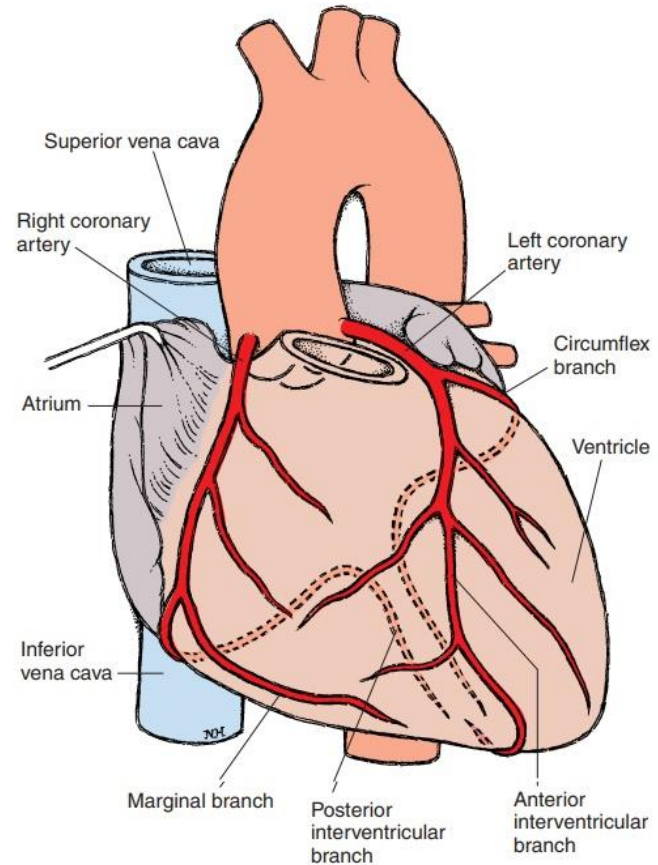


FIGURE
arteries

Coronary Circulation. Anterior view of coronary

Function of the heart

Heart Action The heart is a muscular pump that normally beats 70 to 90 times per minute in the resting adult and 130 to 150 times per minute in the newborn child.

The **cardiac cycle** is one complete heartbeat composed of two phases: (1) **systole** (ventricular contraction) and (2) **diastole** (ventricular relaxation). The tricuspid valve is closed during ventricular systole (contraction) to prevent blood from being regurgitated back into the atria.

Atrial systole occurs when the ventricles are nearly full and forces the remainder of the blood in the atria into the ventricles.

The sinoatrial node initiates the wave of contraction in the atria, which commences around the openings of the large veins and milks the blood toward the ventricles. By this means, blood does not reflux into the veins. The atrioventricular valves open once ventricular diastole (relaxation) occurs, and blood passively flows from the atria to the ventricles

Function of the heart

Once the intraventricular blood pressure exceeds that present in the large arteries (aorta and pulmonary trunk), the semilunar valve cusps are pushed aside, and the blood is ejected from the heart. At the conclusion of ventricular systole, blood begins to move back toward the ventricles and immediately fills the pockets of the semilunar valves. The cusps float into apposition and completely close the aortic and pulmonary orifices.

Functions of the Heart

- Generating **blood** pressure
- Routing **blood**
 - Heart separates pulmonary and systemic circulations
- Ensuring one-way **blood** flow
 - Heart valves ensure one-way flow
- Regulating **blood** supply
 - Changes in contraction rate and force match blood delivery to changing metabolic needs