

Unit 1 Lecture 2

THE HEART

Anatomy of the Heart

The [heart](#) rests on the diaphragm in a space called the mediastinum. It weighs @ 300 grams and is about as big as a clenched fist. The pointed end is called the apex and the opposite end is called the base but is really the top of the heart. The bulk of the heart tissue is made up of the left ventricle. A pericardium (a 3-layered bag) surrounds the heart and composed of fibrous pericardium (that provides protection to the heart, prevents overstretching, and anchors the heart in the mediastinum), a serous pericardium which is composed of two layers (the parietal layer or outer layer that is fused to the fibrous pericardium and the visceral layer or the inner layer that adheres to heart muscle). The visceral pericardium is also called the epicardium. Pericardial fluid is found in the pericardial cavity, which is located between the two layers, helps lubricate and reduces friction between membranes as the heart moves.

The heart wall is composed of three layers: the epicardium (see visceral pericardium above), the myocardium which is cardiac muscle tissue and the bulk of mass in the heart, and endocardium or the innermost layer of the heart. This lining is continuous through all of the blood vessels except for the capillaries.

The [Heart Chambers and Valves](#)

Internally the heart is divided into four chambers. The two upper chambers are the right and left atria. Each has an appendage (auricle) whose function is to increase the volume of the atria. Atria have thin walls because they deliver blood only to the ventricles. The two lower chambers are called the right and left ventricles. The left ventricle is two to four times as thick as the right ventricle because it has to pump blood to the entire body whereas the right ventricle pumps blood only to the lungs. An interventricular septum separates the ventricles and an interatrial septum separates the atria. The interatrial septum also contains the *Fossa ovalis* which is the site of the *foramen ovale*, an opening in the fetal heart. Blood flows through the *foramen ovale* because it has no need to go to the lungs in the fetus. *Trabeculae carneae* are folds and ridges of the myocardium in the ventricles.

Heart valves function to prevent the backflow of blood. The valves of the heart open and close in response to pressure changes. These atrioventricular valves lie between the atria and the ventricles. The Tricuspid valve is on the right side and the Bicuspid valve (mitral valve) is on the left side. *Chordae tendineae* connect the valves to the papillary muscles. Blood moves from the atria to the ventricles when pressure is low in the ventricles. When the

ventricles contract, the AV valves are forced closed and the *chordae tendineae* prevent the valve from eversion into the atria. The pulmonary semilunar valve lies in the opening where the pulmonary trunk leaves the right ventricle and the aortic semilunar valve lies at the opening of the left ventricle and the aorta. These two valves prevent blood flow back into the heart after ventricular contraction. Because there are no valves between the atria and the veins some of the arterial blood is forced back into the veins, but this is minimal due to compression of atrial muscles as the atria contract.

Blood Flow Through the Heart

Deoxygenated blood comes from the superior and inferior vena cava and the coronary sinus into the right atrium which then pumps blood into the right ventricle. From the right ventricle, blood is pumped to the lungs via the left and right pulmonary arteries. Blood returns from the lungs via the two left and two right pulmonary veins to the left atrium which then pumps the blood into the left ventricle. From the left ventricle, blood is pumped to the systemic circulation via the aorta. The *Ligamentum arteriosum* is a remnant of a fetal blood vessel that passed blood from the pulmonary trunk to the arch of aorta bypassing the lungs.

Heart Blood Supply

[Coronary arteries](#) transport blood to the heart. The left coronary artery branches into the anterior interventricular branch which supplies both ventricles and the circumflex branch which supplies left atrium and left ventricle. The right coronary artery supplies the right atria with small branches, then branches into the marginal branch which supplies the right ventricle and the posterior interventricular branch that supplies both ventricles. The coronary veins, specifically the great cardiac vein and the middle cardiac vein drain blood into the coronary sinus which empties into the right atrium. The blood vessels lie in a [coronary sulcus](#) which is an external groove that separates the atria from the ventricles and in the anterior and posterior interventricular sulcus which are external grooves that separate the ventricles.