

-Cardiac muscle tissue consists of many interlocking muscle cells, or fibers. The cells themselves are not very strong, but when tied together form a very strong muscle capable of pushing blood throughout the whole body.

-4 chambers (left right atria and ventricles)

-2 distinct pumps, blood cannot flow freely between them

-heart tissue is unique to the heart

Each cardiac muscle fiber contains a single nucleus and is striated, or striped, it appears to have light and dark bands when seen through a microscope. Dark bands represent areas of thick protein filaments made of myosin proteins that block light passing through the cell and appear dark. Between the dark bands are thin filaments made of actin protein that allow light to pass through and appear light. When the muscle fibers contract, myosin pulls the actin filaments together like an accordion to shrink the muscle cell and make it contract.

Aortic valves are located between the left ventricle of the heart and the aorta. They are semi-lunar valves composed of three leaflets. During diastole, the valve closes to prevent regurgitation of the blood back into the heart. In this way, aortic valves play a major role in helping determine the direction of blood flow. When blood is pulsed out of the heart during systole, it forces the valve to open. When the heart relaxes, the change in blood pressure causes the valve to close, allowing all three leaflets to fit snugly together. It is the structure of the aortic valve that enables it to close snugly to prevent cardiac regurgitation.

The two valves within the heart—the tricuspid and mitral valves—prevent blood backflow from the ventricles into the atria. Because of the force of the blood as it is pumped within the heart, the leaflets of each of these valves are anchored into place by strands of mostly collagen and elastin called chordae tendineae. These anchors prevent the valve leaflets from opening in the wrong direction (into the atria).

The two valves that are directly outside of the heart—the pulmonary and aortic valves—are both tricuspid valves (possessing three leaflets each) and are not anchored in place by tissue. Instead, each of the valve leaflets relies on its tissue structure to withstand the pressures exerted by blood flow.

Human aortic valve leaflets are composed of three distinct tissue layers (trilaminar; see Figure 1). The ventricularis layer faces the left ventricle. The spongiosa layer is the middle valve layer. The aortic side of the leaflet is called the fibrosa layer. Endothelial cells cover these three layers, forming a cell monolayer that protects the valve.





