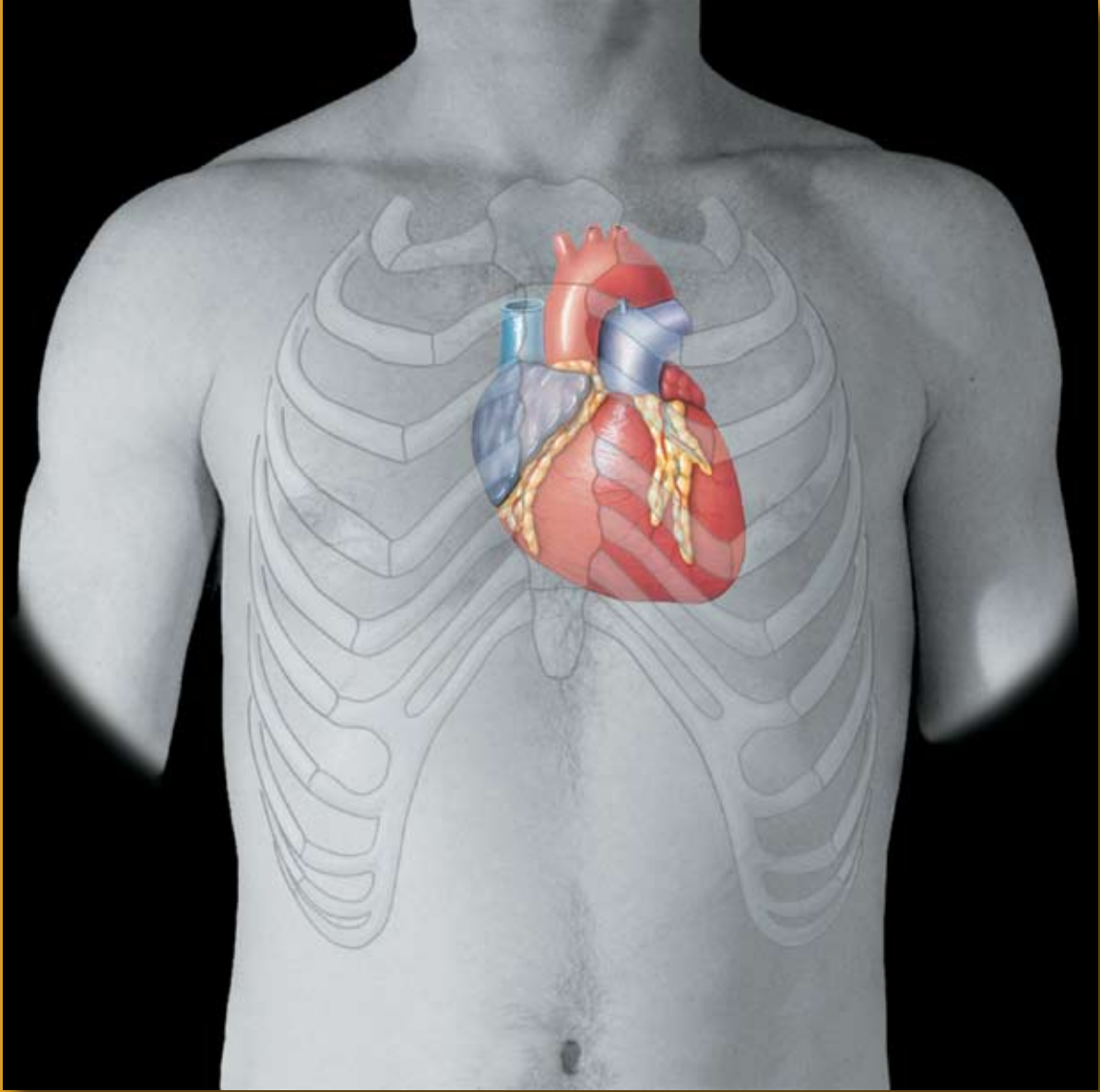


The Heart

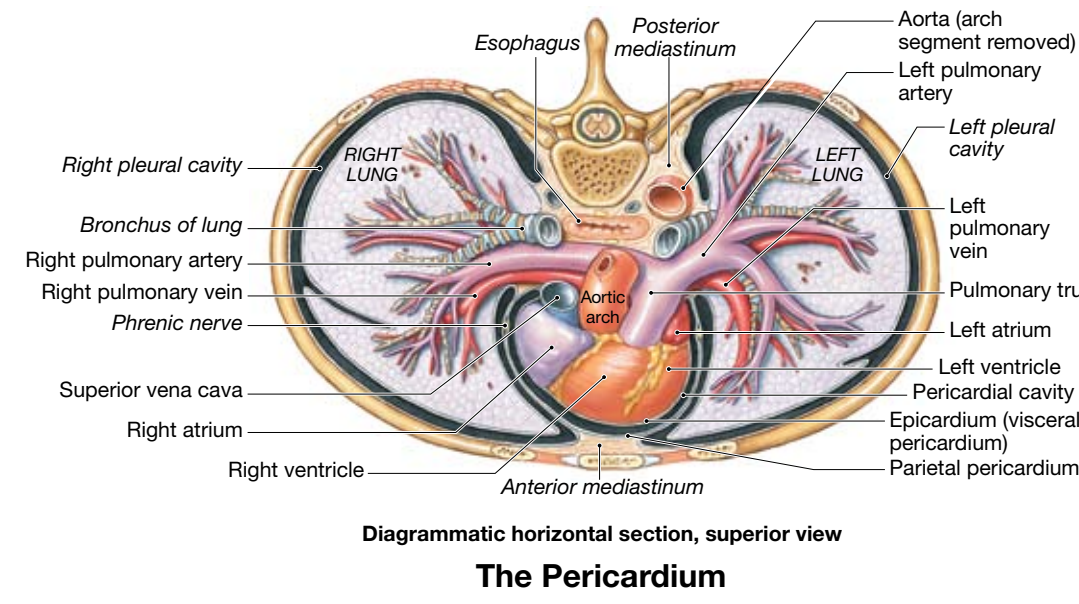


Advertisements and cartoons often show the heart at the center of the chest. However, a midsagittal section would not cut the heart in half, as the heart lies slightly to the left of the midline, sits at an angle to the longitudinal axis of the body, and is rotated toward the left side. A typical adult heart is approximately 12.5 cm (5 in.) from the attached base to the apex, with the apex approximately 7.5 cm (3 in.) to the left of the midline.

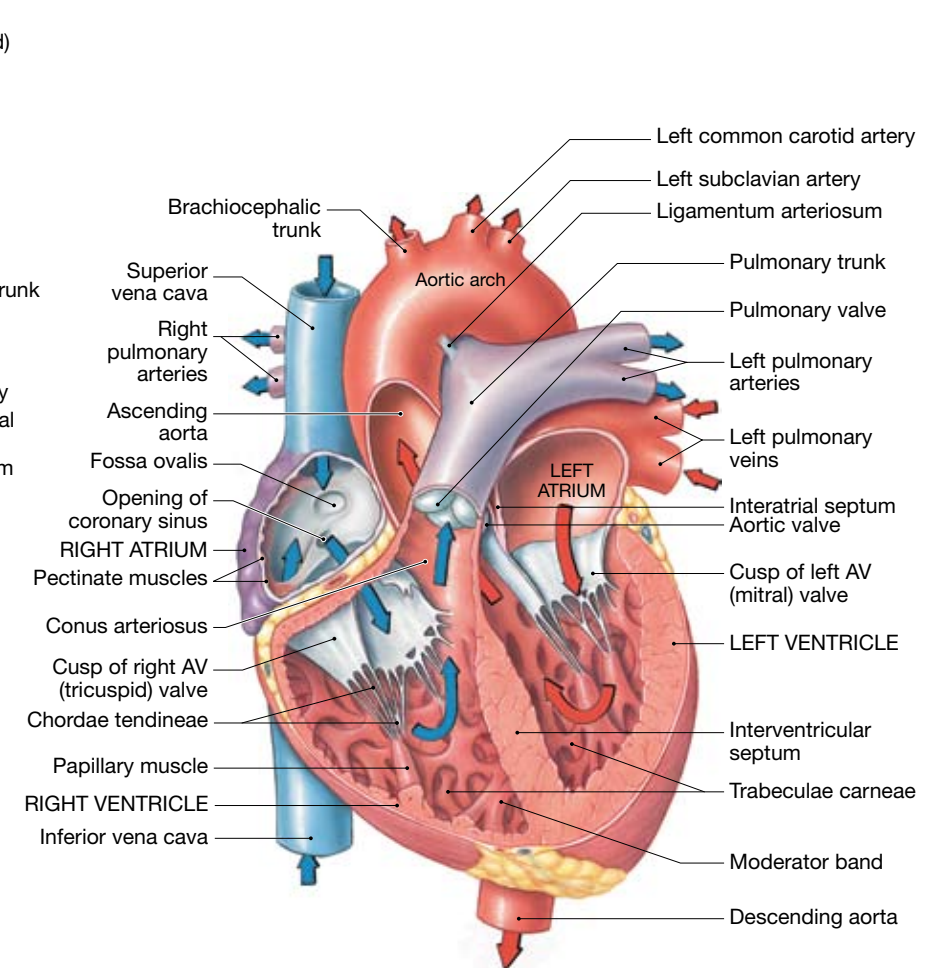
THE PERICARDIUM AND SECTIONAL ANATOMY OF THE HEART

THE PERICARDIUM

The heart is located near the anterior chest wall directly posterior to the sternum in the **pericardium**. The pericardium is divided into the **visceral pericardium** and the **parietal pericardium**. The loose connective tissue of the visceral pericardium, or **epicardium**, is bound to the cardiac muscle tissue of the heart. The parietal pericardium is reinforced by an outer layer of dense, irregular connective tissue containing abundant collagen fibers. This reinforcing layer is known as the **fibrous pericardium**.



Diagrammatic horizontal section, superior view
The Pericardium



Frontal section, anterior view
Sectional Anatomy

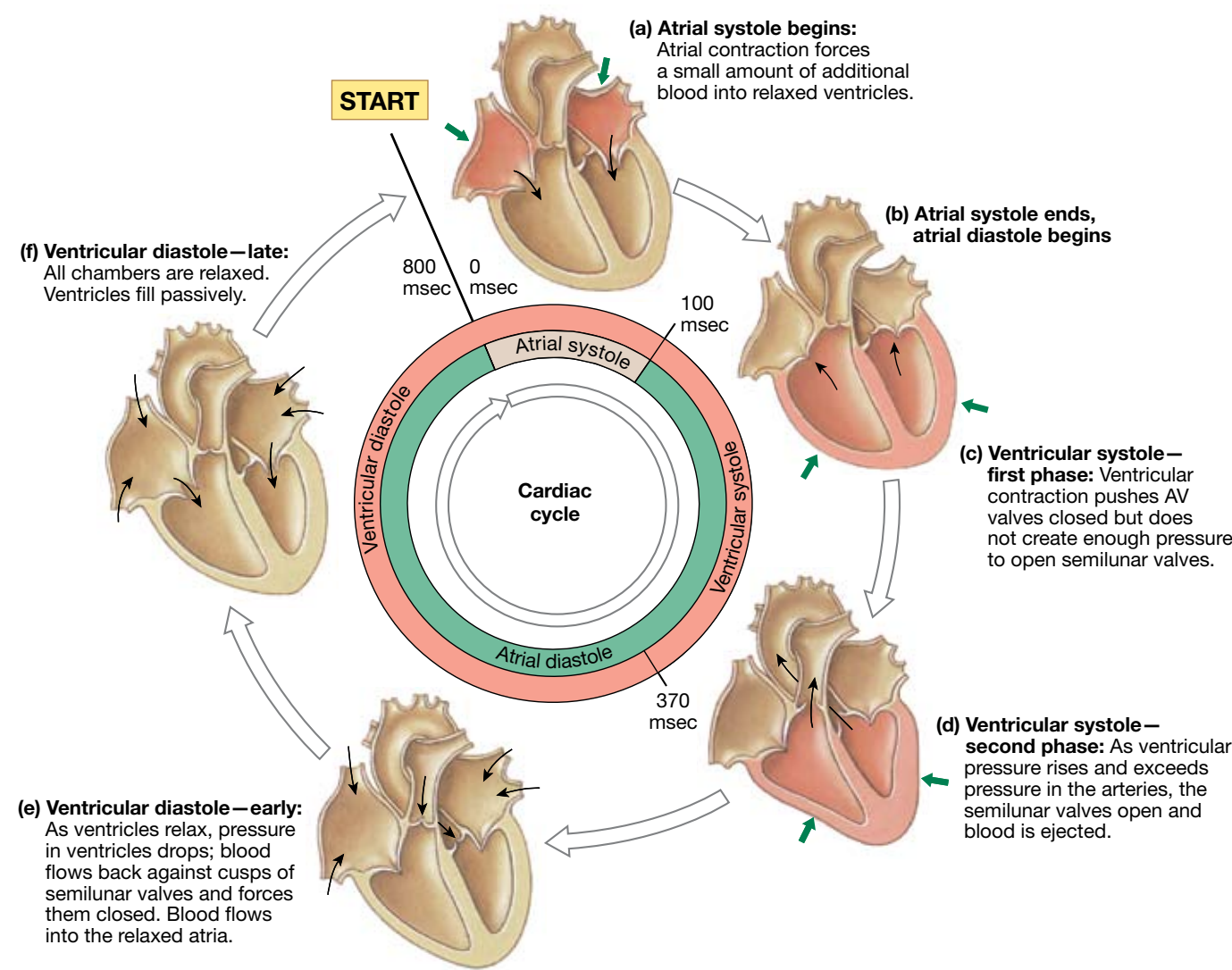
SECTIONAL ANATOMY

This figure details the internal anatomy and functional organization of the atria and ventricles. The atria are separated by the **interatrial septum**, and the **interventricular septum** divides the ventricles. Each atrium communicates with the ventricle of the same side. **Valves** are folds of endocardium that extend into the openings between the atria and ventricles. These valves open and close to prevent backflow, thereby maintaining a one-way flow of blood from the atria into the ventricles.

THE CARDIAC CYCLE

THE CARDIAC CYCLE

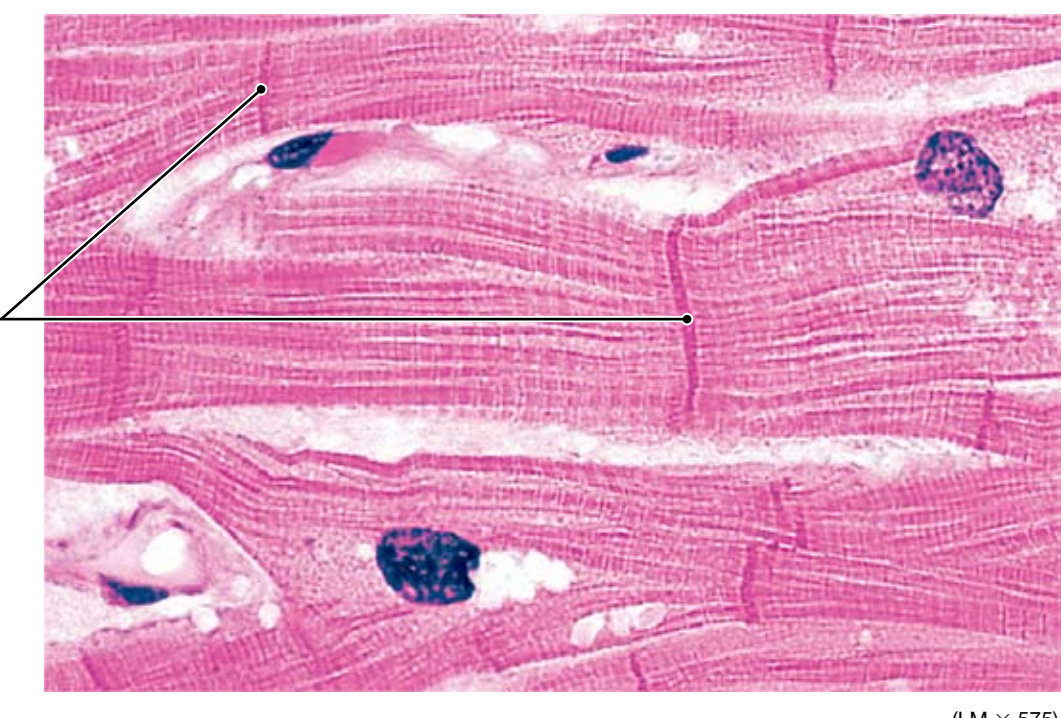
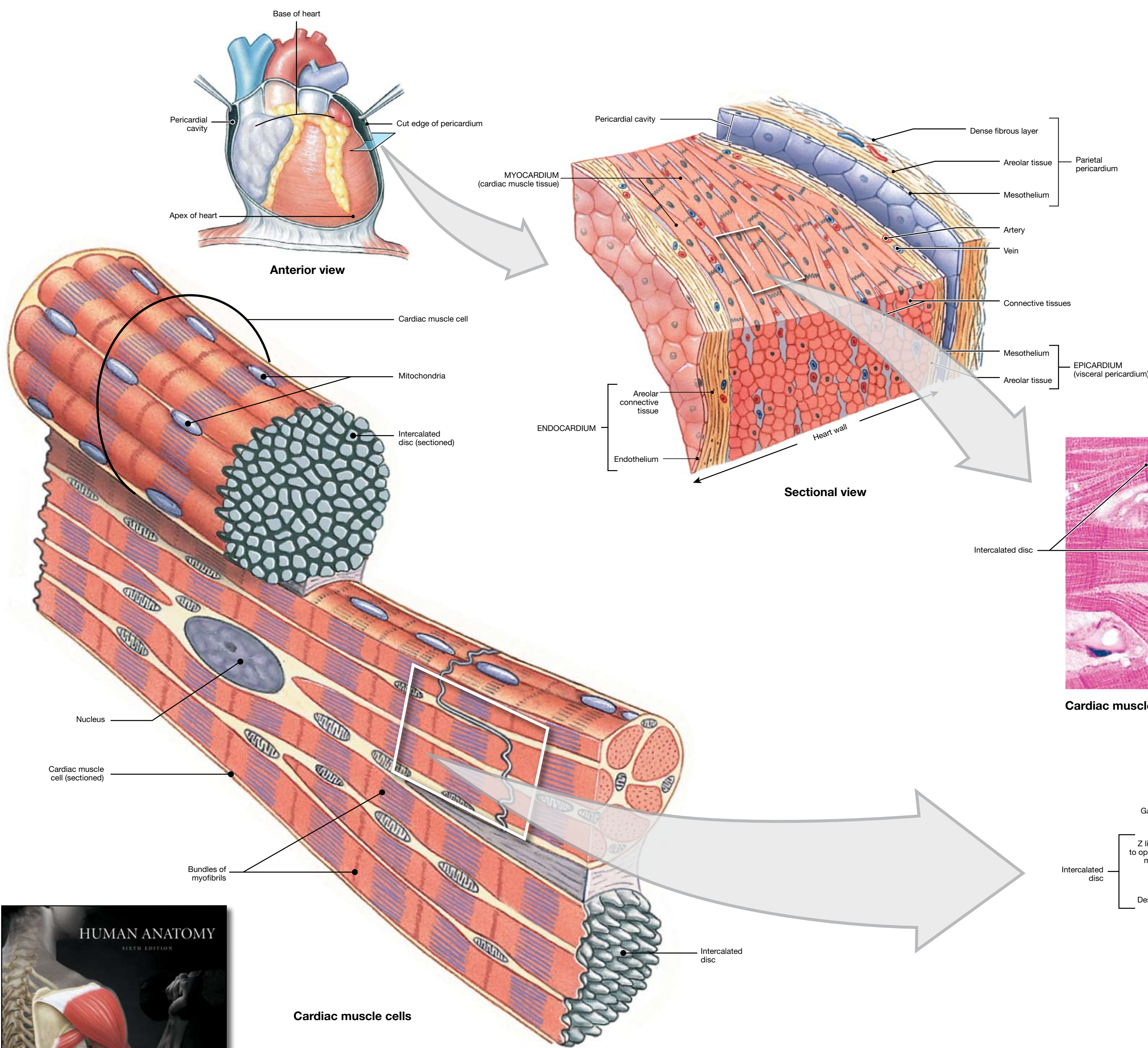
The period between the start of one heartbeat and the beginning of the next is a single cardiac cycle. The cardiac cycle therefore includes alternate periods of contraction and relaxation. For any one chamber in the heart, the cardiac cycle can be divided into two phases. During contraction, or **systole** (SIS-to-le), a chamber ejects blood either into another heart chamber or into an arterial trunk. Systole is followed by the second phase, one of relaxation, or **diastole** (di-AS-to-le). During diastole a chamber fills with blood and prepares for the start of the next cardiac cycle.



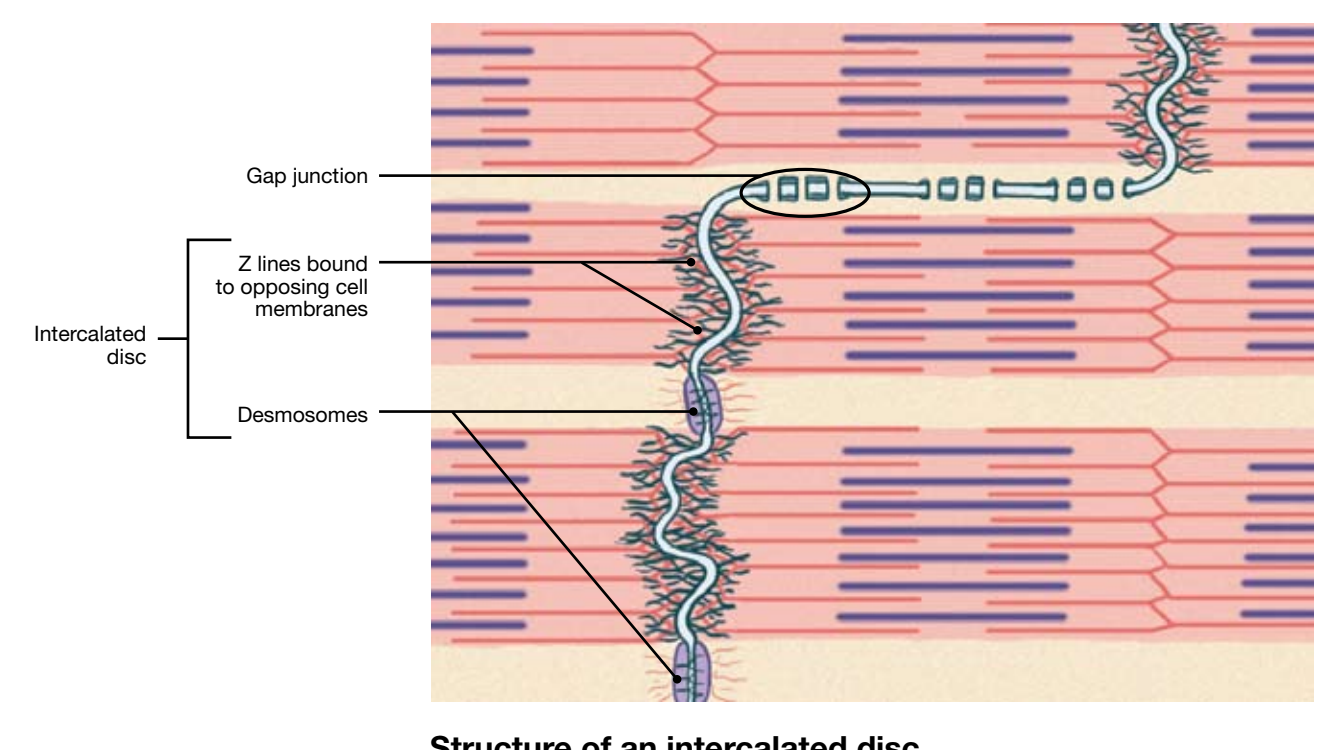
HISTOLOGICAL ORGANIZATION OF MUSCLE TISSUE IN THE HEART WALL

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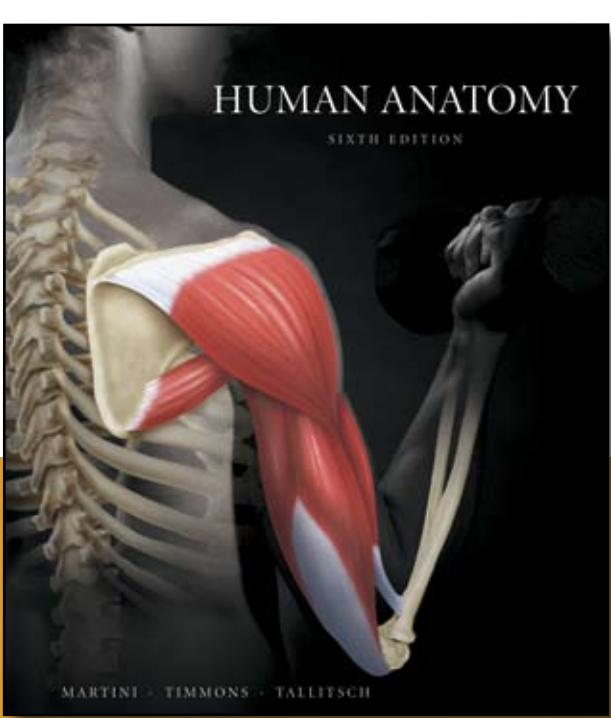
The unusual histological characteristics of cardiac muscle tissue give the myocardium its unique functional properties. **Cardiac muscle cells**, or **cardiocytes**, are relatively small, averaging 10–20 μm in diameter and 50–100 μm in length. A typical cardiocyte has a single, centrally placed nucleus. Cardiac muscle cells are connected to neighboring cells at specialized cell junctions known as **intercalated discs**. Intercalated discs are unique to cardiac muscle tissue. At an intercalated disc the sarcolemmae of the two cardiac muscle cells are bound together by **desmosomes**, which lock the cells together. Myofibrils in these cells anchor firmly to the sarcolemma at the intercalated disc. Cardiac muscle cells are also connected by **gap junctions**. Ions and small molecules can move between cells at these gap junctions. Because cardiac muscle cells are mechanically, chemically, and electrically connected to one another, cardiac muscle tissue functions like a single, enormous muscle cell. The contraction of any one cell will trigger the contraction of several others, and the contraction will spread throughout the myocardium. For this reason, cardiac muscle has been called a **functional syncytium**.



Cardiac muscle tissue (LM x 575)



Structure of an intercalated disc



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