Pericardial Space

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Product code: AM02694



In this specimen the heart itself has been removed to demonstrate the reflections of parietal peritoneum and the orientation of the heart relative to other structures, including the diaphragm (diaphragmatic surface) and the lungs (left and right pulmonary surfaces). The pericardium is the multilayered fibroserous sac that encloses the heart and is continuous with the serous visceral pericardium (epicardium) of the heart itself. In normal anatomical position, the boundaries of the parietal pericardium are also the boundaries of the middle mediastinum (what we call coterminous). The internal surface of the parietal peritoneum has been false coloured to aid in identifying the regions of the heart that are normally positioned in these parts of the middle mediastinum.

The base of the heart is roughly rectangular and projects superiorly and posteriorly (anterior to the hilum of the lungs). It can be seen on the model as the most posterior surface left by the impression of the heart. It is formed by the left atrium (pink) (and to a lesser extent the right atrium [blue-green]) and the proximal parts of the great vessels (red and blue) as they enter and leave the heart. This is also the ‘fixed’ region of the heart, anchoring the heart through the origins of the great vessels where the visceral and parietal serous pericardium are reflected and continuous. The transverse pericardial sinus (clinically relevant for some cardiac surgical procedures) is visible between the pulmonary arteries (red) and the bases of the superior vena cava, pulmonary trunk, and ascending aorta. Inferior to the pulmonary veins, the depressed region formed by the left atrium and left ventricle is termed the oblique pericardial sinus.

From the base, the heart projects anteriorly, inferiorly and towards the left side of the thorax. The most inferior and lateral point is the apex. The apex is formed by the inferolateral part of the left ventricle (yellow) and is normally found in the left fifth intercostal space along the midclavicular line.

Within the mediastinum, the heart rests on the diaphragmatic surface, consisting mainly of left ventricle (and to a lesser extent the right ventricle [light green]). This is the most inferior aspect of the heart and is separated from the base (the posterior surface) by the coronary sinus. It extends from the base of the heart to its apex. On the model it is the area that is just anterior and inferior to the ostium of the inferior vena cava.

The pulmonary surfaces are the broad and convex right and left lateral sides of the heart. The left pulmonary surface reflects onto the left lung and consists mainly of the left ventricle. The right pulmonary surface reflects onto the right lung and consists of the right atrium.

The heart also has an anterior surface that consists mostly of the right ventricle with some right atrium on the right and left ventricle on the left. In this model this surface cannot be appreciated as it has been dissected deep to the anterior surface. The portion of the pericardium that can be seen being reflected to either side would have covered, in part the anterior surface before they were reflected.

Great Vessels: The aorta carries oxygenated blood from the heart into the systemic circulation. It begins as the ascending aorta and originates from the aortic orifice at the base of the left ventricle of the heart. The left and right coronary arteries branch off immediately superior to the aortic orifice from the left and right aortic sinuses respectively to supply the heart muscle itself. The vessel moves superiorly to the level of the second right costal cartilage, the sternal angle, and is then referred to as the arch of the aorta. It becomes the descending or thoracic aorta when the arch moves inferiorly to the vertebral level T4. It spans down to T12 level and supplies much of the thorax. The superior vena cava is a large vein is formed primarily by the union of the right and left brachiocephalic veins. It drains directly into the right atrium at the SVC ostium, carrying a significant portion of deoxygenated blood of the upper body. The inferior vena cava is another large vein that drains much of the deoxygenated blood of the lower body, with many tributaries contributing to it throughout the trunk. It drains directly into the right atrium at the IVC ostium.

Pulmonary Vessels: The pulmonary trunk arises from the right ventricle of the heart. It bifurcates to give rise to the left and right pulmonary arteries left of the midline just inferior to vertebral level T4/5 and the arch of the aorta. These carry deoxygenated blood to the lungs, entering at the root of the lung in the hilum. There are four pulmonary veins in total. A superior and inferior pulmonary vein for each side, left and right. They carry oxygenated blood from the lung, beginning at the hilum and passing through the root of the lung, to the left atrium of the heart.

Transverse and Oblique Pericardial Sinus: The transverse sinus can be described as the common point of parietal and visceral pericardium. This is located beneath the aorta and pulmonary trunk and depicts a tunnel. In contrast to the tunnel-like transverse sinus, the oblique pericardial sinus is more like an ocean bay. The two types of pericardium here also meet, and it is located between the pulmonary veins.

Heart

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Product code: AM02701



This 3D model represents a ‘normal’ sized adult heart with light dissection to the epicardium to expose the coronary arteries and cardiac veins.

At the base of the heart, the terminal part of the superior vena cava and azygous vein can be observed just prior to draining into the right atrium. Immediately adjacent to the superior vena cava, the arch of the aorta has been preserved with the origins of the aortic arch derivative arteries. In slight contrast to the typical branching pattern, the brachiocephalic trunk includes both the right subclavian and right common carotids as well as the left common carotid. As a result, only two direct arterial branches can be observed – with the unusually joined brachiocephaic trunk and left subclavian arising before the descent of the thoracic aorta posterior to the pulmonary trunk. The pulmonary trunk and pulmonary arteries are preserved, including a robust ligamentum arteriosum connecting the left pulmonary artery to the aortic arch.

The removal of the epicardium has exposed the coronary arteries and branches across both the anterior and posterior aspects of the heart chambers. The right coronary artery can be seen descending from its origin at the ascending aorta, and wrapping posteriorly to approach the posterior interventricular sulcus. The origin of the left coronary artery is obscured by the auricle of the left atrium, but the branches from this artery – the anterior interventricular (left anterior descending), diagonal (passing deep into the myocardium) and the circumflex artery can be observed at the superior margin of the left ventricle. The anterior interventricular descends towards the apex with several branches passing deep into the myocardium, while the circumflex passes posteriorly and lies just superficial to a preserved portion of the great cardiac vein. On the posterior aspect, a well-defined coronary sinus is preserved to its termination at the right atrium near the inferior vena cava.

Heart internal structures

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Product code: AM00971



This heart model has been dissected to display the internal structures of the chambers. At the base of the heart the termination of the superior vena cava is preserved entering the right atrium. Part of the inferior vena cava is also preserved on the inferior aspect of the right atrium; however, most of the vessel lumen and much of the anterior wall has been removed to expose the pectinate muscles of the right auricle and the fossa ovalis (which is nearly translucent in the 3D print). The anterior wall of the right ventricle has also been removed to expose the right atrioventricular valve and its three cusps (anterior, posterior, and septal), including the chordae tendineae connecting them to respective papillary muscles projecting from trabeculae carneae (including a septomarginal trabecula entering the anterior papillary muscle from the interventricular septum). The smooth wall of the conus arteriosus is also exposed leading to the pulmonary semilunar valve (left, right, and anterior cusps) at the base of the pulmonary trunk. Preserved and encircling the right atrioventricular valve is the right coronary artery, ultimately passing to the posterior aspect and the origin of the posterior interventricular artery and atrioventricular nodal artery. On the posterior side of heart the terminations of the pulmonary veins are visible entering the opened left atrium. Just anterior to the depression of the fossa ovalis in the interatrial septum the left atrioventricular valve with its two cusps (anterior and posterior) is preserved, along with the associated chordae tendineae and papillary muscles in the ventricle. The walls of the opened left ventricle preserve well-developed trabeculae carneae. At the apex of the ventricle the aortic semilunar valve (with left, right, and posterior cusps preserved) can be seen at the base of the sectioned aorta alongside the origin of both coronary arteries. The left coronary artery in this specimen is very short, giving rise almost immediately from its origin to the left anterior descending artery, the diagonal artery, the ramus intermedius, and the circumflex branch. The latter branch passes between the left atrium and ventricle adjacent to the opened coronary sinus leading to the right atrium. The left anterior descending branch penetrates the myocardium in this individual and travels through the tissue, only emerging superficially to become visible again near the apex.

Heart

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Product code: AM01244

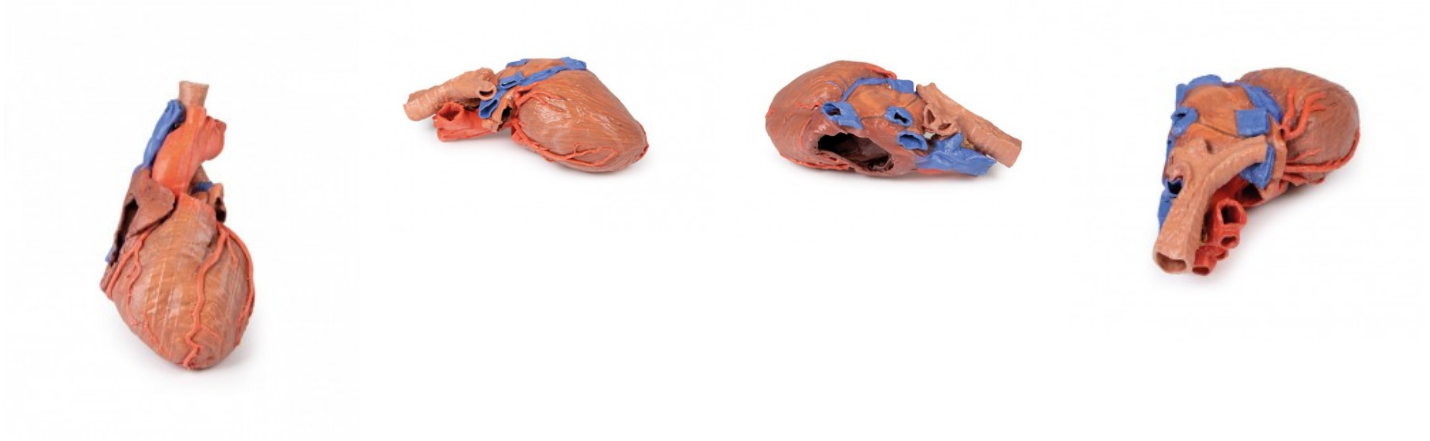


This 3D printed heart specimen preserves superficial cardiac anatomy and the bases of the great vessels. All four chambers (atria and ventricles) are preserved, with the pericardial reflections on the left atrium demarcating the position of the transverse and oblique pericardial sinuses. The right marginal branch of the right coronary artery is visible exiting from the fat-filled coronary sulcus, as well as the posterior interventricular (posteriro descending) artery within its sulcus. The anterior interventricular (left anterior descending) and diagonal branches from the left coronary artery are also visible anteriorly, as well as the terminal portion of the circumflex branch deep to the left auricle and great cardiac vein. On the posterior aspect, the coronary sinus receives all the cardiac veins (great, middle, small) and a prominent posterior vein of the left ventricle. The aortic and pulmonary semilunar valves are visible at the bases of the ascending aorta and pulmonary trunk, respectively.

Heart and the distal trachea, carina and primary bronchi

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Product code: AM00970



This 3D printed specimen preserves the external anatomy of the heart and the distal trachea, carina, and primary bronchi in the posterior mediastinum relative to the great vessels and left atrium (which demonstrates the pericardial reflections of the transverse and oblique pericardial sinuses). An anterior window has been dissected into the right atrium and base of the auricle, exposing the right atrioventricular (tricuspid) valve and passage into the right ventricle. Both the right and left coronary arteries and named branches are visible (with the posterior interventricular artery arising from the right coronary artery). The left auricle has been sectioned to demonstrate the course of the circumflex artery in the coronary groove. The cardiac veins have been removed, but the coronary sinus has been retained inferior to the left atrium. The pulmonary trunk has been removed to expose the (open) pulmonary semilunar valves, while the arch of the aorta is intact to display the origins of the brachiocephalic trunk, left common carotid, and left subclavian. Adjacent to the aorta, the termination of the left and right brachiocephalic veins and azygos vein into the superior vena cava is preserved.