

## Glossary of Key Terms and Concepts - Chapter 7

**Anterior cardinal veins** - These bilaterally symmetrical, paired veins drain blood from the head and neck into their respective common cardinal veins during the early 4th week. The distal ends of the anterior cardinals give rise to the internal jugular veins. The proximal end of the left anterior cardinal vein regresses but the proximal end of the right anterior cardinal becomes the superior vena cava. They should probably be called superior cardinal veins in the bipedal human.

**Aortic arches** - These paired arteries are derived from a basketwork of arteries surrounding the pharynx of piscine progenitors. In fish, they vascularize the gill bars and function to extract oxygen from water flowing through the pharynx. The aortic arches in humans correspond to arches 1, 2, 3, 4, and 6 of the ancestral fish but have become highly modified to form the great vessels of the thorax.

**Aortic sac** - The aortic arches (2, 3, 4, and 6) sprout from this most distal specialization of the truncus arteriosus. It forms part of the arch of the aorta and the brachiocephalic artery.

**Aortic valve** - See semilunar valves.

**Ascending aorta** - This vessel is the most proximal segment of the aorta, derived from the truncus arteriosus.

**Atrioventricular node (AVN)** - This secondary pacemaker region within the superior endocardial cushion receives impulses from the sinoatrial node (SAN) to regulate beating of the ventricles.

**Atrioventricular sulcus** - This constriction demarcates the primitive atrium and primitive ventricle in the 3rd week.

**Atrioventricular valves** - These AV valves prevent backflow into the atria during systole. Their cusps, chordae tendineae and papillary muscles are sculpted from ventricular muscle. The two-cusped AV valve of the left ventricle is called the **bicuspid** or **mitral valve** and the three-cusped AV valve of the right ventricle is called the **tricuspid valve**.

**Bicuspid (mitral) valve** - See atrioventricular valves.

**Bulboventricular sulcus** - This constriction demarcates the superior end of the primitive ventricle (presumptive left ventricle) and the inferior end of the bulbus cordis (presumptive right ventricle) in the third week.

**Bulbus cordis** - This segment of the primitive heart tube is first apparent at the end of the third week. Its inferior end forms much of the **right ventricle** and its superior end forms

an outflow channel, the **conotruncus**, which then forms the proximal **conus cordis** and distal **truncus arteriosus**.

**Bundle of His** - Its specialized myocytes comprise a conduction pathway that carries impulses from the atrioventricular node (AVN) to the ventricles. Its right branch serves the right ventricle and its left branch, the left ventricle.

**Cardiac jelly** - This acellular secretion of the myocardium plays a central role in septation of the heart and formation of the atrioventricular canals. As the heart differentiates, however, this thick layer disappears.

**Cardiogenic region** - This horseshoe-shaped region lateral and cranial to the neural plates, forms the lateral endocardial tubes and hence the primitive heart tube, by vasculogenesis.

**Chordae tendineae** - See "atrioventricular valves" above.

**Common cardinal veins** - The right and left common cardinal veins are short vessel segments which drain blood into the right and left horns of the sinus venosus respectively. They are the confluence of the anterior and posterior cardinal veins.

**Conduction system** - Myocytes within the developing heart tube develop a more rapid rate of depolarization to produce two pacemaker regions, the sinoatrial node (regulating atrial rhythm) and an atrioventricular node connected by a myocardial conduction pathway to coordinate ventricular rhythmicity via the bundle of His. The primitive conduction system develops as early as day 22.

**Conotruncus** - This region of the bulbus cordis forms the conus cordis and the truncus arteriosus. The truncus arteriosus is divided into the ascending aorta and pulmonary trunk.

**Conus cordis** - This segment of the outflow tract is derived from the conotruncus and is remodeled to form outflow regions of the definitive right ventricle and part of the left ventricle.

**Coronary sinus** - This vestige of the left horn of the sinus venosus completely detaches from the left anterior cardinal vein. Cardiac veins join with sprouts from the coronary sinus to form the venous system that will drain the myocardium.

**Crista terminalis** - This ridge of tissue demarcates the boundary between the sinus venarum (definitive atrium) and the right primitive atrium (right auricle). It contains a conduction pathway connecting the SAN with the AVN.

**Definitive left atrium** - This definitive heart chamber forms by incorporating pulmonary veins into the posterior wall of the primitive atrium.

**Definitive left ventricle** - Most of this heart chamber is derived from the primitive ventricle, but part is formed by the left wall of the conus cordis.

**Definitive right atrium** - This definitive heart chamber is formed by incorporation of the sinus venosus into the posterior wall of the primitive atrium.

**Definitive right ventricle** - This definitive heart chamber is derived mostly from the inferior end of the bulbus cordis but also incorporates part of the right wall of the conus cordis and part of the primitive ventricle.

**Dextrocardia** - This term describes the condition resulting from an opposite, "dextral" looping of the primary heart tube which displaces the apex of the "left" ventricle to the right. This contrasts with normal sinistral looping.

**Dorsal mesocardium** - This dorsal mesentery of the primitive heart tube ruptures in the 4th week forming the transverse pericardial sinus.

**Endocardial cushions** - These thickenings in the atrioventricular canal are regions of thickened cardiac jelly.

**Endocardium** - This lining of the heart tube is derived from the lateral endocardial tubes. It consists of endothelium and a thin subendothelial connective tissue.

**Epicardium (visceral pericardium)** - This outer tunic of thin serous membrane covers the myocardium. It is derived from splanchnopleuric mesoderm and also forms the coronary vessels.

**Foramen ovale** - This inferior opening in the septum secundum allows blood to flow from the right to the left atrium during embryonic and fetal life.

**Fossa ovalis** - After birth, pressure rises in the left ventricle, forcing the septum primum against the septum secundum. Typically, these septa fuse leaving evidence of the former foramen ovalis as a shallow fossa ovalis when viewed from within the right atrium.

**Inferior vena cava** - This vessel returns systemic blood from the trunk and lower extremities to the right atrium. It is formed from the right vitelline, subcardinal, supracardinal and posterior cardinal veins.

**Lateral endocardial tubes** - These paired tubes form within the lateral regions of the cardiogenic area by vasculogenesis. During embryonic folding, they are translocated to the thoracic region and fuse to form the primitive heart tube. **Left brachiocephalic vein** - As the left anterior cardinal vein loses its connection with the left horn of the sinus venosus, the left brachiocephalic vein develops from thymic and thymus veins to connect the distal end of the left anterior cardinal vein with the right anterior cardinal vein. It will thus drain blood from the left side of the head and neck to the superior vena cava.

**Membranous ventricular septum** - The membranous ventricular septum develops from migrating neural crest cells. Failure of neural crest cell migration into the heart may result in ventricular septal defects.

**Muscular ventricular septum** - Septation of the ventricles is initiated by growth of this thickened ridge of musculature as the inferior region of the bulboventricular sulcus protrudes into the cardiac lumen. The anterior trabeculated part is called the **primary ventricular fold (septum)** and the smooth posterior region is called the **inlet septum**. They are demarcated by the septomarginal trabecula or moderator band.

**Myocardium** - The myocardium, or cardiac muscle arises from splanchnopleuric mesoderm that invests the primary heart tube. The myocardium secretes the cardiac jelly and gives rise to the conduction system.

**Oblique vein of the left atrium** - This small vein draining the wall of the left atrium, arises from the distal end of the left sinus horn and is directly connected to the coronary sinus.

**Ostium primum** - This opening in the septum primum closes as the septum primum fuses with the septum intermedium.

**Ostium secundum** - The ostium secundum develops within the superior region of the septum primum as the ostium primum closes.

**Papillary muscles** - These muscular specializations of the ventricular walls anchor the chordae tendineae of the AV valves.

**Posterior cardinal veins** - These bilateral, paired vessels drain the trunk and lower and extremities between the 4th and 8th weeks, when they are superseded by the subcardinal and supracardinal systems.

**Primitive atrium** - The primitive atrium appears as a small expansion of the primitive heart tube in the early 4th week. On the right side, it is displaced by incorporation of the right sinus venosus and then forms the right auricle. On the left side, it is displaced by intussusception of the pulmonary veins and forms the left auricle.

**Primitive (primary) heart tube** - The primitive heart tube is formed by fusion of the lateral endocardial tubes.

**Primitive ventricle** - This expansion of the primitive heart tube is apparent early in the 4th week. It mainly forms the definitive left ventricle, although a small part of it contributes the definitive right ventricle.

**Pulmonary trunk** - This outflow tract of the right ventricle develops from the truncus arteriosus.

**Pulmonary valve** - See semilunar valves.

**Semilunar valves** - These valves of the aortic and pulmonary outflow tracts arise as cell death foci sculpt cusps from the left and right truncocoanal septa and from a minor anterior truncus swelling (a cusp of the pulmonary valve) and a minor posterior swelling (a cusp of the aortic valve).

**Septum intermedium** - This structure divides the single AV canal into right and left AV canals as the superior and inferior endocardial cushions meet and fuse during the 6th week. This septum provides a base upon which the interventricular and interatrial septa can fuse to completely separate the right and left ventricular chambers from each other and the right and left atrial chambers from each other respectively.

**Septum primum** - This membranous interatrial septum forms adjacent to the left atrium. It first contains an ostium primum, which closes when the septum fuses with the septum intermedium and then an ostium secundum which forms in its superior region.

**Septum secundum** - This thick septum grows from the atrial roof, just to the right of the septum primum. Its growth is incomplete resulting in the formation of a foramen ovale.

**Sinus venarum** - This is the smooth walled region of the definitive right atrium formed by intussusception of the right horn of the sinus venosus.

**Sinus venosus** - This chamber at the inferior end of the primitive heart tube is the site of confluence of left and right common cardinal, vitelline, and umbilical veins prior to remodeling of the inflow region of the heart. The left sinus horn is remodeled to form the coronary sinus and the right horn expands to form the sinus venarum and thus the definitive right atrium.

**Superior vena cava** - The superior vena cava arises from the proximal end of the right anterior cardinal vein.

**Tricuspid valve** - See atrioventricular valves.

**Truncocoanal septa** - These septa of the outflow tracts are formed from neural crest cells which migrate into the truncus arteriosus through the 3rd, 4th and 6th aortic arches. Their fusion simultaneously separates the right and left ventricular chambers from one another along with their respective outflow tracts, the pulmonary trunk and aorta.

**Truncus arteriosus** - This distal segment of the bulbus cordis is divided into ascending aorta and pulmonary trunk by formation and fusion of the truncocoanal septa between the 5th and 9th weeks.