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General Angiology

Angiology is the description of the organs of circulation of the blood and lymph.

It is conventionally divided into-cadiovascular system and lymphatic system

Cardiovascular system: Closed system of connecting tubes. It consists of-

- Heart-functions as central pump of the cardiovascular system
- Blood vessels- arteries, vein and capillaries
    1) Arteries-carries oxygen rich (oxygenated) blood away from the heart.
    2) Vein- carries carbon dioxide rich (deoxygenated) blood back to the heart.
    3) Capillaries- microscopic tubes in the tissues which permit necessary interchange between blood and tissues.

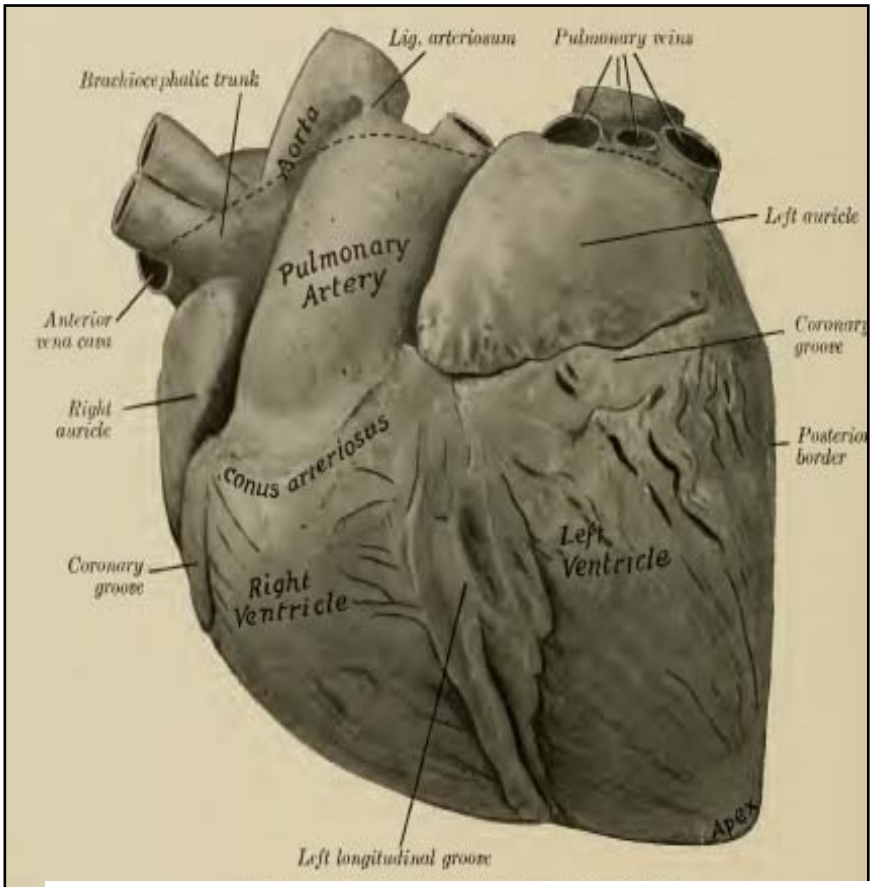


Fig. 1 Heart ; Left view

Heart (Cor):

- ***Shape***: Cone shaped, hollow muscular organ.
- ***Position***: Lies obliquely, a little more to the left side of the median plane than right.
- ***Location/Topography***: Situated in the thoracic cavity; particularly in the middle mediastinum. It extends from the 3rd-6th rib. About 60% of the heart lying to the left of the median plane.
- ***Covering of the heart***: it is covered by a fibro-serous membrane called pericardium. Has 2 part: Fibrous part and serous part. Like other serous memebrane, serous part divided into: Parietal and Visceral layer. Parietal and visceral layer are separated by a small space called pericardial sac. Pericardial sac contains small amount of clear serous fluid called liquor pericardii. This fluid keeps the apposed surfaces moist and smooth.
- Anatomy: Presents a base above and an apex below. Base of the pericardium is attached by large arteries and veins. The apex of the pericardium is attached to the sternum by ligament (sterno-pericardial ligament). ** In dog, additional ligament is present other than sterno-pericardial ligament (Phrenopericardiac ligament).
- Functionally the heart is divided into right and left side. Again each right and left side is sub-divided into upper and lower chamber by built-in heart valve. The valves ensure the blood flows in one

direction i.e., from upper chamber (atrium) to lower chamber (ventricle). Heart valves prevent reflux/backflow of blood.

- The right side of the hearts pumps blood into the capillaries of the lung and is called small/pulmonary circulation.
- The left side pumps blood to the rest of the body is called large or systemic circulation.
- Valves of Heart:
- **Atrioventricular (A-V) Valve**: Rt. And Lt
  The valve which separates the right atrium from the right ventricle is known as the right atrio-ventricular valve/tricuspid valve. Tricuspid valve consist of three cusps/flaps The valve which separates the left atrium from the left ventricle is known as the right atrio-ventricular valve. Lt. A-V valve also known as the bicuspid valve/mitral valve. Bicuspid valve consist of two cusps/flaps

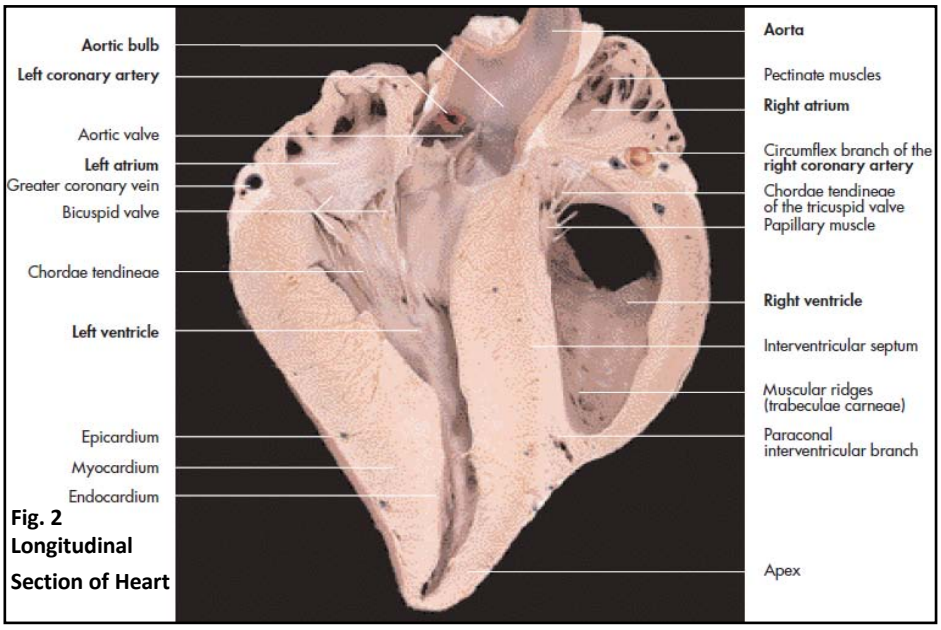


Fig. 2 Longitudinal Section of Heart

- **Semilunar Valve**: The semilunar valves have three cuplike leaflets. Aortic and Pulmonary valve are semilunar valve. Aortic valve at the prigin of the aorta and pulmonary valve located at the origin of the pulmonary artery.
- The muscles of atrial wall is called pectinate muscle
- The muscles of ventricular wall are called papillary muscle.
- Cardiac skeleton: is formed by the fibrous connective tissue that encircles the four heart orifices (atrioventricular, aortic, and pulmonary trunk openings). The skeleton contains fibrocartilage or nodules of bones (ruminants). In ox, two bones (the ossa cordis) develop in the aortic fibrous ring and triangular in shape.

Types of circulation:

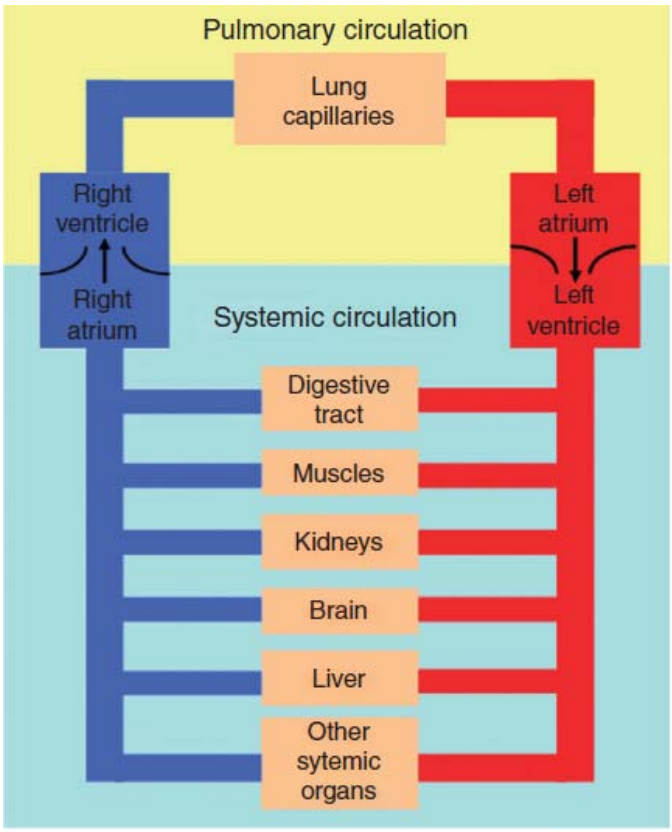
General circulation: In general 2 types

1. Pulmonary/small circulation: circulates all the blood through the lungs.
2. Systemic/somatic/large: refers to the movement of the oxygenated blood throughout the body and subsequent return of the unoxygenated blood to the heart.

- Special circulation
  1. Portal circulation: The arrangement in which a vessel breaks up into capillaries and then recombines again to form another vessel is called portal system/circulation.
     - Hepato-portal: The portal vein and its tributaries form a bypass system that begins and ends as capillary beds.

- Renal portal-In bird, reptiles and amphibians, part of the blood returning from the hindlimbs enter the kidneys to form renal portal circulation.
- Pituitary/hypothalamo-hypophyseal portal

2. Coronary circulation- Circulation of heart
3. Fetal circulation- Circulation in fetus



Pulmonary/small circulation: circulates all the blood through the lungs. The pulmonary circulation transports deoxygenated blood from the right ventricle to the lungs where it picks up O2 while delivering CO2. The right side of the heart is responsible for the pulmonary circuit. Deoxygenated blood returning from the body enters the right atrium and passes into the right ventricle. The right ventricle pumps the blood into the pulmonary artery and into the pulmonary capillaries. Oxygenated blood is returned to the left atrium via the pulmonary vein.

Systemic circulation/large circulation: The systemic circulation distributes oxygenated blood throughout the body. Blood is pumped from the left ventricle into the aorta, and then into smaller systemic arteries. These arteries give rise to arterioles that lead to systemic capillaries. Exchange of nutrients occurs across the capillary walls. Blood enters the systemic venules and then into the systemic veins that return the blood to the right atrium.

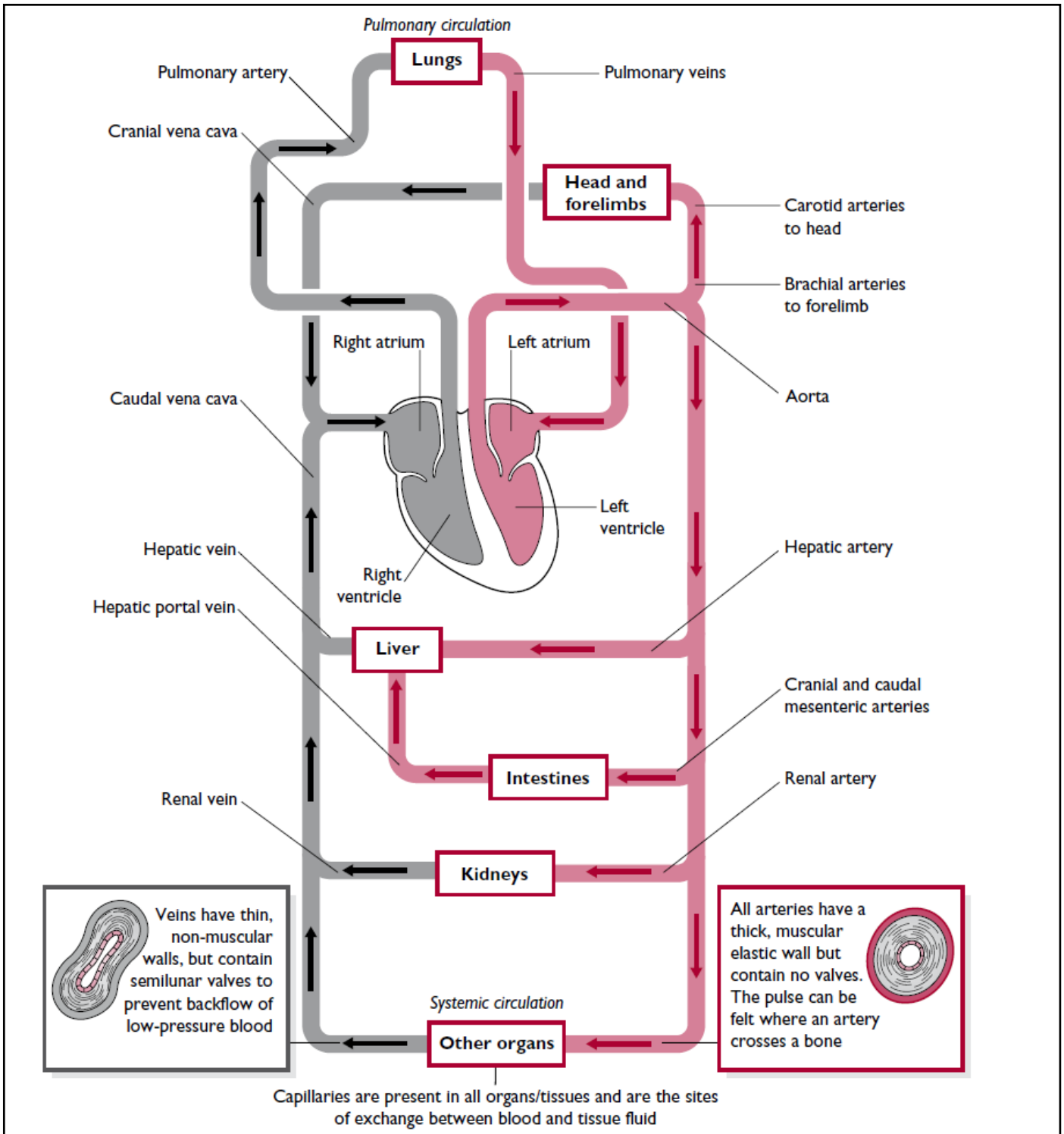


Fig. 7.6 Circulation of blood around the body.