

Veins of the Systemic Circulation

It is well known that arteries distribute blood to various parts of the body, and veins drain blood away from them. For the most part, arteries are deep; veins may be superficial or deep. Superficial veins are located just beneath the skin and can be seen easily. Superficial veins are clinically important as sites for withdrawing blood or giving injections. Three systemic veins, the coronary sinus, superior vena cava, and inferior vena cava, return deoxygenated blood to the heart (right atrium). The coronary sinus receives blood from the cardiac veins; the superior vena cava receives blood from other veins superior to the diaphragm, except the air sacs (alveoli) of the lungs; the inferior vena cava receives blood from veins inferior to the diaphragm.

Veins of the head and neck

Most blood draining from the head and neck passes into three pairs of veins:

- the internal jugular, Within the brain, all veins drain into dural venous sinuses and then into the internal jugular veins. Dural venous sinuses are endothelial-lined venous channels between layers of the cranial dura mater. The right and left internal jugular veins pass inferiorly on either side of the neck, they then unite with the subclavian veins posterior to the clavicles to form the right and left brachiocephalic veins. From here blood flows into the superior vena cava.
- external jugular vein, the right and left external jugular veins begin in the parotid glands near the angle of the mandible. They are superficial veins that descend through the neck across the sternocleidomastoid muscles, they empty into the **subclavian veins**. They drain the scalp and superficial and deep regions of the face. When venous pressure rises, as in cases of heart failure, the external jugular veins become very prominent along the side of the neck.
- vertebral veins, the right and left vertebral veins originate inferior to the occipital condyles. They descend through successive transverse foramina of the first six cervical vertebrae and emerge from the foramina of the sixth cervical vertebra to enter the brachiocephalic veins in the root of the neck. The vertebral veins drain deep structures in the neck such as the cervical vertebrae, cervical spinal cord, and some neck muscles.

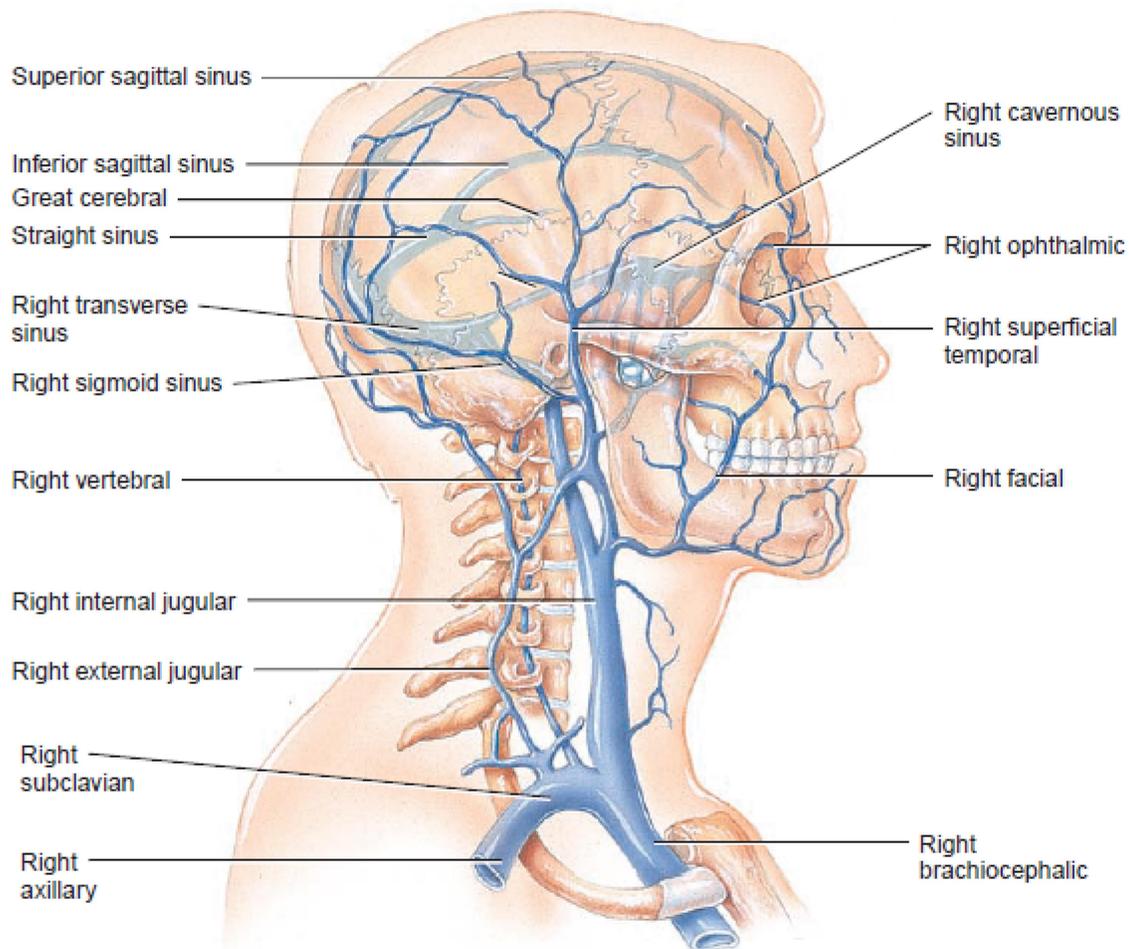


Figure: Veins of the head and neck.

Veins of the Upper Limbs

Venous blood return from the upper limbs to the heart by superficial and deep veins. Superficial veins are located just deep to the skin and are often visible. They anastomose extensively with one another and with deep veins. Deep veins are located deep in the body. They usually accompany arteries and have the same names as the corresponding arteries.

- The principal superficial veins that drain the upper limbs are the cephalic and basilic veins. They originate in the hand and convey blood from the smaller superficial veins into the axillary veins.

- The radial and Ulnar veins begin at the deep palmar venous arches they drain the venous blood from forearm and unite just inferior to the elbow joint, to form the brachial veins.
- The brachial veins accompany the brachial arteries. They drain the forearms, elbow joints, arms, and humerus. They pass superiorly and join with the basilic veins to form the axillary veins.
- The axillary veins ascend to the outer borders of the first ribs, where they become the subclavian veins. The axillary veins drain the arms, axillas, and superolateral chest wall.
- The subclavian veins are continuations of the axillary veins that terminate at the sternal end of the clavicles, where they unite with the internal jugular veins to form the brachiocephalic veins.

Note: The thoracic duct of the lymphatic system delivers lymph into the junction between the left subclavian and the left internal jugular veins. The right lymphatic duct delivers lymph into the junction between the right subclavian and right internal jugular veins.

In a procedure called central line placement, the right subclavian vein is frequently used to administer nutrients and medication and measure venous pressure.

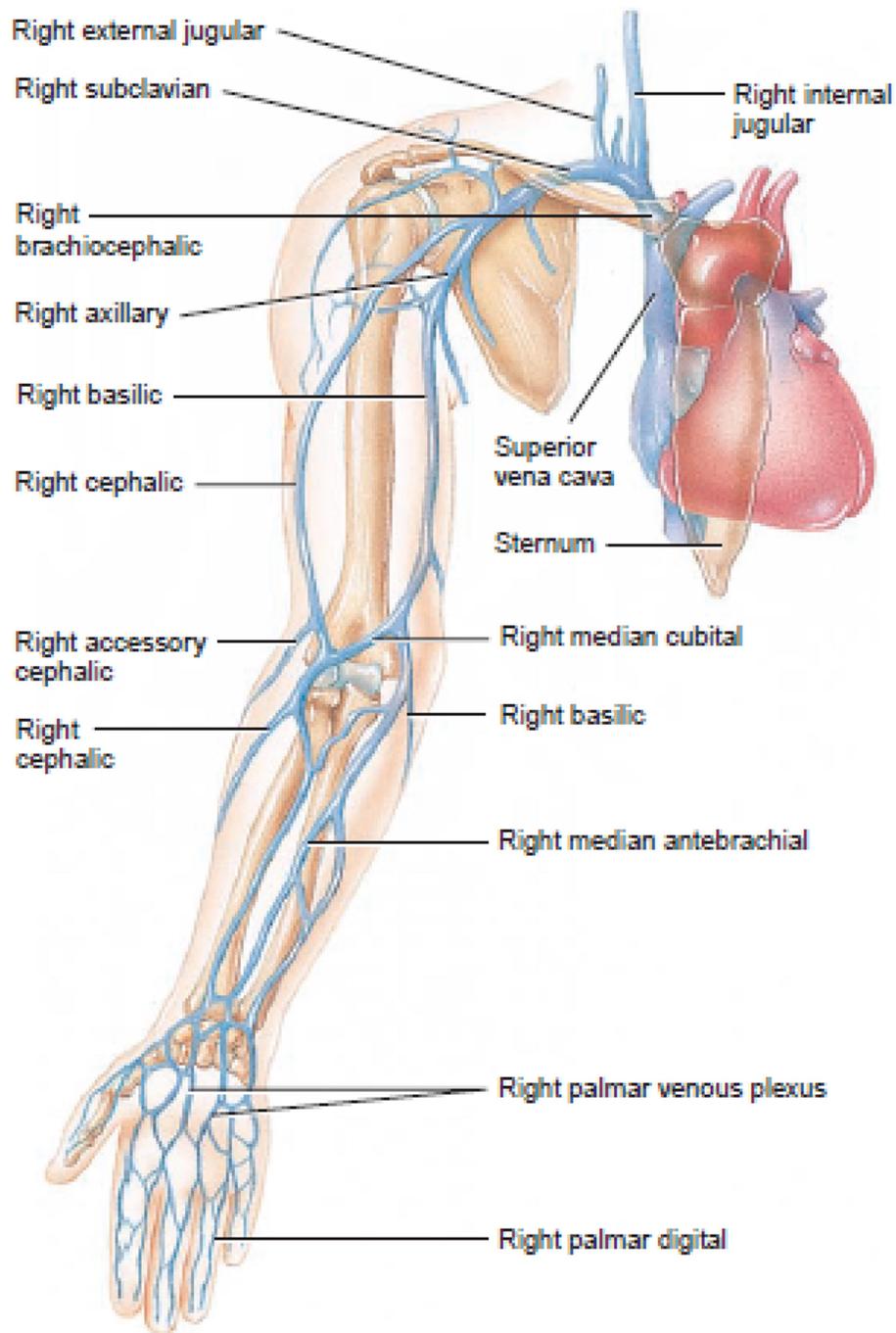


Figure: Veins of the Upper Limbs.

Veins of the Thorax

Although the brachiocephalic veins drain some portions of the thorax, most thoracic structures are drained by a network of veins, called the azygos system, that runs on either side of the vertebral column. The system consists of three veins—the azygos, hemiazygos, and accessory hemiazygos vein that ultimately empty into the superior vena cava.

Veins of the Abdomen and Pelvis

Blood from the abdominal and pelvic viscera and abdominal wall returns to the heart via the inferior vena cava. The inferior vena cava does not receive veins directly from the gastrointestinal tract, spleen, pancreas, and gallbladder. These organs pass their blood into a common vein, the hepatic portal vein, which delivers the blood to the liver. After passing through the liver for processing, blood drains into the hepatic veins, which empty into the inferior vena cava.

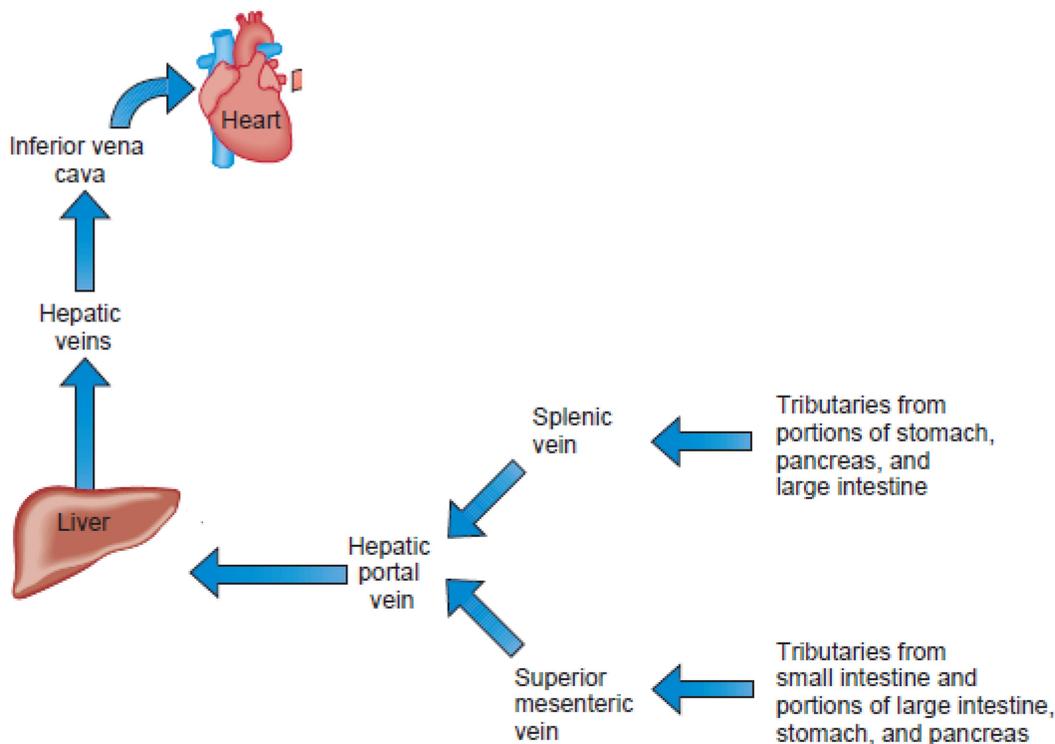


Figure: Hepatic portal circulation

Veins of the lower Limbs

Blood from the lower limbs is drained by both superficial and deep veins. The superficial veins often anastomose with one another and with deep veins along their length.

1. Superficial veins

The great (long) saphenous veins, the longest veins in the body, ascend from the foot to the groin in the subcutaneous layer. They begin at the medial end of the dorsal venous arches of the foot. They empty into the femoral veins at the groin. Generally, the great saphenous veins drain mainly the medial side of the leg and thigh, the groin, external genitals, and abdominal wall.

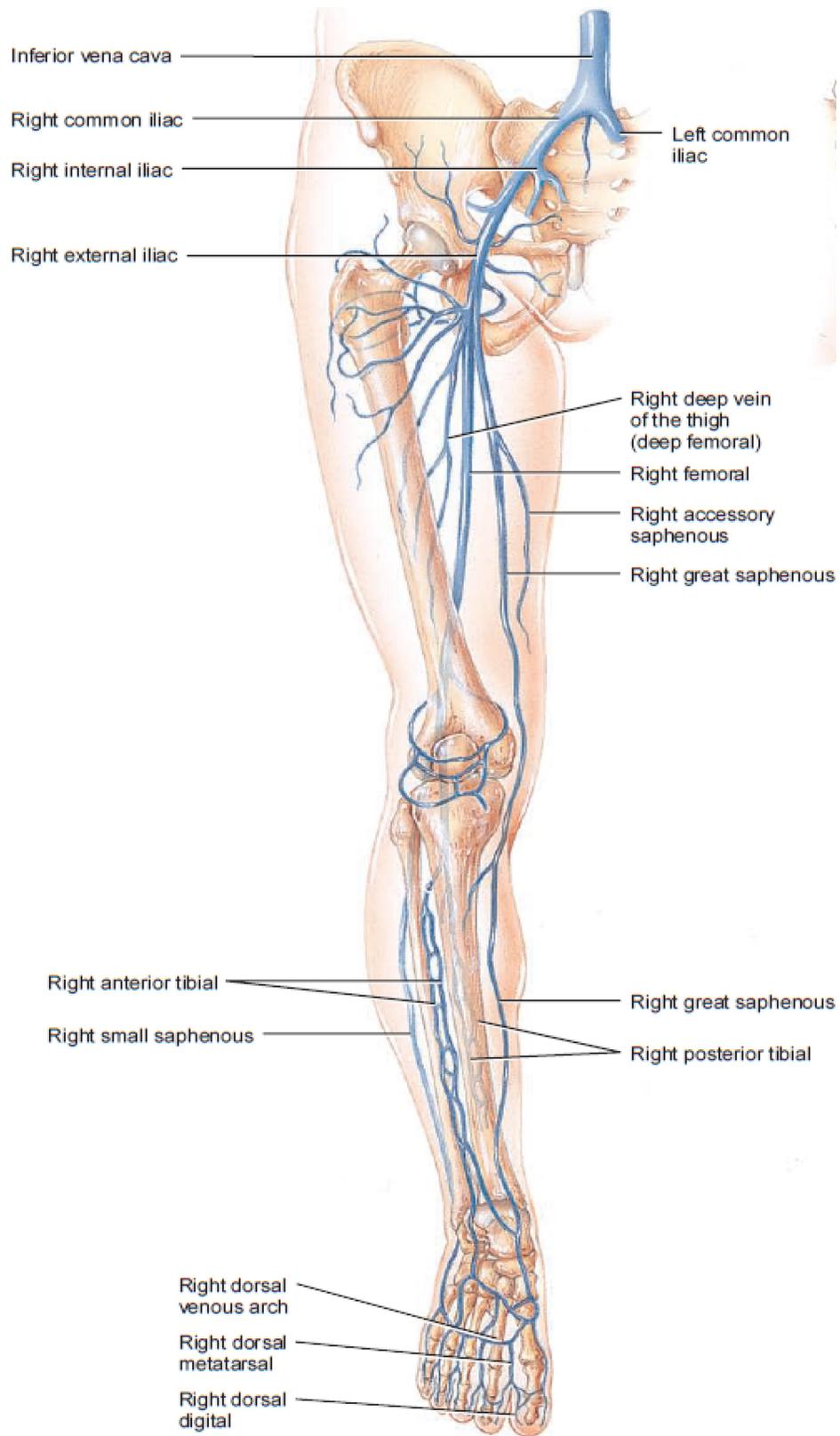
The small (short) saphenous veins begin at the lateral aspect of the dorsal venous arches of the foot. They empty into the popliteal veins in the popliteal fossa, posterior to the knee.

2. Deep vein

- The posterior tibial and anterior tibial veins drain blood from the deep structure of the foot and legs, they unite just inferior to the popliteal fossa to form the popliteal veins.
- The popliteal veins, formed by the union of the anterior and posterior tibial veins, empty into the femoral vein.
- The femoral veins accompany the femoral arteries and are the continuations of the popliteal veins. Just before penetrating the abdominal wall, the femoral veins receive the deep femoral veins and the great saphenous veins. The veins formed from this union penetrate the body wall and enter the pelvic cavity. Here they are known as the external iliac veins.

Clinical notes:

1. In order to take blood samples or pressure recordings from the right side of the heart, a catheter is inserted into the femoral vein as it passes through the femoral triangle. The catheter passes through the external and common iliac veins and inferior vena cava into the right atrium.
2. The great saphenous vein is used as a graft in coronary bypass surgery.



Veins of the lower limb.