

## **Anatomy of Blood Vessels – The Upper Body**

Blood vessels are a closed transport system. Arteries carry blood away from the heart and veins drain the tissues and return blood to the heart. They both function as conducting vessels. The body's cells are only directly served by tiny capillaries that connect the arterioles and venules.

### **Microscopic Structure of the Blood Vessels**

The walls of blood vessels are constructed of three coats, or tunics.

- The interna, or tunica intima, lines the lumen of a vessel and is a thin single layer of endothelium that is continuous with the endocardium of the heart.
- The tunica media is the bulky middle coat. It is made mainly of smooth muscle and elastin.
- The tunica externa, or adventitia, is the outermost tunic. It is made of areolar or fibrous connective tissue and functions as support and protection of the vessels.

Generally, the arterial walls are thicker than the venous walls. In particular, the tunica media is much thicker in arteries than in veins.

➤ Know Figure 32.1 in lab manual.

### **Major Systemic Arteries of the Upper Human Body**

The aorta is the largest artery in the body.

- Extending upward as the ascending aorta from the left ventricle, it arches posteriorly and to the left as the aortic arch. It then courses downward as the descending aorta through the thoracic cavity.

The other major arteries that you should know are:

- Brachiocephalic artery
- Left + Right common carotid arteries
- L+R subclavian artery
- L+R internal carotid artery
- L+R external carotid artery
- L+R axillary artery
- L+R brachial artery

You should be able to locate and identify these on a diagram and the torso model.

### **Major Systemic Veins of the Upper Body**

Arteries are usually located in deep and well-protected areas of the body, but veins are usually easily seen and palpated on the body surface. The majority of deep veins parallel the course of the major arteries.

- The major systemic arteries branch off of the aorta, but the veins tend to converge on the venae cavae, which enter the right atrium of the heart.
- Veins draining the head and upper extremities empty into the superior vena cava.

The major veins of the upper body that you must know are:

- Superior vena cava
- Inferior vena cava
- L+R brachiocephalic vein
- L+R internal jugular vein
- L+R subclavian vein
- L+R external jugular vein
- L+R axillary vein
- L+R brachial vein
- L+R cephalic vein
- Basilica vein
- Median cubital vein
- Accessory cephalic vein
- Median antecubital vein (median vein of forearm)
- Azygos vein

### **Special Circulatory Circuits**

- The azygos system drains the intercostals muscles of the thorax and provides an accessory venous system to drain the abdominal wall.
  - The azygos vein, the hemiazygos, and the accessory hemiazygos veins all make up the system.
- The pulmonary circulation doesn't serve the metabolic needs of the lung tissues. Instead, it functions to bring blood into close contact with the alveoli of the lungs to allow gas exchanges. The functional blood supply of the lungs is provided by the bronchial arteries.

*You should be able to label Figure 32.12 in your lab manual.*

- The uniting of the blood supply of the internal carotid arteries and the vertebral arteries via the Circle of Willis is a protective device that provides an alternate set of pathways for blood to reach the brain tissue in the case of arterial occlusion or impaired blood flow anywhere in the brain system.

### **Fetal Circulation**

The fetal lungs and digestive system are not functional, so all nutrient, excretory and gaseous exchanges occur through the placenta.

- Fetal blood travels through the umbilical cord, which contains three blood vessels: two small arteries and one large vein.
  - The umbilical vein carries nutrient and oxygen-rich blood to the fetus.
  - The umbilical arteries carry carbon dioxide and waste-laden blood from the fetus to the placenta.
  - The ductus venosus carries blood to the right atrium of the heart.
- Fetal lungs are nonfunctional and collapsed, so two shunting mechanisms ensure that blood bypasses the lungs.
  - Much of the blood entering the right atrium is shunted into the left atrium through the foramen ovale, which is a flaplike opening in the interatrial septum.
  - The ductus arteriosus is a short vessel connecting the pulmonary trunk and the aorta that shunts blood that entered the right ventricle out of the pulmonary trunk.
- After birth, the foramen ovale closes and becomes the fossa ovalis. The ductus arteriosus collapses and becomes the fibrous ligamentum arteriosum.