Vascular System

The body requires oxygen and nutrients and needs to eliminate waste products to maintain metabolic stability. The vascular system has a crucial role in bringing oxygen and nutrients to every organ and tissue, and removing waste products, via a series of blood vessels. In conjunction with the heart, which acts as a pump, it forms the cardio-vascular system. Arteries leaving the heart with oxygenated blood provide oxygen, nutrients, hormones and other substances throughout the body. Veins leaving the organs and tissues return to the heart carrying metabolic waste.

Classes of Blood Vessels

There are five classes of blood vessels: arteries and arterioles (the arterial system), veins and venules (the venous system), and capillaries (the smallest bloods vessels, linking arterioles and venules through net-works within organs and tissues).

Anatomy of The Vascular System

1- **Arterial system:** Arteries supply the body with oxygenated blood – with the exception of the pulmonary arteries from the heart; these carry deoxygenated blood to the lungs, and the umbilical artery, which carries deoxygenated blood from the fetus to the placenta. Blood travels from the arteries to the arterioles and on to the capillaries, where gaseous exchange takes place.

Arteries can be divided into:

A- **Elastic arteries:** The elastic arteries are the largest (1-2.5cm in diameter) and comprise large amounts of elastin as well as smooth muscle. They have a large lumen with low resistance to blood flow, and can expand and recoil to accommodate changes in blood volume.

B- **Muscular arteries:** Muscular arteries regulate local blood flow and deliver blood to individual organs. They measure 0.3mm-1cm in diameter and possess more smooth muscle but less elastin than elastic arteries.

C- **Arterioles:** The arterioles are the smallest arteries (0.01-0.3mm in diameter). When they are close to the capillaries, they comprise a single smooth muscle layer overlying endothelial cells.

2- **Venous system:**
The veins are thin, elastic vessels that act as a reservoir of blood. They do not need large amounts of elastin and smooth muscle, since they transport low-pressure blood back to the heart. They have a large lumen, as well as valves that ensure a one-way flow of blood to the heart.

3- **Capillaries:** The capillaries can be compared to the smallest branches of a tree and connect arterioles to venules. The arteries divide into arterioles, which in turn divide into capillaries.

Fig 1. **The five types of blood vessels**