

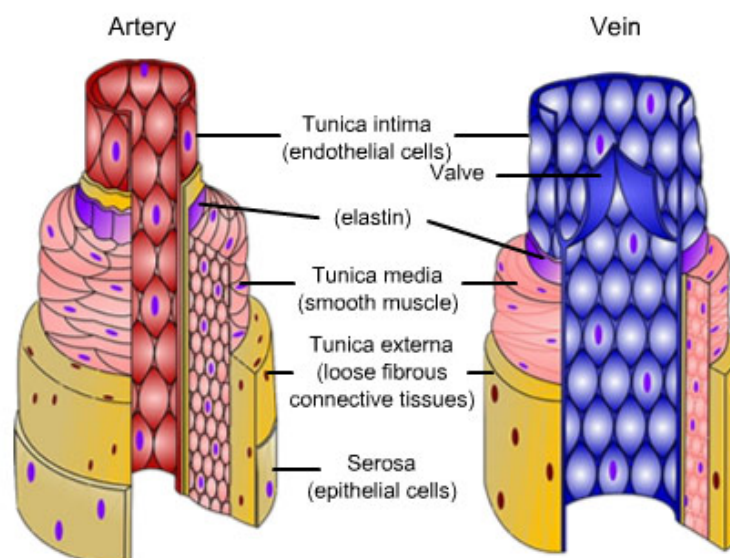
(files/images/vasodilation_1.gif?1612287347255)

Blood vessels

Blood is transported through the body by a continuous system of vessels. Blood vessels in the cardiovascular system are:

- Arteries
- Arterioles
- Capillaries
- Venules
- Veins

Arteries transport blood away from the heart under pressure, and veins carry blood back to the heart at a lower pressure.



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Text

Artery

Vein

Tunica intima (endothelia cells)

Valve

Elastin

Tunica media (smooth muscle)

Tunica externa (loose fibrous connective tissues)

Serosa (epithelia cells)

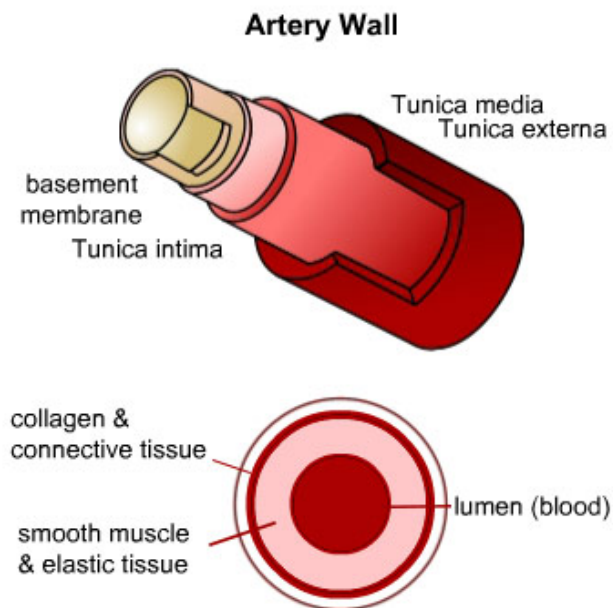
Arteries and arterioles

Arteries carry blood from the heart to the body tissues. They have thick walls made up of three layers - the innermost layer is an **endothelial lining** preventing blood from sticking, the middle layer contains elastic tissue and smooth muscle, and the outer layer is a protective coat. The inner channel through which blood flows is called the **lumen**.

Large arteries such as the **aorta**, **carotid** and **pulmonary** are known as elastic or conducting arteries. These carry blood from the heart to medium sized arteries, and need to accommodate great pressure and blood volume.

Medium-sized arteries are known as muscular arteries; they contain less elastic but more muscle fibres. The walls are thicker and they are capable of greater vasoconstriction and vasodilation than elastic arteries in order to help control the blood flow through the body.

Arterioles are small arteries which control blood flow to the capillaries via vasoconstriction and vasodilation.



(files/images/arteries-and-arterioles.jpg?1612345249082)

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Text

Artery wall

Tunica media

Tunica externa

Basement membrane

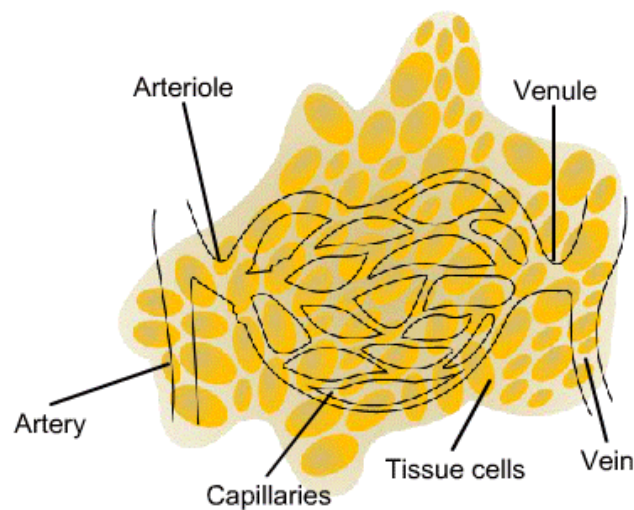
Tunica intima

Collagen and connective tissue
Smooth muscle and elastic tissue
Lumen (blood)

Capillaries

Capillaries allow exchange of materials between the blood and tissues; capillary walls are one cell thick to allow this exchange. Capillaries are the smallest of the blood vessels, only just wide enough to allow circulation of the blood cells. Blood is oxygenated as it reaches capillaries, but largely deoxygenated as the capillaries join up to form venules.

Capillaries form networks around areas of tissue so that every cell has a blood supply. Tissues with high metabolic activity such as the liver, lungs, kidneys and nervous tissue have higher requirements for nutrients, and therefore have a denser network of capillaries.



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Text

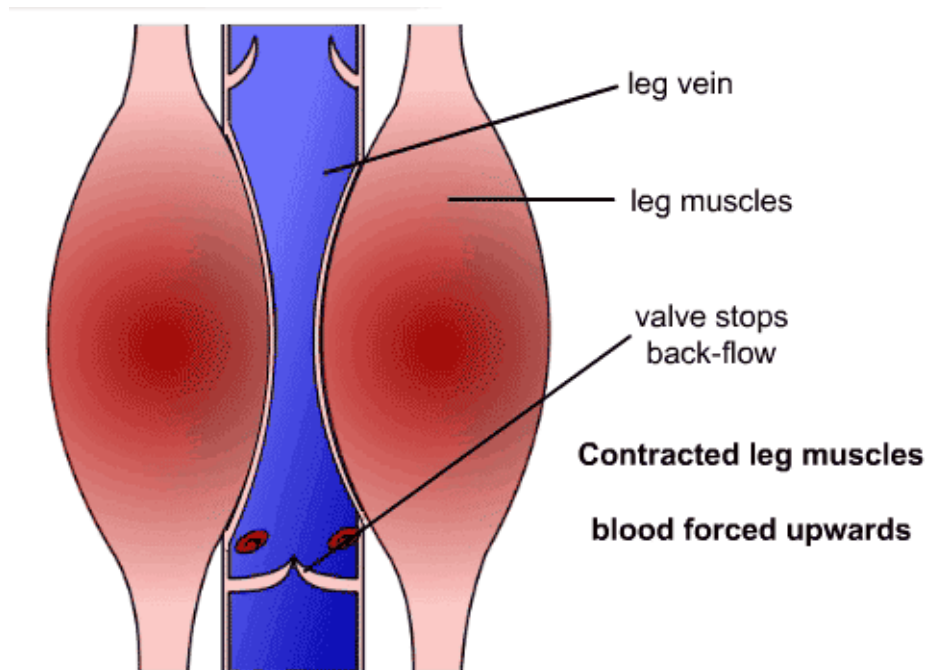
Artery wall
Arteriole
Venule
Artery
Capillaries
Tissue cells
Vein

Veins and venules

Venules collect waste-rich, de-oxygenated blood from capillaries and drain it into veins, becoming larger as they approach the veins. Veins transport blood back to the heart at a lower pressure than in the arteries.

Veins have three layers similar to those in arteries, but also contain valves which help to keep blood flowing towards the heart and prevent backflow. As veins run through muscles, the contraction of skeletal muscles helps to squeeze blood in the veins back towards the heart as shown in this diagram.

Contracted



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Text

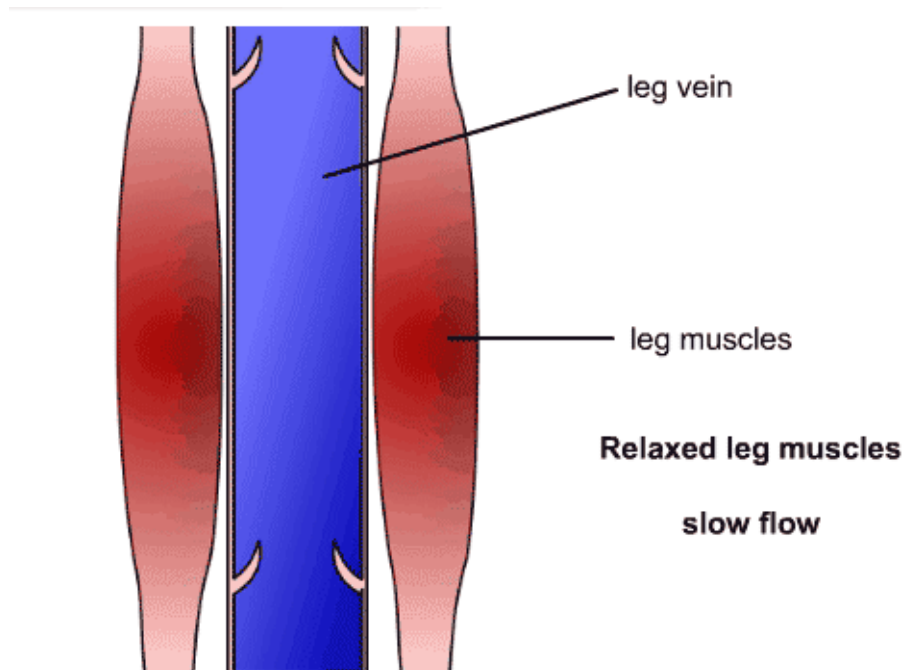
Leg vein

Leg muscles

Valve stops back-flow

Contracted leg muscles, blood forced upwards

Relaxed



UHI / CCO

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Text

Leg vein

Leg muscles

Relaxed leg muscles, slow flow

Blood

Blood is a specialized fluid with a pH of approximately 7.4.

Blood is made up of four key components:

- **Red blood cells (erythrocytes)**
- **White blood cells (leukocytes)**
- **Platelets**
- **Plasma**

It transports substances such as glucose and other nutrients, antibodies, hormones and enzymes around the body. Blood allows transportation of various materials between different cells and tissues of the body, aids in temperature regulation and acid-base (pH) balance, and also aids in protection through immune function.