

## Structure of blood vessels:

**Arteries:** carry blood away from the heart and into arterioles.

**Arterioles:** smaller arteries that control blood flow from arteries to capillaries.

**Capillaries:** tiny vessels that link arteries to veins.

**Veins:** carry blood from capillaries back to the heart.

*Arteries/ arterioles and veins all have the same basic structure (from the outside inwards):*

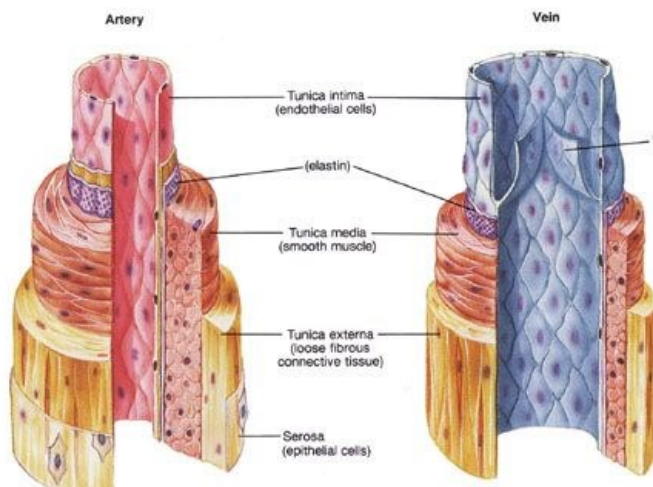
**Tough fibrous outer layer:** that resists pressure changes from both within and outside.

**Muscle layer:** that can contract and so control the flow of blood.

**Elastic layer:** helps to maintain blood pressure by stretching and recoiling.

**Thin inner lining (endothelium):** smooth to reduce friction and thin to allow diffusion.

**Lumen:** not a layer but the central cavity of the blood vessel through which blood flows.



## Blood vessels and their function

### Artery Structure related to function:

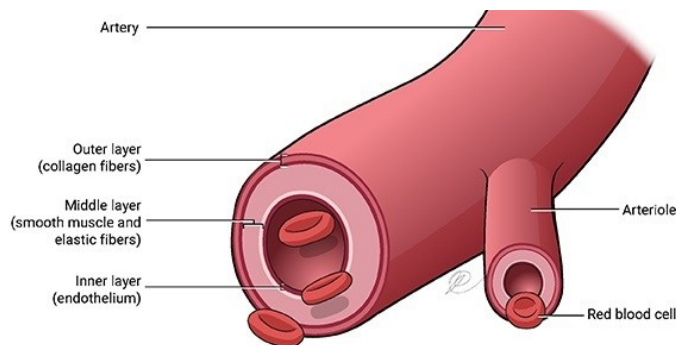
**The function of arteries is to transport blood rapidly under high pressure from the heart to the tissues.** Their structure is adapted because:

**Muscle layer is thick compared to veins:** this means smaller arteries can be **constricted and dilated** in order to control the volume of blood passing through them.

**Elastic layer is relatively thick compared to veins:** its important that **blood pressure in arteries is kept high if blood is to reach the extremities of the body.** The elastic wall is stretched at each heart beat (**systole**). It then recoils when the heart relaxes (**diastole**) in the same way as a stretched elastic band. **This action helps to maintain high pressure and smooth pressure surges created by the beating of the heart.**

**Overall thickness of the wall is great:** this also **resists the vessels bursting under pressure.**

**There are no valves:** (except in arteries leaving the heart) because **blood is under constant high pressure due to the heart pumping blood into the arteries.** It therefore tends not to flow backwards.



### Arteriole structure related to function:

**Arterioles carry blood under lower pressure than arteries, from arteries to capillaries. They also control the flow of blood between the two.** Their structure is related to their function because:

**Muscle layer is relatively thicker than in arteries:** contraction of this muscle layer allows constriction of the lumen of the arteriole. **This restricts the flow of blood and so controls its movement into the capillaries that supply the tissues with blood.**

**Elastic layer is relatively thinner than in arteries:** because blood pressure is lower.

### Vein structure related to function:

**Veins transport blood slowly, under low pressure, from the capillaries in tissues to the heart.:**

**Muscle layer relatively thin:** veins carry blood away from tissues and therefore their constriction and dilation cannot control the flow of blood to the tissues.

**Elastic layer is relatively thin:** the low pressure of blood within the veins will not cause them to burst and pressure is too low to create a recoil action.

**Overall thickness of the wall is small:** no need for a thick wall because the pressure within the veins is too low to create any risk of bursting. Also allows them to be flattened easily, aiding the flow of blood within them.

**There are valves at intervals throughout:** because the pressure is so low, blood could potentially flow backwards. When body muscles contract, veins are compressed, pressurising the blood within them. **The valves ensure that this pressure directs the blood towards the heart only.**