

Anatomy

[Science](#), [Anatomy](#)



Cardiovascular System:

Anatomy Review: Blood Vessel Structure and Function 1. Name the three layers or tunics of the blood vessel wall and what they are composed of.

Location	Tunic Name	Composed of
Innermost	Tunica intima	Endothelium
Middle	Tunica media	Smooth muscle cells and sheets of elastin
Outer	Tunica externa	Collagen fibers that protect and reinforce the blood vessels and anchor it to surrounding structures.

In the following list of characteristics, put “ A” for artery, “ C” for capillary, and “ V” for vein: v contain the lowest pressure a contain the highest pressure a has thick tunica media v thin tunica media smallest of the blood vessels a carries blood away from heart v largest lumen—blood reservoir c has only one tunic (intima) v carries blood toward the heart c site of exchange of nutrients

Name the three groups of arteries:

- elastic artery
- muscular artery
- arteriole

Elastic arteries have a thick tunica media with the greatest amount of elastin. They also experience the greatest pressure and the widest variation in pressure. The best example is the aorta.

Compared to the arteries above, the muscular arteries have more smooth muscle but less Elastin.

They deliver blood to specific organs. The renal artery delivers blood to the kidney and would be an example of this type of artery. Small changes in the

diameter of these blood vessels greatly influence blood flow and blood pressure. Stimulation of vasomotor fibers would cause (vasoconstriction or vasodilation) of the blood vessels. The smallest arteries are called arterioles. The steepest drop in blood pressure occurs in these vessels, thus they offer the greatest resistance to flow. An increase in blood flow through a feeder arteriole will (increase or decrease) blood flow through the capillary. Capillaries: The shunt is a short vessel that directly connects the arteriole and venule. When blood flows through this vessel, there is no exchange of materials. The precapillary sphincter controls blood flow into the true capillaries. Exchange of materials takes place from these capillaries. Compared with blood pressure in the arteries, blood pressure is (high or low) in the capillaries.

Venules: The smallest venules are formed when capillaries unite. They consist mainly of endothelium around which a few fibroblasts congregate.

Blood flow continues to (increase or decrease) in the venules.

Veins: Veins have three distinct tunics, with the tunica externa being the heaviest. Veins have thinner walls and longer lumens than arteries. 10. Because pressure is lower in the veins, special adaptations are necessary to return blood to the heart. These three structural adaptations are: Venous Valve. Here, one way prevent backflow as blood travels toward the heart. Muscle pump. Here, contracting skeletal muscles press against veins, forcing blood through #1 above. respiratory pump.

During inspiration, pressure (increases or decreases) in the thoracic cavity and (increases or decreases) in the abdominal cavity. This results in an upward “sucking” effect that pulls blood toward the heart.

Cardiovascular System: Measuring Blood Pressure

Blood flow is generated by the cardiac output. Blood pressure results when that flow encounters resistance from the vessel walls. Blood pressure is expressed in millimeters of mercury and is written as mmHg. Blood flows in layers within the lumen of blood vessels, with the layers in the middle of the lumen flowing fastest.

This is known as laminar flow. Blood pressure fluctuates with each heartbeat. The pulse you feel in your wrist is a pressure wave created by the contracting heart ejecting blood. The maximum pressure exerted by blood against the artery wall is known as systolic pressure (SP) and is the result of ventricular systole. Normal SP is about 120 mmHg. What does the aortic notch represent? The interruption of smooth flow due to the back flow of blood that closes the aortic semilunar valve when ventricles relax. Diastolic pressure (DP) is the lowest pressure in the artery and is a result of ventricular diastole.

Normal DP is about 70 mmHg. 8. Pulse pressure (PP) is the difference between systolic pressure and diastolic pressure. Write the equation for pulse pressure: $PP = \text{systolic} - \text{diastolic}$. Mean arterial pressure (MAP) is the calculated average pressure in the arteries. It is closer to the diastolic pressure because the heart spends more time in diastole. Write the equation for mean arterial pressure: $MAP = [(2 \times \text{diastolic}) + \text{systolic}] / 3$. 10. When

taking blood pressure, inflate the cuff so that blood flow is occluded in the blood vessel. Open the valve slowly, releasing the pressure.

The first sound you hear through the stethoscope is recorded as the systolic pressure. The sounds you hear are due to the auscultatory gap of the blood.

When you don't hear any sounds, this is recorded as the diastolic pressure.

For questions 11 and 12, calculate PP and MAP, given SP = 130 mmHg and DP = 70 mmHg (see Quiz section for an example). PP = 60 mmHg 12. MAP = 90 mmHg

Cardiovascular System: Factors That Affect Blood Pressure 1. What are the three main factors that influence total peripheral resistance (TPR)?

- turbulence
- vascular resistance
- blood viscosity.

Cardiovascular System: Blood Pressure Regulation

Short-term mechanisms for regulating blood pressure include regulating what three things?

- heart rate
- vessel diameter
- heart contractility

Long-term mechanisms will regulate blood volume-blood pressure. Two major arterial baroreceptors are located where? Aorta; carotid bifurcation

Using up and down arrows, show the effect of increased blood pressure (BP) on the impulses sent to the brain, the effect on the parasympathetic (PNS) and sympathetic (SNS) nervous systems, and the resulting change in blood pressure. ? BP ? ? impulses ? ? PNS and ?

Why is hydrostatic pressure low in the interstitial fluid? c. Net hydrostatic pressure tends to move fluid _____ the capillary. Osmotic (or colloid osmotic) pressure in the capillaries is _____ compared with that in the interstitium. Net osmotic pressure tends to move fluid _____ the capillaries. Given a net hydrostatic pressure of 34 mmHg and a net osmotic pressure of 22 mmHg, the force favoring filtration would equal _____ mmHg.

Indicate which of the following move through the capillary walls by diffusion and which move through fenestrations and/or clefts:

1. Butter:
2. Fish:
3. Cola:
4. Potatoes: