

Transport

Three adaptations of capillaries for exchange

Transport

Fenestrations

Transport

How to tell an artery from a vein in a micrograph

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Role of elastic fibres in arteries

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Role of smooth muscle in arteries

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Two adaptations of veins for returning blood

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Where can the pulse be felt?

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Occlusion of a coronary artery

Pores in the walls of some capillaries, for example in the kidney glomerulus, that allow particularly rapid exchange.

Branching and narrow diameters (large surface area), thin walls one cell thick, and fenestrations where exchange must be rapid.

Stretch when blood is pumped in and recoil between beats, maintaining high pressure and pushing blood on.

Artery: thick wall compared with a narrow, round lumen. Vein: thin wall compared with a wide, often flattened lumen.

Valves prevent backflow; thin, flexible walls are compressed by contracting skeletal muscles, pushing blood towards the heart.

Contracts to narrow the lumen, helping to maintain blood pressure; the thick wall withstands high pressure.

Blockage by fatty plaque (atherosclerosis) or a blood clot, cutting O₂ supply to cardiac muscle and causing a heart attack.

At the radial artery (inside of the wrist) or carotid artery (neck), using fingertips, not the thumb.

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What does a correlation coefficient show?

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Cohesion-tension mechanism

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Four adaptations of xylem vessels

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Arrangement of tissues in a dicotyledonous stem

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Arrangement of tissues in a dicotyledonous root

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How is tissue fluid formed?

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Plasma vs tissue fluid

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Two features of lymph ducts

Transpiration draws water out of xylem by capillary action, creating tension that pulls water up; cohesion keeps the column continuous.

The strength of the correlation between two variables, from -1 to $+1$. A strong correlation does not prove causation.

Epidermis, cortex, ring of vascular bundles (phloem outside, xylem inside) and central pith.

No cell contents, incomplete or absent end walls, lignified walls to withstand tension, and pits for water entry and exit.

Pressure filtration of plasma through capillary walls, promoted by high pressure of blood from arterioles.

Epidermis with root hairs, wide cortex, central vascular region with star-shaped xylem and phloem between its arms.

Valves for one-way flow and thin walls with gaps to let excess tissue fluid in; lymph returns to the blood in veins.

Similar water, ions, glucose and amino acids, but tissue fluid has very little protein, less O_2 and more CO_2 and wastes.

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Single vs double circulation

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Role of the atrioventricular and semilunar valves

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Why is the left ventricle wall thicker than the right?

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Order of events in the left side of the heart

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Systolic and diastolic pressure

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Root pressure

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Adaptations of sieve tube elements

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Adaptations of companion cells

AV valves stop backflow into the atria when ventricles contract; semilunar valves stop backflow into the ventricles when they relax.

Fish: heart → gills → body, blood passes the heart once. Mammal: separate pulmonary and systemic circuits, heart twice.

SA node fires; atrial systole; ventricular systole (AV valve closes, semilunar valve opens); diastole (semilunar valve closes, AV valve opens).

It pumps blood at higher pressure around the whole body; the right only pumps to the lungs.

Positive pressure potential in xylem caused by active transport of mineral ions into the xylem, so water enters by osmosis.

Systolic: highest arterial pressure, during ventricular systole. Diastolic: lowest, during diastole. Typical adult about 120/80 mm Hg.

Many mitochondria for ATP to load sugars actively, and plasmodesmata connecting them to sieve tube elements.

Sieve plates, reduced cytoplasm and organelles, and no nucleus, so sap flows easily.