

Выполните письменный перевод данного текста со словарем. Текст до горизонтальной черты соответствует по объему требованиям программы. Перевод текста после черты дает дополнительные баллы.

Capillaries

These are the ‘exchange vessels’, allowing passage of substances between blood and the fluids outside them which surround the body cells. They consist of a single layer of endothelial cells, with microscopic spaces between adjacent cells which allow the solutes of the blood, including salts, glucose, and dissolved oxygen, to pass into the tissues, and products of tissue metabolism, including carbon dioxide, to pass into the blood. The number of capillaries is so vast that even though they are microscopic their overall resistance to blood flow is low and blood passes through them slowly. The high density of capillaries means the distance for diffusion by the nutrients and gases is small. The more active tissues tend to have a denser supply of capillaries.

Capillaries are formed as a complex system of branching blood vessels between arterioles and venules (microscopic veins). Those near the arteries are at a higher pressure than those near veins. The gaps between endothelial cells are small enough to be almost impermeable to the protein molecules present in the blood, causing the capillary bed to function as a semipermeable membrane. These molecules exert an osmotic force which tends to draw fluid from the tissue spaces into the capillary. This is opposed by the hydrostatic pressure forcing fluid out. A dynamic equilibrium is established, such that at the higher pressure capillaries fluid leaves the circulation, and at the lower pressure ones it is drawn back in. An additional system of vessels, the lymphatics, are fine tubes which provide an alternative route for tissue fluid, via the lymph nodes and back to the circulation.

Disturbance of the balance of the fluid exchange at capillaries can lead to oedema, which is swelling caused by excess tissue fluid.

(1509)

Veins

Blood returns from the tissues to the heart along veins. Larger veins possess valves which ensure that blood travels in the correct direction and prevents the development of undue back pressure. Sometimes the valves may cease to function, causing veins to distend abnormally and permanently. This is the cause of varicose veins.

Veins have another important role in addition to being conduits. Approximately 70% of the entire blood volume is contained within the veins, and these are very distensible. This means that they can readily accommodate quite large changes in their volume, either as a result of a change in the total quantity of blood in the circulation (haemorrhage or transfusion), or because of changes in blood distribution (leg veins distend on standing up, for example). The reason that veins can change their volume with little change in pressure is partly because they collapse when empty, which applies to veins above heart level. When filled, the elastic tissue in their walls is readily distensible, although expansion is eventually limited by the relatively indistensible fibrous tissue (collagen).