

Blood circulation begins with the heart, which pumps blood into arteries and receives blood from veins. Regardless of the amount of oxygen (oxygenation) in that blood, arteries conduct blood away from the heart and veins conduct blood toward the heart. *Capillaries* are networks of extremely thin-walled vessels throughout the body tissues that permit the exchange of gases and nutrients between the vessel interior (vascular space) and the area external to the vessel (extracellular space). Capillaries receive blood from small arteries and conduct blood to small veins.

There are two circuits of blood flow: (1) the **pulmonary circulation** that conveys oxygen-depleted blood from the right side of the heart to the lungs for oxygenation/release of carbon dioxide and takes fresh blood back to the left side of the heart; and (2) the **systemic circulation**, which carries **oxygen-rich blood** from the left side of the heart to the body tissues and returns **oxygen-poor blood** to the right side of the heart. The color red is generally used for depicting oxygenated blood, and blue for oxygen-poor blood.

Capillary blood is mixed; it is largely oxygenated on the arterial side of the capillary bed, and is more deoxygenated on the venous side. This is a consequence of delivering oxygen to and picking up carbon dioxide from the tissues it supplies.

One *capillary network* generally exists between an artery and a vein. There are exceptions: the portal circulation of the liver involves two sets of capillaries between artery and vein (on this page, see the portal vein and the additional capillary network between the capillaries of the gastrointestinal tract and the heart); for more detail, see page 118. Other portal systems exist between the hypothalamus and the pituitary gland (the hypophyseal portal system; page 150); and within the kidney, between the glomerulus and the peritubular capillary plexus (page 148).