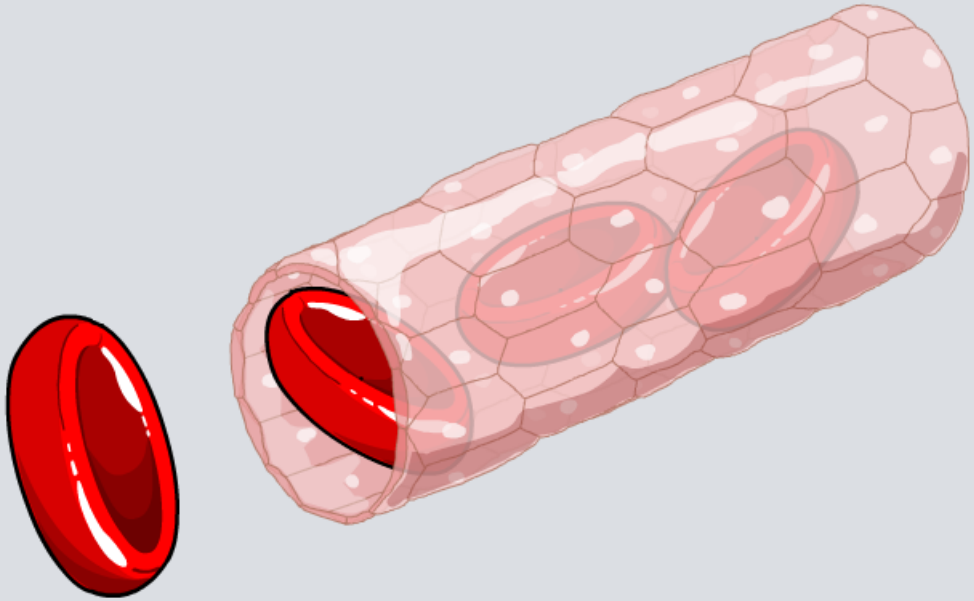
Diffusion



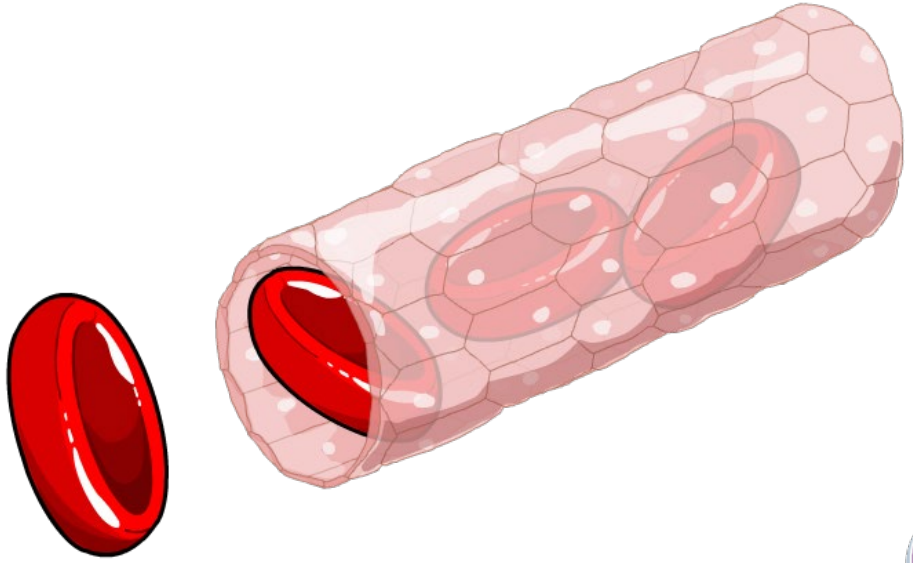
Why is diffusion important to life?

Diffusion is the main way in which substances move over short distances in organisms. What substances need to move?

Oxygen, **food** and **waste products** are some of the substances that move by diffusion.

In animals, how do these vital substances get to where they are needed?

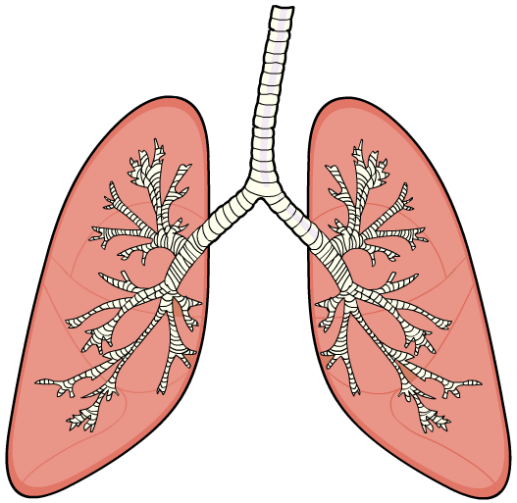
The substances are transported in the bloodstream, from where they can diffuse in and out of cells.



Diffusion and breathing

Breathing involves the exchange of gases in the lungs – a process that occurs by diffusion. What happens when you breathe in?

Oxygen in inhaled air diffuses through the lungs and into the bloodstream. The oxygen is then transported throughout the body.

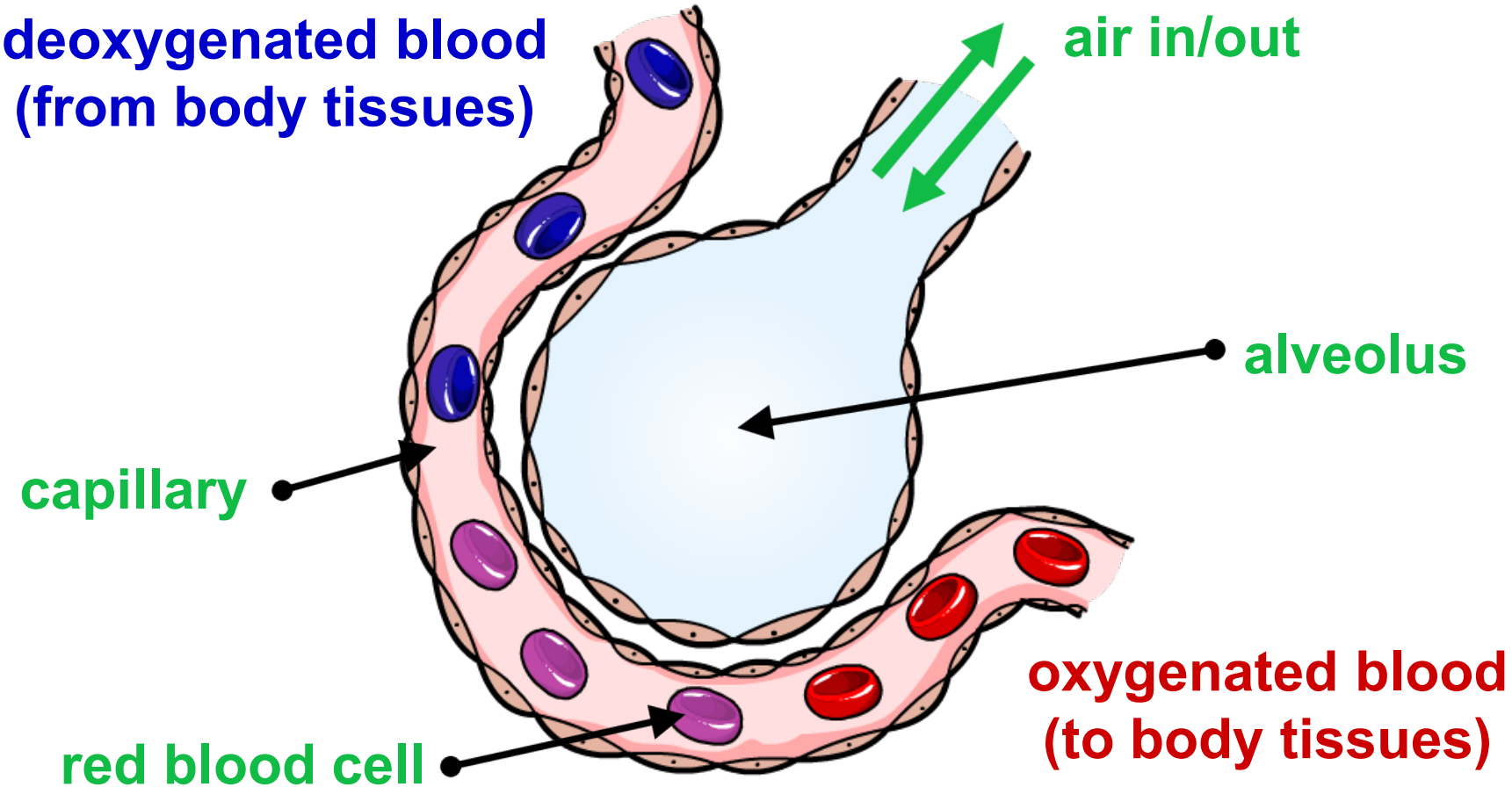


Carbon dioxide is the waste gas produced by respiration. Carbon dioxide diffuses from body tissues into the bloodstream and is exhaled via the lungs.

Where does gas exchange take place in the lungs?

Cross-section through an alveolus

Alveoli are the tiny air sacs at the end of the bronchioles, in which gas exchange occurs.

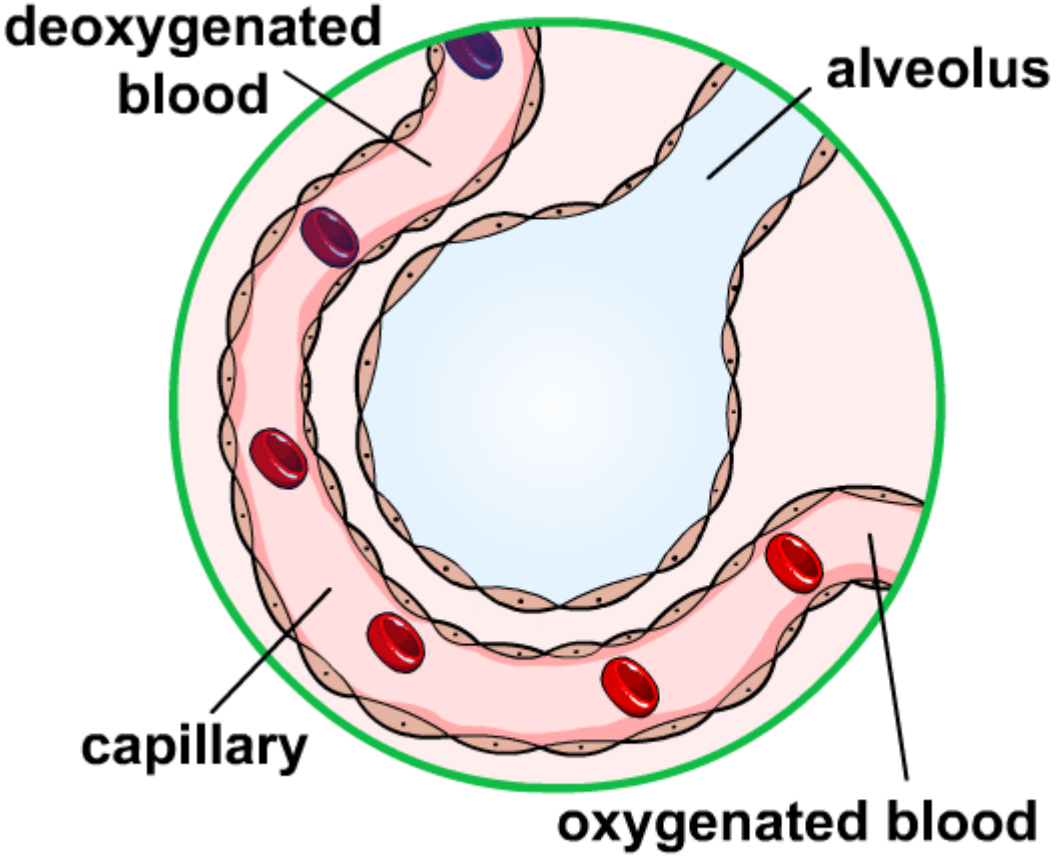


What happens in the alveoli?

What happens in the alveoli during gas exchange?

Gas exchange takes place within the alveoli by diffusion of oxygen and carbon dioxide between inhaled air and the bloodstream.

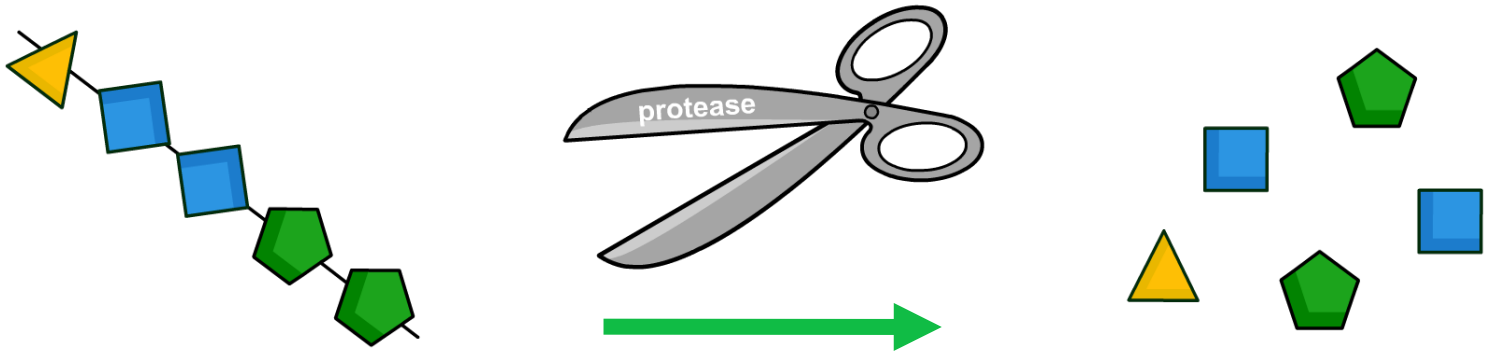
Click "**play**" to find out what happens.



Diffusion and digestion

Carbohydrates, proteins and fats are made up of large molecules that cannot be readily absorbed by the body.

Digestion breaks down large food molecules into smaller molecules such as glucose, amino acids and fatty acids that can be easily absorbed.



In which part of the digestive system is most food absorbed?

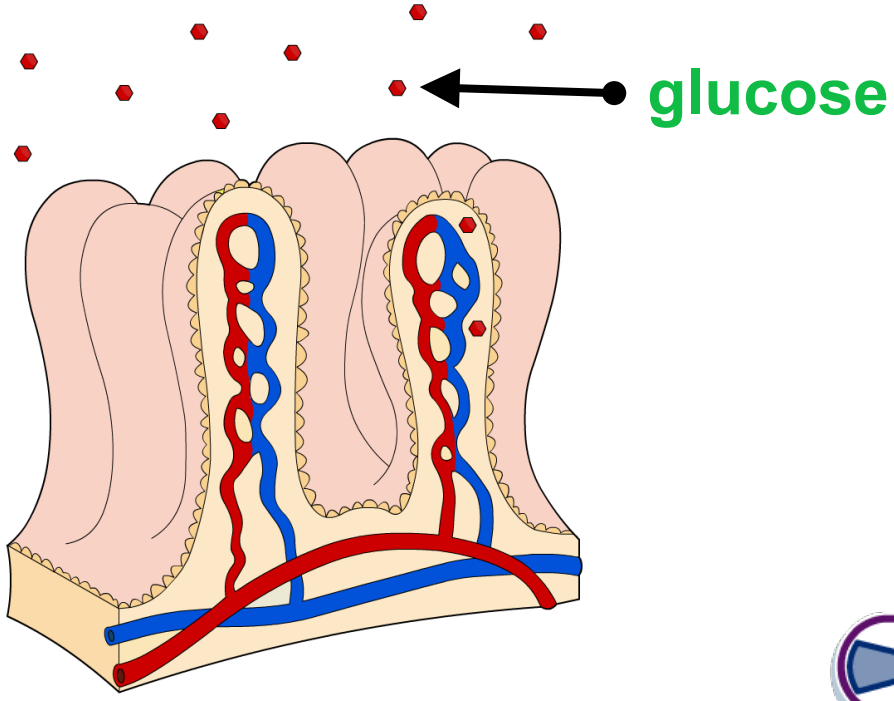
Small food molecules are usually absorbed in the small intestine, diffusing across the intestine wall and into the bloodstream.

Diffusion and the small intestine

How does the initial concentration of dissolved food molecules in the small intestine compare with the concentration of the blood in the villi?

The concentration of dissolved food molecules is higher in the small intestine than in the blood entering the villus.

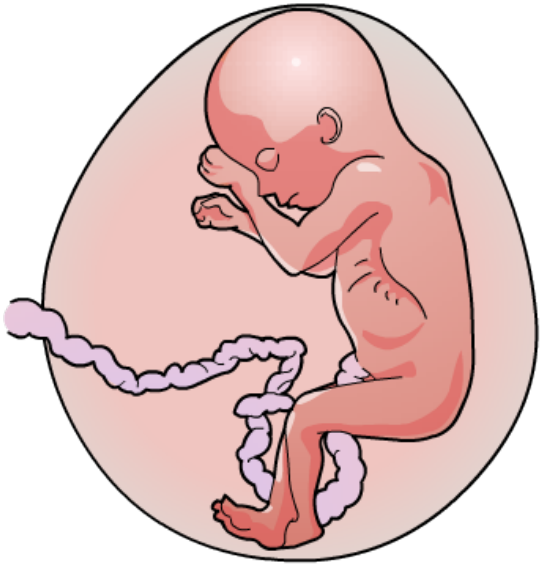
This means that the dissolved food molecules diffuse from the small intestine into the blood, moving from higher to lower concentration.



Diffusion and the placenta

The **placenta** is an organ that develops in the uterus of female mammals during pregnancy. The **umbilical cord** connects the placenta to the fetus.

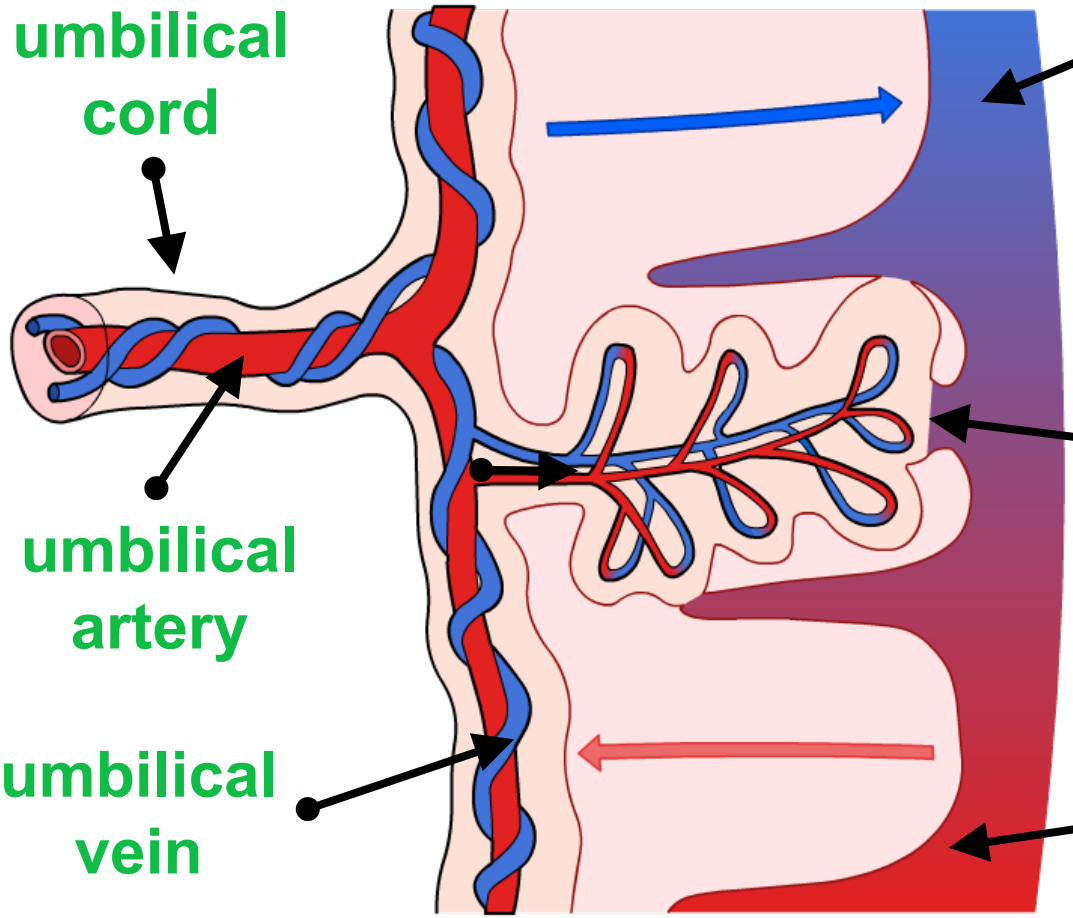
The placenta enables nutrients and oxygen to pass from the mother to the fetus by diffusion, and waste substances to diffuse from the fetus back to the mother.



The placenta can filter out certain molecules and bacteria, but is unable to stop many harmful substances such as alcohol, chemicals and some types of virus from reaching the fetus.

Diffusion and the placenta

How does the placenta work?



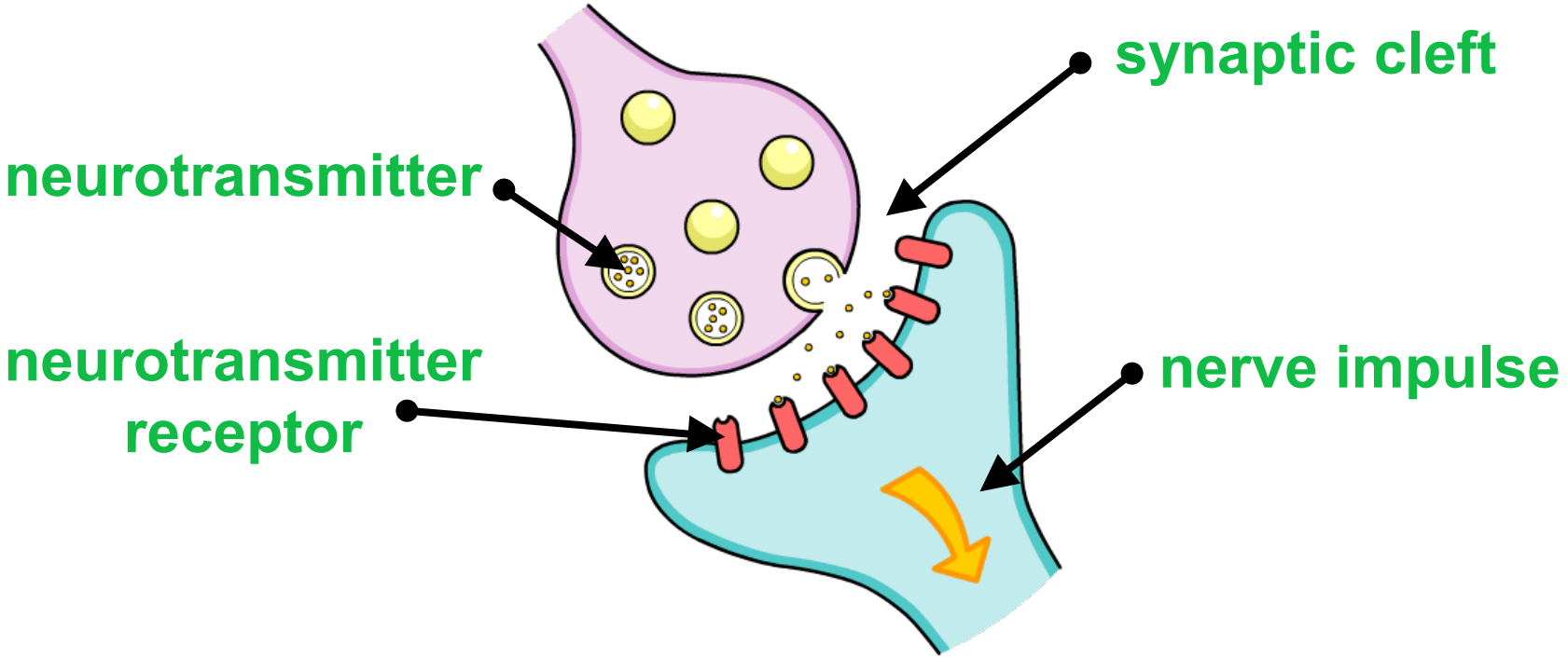
blood to mother
low in O_2/nutrients, high in CO_2/waste

placental villi
increase surface area for diffusion

blood from mother
high in O_2/nutrients, low in CO_2/waste

Diffusion and nerves impulses

A **synapse** is a junction between two neurons across which electrical signals must pass.



Neurotransmitter molecules diffuse from vesicles towards the neurotransmitter receptors, moving from an area of high concentration to low concentration.