

# Getting From Here to There

A lot of traveling goes on inside your body. Your blood is carrying nutrients and oxygen to every cell. But your cells are surrounded by membranes, and your blood is confined within blood vessels.

How do nutrients get past these barriers? There are two ways to do it: just go with the flow or hitch a ride.

## Diffusion: Going With the Flow

What happens when you put a tea bag in a cup of hot water? At first, the tea is concentrated in one spot. But it soon spreads out. You can tell by the color change. The “wall” of the tea bag, however, keeps the tea leaves inside.

The particles that you taste when you sip the tea are so small they pass through the bag. The process that moves the tea particles and the water back and forth through the tea bag is called diffusion.

Inside your body, diffusion works much the same way. Digested nutrients dissolve and move through the walls of your small intestine and blood vessels. The blood then carries the nutrients throughout your body.

Diffusion that does not require any energy from cells is sometimes called passive transport.



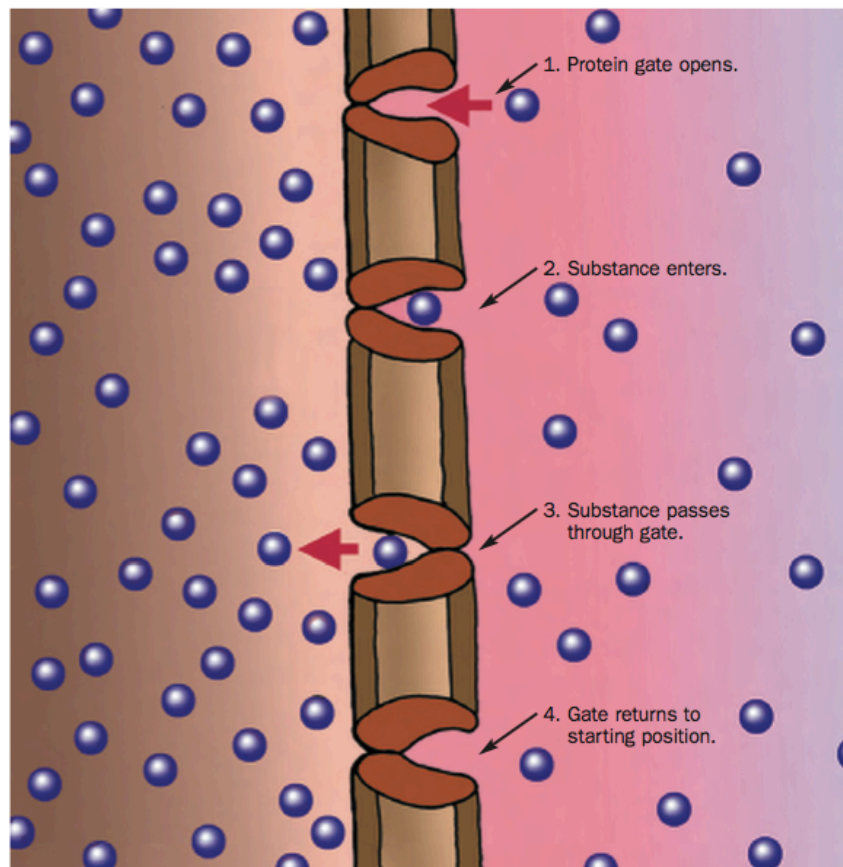
*If it weren't for diffusion, tea bags would be useless!*

## Active Transport: Hitching a Ride

Your cell membranes let some things get through by passive transport. In that case, they are working in the same way that the tea bag does.

For some nutrients, getting through a cell's protective membrane is tougher. The membranes are choosy about what gets through and what does not. Because of this, they are sometimes referred to as "selectively permeable" or "semipermeable." In some cases, it takes energy from the cells to move nutrients from one side of the membrane to the other. The process that allows this to happen is called active transport.

During active transport in the human body, substances use energy from the cell to move through the cell membrane. The energy comes from a substance called ATP (adenosine triphosphate), which is manufactured inside your cells. When a substance arrives at the cell membrane, a protein molecule grabs it, and ATP splits to release its stored energy. The energy changes the shape of the protein, which now acts as a gate in the cell membrane. When the gate (called a carrier) opens, the substance moves into (or out of) the cell. This uses up the energy the ATP has supplied to the carrier, and the gate closes.



*Model of active transport*

Diffusion helps substances move through fluids and across cell membranes inside your body. When diffusion won't work, active transport may come to the rescue. These processes keep traffic moving smoothly to and from every cell in your body.