Welcome to this lesson today on respiration, gas exchange, and transport. Today we'll be discussing the process of respiration and how gas is exchanged and transported throughout the body. So respiration is basically just the process in which oxygen is delivered to cells, and carbon dioxide waste is removed from the body. And the respiratory system and its components all play vital roles in this process of respiration. So cells require oxygen in order to be able to function. So our circulatory system and respiratory system work together in order to deliver this oxygen to the cells and remove the carbon dioxide from the body.

So in this process of respiration, oxygen and carbon dioxide are going to diffuse down a pressure gradient from high to low. So the steeper this pressure gradient is, the faster this diffusion is going to happen. So let's use oxygen as an example. If we have a lower concentration of oxygen outside versus inside, it's going to diffuse down that gradient and so it will go from the atmosphere. And it will be pulled into the lungs following that gradient. So the steeper that gradient is, the faster the diffusion's going to happen.

So hemoglobin actually plays an important role in maintaining this pressure gradient. So as hemoglobin collects oxygen from the lungs and carries it to the body, it maintains this pressure gradient, so then more oxygen can be pulled into the lungs. And we'll talk a little bit more about hemoglobin in just a few moments here. OK, so the next structure that we're going to talk about is the alveoli. And these are located in the lungs. And they're a necessary part of gas exchange.

So membranes of the alveoli and capillaries form this respiratory membrane. And this respiratory membrane allows for diffusion of gases in this process of respiration. So you can see I have a picture here of a lung. So we have the trachea that branches into the bronchi, which branch into bronchioli-- bronchioles, which then branch into alveoli. So right here is the alveoli. OK. So that is the site of gas exchange within the lungs. That's where gases are exchanged, such as oxygen and carbon dioxide, from the blood with the alveoli.

So if we take a look here, we're going to talk about this respiratory membrane. So gas is exchanged between the lungs and between capillaries. So the blood either needs to collect oxygen to carry to the rest of body. Or it needs to get rid of carbon dioxide. So it's going to have this gas exchange with the alveoli in the lungs. So basically, this respiratory membrane is composed on one side, we have our red blood cells within the blood of the capillaries. And then on the other side, this would be the alveoli. OK.

So then here we would have the endothelium of the alveoli. And here we would have the endothelium of the capillary. And then right in between both of them is the basement membrane. So we have our basement membrane of the alveoli and the capillaries are fused right here. So this produces our respiratory membrane. So this is the membrane through which gases are going to diffuse in respiration. So if we have oxygen in the lungs,

it's going to diffuse through this respiratory membrane to the red blood cells which contain hemoglobin. And then the hemoglobin will then carry the oxygen away.

And then the reverse would happen with carbon dioxide. If these red blood cells are carrying carbon dioxide, that would diffuse across this respiratory membrane to the alveoli. And then the carbon dioxide would be exhaled when we breathe out. So this respiratory membrane is where gases diffuse between the red blood cells and the alveoli.

So let's take a look at another diagram here. We're going to just talk briefly about hemoglobin. So as I mentioned, hemoglobin maintains that steep pressure gradient of oxygen. So hemoglobin is a protein found in our red blood cells that can bind up to four oxygen at a time. So because it can bind up to four oxygen at a time, that's why it can maintain the steep pressure gradient. So it allows blood to carry more oxygen than it otherwise would. So whenever hemoglobin is carrying oxygen, we call it oxyhemoglobin. And then as we mentioned, hemoglobin can also carry away carbon dioxide.

So let's take a look at this diagram briefly right here, just so you can see as you're breathing in and out, what hemoglobin is doing with the carbon dioxide and oxygen and how this is being dispersed. So let's say you breathe in oxygen. So then that oxygen that you breathe in is going to be delivered to the left side of your heart. It's going to be pumped through the left side of your heart, and then is going to be transported throughout the cells of your body. And then your body cells are going to use that oxygen. And now these red blood cells don't have as much oxygen anymore. They're oxygen-lacking. They're depleted of oxygen, because that oxygen has been used.

So then the next thing that's going to happen is the blood is going to carry this ox-- or this-- it's going to carry the blood that doesn't have oxygen in it, but instead has carbon dioxide back up to the right side of your heart. And then your right side of your heart is going to pump it back up to your lungs, where it will then collect more oxygen and go through this process again. So as soon as you breathe in, the oxygen you breathe in is going to be collected by hemoglobin in your blood. And so that blood is going to be rich in oxygen and low in carbon dioxide.

But then as soon as your cells use that oxygen up, your blood is now going to be low in oxygen but high in carbon dioxide. So it then needs to be pumped back to the lungs to get rid of that carbon dioxide and collect more oxygen. So hemoglobin, by binding to so many oxygens at a time, helps maintain that pressure gradient so that you can carry more oxygen to your cells.

So this lesson has been an overview on respiration, gas exchange, and transport.