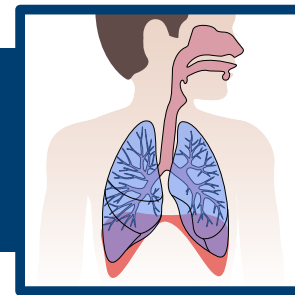


Student Background

PULMO PARK

LESSON 2: RESPIRATORY EXPLORATORY

Activity 2A: Expansion and Contraction



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Expansion, Pressure, and Tension – Oh! My!

Breathing is a passive process resulting from a pressure difference between the lungs and the atmosphere. Inhaling (inspiration) expands the thoracic cavity which creates a negative pressure (a decrease in pressure) within the lungs. In other words, the pressure inside the lungs is less than the pressure outside of the body. Air naturally moves from an area of higher pressure into an area of lower pressure until the pressures are equalized. When the air pressure inside the lungs is equal to the air pressure outside the body, inspiration stops.

Because lungs have elastic properties, they expand during inspiration. But just like a stretched rubber band, there is a limit to how far the lungs can expand. When a stretched rubber band is released, it returns to the original size and shape. Just like the rubber band, when the lungs approach their expansion limit, their elastic properties pull them back. As the lungs contract, the air inside has less room, forcing the air molecules together. When gases are forced together, the pressure increases, resulting a higher pressure inside the lungs. The air inside the lungs moves out of the body into the now lower external pressure. As the air flows out of the body, this is called exhaling or exhalation.

Keep in mind the air pressure outside the body has not changed. Only the air pressure inside the lungs changes. The changes in air pressure within the thoracic cavity is largely due to the movement of the diaphragm. This large, flat muscle separates the thoracic cavity from the abdominal cavity. As the diaphragm contracts and moves downward toward the abdomen. This expands the thoracic cavity and air flows into the lungs through the nose and/or mouth. When the diaphragm relaxes, it moves upward, forcing the thoracic cavity to get smaller which works with the contracting lungs to force lung gases closer together which increases the pressure in the lungs. The body takes advantage of pressure changes to passively move air in and out of the body. This greatly reduces the amount of energy the body uses to breathe.