

The breathing process

[Science](#), [Physics](#)



The first step in the breathing process starts with the brain. The brain sends a message to the diaphragm, telling it to move. The diaphragm is a large dome shaped muscle that divides the chest cavity from the abdominal cavity and attaches to the ribs at the sides and the sternum in the front of the body. When the brain tells the diaphragm to move, it flattens out, enlarging the thorax of the body, the ribs, and the chest. When the chest expands, it pulls on the lungs, causing a drop in pressure in the lungs compared to the pressure of the atmosphere and air is sucked into the lungs to balance the pressures.

There are many muscles used in the process of inhalation. The diaphragm is the most important. The external intercostals are on the outside of the ribs, and extend from rib to rib, in between. These muscles help to pull the lower ribs up when the chest is rising to take air into the lungs. The levatores costorum are small muscles that extend from the vertebrae to the ribs. They also aid in lifting the ribs upward. The serratus posterior superior extend down and out from the vertebrae to the upper ribs in the back.

These muscles also help raise the chest. The pectoralis major is the upper chest muscle that fans out from the humerus and inserts into the sternum and the clavicle. The pectoralis minor extends from the scapula and inserts into the second through fifth ribs. This muscle is also fan shaped and helps to raise the ribs. The latissimus dorsi (or "latts") is the large muscle on the back extending from the lower vertebrae to the hip bone and from the ribs to the upper arm. This muscle helps to expand the lower part of the thorax.

The sternocleidomastoid extends from the skull to the sternum and clavicle. It helps to pull the chest upward. The last muscle important in the act of inhaling is the scalenes, This muscle extends from the neck to the first and second ribs and helps to pull the chest upward. Exhalation: The act of exhaling is pretty much the exact reverse of inhaling. The diaphragm relaxes and goes back into its dome-like shape. The ribs, chest, and thorax lower and return to their natural position. Gravity also plays a part in lowering the chest, ribs, and thorax.

The lungs, elastic air passages, and chest wall recoil, and exhalation occurs. There are also many muscles that are involved with the process of exhaling. The abdominals are the primary muscles of exhalation. They pull in a down and out motion, helping to lower the chest and contract the diaphragm and other muscles. The internal intercostals are on the inside of the ribs and extend between them. They help to pull the ribs downward and inward. The subcostals are also on the inside of the ribs and extend upward and outward from the lower rib to the higher rib.

These muscles also help to pull the ribs inward. The serratus posterior inferior extend up and out from the vertebrae to the four lower ribs and these muscles pull the ribs downward. The quadratus lumborum extends from the lowest rib to the hip bone and anchors the lowest rib from pull from the diaphragm. Finally, the transversus thoracis extends upward and outward from the lower part of the sternum and inserts into the second through sixth ribs. This muscle helps to pull the chest downward.

Singing: It is important in singing to have strong muscles and to use the muscles in a correct way to achieve the maximum potential of the air flow and of the voice. There are three types of respiration: Quiet respiration, forced respiration, and subglottal pressure. Quiet respiration is involuntary breathing. It is the type of breathing that occurs at any restful state and there is very little exchange of air. Forced respiration is voluntary breathing. It is used in yelling, loud talking, and singing.

It requires active use of both the inhalation and exhalation muscles and there is a large amount of air exchanged within the lungs. Subglottal pressure is probably the most important in singing. It is the overpressure of air in the lungs, created by forced respiration. There is forced airflow against partially closed vocal folds. This type of respiration allows the singer to control airflow and have a constant sound. Using correct breath control and muscle control will allow a singer to achieve constant intensity and sound in their voice.