



*"Breath is the bridge which connects life to consciousness, which unites your body to your thoughts."*

– Thich Nhat Hanh

## Reasons to Not Take Breathing for Granted

**People breathe without thinking about it most of the time, even though it's something a healthy adult at rest does an average of 12 to 20 times per minute.**

Breathing supports all of the systems in your body. It impacts sleep quality, memory, concentration, energy level and healing. While we associate breathing with the lungs, it is a reflex controlled by the brain and autonomic (involuntary) nervous system.

Breathing becomes a conscious effort when air supply is cut off, with physical exertion, when under duress, or due to an acute illness or chronic respiratory disease. In some occupations, employees undergo training to learn how to breathe while wearing a respirator in oxygen-deficient environments or prevent inhalation

of particles, droplets or fumes. There are also many people around the world who practice controlled breathing techniques to manage anxiety, calm their mind and relax their body.

### Breathing Physiology

The act of breathing is respiration, a metabolic process that involves inspiration, which delivers oxygen (O) to organs and tissues, and expiration, which forces carbon dioxide (Co<sub>2</sub>) out of the body as waste. The diaphragm, located just below the lungs, is a dome-shaped muscle used in respiration. As you breathe, the diaphragm contracts and creates space in the chest cavity so the lungs can expand. Muscles between your ribs also help enlarge the chest cavity.

As your lungs expand, air is sucked in through your nose and mouth. Air travels down the trachea, or windpipe, into your lungs. After passing through bronchial tubes, it travels to alveoli, or air sacs, and through thin walls into capillaries where red blood cells capture oxygen using a protein called hemoglobin. Oxygen-rich red blood cells are carried to the heart via pulmonary veins and pumped to cells via blood vessels. During this process, Co<sub>2</sub> is produced and exhaled. Serious health problems can develop when the exchange of O and Co<sub>2</sub> is disrupted.

According to the [National Heart, Lung and Blood Institute](#), airway sensors detect irritants and can trigger sneezing or coughing. In people with asthma or allergies, these sensors may cause muscles to constrict air flow. Sensors in the brain and near blood vessels detect gas levels in your blood, while sensors in joints and muscles make breathing-rate adjustments during physical activity.

Injury to the nerves in the upper spinal cord can interfere with the movement of the diaphragm and other muscles in the chest, neck and abdomen. Damage, infection or inflammation in the lungs and/

or airways are underlying causes of conditions that affect the respiratory system. These include asthma, bronchitis, chronic obstructive pulmonary disease (COPD), pneumonia and sleep apnea (when the brain temporarily stops sending signals to the muscles needed to breathe while sleeping).

When a person cannot breathe on their own, a mechanical ventilator is used to move air in and out of their lungs. They may wear a mask attached to a breathing tube or have an endotracheal tube inserted into their windpipe to keep their airway open (intubation).

## Breath Work

Regular exercise and fitness training helps improve your overall health, strength and endurance. A method called respiratory muscle training that is used by athletes to help maximize performance involves breathing exercises, and in some cases, use of a device to monitor inhalation and exhalation rates while adjusting breathing resistance.

Deep breathing is connected to relaxation responses in the body. People who are under stress, injured or emotionally distraught are often encouraged to pause and “take some deep breaths.” Deep abdominal breathing encourages full oxygen exchange and makes it possible for the parasympathetic nervous system to have a calming effect – your heart rate slows, blood pressure drops and mind stops racing. Shallow breathing limits the diaphragm’s range of motion and stimulates the sympathetic nervous system, which triggers the fight-flight-freeze response and may induce shortness of breath.

People who practice yoga and meditation focus on breathing at a natural pace and report positive effects on their physical, spiritual and mental health. “Mindful breathing” involves paying close attention to inhalation, exhalation, pauses and sensations that flow through your body as you breathe. When your mind wanders, the intent is to consciously redirect attention back to your breath. This may be accomplished with eyes

shut or slightly open, while lying down or sitting in a comfortable position, preferably in a place without distractions.

Here are a few resources (there are many available online):

- [Breathing Your Way Toward Mental Clarity](#), American College of Sports Medicine and Wellcoaches
- [Exercise and Lung Health](#), American Lung Association
- [Mindful Breathing Practice](#), Greater Good in Action, UC Berkeley
- [WorkCare Wellness Monthly](#) for tips on improving air quality where you work and live

It’s advisable to ask your personal health care provider, a respiratory therapist, fitness coach, mindfulness practitioner or other qualified professional for guidance on breathing techniques, especially if you have challenges with your respiratory health.

### Did You Know?

*The air we breathe is comprised of approximately 78 percent nitrogen and 21 percent oxygen. It also contains small amounts of gases such as carbon dioxide, neon and hydrogen, and particles such as dust, pollen and pollutants. The air used in industrial and medical settings is subject to content, quality and purity standards. Refer to the:*

- [World Health Organization](#) to learn about global standards for medical oxygen, which is used for many life-saving and health care procedures.
- [Occupational Safety and Health Administration](#) for standards related to the use of respirators in general industry, shipyards, marine terminal, longshoring and construction.
- [International Standards Organization](#) for standards related to the use of gases for industrial applications, including compressed air and hydrogen.