

Respiratory System (Conditions & Diet)

The human respiratory system is a series of organs responsible for taking in oxygen and expelling carbon dioxide. The primary organs of the respiratory system are the lungs, which carry out this exchange of gases as we breathe.

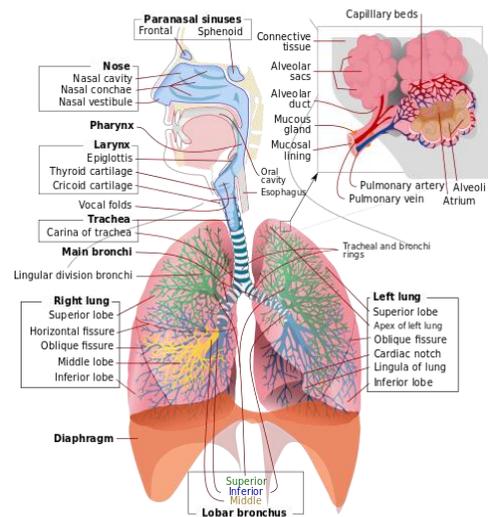
Red blood cells collect the oxygen from the lungs and carry it to the parts of the body where it is needed via the blood – to create energy. During the process, the red blood cells collect the carbon dioxide (the by product of energy production) and transport it back to the lungs, where it leaves the body when we exhale. The human body needs oxygen to sustain itself. A decrease in oxygen is known as hypoxia and a complete lack of oxygen is known as anoxia. These conditions can be fatal; after about four minutes without oxygen, brain cells begin dying, which can lead to brain damage and ultimately death.

In humans, the average rate of breathing is dependent upon age. A new-born's normal breathing rate is about 40 times each minute and may slow to 20 to 40 times per minute when the baby is sleeping. For adults, the average resting respiratory rate for adults is 12 to 16 breaths per minute. Physical exertion also has an effect on respiratory rate, and healthy adults can average 45 breaths per minute during strenuous exercise.

Parts of the respiratory system: As we breathe, oxygen enters the nose or mouth and passes the sinuses, which are hollow spaces in the skull. Sinuses help regulate the temperature and humidity of the air we breathe.

The trachea, also called the windpipe, filters the air that is inhaled. It branches into the bronchi, which are two tubes that carry air into each lung. The bronchial tubes are lined with tiny hairs called cilia. Cilia move back and forth, carrying mucus up and out. Mucus, a sticky fluid, collects dust, germs and other matter that has invaded the lungs. We expel mucus when we sneeze, cough, spit or swallow.

The bronchial tubes lead to the lobes of the lungs. The right lung has three lobes; the left lung has two. The left lung is smaller to allow room for the heart. Lobes are filled with small, spongy sacs called alveoli, and this is where the exchange of oxygen and carbon dioxide occurs. The alveolar walls are extremely thin (about 0.2 micrometres). These walls are composed of a single layer of tissues called epithelial cells and tiny blood vessels called pulmonary capillaries. There is a muscular diaphragm below the lungs.



Parts of the respiratory system

Ventilation: The ribs, intercostal muscles and diaphragm all play important roles in ventilation (breathing).

Breathing in (when you inhale):

- The internal intercostal muscles relax and the external intercostal muscles contract, pulling the ribcage upwards and outwards
- The diaphragm contracts, pulling downwards
- Lung volume increases and the air pressure inside decreases
- Air is pushed into the lungs

Breathing out (when you exhale):

- The external intercostal muscles relax and the internal intercostal muscles contract, pulling the ribcage downwards and inwards
- The diaphragm relaxes, moving back upwards
- Lung volume decreases and the air pressure inside increases
- Air is pushed out of the lungs

HEALTH MATTERS!

Disease of the respiratory system: these fall into two categories: viruses such as influenza, bacterial pneumonia and the new enterovirus respiratory virus that has been diagnosed in children; and chronic diseases, such as asthma and chronic obstructive pulmonary disease (COPD). There is not much that can be done for viral infections but to let them run their course. Antibiotics are not effective in treating viruses and the best thing to do is just rest.

COPD is the intersection of three related conditions — chronic bronchitis, chronic asthma and emphysema. It is a progressive disease that makes it increasingly difficult for sufferers to breathe. Asthma is a chronic inflammation of the lung airways that causes coughing, wheezing, chest tightness or shortness of breath. These signs and symptoms may be worse when a person is exposed to their triggers, which can include air pollution, tobacco smoke, factory fumes, cleaning solvents, infections, pollens, foods, cold air, exercise, chemicals and medications.

Lung cancer is often associated with smoking, but the disease can affect non-smokers as well. Like all cancers, lung cancer is caused by the uncontrolled growth of abnormal cells.

Diet: Whilst it is important to breathe clean air and in an even, controlled manner, nutrition also plays a vital role in the running and maintenance of the respiratory system.

- **Vitamin E** may help open your airways and reduce inflammation, as it is a powerful antioxidant for the immune system that helps to protect and repair damaged lung tissue and aids in red blood cell formation, which increases oxygen within the body. **Sources:** Almonds, spinach, sweet potato, avocado, wheat germ, sunflower seeds, butternut squash etc.
- **Beta-carotene**, which may decrease the effects of exercise induced asthma. Your body converts beta-carotene to **vitamin A**, which is an essential nutrient. It also has antioxidant properties that can help ward off cell damage. **Sources:** Carrots — as well as other red, orange, and yellow fruits and veggies
- **Vitamin A** can help repair lungs. **Sources:** Papaya, greens, cantaloupe, carrots, broccoli, eggs etc.
- **Vitamin C** contains antioxidants, which can detoxify the lungs and help them heal. **Sources:** Oranges, papaya, kiwi, parsley, celery, watermelon, and citrus fruits etc.
- **Flavonoids** (antioxidant) help fight inflammation from asthma by strengthening the capillary walls. They also can protect the lining of lungs and bronchial tubes from damage caused by pollution. Limes are extensively used in anti-congestive medicines such as balms, vaporizers, and inhalers due to the presence of Kaempferol. **Sources:** Onions, limes, apples, blueberries, tomatoes and cabbage etc.
- **Magnesium** relaxes the muscles in the airways and helps more air get through, which can help with asthma and allergic reactions. **Sources:** Dried figs, bananas, brown rice, prunes, leafy greens etc.
- **Selenium** a trace mineral that can help with asthma. All it takes is eating one Brazil nut a day to provide recommended daily amounts. **Sources:** Brazil nuts, tuna, sardines, turkey, grass fed beef, chicken etc.
- **Probiotics** have been shown to reduce inflammation and seem to reduce allergic reactions - for some people, asthma is triggered by allergies. Adequate probiotics (gut flora) is vital for health, and contributes to a strong immune system. **Sources:** supplements and eating non-dairy homemade coconut yoghurt is recommended as best sources.
- **Quercetin (Phytochemical)** a flavonoid found in colourful fruits and vegetables may improve overall lung capacity and relieve symptoms of sinusitis. **Sources:** apples, citrus fruits, grapes, onions, parsley, blackberries, blueberries, dark cherries, and olive oil.
- **Omega-3 fatty acids** found in salmon and flax seeds can reduce inflammation in the lungs. **Sources:** Oily fish, walnuts, flax seeds, green leafy veg etc.
- **Garlic** can help with cleaning and detoxing the lungs. Use fresh garlic for at least one meal a day.
- **Ginger** is a herb that helps detoxify lungs and contributes to better circulation.
- **Horseradish** can also help clear the mucus secretions in the sinus and respiratory system.
- **Hot and spicy foods** can help to liquefy mucus in the respiratory system making it easier to flush out.
- **Avoid dairy products, which create mucous in the body.**
- **Green tea:** To help get all the foreign matter out of the respiratory tract, sinuses, and lungs, drink hot liquids. Hot liquids, such as green tea is one way to get the cilia moving again. This in turn can help get the mucus moving.

Please note: This handout should only be used as a guide to help inform you as to the diet and lifestyle modifications that **may** help to support your respiratory system. It **should not** be used as definitive guide to the respiratory system and related conditions. If you think you may be suffering from a respiratory condition then please contact your medical doctor.