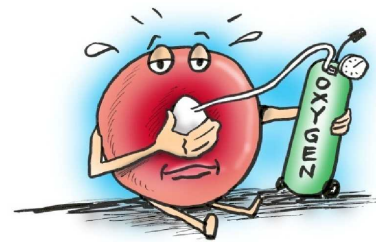


The Respiratory System

Breathing is the process by which oxygen in the air is brought into the lungs and into close contact with the blood, which absorbs it and carries it to all parts of the body. At the same time the blood gives up waste matter (carbon dioxide), which is carried out of the lungs with the air breathed out.

Respiratory System

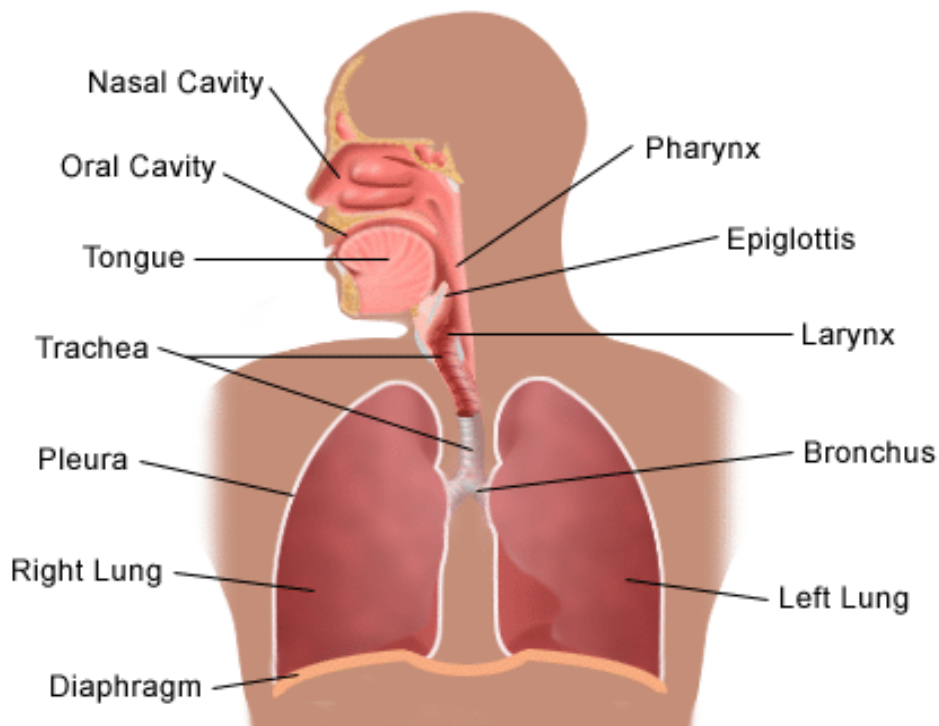


Oxygen gas (O_2) is essential for life. Without it, our cells would not be able to efficiently extract energy they need from nutrients.

This process, called cellular respiration, takes place in the mitochondria:

We breathe 12 to 15 times a minute, allowing oxygen to enter, and carbon dioxide to exit our bodies.

Respiratory System Parts

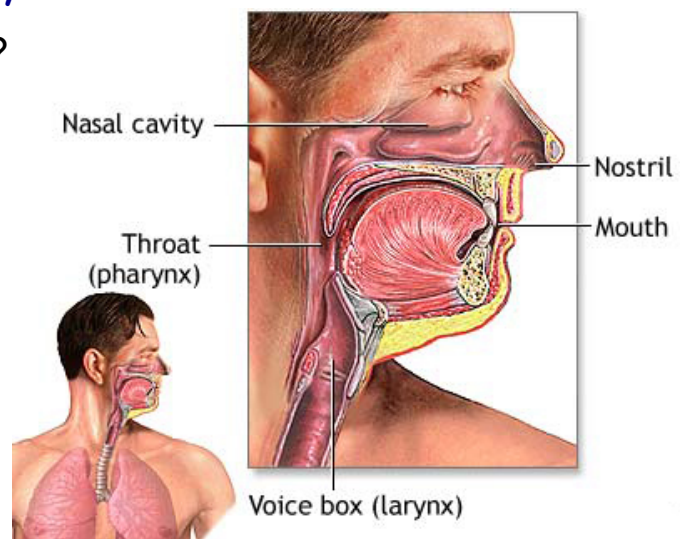


Parts of the respiratory system and their functions

How does air enter into our body?

★ 1) The **NASAL CAVITY** (nose) is the preferred entrance for outside air into the Respiratory System. The hairs that line the inside wall are part of the air-cleansing system.

★ 2) Air also enters through the **ORAL CAVITY** (mouth), especially in people who have a mouth-breathing habit or whose nasal passages may be temporarily obstructed, as by a cold.



- The **ADENOIDS** are overgrown lymph tissue at the top of the throat. When they interfere with breathing, they are generally removed. The lymph system, consisting of nodes (knots of cells) and connecting vessels, carries fluid throughout the body. This system helps resist body infection by filtering out foreign matter, including germs, and producing cells (lymphocytes) to fight them.

- The **TONSILS** are lymph nodes in the wall of the pharynx that often become infected. They are an unimportant part of the germ-fighting system of the body. When infected, they are generally removed.

Parts of the respiratory system and their functions

Once in our body, where does the air go? ←

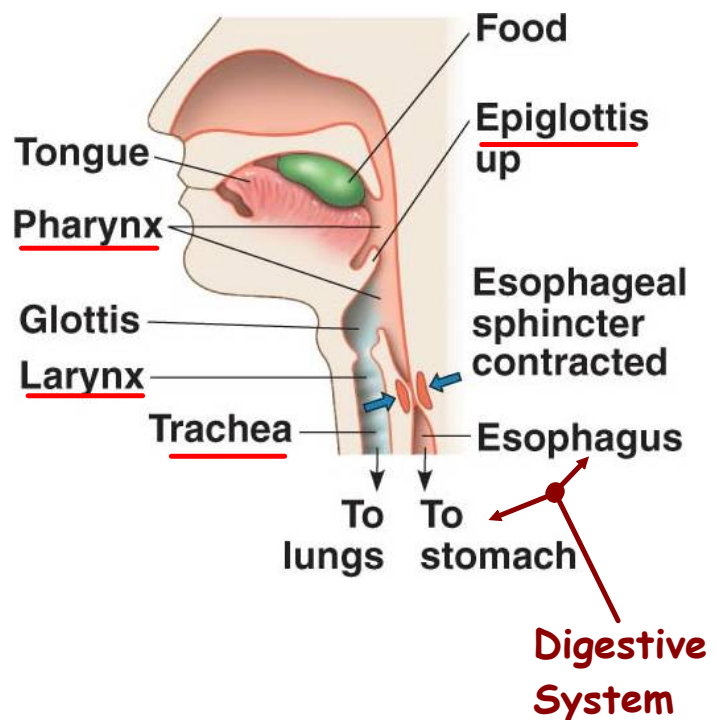
★ - The **PHARYNX** (throat) collects incoming air from the nose and passes it downward to the trachea (windpipe).

- The **EPIGLOTTIS** is a flap of tissue that guards the entrance to the trachea, closing when anything is swallowed that should go into the esophagus and stomach.

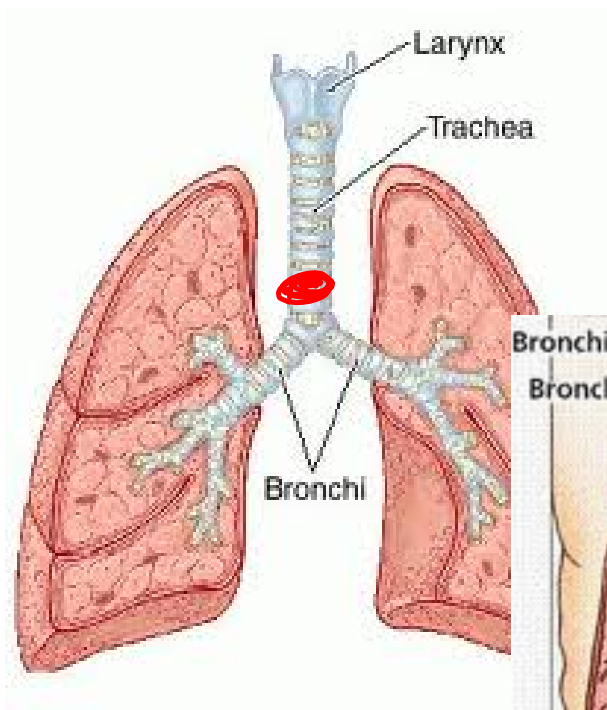
- The **LARYNX** (voice box) contains the vocal cords. It is the place where moving air being breathed in and out creates voice sounds.

- The **ESOPHAGUS** is the passage leading from the mouth and throat to the stomach.

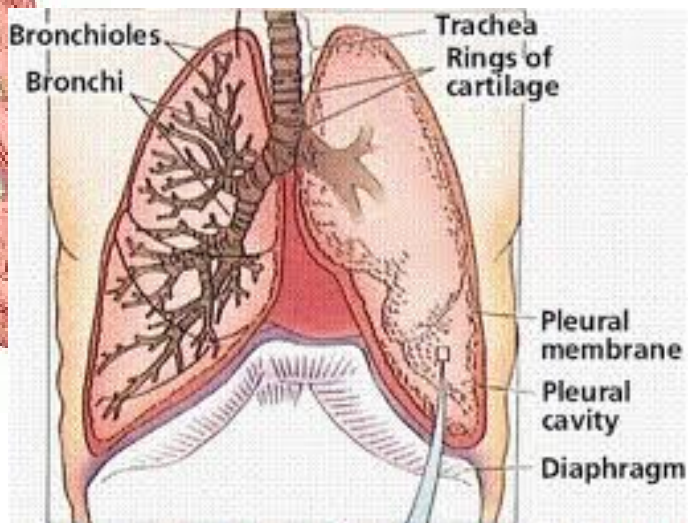
★ - The **TRACHEA** (windpipe) is the passage leading from the pharynx to the lungs.



- The **TRACHEA** (windpipe) is the passage leading from the pharynx to the lungs.



- The trachea divides into the two main **BRONCHI** (tubes), one for each lung. These, in turn, subdivide further into bronchioles.



Parts of the respiratory system and their functions

- The **RIBS** are bones supporting and protecting the chest cavity. They move to a limited degree, helping the lungs to expand and contract.

And now, **THE LUNGS!**



The lungs are spongy elastic organs enclosed in the rib cage, and composed of millions of air sacs, called alveoli.

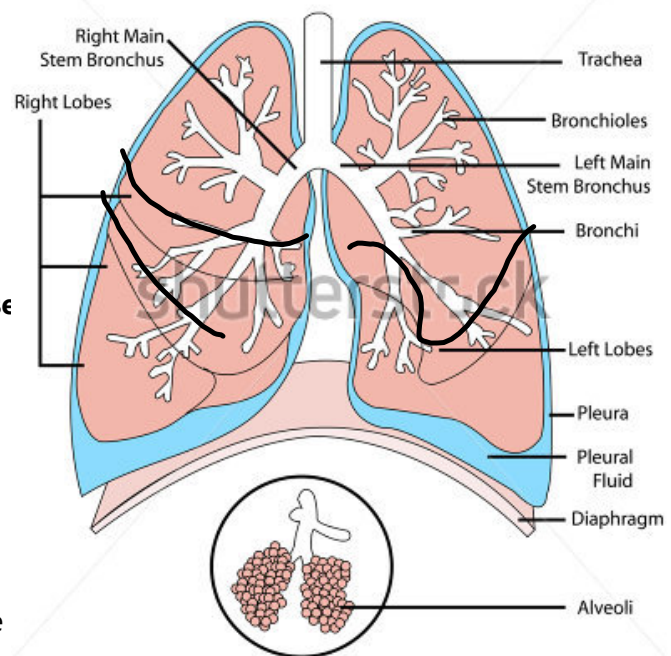


- The **RIGHT LUNG** is divided into three **LOBES**, or sections. The **LEFT LUNG** is divided into two **LOBES**.

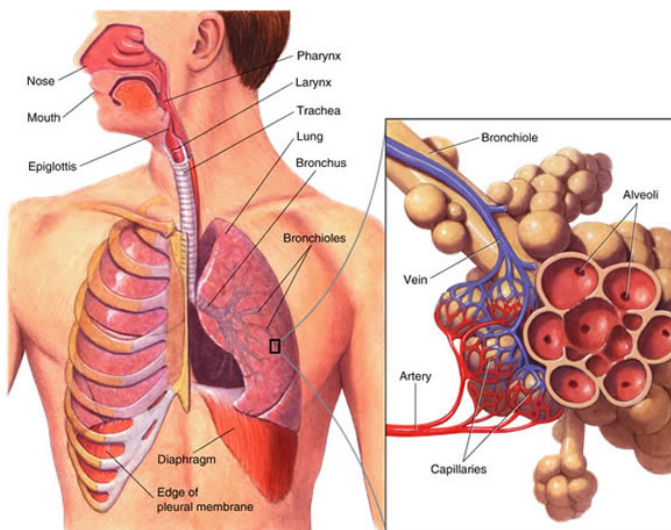


- The **PLEURA** are the two membranes, that surround each lobe of the lungs and separate the lungs from the chest wall.

Diagram of the Human Lungs



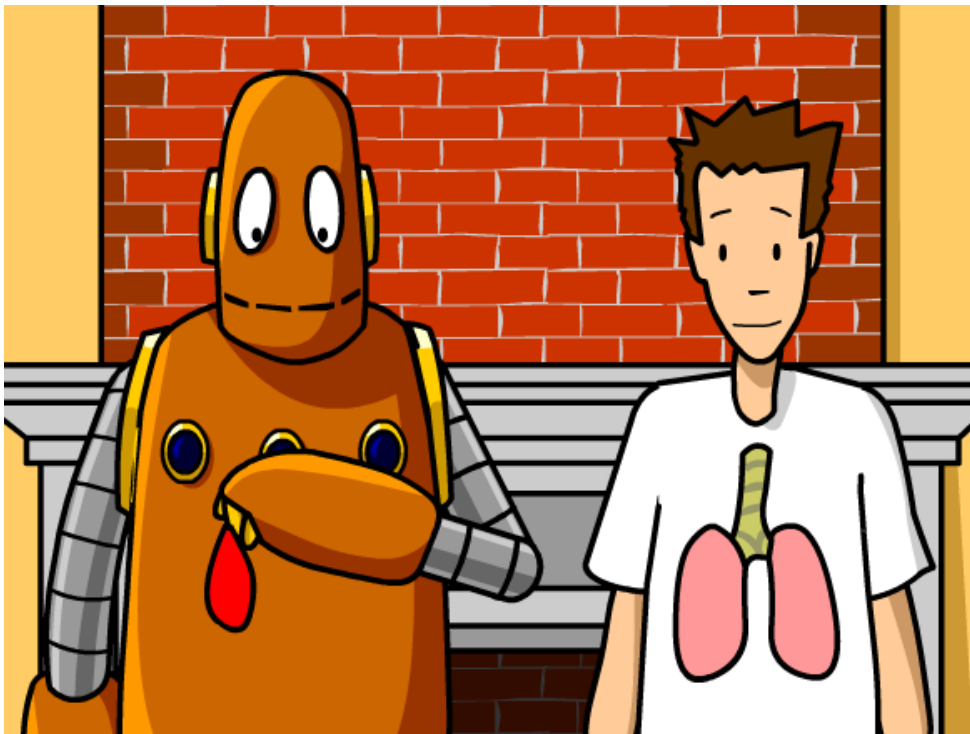
www.shutterstock.com · 60163588



- The bronchial tubes are lined with **CILIA** (like very small hairs) that have a wave-like motion. This motion carries **MUCUS** (sticky phlegm or liquid) upward and out into the throat, where it is either coughed up or swallowed. The mucus catches and holds much of the dust, germs, and other unwanted matter that has invaded the lungs and thus gets rid of it.

- The **DIAPHRAGM** is the strong wall of muscle that separates the chest cavity from the abdominal cavity. By moving downward, it creates suction to draw in air and expand the lungs. The smallest subdivisions of the bronchi are called **BRONCHIOLES**, at the end of which are the alveoli (plural of alveolus).

- The **ALVEOLI** are the very small air sacs that are the destination of air breathed in. The **CAPILLARIES** are blood vessels that are imbedded in the walls of the alveoli. Blood passes through the capillaries, brought to them by the **PULMONARY ARTERY** and taken away by the **PULMONARY VEIN**. While in the capillaries the blood discharges carbon dioxide into the alveoli and takes up oxygen from the air in the alveoli.



<http://www.brainpop.com/health/bodysystems/respiratorysystem/>

One more time... Gas exchange within the lungs

Why?

For cellular respiration to occur, the oxygen (O_2) that has been absorbed by the lungs need to reach all the cells in our body.

Carbon Dioxide (CO_2) is a waste product of cellular respiration needs to be expelled from the body.

Where?

This gas exchange takes place in the alveoli of the lungs.

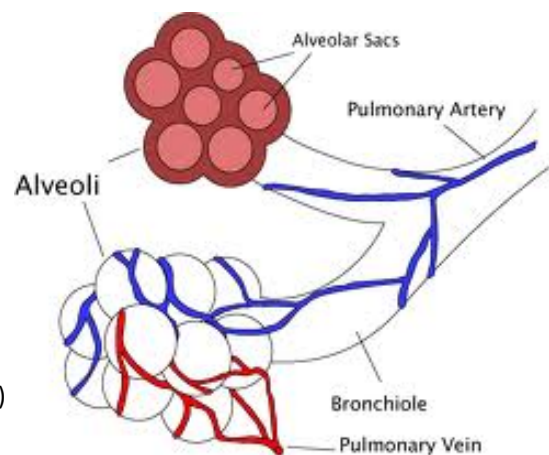
Alveoli are small cavities filled with air that make up the bulk of our lungs. We have millions of alveoli and each one is surrounded by tiny blood vessels called capillaries.

How?

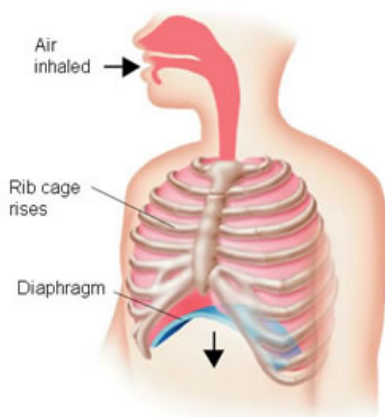
Blood that is rich in Carbon Dioxide (CO_2) and poor in Oxygen (O_2) reaches the alveoli.

CO_2 diffuses from the blood to the alveoli (because the concentration of CO_2 is higher in the blood than in the alveoli air)

O_2 diffuses from the alveoli to the blood (because the concentration of O_2 is higher in the alveoli air than in the blood)



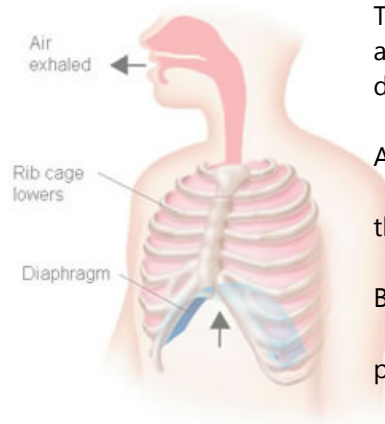
How does breathing occur?



Inhalation

- Diaphragm contracts and descends
- Intercostal muscles contract
- Ribs rise (increasing size of the ribcage)
- Air pressure inside the lungs decreases.

- Air (rich in Oxygen) from outside flow into the lungs until the pressure inside and outside the lungs is equal



Exhalation

- Diaphragm relaxes and rises
- Intercostal muscles relax
- Ribs descends (decreasing the size of the ribcage)
- Air pressure inside the lungs increases.

- Air (rich in Carbon Dioxide) from inside the lungs flows outside until the pressure inside and outside the lungs is equal

The lungs are highly elastic (flexible) and respond to the actions of the diaphragm and the rib cage

A) Diaphragm:

* the wall of muscle that lies under the lungs

B) Rib Cage:

* the bones and cartilage which protect the heart and lungs

Malfunctions of the Human Respiratory System

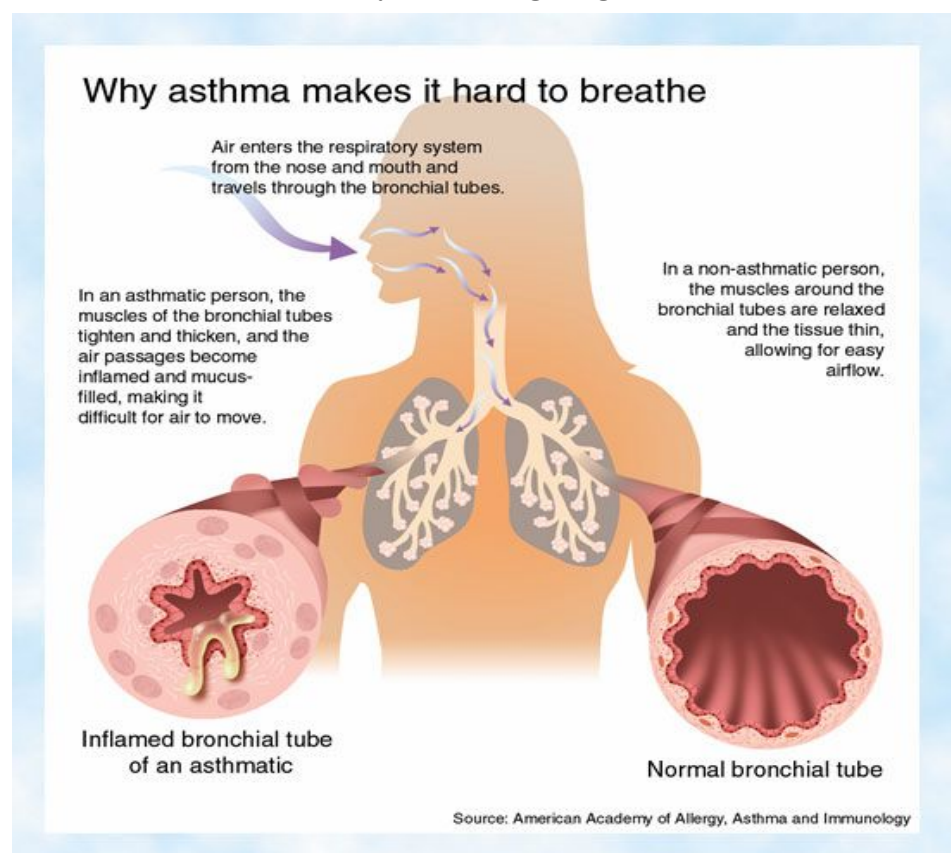
1) Bronchitis:

- * an inflammation of the membranes of the bronchial tubes
- *Bronchitis is inflammation of the main air passages to the lungs.



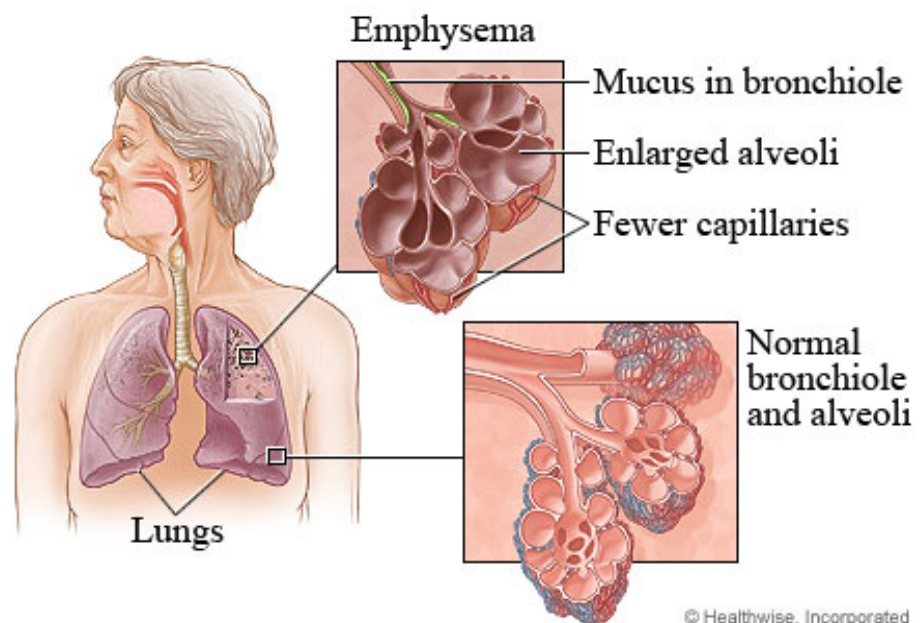
Malfunctions of the Human Respiratory System

2) Asthma:
 * an allergic response characterized by the constriction (narrowing) of the bronchial tubes
 * can be caused by many different factors
 * medications and inhalers are used to open up the respiratory passages



3) Emphysema:

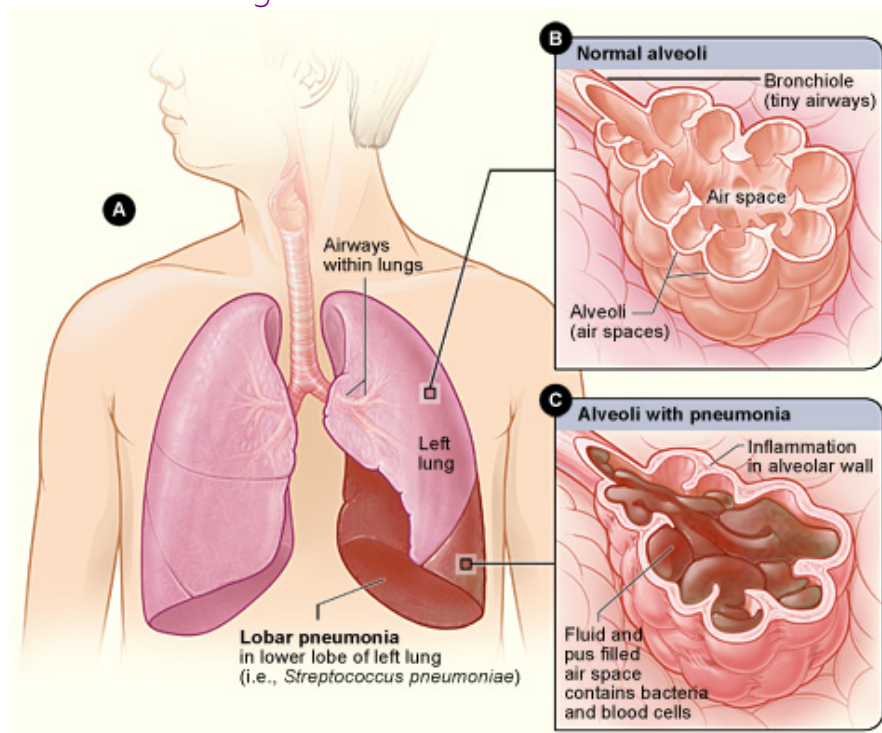
- * a general deterioration of the lungs
- * alveoli are enlarged and stiff (and can't function) which reduce the lung capacity for air



4) Pneumonia:

* a condition where the alveoli become filled with fluid, preventing the normal exchange of gases

* can be life threatening



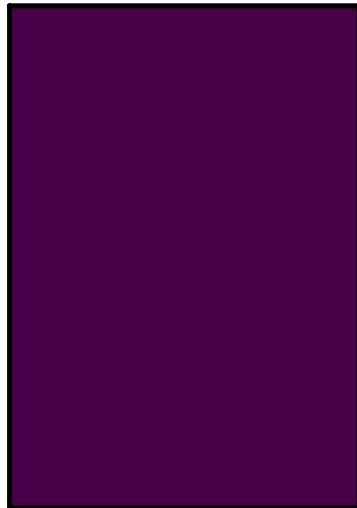


Smoking is, hands down, the worst thing you can do to your lungs on a regular basis.

It's not enough to skip only cigarettes. Pipes, cigars, or any drugs can harm lungs too.



WARNING: Cigarettes cause fatal lung disease.



A frequently asked question by smokers:

Will My Heart & Lungs Heal Themselves If I Quit Smoking?

Yes! :) Because your body constantly repairs itself, growing new bone, skin, blood, heart and lung cells daily. Your body's regenerative ability makes it possible to overcome infections and injuries. Otherwise, every common cold, minor cut or contusion would become a potentially disabling or life-threatening event.

If you are a smoker and you quit there are benefits that occur days after you quit smoking and some that happen only minutes after you quit!

Other benefits take months or years but quitting smoking (or never starting in the first place) is always the best choice.

Quit Smoking Timeline

What happens once you quit?



20 MINUTES

- Blood pressure drops to normal
- Pulse rate drops to normal
- Body temperature of hands and feet increases to normal

8 HOURS

- Carbon monoxide level in blood drops to normal
- Oxygen level in blood increases to normal

24 HOURS

- Chance of heart attack decreases

48 HOURS

- Nerve endings start regrowing
- Ability to smell and taste is enhanced

2 WEEKS TO 3 MONTHS

- Circulation improves
- Walking becomes easier
- Lung function increases up to 30 percent

1 TO 9 MONTHS

- Coughing, sinus congestion, fatigue, and shortness of breath decrease
- Cilia regrow in lungs, increasing their ability to handle mucus, clean the lungs, and reduce infection
- Body's overall energy increases

1 YEAR

- Excess risk of coronary heart disease is half that of a smoker

5 YEARS

- Lung cancer death rate for an average former smoker (one pack a day) decreases by almost half
- Stroke risk is reduced to that of a non-smoker five to 15 years after quitting
- Risk of cancer of the mouth, throat, and esophagus is half that of a smoker's

10 YEARS


- Lung cancer death rate is similar to that of a non-smoker
- Precancerous cells are replaced
- Risk of cancer of the mouth, throat, esophagus, bladder, kidney, cervix, and pancreas decreases

15 YEARS +

- Risk of coronary heart disease is that of a non-smoker

<http://www.stqp.org/quitsmokingtimeline.asp>

Smokers vs Normal Lungs

 <http://www.youtube.com/watch?v=yskYG-EVIBY>

Notes on Respiratory System

Air (rich in oxygen or O₂) enters into our system through the **nasal cavity (the nose)** or the **oral cavity (the mouth)**.

The air travels into the **pharynx** and then the **trachea** (windpipe). The trachea divides off into **two bronchi** which branch out into **bronchioles**.

The **bronchioles** lead to **alveoli** (small air sacs) which is where the gas exchange of oxygen and carbon dioxide (CO₂) take place.

The alveoli are surrounded by blood vessels called capillaries. When the **blood** cells reach the alveoli, they are high in carbon dioxide, but low in oxygen. The alveoli are high in oxygen and low in carbon dioxide. There is an exchange due to this difference in gas composition.

When we exhale, the air (now rich in CO₂) travels back up the bronchioles, to the bronchi, up the trachea, through the pharynx and out the nasal or oral cavity.

