Canadian Pulmonary Rehabilitation Program

G.F. MacDonald Centre for Lung Health

Living Well with Chronic Lung Disease

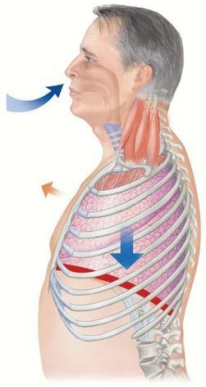
Breathing

Breathing involves two phases: Inpiration (moving air into the lungs) and Expiration (moving air out of the lungs)

The diaphragm is the major muscle of breathing. When the diaphragm contracts, the chest expands so the air is pulled into the lungs. When the diaphragm returns to its normal position, air is pushed out of the lungs.

The red line in the picture to your right, is the diaphragm

Inhalation



Exhalation

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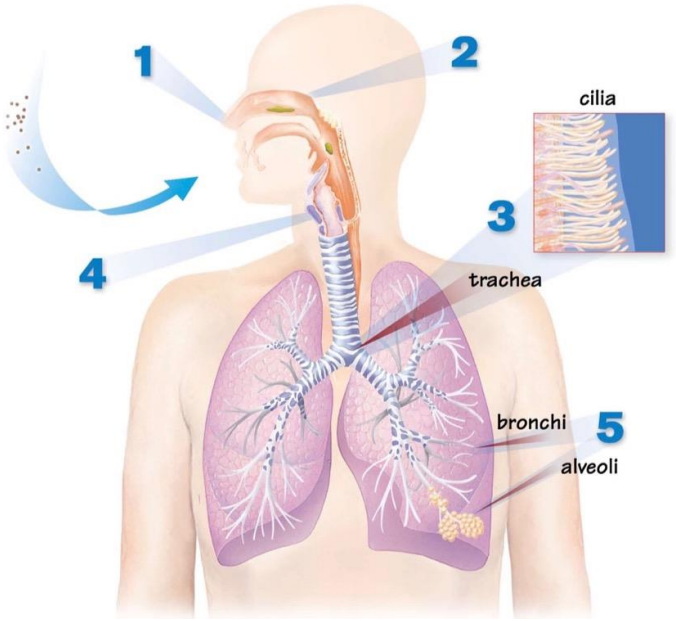
Lung Anatomy

Air enters through your nose which warms, filters and humidifies the air.

It continues down your windpipe then branches into your right and left lung into smaller and smaller airways.



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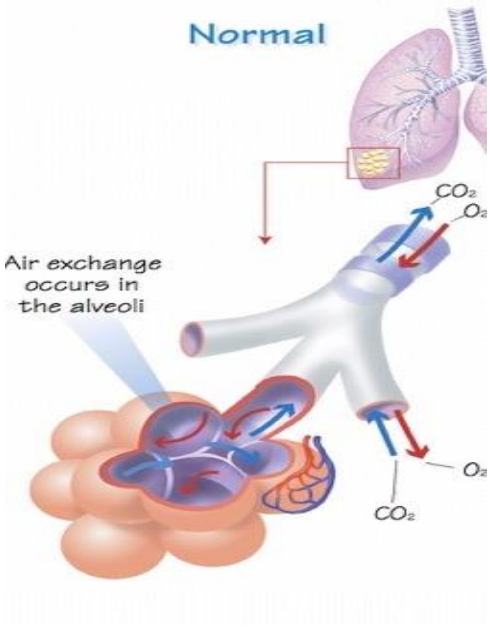
Gas Exchange

Eventually air enters small air sacs called Alveoli which are surrounded by tiny blood vessels

Oxygen transfers into the blood, and carbon dioxide transfers out of the blood

The heart pumps oxygenated blood to your organs and tissues, and carbon dioxide is exhaled from the lung



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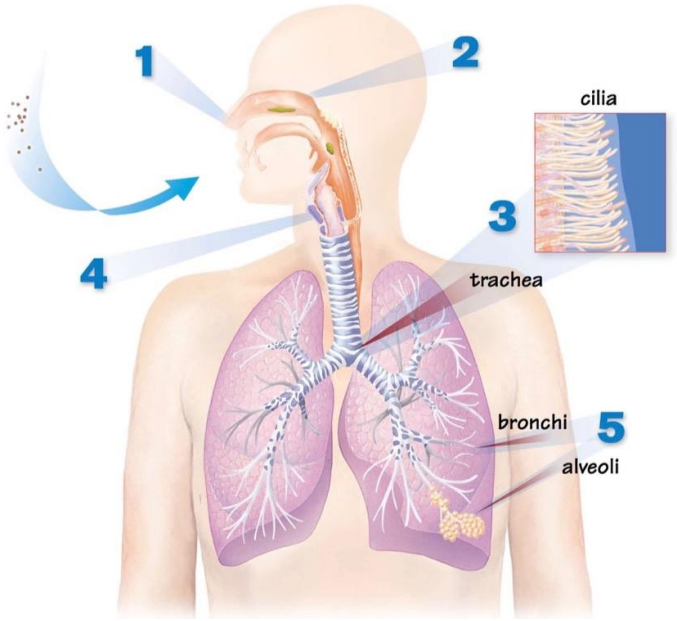
Lung Anatomy- Self Cleaning

Each breath brings dust and pollutants into your lungs

Particles and become trapped in the mucus lining your airways

Cilia sweep the mucus up to the back of your throat to be swallowed or coughed out

This process prevents particles from reaching your lower airways and causing infections



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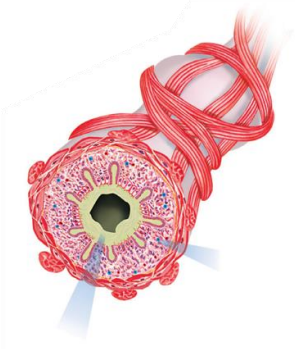
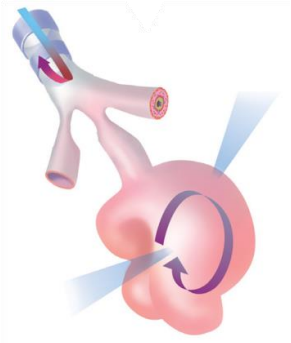
C.O.P.D.

Chronic Obstructive Pulmonary Disease consists of two aspects:

Chronic Bronchitis & Emphysema





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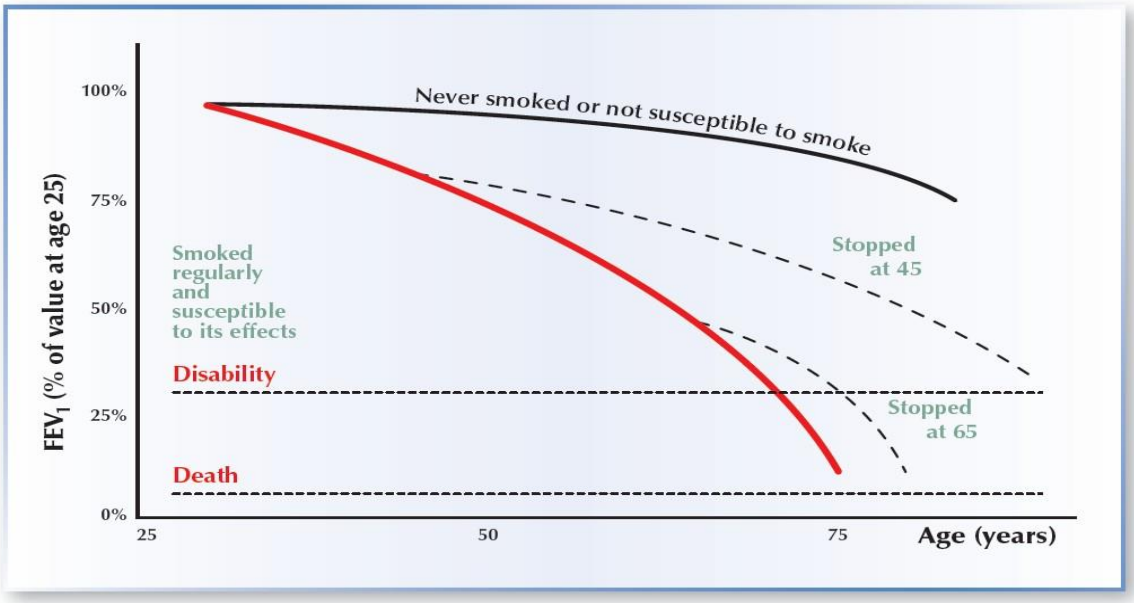
The main cause of COPD: Smoking



Fletcher C, Peto R, Br Med J 1977, 1: 1645-8

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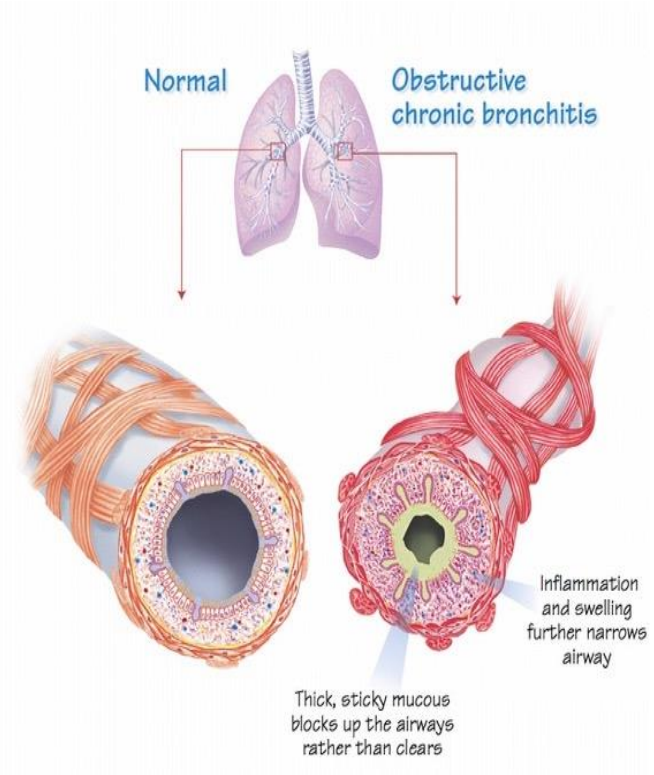
Bronchitis

- Airways become inflamed
- Increased production of thick mucous
- Increased cough
- Airway obstruction
- Trapped air
- Shortness of breath



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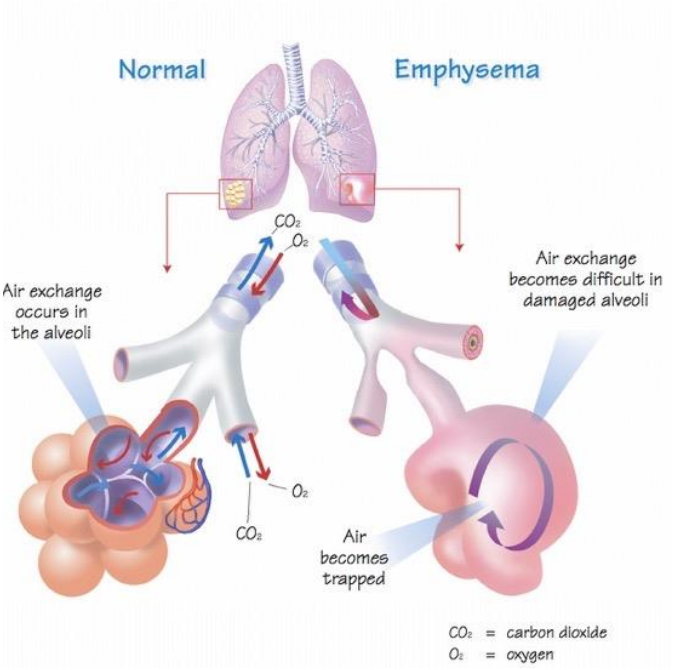
Emphysema

- Alveoli (air sacs) are damaged or destroyed
- Loss of elasticity
- Airway obstruction
- Air trapping
- Impaired gas exchange
- Shortness of breath



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Alpha-1 Antitrypsin Deficiency (AATD)

- Alpha-1 antitrypsin is a protein in the blood that protects lungs and liver
- Lack of the protein is a genetic disorder that may result in a lung disease or liver disease

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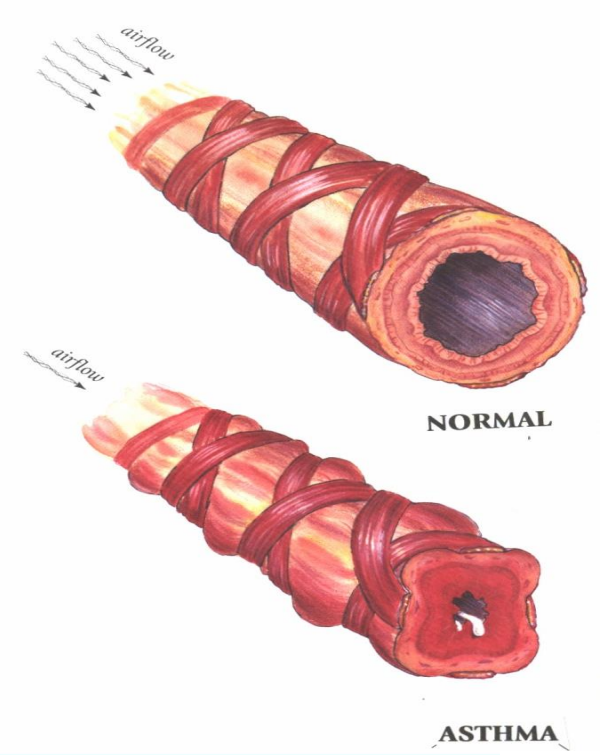
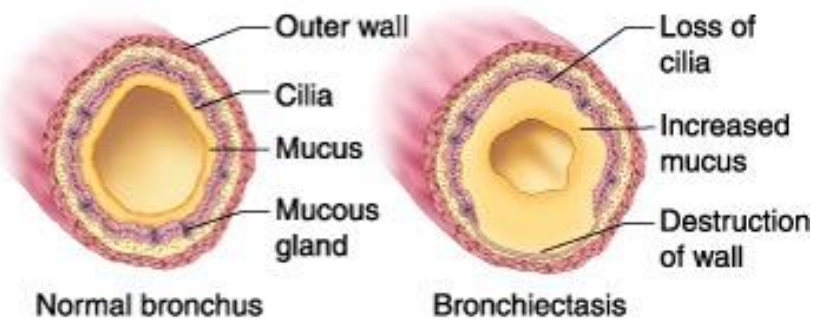
Asthma

- Hypersensitivity of the airways
- Usually caused by a trigger
  - Dust, pollen, smoke
  - Stress, exercise
- Bronchospasm
- Inflammation
- Increased mucus



Bronchiectasis



- Usually due to recurring infections & inflammation
- Enlargement of the mid sized bronchial tubes
- Destruction of elastic tissue, muscle and cartilage
- Increased mucous leading to further infections
- Obstruction to airflow

https://www.lung.ca/lung-health/lung-disease/bronchiectasis

Restrictive Lung Disease

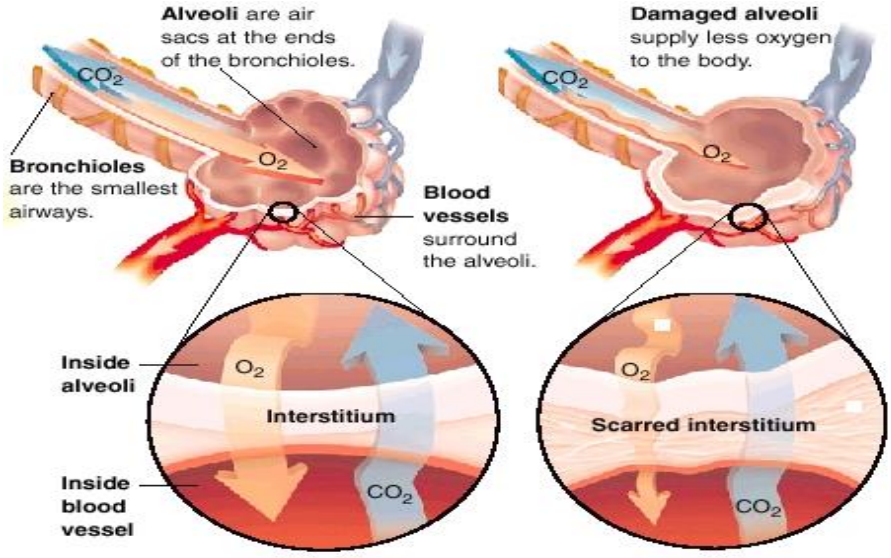
Inside the lungs:

- Interstitial lung disease:
  - Pulmonary fibrosis
  - Sarcoidosis
  - Asbestosis
  - Scleroderma
  - Interstitial pneumonias
  - Pneumonitis

Outside the lungs:

- Kyphosis
- Scoliosis
- Severe Obesity
- Diaphragm paralysis

Interstitial Lung Disease



The interstitial space is between the alveoli and blood vessels in the lungs

When this is scarred, the ability for oxygen to go into the blood is reduced

This may lead to shortness of breath and lower oxygen levels

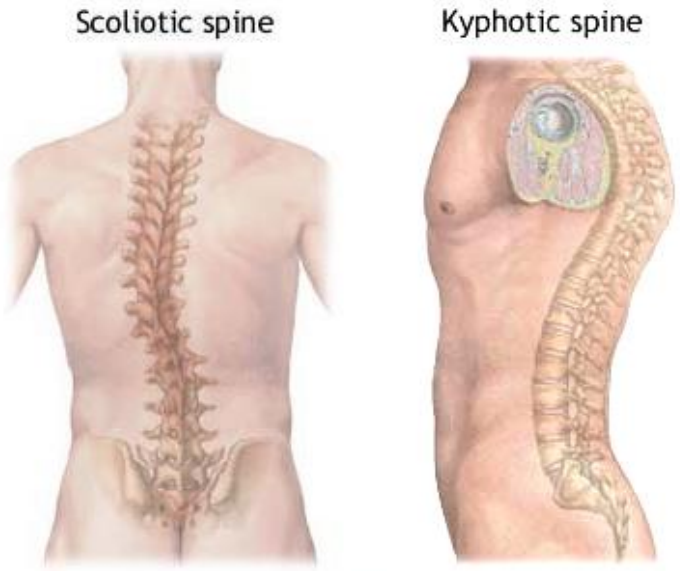
Fibrosis (Scarring of lung tissue)

Cause may be unknown (idiopathic) or may be from breathing in irritants

- This may cause inflammation, and /or scarring of the lung tissue
- This can lead to stiffer lungs which may make breathing in more difficult
- It can also lead to lower oxygen levels, especially on exertion

Restrictive Lung Disease Outside of the lungs

- Chest wall abnormalities
- Spinal abnormalities
- Severe Obesity
- Diaphragm paralysis



What symptoms do you have?

- Shortness of breath
- Cough with or without mucous
- Chest tightness
- Wheezing
- Fatigue
- Anxiety

If you are unsure of your diagnosis, ask your healthcare provider. These diseases can also vary greatly in severity.

Summary

Lung Function

- The diaphragm moves air in and out of your lungs
- The lungs provide oxygen and remove carbon dioxide
- Mucous captures pollutants & cilia sweeps the mucous up and out to help prevent infections
- Lung diseases can interfere with these processes

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Reflection Activity

To manage your lung disease effectively, you need to be aware of your symptoms

- List the symptoms of lung disease that you experience most often
- Think about what strategies you use to alleviate these symptoms