


*What you should know  
about LUNG DISEASE*

*Dr. Davidicus Wong*



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**EMPOWERING PATIENTS**  
*Public Health Education Program*



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*The EMPOWERING PATIENTS  
wellness education program  
[divisionsbc.ca/burnaby](http://divisionsbc.ca/burnaby)*



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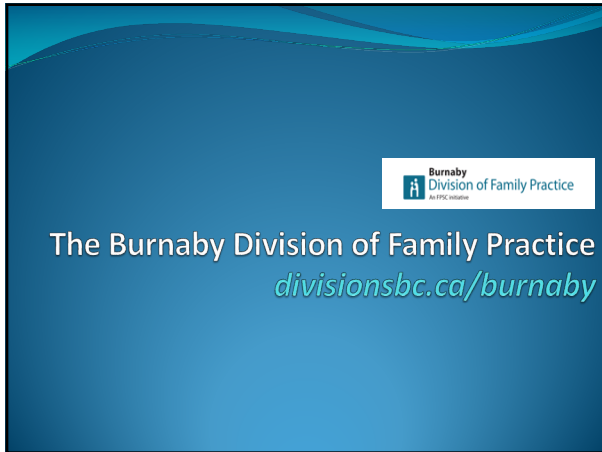
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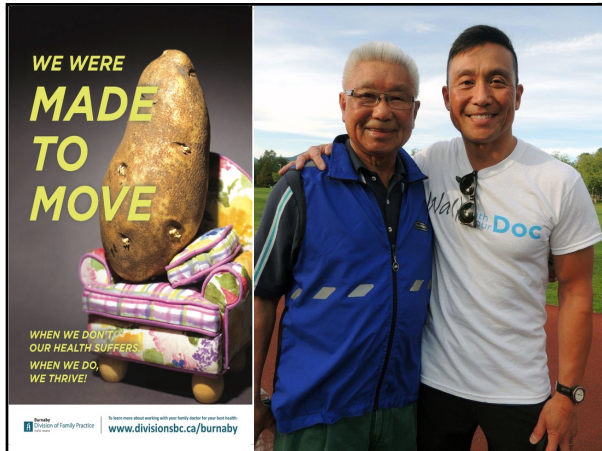
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***We care about our patients***



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***We care about our community***



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***What you should know  
about LUNG DISEASE***

- 1. Basic Anatomy of the Respiratory System*
- 2. How Your Lungs Work*
- 3. Respiratory Symptoms*
- 4. Pneumonia and Bronchitis*
- 5. Interstitial Lung Disease*
- 6. Asthma and Chronic Bronchitis*
- 7. Sleep Apnea*
- 8. Lung Cancer*
- 9. Pulmonary Embolism, Pneumothorax*

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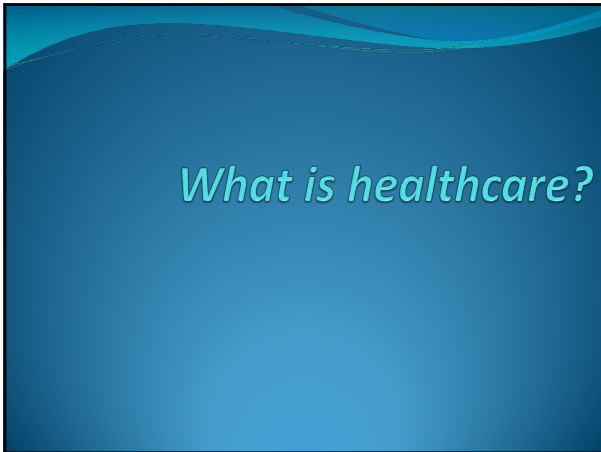
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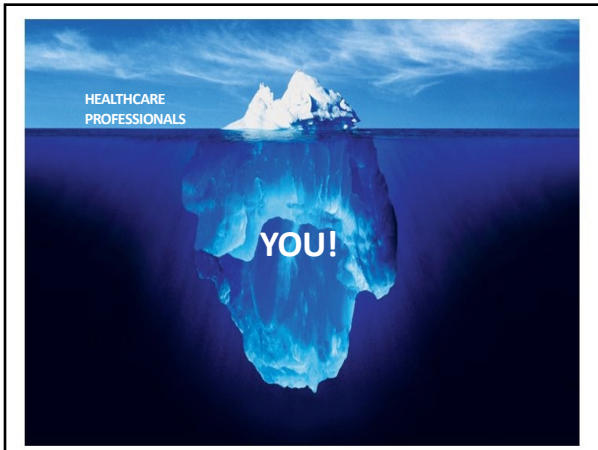
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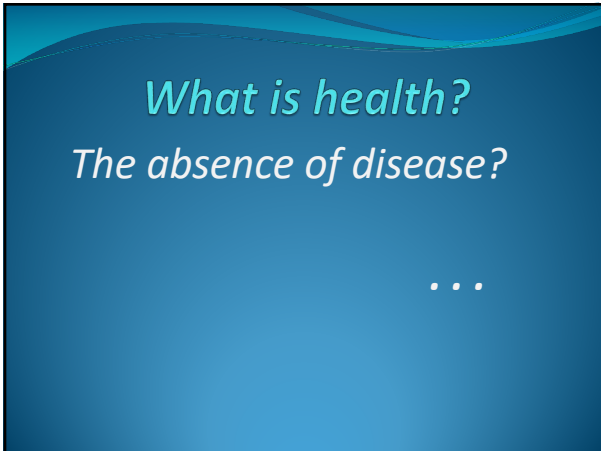
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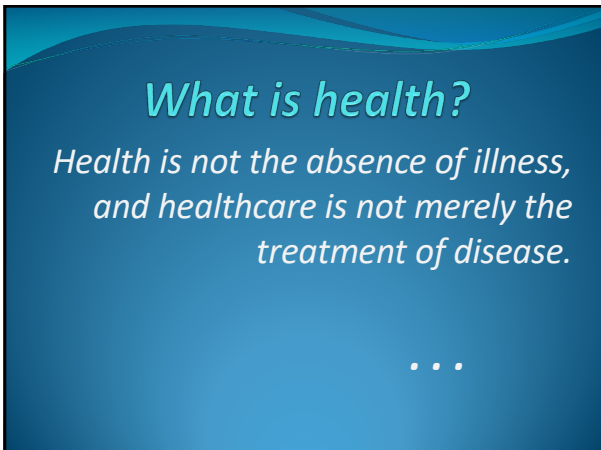
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***Your Positive Potential***  
*I believe that we each have a unique potential in life, and it is our duty to realize that potential and help others achieve theirs.*

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***Your Positive Potential***  
*does not mean perfection.*

*It is guided by your personal values.*

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*What do you need for good self-care?*

- 1. Knowledge*
- 2. Professional & Peer Support*
- 3. Planned care*

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*What do you need for good self-care?*

1. Knowledge
2. Professional & Peer Support
3. Planned self-care
  - Healthy eating
  - Physical activity
  - Medications
  - Monitoring

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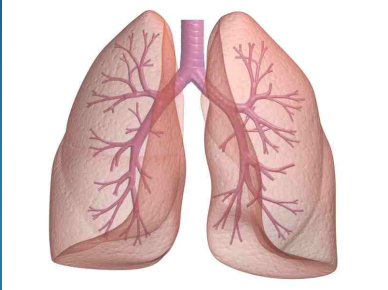
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*Respiratory System*



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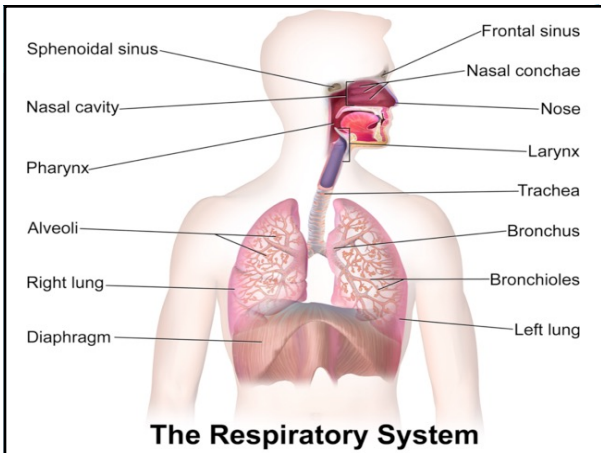
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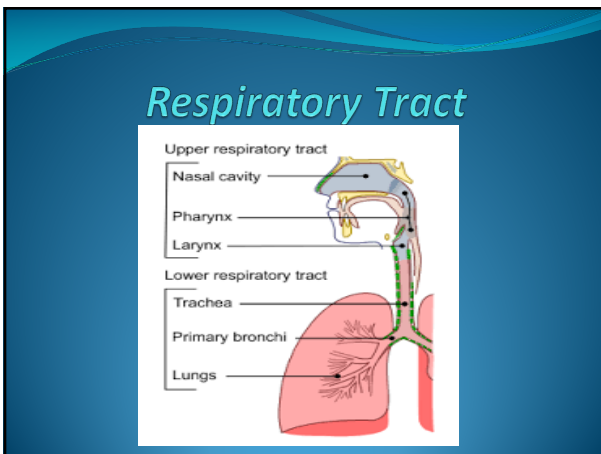
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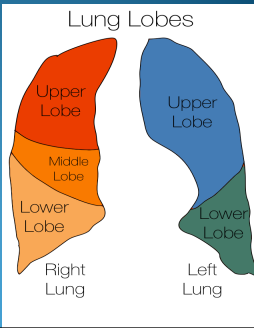
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## The Structure of Your Lungs

*The lungs are divided into two parts:*

*The RIGHT LUNG (upper, middle and lower lobes)*

*The LEFT LUNG (upper and lower lobes)*




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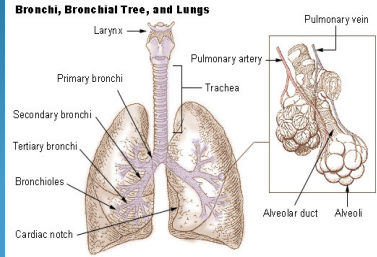
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*Air enters the TRACHEA (your breathing tube) that extends down your throat and branches into the LEFT and RIGHT BRONCHI which branch into the smaller BRONCHIOLES that bring air into the ALVEOLAE, tiny air sacs where gases (oxygen and carbon dioxide) are exchanged with the blood circulating in the tissues of the lungs*




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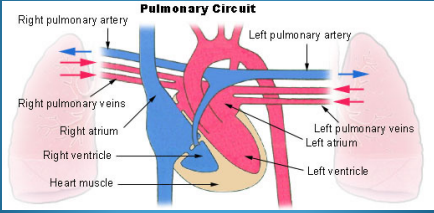
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*The PULMONARY ARTERIES receives the de-oxygenated blood from the right side of the heart*

*The PULMONARY VEINS carry oxygenated blood back to the left side of the heart which pumps that oxygen-rich blood to all the tissues of the body*




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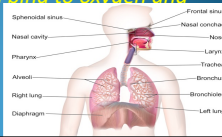
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## How Your Lungs Function

With each breath in, your **DIAPHRAGM** contracts (pushing the belly out) and draws air into the lungs through your nose and mouth (where mucus traps dust and other particles from entering the lungs) down your **TRACHEA**, the right and left **BRONCHI** and the **BRONCHIOLES**, filling the tiny **ALVEOLI** where red blood cells exchange oxygen for carbon dioxide.

Hemoglobin molecules in your blood bind to oxygen and carry it to the rest of the body.



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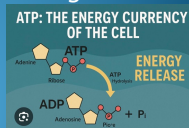
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## Oxygenated Blood

Carries oxygen from your lungs to every cell of your body

- This powers metabolism
- Allows cells to break down nutrients (such as glucose) to create ATP (the energy currency of your body)
- In order for us to think, move and grow



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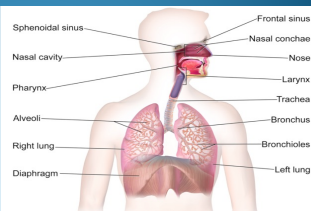
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## How Your Lungs Function

When you exhale, the **DIAPHRAGM** relaxes and air is passed back up your **TRACHEA** and out through your nose or mouth.

Air passing through the vocal cords in the trachea allows you to speak . . . and sing!



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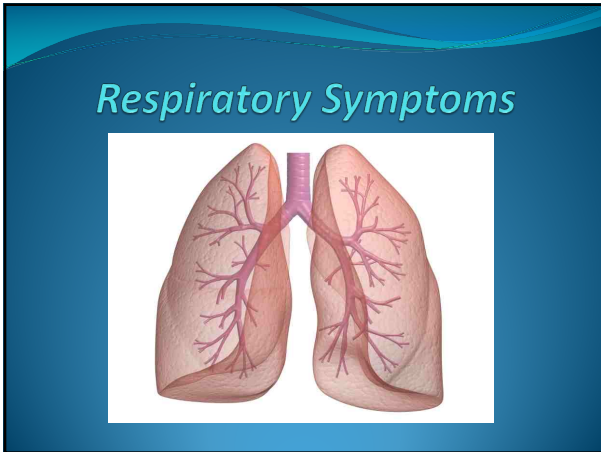
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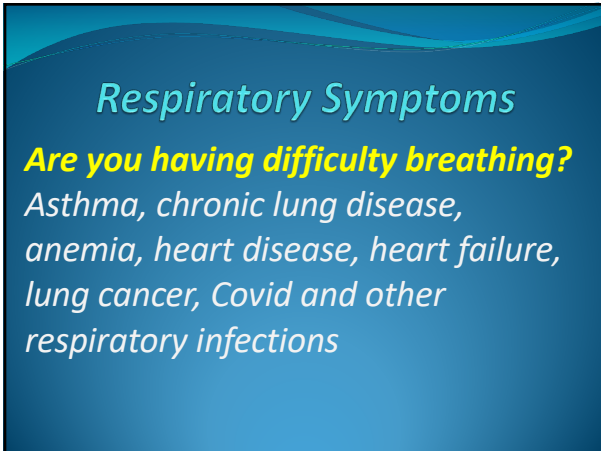
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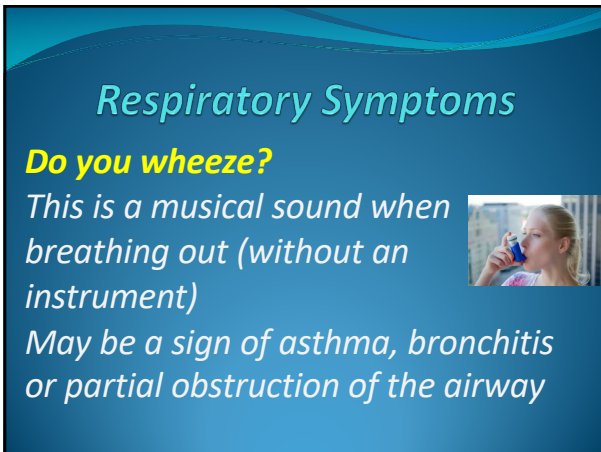
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**Respiratory Symptoms**  
**Have you been coughing?**  
 Caused by any irritation of the airway: colds, allergies, postnasal drip, bronchitis, asthma, acid reflux, Covid, pneumonia and respiratory tract cancers

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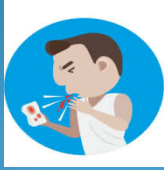
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**Respiratory Symptoms**  
**Have you coughed up blood?**  
 Nosebleeds, broken blood vessels, nasopharyngeal and lung cancers



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**Types of Lung Disease**

1. Airway disease (COPD, asthma, bronchitis, pneumonia, COVID)
2. Lung Tissues Disease (pulmonary fibrosis, sarcoidosis)
3. Circulatory Disease (pulmonary hypertension, pulmonary embolism)
4. Lung Cancer

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## Bronchitis and Pneumonia

Lower respiratory tract infections



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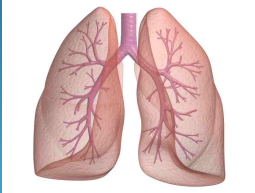
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## Acute Bronchitis

An infection of the bronchi

Symptoms:

- cough
- shortness of breath
- chest congestion
- sometimes productive of mucus
- sometimes wheezing



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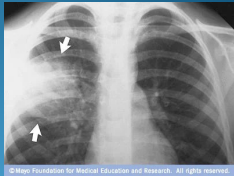
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## Pneumonia

An infection of the tissues of the lungs

Symptoms:

- cough
- shortness of breath
- chest congestion
- sometimes productive of mucus
- sometimes wheezing
- sometimes chest pain with breathing



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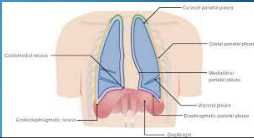
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## Pleurisy/Pleuritis

Inflammation of the PLEURA - the membranes lining the outer edges of the lungs

Often associated with pain with breathing in and out



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## Asthma

A chronic, usually hereditary and sometimes allergic condition of reversible airway constriction (bronchospasm)

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## Asthma

**Symptoms:**

- Coughing
- Wheezing (heard on exhalation)
- Shortness of breath with exercise
- Sometimes triggered by allergies, exercise and cold air
- Often worse at night

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## Asthma

Diagnosed with **SPIROMETRY** (pulmonary function tests)

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## Asthma

**Treatment:**

1. Short acting bronchodilators (e.g. salbutamol/Ventolin inhaler)
2. Inhaled steroids to reduce airway inflammation (e.g. Pulmicort, Flovent)
3. Long acting bronchodilators (e.g. Oxeze)
4. Combination inhalers (e.g. Symbicort, Advair)
5. Oral medications: Singulair, Prednisone (short term for severe attacks)

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## Asthma

### THE CHEMISTRY OF ASTHMA INHALERS

Asthma medication commonly comes in two different colours of inhalers: blue and brown. Though these colours can vary, usually the medication can be classed as either a 'reliever' or a 'preventer'. The identity and function of the chemical compounds in each vary.

#### RELIEVERS

**SALBUTAMOL**  
*(also known as albuterol in the US)*

⏱️ Bronchodilator
⚡ Short-acting
⌚ Mean Duration
👤 Maximal Effect

Relievers, such as salbutamol, are taken for the immediate relief of asthma symptoms. They cause the airways to widen by relaxing the muscles in the lungs. Usually, they are taken 'inhaler' - that is, turned into a fine mist that is then inhaled, and their action is apparent after a short amount of time, making them of great use in cases of asthma attacks. Salbutamol is commonly marketed as Ventolin.

#### PREVENTERS

**BUDESONIDE**  
*(sold under trade name Pulmicort)*

🛡️ Anti-inflammatory
⌚ Long-acting
👤 Onset of Action
⚡ For Peak Effect

Preventers help asthma sufferers by acting to reduce inflammation and keep their airways open. They are commonly steroids, and are only useful for prevention - they won't provide any relief if you are already experiencing an asthma attack. It has to be taken daily, and its full effects are not reached for several weeks. Though there are several different drugs used as preventers, they all function similarly.

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ASTHMA INHALERS: Stuart B. Yip, www.biorxiv.org/content/10.1101/005670

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## Asthma

CONTROLLERS		
<b>Anti-Inflammatories</b>  <b>*FLUTICASONE</b> (Fluticasone propionate) Available in 110, 250, 500, and 1000 mcg per inhalation Brand: <b>Fluticasone</b>	<b>Combination Medications</b>  <b>*AZELASTINE</b> (Azelastron) <b>*FORMOTEROL</b> (Formoterol fumarate dihydrate) Available in 100/4.5, 200/9, and 500/4.5 mcg per inhalation Brand: <b>Azelastine</b>	<b>Long-Acting Bronchodilators</b>  <b>*SALMETEROL</b> (Salmeterol xinafoate) Available in 50 and 100 mcg per inhalation Brand: <b>Salmeterol</b>
 <b>*FLUTICASONE</b> (Fluticasone propionate) Available in 110, 250, 500, and 1000 mcg per inhalation Brand: <b>Fluticasone</b>	 <b>*AZELASTINE</b> (Azelastron) <b>*FORMOTEROL</b> (Formoterol fumarate dihydrate) Available in 100/4.5, 200/9, and 500/4.5 mcg per inhalation Brand: <b>Azelastine</b>	 <b>*SALMETEROL</b> (Salmeterol xinafoate) Available in 50 and 100 mcg per inhalation Brand: <b>Salmeterol</b>
 <b>*FLUTICASONE</b> (Fluticasone propionate) Available in 110, 250, 500, and 1000 mcg per inhalation Brand: <b>Fluticasone</b>	 <b>*AZELASTINE</b> (Azelastron) <b>*FORMOTEROL</b> (Formoterol fumarate dihydrate) Available in 100/4.5, 200/9, and 500/4.5 mcg per inhalation Brand: <b>Azelastine</b>	 <b>*SALMETEROL</b> (Salmeterol xinafoate) Available in 50 and 100 mcg per inhalation Brand: <b>Salmeterol</b>
<b>RELIEVERS (Short-Acting Bronchodilators)</b>		
 <b>*ALBUTEROL</b> (Albuterol sulfate) Available in 200, 90, and 180 mcg per inhalation Brand: <b>Albuterol</b>	 <b>*FORMOTEROL</b> (Formoterol fumarate dihydrate) Available in 10, 20, and 30 mcg per inhalation Brand: <b>Formoterol</b>	 <b>*SALMETEROL</b> (Salmeterol xinafoate) Available in 50 and 100 mcg per inhalation Brand: <b>Salmeterol</b>
 <b>*ALBUTEROL</b> (Albuterol sulfate) Available in 200, 90, and 180 mcg per inhalation Brand: <b>Albuterol</b>	 <b>*FORMOTEROL</b> (Formoterol fumarate dihydrate) Available in 10, 20, and 30 mcg per inhalation Brand: <b>Formoterol</b>	 <b>*SALMETEROL</b> (Salmeterol xinafoate) Available in 50 and 100 mcg per inhalation Brand: <b>Salmeterol</b>

This is not a complete list of available agents. Please consult the CPS for others.

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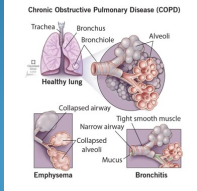
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## Chronic Obstructive Pulmonary Disease (COPD)

### Chronic Bronchitis and Emphysema

Irreversible bronchoconstriction and inflammation of the airways



**Chronic Obstructive Pulmonary Disease (COPD)**

Labels in diagram: Trachea, Bronchus, Bronchiole, Alveoli, Healthy lung, Collapsed airway, Narrow airway, Collapsed alveoli, Emphysema, Mucus, Bronchitis, Tight smooth muscle.

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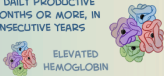


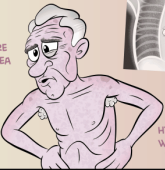

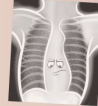
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## Chronic Obstructive Pulmonary Disease (COPD)

<h3 style="text-align: center;">CHRONIC BRONCHITIS</h3> <p><b>CLINICAL DIAGNOSIS: DAILY PRODUCTIVE COUGH FOR THREE MONTHS OR MORE, IN AT LEAST TWO CONSECUTIVE YEARS</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>OVERWEIGHT AND CYANOTIC</p>  </div> <div style="text-align: center;"> <p>ELEVATED HEMOGLOBIN</p>  </div> <div style="text-align: center;"> <p>PERIPHERAL EDEMA</p>  </div> <div style="text-align: center;"> <p>RHONCHI AND WHEEZING</p>  </div> </div>	<h3 style="text-align: center;">EMPHYSEMA</h3> <p><b>PATHOLOGIC DIAGNOSIS: PERMANENT ENLARGEMENT AND DESTRUCTION OF AIRSPACES DISTAL TO THE TERMINAL BRONCHIOLE</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>OLDER AND THIN</p>  </div> <div style="text-align: center;"> <p>SEVERE DYSPNEA</p>  </div> <div style="text-align: center;"> <p>QUIET CHEST</p>  </div> <div style="text-align: center;"> <p>X-RAY: HYPERINFLATION WITH FLATTENED DIAPHRAGMS</p> </div> </div>
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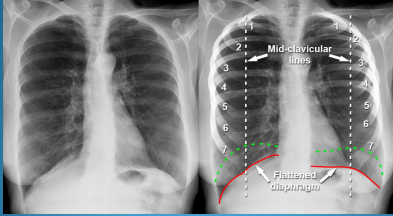
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### Chronic Obstructive Pulmonary Disease (COPD)



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### Chronic Obstructive Pulmonary Disease (COPD)



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### Chronic Obstructive Pulmonary Disease (COPD)

**Chronic Bronchitis and Emphysema**

Symptoms:

- Chronic cough
- Often productive of mucus in the morning
- Shortness of breath with exertion
- Shortness of breath at rest (when severe)
- Frequent exacerbations with respiratory infections
- Sometimes, chronic wheezing

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## Chronic Obstructive Pulmonary Disease (COPD)

### Chronic Bronchitis and Emphysema

#### Diagnosis and Monitoring: Pulmonary Function Tests

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## Chronic Obstructive Pulmonary Disease (COPD)

### Treatment:

- Smoking cessation (Quitnow.ca, BC Smoking Cessation Program)
- A variety of inhalers to decrease inflammation and open the airways
- Respiratory rehabilitation
- Home oxygen (in severe cases for those who qualify through testing)

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## Pneumonia Vaccine

*Pneumococcal Polysaccharide Vaccine (Pneumovax or Pneumo 23, Prevnar 20)*

- Everyone over 65
- residents in residential care or assisted living facilities
- Others with certain chronic conditions who are at increased risk for infection with streptococcus pneumoniae (e.g. asthma, COPD)

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## RSV Vaccine

*Respiratory Syncytial Virus vaccines*

- Three vaccines in Canada: Abrysvo, Arexvy, mResvia
- \$230 to \$300
- Single dose
- Recommendations: pregnant women 32 to 36 weeks; over 75 years; 60 to 74 years with risk factors (e.g. heart, lung and liver disease, LTC)

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## Lung Cancer



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**Lung Cancer**

*Primary Bronchogenic Carcinoma* arising from the cells of the lung

*Metastatic Lung Cancer* cancer originating from elsewhere in the body spreading to the lungs

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**Lung Cancer**

**Symptoms**

- Often no symptoms (found on chest x-rays or CT scans)
- Chronic cough
- Increasing shortness of breath
- Unexplained weight loss
- Hemoptysis (blood in sputum)
- Wheezing

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**Lung Cancer Screening**

Low Dose CT Scan

**Inclusion Criteria**

- Ages 55 to 74 years;
- Has a health care provider;
- Smoking history;
- Willing and able to undergo LDCT; and,
- PLCOm2012 risk of  $\geq 1.5\%$  over 6 years. restrictions (>450lbs)

Lung Screening Program 1 877 717 5864  
<http://www.bccancer.bc.ca/screening/lung/get-screened>

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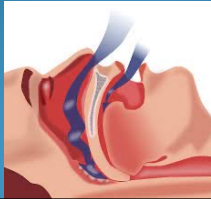
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## Obstructive Sleep Apnea

When the soft tissues in your throat (e.g. tongue and soft palate) narrow or close blocking the flow of air into your trachea



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## Obstructive Sleep Apnea

### Common Symptoms:

- Daytime drowsiness
- Loud snoring often with choking and gasping
- Morning headaches
- Restless sleep with frequent awakenings during the night

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## Obstructive Sleep Apnea

### The Risks of Untreated Sleep Apnea:

- Accidents (including car accidents)
- Cognitive impairment
- Increased blood pressure
- Marital discord



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## Obstructive Sleep Apnea

### Diagnosis:

- HSAT: home sleep apnea testing with equipment borrowed from a sleep lab
- Polysomnogram: an overnight stay at a sleep lab




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## Obstructive Sleep Apnea

### Treatment:

- Weight loss if overweight
- Avoiding alcohol and sedatives
- Sleeping on your side (tennis ball in a fanny bag)
- Oral appliance that prevents your tongue from falling back into your airway

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## Obstructive Sleep Apnea

### Treatment




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81

## Obstructive Sleep Apnea

### Treatment



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## Obstructive Sleep Apnea

### Treatment

- CPAP



**CPAP Therapy**  
A potential life saving and changing option for the treatment of sleep apnea.

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## Epworth Sleepiness Scale (ESS)

**What is your total score from the Epworth Sleepiness Scale?**  
 Choose 1 if score is 0-6 3 if score is 11-13  
2 if score is 7-10 4 if score is > 14

Situation	Chance of dozing (0-3)			
Sitting and reading	0	1	(2)	3
Watching television	0	1	(2)	3
Sitting inactive in a public place - for example, a theater or meeting	0	(1)	2	3
As a passenger in a car for an hour without a break	0	1	(2)	3
Lying down to rest in the afternoon	0	1	2	(3)
Sitting and talking to someone	(0)	1	2	3
Sitting quietly after lunch (when you've had no alcohol)	0	1	(2)	3
In a car, while stopped in traffic	0	(1)	2	3
<b>Total Score</b>				13

0 = would never doze      2 = moderate chance of dozing  
 1 = slight chance of dozing      3 = high chance of dozing

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## Epworth Sleepiness Scale

0 to 10	Normal range in healthy adults
11 to 14	Mild sleepiness
14 to 17	Moderate sleepiness
18 or higher	Severe sleepiness

*If you scored 11 or higher, you should consult with your family physician*

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## Interstitial Lung Disease

Progressive scarring of lung tissue




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86

## Interstitial Lung Disease

**Symptoms:**

- Shortness of breath at rest or with exertion
- Dry cough

**Diagnosis:**

- Chest X-rays
- CT Scans
- Pulmonary function tests

**Complications:**

- Pulmonary hypertension
- Heart failure
- Respiratory failure

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## Interstitial Lung Disease

Many causes:

- Long term exposure to hazardous materials, such as asbestos, silica dust, grain dust, radiation treatment
- Autoimmune conditions, such as rheumatoid arthritis, sarcoidosis, scleroderma, Sjogren's syndrome
- Some medications, such as amiodarone, chemotherapy drugs, rituximab, sulfasalazine

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## Pulmonary Thromboembolism

A blood clot that blocks the flow of blood in an artery of the lung

The usual cause is a blood clot in the deep veins of the leg (Deep Vein Thrombosis)

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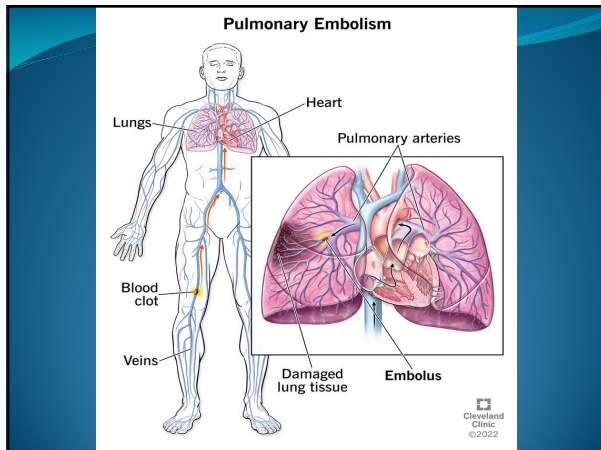
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### Pulmonary Thromboembolism

**Symptoms:**

- A cough that may be bloody
- Rapid heart rate
- Excessive sweating
- Chest pain
- Shortness of breath
- Lightheadedness
- Leg pain and swelling

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### Pulmonary Thromboembolism

**Diagnosis:**  
A CT Angiogram

**Treatment:**  
Anticoagulation (medication that dissolves the clot)

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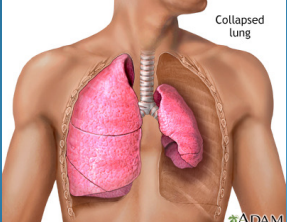
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### Pneumothorax

**Collapse of the lung**  
When air leaks into the space between the lung and the chest wall



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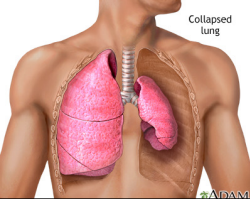
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### Pneumothorax

**Symptoms**

- Sudden chest pain and shortness of breath



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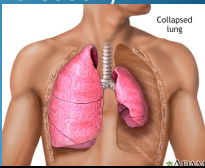
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### Pneumothorax

**Causes:**

- Blunt or penetrating chest injury (e.g. a fall, MVA, stabbing, acupuncture, medical procedure)
- Can be spontaneous without any cause



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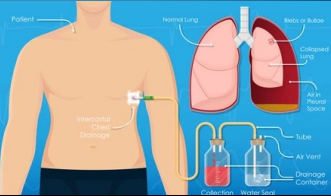
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### Pneumothorax

**Treatment:**

- Inserting a needle or chest tube between the ribs to remove the excess air



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***Your Positive Potential***  
*I believe that we each have a unique potential in life, and it is our duty to realize that potential and help others achieve theirs.*

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***Our Positive Potential***  
*With knowledge, engagement and support, we can manage chronic health conditions and live well.*

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***The Most Common Chronic Condition***  
*Everyone in this room has the same chronic condition.*

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*The Most Common  
Chronic Condition*  
*It is incurable,*  
...

100

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*The Most Common  
Chronic Condition*  
*It is incurable,*  
*it is sexually transmitted,*  
...

101

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*The Most Common  
Chronic Condition*  
*It is incurable,*  
*it is sexually transmitted,*  
*and it has a 100% mortality*  
...

102

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*The Most Common  
Chronic Condition  
That chronic condition is LIFE.*

...

103

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*The Most Common  
Chronic Condition  
That chronic condition is LIFE.  
Let's make the most of it!*

104

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**SHARE**  
*Let's create a healthier community*



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