

Lung Cancer

Background Information for Teachers from CancerEd

Lessons Included: None yet- but lesson Plans for both K-2 and 3-5 on Lung Cancer are coming soon! Check out our website to see other Lesson Plans available now.

Key Concepts:

- Lung cancer is the most deadly form of cancer yet it is one of the most preventable cancers.
- Lung cancer can be caused by smoking, secondhand smoke, asbestos and radon exposure, and familial predisposition.
- Lung cancer is treated much more effectively if caught before it spreads. Once it spreads, lung cancer is very difficult to treat.

Lung cancer is one of the most deadly yet preventable cancers out there. It is important for students to understand lung cancer because many of their adult family members may be affected. The US National Cancer Institute reports that one out of every fourteen men and women will be diagnosed with lung cancer in their lifetime.

The lungs are very important organs of the body. They are part of the **Respiratory System**, which is responsible for exchanging gases between the air we breathe in and our blood--the lungs take in the oxygen from the air we breathe and get rid of carbon dioxide, which is a waste product of **Cellular Respiration** (a process that converts sugar into energy). The air enters the nose or mouth and is filtered as it passes through the **Trachea**. This trachea splits into two **Bronchi** that carry the air into the lungs. The lungs are filled with small sponge-like sacks called **Alveoli**. The alveoli are only one cell thick, so it is easy for gases like oxygen and carbon dioxide to diffuse back and forth across the membrane.

In the lungs, oxygen is diffused into the blood and carried to the tissues where it is used to oxidize sugar during cellular respiration. At the tissues, carbon dioxide diffuses into the blood where it is carried back to the lungs so it can be expelled from the body each time we exhale. Lung cancer can develop in the cells of the respiratory system and can make this gas exchange process more difficult. Most lung cancers arise in the epithelial cells, which are the cells that surround the bronchi and bronchioles: our bodies' airways.

What makes lung cancer so deadly is that lung cancer cells often **Metastasize** (spread to other parts of the body), which makes it very difficult to treat. Lung cancers can be categorized into either **Small Cell Lung Cancers (SCLC)** or **Non-Small Cell Lung Cancers (NSCLC)**. Non-small cell lung cancers are much more common than small cell lung cancers; however, small-cell lung cancers tend to grow more quickly than non-small cell lung cancers and also tend to be more responsive to chemotherapy. Each of these types of cancers requires different treatment and metastasizes differently, but both types are very serious.

One of the best ways to prevent lung cancer is to avoid smoking. **Carcinogens** from the smoke can damage the cells of the airways almost immediately, altering their DNA and resulting in cancer cell formation. According to the American Lung Association, smoking contributes to 80% of lung cancer deaths in women and 90% of lung cancer deaths in males. Even if a person is a non-smoker, they can still be at risk due to second hand smoke from other family members or friends. In fact, nonsmokers increase their risk of getting lung cancer by 20 to 30 percent by being exposed to **Secondhand Smoke** at the workplace or at home. If you are living or working with a smoker, encourage him/her to smoke outside and away from the home or workplace to prevent the harmful impacts of secondhand smoke.

Smoking is not the only cause of lung cancer, though. Exposure to **Asbestos** and **Radon** has also been proven to increase a person's risk of developing lung cancer. Asbestos used to be widely used for insulation materials in the workplace; however, today it is limited or banned in many countries, including the United States. It would be useful to check with your workplace to see if asbestos is still used. Radon gas is a natural decay product of uranium. It can travel up through soil and enter homes through cracks in the foundation, pipes or other openings. There are simple test kits people can purchase to test for this invisible and odorless gas. People can also have a familial disposition to developing lung cancer, which means that some people are more likely to develop this disease than others because of genetics.

Symptoms of lung cancer vary from patient to patient, depending on the stage of the lung cancer and whether it has metastasized to other areas of the body. Common symptoms typically include: respiratory problems (like shortness of breath), coughs that don't go away or get worse, chest pain that's worse with deep breathing,

coughing or laughing, infections like bronchitis and pneumonia (that don't go away or keep coming back, etc.). It's important to know that most lung cancers do not cause any symptoms until they have spread to other parts of the body. If lung cancer has spread to various organs, different symptoms will surface depending on where it has spread, including bone pain, nervous system changes (headaches, weakness or numbness of the limbs, seizures, etc.), lumps near the surface of body, etc.

Lung cancer can be diagnosed through various procedures including, a chest x-ray, CT scan, MRI, or a PET scan. These scans will likely show the presence of a tumor. **Sputum** (mixture of saliva and mucous coughed up from the respiratory tract) **Cytology** is used to confirm the cancer—if a patient has lung cancer the mucosal cells of the sputum will look abnormal under a microscope.

Treatment of lung cancer is far more effective if it's caught earlier, so if you or someone you know is suffering from any of these symptoms, it is important to encourage him/her to see his/her primary physician. The five-year survival rate of lung cancer if detected early is 54 percent; however, this number drops to 4 percent if it has spread to other organs. Unfortunately, only 15 percent of lung cancers are detected at an early stage. Treatment options include: surgery, radiation, chemotherapy, targeted therapy as well as others, depending on the stage of the cancer. Typically a combination of treatment options will be used in order to increase effectiveness (to learn more, see *Cancer Treatment Options* backgrounder).

Special Considerations: For students, it is important to encourage healthy behaviors early on to decrease the risk of lung cancer, especially with teenagers. Since lung cancer is preventable in most cases, encouraging students not to smoke or be around people who do smoke is crucial. It would also be valuable to explain that cigarettes contain nicotine, which is highly addictive—once a person becomes addicted to smoking it is very difficult for him/her to stop.

References:

- http://www.medicinenet.com/lung_cancer/article.htm
- <http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/lung-cancer/learn-aboutlung-cancer/lung-cancer-fact-sheet.html?referrer=https://www.google.com/>

Resources:

NOTE: This section lists resources that provide additional background information for teachers about this topic. Additional resources including information for children, classroom materials, and project ideas can be found in the Resource Center.

Mayo Clinic: <http://www.mayoclinic.org/diseases-conditions/lung-cancer/basics/definition/con-20025531>

A great resource to read from the Mayo Clinic to learn more about lung cancer.

American Lung Association: <http://www.lung.org/?referrer=https://www.google.com/>