

Name: _____
SHS Living Environment

Date: _____

Lab # _____ Smoking and Lung Disease

Introduction:

Some of the most deadly substances in tobacco smoke are tar, carbon monoxide, and nicotine.

When we breathe in air, your respiratory system does a good job of making sure that air is clean before it gets to your lungs. Your respiratory passages are lined with a variety of cells and hairs to keep foreign particles out of your lungs. **Cilia** are hair-like projections which line these passageways. The **job of cilia** is to sweep foreign particles up and out of the passageways so that they are less likely to get into your lungs. **Epithelial cells** line the respiratory passageways as well, and contain cells that **secrete mucus**. Both the cilia and mucus keep air passages clean. The mucus traps particles and the cilia remove them from the body.

Tar is the dark, sticky substance produced when tobacco burns (think of a blacktop driveway-this is what you are inhaling when smoking!). When someone inhales tobacco smoke, tar settles on the **cilia** and makes the cilia clump together. Tar also contains chemicals that are known to cause **cancer**. The cells which line the passageways become thickened due to these chemicals. These precancerous cells are very rare in non-smokers but common in smokers. The abnormal cells increase as a smoker continues to smoke and decrease when smoking stops.

Smoking also **irritates** the respiratory passages and **destroys cilia**. Mucus cells in the passageways react to irritations by **secreting more mucus**. Without cilia to remove the mucus, mucus collects in the passageways. The body tries to clear the passageways by coughing, producing what is known as a **smoker's cough**. In addition, foreign particles, such as disease organisms, can now reach the narrow bronchial tubes. This causes them to become irritated and constrict (become smaller). They then become clogged resulting in less oxygen reaching the body.

When tobacco is burned, **carbon monoxide** is produced. Carbon monoxide is dangerous to inhale. Its molecules bind to hemoglobin in the red blood cells. This takes the place of some of the oxygen that the red blood cells normally carry. Smoker's blood may contain too little oxygen, causing a faster heartbeat and breathing rate.

Nicotine speeds up the nervous system, heart, and other organs. Nicotine produces an **addiction**, or physical dependence. Smokers crave a cigarette if they go without one.

Some serious respiratory problems can result from long-term smoking. Over time, smokers can develop **bronchitis, emphysema, and lung cancer**.

Bronchitis is an irritation of the breathing passages. The small passages become narrower than normal and may be clogged with mucus. Long-term bronchitis can cause permanent damage to the breathing passages.

The chemicals in tobacco smoke also damage lung tissue. **Emphysema** is a disease that destroys lung tissue and causes difficulty in breathing. People with emphysema do not get enough oxygen and cannot adequately eliminate carbon dioxide.

Cigarette smoke contains over 40 chemicals that cause cancer. Tumors take away space in the lungs that should be used for gas exchange. Lung cancer is difficult to detect early enough for effective treatment.

Some of the chemicals in tobacco smoke get into the blood and cause problems in the circulatory system. **Compared to nonsmokers, smokers are more than twice as likely to have heart attacks.**

Smokers are not the only people to suffer from the effects of tobacco smoke. In **passive smoking**, people involuntarily inhale the smoke from other people's cigarettes, cigars or pipes.

Over 90% of American smokers began smoking when they were teenagers. You may be pressured by friends or tempted by advertisements. It is important to remember it is very hard to quit smoking once you start.

Purpose: Students will learn the effects that smoking has on normal lung tissue by using the website www.brainpop.com to view a short animated movie and answer questions based on that movie. Students will also be able to state the effects smoking has on normal lung tissue by viewing slides of smokers' versus normal lung tissue.

Materials: lab, computer, microscope, normal lung tissue slides, smoker's lung tissue slides, pictures of normal lungs and smokers' lungs

Procedure: There are 4 parts to this lab.

Part A: Watch the brainpop video on smoking and take the smoking quiz. Then complete the story on the next page.

Part B: Using the pictures supplied by your teacher, draw a healthy lung and diseased smoker's lung in **Observation 1 box**.

Part C: View the prepared slides of normal and smoker's lung tissue and draw slides (cells) in the **Observation 2 box**. If prepared slides are not available, use pictures supplied by your teacher.

Part D: Answer conclusion questions and do summary.



SMOKING

1 What is the main ingredient in cigarettes?

- A** Sticks
- B** Tobacco
- C** Poison

2 What is the extremely addictive chemical inside of cigarettes?

- A** Carbon dioxide
- B** Nickel
- C** Nicotine

3 What is the job of your lungs?

- A** To take in oxygen and expel carbon dioxide
- B** To take in smoke and expel oxygen
- C** To filter smoke out of the air

4 What happens to smokers who try to play sports?

- A** Nothing
- B** They develop shortness of breath and cramps
- C** Smoking improves their coordination and strength

5 What color are a smoker's lungs?

- A** Black
- B** White
- C** Green

6 What carcinogen in cigarettes coats your lungs?

- A** Urine
- B** Nicotine
- C** Tar

7 What types of symptoms does smoking cause right away?

- A** Excess energy
- B** Coughing and bad breath
- C** Cancer

8 What are the long term illnesses associated with smoking?

- A** Flu and pneumonia
- B** Colds and coughs
- C** Cancer, emphysema, and heart disease

9 Why is it difficult to quit smoking?

- A** Because nicotine is an addictive chemical
- B** Because it's so glamorous and exciting
- C** It's actually not difficult to quit smoking

10 What deadly disease is smoking is the leading cause of?

- A** Stroke
- B** Brain tumor
- C** Lung cancer



ACTIVITY

Name:

Date: February 1, 2010

HEALTH > PERSONAL HEALTH > SMOKING

COMPLETE THE STORY Fill in the blanks using words from the word bank.

TAR HEART DRUG ILLNESSES NICOTINE LUNGS TOBACCO HELP CANCER OXYGEN

Smoking gives you bad breath, makes you cough, and stinks up your whole life. It can lead to deadly like emphysema, lung cancer, and heart disease. Cigarettes are made from a plant called and hundreds of chemicals, including nicotine, tar, ammonia, and para-methoxybenzaldehyde.

Your lungs have a job to do—they are supposed to take in and distribute it to the rest of your body. Inhaling smoke instead of air damages the cells in your lungs. The sticky in cigarettes literally coats your lungs, turning them black over time. It becomes hard to breath and it is more difficult for the to distribute oxygen. Over time, some of these damaged lung cells can become cancerous. Smoking is the number one cause of lung

..... is a highly addictive chemical that is found in cigarettes. It narrows your blood vessels and puts added strain on your, causing all types of coronary problems. It is a, and anyone who starts smoking is at a high risk of not being able to stop.

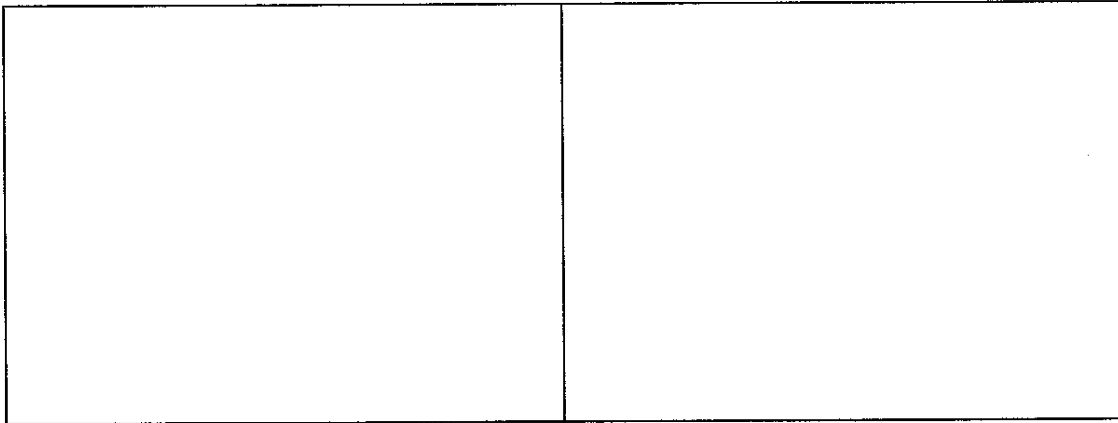
You cannot force someone to stop smoking; people have to decide to quit on their own. But you can still them stop by letting them know you care, and by telling them that you are worried and want them to be around for a long time.

FURTHER RESEARCH

Commercials for cigarettes are not allowed on television. Why not?

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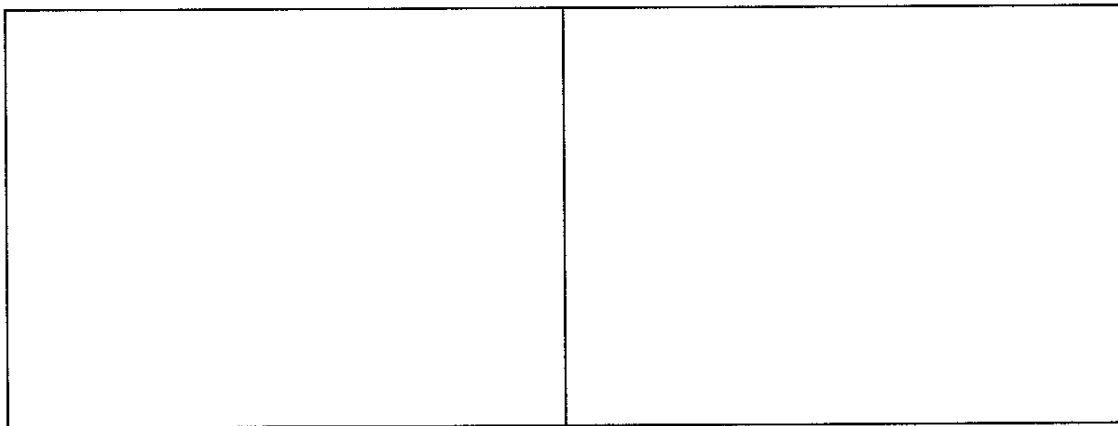
Observations1



Normal Lung

Smoker's Lung

Observations2



Normal Lung Tissue

Smoker's Lung Tissue

Conclusions:

1. State the **functions** of the following respiratory structures:

Cilia:

Mucus:

2. **Describe the causes** of a “smoker’s cough”.

3. Do you think there is a connection between smoking and lung disease? **Explain.**

4. What are **three** of the most harmful chemicals in tobacco smoke?

5. **How** does tar affect the cilia in your respiratory system and **why** is this harmful?

6. **How** does inhaling carbon monoxide decrease the oxygen level in your blood?

7. **Describe** how **bronchitis**, **emphysema** and **lung cancer** affect the respiratory system.

Matching:

8. Addiction _____	a. a dark sticky substance produced when tobacco burns
9. Bronchitis _____	b. a dangerous, colorless, and odorless gas
10. Carbon Monoxide _____	c. irritation of the breathing passages
11. Emphysema _____	d. a drug that speeds the activities of the nervous system and heart
12. Nicotine _____	e. inhaling smoke from other people's cigarettes, cigars and pipes
13. Passive Smoking _____	f. a disease that destroys lung tissue
14. Tar _____	g. a physical dependence on a substance

Observation 1

Healthy Non-Smoker's Lung



Diseased Smoker's Lung

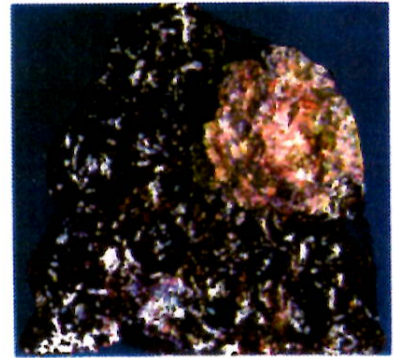


LUNG OF A NON-SMOKER
(Cast from real specimen)

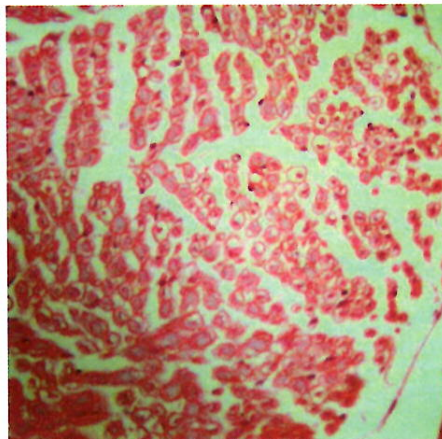


A non-smoker's lung is pink in color.

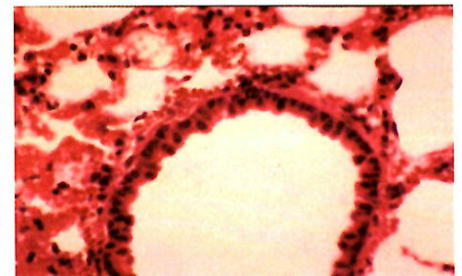
LUNG OF A SMOKER
(Cast from real specimen)



Healthy Non-Smoker's Lung Tissue



Diseased Smoker's Lung Tissue



Observation 2