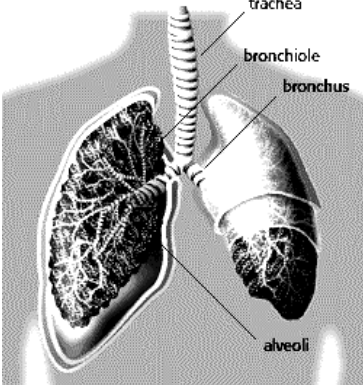
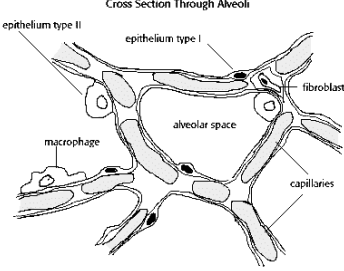


Teacher's Guide
Chemicals & Human Health

Lung Toxicology Activity

1. Pre-test - Have the students answer the questions on the worksheet prior to visiting the website.
2. Have the students go to the Chemicals and Human Health website and click on the Lung Toxicology Problem Set. www.biology.arizona.edu/chh
3. Have the students find the correct answer to the questions as they go through the Lung Toxicology Problem Set.
4. Answers & scoring rubric

<p style="text-align: center;">Pre-Questions (circle the answer you think is correct)</p>	<p style="text-align: center;">Correct Answer (write in the correct answer from website)</p>	<p style="text-align: center;"># Points</p>	<p style="text-align: center;">Explain (explain the correct answer)</p>
<p>Which of the following is NOT found in the human lung?</p> <p>A. bronchiole B. trachea C. bronchi D. alveoli</p>	<p>B</p>	<p>1 – for correct answer</p> <p>4 – one for each correctly drawn & labeled part</p>	<p>Draw a picture and label the parts of the lung:</p> <p style="text-align: center;">Structure of Human Lungs</p> 
<p>Which of the following is the smallest part of the lung where gas exchange occurs?</p> <p>A. bronchiole B. trachea C. bronchi D. alveoli</p>	<p>D</p>	<p>1 – for correct answer</p> <p>1 – for explanation</p>	<p>Approximately how many are there in the adult human body?</p> <p><i>300 million</i></p>
<p>Which of the following alveolar cell types clean particles deposited in the lungs?</p> <p>A. macrophages B. epithelium type I C. epithelium type II</p>	<p>A</p>	<p>1 – for correct answer</p> <p>5 – one point for each correctly drawn &</p>	<p>Draw a picture that includes all of the cell types and label:</p>

<p>D. fibroblasts E. capillaries</p>		<p>labeled part</p>	
<p>One of the primary functions of the alveoli is to create a large surface area in the lungs. Why is a large surface area so important?</p> <p>A. for energy storage B. to remove toxins from the blood C. to store oxygen for future use D. for gas exchange E. for the krebs cycle</p>	<p>D</p>	<p>1 – for correct answer 1 – for the explanation</p>	<p>Explain: <i>The primary function of the lung is gas exchange. The alveoli allow this gas exchange to occur quickly because of the large surface area.</i></p>
<p>When do the alveoli develop in lungs in humans?</p> <p>A. during the first 1-2 years of life B. in the 1-5th week of pregnancy C. between 3 and 5 years of age D. during the last 6 weeks of pregnancy E. continually throughout a person's lifetime</p>	<p>A</p>	<p>1 – for correct answer 5 – one point for each correct stage of development 1-2 points depending on length and accuracy of explanation</p>	<p>Describe the stages of lung development:</p> <p><i>0-5 week old embryo: major airways (trachea, bronchi) form</i> <i>5-16 week old embryo: bronchi branch and subdivide</i> <i>16-26 week old embryo: lung cells differentiate into different cell types</i> <i>26 week old embryo – birth: airways expand and grow</i> <i>1-2 year old baby: alveoli form by the formation of additional septa</i></p> <p>*Bonus Question: How do you think second-hand smoke may affect a child? Explain</p> <p><i>Since lung development occurs while in the womb and in the first two years of life, exposure to second-hand smoke may adversely affect a child's lungs. This can cause breathing problems like asthma.</i></p>
<p>Which of the following causes the most deaths in the US?</p> <p>A. AIDS B. motor vehicles C. homicide D. smoking E. alcohol</p>	<p>D</p>	<p>1 – for correct answer 1 – for explanation</p>	<p>How is that attributed to the most deaths? <i>Smoking can cause death in several ways including stroke, heart disease, lung cancer, emphysema and other diseases and cancers.</i></p>
<p>Which statement do you agree</p>	<p>B</p>	<p>1 – for correct</p>	<p>Explain why.</p>

<p>with?</p> <p>A. Environmental tobacco smoke (ETS), also known as second-hand smoke, has LESS toxic compounds than directly inhaled tobacco smoke.</p> <p>B. Environmental tobacco smoke (ETS), also known as second-hand smoke, has MORE toxic compounds than directly inhaled tobacco smoke.</p>		<p>answer</p> <p>2 – one per question in explain column</p>	<p><i>ETS has more toxic compounds because the smoke sucked through the cigarette and inhaled by the smoker has been burned at a higher temperature than the smoke that is coming off the end of the cigarette. This higher temperature burning destroys or inactivates some of the toxic compounds.</i></p> <p>About how many toxic compounds are in cigarette smoke? <i>Over 40</i></p>
<p>What is PM10?</p> <p>A. the number of packs per day that cause lung cancer in 10% of the population</p> <p>B. particles which are small enough to be deposited in the lungs</p> <p>C. a measure of the amount of pollen in a certain volume of air</p> <p>D. a measure of the severity of an asthma attack</p>	<p>B</p>	<p>1 – for correct answer</p> <p>2 – one for each example included.</p>	<p>How does this hurt the lungs? <i>Particles less than 10 microns in diameter can get all the way down into the alveoli in the lungs. They can cause tissue damage as they hit the lung tissue. These tiny particles can also damage the lung by causing irritation which can lead to scarring of the lung tissue.</i></p>
<p>Oxidants are one toxic component of cigarette smoke. Why are they dangerous?</p> <p>A. They block surfactant secretion so that alveoli collapse.</p> <p>B. They block the oxygen carrying capacity of hemoglobin.</p> <p>C. They cause cilia to quit beating so lungs get clogged with particles.</p> <p>D. They can damage the DNA of lung cells much like the sun damages skin cells.</p>	<p>D</p>	<p>1 – for correct answer</p> <p>1 – for correct disease</p>	<p>What disease can be the end result of this damage?</p> <p><i>Cancer</i></p>
<p>Asthma is caused by decreased airflow in and out of the lungs due to:</p> <p>A. small abnormalities in airways</p> <p>B. reversible bronchial spasms</p> <p>C. destruction of alveolar walls</p> <p>D. allergic reaction in lung tissues</p>	<p>B</p>	<p>1 – for correct answer</p> <p>5 – one for each answer per question</p>	<p>List three responses in the lung that cause asthma. <i>muscle spasms in the airways, swelling of cells lining the airways, and excess mucus in the airways</i></p> <p>What is a “trigger?” List 2 examples. <i>A trigger is a factor in the environment that can cause an asthma attack in an asthmatic person, but does not effect non-asthmatics. Exercise, smoke, allergens, dust</i></p>

Chemicals & Human Health
Lung Toxicology Problem Set: Student Sheet

Directions

1. Answer the pre-questions.
2. Go to the website www.biology.arizona.edu/chh and click on the link to the Lung Toxicology Problem Set.
3. Write the correct answer in the column labeled Correct Answer. All of the answers can be found in the Lung Toxicology Problem Set.
4. Explain the correct answer.

Pre-Questions (circle the answer you think is correct)	Correct Answer (write the letter of the correct answer from the website)	Explain (explain the correct answer)
Which of the following is NOT found in the human lung? A. bronchiole B. trachea C. bronchi D. alveoli		Draw a picture and label the parts of the lung:
Which of the following is the smallest part of the lung where gas exchange occurs? A. bronchiole B. trachea C. bronchi D. alveoli		Approximately how many are there in the human body:
Which of the following alveolar cell types clean particles deposited in the lungs? A. macrophages B. epithelium type I C. epithelium type II D. fibroblasts E. capillaries		Draw a picture that includes all of the cell types and label:
One of the primary functions of the alveoli is to create a large surface area in the lungs. Why is a large surface are so important?		Explain:

<p>What is PM10?</p> <p>A. the number of packs per day that cause lung cancer in 10% of the population</p> <p>B. particles which are small enough to be deposited in the lungs</p> <p>C. a measure of the amount of pollen in a certain volume of air</p> <p>D. a measure of the severity of an asthma attack</p>		<p>How does this hurt the lungs?</p>
<p>Oxidants are one toxic component of cigarette smoke. Why are they dangerous?</p> <p>A. They block surfactant secretion so that alveoli collapse.</p> <p>B. They block the oxygen carrying capacity of hemoglobin.</p> <p>C. They cause cilia to quit beating so lungs get clogged with particles.</p> <p>D. They can damage the DNA of lung cells much like the sun damages skin cells.</p>		<p>What disease can be the end result of this damage?</p>
<p>Asthma is caused by decreased airflow in and out of the lungs due to:</p> <p>A. small abnormalities in airways</p> <p>B. reversible bronchial spasms</p> <p>C. destruction of alveolar walls</p> <p>D. allergic reaction in lung tissues</p>		<p>List three responses in the lung that cause asthma.</p> <p>What is a “trigger?” List 2 examples.</p>