

Essential Question: Why will knowing about Matter & Energy be important in our lives?

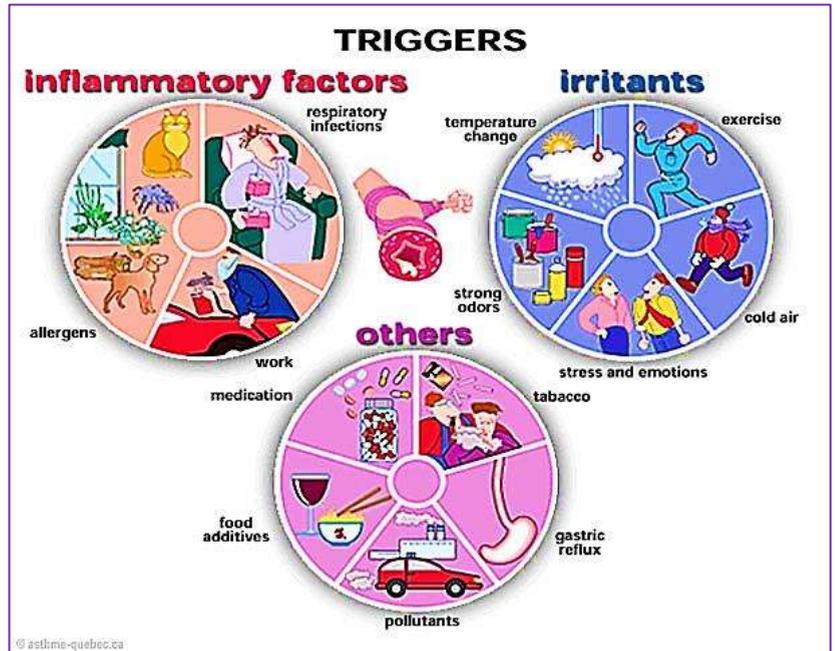
Activity 8 - What are the Respiratory hazards in our Puget Sound Environment?

Adapted from: NIH.gov, CDC Data briefs, National Heart Lung & Blood Institute (2013)
Puget Sound Clean Air Agency <http://www.pscleanair.org>

Purpose: I can explain how my **lifestyle choices and our environment** can directly affect my body systems.

Background: In the previous lesson you were introduced to the how the respiratory system works and how an asthma attack can occur. In this lesson you will learn what factors cause respiratory disease, get background on respiratory disease and discover the respiratory hazards we face as residents of Puget Sound.

Please answer these questions in complete, quality and correct sentences reflecting the questions



1. Tell the two types of factors that combine to produce respiratory disease **AND** give an example of each factor.

2. Trends: Tell the trend in asthma from 2001 and in 2010

3. Tell one factor researchers think causes asthma for children **AND** one for adults.

4. Explain why people with asthma, or other respiratory diseases, in the Puget Sound area are at a greater risk for getting attacks than people living in Eastern Washington.

Find out the quality of your area's air by going to this link: <http://www.stateoftheair.org/> & enter your zip code!

Student Review: 1-Below Standard, 2-Approaching Standard, 3-Standard, 4-Above Standard
Use the scale to evaluate completeness & correctness of the job. Put score, Initial & date in boxes.

Score

Initial/Date

5. Tell the two types of particulate matter **AND** why exposure to particulate matter is a big concern for all of us.

6. Explain the dangers of exposure to diesel exhaust **AND** Ozone exposure.

a. Diesel

b. Ozone

7. Describe how Puget Sound air quality rates compared to federal air quality standards.

8. Tell the sources of PM during the winter and summer **and** tell what can be done to avoid having these pollutants in our environment.

Write three questions w/answers you think could show up on a test about this activity:

Level 1 – Easy Piezy

Level 2 - Solid

Level 3 - Awesomely Difficult

Unit B Bodyworks: Asthma and the Puget Sound Environment

Adapted from: NIH.gov, CDC Data briefs, National Heart Lung & Blood Institute (2013)
Puget Sound Clean Air Agency <http://www.pscleanair.org>

Purpose: I can explain how my **lifestyle choices and our environment** can directly affect my body systems.

What is asthma? Asthma (AZ-ma) is a chronic (long-term) lung disease that inflames and narrows the bronchioles inside the lungs. Asthma causes recurring periods of wheezing (a whistling sound when you breathe), chest tightness, shortness of breath, and coughing.

Background: Respiratory diseases like **asthma**, pneumonia, influenza and chronic obstructive pulmonary disease (COPD) are complex diseases caused by many factors. These two factors are:

1. Personal factors that include: gender, age, & genetic background.
2. Environmental, or outside, factors: exposure to environmental stimuli or “triggers” such as allergens, molds, air pollutants and tobacco smoke.

Asthma: Asthma affects people of all ages, but often starts during childhood. In the United States asthma cases increased from 7.3% in 2001 and then up to 8.4% in 2010. The asthma rate for children is about 2% higher than for adults. In 2010, about 25.7 million persons had asthma.

How does Asthma happen? When the airways encounter asthma “triggers”, the muscles around the airways tighten. These airways narrow so less air can flow into the lungs. The swelling can worsen, making the airways even narrower. Cells in the airways can make more mucus than usual. This sticky, thick liquid further narrows the airways. This chain reaction results in asthma symptoms.

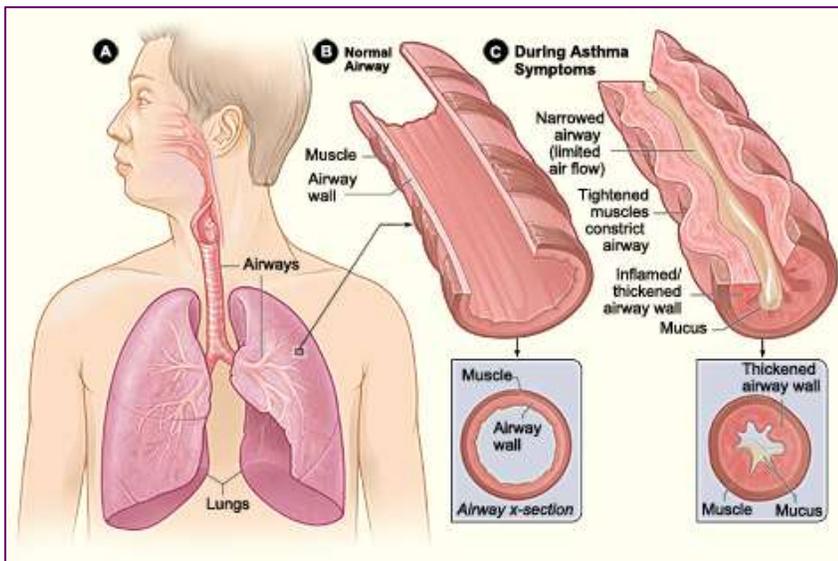


Figure A shows the location of the lungs and airways in the body.

Figure B shows a cross-section of a normal airway.

Figure C shows a cross-section of an airway during asthma symptoms.

What causes Asthma? The exact cause of asthma isn't known. Researchers think some genetic and environmental factors interact to cause asthma, often early in life. These factors include:

- An inherited tendency to develop allergies
- Parents who have asthma
- Certain respiratory infections during childhood
- Contact with some airborne allergens or exposure to some viral infections in young children when the immune system is developing.
- Airborne irritants may also play a big role in adult onset asthma.

For example: Frequent exposure to irritants Ex: tobacco smoke, air pollution, pollen, some chemicals etc.) might make your airways more reactive to substances in the air as you age.

Unit B Bodyworks: Asthma and the Puget Sound Environment

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Puget Sound Clean Air Agency <http://www.pscleanair.org>

Where does the pollution that can trigger asthma come from? Most people with asthma have asthma attacks when exposed to irritants in the air. **Particulate matter** from car exhaust, lawnmowers, or factories, for example, is one of the greatest causes of asthma attacks.

- People who live in a highly populated area, like Puget Sound, are exposed to a greater number of airborne irritants. This makes life difficult and dangerous for those with asthma.

What is Particulate Matter? Dust, dirt, soot, smoke – Are considered “**particulate matter.**” These particles are easily inhaled into the lungs. Particulate matter poses a host of serious health effects, and represents the most important air pollutant challenge facing the Puget Sound region.

There are two classes of these tiny airborne particles. **PM10** - particles that measure 1/7th of a human hair and **PM2.5** - fine particles measuring 1/35th of a hair. These tiny particles can easily enter your bloodstream & cause breathing and heart problems. The health effects even from short-term exposure are serious.

PM2.5 exposure has serious health effects.

- Exposure to PM2.5 is linked with respiratory disease, decreased lung function, asthma attacks, heart attacks and premature death.
- Children, the elderly, pregnant women, & those with compromised immune systems or ill are especially vulnerable. Recent studies show people living near ports & roadways have higher exposures & health risk. These people should avoid outdoor exertion if PM2.5 levels are high.

Diesel Exhaust and your health. Diesel exhaust linked to respiratory and cardiovascular problems and premature death. However, it also represents 78 percent of the potential cancer risk from all air toxics in the Puget Sound area.

Ozone is another air pollutant of concern. Ozone is created when hot sun "cooks" emissions from motor vehicles, industry, paints, solvents and gasoline fumes. The main component in smog, ozone can trigger a variety of health problems and worsen bronchitis, emphysema, & asthma. Smog also can reduce lung function & inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue.

Smog in our region In the Puget Sound area, our worst smog tends to occur on the hottest summer days, when temperatures reach 85 degrees or higher.

Air Quality Status: Air quality levels in three of our four Puget Sound counties do not meet Federal standards at times. Pierce County (Tacoma area) has been cited the most.

Seasonal Sources of PM: In the winter, the most particle pollution comes from burning in fireplaces and wood stoves. During summer, vehicle exhaust (cars, trucks, buses, lawn mowers, among others), land-clearing burning and backyard burning of yard waste are the major sources of fine particles.

Ways to help reduce PM in our air:

- Avoid wood-burning for home heating (use natural gas and propane);
- Reduce driving and choose cleaner cars and fuels.
- Refrain from lighting outdoor fires.

These are all steps we can take to reduce fine particle pollution. If we work together we can have cleaner air!