

ACTIVITY #3: LUNG HEALTH — ASTHMA AND ALLERGIES

TIME 50 minutes, computer lab

REQUIRED RESOURCES

- Activity**
- Computer lab with internet access for student research
 - Notepaper and pencil for research
 - Poster board and paper for creating a picture of the respiratory system
 - “Lung Health — Asthma and Allergies Teacher Answer Key: Respiratory System”
 - “Lung Health — Asthma and Allergies Student Worksheet,” one for each student
 - “Lung Health — Asthma and Allergies Teacher Answer Key: Student Worksheet”

Active Break

- Jumping ropes
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Objectives

1. To understand the respiratory system and how it functions.
2. To understand asthma and allergies and the connection between air quality and health.
3. To identify actions to ensure a healthy environment and to promote healthy lifestyles.

Curriculum Connections

This activity is designed for Grades 6 to 9 Health. It also covers some Physical Education and Science topics. Curriculum connections are listed by province, grade and subject on the Air Aware website,

http://www.cleanairchampions.ca/programs/air_aware/teacher_zone/curriculum_connections.php

Activity

1. Begin a discussion with students about the respiratory system using the following questions as a guide.

- What is the function of the respiratory system?

The primary function of the respiratory system is to supply our blood with oxygen. The cardiovascular system then delivers the oxygen to all parts of the body. The respiratory system does this through breathing. When we breathe, we inhale oxygen, and we exhale carbon dioxide.

- What can impact the health of our lungs?

Inactive lifestyles, smoking, air pollution, inhaling toxic substances, diseases, allergies, and genetics.

2. Indicate that the next activity will help students better understand the functions of the lungs and how lung functioning relates to our health and air quality.
3. In groups of two or three, have students conduct research, in class or as homework, into how the respiratory system works. Since some of these recommended websites use sound, websites could be projected for the whole class or students could use headphones:

- Clean Air Champions, Air Aware program, information about asthma and the respiratory system:

http://www.cleanairchampions.ca/programs/air_aware/about_asthma/the_respiratory_system.php

- Saskatchewan Lung Association, information about the respiratory system written for grades 7 to 12, for Canada's Digital Collections, Industry Canada:

http://lung.ca/children/grades7_12/respiratory/respiratory_system.html

- Kids Health, lungs and respiratory information:

http://kidshealth.org/PageManager.jsp?lic=1&article_set=54039&cat_id=20607

5. Ask each group to create a picture of their research labeling the major parts of the respiratory system (i.e., nose, mouth, trachea, lungs, diaphragm, bronchia, bronchioles, alveoli).
6. Discuss the various components of the respiratory system and their functions using "Asthma and Allergies Teacher Answer Key: Respiratory System."
7. Introduce lung diseases or conditions that affect the respiratory system and our health: asthma, allergies, chronic obstructive pulmonary disease (COPD), tuberculosis, sleep apnea, and respiratory syncytial virus (RSV). See the Canadian Lung Association website:

http://www.lung.ca/diseases-maladies/infectious-infectieuses_e.php

8. Share the following facts about asthma:

Three million Canadians suffer from asthma.

Asthma is the most common chronic respiratory disease of children and young adults.

In 2001, a total of 299 Canadian deaths were attributed to asthma. 60% of people with asthma do not have their asthma under control.

In the Olympic Games for 2006, 2008, and 2010, approximately 7% of athletes had asthma, making it the most common medical condition experienced by Olympic athletes.

The cause of asthma is not known, and currently there is no cure.

Sources: Asthma Society of Canada; Statistics Canada, *Health Reports*, Vol 16. No. 2, March 2005; Australian Association for Exercise and Sport Science, *Position Statement on Exercise and Asthma*, 2011.

9. Share the following information about asthma and allergies with students:

http://www.cleanairchampions.ca/programs/air_aware/fact_sheets.php

Asthma is a "chronic inflammatory disease of the airway" that causes the following symptoms: shortness of breath, tightness in the chest, coughing, and wheezing. Asthma can vary in its severity, can vary from person to person, and can flare up from time to time. The cause of asthma is not known, and currently there is no cure. People with asthma often have trouble breathing when they are in the presence of what are called "triggers." When someone has asthma and their symptoms are "triggered," it means that the flow of air is obstructed as it passes in and out of the lungs. There are two types of asthma triggers:

- *allergic triggers that cause inflammation of airways — dust mites, animals, cockroaches, moulds, and pollen*
- *non-allergic triggers that can irritate airways that are already inflamed — viral infections, smoke, exercise, cold air, chemical fumes and strong-smelling substances, certain air pollutants and intense emotions.*

Many people with asthma also have allergies. People with allergies and asthma that come into contact with their allergic triggers will have a reaction in their airways, as well as, the usual allergy symptoms (itchy, watery eyes, etc.) An allergy is an abnormal reaction by your body to things that your body becomes sensitive to. These are called allergens. There are two types of allergens: ingested allergens (food, drink and medicines) and inhaled allergens (pollen, dust, animal dander, mould, etc.) Inhaled allergens are the most common cause of allergy problems in people with asthma.

Viral infections such as the common cold are one of the most common non-allergic triggers. Another non-allergic trigger is exercise, and this is often referred to as exercise-induced asthma. Cold, dry air is believed to be the main cause of exercise-induced asthma. When exercising, we tend to breathe quickly, shallowly and through the mouth. The air reaching the lungs misses the warming and humidifying effects of breathing through the nose. Smoke, from smoking cigarettes, inhaling second-hand smoke or smoke from fires, is another non-allergic trigger. Strong-smelling substances such as perfume can be another trigger. Air pollution is also a non-allergic trigger: ground level ozone, particulate matter and nitrogen dioxide are three pollutants that can trigger non-allergic asthma symptoms.

Asthma can affect anyone. Most people with asthma can live full, active lives. Asthma symptoms can be managed, and the goal is to be symptom-free by avoiding asthma triggers, by taking medication, by following an asthma action plan, and by following-up regularly with your doctor.

10. Ask students to research information about asthma, allergies, active living and air quality on the following websites:

- Asthma Society of Canada online video illustrates the effects of asthma on breathing. To access the film, select *Asthma Myths & Facts* and then select *Breathing with Asthma*:
<http://pubmodules.machealth.ca/asthma/management/player.html>
Exercise & Sports, <http://www.asthma.ca/adults/lifestyle/exercise.php>
Act Now! Allergies Count Too!, <http://www.asthma.ca/allergies/index.html>

- Canadian Lung Association’s website on asthma, http://www.lung.ca/diseases-maladies/asthma-asthme_e.php
- Allergy/Asthma Information Association website on allergies, asthma and anaphylaxis, <http://aaia.ca/en/index.htm>
- Lung Association of Ontario information on asthma, <http://www.on.lung.ca/page.aspx?pid=414>
- Clean Air Champions’ Backgrounder, <http://www.cleanairchampions.ca/resources/backgrounders.php>
- Air Quality and Health Index, http://www.cleanairchampions.ca/programs/air_aware/the_aqhi.php
- Ontario Physical and Health Education Association (OPHEA), a variety of asthma resources as well as many other physical education and health resources (contact OPHEA if you teach outside of Ontario), <http://www.ophea.net/category/topic/asthma>
<http://www.ophea.net/category/program-name/daily-physical-activity>

11. Ask students to write one to three paragraphs describing asthma, allergies, active living and air quality to add to their diagram of the lung. Have students identify the two categories of asthma triggers: allergic and non-allergic. Have them develop a list of triggers for each category to add to their diagrams.
12. From their research, have students answer the questions on the “Lung Health — Asthma and Allergies Student Worksheet.” Use the questions and “Lung Health — Asthma and Allergies Teacher Answer Key” to guide a discussion on active living, air quality, asthma and allergies.
13. Ensure students understand the types of treatment for asthma so they can better help if someone they know has their asthma symptoms triggered.

The first part of an asthma treatment plan is to avoid asthma triggers. There are two types of medication used for treating asthma:

- *controlling medications usually taken daily that reduce inflammation in the airways*
- *reliever medications that alleviate symptoms immediately.*

Most people are familiar with reliever medications and are familiar with the terms inhalers or puffers. Reliever medications are only a short-term solution and do nothing for the underlying problem of inflammation. Someone with asthma who is coughing or wheezing should use their reliever medication. Students can help people with asthma by encouraging them to carry their inhalers or getting their inhalers for them when needed.

Important steps for better control of exercise-induced asthma:

- *use reliever medication 15 minutes prior to exercise*
- *warm up for 6 to 10 minutes before beginning to exercise*
- *drink plenty of fluids*

- *stop exercising if symptoms arise*
 - *cool down at the end of exercise.*
- 14.** Ask students to identify one thing they learned or found surprising during this activity. Make a list of the things they learned. Assign one insight to each of the student groups and ask them to write it in large letters, using as few as words as possible on a blank piece of paper. You can ask students to illustrate their insight, as well. Take a photograph of each sheet of paper to submit to Air Aware’s National Program Coordinator, Angela Melhuish, at angela@cleanairchampions.ca. If you include students in the photos, ensure that no faces are visible. At the end of the year, Air Aware will create a video from the submissions to post online. Each class that submits photos will be entered in a draw to win a Giant Bike! Visit the website below to enter.

http://www.cleanairchampions.ca/programs/air_aware/enter_our_giant_contest/for_schools.php

Extension — Making it Relevant

- Have students record the amount of moderate- to vigorous-intensity physical activity they do each day. Refer to *Canada’s Physical Activity Guideline* for youth ages 12 to 17 which recommends 60 minutes of moderate- to vigorous-intensity physical activity daily. Use the Public Health Agenda of Canada’s *Tips to Get Active* to discuss ways of being more active: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/pa-ap/06paap-eng.php>. (For more ideas on monitoring daily physical activity, refer to Air Aware Activity 1 for Grades 6 to 9.)
- Ask students to conduct a school walk-about to identify asthma triggers within the school. Working in small groups, provide each group with the list of asthma triggers (Step 9) and a map of the school if possible. You could assign specific areas of the school to each group. When they find an asthma trigger, have them record the name of the asthma trigger on their map. Use one map of the school to record all of the asthma triggers that the student groups located. Identify the asthma triggers that are allergic triggers and those that are non-allergic triggers. Discuss ways that the asthma triggers could be reduced in the school. Reducing the asthma triggers will also help reduce the allergic triggers.

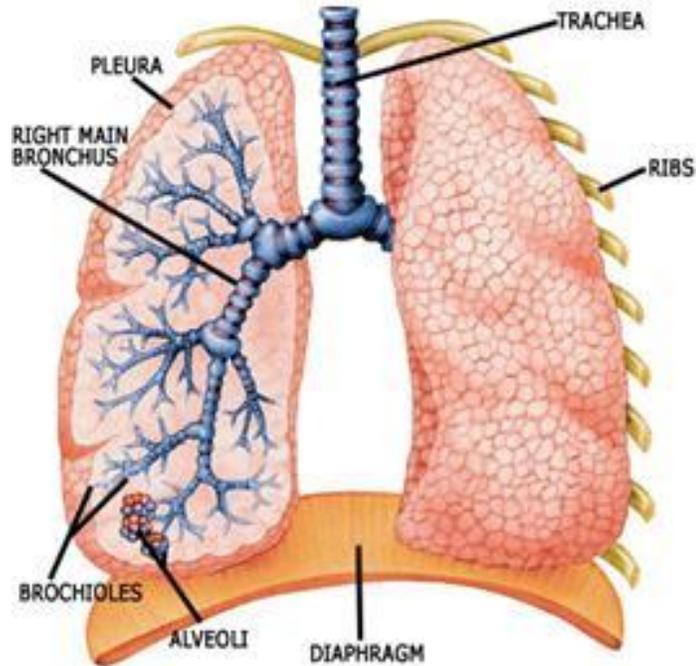
Extension — Being Active

- 1.** Try some different muscle strengthening or bone-strengthening activities. The *Canadian Physical Activity Guidelines* recommends activities to strengthen muscle and bone at least three days per week. Bone strengthening helps muscles push against bones helping to make bones strong. Jumping rope is a great approach to bone strengthening. Host a lunch-hour session on jumping rope. On a nice day, you can take the class outside. During the session, you can progress from single jumping to competitive double rope. To learn more about jumping rope, consider these websites:
Canadian Rope Skipping Federation, <http://www.crsfsite.net/main/>
Competitive Rope Skipping, <http://www.youtube.com/watch?v=hvaun4ArZ90&feature=related>
Heart & Stroke Jump Rope for Heart, <http://www.heartandstroke.ca>
JumpRope.com, <http://www.jumprope.com>

2. Simulate the role of the cilia in the respiration process and the impact of air pollution and some lung diseases on the cilia. The cilia are tiny hairs in the nasal passage that filter out dust and other particles. When the cilia are working well, they work together using a sweeping motion to remove particles. Have the students line up in two rows with their hands over their heads (one student behind the other, with enough space between them for them to bend over). Using a count of four, have the students bend over on two counts and then return to upright on the next two counts. Have the students keep in time so they are all bending over at the same time. Then have every third student use a count of three, they bend over on one count and then return upright on the next two counts. What happens to the cilia working together when students aren't using the same count? This is the impact that some lung diseases and air pollution have on cilia. To remove particles from entering the respiratory system, cilia need to work together.
3. Refer to the Clean Air Champions website for other active games:
http://www.cleanairchampions.ca/programs/air_aware/quizzes_activities_and_games.php

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TEACHER ANSWER KEY Respiratory System



Breathing is the process by which oxygen in the air is brought into the lungs. The blood absorbs the oxygen and carries it to all parts of the body. At the same time, the blood gives up waste matter (carbon dioxide), which is carried out of the lungs with the air breathed out.

When we breathe in (inhale) through our nose and mouth, air travels down our trachea (windpipe) and into our lungs through the left and right bronchi. Each bronchus splits into smaller bronchioles and then leads to small sacs called alveoli.

It is in the alveoli that the oxygen-rich air we have inhaled is absorbed into our blood. In the blood, the oxygen is carried to the heart and is then pumped to the trillions of cells throughout our body. Our cells use the oxygen to make energy and then release carbon dioxide (CO₂), a waste product that is removed from the body as we exhale.

Asthma is a “chronic inflammatory disease of the airway” that causes the following symptoms: shortness of breath, tightness in the chest, coughing, and wheezing. Asthma can vary in its severity, can vary from person to person, and can flare up from time to time. The cause of asthma is not known, and currently there is no cure. People with asthma often have trouble breathing when they are in the presence of what are called “triggers.” When someone has asthma and their symptoms are “triggered,” it means that the flow of air is obstructed as it passes in and out of the lungs. Allergic triggers cause inflammation of airways — dust mites, animals, cockroaches, moulds, and pollen. Non-allergic triggers can irritate airways that are already inflamed — viral infections, smoke, exercise, cold air, chemical fumes and strong-smelling substances, certain air pollutants and intense emotions. (See Step 9 of this Activity for more information).

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TEACHER ANSWER KEY

Student Worksheet

1. How does exercise or active living help our health?

When you are active, your body needs more energy. To produce this energy, your body needs oxygen. When you lead an active lifestyle and exercise, your body becomes more efficient in producing energy from oxygen. If you do not regularly exercise and then want to do something active, your cardiovascular system has trouble delivering enough oxygen to produce energy. This leads to shortness of breath and a build-up of lactic acid in your body. Exercise helps strengthen your chest and upper body muscles which, in turn, improve breathing. Exercise also helps strengthen your heart (your cardiovascular system), boosts your immune system, and helps you keep a healthy body weight.

2. How does exercise help people with asthma?

Asthma does not have to prevent people from participating in sports. In fact, if asthma conditions are properly controlled, people with asthma can participate in any type of physical activity. In fact, exercise can actually improve asthma:

- *Strengthening your chest and upper body muscles. If you have asthma, this is especially important because it can help your lungs work better;*
- *strengthening your heart (cardiovascular system);*
- *boosting your immune system and,*
- *helping you keep a healthy body weight.*

The benefits of exercise (even for exercise-induced asthma) almost always outweigh the risks.

3. How are allergies and asthma connected?

More than 80% of people with asthma also suffer from allergic rhinitis or sinusitis. Asthma and allergic rhinitis are related conditions linked by a common airway. The air we breathe in passes through our nose (at the start of our airway) and continues down the airway into the lungs. Allergic rhinitis and asthma can cause breathing problems by obstructing the free passage of air along this path. Some allergens, such as animal dander and house dust mites, can be present all year round whereas tree, grass and ragweed pollen appear only during certain seasons.

4. How could you be a support for someone with asthma and/or allergies?

I could support someone with asthma and/or allergies by knowing their allergens and asthma triggers. For someone with asthma, I should know their medications and know where they keep their reliever inhaler so that I could quickly find it if they begin showing

asthma symptoms. If someone is anaphylaxis, I should know where he/she carries their epinephrine auto-injector and how to administer it.

5. Why is good air quality important for everyone, especially for people with asthma?

Air pollution affects all of us. Good air quality is important for everyone. Even very healthy people can have difficulty breathing on days when the air is heavily polluted. Ozone and particulates cause inflammation and swelling in lung tissue and decreased lung function in everyone. There is no safe level exposure to ground level ozone or smog! Children, the elderly, those who are physically active outdoors, and those with pre-existing medical conditions such as asthma are particularly vulnerable to poor air quality.

6. Why is good air quality important for athletes?

Athletes of all levels including weekend athletes are particularly at risk from air pollution and smog because they spend a lot of time training outdoors. During exercise, particularly at high intensity, athletes inhale deeply, drawing large volumes of dirty air deep into their lungs, and they breath via their mouth, bypassing the filtration system in the nose.

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STUDENT WORKSHEET

Use the research your group completed on asthma, allergies and active living to answer the following questions.

1. How does exercise or active living help our health?
2. How does exercise help people with asthma?
3. How are allergies and asthma connected?
4. How could you be a support for someone with asthma and/or allergies?
5. Why is good air quality important for everyone, especially for people with asthma?
6. Why is good air quality important for athletes?