

Let's Talk About: The Health Effects of Air Pollution



ST. PAUL'S HOSPITAL
COMMUNITY FORUMS

What is Air Pollution?

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms. The sources are both natural and human-based and air pollution can be found indoors and outdoors. In fact, indoor air pollution and urban air quality are considered to be two of the world's worst pollution problems.

The effects of air pollution are numerous and diverse. In addition to severely affecting the natural environment, it can seriously impact the health of many individuals. Poor air quality principally affects the body's respiratory system and the cardiovascular system. Studies have shown that exposure to air pollution can affect heart rate, blood pressure, blood vessel function, lung function, blood clotting, and heart rate variability (a factor in developing heart rhythm disturbances), speed the progression of atherosclerosis, and precipitate myocardial infarction (heart attacks). Short-term exposure is associated with difficulty breathing, wheezing, coughing, headaches, nausea, and irritation to the eyes.

Pollutants can also exacerbate existing respiratory and cardiac conditions such as asthma and COPD. Prolonged exposure to air pollution can result in: chronic respiratory disease, lung cancer, and heart disease. These effects can also result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death.

Did you know...?

- Short- and long-term exposure to air pollution are estimated to have resulted in 6,000 premature deaths in Canada in 2008 as well as 11,000 hospital admissions.
- The vast majority of the deaths and hospitalizations attributed to poor air quality are from cardiovascular disease, particularly heart attacks, heart failure, and stroke.

The respiratory system is particularly sensitive to air pollutants because it is the initial site of contact with pollutants. Lungs are anatomically structured to bring large quantities of air (on average, 400 million litres in a lifetime) into

intimate contact with the blood system, to facilitate the delivery of oxygen.

Lung tissue cells can be injured directly by air pollutants such as ozone, metals, and free radicals. Ozone can damage the alveoli (individual air sacs in the lung where oxygen and carbon dioxide are exchanged) and cause secondary lung injury. In response to the incoming toxic elements, lung cells also release a variety of potent chemical mediators that may critically affect the function of other organs such as those of the cardiovascular system. This response may also cause lung inflammation and impair lung function. Some pollutants may also directly cause functional alterations that affect the rhythm and contractility of the heart. If severe enough, functional changes may lead to lethal arrhythmias without major evidence of structural damage to the myocardium.

Population at Risk

- **People with diabetes, lung disease or heart disease.**
- **Seniors** are at higher risk because of weakening of the heart, lungs and immune system and increased likelihood of health problems such as heart and lung disease.
- **Children** are also more vulnerable to air pollution: they have less-developed respiratory and defense systems. Because of their size, they inhale more air per kilogram of body weight than adults. Children also spend more time outdoors being physically active, which can increase their exposure to air pollution.
- **Pregnant women:** air pollution exposure has been associated with an increased risk of giving birth prematurely or to a low birthweight baby.
- **People participating in sports or strenuous work outdoors** breathe more deeply and rapidly, allowing more air pollution to enter their lungs.

Join medical experts from Providence Health Care for monthly community forums at St. Paul's Hospital. Each month features a different health topic with time to pose questions to the experts.

The forums are free and take place the third Wednesday of every month.

7:00 – 9:00 pm
(doors open at 6:30)
New Lecture Theatre
St. Paul's Hospital
1081 Burrard Street

For more information and to register, please email ownyourhealth@providencehealth.bc.ca or call 604-806-8495.

This evening's presentations will be available to view on our website:

www.phcmmedicine.ca

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Research at St. Paul's Hospital and UBC

What can you do to reduce and limit exposure to air pollution and its health impacts?

- Supporting clean-energy initiatives: conserve energy and recycle paper, plastic, glass etc.
- Leave the car at home and use public transit, walk or ride a bike. Commuting is an important source of air pollution exposure. The highest pollutant concentrations are along major roads. When possible, individuals should limit the time they spend commuting to reduce exposure and/or to lessen the amount of pollution they generate, if they drive a vehicle.
- For outdoor activities—power walks, jogs, family bike rides—stay away from high-traffic areas and choose parks and quiet side streets instead.
- Check your local Air Quality Health Index scale regularly to find out when to limit your exposure to short-term pollution.
- When considering where to live and work, choose a location which is more than 150 meters away from major roads. High pollutant concentrations can be found up to 750 meters from truck routes.

Using HEPA filter air cleaners or installing HEPA filters in forced air furnaces will reduce indoor exposure to particles. For air cleaners it is important to select non-ozone generating models.

Optimal use of cardiac and respiratory medications based on individual clinical parameters offers protection, given acute exposure to particulates and ozone.

- Diets rich in antioxidants and fish may help protect against the harmful effects of air pollution. Small scale studies show that Omega-3 fatty acids and Vitamins C and E, taken as supplements, limit the cardiovascular and respiratory effects of exposure to higher levels of air pollution. *However, there are currently no established recommendations for the routine use of specific dietary supplements to prevent the effects of air pollution.*

Air Quality Health Index

The Air Quality Health Index or "AQHI" is a scale designed to help you understand what the air quality around you means to your health.

It is a health protection tool that is designed to help you make decisions to protect your health by limiting short-term exposure to air pollution and adjusting your activity levels during increased levels of air pollution. It also provides advice on how you can improve the quality of the air you breathe.

This index pays particular attention to people who are sensitive to air pollution and provides them with advice on how to protect their health during air quality levels associated with low, moderate, high and very high health risks. For more information visit: www.airhealth.ca.

Research

Our research in the Lower Mainland has focused on traffic-related air pollution. We have found that children who live in areas of higher traffic-related air pollution are more likely to be born prematurely or at low birthweight, have an increased risk of respiratory and middle ear infections, and are at greater risk of developing asthma. Adults who live in close proximity to traffic are more likely to die from cardiovascular disease.

The UBC School of Environmental Health presents an on-demand, online course on outdoor air quality and health and the Air Quality Health Index (AQHI). This course is available at no cost, made possible through funding by Health Canada. For more information please check out this website: http://www.soeh.ubc.ca/Continuing_Education/entrypage.html

Sources:

Health Canada <http://www.hc-sc.gc.ca>

Environment Canada: <http://www.ec.gc.ca>

Heart and Stroke Foundation of Canada: <http://www.heartandstroke.com>

BC Lung Association:

http://www.bc.lung.ca/airquality/airquality_primer.html

St. Paul's Hospital is an acute care, teaching and research hospital located in downtown Vancouver. It is home to many world-class medical and surgical programs, including heart and lung services, HIV/AIDS and kidney care.

St. Paul's serves both the local community and patients from across BC and the Yukon. St. Paul's is one of 14 health care facilities in Vancouver operated by Providence Health Care, one of Canada's largest faith-based health care organizations. Providence's 1,000 physicians and 6,000 staff deliver compassionate care to patients and residents in British Columbia while training medical professionals and making innovative advances in research.

To support programs like this at St. Paul's Hospital, please visit www.helpstpauls.com to make a donation to the Department of Medicine Academic Fund.

www.phcmedicine.ca