



Catching Your Breath: Research Efforts to Analyze the Negative Effects of Air Pollution on Human Health

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very day, the average adult breathes 15,000 to 20,000 litres of air.

If you live in a city, chances are good that the air is none too clean – especially in summer, when warmer temperatures and prolonged heat waves combine with already-present air pollutants to create more smoggy days.

According to McGill’s Dr. Mark Goldberg, when you’re breathing urban air, you’re breathing a toxic soup. Air pollution is made up of harmful gases and elements that are produced by vehicles, homes, power plants, smelters, burning wood and other industries.

Besides the threat to the environment, air pollution is also a serious threat to human health. Health research has established clear links between air pollution and the development of lung cancer and cardiovascular disease. The Ontario Medical Association estimated that, in 2005, nearly 5,800 Ontarians would die prematurely as a result of air pollution.

Children are especially vulnerable to the health effects of air pollution because of their smaller body size, the fact that their lungs are still developing and because they generally spend more time being active outdoors than adults.

As an environmental and occupational epidemiologist, Dr. Goldberg is pursuing more evidence of the negative effects of air pollution on human health. The Canadian Institutes of Health Research (CIHR) is currently supporting him to conduct a number of studies on the subject. For instance, Dr. Goldberg is evaluating the effects of air pollution on the health of Montreal residents, based on where they live. The first step is mapping levels of air pollution throughout the city, using 130 “passive monitors” installed on telephone poles across Montreal.

These highly sensitive monitors can measure levels of nitrogen dioxide (which is generated primarily from internal combustion, especially by automobiles and trucks) and volatile organic compounds (which include everything from paint solvents to cleaning fluids to benzene). With so many of the monitors, Dr. Goldberg can detect where in the city air pollution is at its worst. You can actually make a map, he says, and then, taking into account traffic and other factors, you can predict the levels of pollution on any street.

Dr. Goldberg’s next step is to compare this information with data about lung and other kinds of cancer to determine whether, over time, the diseases can be linked to people who live in specific locations of Montreal that have higher-than-expected levels of air pollution.

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Other CIHR-funded researchers focusing on air pollution include Dr. Michael Brauer of the University of British Columbia (UBC), who is assessing the health impact of wood smoke from forest fires. His work could help health and forestry policy analysts make more educated decisions in the future, especially given recommendations to reintroduce controlled burning to manage forests in British Columbia. As well, Dr. Stephanus Van Eeden, also from UBC, is studying how atherosclerosis can be caused by air pollution and how viruses interact with air pollutants to trigger asthma attacks.

CIHR Research

The concern over the health impacts of air pollution is widespread. According to Kenneth Maybee, Vice-President of the Canadian Lung Association responsible for environmental issues, we are realizing, more and more, the serious health consequences of exposure to air pollution. Research by scientists, such as Dr. Goldberg, he says, provides yet more evidence that we need to alleviate these health consequences by taking more urgent action to improve air quality in Canada.

Canadian governments are working in a variety of arenas to make our air cleaner. Research funded by CIHR is adding to a growing body of evidence that underscores the need to act. In the meantime, the Ontario Medical Association suggests that people can protect themselves from the dangers of smog on days when the air is particularly polluted by reducing strenuous outdoor activity, taking lots of rest breaks and seeking cool, air-conditioned environments or shaded areas away from traffic.

In the future, Dr. Goldberg will continue studying the effects of air pollution on vulnerable populations, including the elderly and people of lower socio-economic status. He also wants to find out whether air pollution plays a role as a trigger for irregular heartbeats. This research could prove to be useful for both clinicians and environmentalists.

As Dr. Goldberg says, however, it doesn't matter who you are, or how much money you have, air pollution is an issue.

About the Author

Dr. John Frank is Scientific Director, Institute of Population and Public Health, Canadian Institutes of Health Research. For more information go to the CIHR web site, www.cihr-isrc.gc.ca

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