

Air Pollution and Your Heart

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[music] Anne Johnson: Welcome to Environmental Health Chat, a podcast about how the environment affects our health, from the National Institute of Environmental Health Sciences Division of Extramural Research and Training. I'm your host Anne Johnson.

Think for a minute about air pollution. Black smoke billowing out of a diesel truck. Smokestacks in the industrial part of town. The hazy look of a city skyline under a blanket of smog.

Now think about how that pollution affects the human body. You're probably thinking about coughing, or respiratory conditions like asthma. And it's true—air pollution definitely harms the lungs. But the real killer, air pollution's health effect with perhaps the greatest impact on the largest number of people, is how it affects the heart and blood vessels.

Today's guest is Dr. Joel Kaufman. He's a professor of medicine, environmental and occupational health sciences, and epidemiology at the University of Washington in Seattle. He studies the relationship between air pollution and heart disease.

Some of the strongest evidence of this relationship is that there's often a spike in the number of heart attacks around days with bad air pollution.

Joel Kaufman: There's the short term effect that we might call a triggering of a heart attack. When we say triggering a heart attack, we mean the occurrence of a heart attack—or a stroke—in someone who is at risk for having that occur. But there's also a large and growing set of literature that living in areas that on average have higher air pollution puts you at risk in the long term, as well.

Anne Johnson: So it seems that the more often you're exposed to high air pollution, the higher your risk of developing heart disease. Laboratory studies have shown that exposure to air pollution can lead to hardening of the arteries, higher blood pressure, changes to the size and structure of the heart, and an increased likelihood of the clots that trigger strokes and heart attacks.

Joel says air pollution should be thought of as a risk factor for heart disease, the same way you think about high blood pressure.

Joel Kaufman: In general, you know, we know that people who smoke, people who have high blood pressure, people who have elevated cholesterol, people who have unlucky genes, people who have diabetes, are at increased risk of developing these conditions of atherosclerosis, hardening of the arteries, as well as heart attacks and strokes. Air pollution can really be considered another risk factor that adds to those risk factors. In general, people who have none of those risk factors are going to be at low risk and people who have several of those factors are going to be at high risk.

Anne Johnson: Most of the research in this area uses fine particulate matter as a measure of air pollution. That's the type of pollution that typically comes from burning fossil fuels, like car exhaust or emissions from coal-fired power plants. It should be said that it's not entirely clear whether that type of pollution has a greater impact than others, or if it's just the easiest to measure.

But at any rate, if you know you have other cardiovascular risk factors, what can you do to control your exposure to air pollution? Should you stay inside? Wear a face mask?

Joel Kaufman: The trick is to think about how to reduce your exposure while not reducing the positive benefits of things like being active, spending time outdoors, and being healthy and fit. So in general, I always like to encourage people that if the choice is between being active and exercising and not, the answer is to be active and exercise.

Anne Johnson: But, he says, if you can avoid exercising near roads with heavy traffic, that's even better. You can also reduce the amount of pollution that gets into your house or workplace by keeping your windows closed or installing a HEPA air filter. Such measures are especially important if you already have established heart disease or congestive heart failure. If you have a heart condition it's also wise to keep tabs on daily air quality levels and avoid exerting yourself outdoors on days with high pollution.

But there's only so much a person can control. In large part, air pollution is something that must be dealt with at a societal level.

Joel Kaufman: The air pollution story in the United States can be viewed in many ways as a public health triumph—that is, we've been extremely successful over the last 40 years in reducing concentrations of air pollution. At the same time, even at the lower levels that we're now experiencing in the United States, there's still a health-associated impact. We haven't yet gotten to a place where further reduction of exposure won't provide ongoing benefit to health. So we've seen a huge improvement and there's still room for improvement. The flip side of that is that things have gotten as bad or worse in rapidly developing countries. If we look, for example, at China or India at this point in time we're seeing terrible air pollution, in some cases as bad as it was during the worst of the industrial revolution in the West. So there's a lot of work to be done.

Anne Johnson: And that's where research comes in. Joel says the reason we need more studies on this isn't just to figure out how air pollution contributes to heart disease, but to figure out how to use our public health dollars most effectively.

Joel Kaufman: Where things still need to be moving is to understand a few things. One is, 'Is there a level at which air pollutant concentrations can be considered no longer of concern?' to determine when we can stop worrying about it so much in this country. Another area is really understanding what are the sort of culprit sources or components of air pollution. We talk about traffic-related air pollution, which is a mix of chemicals, and what we'd like to know is are there particular agents in there that are actually the bad actors in initiating the responses that lead to the development of cardiovascular disease. Because if we could determine with more certainty what those bad actors are, then we could target prevention efforts in a more cost-effective way.

Anne Johnson: You can find links for more information on this topic at our website, niehs.nih.gov/podcasts. Thanks again to today's guest, Dr. Joel Kaufman.

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