

Research Finds New Cause of Ozone Wheezing and Potential Treatments

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(PhysOrg.com) -- Researchers at the Duke University Medical Center and the National Institute of Environmental Health Sciences (NIEHS) discovered a cause of airway irritation and wheezing after exposure to ozone, a common urban air pollutant.

Using an animal model, the researchers were also able to identify several ways to stop the airways from narrowing, which could help identify potential targets for drugs that help physicians treat emergency room patients suffering from wheezing, coughing and shortness of breath.

"Animals exposed to ozone produced and released high amounts of a sugar known as hyaluronan," said John Hollingsworth, MD, a pulmonologist and assistant professor in the Department of Medicine at Duke University Medical Center and senior author of the paper. "We found hyaluronan to be directly responsible for causing the airways to narrow and become irritated. We believe this may contribute to asthma symptoms in humans as well."

"It is not the ozone itself that causes the body to wheeze, but the way the lungs respond to ozone," said Stavros Garantziotis, MD, principal investigator in the NIEHS Laboratory of Respiratory Biology and lead author of the paper published online this week in the *Journal of Biological Chemistry*.

The researchers found several proteins that could mediate the hyaluronan effect and can be used as treatment targets. They were also

able to block the airway responsiveness in mice by binding the native hyaluronan away, as well as by administering a slightly modified form of hyaluronan. "Although more research is needed before these findings can be translated to humans, we are optimistic these treatment options could prove beneficial to patients," said Hollingsworth.

"This finding has real-life therapeutic implications," said Garantziotis. The researchers point out there are approximately 4,500 hospital admissions and 900,000 school absences each year attributed to ozone inhalation, especially on high-ozone alert days.

In an Environmental Protection Agency analysis, ozone costs the United States about \$5 billion a year as a result of premature deaths, hospitalizations and school absences. Inhaling ozone can lead to irritated airways and increased wheezing, particularly in children and adults who have asthma and chronic obstructive lung disease. Ozone is formed in the inner atmosphere from pollutants emitted from vehicles and other sources exposed to sunlight.

"This collaborative effort exemplifies the powerful advances we can continue to make to improve human health by teaming the innovativeness of our in-house researchers with our grantees," said Linda S. Birnbaum, PhD, NIEHS director. "This is also a good example of how NIEHS is helping to bring a pool of creative, talented young scientists to the field of environmental health sciences."

Provided by Duke University

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