

Where there's smoke, there's thiocyanate: Researchers find tobacco users in Canada exposed to higher levels of cyanide

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Tobacco users in Canada are exposed to higher levels of cyanide than smokers in lower-income nations, according to a large-scale population health study from McMaster University.

Scientists made the discovery while investigating the molecule thiocyanate—a detoxified metabolite excreted by the body after cyanide inhalation. It was measured as a urinary biomarker of tobacco use in a study of self-reported smokers and non-smokers from 14 countries of varying socioeconomic status.

"We expected the urinary thiocyanate levels would be similar across regions and reflect primarily smoking intensity. However, we noticed significant elevation of thiocyanate in smokers from [high-income countries](#) even after adjusting for differences in the number of cigarettes smoked per day," says Philip Britz-McKibbin, co-author of the study and a professor of chemistry and chemical biology at McMaster.

Tobacco-related illness remains the leading cause of preventable illness and premature death in Canada, contributing to approximately 48,000 deaths annually. According to researchers, the findings could be caused by the type of cigarettes smoked in high-income countries like Canada.

"The cigarettes commonly consumed in Canada are highly engineered products with lower tar and nicotine content to imply they're less harmful. Heavy smokers with nicotine dependence compensate by smoking more aggressively with more frequent and deeper inhalations that may elicit more harm, such as greater exposure to the respiratory and cardiotoxin, cyanide."

Smoking rates in Canada have declined from 26 percent in 2001 to 13 percent in 2020. But participation in smoking cessation programs has declined during the COVID-19 pandemic, leading to concern about a potential uptick in [smoking rates](#), including cannabis use and a plethora of vaping of products popular among young adults.

Researchers say urinary thiocyanate can serve as a robust biomarker of the harms of tobacco smoke that will aid future research on the global

tobacco picture, since most [smokers](#) now reside in developing countries. As smoking rates have decreased here in Canada, at-risk groups like youth and [pregnant women](#) have been prone to underreport their tobacco use when surveyed, making a reliable biomarker more valuable.

"Historically assessing tobacco behaviors have relied on questionnaires that are prone to bias, especially when comparing different countries and local cultures. The idea is to find robust methods that can quantify recent tobacco smoke exposure more reliably and objectively, which may better predict disease risk and prioritize interventions for smoking cessation," says Britz-Mckibbin.

The study was published in the latest issue of *Nicotine and Tobacco Research*.

More information: Stellena Mathiapparanam et al, Validation of Urinary Thiocyanate as a Robust Biomarker of Active Tobacco Smoking in the Prospective Urban and Rural Epidemiological Study, *Nicotine & Tobacco Research* (2023). [DOI: 10.1093/ntr/ntad027](https://doi.org/10.1093/ntr/ntad027)

Provided by McMaster University

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