

Researchers uncover new evidence of cancer-causing agent present in gaseous phase of cigarette smoke

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A team of researchers led by A. K. Rajasekaran, PhD, Director of the Nemours Center for Childhood Cancer Research, has shown that a key protein involved in cell function and regulation is stopped by a substance present in cigarette smoke. Their work is published online in the *American Journal of Physiology - Lung Cell and Molecular Physiology*.

Cigarette smoke is well recognized as a cause of lung cancer and is associated with many other forms of cancer in adults. Cigarette smoke has more than 4,000 components, many of which are linked to the development and progression of lung cancer. Evidence has shown secondhand smoke to be as dangerous as primary smoke due to its impact on the cells of the body.

In the study, the authors found a cancer-causing agent called reactive [oxygen species](#) (ROS) present in the gaseous phase of cigarette smoke that has the ability to inhibit normal cell function. Exposure to the secondhand smoke produced by as little as two cigarettes was found to almost completely stop the function of a cell's sodium pump within a few hours. In normal cells, the sodium pump plays a critical role transporting potassium into the cell and sodium out of the cell. The competence of the cell's sodium pump, i.e., its inability to regulate sodium, is predictive of cell damage, disease progression and ultimately, survival.

"This is critical information with regard to secondhand smoke," said Dr. Rajasekaran. "We now know that one need not inhale the particulate matter present in secondhand smoke to suffer the consequence of smoking. Exposure to the gaseous substance alone, which you breathe while standing near a smoker, is sufficient to cause harm." Dr. Lee Goodglick, Associate Professor in the Department of Pathology and Laboratory Medicine, UCLA, and co-senior author of the study, noted, "Few reliable lung [cancer biomarkers](#) that could predict survival, treatment options or response to therapy exist today. Even fewer have been recognized where the function of the [biomarker](#) is known, yielding important information about the mechanism of action. This study really accomplishes both."

This research is the latest finding in the compendium of evidence that supports protecting children from exposure to cigarette smoke. Excessive exposure to cigarette smoke during childhood can facilitate lung cancer development as children grow into adults. While more research is needed to understand the consequences of sodium pump inhibition by [cigarette smoke](#), this study reveals that [secondhand smoke](#) is even more dangerous than previously thought.

Provided by Nemours

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