

Researchers use novel methods to identify how cigarette smoke affects smokers

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Smoke from cigarettes can affect nearly every organ in the body by promoting cell damage and causing inflammation, but no one has understood which smoker is or is not susceptible to disease development.

At the American Association for Cancer Research (AACR) 102nd Annual Meeting 2011, however, researchers from Georgetown Lombardi Comprehensive Cancer Center, a part of Georgetown University Medical Center, demonstrate how [cigarette smoke](#) produces different "metabolites" or active biological compounds, in individual smokers, compared to non-smokers.

In their pilot study, they analyzed hundreds of metabolites found in the blood and urine of nine smokers and 10 non-smokers. The researchers narrowed their focus to the top 50 metabolites in smokers and non-smokers, which differed by group. In the smokers group, the levels of nicotine-related metabolites varied. In addition, overall metabolomic profiles varied among male and female. The researchers validated the reproducibility of the methodology to ensure the experiments were giving low variability.

"This gives us an idea of how people produce [metabolites](#) differently when smoking cigarettes, which is based on their particular [genetic profile](#) and other biological and environmental factors," says the study's lead investigator, Ping-Ching Hsu, a doctoral student who works in the laboratory of oncology researcher Peter Shields, M.D., who specializes in tobacco carcinogenesis, and occasionally serves as an expert witness

against cigarette manufacturers in tobacco related litigation. Shields is the senior author.

This study is designed to identify the "metabolome" of individual smokers, which can provide clues as to both the specific effect that cigarette smoking has on human biology, as well as how individuals vary in their internal response to the smoke.

The ultimate goal of this study, which is part of extensive research project, is to find [biomarkers](#) in smokers that predict for development of disease in smokers, Hsu says. It can also help in the development of blood tests that will allow researchers to assess the harmfulness of one tobacco product compared to another.

A metabolite is produced when anything taken into the body – such as food, tobacco smoke, alcohol, or medicine – is metabolized, or broken down into chemicals that produce a biological function via metabolic pathways. The global metabolome is the network of metabolic reactions, and metabolomics is analysis of the metabolome at any given time.

Comparatively, cigarette manufacturers have only been required to use machines that "smoked" cigarettes to derive the chemical content of potential carcinogens. "Metabolomics provides a broad picture of what is happening in the body of smokers," Hsu says.

This is the second study Hsu has presented at an AACR conference. In November, she reported the findings of a study that examined the blood "metabolomics" profile of light versus heavy [smokers](#), and found that smoking behavior could alter several biological pathways.

Provided by Georgetown University Medical Center

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