

'A stark warning:' Smoking causes genetic damage within minutes after inhaling

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Cigarette smoke damages DNA within minutes after inhalation. Credit: iStock

In research described as "a stark warning" to those tempted to start smoking, scientists are reporting that cigarette smoke begins to cause genetic damage within minutes -- not years -- after inhalation into the lungs.

Their report, the first human study to detail the way certain substances in tobacco cause DNA damage linked to cancer, appears in *Chemical Research in Toxicology*, one of 38 peer-reviewed scientific journals published by the American Chemical Society.

Stephen S. Hecht, Ph.D., and colleagues point out in the report that [lung cancer](#) claims a global toll of 3,000 lives each day, largely as a result of cigarette smoking. Smoking also is linked to at least 18 other types of cancer. Evidence indicates that harmful substances in [tobacco smoke](#) termed

polycyclic [aromatic hydrocarbons](#), or PAHs, are one of the culprits in causing lung cancer. Until now, however, scientists had not detailed the specific way in which the PAHs in cigarette smoke cause DNA damage in humans.

The scientists added a labeled PAH, phenanthrene, to cigarettes and tracked its fate in 12 volunteers who smoked the cigarettes. They found that phenanthrene quickly forms a toxic substance in the blood known to trash DNA, causing mutations that can cause cancer. The smokers developed maximum levels of the substance in a time frame that surprised even the researchers: Just 15-30 minutes after the volunteers finished smoking. Researchers said the effect is so fast that it's equivalent to injecting the substance directly into the bloodstream.

"This study is unique," writes Hecht, an internationally recognized expert on cancer-causing substances found in cigarette smoke and smokeless tobacco. "It is the first to investigate human metabolism of a PAH specifically delivered by inhalation in [cigarette smoke](#), without interference by other sources of exposure such as [air pollution](#) or the diet. The results reported here should serve as a stark warning to those who are considering starting to smoke cigarettes," the article notes.

Provided by American Chemical Society

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