Scientists discover how cigarette smoke causes cancer

Everyone has known for decades that that smoking can kill, but until now no one really understood how cigarette smoke causes healthy lung cells to become cancerous. In a new research report published in the March 2008 print issue of *The FASEB Journal*, researchers from the University of California, Davis, show that hydrogen peroxide (or similar oxidants) in cigarette smoke is the culprit.

This finding may help the tobacco industry develop "safer" cigarettes by eliminating such substances in the smoke, while giving medical researchers a new avenue to developing lung cancer treatments.

"With the five-year survival rate for people with lung cancer at a dismally low 15.5 percent, we hope this study will provide better insight into the identification of new therapeutic targets," said Tzipora Goldkorn, senior author of the report.

In the research study, Goldkorn and colleagues describe how they exposed different sets of human lung airway cells (in the laboratory) to cigarette smoke and hydrogen peroxide. After exposure, these cells were then incubated for one to two days. Then they, along with unexposed airway cells, were assessed for signs of cancer development. The cells exposed to cigarettes smoke and the cells exposed to hydrogen peroxide showed the same molecular signatures of cancer development, while the unexposed cells did not.

"Guns kill, bombs kill and cigarettes kill," said Gerald Weissmann, MD, Editor-in-Chief of The FASEB Journal. "While biologists can't do much about the first two, studies like this will help in the fight against tobacco-related death and disease. These experiments not only pin-point new molecular targets for cancer treatment, but also identify culprits in cigarette smoke that eventually will do the smoker in."

According to the U.S. Centers for Disease Control and Prevention, cigarette smoking is the single most preventable cause of premature death in the United States, resulting in more than 400,000 deaths per year or about 1 in 5 U.S. deaths overall. Smoking accounts for the vast majority of lung cancer deaths, causing 90 percent of all lung cancer deaths in men and about 80 percent in women.

In 2000, a Surgeon General report revealed that tobacco smoke contains more than 4,000 chemical compounds, with 43 being known carcinogens. Some of the 4,000 compounds result from chemicals added in processing to improve taste, increase burning times, and prolong shelf life.

Source: Federation of American Societies for Experimental Biology

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