Nonsmokers in automobiles are exposed to significant secondhand smoke

November 14 2014

Smoking harms nearly every organ in the body and causes many diseases. Credit: CDC/Debora Cartagena

Nonsmokers sitting in an automobile with a smoker for one hour had markers of significantly increased levels of carcinogens and other toxins in their urine, indicating that secondhand smoke in motor vehicles poses a potentially major health risk according to a groundbreaking study led by UC San Francisco researchers.

The nonsmoking passengers showed elevated levels of butadiene, acrylonitrile, benzene, methylating agents and ethylene oxide. This group of toxic chemicals is "thought to be the most important among the thousands in tobacco smoke that cause smoking-related disease," said senior investigator Neal L. Benowitz, MD, a UCSF professor of medicine and bioengineering and therapeutic sciences and chief of the division of clinical pharmacology at San Francisco General Hospital and Trauma Center.

"Ours is the first study to measure exposure to these particular chemicals in people exposed to secondhand smoke," said Benowitz. "This indicates that when simply sitting in cars with smokers, nonsmokers breathe in a host of potentially dangerous compounds from tobacco smoke that are associated with cancer, heart disease and lung disease."

The scientists published their results on November 14, 2014 in the journal *Cancer, Epidemiology, Biomarkers & Prevention* published by the American Association for Cancer Research.

For the study, 14 nonsmokers each sat for one hour in the right rear passenger seat of a parked sport utility vehicle behind a smoker in the driver's seat. During that time, the smoker smoked three cigarettes. The front and rear windows were opened 10 centimeters, or almost four inches.

Before being exposed to the smoke and then eight hours afterward, the nonsmokers' urine was analyzed for biomarkers of nine chemical compounds found in cigarette smoke that are associated with cancer, cardiovascular disease and respiratory diseases. Seven biomarkers showed a significant increase following exposure to secondhand smoke.

"This tells us that people, especially children and adults with preexisting health conditions such as asthma or a history of heart disease should be

protected from secondhand smoke exposure in cars," said lead author Gideon St. Helen, PhD, a postdoctoral researcher in the UCSF Department of Medicine.

The scientists cautioned that the research might not represent smoking situations in most cars because the stationary vehicle used in the research would provide less ventilation than a moving car.

"Nonetheless, the air samples we took were similar in makeup to those seen in previous smoking studies that used closed cars and cars with different ventilation systems in operation," said St. Helen. "And so we believe that the general levels of risk to nonsmokers that we present is realistic."

Provided by University of California, San Francisco