

Cigarette smoking may cause physical changes in brains of young smokers, study shows

March 4 2014, by Mark Wheeler



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

(Medical Xpress)—The young, it turns out, smoke more than any other age group in America. Unfortunately, the period of life ranging from late adolescence to early adulthood is also a time when the brain is still developing.

Now, a small study from UCLA suggests a disturbing effect: Young adult smokers may experience changes in the structures of their brains due to cigarette [smoking](#), dependence and craving. Even worse, these changes can occur in those who have been smoking for relatively short time. Finally, the study suggests that neurobiological changes that may result from smoking during this critical period could explain why adults who began smoking at a young age stay hooked on cigarettes.

The study appears in the March 3 online edition of the journal *Neuropsychopharmacology*.

"Although we are not certain whether the findings represent the effects of smoking or a genetic risk factor for nicotine dependence, the results may reflect the initial effects of cigarette smoking on the brain," said senior author Edythe London, a professor of psychiatry and of molecular and medical pharmacology at UCLA's Semel Institute for Neuroscience and Human Behavior and David Geffen School of Medicine. "This work may also contribute to the understanding of why smoking during this developmental stage has such a profound impact on lifelong smoking behavior."

London and her colleagues, including first author Angelica Morales, a graduate student researcher in London's lab, found differences among younger smokers and non-smokers in the insula, a part of the brain's cerebral cortex that is involved in monitoring internal states and making decisions. The researchers focused on the insula because it is known to play a central role in the maintenance of tobacco dependence, having the highest density of nicotinic acetylcholine receptors within the human cerebral cortex.

The researchers took smoking histories, assessed cigarette craving and dependence, and examined the insula using high-resolution structural magnetic resonance imaging in 42 participants ranging in age from 16 to

22. Of the participants, 24 were non-smokers and 18 were smokers. Those who smoked began around the age of 15 and smoked fewer than seven cigarettes a day at the time of the study.

By measuring cortical thickness of the insula in both groups, the researchers found that the amount of "pack-years" — the time of cigarette exposure — was negatively related to the thickness in the right side of the insula. That is, the more someone smoked, the thinner that part of the insula. The relationship also held true for the participants' level of dependence on cigarettes and the urge to smoke.

"Our results suggest that participants with greater smoking exposure had more severe [nicotine dependence](#), more cigarette craving and less insular thickness than those with less exposure," London said. "While this was a small study and needs to be replicated, our findings show an apparent effect of smoking on brain structure in young people, even with a relatively short smoking history. And that is a concern. It suggests that smoking during this critical time period produces neurobiological changes that may cause a dependence on tobacco in adulthood."

Other study authors included Dara Ghahremani, Milky Kohno and Gerhard Helleman, all of UCLA. Funding for the study was provided by Philip Morris USA. Philip Morris did not have any input on the design of the studies, data analysis or interpretation.

Provided by University of California, Los Angeles

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