Study correlates ADHD and secondhand smoke

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(Medical Xpress)—Duke Medicine has established a new research program to investigate the relationship between exposure to

environmental tobacco smoke during pregnancy and childhood and attention deficit hyperactivity disorder (ADHD) in children.

Funded jointly by the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health, and the U.S. Environmental Protection Agency (EPA), the Center for Study of Neurodevelopment and Improving Children's Health following Environmental tobacco Smoke exposure (NICHES) at Duke will receive approximately $7.8 million from 2013 to 2018.

"A recent study suggests that up to half of U.S. children are exposed to secondhand smoke, which could be changing the way their genes are regulated," said Susan K. Murphy, Ph.D., associate professor of obstetrics and gynecology at Duke University School of Medicine and the center's principal investigator. "NICHES is seeking to substantially improve our overall understanding of the environment's role—including exposure to tobacco smoke—in ADHD."

Secondhand smoke is known to be an environmental risk factor for ADHD, the most common psychiatric disorder in childhood. ADHD affects over five million children in the United States and costs the country $42.5 billion each year, according to a 2007 study in the Journal of Pediatric Psychology.

Genetic factors account for approximately 76 percent of the risk for ADHD, but the remaining risk is attributed to the environment. Environmental factors can cause changes in gene expression through altering a process called epigenetic regulation. These changes can increase one's risk of disease, and may even be passed down to offspring.

Prior research has shown that tobacco smoke exposure causes epigenetic changes, but a comprehensive understanding of its effects and how it

relates to ADHD risk is largely unknown. The new interdisciplinary children's center will work to answer these questions through three research projects and a community outreach and education component:

Led by Bernard Fuemmeler, Ph.D., MPH, associate professor of community and family medicine, psychiatry and behavioral science and psychology and neuroscience, researchers will study a group of children whose mothers have been participating in Duke research since before their child was born. Children of these mothers will be evaluated for cognitive development and monitored for ADHD-like symptoms, which will be related to exposure to secondhand smoke. Secondhand smoke exposure will be measured through blood markers at birth and during childhood.

A translational research project led by Edward Levin, Ph.D., professor of psychiatry and behavioral sciences, will investigate prenatal exposure to chemicals in tobacco smoke and nicotine in rats to determine if the exposure is associated with ADHD-like behaviors and how prenatal exposure to tobacco chemicals and nicotine alter neural proliferation, differentiation and circuit formation in the brain.
The third research project, led by Murphy, will work to define epigenetic changes that occur following tobacco smoke exposure in rats and humans and how these relate to ADHD-like behaviors in the rats and ADHD in humans.

The community outreach component of the center, led by Rochelle Schwartz-Bloom, Ph.D., professor of pharmacology and cancer biology, will develop social media-based educational materials for members of the public at risk of smoking to communicate the research findings.

"Our main goals are to understand the epigenetic mechanisms that underlie neurodevelopmental vulnerability to environmental toxicants like tobacco smoke, which will help us to determine which children are

at risk for ADHD, identify targets for developing new treatments, and ultimately improve children's health," Murphy said.

Provided by Duke University