Smoking linked to ADHD in future generations

by Will Parker

Florida State University scientists investigating neurobehavioral disorders say that attention deficit hyperactivity disorder (ADHD) could be an environmentally induced health condition inherited from a grandmother who smoked during pregnancy.

ADHD affects about 10 percent of children and 5 percent of adults in the United States. Health experts have struggled to produce a definitive scientific explanation for the massive increase in ADHD diagnoses in the last few decades.

Now, researchers Pradeep G. Bhide and Jinmin Zhu have found evidence that ADHD associated with nicotine can be passed across generations. Their intriguing findings about epigenetic inheritance are published in the current issue of The Journal of Neuroscience.

In previous research, it was found that nicotine can leave heritable epigenetic marks on the genome, which make future offspring more susceptible to respiratory conditions. "What our research and other people's research is showing is that some of the changes in your genome - whether induced by drugs or by experience - may be permanent and you will transmit that to your offspring," said Bhide.

Building on recent discoveries about how things like stress or fear in one individual can be passed along to the next generation, Bhide and Zhu were curious about a proven link between prenatal nicotine exposure and hyperactivity in mice. Their data demonstrated that there is a transgenerational transmission via the maternal, but not the paternal, line of descent.

"What's important about our study is that we are seeing that changes occurring in my grandparents' genome because of smoking during pregnancy are being passed to my child," says Bhide. "So if my child had ADHD it might not matter that I did not have a disposition or that I never smoked."

The researchers speculate that one possible contributing factor in the current spike in ADHD cases correlates in some manner to an increase in the number of women who smoked during
pregnancy as cigarettes became fashionable in the United States around the time of World War II and in the decades that followed.

"Genes are constantly changing. Some are silenced and others are expressed, and that happens not only by hereditary mechanisms, but because of something in the environment or because of what we eat or what we see or what we hear," Bhide said. "So the genetic information that is transmitted to your offspring is qualitatively different than the information you got from your parents. The next question is how does transmission to future generations happen? What is the mechanism? And the second question is, if the individual is treated successfully would that stop the transmission to future generations?"