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## **Grandmothers' smoking linked to grandchildren's asthma decades later**

*USC researchers find tobacco's effects in utero may be passed through generations*

LOS ANGELES, April 11 – A child whose grandmother smoked while pregnant may have double the risk of developing childhood asthma as a child whose grandmother did not smoke, according to researchers from the Keck School of Medicine of the University of Southern California (USC).

Published in the April issue of the journal *Chest*, the study suggests that tobacco's harmful effects on the lungs can be passed down through generations, from grandmother to grandchild, even when the child's mother appears unaffected.

“This is the first study to show that if a woman smokes while she is pregnant, both her children and grandchildren may be more likely to have asthma as a result,” said the study's senior author, Frank D. Gilliland, M.D., Ph.D., M.P.H., professor of preventive medicine at the Keck School of Medicine. “The findings suggest that smoking could have a longer-lasting impact on families' health than we had ever realized.”

Keck School preventive medicine researchers interviewed parents or guardians of 908 Southern California children participating in the USC Children's Health Study, which includes children and teens recruited in grades 4, 7 and 10. Of the participants, 338 children had asthma by age 5, while another 570 children were asthma-free.

They found these results:

- Children whose mothers smoked while pregnant were one-and-a-half times more likely to develop asthma early in life than children whose mothers did not smoke while pregnant.
- Children whose grandmothers smoked were more than twice as likely (2.1 times) to develop asthma.
- Even if a child's mother did not smoke while she was pregnant—but the child's grandmother did—the child had nearly double the risk (1.8 times) of developing asthma.
- If both the mother and grandmother smoked while pregnant, a child was more than two-and-a-half times more likely (2.6 times) to develop asthma.

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“We suspect that when a pregnant woman smokes, the tobacco might affect her fetus’s DNA in the mitochondria, and if it is a girl, her future reproductive cells as well,” Gilliland says. “We speculate that the damage that occurs affects the child’s immune system and increases her susceptibility to asthma, which is then passed down to her children.”

Researchers suggest that when a pregnant woman smokes, chemicals from the tobacco may biologically damage her fetus. They hypothesize that smoke can affect the child in two ways: First, if the child is a girl, her eggs may be affected, which will in turn put her future children at risk; and second, the fetus’s mitochondria may be damaged through subtle changes in which genes are turned on or off—changes that may be transmitted through the maternal line as well.

The scientists speculate that these alterations decrease immune function and reduce the body’s ability to rid itself of toxins, thereby increasing their risk of asthma in smokers’ children and grandchildren. They also note that further studies are needed to confirm their results and investigate the issue more deeply.

“These findings indicate that there is much more we need to know about the harmful effects of *in utero* exposure to tobacco products and demonstrate how important smoking cessation is for both the person smoking and their family members,” said Paul A. Kvale, M.D., president of the American College of Chest Physicians, which publishes *Chest*.

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Yu-Fen Li, Bryan Langholz, Muhammad T. Salam, and Frank D. Gilliland, “Maternal and Grandmaternal Smoking Patterns Are Associated With Early Childhood Asthma,” *Chest*. Vol. 127, No. 4, April 2005, Pp. 1232-1240.