

Grandmother's cigarette habit could be the cause of grandchild's asthma

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Grandmother's cigarette smoking could be responsible for her grandchild's asthma, and the recent discovery of this multi-generational transmission of disease suggests the environmental factors experienced today could determine the health of family members for generations to come, two Los Angeles Biomedical Research Institute (LA BioMed) lead researchers write in the March edition of *Review of Obstetrics & Gynecology*.

The researchers, John S. Torday, PhD, and Virender K. Rehan, MD, wrote an editorial citing recent studies by Dr. Rehan that found pregnant rats given nicotine produced asthmatic pups that went on to produce their own asthmatic pups, despite the absence of nicotine exposure in the third generation.

The findings suggest nicotine can leave heritable epigenetic marks on the genome, which make future offspring more susceptible to respiratory conditions.

The researchers also cited the Children's [Health](#) Study from Southern California, which reported that grandmaternal smoking during pregnancy increases the risk of [asthma](#) in grandchildren regardless of whether the mother smoked or not.

Based on those findings, the researchers conclude that [environmental factors](#) experienced during pregnancy will affect not only the child in utero but also future generations of the same family. They say this multi-

generational transmission could explain why 98% of inherited human diseases are unaccounted for by the prevailing view of genetic trait transmission, known as Mendelian genetics.

The researchers concluded that the cause of the second generation's asthma was epigenetic modification (an environmental factor causing a genetic change). Nicotine was affecting both the lung cells and the sex cells in ways that caused the lungs that developed from those cells to develop abnormally, causing asthma.

"These studies break new ground in validating and further explaining the mechanisms involved in the transmission of epigenetic human diseases," Dr. Torday said. "The transmission of the asthma to the second generation and its prevention by a specifically-targeted molecular intervention are the first unequivocal demonstrations of multi-generational transmission of an epigenetically-mediated effect on the offspring."

Dr. Rehan, who has conducted multiple studies on nicotine's effects, noted that asthma rates are growing in the U.S. and around the world. World-wide, approximately 250,000,000 women smoke daily. Twelve percent of women in the U.S. continue to smoke during pregnancy, resulting in the birth of at least 400,000 smoke-exposed infants per year in the U.S. alone

"Asthma is the most common chronic disease of childhood, resulting in a significant impact on the lives of children and driving up medical costs for all," Dr. Rehan said. "While many factors contribute to asthma, smoking during pregnancy is a well-established one and one that can be avoided. Eliminating smoking during pregnancy would significantly reduce the prevalence of childhood asthma for this generation and for future generations."

More information: www.expert-reviews.com/doi/full/10.1586/eog.12.79

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