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Cigarette smoke damages DNA in reproductive cells of fathers, these changes inherited by offspring

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When shopping for dad's Father's Day gift, consider what he gave you when you were conceived. If he smoked, your genes are likely damaged, and your odds for diseases increased. A report in the *FASEB Journal* shows that men who smoke before conception can damage the genes of their offspring. These inherited changes in DNA could render developing offspring susceptible to later diseases, providing evidence for quitting smoking before trying to conceive.

As you decide what to get dad for Father's Day, you might want to consider what he gave you when you were conceived. If he smoked, your genes are likely damaged, and your odds for cancers and other diseases throughout your life could be increased. A new research report appearing online in the *FASEB Journal*, scientists show for the first time in humans that men who smoke before conception can damage the genetic information of their offspring. These inherited changes in DNA could possibly render an offspring in the womb susceptible to later disease such as cancer. This provides evidence showing why men should be urged to stop smoking before trying to conceive in the same way women have been urged to quit. Interestingly, a fertile sperm cell takes about three months to fully develop; therefore men would ultimately need to quit smoking long before conception to avoid causing genetic problems.

"That smoking of fathers at the time around conception can lead to

genetic changes in their children indicates that the deleterious effects of smoking can be transmitted through the father to the offspring," said Diana Anderson, Ph.D., a researcher involved in the work from the School of Life Sciences at the University of Bradford, in the United Kingdom. "These transmitted genetic changes may raise the risk of developing cancer in childhood, particularly leukemia and other genetic diseases. We hope that this knowledge will urge men to cease smoking before trying to conceive."

To make this discovery, Anderson and colleagues used DNA biomarkers to measure genetic changes in the paternal blood and semen around conception, as well as maternal and umbilical cord blood at delivery in families from two different European regions in central England and a Greek island. Information regarding the lifestyle, environmental and occupational exposures of these families was taken from validated questionnaires. The combined analysis of exposures and DNA biomarkers was used to evaluate the role of exposures before conception and during pregnancy in the causation of genetic changes in the offspring. These results have strong implications for the prevention of disease.

"This report shows that smoking is a germ cell mutagen. If dad uses cigarettes, his kids will be affected even before they are born," said Gerald Weissmann, M.D., Editor-in-Chief of the FASEB Journal. "As Father's Day approaches, family members may want to give dads and prospective dads the help they need to quit smoking for good."

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