Women who smoke while pregnant could alter their children's genes

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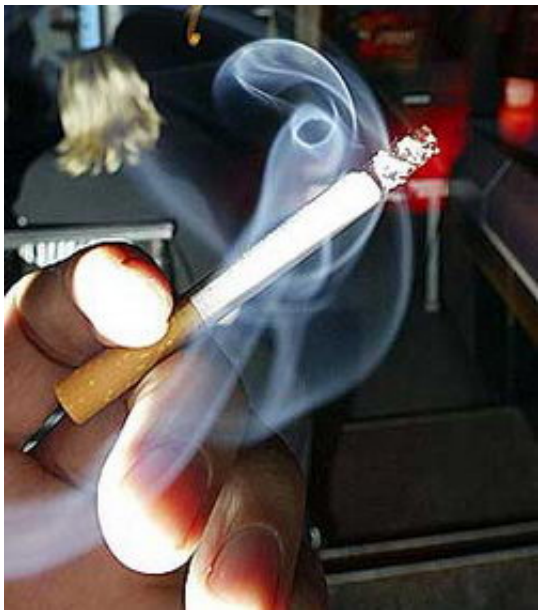

The largest study of its kind has shown that smoking during pregnancy could cause epigenetic changes in the fetus, resulting in birth defects and health problems later in life. Christina Markunas of the National Institute of Environmental Health Sciences and her colleagues have found that newborn children of mothers who smoked while pregnant are more likely to have experienced certain changes to their DNA than newborn children of non-smokers. The research appears in *Environmental Health Perspectives*.

Children exposed to tobacco smoke in utero have a higher risk of birth defects and are more likely to suffer from some medical problems than the children of women who did not smoke while pregnant. This disparity between the children of smokers and the children of non-smokers continues into adulthood. While scientists aren't sure why smoking during pregnancy causes these problems, earlier studies have suggested that exposure to toxins in tobacco smoke could cause changes to the DNA of the developing fetus. Of the more than 7,000 chemicals in tobacco smoke, hundreds are harmful. At least 69 are carcinogens.

In one study, reported in 2011, researchers examined the possibility that exposure to tobacco smoke could cause changes in DNA methylation, the addition of a methyl tag to a gene. Alterations in DNA methylation can change how a gene functions and increase the risk of developing certain diseases, including cancer. That study, which looked at DNA from the cheek cells of 173 children and their mothers, found that children whose mothers smoked while pregnant were twice as likely to experience DNA methylation of a gene involved in the immune response and many types of cancer than the children of mothers who did not smoke during pregnancy.

Markunas and her team studied a much larger group of mothers and children. They analyzed blood samples from 889 newborns, of which 287 had mothers who reported smoking in the first trimester of pregnancy. They found a link between maternal smoking and altered methylation in 110 gene regions.

Some of the genes affected play a role in placental and embryonic development, substance abuse, nicotine addiction and the ability to stop smoking. Children of women who smoke during pregnancy are more likely to have low birth weights and are more likely to be nicotine or drug addicts as adults than children who were not exposed to tobacco smoke before birth.

The team says that further studies are needed to determine whether these DNA alterations persist throughout life.

More information: *Environ. Health Perspect.*; DOI: 10.1289/ehp.1307259

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