Prenatal exposure to flu pandemic increased chances of heart disease

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People exposed to a H1NI strain of influenza A while in utero were significantly more likely to have cardiovascular disease later in life, reveals a new study to be published in *Journal of Developmental Origins of Health and Disease* on Oct. 1.

"Our point is that during pregnancy, even mild sickness from flu could affect development with longer consequences," said senior author Caleb Finch, USC professor of gerontology and biological sciences.

Finch, Eileen Crimmins (USC Davis School of Gerontology), lead author Bhashkar Mazumder (Federal Reserve Bank of Chicago), Douglas Almond (University of Chicago) and Kyung Park (Columbia University) looked at more than 100,000 individuals born during and around the time of the 1918 influenza pandemic in the United States.

After first appearing in the spring and all but disappearing in the summer, the 1918 flu pandemic "resurged to an unprecedentedly virulent October-December peak," the researchers write. The outbreak of influenza A, H1N1 subtype killed two percent of the total population. Most people experienced mild "three-day fever" with full recovery.

"[The] 1918 flu was far more lethal than any since. Nonetheless, there is particular concern for the current swine flu which seems to target pregnant women," said Finch, director of the Gerontology Research Institute at USC. "Prospective moms should reduce risk of influenza by vaccination."

The researchers found that men born in the first few months of 1919 — second or third trimester during the height of the epidemic — had a 23.1 percent greater chance of having heart disease after the age of 60 than the overall population. Heart disease is the leading cause of death in the United States.

For women, those born in the first few months of 1919 were not significantly more likely to have cardiovascular disease than their peers, pointing to possible gender differences in effects of flu exposure. But women born in the second quarter of 1919 — first trimester during the height of the epidemic — were 17 percent more likely to have heart disease than the general population in later life, according to the study.

In addition, the researchers examined height at World War II enrollment for 2.7 million men born between 1915 and 1922 and found that average height increased every successive year except for the period coinciding with in utero exposure to the flu pandemic.

Men who were exposed to the H1N1 flu in the womb were slightly shorter on average than those born just a year later or a year before, according to the study. The researchers controlled for known season-of-birth effects and maternal malnutrition.

"Prenatal exposure to even uncomplicated maternal influenza can have lasting consequences later in life," said Crimmins, professor of gerontology and sociology at USC. "The lingering influences from the 1918-1919 influenza pandemic extend the hypothesized roles of inflammation and infections in cardiovascular disease from our prior Science and PNAS articles to prenatal infection by influenza."

More information: Finch et al., "Lingering Prenatal Effects of the 1918 Influenza Pandemic on Cardiovascular Disease." *Journal of Developmental Origins of Health and Disease*. DOI:

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