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A mother's high cholesterol before pregnancy can be passed on to her children

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What leads to high cholesterol? Your genes and lifestyle factors may not explain it all. A study presented today at the Canadian Cardiovascular Congress has connected some of the risk for high cholesterol in adults to their mother's cholesterol levels before she even became pregnant.

The key finding: if a mother had high LDL ("bad") cholesterol prior to a pregnancy, her children are almost five times as likely to also have high LDL cholesterol as adults.

"Maternal health and exposures in the womb may be important in modifying cardiovascular disease risks for their offspring," says author Dr. Michael Mendelson, a clinical and research fellow at Boston Children's Hospital. "One exposure that hasn't been explored well is high cholesterol in young women of childbearing age. We wanted to know: does this pose an extra risk for the child?"

The study analyzed clinical and laboratory data gathered from the three generations of participants in the Framingham Heart Study (FHS). This ongoing study goes back to 1948 and led the way to identifying risk factors for cardiovascular disease.

"No one else was measuring cholesterol in young healthy people in the 1950s, let alone young women before pregnancy, so we could leverage the FHS information to look at this issue," says Dr. Mendelson.

The FHS began with an original cohort of 5,200 adult men and women

from Framingham, Mass., who had not yet developed overt symptoms of cardiovascular disease.

For this study, the sample included adult offspring of the first and second generation subjects and drew on the maternal examinations prior to the participants' birth.

"What we found was that maternal cholesterol before pregnancy was associated with important cardiovascular disease risk factors among adult offspring," says Dr. Mendelson. "The association was stronger for high cholesterol in mothers before pregnancy as compared to those with high cholesterol after pregnancy."

The study comes from the cutting-edge field of epigenetics, which looks at how our genes can be switched on and off by environmental changes.

"The risk of developing high cholesterol is not fully explained by known genetic and lifestyle factors," says Dr. Mendelson. "Influences which may play a role in turning genes on or off – such as exposure to high cholesterol in the womb – may have a lasting effect in regulating cholesterol levels, even decades later."

The next step is to look at the mechanisms of why this happens, says Dr. Mendelson. Ultimately, this line of research may lead to finding new ways to break the trans-generational cycle of abnormal cholesterol levels and death from cardiovascular disease.

Heart and Stroke Foundation spokesperson Dr. Beth Abramson notes that the research reconfirms the importance of managing cholesterol levels throughout life.

"While the concept of 'turning on' genes is exciting when looking at the mechanisms of disease, it's sometimes hard to tease out whether the risk

is passed on through lifestyle choices or genes. Regardless, the implications are serious. We need to manage our cholesterol to protect ourselves and our children."

High blood cholesterol is a major risk factor for heart disease and stroke. It can lead to a buildup of plaque in the artery walls and narrowing of the arteries, causing a condition called atherosclerosis which can make it more difficult for blood to flow through the heart and body.

"Fortunately, we know a great deal about heart disease prevention and how to reverse some of the risks," says Dr. Abramson.

She urges Canadians to maintain their heart health through regular visits to their doctor, being physically active and smoke free, following a healthy diet and reducing stress and excessive alcohol consumption. "We all can manage cholesterol through diet, lifestyle, and where appropriate with medication. Taking medications as directed by your physician can help further reduce risks."

Provided by Heart and Stroke Foundation of Canada

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