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## Poverty leaves its mark on DNA, researchers find

CBC News Posted: Oct 28, 2011 3:57 PM ET | Last Updated: Oct 28, 2011 4:07 PM ET

Adults who grew up in poverty show changes in the "programming" of their DNA that may be linked to health problems such as obesity and autoimmune diseases, Canadian and British researchers have found.



DNA is programmed to turn certain genes up or down by adding a chemical marker in specific places. iStock

Researchers had previously known that DNA is "programmed" in the womb to turn certain genes up or down, and more recently have shown that some programming can continue into childhood and adulthood.

But the study published online this week in the International Journal of Epidemiology is the first to show an actual link between a person's early economic circumstances and the biochemistry of that person's DNA, said Moshe Szyf, a professor of pharmacology at McGill University, who co-authored the study with colleagues at the University of British Columbia and the UCL Institute of Child Health in London.

The researchers examined the DNA in the blood of a group of 40 45-year-old Brits who had been part of an ongoing study since birth. Because of that, the researchers knew whether they grew up in rich or poor families as well as other information about them.

The researchers were looking for a chemical marker called a methyl group that is added to the DNA in certain places through a process known as methylation. That turns genes up or down, meaning they become more or less activated, a phenomenon known as epigenetics.

### Adaptation to changing world

"Our DNA is old and it doesn't always fit to the kind of world we're going to live in," Szyf told CBC's *Quirks & Quarks* in an interview Saturday.

Scientists think a child's DNA methylation respond to signals both before and after birth about what kind of gene function it will need. For example, a child born into a world with plentiful food will not need the ability to store as much food as fat as a child born into a world of famine, Szyf said.

In the study group, those participants who were raised in difficult economic circumstances showed DNA patterns in which groups of genes changed in ways that would have traditionally helped humans adapt to impoverished environments.

For example, there were changes that could boost activity in immunity genes, which did not surprise researchers, because traditionally people who lived in poverty were exposed to lots of disease.

"They see the signal from the mother as being 'it's going to be a harsh world, there's going to be a lot of bacteria around, prepare yourself,'"

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- Quirks & Quarks: Download the MP3 of the interview or hear the rest of the show
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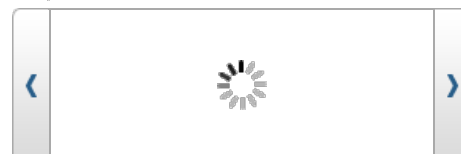
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Syzf said.

He added that the impact of poverty during childhood on the DNA methylation was found to be much greater than the impact of a person's economic circumstances as an adult, or other factors such as whether the mother smoked while pregnant.

Some health problems, such as autoimmune diseases (where a person's immune system attacks their own body), may be common among poor people now because they live differently than poor people in the past, Syzf suggested. For example, today's less well off exist in a much cleaner environment, at least in most Western societies.

"Essentially, you have an immune system that's programmed to deal with something that was anticipated but never happens. And now that immune system starts working against itself."

Syzf said the hope is that early intervention to help poor families could protect children from the response that marks their DNA for life.

He added that researchers now have the tools to test whether such intervention has, in fact, worked.

As well, he said, most drug companies are already working on drugs that can affect methylation, which is chemically reversible.

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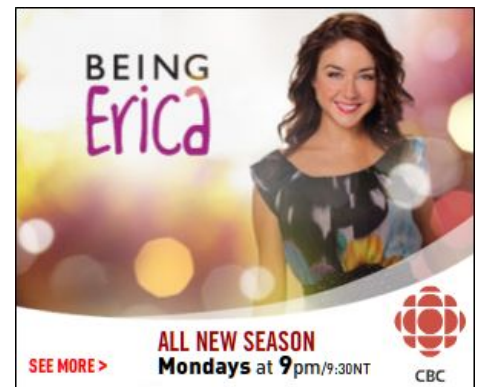
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