

WHAT CAN EPIGENETICS TELL US ABOUT TWIN DEVELOPMENT?

As you would expect, five-year-old identical twins, Marcos and Gabriel, have a great deal in common. They love playing outside, riding on their bikes and playing board games.

But some differences are starting to emerge. Gabriel suffers from asthma, hives on his skin and a heart murmur while Marcos doesn't.

It is these similarities and differences between twins that are helping researchers, like Associate Professor Jeff Craig, to discover what role genes and environment play in our health.

Jeff is studying epigenetic differences within twin pairs. Epigenetics is the study of how changes to our DNA can turn genes 'on' or 'off'. He is especially interested in how the environment in the womb may affect the genes of babies and their later health.

Groundbreaking research by his team has shown that the environment experienced in the womb may have a greater effect on our future health than previously thought - and more of an effect than our DNA, and the health and lifestyle of mothers while pregnant.

By comparing the level of epigenetic differences in identical twins versus non-identical twins, researchers were able to estimate the contributions of both genes and environment in the womb to the newborn.

"This study demonstrated that the unique environment in the womb impacts each twin differently. This must be due to events that happened to one twin and not the other whilst in the womb and shows that the experiences in the womb are important in defining the epigenetic profile we are born with," Jeff said.

Researchers say these ideas are further supported by their finding that birth weight differences within pairs of twins are related to epigenetic differences, especially in genes that may be linked with predisposition to diseases previously associated with low birth weight.

For Marcos and Gabriel's mother, Zaina Nehme, it came as a surprise that there were so many differences between her two boys.

"In their first couple of years these differences were a surprise to me. I was under the



Identical twins, Marcus and Gabriel Nehme, have many differences as well as similarities.

Photo courtesy of Andre Tan & the Murdoch Children's Research Institute

impression that because identical twins have the same genetic composition it is a given that both would suffer from the same health conditions," she said.

"However, as my knowledge increases about twins and more research is done in the area, I get less surprised. Nevertheless, I keep on asking myself - if genes can account for their similarities, what accounts for their differences? And it seems epigenetics has a lot of the answers."

Assoc/Prof Craig is the Deputy Director of Twins Research Australia and is undertaking his twin epigenetic research at the Murdoch Children's Research Institute. Thanks to MCRI for the original interviews on which this story is based.

To keep up to date with the latest in twin research, visit Twins Research Australia at www.twins.org.au. You can also connect with us on [Facebook](#), [Instagram](#) and [Twitter](#).

