

Epigenetic 'fingerprint' identifies diabetes risk

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Professor Leigh Ackland (left), Director of Deakin's Centre for Cellular and Molecular Biology, and Deputy Director of the Molecular and Medical Research SRC and Ms Bronwyn Halfpenny (right), Victorian Government Health Ambassador for Diabetes. Credit: Deakin University

Deakin researchers have identified an epigenetic marker that predicts risk of type 2 diabetes in women with gestational diabetes.

Scientists at Deakin University have discovered that specific epigenetic markers can distinguish [women](#) with [gestational diabetes](#) who develop type 2 diabetes from women with gestational diabetes who do not develop type 2 diabetes after pregnancy.

Gestational diabetes is increasing significantly in Australia. Its incidence has almost doubled since 2013 – increasing by eight per cent during 2016.

"In the past year in Australia over 37,000 women were diagnosed with gestational diabetes, that's 103 women every day," said project leader Professor Leigh Ackland, Director of Deakin's Centre for Cellular and Molecular Biology, and Deputy Director of the Molecular and Medical Research SRC.

"Gestational diabetes is a strong population predictor of subsequent development of type 2 diabetes, with a greater than seven-fold increase in risk of development of type 2 diabetes, compared with women with normal [blood glucose levels](#) in pregnancy," Professor Ackland said.

A Deakin team, with colleagues from several other universities, tested 39 Australian women in the late stages of pregnancy for glucose intolerance and Type 2 diabetes – retesting the women at 20 weeks post-partem. In women with gestational diabetes, different epigenetic profiles were found in the group of women who developed type 2 diabetes, compared with women who did not.

The Victorian Government Health Ambassador for Diabetes, Ms Bronwyn Halfpenny, recently visited Deakin's Centre for Cellular and Molecular Biology, and the Molecular and Medical Research Strategic

Research Centre (SRC) to learn about the research. Ms Halfpenny is Member for Thomastown and Government Whip in the Victorian Legislative Assembly.

"It is wonderful to learn about the science behind diabetes," Ms Halfpenny said. "I am very interested in the potential of this research. It's particularly exciting that we can target specific groups – as a much better way of allocating our resources."

Professor Ackland explained that women with a history of gestational diabetes are at increased risk of cardiovascular disease and their offspring are at increased risk of metabolic syndrome, diabetes and cardiovascular disease.

Professor Trish Livingston, Associate Dean (Research) in the Faculty of Health, explained that the new field of epigenetics has outstanding potential for progressing health treatment in many areas. Made possible by sophisticated analytic technology such as 3-D imaging and genome sequencing, it addresses changes in organisms caused by modification of gene expression, rather than alteration of the genetic code itself.

"Epigenetics shows us how environmental factors can affect the human body and can change our physiology," said Professor Livingston. "The changes to gene expression can be transmitted across generations."

Professor Ackland noted that, until now, epigenetics has been more of a lab-based science.

"It hasn't been taken up previously in public health areas like gestational diabetes, but it has huge potential," she said.

The Deakin researchers are currently seeking funding to develop the next research phase as a collaborative project across Victorian regions

with health providers such as Western Health and Monash Health, to validate their study on a larger scale over a five-year, post-partum period.

They hope the new study will enable them to develop a predictive test – allowing lifestyle interventions to more effectively target at-risk women. It would also show if epigenetic changes can be reversed by treatment such as diet and exercise, and reveal epigenetic differences across ethnic groups.

The Associate Director of the Global Obesity Centre at Deakin, Professor Anna Peeters, explained that the overweight and obesity epidemic is a major cause of the increase in the national incidence of diabetes, amongst other conditions like heart disease.

"This epidemic is creating a huge burden of future disease for Australia. In 1980, when we began collecting obesity-related data, one in ten Australian adults were overweight or obese," said Professor Peeters.

"Now, almost 30 per cent of Australian adults fit that category, but the distribution is not equal. In poorer neighbourhoods as many as 40 per cent of adults can be overweight or obese. Indigenous Australians are particularly at risk.

"However, we have very good data about the success of interventions, which can reduce the incidence of diabetes by 50 per cent. It is clearly more cost effective to intervene with those at highest risk."

Professor Bodil Rasmussen, Chair in Nursing (Western Health) added: "Over time, people may revert to their older habits, but even delaying the onset of [diabetes](#) a few years would give individuals better chances of having a longer life."

More information: Agnes A. Michalczyk et al. Epigenetic Markers to Predict Conversion From Gestational Diabetes to Type 2 Diabetes, *The Journal of Clinical Endocrinology & Metabolism* (2016). [DOI: 10.1210/jc.2015-4206](https://doi.org/10.1210/jc.2015-4206)

Provided by Deakin University

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