New test could help identify type 2 diabetes risk

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Analyzing changes to DNA in the blood can improve the ability to predict a person's risk of developing type 2 diabetes within a decade.

Scientists looked at the influence of these changes—known as DNA methylation—alongside other risk factors in almost 15,000 people to predict the likelihood of developing the condition years in advance of any symptoms developing. The findings could lead to [preventative measures] being put in place earlier, reducing the economic and health burden caused by type 2 [diabetes].

The study is published in the journal *Nature Aging*. Researchers from the University of Edinburgh were supported by experts at the University of Helsinki, the German Research Center for Environmental Health (GmbH) and the German Center for Diabetes Research (DZD).

Current risk prediction tools for type 2 diabetes use information such as age, sex, BMI and family history of the disease. Researchers from the University of Edinburgh found that the inclusion of DNA methylation data alongside these risk factors provided a more accurate prediction. Methylation is a [chemical process] in the body in which a small molecule called a [methyl group] is added to DNA.

The scientists used their results to estimate the predictive performance using a hypothetical screening scenario of 10,000 people, where one in three individuals develop type 2 diabetes over a 10-year period.

The model that used DNA methylation correctly classed an extra 449 individuals compared with traditional risk factors alone.

The addition or removal of these methyl groups can affect how some molecules act in the body. These methylation patterns can help to track aging processes and development of disease.

Data came from 14,613 volunteers in the Generation Scotland study—a large study designed to help scientists investigate the causes of [disease], understand the country's healthcare priorities, and inform future medical

treatments and health policies.

The team also repeated the analyses in 1,451 individuals from a study based in Germany to ensure their findings could be replicated in people from different backgrounds.

More than 4.9 million people live with diabetes in the U.K., with 90 % of those with type 2. Type 2 diabetes is a serious condition where the insulin a pancreas makes cannot work properly, or a pancreas cannot make enough insulin. This can lead to high blood sugar levels and, in turn, a range of health issues such as heart diseases and stroke, nerve damage and foot problems.

Yipeng Cheng, a Ph.D. student from the University of Edinburgh's Center for Genomic and Experimental Medicine, said, "It is promising that our findings were observed in the Scottish and German studies with both showing an improvement in prediction above and beyond commonly used risk factors. Delaying onset is important as diabetes is a risk factor for other common diseases, including dementias."

The study's principal investigator, Professor Riccardo Marioni, also from the University of Edinburgh's Center for Genomic and Experimental Medicine, said, "Similar approaches could be taken for other common diseases to generate broad health predictors from a single blood or saliva sample. We are incredibly grateful for our study volunteers who make this research possible—the more people that join our study, the more precisely we can identify signals that will help delay or reduce the onset of diseases as we age."

Generation Scotland is currently recruiting volunteers and has recently opened to young people aged between 12 and 15 for the first time. Anyone who lives in Scotland can sign up online at www.generationscotland.org

More information: Catalina Vallejos, Development and validation of DNA methylation scores in two European cohorts augment 10-year risk prediction of type 2 diabetes, *Nature Aging* (2023). DOI: 10.1038/s43587-023-00391-4.
www.nature.com/articles/s43587-023-00391-4

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