

Type 1 diabetes originates in the gut but could probiotics offer a cure?

Two separate pieces of research have found that the development of type 1 diabetes is likely caused by the gut, and therefore, a type of probiotic could be the cure.

Scientists from several European and US institutions studied 33 Finnish infants over three years from birth who were genetically predisposed to type 1 diabetes.

Their study, entitled 'The Dynamics of the Human Infant Gut Microbiome in Development and in Progression toward Type 1 Diabetes' is published in the *Cell Host & Microbe* journal.

They discovered that four children in the group that developed type 1 diabetes had 25% less types of bacteria in their guts than other children.

The same four infants were also found to have more amounts of a specific bacteria that is known to trigger gut inflammation. This could be a prelude to type 1 diabetes as the bacteria causes the immune system to mistakenly attack and destroy beta cells in the pancreas that usually make insulin and monitor glucose levels.

'We know from previous human studies that changes in gut bacterial composition correlate with the early development of type 1 diabetes, and that the interactions between bacterial networks may be a contributing factor in why some people at risk for the disease develop type 1 diabetes and others don't,' said Jessica Dunne, Director of Discovery Research at Juvenile Diabetes Research Foundation (JDRF), a UK charity which funded the study.

Cornell University researchers have a similar idea, but they have been working on a treatment that involves regulating insulin by engineering the bacteria found in our guts.

Their study, entitled 'Engineered Commensal Bacteria Reprogram Intestinal Cells Into Glucose-Responsive Insulin-Secreting Cells for the Treatment of Diabetes' is published in the *Diabetes* journal.

The scientists took a strain of bacteria known as *Lactobacillus gasseri* – a type of bacteria found in probiotic yoghurts – and engineered the bacteria to be able to secrete a hormone called glucagon-like peptide-1 (GLP-1).

When they fed this engineered probiotic to a group of diabetic rats for 90 days, they discovered that the bacteria triggered the upper intestinal epithelial cells in the rats to convert into cells that acted a lot like the pancreatic beta cells.

The rats had up to 30% lower blood glucose than diabetic rats that did not receive the probiotic, and the probiotic was shown to reduce glucose levels in diabetic rats the same way the levels would be reduced in normal rats.

The next step for March and his team is to prove that their method of engineering bacteria to move insulin production to the intestine will work in humans too.

They aim to develop a pill that patients suffering from both type 1 and type 2 diabetes can take daily, that will be available within the next two years.



High unmet need for diabetes diagnosis and care across sub-Saharan Africa

Health systems in sub-Saharan Africa fail to identify the majority of patients with diabetes, and a large unmet need for diabetes counselling and treatment remains, according to an analysis of population-based surveys.

'The burden of diabetes and overweight/obesity are very substantial in the sub-Saharan African countries included in this piece, but much of the need for diagnosis, lifestyle counselling and treatment is not being met by the current systems of care,' Jennifer Manne-Goehler, MD, DSc, a resident in medicine at Beth Israel Deaconess Medical Centre, clinical fellow at Harvard Medical School and research fellow at the Harvard T.H. Chan School of Public Health. 'In particular, younger and less educated people with diabetes in this region are most in need of these health services.'

Manne-Goehler and colleagues analysed individual-level data from nationally representative population-based surveys conducted between 2005 and 2015 across 12 countries in sub-Saharan Africa, including Benin, Comoros, Guinea, Kenya, Liberia, Mozambique, Seychelles, Tanzania, Togo and Uganda (n = 38,311; mean age, 39 years; 58% women; 57% currently employed).

Researchers assessed self-reported data to quantify the met and unmet needs for screening and diagnosis of diabetes. Three measures were defined: patients with overweight or obesity having ever received a blood glucose measurement; individuals defined as having diabetes ever having received a blood glucose measurement; and individuals defined as having diabetes having been told by a healthcare provider about diabetes diagnosis, a measure of awareness of diagnosis.

Across the 12 surveys analysed, single-country diabetes prevalence ranged from 2% in Mozambique to 14% in the Seychelles; median prevalence in the region was 5%. Among respondents aged 55 to 64 years, median prevalence of diabetes was 9%. Across surveys, a median of 27% of respondents had overweight or obesity; among those, a median of 22% reported ever having received a blood glucose test. Among respondents with diabetes, a median of 36% self-reported receiving a blood glucose test; a median of 27% reported being told of their diabetes diagnosis.

Responses also suggested an unmet need for care. A median of 15% of respondents reported that they were counselled by a health care provider to lose weight; 15% reported that they received counselling regarding exercise. A median of 25% of respondents reported the use of oral diabetes drugs; 11% reporting using insulin.

'Our analysis of pooled, individual-level data across 12 nationally representative population-based surveys shows strikingly high levels of unmet need across several key indicators of diabetes diagnosis and care,' the researchers wrote. 'Taking the median of country means as a summary statistic, among all people with diabetes, only a third reported having ever received a blood sugar measurement and only a third recalled being diagnosed as having diabetes. Similarly, only small proportions of overweight or obese people reported being screened for diabetes, despite their high risk for the disease.'