

Study identifies specific bacteria which precede autoimmune diabetes

28 October 2011

A study led by Matej Oresic from VTT Technical Research Centre of Finland suggests that autoimmune diabetes is preceded by diminished gut microbial diversity of the *Clostridium leptum* subgroup, elevated plasma leptin and enhanced glucose-stimulated insulin secretion.

In collaboration with the DIPP - Finnish [Type 1 Diabetes](#) and Prediction study, VTT researchers have previously found that specific [metabolic disturbances](#) precede early β -cell autoimmunity markers in children who subsequently progress to type 1 [diabetes](#). However, the question remained what are the environmental causes and tissue-specific mechanisms leading to these disturbances?

Matej Oresic from VTT Technical Research Centre of Finland and collaborators Eriika Savontaus from the University of Turku, Samuel Kaski from Aalto University and Mikael Knip from the University of Helsinki set out to address this question, and the results were published on October 27, 2011 in *PLoS Computational Biology* journal.

The team carried out a study using non-obese diabetic (NOD) mice that recapitulated the protocol used in the DIPP clinical study, followed up by independent studies in which NOD mice were studied in relation to the risk of diabetes progression. Researchers found that young female NOD mice that later progress to autoimmune diabetes exhibit the same metabolic pattern as prediabetic children. These metabolic changes are accompanied by enhanced glucose-stimulated [insulin secretion](#), upregulation of insulinotropic amino acids in islets, elevated plasma leptin and adiponectin, and diminished gut [microbial diversity](#) of the *Clostridium leptum* subgroup.

The elucidation of early metabolic pathways associated with progression to Type 1 diabetes points to novel avenues for early disease

prevention. The ongoing efforts of VTT researchers are focused on the potential of specific bacteria from the *C. leptum* subgroup to help prevent Type 1 diabetes.

This study was supported by the Finnish Funding Agency for Technology and Innovation Tekes, the Seventh Framework Program of the European Community, and Juvenile Diabetes Research Foundation.

The environmental factors and molecular mechanisms leading to Type 1 diabetes are poorly understood and of great public health interest. The incidence of inflammatory and autoimmune diseases is rising faster than for any other major disease, and these diseases are affecting a wide spectrum of the population. The number of new cases of Type 1 diabetes in European children less than 5 years of age is expected to double between 2005 and 2020.

More information: M. Sysi-Aho, A. Ermolov, P. V. Gopalacharyulu, A. Tripathi, T. Seppänen-Laakso, J. Maukonen, I. Mattila, S. T. Ruohonen, L. Vähätalo, L. Yetukuri, T. Härkönen, E. Lindfors, J. Nikkilä, J. Ilonen, O. Simell, M. Saarela, M. Knip, S. Kaski, E. Savontaus, M. Oresic, Metabolic regulation in progression to autoimmune diabetes, *PLoS Comp. Biol.* 7 (10), e1002257 (2011). www.ploscompbiol.org/article/info:doi/10.1371/journal.pcbi.1002257

Provided by VTT Technical Research Centre of Finland

APA citation: Study identifies specific bacteria which precede autoimmune diabetes (2011, October 28) retrieved 19 May 2019 from <https://medicalxpress.com/news/2011-10-specific-bacteria-autoimmune-diabetes.html>

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