

Is there a relationship between sleep-wake rhythm and diabetes?

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The gene mediates insulin secretion indirectly via the release of melatonin, which implicates a previously unknown relationship between the sleep-wake rhythm and the fasting glucose level. The finding could open up new possibilities of treatment which go far beyond the primarily symptomatic therapy approaches to diabetes that have been practised until now.

Diabetes mellitus and diabetes-associated late complications are among the most frequent chronic diseases and causes of death worldwide. In Germany there are approximately six million people with type 2 diabetes who are aware that they have the disease. In addition, there is a relatively high estimated number of undiagnosed diabetics. Besides lifestyle factors such as overweight and lack of exercise, genetic factors play an important role in the pathogenesis of this disease.

The international MAGIC Consortium (MAGIC = Meta-Analyses of Glucose and Insulin-related traits Consortium) combined the data from 13 case-control studies with over 18,000 diabetic and 64,000 non-diabetic study participants and was able to identify a variant of the MTNR1B gene which is associated with both elevated fasting glucose levels as well as an elevated risk for type 2 diabetes. The goal of the MAGIC Consortium is to identify gene variants which regulate the fasting glucose levels in healthy individuals.

The study results were published in the January issue of *Nature Genetics*.

Germany is represented within the framework of the KORA studies by scientists of the Helmholtz Zentrum München (Assistant Professor Thomas Illig; Director of the KORA studies: Professor H.-Erich Wichmann) and the German Diabetes Center in Düsseldorf (Dr. Wolfgang Rathmann, Dr. Christian Herder; Direktor: Professor Michael Roden).

The MTNR1B gene is expressed in insulin-producing islet cells, among other cells, and encodes one of the two known melatonin receptors. It is assumed that this receptor inhibits the release of insulin via the neural hormone melatonin. The melatonin level in the body is high at night and declines in daylight, whereas the insulin level is higher during the day than in the night. Taken together, these new data implicate an association between the sleep-wake rhythm, the so-called circadian rhythm, and fasting glucose levels, which was not known previously.

Until now an efficient strategy for prevention and for therapies to treat the cause of the disease has been missing in diabetes research. The Helmholtz Zentrum München is working intensively on new approaches in the study and treatment of diabetes. Further studies will show which role melatonin plays in the regulation of insulin secretion, fasting glucose levels and the development of diabetes and whether this finding will lead to new treatment options.

Paper: Inga Prokopenko et al. Variants in MTNR1B influence fasting glucose levels. Nature Genetics 2009, 41: 77-81 Online publication (doi 10.1038/ng.290)www.nature.com/ng/journal/v41/n1/abs/ng.290.html

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