How does hypomagnesemia contribute to diabetes mellitus?

Clinical relevance

Hypomagnesaemia (serum magnesium (Mg^{2+}) <0.7 mmol/L) has been strongly associated with type 2 Diabetes Mellitus (T2DM). Patients with reduced serum Mg^{2+} concentrations show a more rapid disease progression. Moreover, dietary Mg^{2+} supplementation for patients with T2DM improves glucose metabolism and insulin sensitivity. However, the molecular mechanism by which Mg^{2+} improves T2DM has not been elucidated yet.

Background

It has been shown that two single nucleotide polymorphisms (SNPs) in the Mg^{2+} channel TRPM6 (V1393I and K1584E) confer susceptibility to T2DM. TRPM6 channels containing these SNPs are not longer activated by insulin. Patients with hypomagnesaemia secrete less insulin than normomagnesaemic individuals, indicating a role for Mg^{2+} in insulin secretion. Moreover, hypomagnesaemia is associated with increased insulin resistance. Taken together, these data underline that Mg^{2+} is an important factor in the progression of T2DM.

Aims and Research Questions

We propose that hypomagnesaemia contributes to the pathogenesis and the progression of T2DM. However, the molecular mechanisms are largely unknown. Within this project we aim to answer the following questions:

- Does magnesium regulate insulin secretion in the pancreatic B-cells?
- Does magnesium contribute to insulin resistance?

What will you do?

We offer the possibility to perform and present clinically-oriented research in a professional, multicultural and highly-motivating working environment with about 35 colleagues in a well-equipped department. You'll be part of the diabetes/hypomagnesemia research team in which you will be responsible for your own research question. Under the supervision of a postdoctoral researcher, you will learn a broad range of techniques, such as molecular cloning, cell culture, immunohistochemistry, bioinformatics, real time PCR and western blot.

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