Can magnesium prevent calcification in chronic kidney disease?

Clinical relevance

Cardiovascular disease is the leading cause of death in patients with chronic kidney disease (CKD). The risk ratios for cardiovascular mortality are doubled in patients with CKD compared to the general population. An important component of cardiovascular risks is stiffening of arterial wall that results from vascular calcification. Hyperphosphatemia and hypercalcemia, which are the main features of mineral bone disorder in CKD patients, contribute to vascular calcification and atherosclerosis of the main arteries, including the aorta.

Background

Over the last decades, serum magnesium (Mg^{2+}) levels have been demonstrated to be inversely correlated to vascular calcification in hemodialysis patients. Initial studies in hemodialysis patients indicated that Mg^{2+} supplementation reduces vascular calcification. Indeed, Mg^{2+} was shown to reduce Ca^{2+} deposits in vitro and Mg^{2+} was shown to reduce calcification in a mouse model of calcification.

Aims and Research Questions

Therefore, we propose that Mg^{2+} plays an important role in preventing vascular calcification. However, the molecular mechanisms underlying the preventive effects of Mg^{2+} on vascular calcification remain to be elucidated.
Within this project we aim to answer the following questions:
- What are the targets of Mg^{2+} in the vascular smooth muscle cells (VSMCs) to prevent calcification?
- Does Mg^{2+} supplementation prevent vascular calcification in CKD?

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 CKD/calcification research team in which you will be responsible for your own research question. Under the supervision of a postdoctoral researcher, you will be involved in an animal experiment to test the effects of magnesium. Additionally, you will culture VSMCs to test the effects of Mg^{2+} in vitro. You will learn a broad range of techniques, such as cell culture, immunohistochemistry, bioinformatics, real time PCR, ion determinations and animal experimentation.

Contact

Department:	Physiology – Ion Transport Group
Supervisor:	Prof. Joost Hoenderop / Dr. Jeroen de Baaij
Contact Person:	Hugo Hulshof
Email address:	hugo.g.hulshof@radboudumc.nl
Website:	www.physiomics.eu