

## Regulation of Cellular Mg<sup>2+</sup> by SLC41 Family and Pathological Mechanism for Its Abnormality

Takahiro Iwamoto<sup>1</sup>, Satomi Kita<sup>1</sup>, Hideaki Tagashira<sup>1</sup>, Yusuke Gotoh<sup>1</sup>, Yuji Arai<sup>2</sup>

<sup>1</sup>Department of Pharmacology, Faculty of Medicine, Fukuoka University,

<sup>2</sup>Department of Bioscience and Genetics, National Cerebral and Cardiovascular Center

### Summary

Mg<sup>2+</sup> is an important divalent cation and plays an essential role in various cellular functions, such as cellular energy metabolism, ion channel activity, and enzyme activity. Mg<sup>2+</sup> homeostasis primarily depends on the balance between intestinal absorption and renal excretion. Mg<sup>2+</sup> deficiency or abnormal Mg<sup>2+</sup> metabolism is related to various cardiovascular diseases. Recently, various candidate genes of Mg<sup>2+</sup> transporter are reported, but their functional roles are still well unknown. We first treated mice with three kinds of magnesium diets (low-magnesium diet, normal-magnesium diet, or high-magnesium diet) for 4 weeks, and found that the expression levels of SLC41A1 and SLC41A2 in aorta were dependent on the Mg<sup>2+</sup> intake. Therefore, the aim of the present study is to determine the physiological roles of SLC41A1 and SLC41A2. We also found that phenylephrine-induced contraction was reduced in isolated aorta from low-magnesium-fed mice. Furthermore, we next generated SLC41A1/SLC41A2-knockout mice. Interestingly, phenylephrine-induced contraction was reduced in isolated aorta from SLC41A2-knockout mice fed with normal-magnesium diet. When SLC41A2-knockout mice were treated with high-magnesium diet, the phenylephrine-induced contraction was recovered. These results suggest that SLC41A1/SLC41A2 play an important role in vascular function. Further work will be required to define the pathological role of SLC41A1/SLC41A2 in cardiovascular diseases.