

Preface

New Perspectives in Magnesium Research is published as a document of the 11th International Magnesium Symposium, a joint meeting of Japanese Society for Magnesium Research. Professor Jean Durlach has been President of International Society for Magnesium Research since it was established in 1970. There are international meetings every 2 to 3 years in many parts of the world. The last meeting hosted by the Japanese Society for Magnesium Research was in Kyoto in 1988, when the Society President was Professor Yoshinori Itokawa.

Magnesium is the most abundant cation, second only to potassium in the intracellular compartment and to calcium in bone tissues. One of the big differences between calcium and magnesium is the difference between intra- and extracellular levels. Extra- and intracellular ratio is 10,000 for calcium, but 0.33 for magnesium. Such facts have significance for maintenance of life. Intracellular space rich in magnesium is just like seawater, adequate for the origin of life and maintenance of life in sea animals and plants. Bone magnesium constitutes a part of hydroxyapatite and may be important in maintaining bone integrity.

In physiological situations, magnesium is involved in metabolism of fat, amino acids, and sugar. Magnesium plays an important role in PPAR (peroxisome proliferators-activated receptor)-mediated signaling pathways as a key cofactor in the protein phosphorylation.

In bone and calcium metabolism, magnesium seems to play roles as a constituent of bone. Experimentally, magnesium deficiency induces osteoporosis but there have not been definite evidences of correlation between osteoporosis and magnesium. In calcium- and magnesium-deficient animals, calcium restores the bone quality but magnesium only partially. Another aspect of role of magnesium is the regulation of calcium metabolism through calcium-sensing receptor, which requires magnesium for its action. Another point is how magnesium participates in vitamin D action. Vitamin D is another important factor, other than calcium-sensing receptor, that requires magnesium in its action. The correlation between calcium-sensing receptor and vitamin D receptor has been discussed. Thus, magnesium plays some roles in the regulation of calcium and bone metabolism.

Clinically, diabetes mellitus, atherosclerosis, hypertension, cardiovascular diseases, and hyperlipidemia are in some other ways influenced by magnesium. More evidence is needed to have a definite conclusion how to manage clinical problems, problems of public health, and individual nutrition.

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