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Magnesium in man: implications for health and disease

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Abstract

Magnesium (Mg(2+)) is an essential ion to the human body, playing an instrumental role in supporting and sustaining health and life. As the second most abundant intracellular cation after potassium, it is involved in over 600 enzymatic reactions including energy metabolism and protein synthesis. Although Mg(2+) availability has been proven to be disturbed during several clinical situations, serum Mg(2+) values are not generally determined in patients. This review aims to provide an overview of the function of Mg(2+) in human health and disease. In short, Mg(2+) plays an important physiological role particularly in the brain, heart, and skeletal muscles. Moreover, Mg(2+) supplementation has been shown to be beneficial in treatment of, among others, preeclampsia, migraine, depression, coronary artery disease, and asthma. Over the last decade, several hereditary forms of hypomagnesemia have been deciphered, including mutations in transient receptor potential melastatin type 6 (TRPM6), claudin 16, and cyclin M2 (CNNM2). Recently, mutations in Mg(2+) transporter 1 (MagT1) were linked to T-cell deficiency underlining the important role of Mg(2+) in cell viability. Moreover, hypomagnesemia can be the consequence of the use of certain types of drugs, such as diuretics, epidermal growth factor receptor inhibitors, calcineurin inhibitors, and proton pump inhibitors. This review provides an extensive and comprehensive overview of Mg(2+) research over the last few decades, focusing on the regulation of Mg(2+) homeostasis in the intestine, kidney, and bone and disturbances which may result in hypomagnesemia.

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