

Intracellular absorption of transdermal magnesium demonstrated by ESEM-EDS

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Magnesium, the second most abundant intracellular cation in human body, plays a fundamental role in intracellular metabolism.

As a cofactor in a huge number of key enzymatic reactions, magnesium is especially important for those enzymes that use nucleotides as cofactors or substrates (phosphotransferases, phosphohydrolases, etc.).

The majority of magnesium studies were performed by detecting serum magnesium concentration, measure that doesn't consider the intracellular uptake. In the present study, a different approach has been carried out. By means of an Environmental Scanning Electron Microscope (ESEM) equipped with an Energy Dispersive Spectroscopy (EDS) detector, the intracellular magnesium presence and uptake has been measured in a semiquantitative approach on samples of exfoliating epithelial cells from the oral mucosa [1].

The intracellular magnesium uptake has been experimentally induced by applying, twice a day and for 4 months, on the skin of healthy volunteers, a spray of a magnesium chlorate supersaturated solution. Epithelial cells and blood samples were collected at time zero and every 2 months of treatment. Despite the constant serum concentration of magnesium along the treatment and in absence of any side effect, the EDS analysis reveals a progressive and regular intracellular magnesium increasing of about 100% of the values at each experimental step.

Results can confirm the high specificity and, more in general, the high reliability of the EDS analysis about a parameter that can result neglect utilizing only the serum concentration. Moreover, transdermal absorption of magnesium can represent an efficient way of magnesium administration, low dose and side effect free, to be utilized in chronic clinical magnesium deficiency [2].

Reference

[1] Silver BB. Development of cellular magnesium nano-analysis in treatment of clinical magnesium deficiency. *Journal of the American College of Nutrition* 2004; 23(6): 732-37.

[2] He K, et al. Magnesium intake and incidence of metabolic syndrome in young adults. *Circulation* 2006; 113: 1675-82.

Keywords

EDS, epithelial cells, intracellular magnesium.