Letter to the Editor

Serum magnesium and lipids: More clarity is needed

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To the Editor,

In their recent paper, Randell et al. reported that serum magnesium levels were directly correlated with total, HDL- and LDL-cholesterol in a large adult study population [1]. This paper is very interesting, and the possibility that the relationship between magnesium and lipoproteins in healthy subjects may have different meaning from that in diabetic patients merits attention. Furthermore, we agree that a binding interaction between magnesium and lipoprotein could at least partially account for these results. However, as the authors acknowledged, this binding interaction may diminish the utility of serum total magnesium measurement as an indicator of magnesium status. The fact that plasma albumin qualified as the main correlate of serum total magnesium is neither novel nor surprising, and seems to confirm this hypothesis.

In our opinion, other problems limit the study by Randell et al. [1]. We are not sure that this population is free from serious metabolic diseases. The prevalence of obesity defined as BMI > 30 kg/m² was 19.9%, but when the authors used DEXA-measured percent of body fat the corresponding figure was 38.9%. Thus, more than one third of this population had a clinical condition which is known to be associated with relevant modifications of intracellular magnesium metabolism [2,3], mainly related to insulin resistance [4–7].

Furthermore, the true comparability of the results by Randell et al. [1], obtained with total magnesium measurement, with those from studies carried out using ionized magnesium determination [8–10] is limited. Indeed, serum ionized magnesium can be significantly reduced in frankly type 2 diabetic subjects compared with non-diabetic control subjects, while serum total magnesium levels remain normal [11]. Furthermore, the close relationship between serum ionized (but not total) magnesium and intracellular free magnesium concentrations measured by the gold standard method 31P-NMR spectroscopy [11], makes results obtained with the measurement of serum ionized magnesium more representative of the real magnesium status and more comparable with findings obtained with the complex and not easily available determination of free intracellular magnesium [5,12].

Finally, it is unclear how results obtained in hemodialysis patients [13], cord blood from newborns [14], or children with hematuria [15], can be combined with those found in a large adult population [1] to “contradict the view of a favorable relationship between higher magnesium and a healthy non-atherogenic lipid profile, especially, when serum total magnesium is used”. Several different factors can influence magnesium status in all these conditions, and changes in magnesium metabolism could not be easily identified when using serum total magnesium determination. Thus, although a simple binding interaction can be invoked to explain the results by Randell et al. [1], the complexity of the pathophysiological processes involving magnesium and its regulation cannot be denied.

In conclusion, the present knowledge suggests that the relationship between magnesium status and lipids in healthy individuals may be different from that in patients with chronic conditions, such as obesity, diabetes, and hypertension. However, in our opinion, further studies examining ionized magnesium in the general adult population should be undertaken to make more clarity in this complex matter.

References


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