Appendix V: Importance of Balancing Ca with Mg and Dangers of the Rising Ca:Mg Dietary Intake Ratio

1. Magnesium balances Calcium: Importance of the Ca:Mg Ratio – see Fig. 4

Of Central importance to the Mg Hypothesis of CVD is the intracellular Calcium to Magnesium Ratio (Ca:Mg). In the 1990s, Resnick and co-workers discovered that the intracellular calcium to magnesium ratio (Ca:Mg) was totally predictive of tissue responses that, taken together, manifest as cardiovascular disease. For example, when Mg becomes low in the cell, calcium rises in the cell, raising the cell’s Ca:Mg ratio which causes a firing off a cascade of reactions particular to that cell’s “fight or flight” response. If it’s a nerve cell, it rapidly and continuously fires. If a muscle cell, it will contract and not relax until the Ca:Mg ratio is brought to normal resting state. These various tissue manifestations of the high Ca:Mg intracellular ratio are illustrated in Figure 4.

A marginal Mg status or Mg deficit state will often manifest these abnormal Ca:Mg responses as clinical symptoms so often seen in our society on the low Mg diet. Modern medicine, not yet accepting the Mg Hypothesis of CVD, treats these symptoms with medications rather than nutrient therapy that could correct the high Ca:Mg ratio causing the symptoms.

Some references of Resnick and colleagues work on Ca:Mg ratio in cells with links to pubmed abstracts:


2. The Ca:Mg ratio in USA diets is increasing – see Figs. 5a, 5b & 6

Since 1977 the Ca in USA diets has risen much more than the Mg in USA diets. This trend is shown in Figures 5a and 5b. As a result, the food intake Ca:Mg ratio in the USA has gone from largely below 3.0 to largely above 3.0 during the last 35 years (see Figure 6). This rising ratio does not include supplements, only food sources of Ca and Mg. It has been recommended that a Ca:Mg intake ratio should not exceed 2.0 for both foods and supplements.

References on rising Ca:Mg food intake ratios in USA with links to Full Texts and to Pubmed abstracts:

[for highlighted abstracts of the following references, click here “Abstract” document for Appendix VI]

(See Full Texts of the following papers)

3. Recent studies show Ca supplementation puts people more at risk of CVD.

For the past decade, Ca supplements have been widely recommended to prevent osteoporosis. This has widely been assumed “safe” as USA Calcium intakes from food are often below recommended levels. However, given our society’s low Mg intakes, Ca from supplements may not be balanced with Mg and can exacerbate the high Ca:Mg ratio and bring on heart disease, unexpected in a medical paradigm that does not include the Mg Hypothesis of CVD.

References on CVD risks with Ca supplementation:
(For Appendix V highlighted abstracts click)


Importance of Calcium in CVD


Early References by M.S. Seelig that predicted the adverse effect of Ca supplementation on cardiovascular health, given the Mg Hypothesis of CVD:


What About Vitamin D?

Many recent reports show low serum vitamin D values being related to several health issues including bone health and heart health (Gotsman et al, 2012). Magnesium is required for the biological activation of Vitamin D. When Magnesium status is low, Serum Vitamin D levels remain low (Rude, 1985) as do serum Calcium and serum Potassium. It remains to be shown whether recent reports on Vitamin D and health issues are truly due to low levels of vitamin D, low levels of magnesium or both.


To read on other research aspects of the calcium to magnesium ratio, see: