

Drinking water composition and disease – is acidity a key factor?

RAGNAR RYLANDER

BioFact Environmental Health Research Center, Ledum, Sweden

email: envhealth@biofact.se

Since the discovery of the relation between river water acidity and death in apoplexy in Japan in 1957 a number of epidemiological investigations have reported a protective effect against cardio-vascular disease by drinking water hardness and its content of magnesium and/or calcium. In studies from Sweden, dose-response relationships were found between the drinking water content of magnesium and death in heart infarction. While a similar relation is present in some studies, others have not found it. Although it is well known that magnesium deficiency causes an increased risk for arrhythmia of the heart, muscular tonus and increased blood pressure, the results from intervention studies with magnesium or calcium on clinical markers for deficiency are ambiguous.

Mineral homeostasis is controlled by acid-base conditions in the body. Previous research has demonstrated a relation between the acid load and excretion of calcium. No information is available for magnesium. In view of this a study was undertaken where a population sample (n=85) collected 24 hour urine which was analysed for magnesium, potassium, and calcium. Net endogenous acid production was determined by measuring net acid excretion (NAE).

The results demonstrated a statistically significant relationship between NAE and magnesium ($R^2=0.27$, $p<0.0001$) and calcium ($R^2=0.30$, $p<0.0001$) but not for potassium ($R^2=0.06$, n.s.). There is a significant relation between the content of magnesium and bicarbonate ions in the drinking waters in Sweden. It is thus a possibility that an increased acid load due to absence of bicarbonate ions in the water (on the same time low in magnesium) caused a decreased renal reabsorption of magnesium, increasing the risk for cardiovascular disease. Support for this hypothesis is found in an intervention experiment where a reduction in blood pressure was obtained by the consumption of water rich in bicarbonate as well as magnesium. Further Intervention experiments are required to assess the importance of bicarbonate in drinking water for the homeostasis of magnesium and risk for disease.