

## CALCIUM, DAIRY PRODUCTS AND WEIGHT MANAGEMENT

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Accumulating evidence from observational studies indicates an inverse association between dietary calcium intake and body weight and body fat mass. Some randomised controlled trials (RCT) have been reported, and a meta-analysis points at the importance of dairy calcium for weight control, particularly during energy restriction. However, though several of the reported RCTs are suggestive of a beneficial effect of dietary calcium, especially dairy calcium, on body weight, it is not possible to draw any final conclusions before more studies have been conducted.

Increased dietary calcium intake has been proposed to affect both sides of the energy equation, i.e. both energy intake and energy utilization, at least in subjects with low habitual intake. Recently we have shown that increased dairy calcium intake produces a decrease in fat digestibility, presumably due to formation of insoluble calcium-fatty acid soaps and binding of bile acids. Based on a meta-analysis we have estimated that an increase in dairy calcium intake of ~1200 mg/day produces an increased fecal fat excretion of 5.2 g/day. This corresponds to a change in body weight of -2.2 kg/year. Others have proposed that increased dietary calcium intake may affect energy utilization, by decreasing *de novo* lipogenesis and stimulating lipolysis and thermogenesis. This hypothesis is mostly based on *in vitro* and animal studies, and evidence from human studies are limited. Therefore more human studies are called for before any final conclusions can be drawn. Finally it has been suggested that low dietary calcium intake may affect appetite regulation and lead to an increased food intake, and this effect has recently been substantiated by a meta-analysis.

In the Diogenes trial, we have shown that a slight increase in total protein (~25 % of energy), and a corresponding reduction in total carbohydrate, relative increase in low-glycemic index carbohydrates, promotes weight control both in adults and in obese children.

Due to the high content of saturated fatty acids in dairy products, it is the general perception that consumption of dairy products is associated with increased risk of cardiovascular disease (CVD). However, a recent meta-analysis based on data from observational studies suggests that high milk intake may be associated with reduced risk of CVD. We and others have found that calcium rich dairy products may not affect blood lipid profile as adversely as predicted from its fat content and composition. In agreement a cholesterol reducing effect of calcium *per se* has been shown in some studies. This can partly be explained by a decreased fat digestibility, but it is likely that other mechanisms are involved as well.



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