



# CHOLESTEROL-LOWERING: STANOLS AND STEROLS

The link between raised blood cholesterol levels and increased risk of coronary heart disease (CHD) is well established. Making lifestyle and dietary changes (in particular to reduce saturated fat intake) is known to be effective in reducing blood cholesterol levels. In addition, there is growing evidence that plant sterols/stanols help in lowering total and low density lipoprotein (LDL) cholesterol levels and that this effect is additive to that achieved by dietary fatty acid manipulation.<sup>1</sup>

Plant sterols (also known as phytosterols) are found naturally in a range of plant sources such as vegetable oils, nuts, grains, seeds, wood pulp and leaves. Typical diets commonly include sitosterol, campesterol and stigmasterol along with smaller amounts of plant stanols (which are saturated plant sterols) like sitostanol. Plant sterols/stanols are similar in chemical structure to cholesterol. The presence of a methyl or ethyl group in their side chains means that, compared to cholesterol, plant sterols are minimally absorbed in the gut. Plant sterols are thought to decrease the absorption of dietary and endogenously derived cholesterol in the intestine and a number of mechanisms for this effect have been suggested. This reduction in absorption of cholesterol increases hepatic uptake of LDL and reduces blood LDL levels, although there are compensatory mechanisms that increase the rate of endogenous cholesterol synthesis which limit the magnitude of the effect.

Although strict vegetarians will consume between 600-800 mg of plant sterols/stanols each day, the typical daily intake ranges from 160-400 mg/day which is thought to have little effect on cholesterol absorption.

## Efficacy

Following animal studies in the 1950s research in the 1970s showed that a maximum reduction in total cholesterol level was achieved with 3 g/day of tall (pine) oil sterol. More recently, the esterification of plant sterols/stanols (by the attachment of a fatty acid) has increased their solubility in fat and allowed them to be incorporated into spreading fats and other fat-based products like mayonnaise. In the UK, these are marketed under the names Benecol and Flora pro.activ.

Studies suggest that the consumption of about 2-3g/day of plant sterols/stanols reduce LDL cholesterol levels by between 9%-20% although there is considerable variation amongst individuals. No or little effect on high density lipoprotein cholesterol or triglyceride levels has been reported. The reduction in LDL cholesterol levels has been found in both adults and children with hypercholesterolaemia, in those with normal blood cholesterol levels, in people with Type II diabetes and in postmenopausal women with CHD. Plant stanol ester margarines have also been shown to be an effective adjunct to hypercholesterolaemia treatment using statins and fibrates.<sup>2,3</sup>

## Safety

Consumption of plant sterol/stanol esters for up to 12 months produced no evidence of adverse effects. However, longer term consumption studies involving large numbers of people have been called for, particularly as plant sterols can reduce the absorption of carotenoids in the gut. Consequently additional monitoring of the effects of foods containing plant-derived sterol/stanol esters on fat soluble nutrient levels has been recommended.<sup>4</sup> In addition, those individuals with homozygous sitosterolaemia (a rare metabolic disease) should restrict their intake. To date there are no studies which have examined the effect of these substances on pregnant women. Thus, until the results of long-term studies are available, it has been recommended that:

- foods containing high levels of plant-derived sterol/stanol esters are considered as an additional option for risk reduction in adults with hypercholesterolaemia
- these fats should be used to supplement a healthy diet, containing plenty of fruit and vegetables.

More information is required before routine consumption is recommended in the general population as a means of contributing to the prevention of CHD. It may also be worth noting that plant sterol/stanol ester margarines are priced at about 3-4 times more than other margarines.

## Reference:

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