

# Plant Stanols and Sterols

**COMMON NAME:** Plant Stanols and Sterols

**SCIENTIFIC NAME:** Stanols: campestanol, sitostanol

Sterols: campesterol, sitosterol, stigmasterol

## RECOMMENDED

### LEVELS OF EVIDENCE



**Recommended:**

Several well-designed studies in humans have shown positive benefit. Our team is confident about its therapeutic potential.



**Recommended with Caution:**

Preliminary studies suggest some benefit. Future trials are needed before we can make a stronger recommendation.



**Not Recommended - Evidence:**

Our team does not recommend this product because clinical trials to date suggest little or no benefit.



**Not Recommended – High Risk:**

Our team recommends against using this product because clinical trials to date suggest substantial risk greater than the benefit.

### Evaluated Benefits

Lowering of LDL and total cholesterol

The combination of plant stanols with statin treatment results in further total and LDL cholesterol reductions in all studies compared with statin alone.

## Source

Stanol/sterol esters are found naturally in plant cell membranes. Structurally they are similar to cholesterol, with only minor differences in relative position of ethyl and methyl groups. Plant sterols are natural compounds present as minor components of vegetable oils, nuts, seeds, legumes, fruits, vegetables, and grains. Typical daily intakes from food range from 150 to 400 mg. Plant stanols are the saturated counterparts of plant sterols and occur more scarcely in nature. Typical Western diets provide only 20 to 50 mg of plant stanols per day. However, stanols can be industrially produced and added to margarines and other foods.

## Indications/Population

Lower elevated levels of LDL and total cholesterol in patients with hyperlipidemia

## Mechanism of Action

In the intestine, plant sterols compete with absorption of cholesterol by binding to micelles and reducing the cholesterol content of the lipid-laden micelles. Their presence in intestine, thus, adversely affects the solubilization of cholesterol.

In addition, LDL receptor activity is upregulated and more LDL particles and precursors (very low-density lipoproteins and intermediate-density lipoproteins) are taken up from the circulation to tissues, mainly the liver, by the enhanced receptor activity. The synthesis of LDL particles is diminished, and these two mechanisms result in serum total and LDL cholesterol reduction.

Although typical dietary intake has virtually no impact on lipids, ingestion of 800 to 3,000 mg per day of plant stanols or sterols has been found to lower LDL cholesterol by 6–20% without changing HDL cholesterol or triglyceride levels.

## Side Effects

- Reported side effects have been gastrointestinal in nature.
- Serum plant sterol concentrations are increased by a factor of two during plant-sterol-enriched functional food consumption.
- Simultaneous statin consumption may increase serum plant sterol levels, possibly increasing the risk of coronary heart disease (CHD) in patients with the genetic mutation causing sitosterolemia.

## Dosing

2 grams per day, there is a slightly lower efficacy of single versus multiple daily “doses” of phytosterols. A greater efficacy was noted with solid versus liquid foods.

The consumption of 2 grams per day of stanols only minimally increases serum plant stanol levels but reduces LDL cholesterol by up to 15%.

## Drug Interactions/Cautions

There is some concern with reduced absorption of some fat-soluble vitamins and carotenoids. Consumption of at least 5 servings of fruits and vegetables per day, with inclusion of at least one carotenoid-rich fruit or vegetable, allowed maintenance of plasma carotenoid levels.

Recent studies have shown a link between high levels of plasma sterols with increased cardiovascular risk.

As noted in Side Effects, simultaneous statin consumption may increase serum plant sterol levels, possibly increasing the risk of coronary heart disease in patients with the genetic mutation causing sitosterolemia.

## Notes

The FDA has authorized a claim that foods containing plant stanol/sterol esters may reduce the risk of coronary heart disease.

Recent advances have allowed production of food products, such as yogurt and cereals, that are enriched with plant stanol/sterol esters and promoted as foods that can help lower serum cholesterol.

Hereditary sitosterolemia (caused by mutations of ABCG5 and ABCG8 genes) with premature coronary heart disease occurs. It is well accepted that persons with the rare disorder of homozygous phytosterolemia should not consume products enriched with plant sterols.

Plant stanol/sterol esters have been recognized by the National Cholesterol Education Program Adult Treatment Panel III as a component of maximal dietary therapy to achieve recommended LDL cholesterol levels.

The American Heart Association has described consumption of plant-sterol-containing foods as a promising addition to dietary interventions.”

Greater responsiveness to plant stanol/sterol esters is associated with the apoprotein E4 genotype, the presence of which is associated with high cholesterol-absorption efficiency.

## References

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