

# **Dietary intake of naturally occurring plant sterols in relation to serum cholesterol and myocardial infarction**

- Epidemiological studies from Sweden and the UK

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The thesis is based on the following papers:

- I. Klingberg S, Andersson H, Mulligan A, Bhaniani A, Welch A, Bingham S, Khaw K-T, Andersson S, Ellegård L. **Food sources of plant sterols in the EPIC-Norfolk population.** Eur J Clin Nutr 2008;62:695-703
- II. Klingberg S, Winkvist A, Hallmans G, Johansson I. **Evaluation of plant sterol intake estimated with the Northern Sweden Food Frequency Questionnaire.** Public Health Nutr 2012 Jul 2 [Epub ahead of print]
- III. Klingberg S, Ellegård L, Johansson I, Hallmans G, Weinehall L, Andersson H, Winkvist A. **Inverse relation between dietary intake of naturally occurring plant sterols and serum cholesterol in northern Sweden.** Am J Clin Nutr 2008;87:993-1001
- IV. Klingberg S, Ellegård L, Johansson I, Jansson J-H, Hallmans G, Winkvist A. **Dietary intake of naturally occurring plant sterols and the risk for a first myocardial infarction: a nested case-referent study in Northern Sweden.** Manuscript.



UNIVERSITY OF GOTHENBURG

# **Dietary intake of naturally occurring plant sterols in relation to serum cholesterol and myocardial infarction**

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Cardiovascular diseases (CVDs) are the leading cause of death in the world. High serum level of cholesterol is one of the major risk factors for CVD development. Serum levels of cholesterol can be modified by diet. Generally, these dietary effects have been attributed to different fats and soluble fibres, but other nutrients like plant sterols may play an important role.

The aim of this doctoral thesis was to investigate the dietary intake of naturally occurring plant sterols and their relation to serum levels of total and low density lipoprotein (LDL)- cholesterol and to the risk of contracting a first myocardial infarction (MI). These investigations were performed within the UK European Prospective Investigation into Cancer and Nutrition (EPIC)-Norfolk Study and within the Northern Sweden Health and Disease Study (NSHDS). In both studies, dietary intake of naturally occurring plant sterols was estimated with food frequency questionnaires.

Reported intake of naturally occurring plant sterols was around 250 mg/day for men and 210 mg/day for women in northern Sweden. In the investigated UK population, the reported intake has previously been shown to be around 300 mg/day for both men and women. In the UK, bread and other cereals, vegetables and added fats were the three most important food sources of naturally occurring plant sterols, together contributing with more than 50% of the total intake. In Sweden, intake of vegetable oil was highly correlated to both absolute and energy-adjusted plant sterol intake. In Sweden, plant sterol intake was inversely related to serum levels of total cholesterol in both men and women, and to serum levels of LDL-cholesterol in women. Odds ratio for a first MI was 0.76 for men in the highest quarter of plant sterol intake compared to men in the lowest quarter, while no effect was seen for women.

The present epidemiological studies suggest that dietary intake of naturally occurring plant sterols reduce serum levels of cholesterol and reduce the risk of contracting a first MI. Advice to enhance intake of naturally occurring plant sterols may be incorporated in the nutritional treatment of hyperlipidaemia and into the prevention of CVDs. To firmly establish the effect of naturally occurring plant sterols on serum levels of total and LDL-cholesterol, intervention studies are however needed.

*Keywords:* plant sterols, dietary intake, food sources, serum cholesterol, CVD, myocardial infarction, nutrition, epidemiology

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