

## Activity 1.23 Functional foods and CHD

### Purpose

- To reinforce how changing diet can affect the risk of CHD.

### Functional foods

This activity considers the development and trial of **functional foods**. These are foods that contain an added ingredient that gives them a health-promoting property in addition to their usual nutritional value, for example calcium added to orange juice or iron added to breakfast cereal.

One of the most high profile functional foods is cholesterol-lowering margarine, welcomed because high blood cholesterol is a known risk factor for coronary heart disease.

If 2 g a day of plant sterol or stanol was added to the average daily portion of margarine, there would be a reduction in the risk of heart disease of about 25%, an article in the *British Medical Journal* concluded. The normal dietary intake of plant sterols, which are found mostly in cooking oils and margarine, is 200–400 mg a day. The normal intake of plant stanols is negligible.

Benecol was the first cholesterol-lowering spread, and it contains plant stanols. Unilever followed with Flora pro-Activ, which was launched in August 2000. The margarine is enriched with plant sterols. These plant compounds are very similar, both lowering LDL or 'bad' cholesterol levels by reducing the amount we absorb from our small intestine. They work by preventing LDL cholesterol entering the bloodstream from the digestive system and liver.

### How much enriched margarine do you need to eat?

In one randomised, double-blind, placebo-controlled study the effects of a control spread (Flora), three different concentrations of a sterol-enriched spread and butter were compared. Eighty volunteers, all of whom had normal levels of cholesterol in their blood, ate controlled quantities of each spread for 3½ weeks. The table below lets you examine the relationship between blood cholesterol and plant sterols.

**Table 1** Changes in blood lipids (mmol per l) after use of plant sterol-enriched margarine, or butter, with respect to control spread.

	Control spread (Flora)	Change with 0.83 g sterols	Change with 1.16 g sterols	Change with 3.24 g sterols	Change with butter
Total cholesterol	5.16	-0.26	-0.31	-0.35	+0.14
LDL cholesterol	3.05	-0.20	-0.26	-0.30	+0.12
HDL cholesterol	1.64	-0.01	-0.02	-0.02	+0.03
LDL:HDL cholesterol ratio	2.01	-0.13	-0.16	-0.16	+0.04

Source: Hendriks, H.F.J., Weststrate, J.A., Van Vliet, T. and Meijer, G.M. (1999) Spreads enriched with three different levels of vegetable oil sterols and the degree of cholesterol lowering in normocholesterolaemic and mildly hypercholesterolaemic subjects, *European Journal of Clinical Nutrition* 53, 319–327. © Macmillan Publishers Ltd., reprinted by permission.

## Activity 1.23 Functional foods and CHD

## Student

### Questions

- Q1** Work out the percentage change relative to the control spread in total cholesterol, LDL cholesterol, HDL cholesterol and the LDL:HDL cholesterol ratio for each concentration of sterols and for butter.
- Q2** The chosen control spread was Flora. To ensure a fair trial, in what way must it have been similar to the sterol-enriched margarine?
- Q3** Comment on:
- the percentage change in total cholesterol, LDL cholesterol and HDL cholesterol composition for each of the three sterol-enriched spreads
  - the effect of the butter on the total cholesterol, LDL cholesterol and HDL cholesterol percentage change.
- Q4** What effect would the change in the LDL cholesterol as a result of eating the sterol-enriched spreads be expected to have on the chances of developing coronary heart disease?

### Extension questions

- Q5** Cholesterol and fat-soluble nutrients including certain vitamins are absorbed along similar pathways so it was important for scientists to see whether the plant sterols reduced the absorption of such nutrients. Some lowering of carotenoid absorption was found: the degree depended on the level of sterol intake. A spread was developed that was enriched with 8% sterols. This provided 1.6 g of sterols per day (with typical usage levels). Suggest three vitamins whose absorption might be affected by plant sterols.
- Q6** Find out what is meant by a double-blind, placebo-controlled study.

### Facts and figures

After extensive trials, including the one above, Unilever maintained that using such products reduced LDL-cholesterol levels by between 10–15% within a few weeks. Interestingly, the Advertising Standards Agency scrutinised the studies submitted by Unilever and found that people with a healthy diet and active lifestyles were likely to reduce LDL-cholesterol levels by only 10% and concluded that their claim was misleading!

Bodies such as the Food Standards Agency have signified broad approval of the use of sterol-enriched spreads and concluded that their use would lead to a real reduction in the risk of heart disease. Recent research has shown that raised cholesterol levels are no longer thought to be as important by the general public as they were a few years ago. Eighty per cent of adults in the UK still don't know their cholesterol levels, and even fewer are aware of the significance of the difference between the cardio-protective, high-density lipoprotein (HDL) 'good' cholesterol and the dangerous, arterial-damaging, low-density lipoprotein (LDL) cholesterol.

This gives you some insight into the problems of developing a novel food. Visit the Flora pro-Activ website (see the weblinks for this activity) to find out more about how the margarine works.