

EDITORIALS



Where the latest US dietary guidelines are heading

So farewell dietary cholesterol and total fat as risk factors worth worrying about

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Recently, the US Dietary Guidelines Advisory Committee released its recommendations for the next edition of *Dietary Guidelines for Americans*.¹ Two notable conclusions of the committee have attracted particular attention^{2,3}: the elimination of dietary cholesterol as a “nutrient of concern” and the absence of a limit on total fat consumption. The committee’s pronouncements will reverse nutrition policy because the low cholesterol, low fat diet has been the cornerstone of public health nutrition since 1980. In this editorial I will review the evidence for this change in policy from a historical perspective.

Fat is bad

The low cholesterol, low fat diet for preventing heart attacks was popularised in the first part of the 20th century. Classic animal experiments showed that feeding rabbits excessive cholesterol induced lipid containing lesions in the aorta. Anitschkow hypothesized that a high plasma cholesterol concentration caused atherosclerosis and its complications.⁴ Observant medical doctors from the Netherlands noticed extraordinarily low numbers of patients with myocardial infarction in the East Dutch Indies (Cornelis de Langen) and China (Isodore Snapper).⁵ The diets of these lean populations were low in cholesterol and fat and were associated with low plasma cholesterol levels, and these findings contributed to the diet-heart hypothesis.

But even at the time the diet-heart hypothesis could not explain all the known facts. For example, feeding animals excessive cholesterol did not induce atherosclerosis in all species, and populations with a high total fat intake, through a high consumption of olive oil or seafood, did not have a high number of people with myocardial infarction.

In the 1950s and 1960s it became clear that the type of fat is more important than the quantity. Controlled dietary experiments by Keys and colleagues and Hegsted and colleagues showed that saturated fat increased and polyunsaturated fat decreased plasma cholesterol whereas monounsaturated fat was neutral compared with a diet in which the fats were replaced with carbohydrates.^{6,7}

One component of plasma cholesterol, low density lipoprotein (LDL) cholesterol, was identified as a causal risk factor for coronary heart disease,⁸ and the intake of different types of fats

was found to affect its concentration. A meta-analysis of 60 controlled dietary experiments carried out since 1970, showed that substituting saturated fats for carbohydrates as the source of 1% of energy intake increased LDL cholesterol by 0.032 mmol/L. Substitution with monounsaturated fats decreased LDL cholesterol by 0.009 mmol/L and substitution with polyunsaturated fats decreased it by 0.019 mmol/L.⁹

The strongest reductions in LDL cholesterol occurred when saturated fats were replaced by mono or polyunsaturated fats; monounsaturated fats reduced LDL cholesterol by 0.041 mmol/L and polyunsaturated fat by 0.051 mmol/L. Replacement of carbohydrates by all three types of fats increased high density lipoprotein (HDL) cholesterol (the “good” cholesterol) and decreased triglycerides levels.

New developments

Fatty acids are not the only determinants of blood lipid levels. Certain carbohydrates and dietary fibre can reduce LDL cholesterol. A meta-analysis of randomized controlled trials showed that replacement of 15% of energy of simple sugars with starch reduced LDL cholesterol by 0.27 mmol/L under isocaloric conditions.¹⁰ Another meta-analysis of trials showed that 1 g/day of pectin, the water soluble fibre compound in fruit, reduced LDL cholesterol by 0.05 mmol/L.¹¹ Meta-analyses of studies of fibre rich foods have shown that 30-60 g of oats reduced LDL cholesterol by 0.18 mmol/L, 130 g of legumes reduced it by 0.17 mmol/L, and 35 g of nuts by 0.16 mmol/L.¹²⁻¹⁴

In 1981, Lewis and colleagues carried out a landmark dietary experiment.¹⁵ They compared four diets varying in total fat, type of fat (polyunsaturated:saturated fat ratio), cholesterol, and fibre. They found that the most favourable lipid values were not obtained by the traditional low fat, low cholesterol, low fibre diet (as consumed by lean Asian populations) but by diets either high or low in total fat, with a polyunsaturated:saturated fat ratio of 1.0 and a high fibre content.

In the 1980s, dietary guidelines around the world recommended restricting dietary cholesterol to 300 mg/day because controlled dietary experiments had shown that dietary cholesterol increased LDL cholesterol.³ In a meta-analysis of four small prospective cohort studies dietary cholesterol was positively associated with

coronary heart disease.¹⁶ Subsequently, it became clear that the effect of dietary cholesterol on LDL cholesterol was smaller in diets with a high polyunsaturated:saturated fat ratio than in those with a low ratio, and in large epidemiological prospective studies dietary cholesterol was not associated with a higher risk of coronary heart disease.³ More recent national food consumption surveys in the Netherlands and the US indicated that the average cholesterol intake was about 200 mg/day, considerably less than the recommended maximum of 300 mg/day. Because of the relatively small effect of dietary cholesterol on LDL cholesterol, the absence of a relation between dietary cholesterol and the risk of coronary heart disease, and the relatively low population intake of cholesterol, the 2006 Dutch guidelines committee¹⁷ and the 2015 US committee concluded that it was no longer necessary to give quantitative advice on dietary cholesterol.

Nutritionally adequate, plant food based diets, rich in unsaturated fatty acids, such as the traditional Mediterranean style diets, not only have beneficial effects on blood lipid levels but also reduce cardiovascular risk and are associated with a lower risk of all cause mortality in prospective cohort studies.^{18 19} In that context, guidelines for dietary cholesterol and total fat are not needed because they do not affect cardiovascular risk.

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