Reduction of blood cholesterol levels in the population: can it be done?

OF the three major risk factors for coronary heart disease, smoking, high blood pressure, and high blood cholesterol levels, the latter is both the most important and the most neglected. Japanese, black Africans, and rural Greeks and Italians, with blood cholesterol levels below the threshold of 5.2 mM (200 mg dl^{-1}), rarely have coronary heart attacks however much they smoke and however high their blood pressure, although they do suffer lung cancer and strokes. Unlike smoking and high blood pressure, a blood cholesterol level over this threshold is both a necessary and a sufficient cause of coronary heart disease.

Only 15% of adult men in Britain have blood cholesterol levels below this threshold. What is to be done? One policy is to concentrate clinical effort on the 10–20% of the population with the highest levels.[1] However, even if this policy were 100% effective, it would help only 18–32% of those who will suffer heart attacks during the next five years[2] and even this limited objective is beyond the present resources of either hospital or community practice, because of the enormous numbers of people involved. An average general practice with 2000 patients includes 300 men aged 40–59 years whose blood cholesterol levels would have to be measured. Of these men 60 would be in the top 20% of the range and would need dietary advice and follow-up. Most practices have concentrated on blood pressure control, not because it is more effective, but because treatment involves easy prescription of pills rather than arduous changes in behaviour.

How normal is the 'normal' range?

If we are concerned with high blood cholesterol values not because they are unusual (in the top 20%), but because they cause disease (the top 85%), we must accept that appropriate normal reference populations are not to be found in Britain where the mean blood cholesterol level is 6.2 mM (239 mg dl^{-1}), but around the Mediterranean and in the Far East where the mean blood cholesterol level is 4.0–5.2 mM (160–200 mg dl^{-1}).[3] The 85% of British men with blood cholesterol levels above 5.2 mM (200 mg dl^{-1}) have a health problem which must, at least in part, be our responsibility. However, if coping with the 2% of the population who are diabetic, and the 4% with diastolic blood pressures of 110 mmHg or over are tasks too big for us to tackle effectively as yet, it is hardly surprising that we have not been eager to accept the even bigger problem of tackling the 85% of adult men with high cholesterol levels and the 30% who smoke. We need more hands on deck if we are to act on prevention rather than just talk about it.

The population approach

The alternative approach, to educate the whole population, is so big that no one feels personally responsible for promoting it. Apart from some leaflets in the waiting room and an occasional wag of the finger, we have left this educational task to the media and those parts of the food industry that see new opportunities for profit from a more health-conscious public. The result is that those who most need the information are the least likely to get it. We can and should find better ways of reaching individuals, small groups and our local communities.

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The population distribution of blood cholesterol levels in middle-aged men must be shifted downwards by about 18%, to the Japanese or Mediterranean pattern. Can this be done? Perhaps; but only slowly and with immense effort, and general practice must play a part. American figures[4] show that the proportion of the population with blood cholesterol levels greater than 6.7 mM (260 mg dl^{-1}) fell by 13% for men and 23% for women between 1961 and 1973, associated with a shift from the consumption of animal to vegetable fats, and towards a lower proportion of all fat in the national diet. US Department of Agriculture surveys[5] found that two-thirds of families claimed to have modified their diet in some way for health reasons, usually prompted by advice from doctors or nurses. Between 1963 and 1980, milk and cream consumption fell in the USA by 24%, butter by 33% and animal fats and oils by 39%, while consumption of vegetable fats and oils rose by 58% and fish by 23%.

No corresponding change in our national diet has occurred. British data[6] reveal shifts in various sources of animal fat, but most of these seem to cancel one another out, and there has been little overall change in the proportion of the energy intake derived from fat, which remains at around 40%. A reduction in total fat intake to about 30% of the energy intake has been recommended by the Health Education Council, together with an increase in the proportion of fat from vegetables and fish by 50%.

What can we do?

We should not let the complexities of Frederickson's types[7] make us leave cholesterol control to experts. The advice needed by the vast majority of people with high blood cholesterol is simple.

Since the first step in all cholesterol-lowering programmes is weight reduction, and since effective reduced-energy diets also tend to have a cholesterol-lowering effect, primary care teams should concentrate initially on the visible, cheaply and easily measured, readily understood problem of obesity in those aged under 55 years, mounting a broad campaign for healthier eating by the whole population. When the Royal College of General Practitioners produced its report on prevention of arterial disease,[8] most of us thought this was enough, and did not advocate a policy of systematic case-finding or treatment for high blood cholesterol levels, although this view was tenaciously (and rightly) opposed by one of the authors of the report, Jim Mann.

Do we need to measure blood cholesterol levels?

Total cholesterol levels in the blood can now be estimated quickly, cheaply and accurately using clotted blood from non-fasting subjects on an auto-analyser, whereas the manual methods used up to the early 1970s were often inaccurate. Measurement of total cholesterol levels gives less information about risk than a full lipid profile, including high-density lipoprotein cholesterol levels, but this is a more expensive procedure and is more subject to laboratory error. Recent developments suggest that dry auto-analysers, using a single drop of capillary blood, could be in routine use in the general practitioner's surgery within the next five years, giving accurate cholesterol values at the time of consultation. The capital cost is at present around £3500 and the unit cost for each test about 50p. For modifying obesity, feedback of information to patients on their achievement is essen-

tial for success; is this not likely to be true also for modifying blood cholesterol levels? If we take trouble to obtain accurate information on personal needs and personal achievements, are we not more likely to encourage effective personal action?

Whose blood cholesterol level should be measured?

There is good reason to measure total cholesterol levels in people aged under 55 years with symptomatic arterial disease, as reduction in blood cholesterol levels results in regression of atheroma.[9] It should also be measured at least once in all hypertensive and diabetic patients, and in anyone under the age of 60 years with a history of coronary heart disease in a parent or sibling. We may have more success in counselling smokers if we assess all their other risk factors, including total cholesterol levels. Women taking oral contraceptives who insist on smoking should also have their total cholesterol levels determined to assist in explaining their personal risk. It is particularly important to measure cholesterol levels in female diabetics, who have the same risk of coronary disease as men. Finally, those interested enough to ask for their blood cholesterol levels to be measured deserve to have this information.

Who needs follow up?

All hypertensive and diabetic patients and patients with symptoms of arterial disease need dietary advice and follow up, with feedback by regular measurement of weight and occasional measurement of total cholesterol level. Other groups need dietary advice, and those with total blood cholesterol levels of 7.0 mM (270 mg dl^{-1}) or above should be followed up. Total cholesterol levels should be measured again about three months after starting a cholesterol-lowering diet, with occasional checks thereafter.

Despite the complexities of evidence on diet and coronary heart disease, practical conclusions are simple. People under 50 years of age, particularly if they have a family history of heart disease or are known to have a total blood cholesterol level of more than 5.2 mM (200 mg dl^{-1}), should take the following five steps:

1. Reduce energy intake with the aim of attaining a weight for height that is not associated with substantially raised mortality, that is a body mass index (weight (kg)/height^2 (m^2)) of less than 30.
2. Increase energy throughput by taking regular exercise.
3. Reduce intake of fats of all kinds by one quarter.
4. As far as possible, replace dairy and meat fat by fats and oils derived from vegetables and fish.
5. Increase intake of vegetables and fruit, particularly those eaten raw, eat only wholemeal bread, and increase the proportion of bread in the diet.

Like the obese, people with high blood cholesterol levels vary in their response to diet, some achieving a reduction of as much as 20% with little difficulty, others as little as 5% or less despite great effort. Those who find it difficult or impossible need reassurance that reduction of high cholesterol levels is only one way to reduce risk, and they should be encouraged to concentrate on exercise and giving up smoking.

Cholesterol-lowering drugs

Drugs to lower cholesterol levels are rarely justified. Cholestyramine (24 g daily) is a bulky, nauseating, anion-exchange resin which binds cholesterol in the gut and blocks its metabolism. It causes flatulence and is generally poorly tolerated, but it can reduce blood cholesterol levels by about 28% in patients who take all their medication and adhere strictly to a cholesterol-lowering diet. However, it is expensive — £456.00 to treat one patient for one year at 1984 prices. In the Lipids Research Clinics trial,[10] about two-thirds of the cholestyramine prescribed was taken, and this reduced blood cholesterol levels by an average of 14%, compared with 5% in the controls on diet only.

Clofibrate has been more widely prescribed and is easier to use. However, taken over several years it doubles the incidence of gallstones and apparently increases non-cardiovascular deaths.[11] Its use seems to be justified only in people with Frededrickson type III hyperlipidaemia, and even then, only as an adjunct to diet.

Huge doses of nicotinic acid (3–6 g daily) reduce blood cholesterol, but cause an uncomfortable sensation of prickly heat around the face and neck, with flushing and itching. The use of this drug seems to be safe.

None of these drugs is a substitute for diet, and none should be considered until dieting is well established and its effect on blood cholesterol has been measured.

We work on a small margin

As populations become healthier, small gains require greater effort by more people. Civilization advances by successive redefinitions of the intolerable; death from pump failure while the rest of the machine is still in good working order needs to become so defined. This will require action by millions of people, many of whom will gain nothing personally from it. That is out of tune with the times, but the times may be out of tune with our species.

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