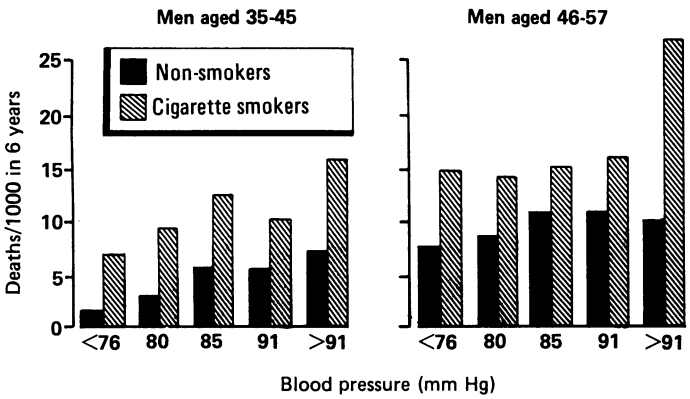
implying that everyone should have their cholesterol concentration measured and would benefit equally from having it lowered. Yet epidemiologists used a multiplicative model for coronary risk factors because it fitted the data well and was easy to derive by computer.[18 19] Resolution of whether risk factors in the real world behave in an additive or a multiplicative manner is not simple because no mathematical model is perfect, but it is fundamental to the question of whether selective cholesterol testing is more efficient than mass testing. Fortunately, the follow up data on more than 300 000 men screened for the multiple risk factor intervention trial allow how risk factors interact to be examined without presuming either additive or multiplicative models.[19]

Men in the study were classified by age and whether they smoked cigarettes and were divided into equal sized fifths for cholesterol concentration and also for blood pressure. Within each of the 20 subgroups of age, smoking, and blood pressure I subtracted the observed coronary mortality after six years in the lowest cholesterol fifth from that in the highest. This cholesterol attributable risk (figure) gives a measure of the maximum theoretical benefit to coronary mortality by changing someone's cholesterol concentrations from the highest fifth to the lowest without changing other risk factors. The figure shows that the cholesterol attributable risk is far from being constant, that the additive model of risk factors is therefore misleading, and that a selective strategy of cholesterol testing is therefore justified. In men aged 35-45 the cholesterol attributable risk in those who do not smoke and have low blood pressure is minute, and the costs and anxieties of measurement may be disproportionate to the potential benefit. Other risk factors multiply the risks many times, emphasising the importance of multifactorial assessment and of intervening on other risk factors in those at high risk because of a high cholesterol concentration.

Symptoms or history of coronary or arterial disease,[9] a strong family history, and diabetes are also likely to exacerbate cholesterol attributable risk. The risk of patients who have angina, who have had a myocardial infarction or coronary artery surgery, or who are on drugs for hypertension is sufficient to justify measuring and monitoring cholesterol. These patients, who are already under clinical care, may benefit from lipid lowering drugs if a determined dietary campaign fails. The next group who may justify cholesterol testing are patients without symptoms who have multiple risk factors. These patients will be much weaker candidates for lipid lowering drugs, and the likely effect of testing on compliance with dietary advice may influence a decision on testing.

There are two difficulties with selective testing. Firstly, some cases of heterozygous familial hypercholesterolaemia would be missed. About 0·2% of the population carries this gene. If effective identification and treatment existed it might be best to detect this in infancy. Secondly, selective testing goes against American[9 16] and some European advice.[1 12] Increasingly, patients will demand the right to know their cholesterol concentrations and will be confronting their general practitioners with the results of tests done elsewhere. Whatever policy of testing practitioners adopt they will have to become better at assessing risk factors, counselling, and giving dietary advice. They will also need to defuse the panic caused by simplistic, arithmetical interpretation of meretricious, isolated cholesterol tests.



Risk of death from coronary heart disease attributable to being in highest rather than lowest fifth of serum cholesterol concentration by age, blood pressure, and cigarette smoking. Values are derived from those screened for the multiple risk factor intervention trial[19]

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Dietary advice for lowering plasma cholesterol

General practitioners need to know more

Overall a 1% reduction in plasma cholesterol concentration in middle aged men should result in a 2% reduction in the incidence of coronary heart disease.[1] The reduction should benefit men aged under 50 more than older men. The indications for measuring plasma cholesterol concentration, which include a family history of cardiovascular disease below the age of 50, have been specified,[2] and the aim should be to reduce cholesterol concentrations >5·2 mmol/l towards this value. For people with plasma cholesterol concentrations of 5·2-6·5 mmol/l dietary advice and correction of other risk factors are appropriate whereas those with plasma concentrations >6·5 mmol/l need more intensive dietary intervention and follow up. Plasma cholesterol concentrations increase with age, reaching a plateau in the fifth decade in men but continuing to increase, at least up to the age of 60, in women. In the United Kingdom over half of all men and women

aged 25-59 have a plasma cholesterol concentration of over 5·5 mmol/l.[3] Thus dietary advice to reduce plasma cholesterol concentration is relevant to the general population.

In most patients with moderate hypercholesterolaemia the plasma cholesterol concentration can be reduced by fairly simple dietary measures. But if these measures are insufficient, particularly in patients with plasma cholesterol concentrations >7·8 mmol/l, general practitioners need to be aware of the role of drug treatment. Primary prevention is a priority, but prevention of progression in patients with established coronary heart disease should also be a goal.

The two main dietary factors that influence plasma cholesterol concentration are fat intake and energy balance.[4] In overweight patients plasma cholesterol concentration usually falls with loss of weight. A decrease in the intake of saturated fatty acids, provided mainly by dairy fat and fatty meat, is the most important element in a diet to lower cholesterol. Saturated fats should be limited to less than 10% of the energy intake.[5] Their replacement with either monounsaturated or polyunsaturated fatty acids is effective in lowering low density lipoprotein cholesterol concentration.[6] Most authorities advocate reducing the proportion of energy derived from total fat from the current average of about 40% to about 30%.[2 7 8] Decreasing the proportion of energy from fat much below this level, although sometimes advocated, has the potentially undesirable effect of lowering the concentration of high density lipoprotein cholesterol and decreases the palatability of the diet. Dietary cholesterol, which is mainly provided by eggs, has only a small effect on plasma cholesterol concentration.[9] Fish oils have little effect on plasma cholesterol concentration at the doses commonly used and may even increase low density lipoprotein concentration in some patients.[10] They are thought to protect against coronary heart disease by mechanisms independent of plasma cholesterol concentration.[11]

A comparison of three diets with 42%, 35%, and 27% energy from fat and ratios of polyunsaturated to saturated fatty acids of 0·2, 1·0, and 1·0 respectively showed that dietary change can reduce total cholesterol concentration by 9-19%.[12]

The study by Francis and colleagues reported on page 1620 probably underestimates the lack of dietary knowledge among primary care professionals, as they recognise, because they studied a selected and highly motivated group. They nevertheless identified several important and commonly held misconceptions including an exaggerated belief in the importance of dietary cholesterol, confusion about the role of polyunsaturated fats, a tendency to recommend weight reducing diets to non-obese subjects, and, in a fair proportion, an inability to focus on dietary issues relevant to lowering saturated fatty acid intake; a substantial proportion also tended to give predominantly negative advice.

Advice about dietary change should not be cast in a negative light; if it is cast negatively the public will see preventive activities by health professionals as directed solely towards prohibiting pleasurable and, until now, culturally accepted behaviour. Instead, increased consumption of fruit, vegetables, and fish should be advocated together with, in non-obese subjects, replacement of energy from saturated fatty acids by unrefined carbohydrates and unsaturated fatty acids.

Dietary changes that will considerably reduce the intake of saturated fatty acids include: changing to skimmed milk, eating less cheese and using low fat cheese, changing from butter or ordinary margarine to a low fat spread or a margarine high in polyunsaturates, changing from hard cooking fats to liquid vegetable oils low in saturated fats (rapeseed, olive, sunflower, safflower, corn, and soyabean oils), and choosing lean cuts of meat and fish. Grilling rather than frying food can also be helpful.

Various leaflets, offering information on dietary changes should be a useful adjunct to verbal advice,[13-15] but the medical model of health education that assumes that information leads to changes in behaviour is too simplistic. Other factors may also be relevant,[16] such as perceptions of vulnerability, seriousness, benefits, and costs. Cues to action such as the appearance of a symptom, coverage in the news media, and illness in a friend may increase the likelihood of change.

The study by Francis and colleagues highlights the gap between theory and practice and the need for health professionals to be given clear dietary guidelines for managing hypercholesterolaemia. Any attempt to produce dietary change must, of course, be a part of a wider programme that includes other risk factors such as smoking and hypertension. The deficiencies in knowledge about diet and coronary heart disease among general practitioners and nurses suggest the need for greater emphasis on this topic in both undergraduate and continuing education.

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Urinary tract infections in men

Investigate at all ages

The urinary tracts of men differ from those of women so it should be no surprise that urinary tract infections differ between the sexes. Overall, men have fewer urinary tract infections despite having a less stringent criterion for diagnosis ($>10^3$ colony forming units/ml in men compared with $>10^5$ in women).[1] Different organisms infect men, and the prevalence of bacteriuria varies at different ages, but the difficulty of localising infection to the lower or upper urinary tract is shared in men and women.[2]