The role of nutrition in the prevention of cardiovascular disease

PETER CLIFTON FRACP, PhD

Diet can have a significant impact on the risk of cardiovascular disease and patients need nutritional advice to achieve the best outcome.

Key points

- **Eating a small amount of nuts each day lowers a patient's risk of cardiovascular disease.**
- **Consumption of red and processed meats should be minimised and these foods replaced when possible with dairy products, fish or chicken.**
- **A Mediterranean-style diet with a high intake of fish, fruit and vegetables should be consumed.**
- **Saturated fat should be replaced with unsaturated fats.**

Many of the established nutritional recommendations for patients with heart disease, such as lowering the intake of saturated fat, consuming fish oil and losing excess weight, have been challenged over the past five years. The effect of dietary fat modification and fish oil intake has been examined but there is limited evidence on the effect of other interventions in people with heart disease. Therefore, most recommendations have been based on epidemiology and relate mostly to primary prevention of cardiovascular disease. This article attempts to examine the evidence and offer a consensus view on the role of nutrition in the prevention of cardiovascular disease.

CARDIOLOGY TODAY 2015; 5(3): 26-27

Professor Clifton is Professor of Nutrition at the University of South Australia, Adelaide, SA.

Mediterranean diet

A Mediterranean diet is one that has a low intake of saturated fat, meat and dairy products, and a high intake of olive oil, fruit, vegetables, legumes, nuts and fish. There is considerable epidemiological evidence that a Mediterranean diet is associated with lower rates of heart disease, stroke, type 2 diabetes and dementia, even in non-Mediterranean countries.[1] Flavonoid intake from fruit and vegetables has also been associated with a lower rate of heart disease.[2]

The PREDIMED (Effects of the Mediterranean diet on the primary prevention of cardiovascular diseases) study of men and women at high risk of cardiovascular disease suggested that polyphenols may be the mediator of cardiovascular protection in the Mediterranean diet. It showed that consuming the Mediterranean diet and an extra 32 to 50 g/day of extra virgin olive oil, which contains hydroxytyrosol, reduced the risk of cardiovascular disease, particularly stroke, by 30%.[3] In a second group of study participants, consuming the Mediterranean diet and an extra 30 g/day of a mixture of walnuts, hazelnuts and almonds reduced the risk of cardiovascular events by 29%. The control diet (advice to reduce dietary fat) reduced fat intake by 2%, with a reduction in the consumption of nuts, fish and legumes compared with the Mediterranean diets.

Although the study was large (7447 participants), the total number of cardiovascular events was small (n = 288). Reductions in the number of cardiovascular events was lower in the intervention groups within the first few months of the study but no difference was seen in the subsequent four years, which is somewhat surprising; only rates of stroke were reduced by statistically significant amounts. The two intervention diets lowered lipid and glucose levels and blood pressure in a subset of the study population who had these values measured.[4,5]

In Australia, adding 30 g/day of nuts to our diets is easily achievable but in the study the background diet was strictly Mediterranean and this may alter the impact in the Australian population. An extra 32 to 50 g/day of extra virgin olive oil may be more difficult to apply to diets in Australia because of the large quantity of oil required (1 litre/week).

Weight

Epidemiological studies have shown that body mass index is a good predictor of cardiovascular events, and it would be expected that a reduction in weight should lower the rate of cardiovascular events.[6] In the Swedish Obese Subjects (SOS) study, large amounts of weight loss (18% at 20 years follow up) after bariatric surgery resulted in reductions in the risks of heart attack by 29%, stroke by 34% and total mortality by 29% over 20 years.[7]

However, the Look AHEAD (Actions for Health in Diabetes) Study failed to show any improvements in the rates of cardiovascular disease despite a weight loss of 8.6% in participants during the first year from both diet and exercise, with a loss of 6% at study end.[8] This lack of improvement may have been because of the lower weight loss seen in this study than in SOS or because of the use of less medication (statins) in the intervention group compared with the control group. However, a difference in cardiovascular risk may still be seen in 20 years' time as in the SOS.

Fish oil

The use of fish oil supplements for the prevention of cardiovascular disease has become controversial, with a spate of negative primary and second prevention studies over the past five years. The most recent meta-analysis of all supplement studies showed no overall benefit after adjustment for multiple endpoints.[9] Today, the use of fish oil supplements in patients, many of whom have been stented and are on statins and ACE inhibitors, is not recommended because it has no additional clinical benefit.[10]

Saturated fat

Epidemiological studies have shown that replacing saturated fat with carbohydrate does not reduce the rate of cardiovascular disease events despite a small reduction in the levels of LDL-cholesterol.[11] This has been confirmed in a small number of interventional studies including the very large (>48,000 participants) Women's Health Initiative.[12] Replacing saturated fat with polyunsaturated fat has been associated with benefit epidemiologically; however, these results are from old and flawed interventional studies for either primary or secondary prevention. Very high amounts of polyunsaturated fat (15% of energy) lowers the rate of cardiovascular disease by 19% but it is not clear if short-chain omega-3 fatty acids provide some or all of the benefit because some of the trials were confounded by the presence of trans fatty acids.[13,14]

The Lyon Diet Heart Study made many small changes to participant's diets, reducing saturated fat intake by 3.7% and polyunsaturated fat intake by 1.5%, and the benefit was much greater than would be expected, especially as traditional risk factors were not altered.[15] The trial was small and had many design problems, particularly the lack of a blinded arm. The most recent Cochrane review suggests that reducing the consumption of saturated fat and replacing it with polyunsaturated fat reduces cardiovascular events by 14%.[16] This benefit was related directly to the degree of effect on serum total cholesterol, LDL-cholesterol and triglyceride levels, but intervention needed to be of at least two years' duration and benefit was seen in studies of men and not women. There were no clear effects of dietary fat changes on total mortality or cardiovascular mortality.

The Alternative Healthy Eating Index-2010 suggests that in people in the USA a healthy diet could reduce heart disease by 39% in men and 28% in women.[17] The diet studies examined event rates over eight to 15 years and the diets had been followed from before the observation began.

Meat

Mortality

Consumption of processed meats has been associated with a 42% higher risk of heart disease per 50 g serving per day ($p = 0.04$) and a 19% higher risk of diabetes mellitus ($p<0.001$).[18] Also, total mortality was increased by 23% in people who ate 50 g/day of processed meat.[19]

Meat versus dairy

Although fat from both dairy and meat products contains saturated fats that elevate levels of LDL-cholesterol (myristic and palmitic acids), dairy products appear to be associated with protection from cardiovascular disease (21% per 5 g/day).[20] However, the same amount of saturated fat from meat was associated with a 26% increased risk of cardiovascular disease.[20] Swapping a modest amount of meat with dairy can reduce cardiovascular disease risk by 25%.[20] Other components, of dairy products, such as calcium and magnesium, can also offer protection. In addition, carnitine and phosphatidylcholine in meat can be converted by the intestinal microbiome to amines (trimethylamine), which when oxidised in the liver are associated with heart disease and type 2 diabetes.[21,22]

Fruit, vegetables and fibre

Increased fruit, vegetable and fibre intake to reduce cardiovascular disease risk is based solely on epidemiology and has little or no interventional evidence to support it. Nevertheless, their consumption is still very strongly recommended. It is possible that fibre and polyphenols modulate bacterial populations and metabolism and protect against cardiovascular disease via bacterial end products, many of which have not been identified or characterised.[23]

Alcohol

Alcohol still lurks in the grey zone regarding its protecting against cardiovascular disease deaths (J-shaped relationship). It shows a U-shaped association with total mortality, with a 51% increase in mortality with consumption of two or more drinks per day.[24]

Conclusion

Increased consumption of fruit and vegetables, nuts, wholegrains, fish, dairy and virgin olive oil and other unsaturated fats and decreased consumption of processed meat and saturated fat may reduce recurrent CVD risk by 20 to 40%. Fish oil is not harmful but may not be beneficial for most people. **CT**

References

A list of references is included in the website version (www.medicinetoday.com.au) of this article.

COMPETING INTERESTS: Professor Clifton is the coauthor of six diet books, including *the CSIRO Total Wellbeing Diet.*

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