

Red meat and cholesterol

Cholesterol is a substance that is essential to life as a primary component of cell membranes and as a substrate for the synthesis of steroid hormones, bile acids and vitamin D. Cholesterol is transported around in the body in various particles in the blood such as low density lipoprotein (LDL) and high density lipoprotein (HDL). High blood levels of cholesterol are linked with coronary heart disease (CHD).

Dietary Cholesterol

The main reason for high blood cholesterol is the body making too much and the influence of dietary cholesterol on blood cholesterol is relatively small because cholesterol is synthesised in the body and most people can reduce synthesis if dietary intake is high. In general, significant effects of dietary cholesterol are seen only at extreme levels of intake, for example a very high intake (> 300mg) resulting from unusually high consumption of cholesterol-rich foods. Lean red meat is low in dietary cholesterol.

Excessive intakes of saturated fatty acids in the diet are the main dietary reason for high blood levels of cholesterol. Contrary to popular belief, lean red meat does not contain high levels of fat or saturated fat. The total fat content of red meat has been considerably reduced over the last few decades and the amount of fat in red meat is actually much lower than most people think.

Reductions in the fat content of red meat have been achieved by breeding techniques on the farm and new butchery techniques, which trim off most of the fat. Fully trimmed lean raw beef typically contains only 5% fat, fully trimmed lean raw pork only 4% fat and fully trimmed lean raw lamb only 8% fat. In comparison, Cheddar cheese contains an average of 34% fat. Furthermore, about half of the fat found in red meat is the healthier polyunsaturated or monounsaturated types. Choosing lean cuts of meat and trimming off any visible fat helps to reduce the saturated fat content further.

Therefore, lean red meat does not cause adverse effects on total cholesterol and low-density lipoprotein (LDL) cholesterol levels in the blood.

What is the evidence?

Some cross-sectional studies suggest that meat eaters have a significantly higher intake of total fat and saturated fat which is associated with increased plasma total cholesterol and increased LDL cholesterol compared with vegetarians⁽¹⁾. However, in these trials, hidden fats in fast foods, snack foods and other processed foods, rather than red meat, were the primary sources of saturated fat in the meat eater's diets⁽²⁾.

Furthermore, there is evidence from several studies that lean red meat does not raise total blood cholesterol or LDL cholesterol. A 5-week intervention study in 10 healthy people showed that consumption of a very low fat diet containing 500g/day of very lean beef (more than ten times the average intake of red meat in UK adults) reduced total and LDL cholesterol levels by 17 and 27 per cent respectively.⁽³⁾

In a further study on 22 healthy adults, a low-fat diet containing 500g/day of lean red beef was tested for 2 weeks after which times oils associated with cholesterol lowering (safflower oil or olive oil) were added to the diet. LDL cholesterol decreased significantly by 13-14 per cent on the low fat lean red beef diet and remained low after the addition of the oils to the diet.⁽⁴⁾

In another study, 24 adults with mildly elevated plasma cholesterol levels consumed their usual diets containing an average 154g cooked meat each day (beef, veal, lamb, pork, chicken). During the following 6 weeks, the subjects ate 500g/day of lean red beef in either a low fat diet or a modest fat diet. Plasma levels of total cholesterol and LDL cholesterol fell significantly in both groups of lean red beef eaters with no differences between the groups. The saturated fat levels of the two dietary regimes

⁽¹⁾ Li D et al. European Journal of Clinical Nutrition 1999;53:612-619

⁽²⁾ Ashton YM, Mann NJ. The contribution of food groups to the total fat and fat type in various diets. Proceedings of the Nutrition Society 2000; 24: 104.

⁽³⁾ Mann NJ, Johnson LG, Warrick GE, Sinclair AJ. The arachidonic acid content of the Australian diet is lower than previously estimated. J Nutr 1995; 125: 2528-2535.

⁽⁴⁾ Morgan S, O'Dea K, Sinclair AJ. Low-fat diets rich in lean beef: The effects of the addition of safflower and olive oil. J Amer Diet Assoc 1993; 93: 644-648.

were 4.2 and 6.7 per cent of energy compared with the subjects' usual dietary saturated fat intake of 15.1 per cent energy.⁽⁵⁾

Another study examined the effect of mixed meat and meat products with different amounts of animal fat on plasma cholesterol in 15 men with high lipid levels. The study comprised a 4-week reference period (diet A, typical of the average British diet), followed by two four-week experimental dietary periods with lower amounts of fat and saturated fat. Daily consumption of meat and meat products was the same in each experimental dietary period (180 g/day, 20g cooked and 160g raw weight). In this study, the mixture of meat and meat products included carcass meat, offal, bacon, cooked meats, canned meats, sausages, meat pies and other meat products. The fat content of the meat and meat products was 16% for diet A and 8.5% for diets B and diet C. Additional fibre was added to diet C. Compared with diet A, the plasma concentrations of total cholesterol and LDL-cholesterol fell by 8.6 per cent and 11 per cent in diet B and by 18.5% and 23.8% in diet C. Based on these results, the authors suggested that it was possible to reduce plasma cholesterol levels by reducing dietary fat (animal fat) rather than removing meat from the diet.⁽⁶⁾

Cardio-protective Diet

For a Cardio-protective diet the National Institute for Health and Clinical Excellence (NICE 2008) recommends people should eat a diet in which:

- Total fat intake is 30% or less of total energy intake
- Saturated fats are 10% or less of total energy intake
- Dietary cholesterol is less than 300 mg/day
- Saturated fats are replaced by monounsaturated and polyunsaturated fats
- Five portions of fruit and vegetables are consumed per day
- Two portions of fish are consumed per week, including a portion of oily fish

⁽⁵⁾ Morgan SA, O'Dea K, Sinclair AJ. A low-fat diet supplemented with monounsaturated fat results in less HDL- lowering than a very-low-fat diet. J Am Diet Assoc 1997; 97: 151-156.

⁽⁶⁾ Morgan SA, O'Dea K, Sinclair AJ. A low-fat diet supplemented with monounsaturated fat results in less HDL- lowering than a very-low-fat diet. J Am Diet Assoc 1997; 97: 151-156.

Target cholesterol levels for the UK Public

	Primary care	Secondary care : Those at high risk of heart problems, diabetes or high blood pressure
Total cholesterol	No more than 5mmol/l	No more than 4mmol/l
LDL cholesterol	No more than 3mmol/l	No more than 2mmol/l

NICE Guidelines (2008) Lipid modification – Cardiovascular risk assessment and the modification of blood lipids for the primary and secondary prevention of cardiovascular disease.

In conclusion

Studies show that lean red meat does not have deleterious effects on total cholesterol and LDL cholesterol levels in the blood. The overall dietary balance is important and in the context of a low fat diet, lean red meat may actually have beneficial effects on blood cholesterol.

Please visit www.meatandhealth.com for more information.