

High Cholesterol

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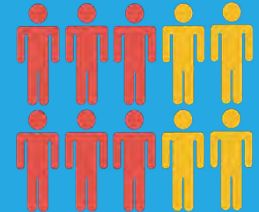
Promoting Sustainable Health and Nutrition

Cholesterol is a fatty substance found in the blood. It is used by the body to make cells, hormones and bile.

The liver makes all the cholesterol your body needs. The rest of the cholesterol in your body comes from food, mainly those derived from animal products like eggs, meat and dairy.



Six out of ten adults in England have high cholesterol levels.



High cholesterol is dangerous because it causes blood vessels to narrow. It is the **main risk factor** for developing heart disease, **our biggest killer**. It can also cause other diseases like stroke and dementia.



Blood vessel with **atherosclerosis** cross section and longitudinal view

Types of cholesterol

Cholesterol is usually divided into '**good**' and '**bad**' cholesterol, depending on whether it helps remove or build up cholesterol in the body.

The Good
High-density lipoprotein (HDL)

The Bad
Low-density lipoprotein (LDL)

Non-HDL
cholesterol - which is a combination of LDL and other 'bad' cholesterol

In general, the lower the LDL and the higher the HDL, the **better your chances of preventing heart disease and other conditions**.

It is **more important** to have a low LDL level than it is to have a high HDL level.

Cause of high cholesterol

The main cause of high cholesterol is **our diet**.



Other less common causes: genetic disorders, or diseases of the liver, thyroid gland or kidneys.

Common foods *high in cholesterol* are eggs, shellfish, and offal such as liver.

Saturated fat and trans-fats are also an important factor in raising cholesterol levels. They cause the body to produce more cholesterol than normal.

When you eat foods that contain both these fats and cholesterol, they work together to cause an even bigger rise in cholesterol.

Common foods that contain both cholesterol and saturated fat include:

- Dairy foods like milk, cheese and cream
- Meat products like burgers, sausages and bacon
- Animal fats like butter and ghee
- Processed foods like baked goods, fast food and cured meats

Some tropical oils such as palm oil and coconut oil contain saturated fat, but not cholesterol.



Added sugar and refined grains also increase cholesterol levels.



What are healthy levels of cholesterol?

The lower the better!

Lowering the LDL by 0.7 mmol/L, reduces your risk of heart attack and stroke by 30%.

**increased risk = people with existing heart disease, diabetes, lipid disorders, high blood pressure, smokers, or of South Indian ancestry*

Keep your LDL cholesterol

at 3 mmol/L, or below 2 mmol/L if you have increased risk.*

However, heart attacks and strokes still occur despite this guidance.

The optimal level of LDL to *minimise risk* is nearer to 1.4 - 1.8 mmol/L.

Did you know?

1 egg contains almost as much cholesterol as your daily limit (200mg)

Common questions

Do eggs raise cholesterol?

Yes. Dietary cholesterol from foods like eggs **modestly raises** total cholesterol and LDL.

The degree to which it goes up depends on the individual. Hyper-responders have a bigger rise as more cholesterol gets absorbed through their gut and less eliminated in bile.

Also, those who have low cholesterol levels will have a greater rise than those with baseline levels that are higher.

People with diabetes and heart disease in particular should avoid high cholesterol foods like eggs as it markedly increases their risk of heart attacks and strokes.

Is it healthier to eat chicken or lean meat?

Both types of meat **raise** cholesterol to a similar degree.

Can people of normal body weight have high cholesterol?

Any body type can have high cholesterol, though it is more commonly found in **overweight** individuals.

Do I only need to think about cholesterol when I am older?

With a typical Western diet, cholesterol levels can be high from **childhood**. It's worth checking cholesterol regularly from your 20s to **make early changes**.

How to reduce cholesterol levels

1 Eat more whole plant foods



Plant products don't contain cholesterol. Most plant products contain unsaturated fats, which lower cholesterol. Animal products contain cholesterol and saturated fats, which both raise blood cholesterol.



2 Be mindful of vegetable oil



Avoid coconut or palm oil, which contain largely saturated fat. Other plant oils like olive oil contain small amounts of saturated fat. It's best to limit any added oils if you have high cholesterol, heart disease or diabetes.

3 Avoid trans-fat



These are contained in animal products, fast food and processed food like cured meats, snacks and baked goods.

4 Eat more cholesterol lowering foods



Fibre

Soluble fibre, like that found in oats, barley and beans, has been shown to reduce cholesterol levels. Aim for 30g per day.



Soya

Soya has the largest amount of the antioxidant isoflavone, which lowers LDL levels. Aim for 25-50 g per day.



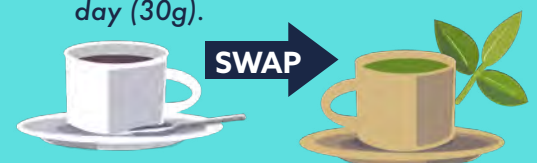
Nuts and seeds

Flax seed, almonds, walnuts and pistachios all reduce cholesterol levels. Nuts and seeds also contain plant sterols, which reduce cholesterol absorption in the gut. Aim for one serving a day (30g).



Red fruits and vegetables

The antioxidant lycopene, which gives foods their red colour, lowers cholesterol. Tomatoes, watermelon, pink grapefruit, red cabbage, red bell peppers all have large amounts of lycopene. Eat as much as you can!



Swap coffee for green tea

Coffee raises cholesterol, whereas green tea reduces it. If you drink coffee, paper-filtered raises it the least.

5



Lose weight

Aim for a BMI of 18.5 - 24.9. Obesity is associated with increased levels of bad cholesterol.

6



Exercise

Aim for at least 30 minutes of moderate-intensity exercise (e.g., brisk walking) five days a week. This raises beneficial HDL levels.

7



Quit Smoking

Smoking lowers beneficial HDL levels.

8



Eliminate Alcohol

Alcohol raises the good HDL cholesterol, but the benefits from this are small. You will get more benefit from a plant-based diet and exercise rather than from drinking alcohol.

Benefits of a plant-based diet

The aim of a plant-based diet is to minimise animal products, processed food, added sugar and oils.

It encourages the predominant consumption of:

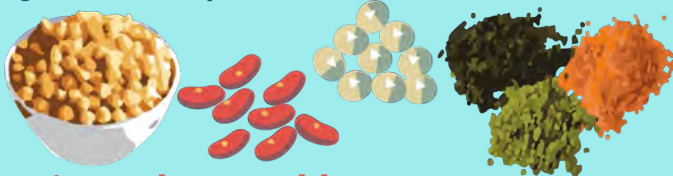
Whole grains

e.g. oats, rye, buckwheat, quinoa



Legumes

e.g. lentils, chickpeas, beans



Fruits and vegetables



Those eating purely plant-based have a much lower total cholesterol level - 3.4 mmol/L in one study - compared to the UK average of 5.9 mmol/L.

It reduces cholesterol through a variety of ways

- 1 It's free of cholesterol and has minimal saturated fat
- 2 It's high in fibre, antioxidants, sterols and other compounds which lower cholesterol.
- 3 It promotes a healthy gut biome, which produce compounds that lower cholesterol.
- 4 It's low-calorie and aids weight loss.

The best diet at reducing cholesterol: The Portfolio diet

This is a plant-based diet very low in fat in combination with foods known to reduce cholesterol - plant sterols, soya, soluble fibre and almonds.

After 4 weeks, this diet reduced LDL levels by 35%.

This was compared to a low-fat diet incorporating low-fat dairy foods, which lowered LDL levels by 12%.

References

American Heart Association: www.heart.org

Heart UK: www.heartuk.org.uk

Mayo Clinic: www.mayoclinic.org

My Food Data: www.myfooddata.com

Physicians Committee for Responsible Medicine: www.pcrm.org

Bergeron N, Chiu S, Williams PT, King SM, Krauss RM. Effects of red meat, white meat, and nonmeat protein sources on atherogenic lipoprotein measures in the context of low compared with high saturated fat intake: a randomized controlled trial. *Am J Clin Nutr*. Published online June 4, 2019.

Bhatnagar D, Soran H, Durrington PN. Hypercholesterolaemia and its management. *BMJ*. 2008 Aug 21;337:a993. doi: 10.1136/bmj.a993. PMID: 18719012.

Fielding CJ, Havel RJ, Todd KM, Yeo KE, et al. Effects of dietary cholesterol and fat saturation on plasma lipoproteins in an ethnically diverse population of healthy young men. *J Clin Invest*. 1995 Feb;95(2):611-8. doi: 10.1172/JCI117705. PMID: 7860745; PMCID: PMC295526.

Grundey SM, Cleeman JI, Merz CN, Brewer HB Jr, et al. National Heart, Lung, and Blood Institute; American College of Cardiology Foundation; American Heart Association. Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III guidelines. *Circulation*. 2004 Jul 13;110(2):227-39. doi: 10.1161/01.CIR.0000133317.49796.0E. Erratum in: *Circulation*. 2004 Aug 10;110(6):763. PMID: 15249516.

Jacobson TA, Maki KC, Orringer CE, Jones PH, et al. NLA Expert Panel. National Lipid Association Recommendations for Patient-Centered

Management of Dyslipidemia: Part 2. *J Clin Lipidol*. 2015 Nov-Dec;9(6 Suppl):S1-122.e1. doi: 10.1016/j.jacl.2015.09.002. Epub 2015 Sep 18. Erratum in: *J Clin Lipidol*. 2016 Jan-Feb;10(1):211. Underberg, James A [added]. PMID: 26699442.

Jenkins DJ, Kendall CW, Marchie A, Faulkner D, et al. The effect of combining plant sterols, soy protein, viscous fibers, and almonds in treating hypercholesterolemia. *Metabolism*. 2003 Nov;52(11):1478-83. doi: 10.1016/s0026-0495(03)00260-9. PMID: 14624410.

Krauss RM, Eckel RH, Howard B, Appel LJ, et al. AHA Dietary Guidelines: revision 2000: A statement for healthcare professionals from the Nutrition Committee of the American Heart Association. *Circulation*. 2000 Oct 31;102(18):2284-99. doi: 10.1161/01.cir.102.18.2284. PMID: 11056107.

O'Keefe JH Jr, Cordain L, Harris WH, Moe RM, Vogel R. Optimal low-density lipoprotein is 50 to 70 mg/dl: lower is better and physiologically normal. *J Am Coll Cardiol*. 2004 Jun 2;43(11):2142-6. doi: 10.1016/j.jacc.2004.03.046. PMID: 15172426.

Resnicow K, Barone J, Engle A, Miller S, Haley NJ, Fleming D, Wynder E. Diet and serum lipids in vegan vegetarians: a model for risk reduction. *J Am Diet Assoc*. 1991 Apr;91(4):447-53. Erratum in: *J Am Diet Assoc* 1991 Jun;91(6):655. PMID: 1849932.

Satija A, Hu FB. Cardiovascular benefits of dietary fiber. *Curr Atheroscler Rep*. 2012 Dec;14(6):505-14. doi: 10.1007/s11883-012-0275-7. PMID: 22872372.

Spence JD, Jenkins DJ, Davignon J. Dietary cholesterol and egg yolks: not for patients at risk of vascular disease. *Can J Cardiol*. 2010 Nov;26(9):e336-9. doi: 10.1016/s0828-282x(10)70456-6. PMID: 21076725; PMCID: PMC2989358.