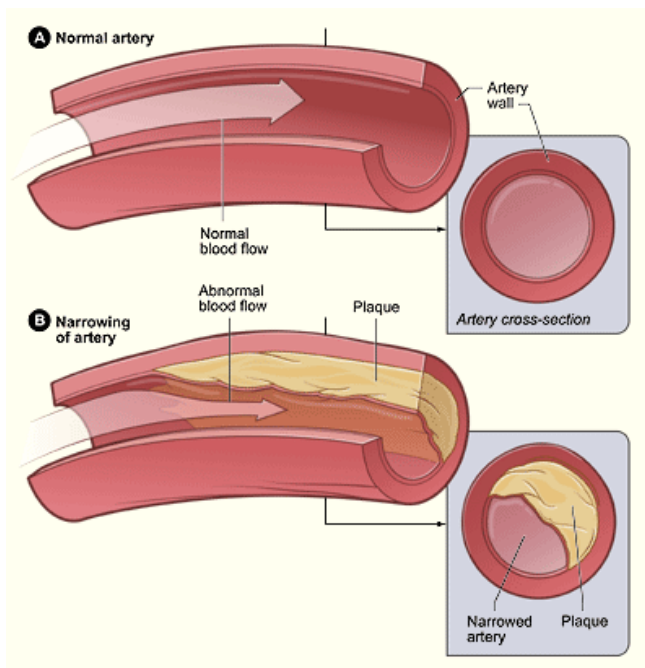
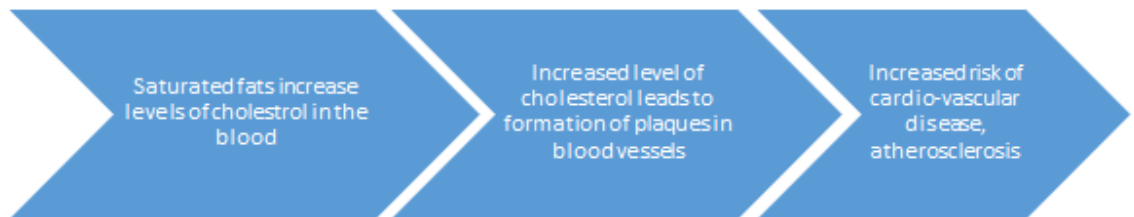


2. Lipids and their role in health and disease: Solutions

Types of lipids

Solid (mainly animal origin) Contain saturated fats	Liquid (mainly plant origin) Contain unsaturated fats
Butter	Vegetable oils (sunflower, rapeseed, etc)
Lard	Fish oil
Coconut oil	Algae oil

What is the problem with saturated fats?



https://commons.wikimedia.org/wiki/File:Atherosclerosis_diagram.png

Source: http://www.nhlbi.nih.gov/health/dci/Diseases/Hbc/HBC_WhatIs.html

Cholesterol

Read the bullet point facts about cholesterol and answer the quick questions below

- **Cholesterol** is an organic compound, a naturally occurring lipid that can be found in animal cell membranes. It has several important biological roles.
- In humans, about 80% of cholesterol is produced by the body (by liver, intestine, kidneys and endocrine glands). The other 20% are obtained from the food.
- Cholesterol modulates membrane fluidity over a range of temperatures. It increases membrane rigidity by increasing the “packing” density of phospholipid molecules in the lipid bilayer.
- Cholesterol is an essential precursor for vitamin D biosynthesis. It is necessary for the production of various steroid hormones (such as cortisol, aldosterone) and sex hormones (oestrogen, progesterone, testosterone), as well as for the production of bile acids. It is also involved in nervous and immune system functions.
- Cholesterol is insoluble in water and thus cannot be delivered on its own to tissues via blood. Instead, in the blood cholesterol is found as soluble complexes with special transporter proteins. These proteins are called lipoproteins.
- There are several types of lipoproteins, differentiated by their molecular mass and the solubility of the lipoprotein-cholesterol complex, which is linked to the tendency of cholesterol crystals to precipitate and form atherosclerotic plaques.
- The main classes are high-density lipoproteins (HDL), low-density lipoproteins (LDL) as well as very low-density lipoproteins (VLDL). LDL transports fatty acids and cholesterol to peripheral tissues. HDL transports fatty acids and cholesterol to the liver, where they get broken down and removed from the body.

People talk about “good” and “bad” cholesterol in blood – what they actually mean are lipoproteins. Which lipoprotein (in terms of density) do you think is called “good” and which “bad”? Why?

HDL is “good” cholesterol because it carries fatty acids and cholesterol from peripheral tissues to the liver, which then breaks them down or removes them. LDL and VLDL are “bad” cholesterol because they are the ones that go from the liver to peripheral tissues, and if there is too much cholesterol and lipids for cells to use and for the liver to cope with, excess LDL and VLDL accumulate in circulation and contribute to fatty buildups in arteries (atherosclerosis).

In the “healthy foods” section of the supermarket you notice bottle of oil with a “no cholesterol!” sticker on it. It costs 50p more than others without such a sticker. Do you think it is worth paying more for the “no cholesterol” one? Explain your answer.

Cooking oils in the supermarket are of plant origin, and by definition plants do not have cholesterol, only animals do. So while the sticker is true, it is not worth paying extra money because the oils without such stickers do not have cholesterol either.