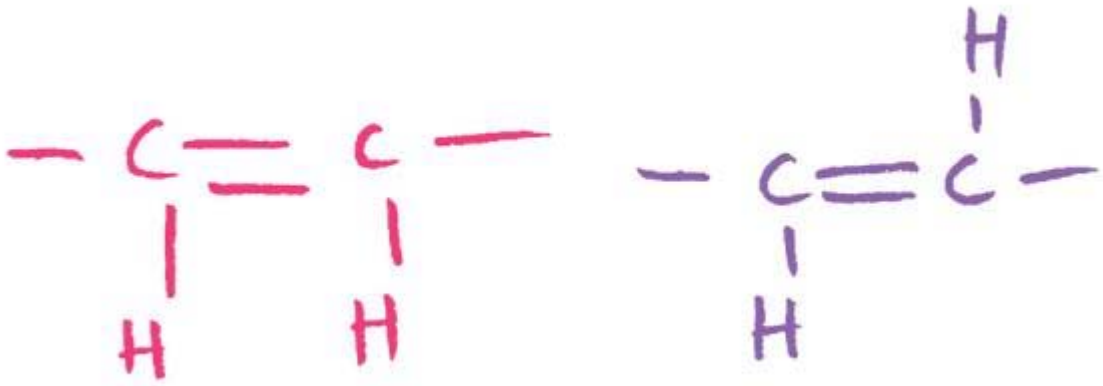
Fat, nutrition and health

Our relationship with fat is complicated

Whether fat is good or bad – and there is much debate to be had on the issue – there's no denying that we need some fat in our diets. The essential fatty acids alpha-linolenic acid (omega-3) and linoleic acid (omega-6), for example, have important roles to play in regulating our immune responses.



In unsaturated fats, the 'cis' configuration (shown in pink, above) is usual. In trans fats (shown in purple), some bonds are flipped. CC BY Big Picture: Fat (2015)

Our bodies can't make essential fatty acids, so we must get them from foods such as rapeseed and walnut. From these, we're capable of making other types of omega-3 fatty acids, but because we don't do so very efficiently, it's easier to get them from oily fish like mackerel. Omega-3 and omega-6 fatty acids have more than one double bond in their carbon backbone and so are known as polyunsaturated ('poly', from the Greek for 'many').

The problem with low-fat diets is that in the long term, we need to get our calories somewhere else and that somewhere else is usually carbohydrate. Some scientists are now arguing that guidelines on fat need to be changed. There is evidence to suggest that rising levels of heart disease, diabetes and obesity may have more to do with people eating too much sugar than too much fat.

A certain way of processing vegetable oils produces what are known as trans fats, or partially hydrogenated oils. Trans fats are desirable to manufacturers because they extend the shelf life of cooking oils and baked and fried goods. However, eating trans fats is linked to heart disease and diabetes, and these fats are universally considered bad for your health. It's worth noting that trans fats occur naturally in some dairy products.

How does fat relate to obesity?

Body mass index (BMI) is one way to define a healthy weight. The World Health Organization defines obesity as having a BMI of at least 30. Globally, 12.9 per cent of people were obese in 2014. Despite widespread recognition of the problem and public health campaigns designed to address it, obesity rates have doubled since 1980.

We used to think that the amount of fat a person ate in their diet was closely linked to their percentage of body fat. Yet statistics for the UK show that we eat less fat now (as well as less sugar and fewer total calories) than we did in the 1970s but have higher levels of obesity.

This apparent inconsistency may be partly explained by people under-reporting what they are eating. But it also suggests that there are other reasons for the obesity epidemic, such as more sedentary lifestyles where we spend much of our time sitting down – at home, at work or in cars. Broadly speaking, we must be consuming more energy than we expend.

Obesity occurs when excess energy accumulates as fat in cells called adipocytes. It involves increases in both the number of fat cells (hyperplasia) and their size (hypertrophy). Some excess fat cell development is healthy, as without adipocytes, fat would be stored around organs and blood vessels, leading to metabolic disorders. However, there may still be ways to manipulate fat cell development in order to treat obesity.

Healthy eating guidelines can be confusing

Current UK guidance on saturated fats states that men should eat no more than 30 g of saturated fat a day, while women should eat no more than 20 g. Small amounts of monounsaturated and polyunsaturated fats are recommended, while no more than 5 g of trans fats should be consumed a day. Official US dietary guidelines also provide an upper limit for the proportion of calories that should come from fat overall: between 20 and 35 per cent.

However, based on a report from the Dietary Guidelines Advisory Committee in the USA, some experts are now suggesting that guidelines should be revised to remove this limit. The committee had concluded that "Reducing total fat (replacing total fat with overall carbohydrates) does not lower CVD [cardiovascular disease] risk... Dietary advice should put the emphasis on optimising types of dietary fat and not reducing total fat."

Over the decades, fad diets have encouraged people to either restrict or increase the amount of fat they eat. Low-fat diets inevitably turn out to be high-carbohydrate. Meanwhile, high-fat diets like the Atkins diet famously advise dieters to "eat the hamburger and throw away the bun" to reduce carbohydrate intake, and the 'paleo' diet shuns virtually all sources of sugar in favour of meat, fish and nuts. Although there is no correct ratio of fat to carbohydrate, most nutrition experts would probably agree that it is important to eat a healthy, balanced diet that does not exclude entire food groups.

Can some foods do you good?

Functional foods such as probiotic yoghurts are those that provide some kind of enhanced nutritional value. In the case of spreads for bread that contain plant sterols or stanols, they are proven to lower levels of low-density lipoprotein (LDL) cholesterol in the blood.

Plant sterols are natural steroid compounds found in plants that are thought to work in several ways, including by lowering cholesterol absorption by the gut. They can be consumed in fruit, vegetables and other plant foods, but people with high cholesterol sometimes eat fortified spreads, yoghurts and milk as well.

Canadian studies published in the 2000s suggest that people who eat these cholesterol-lowering foods achieve about the same decrease in blood LDL cholesterol as those who take cholesterol-lowering drugs called statins.

Leptin – the hormone that tells us we're full

A very rare inherited condition causes children to suffer from severe hunger and overeating. Discovered in 1997, the condition is known as congenital leptin deficiency. It is due to faulty versions of a gene involved in the production of the hormone leptin.

Without leptin to signal to their brains that they are sated (full), these children live in constant hunger and find it extremely difficult to regulate their weight, usually becoming obese at a young age.

Leptin also plays a crucial role in puberty and fertility – children with congenital leptin deficiency do not go through puberty. Leptin, which is released from fat cells, acts to indicate to the brain the level of energy reserves. If leptin levels are low, the brain regards this as a signal that energy is limited and may delay the body's development. Studies in monkeys and humans suggest that leptin levels need to be higher in girls than in boys during puberty.