

Kilojoules and calories

We eat food to fuel our bodies for energy, growth and repair. Carbohydrates, proteins and fats are broken down by the digestive system into their simplest components, being simple sugars, amino acids and fatty acids.

Carbohydrates are the body's preferred fuel, although proteins and fats can also be converted into energy. Food energy is measured in kilojoules (kJ). The common term for this used to be 'calorie', but 'kilojoule' is the term now accepted internationally. This unit of measurement allows us to talk about how much energy a food contains and how much energy is burned up during exercise.

Energy as kilojoules

A kilojoule is a unit of measure of energy, in the same way that kilometres measure distance. Food energy can also be measured in terms of the nutritional or 'large' Calorie (Cal), which has the same energy value as 4.186 kilojoules (kJ). This should not be confused with the 'small' or gram calorie, which is used by scientists to measure the amount of energy required to heat water. There are 1,000 (small) calories in one (large) Calorie, which is why it is also sometimes known as a 'kilocalorie'.

4.184 kilojoules = 4,184 joules = 1 Calorie = 1 kilocalorie = 1,000 calories

Kilojoules in food

The foods we eat provide energy, which is measured in kilojoules. Just how much energy depends on the amount of carbohydrate, protein and fat the food contains. Foods such as fruits, vegetables and legumes are relatively low energy (kilojoule) dense foods.

Foods which are high in fats, added sugars or alcohol are by far the most energy-dense foods. This is why they should only be consumed in moderation, particularly if you are overweight or obese.

The energy value **per gram** of various food components includes:

- **fat** – 37 kJ (9 Cal) – not all fatty acids may provide the same amount of energy
- **alcohol** – 29 kJ (7 Cal)
- **carbohydrates** – 16 kJ (4 Cal) – not all carbohydrates may provide the same amount of energy
- **protein** – 17 kJ (4 Cal)
- **dietary fibre** – 13 kJ (3 Cal) – if fermented by bacteria in the large intestine
- **water** – 0 kJ (0 Cal).

Research into energy values of food

Research into fat and carbohydrate metabolism is changing our understanding about the energy values of different types of fats and carbohydrates. Research indicates that how the body metabolises (breaks down) different foods may be important. It appears that not all fats or carbohydrates have the same energy value as their chemical analysis in the test tube might indicate.

Some fats are broken down faster

Animal studies show that polyunsaturated, monounsaturated and saturated fatty acids are broken down differently in the body and may not be used in the same way. Some fats, like polyunsaturated fats (especially omega-3 fatty acids from fish oils), may be more easily used up from fat stores during exercise than fats from other animal sources.

This suggests that saturated fat may be more likely to go into and stay in fat cells than some forms of polyunsaturated fat and possibly monounsaturated fat.

Sugars and carbohydrates

Carbohydrates are broken down by the body into sugars or 'glucose'. Some carbohydrate foods, such as white bread, processed cereals and biscuits are metabolised faster than others and are known as foods with a high glycaemic index (GI). Some research suggests that a diet dominated by carbohydrate foods with a high GI is associated with greater body fatness. However, both high GI and low GI foods can be included in a healthy diet.

Understanding the GI of different foods is particularly important for people with diabetes, as low GI foods provide a slower, more sustained release of glucose into the bloodstream, helping to keep blood glucose levels stable.

Our energy requirements vary

Energy requirements differ from one person to the next because of genetic predisposition, build, gender, age, metabolism, environment and amount of regular physical activity.

A person's energy requirements can also differ from one day to the next, and as we grow older. For example:

- Young children and adolescents require high amounts of energy to fuel their growth and development.
- Women need more energy during certain stages of their reproductive lives, such as pregnancy and breastfeeding. It is thought that daily energy needs increase on average by about 1,800 kJ for pregnant women in the second and third trimesters, and around 2,000 kJ during breastfeeding.
- Muscle tissue has a big appetite for kilojoules. The more muscle mass you have, the more kilojoules you will burn.
- Men generally have higher energy requirements than women, because they have more muscle tissue.
- As we age, activity levels are often reduced, which causes a loss of muscle tissue, and so our energy requirements tend to decrease. Various other age-related changes to the metabolism also contribute to reduced energy requirements. It's not clear how much of the muscle lost during ageing is a result of the ageing process or due to reduced activity. Strength and resistance training in older adults (even the very old and frail) seems to help reduce or prevent the decline in muscle mass that is generally observed with ageing.

Eating too many kilojoules

When we regularly eat more energy than our body needs, the excess is stored inside fat cells. Just one kg of body fat contains the equivalent of 37,000 kJ. To lose one kg of body fat in a month, you would need to reduce consumption by around 1200 kJ a day.

How to lose excess weight

The best way to lose excess weight is to enjoy a variety of foods from each of the five food groups in the amounts recommended and, importantly, to exercise regularly.

Exercise not only uses up stored energy, but also helps to stimulate muscle development. Remember, the more muscle tissue you have, the more kilojoules you can burn.

If you are over 40, have a pre-existing medical condition or you haven't exercised for some time, see your doctor before starting a new fitness program.

Where to get help

- Your doctor
- Dietitians Association of Australia Tel. 1800 812 942
- Nutrition Australia Tel. (03) 8341 5800

Things to remember

- A kilojoule (or Calorie) is a unit of energy.
- The kilojoule content of foods depends on the amount of carbohydrates, fats and proteins present in the food. If we regularly eat more kilojoules than our body needs, the excess will be stored as body fat.

This page has been produced in consultation with, and approved by:

Deakin University - School of Exercise and Nutrition Sciences

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