

## Kilojoules and calories explained

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: 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 value

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. One Calorie (Cal) 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'. The terms 'calorie' and 'Calorie' are often used interchangeably, which can be confusing.

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. Fats and 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** – 37kJ (9 Cal) – not all fatty acids may provide the same amount of energy
- **Alcohol** – 29kJ (7 Cal)
- **Carbohydrates** – 16kJ (4 Cal) – not all carbohydrates may provide the same amount of energy
- **Protein** – 17kJ (4 Cal)
- **Dietary fibre** – 13kJ (3 Cal) – if fermented by bacteria in the large intestine
- **Water** – 0kJ (0 Cal).

### Research into energy values of food is ongoing

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 move on faster than others

Animal studies show that polyunsaturated, mono-unsaturated 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 mono-unsaturated fat.

## Sugars and carbohydrates

Carbohydrates are broken down by the body into sugars or 'glucose'. Some carbohydrate foods are metabolised faster than others; these are known as foods with a high glycaemic index (GI). Some research suggests that a diet dominated by carbohydrate foods with a high glycaemic index is associated with greater body fatness.

## Our energy requirements are variable

Energy requirements differ from one person to the next because of genetic predisposition, build, gender, age, metabolism, environment and amount of regular physical activity. An individual'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 1,800kJ for pregnant women and around 2,500kJ 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 the 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 generally observed with ageing.

## Too many kilojoules

When we regularly eat more energy than our body needs, the excess is stored inside fat cells. Just 1kg of body fat contains the equivalent of 37,000kJ. To lose 1kg of body fat in a week, you would need to burn an additional 37,000kJ, or around 5,000kJ a day.

## How to lose excess weight

The best way to lose excess weight is to switch to a high fibre, low fat diet and, most 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
- An accredited practising dietitian, contact the Dietitians Association of Australia
- Nutrition Australia [www.nutritionaustralia.org](http://www.nutritionaustralia.org)

## 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.

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