

How food and activity impact body weight



There is only one way to lose weight and that is to use up more energy than consumed as food. The standard measure of the energy in food is the calorie (sometimes called kilocalorie or kcal) or the kilojoule (kJ). Most people are familiar with the concept of calories for measuring energy. The kilojoule is a metric measurement of energy, just as the kilometer is a metric measurement for distance.

Weight remains stable when the number of calories consumed equals the number of calories used for basic living and physical activity. Weight loss occurs when more calories are used than taken in. This concept is known as the energy balance equation.

Energy balance and weight changes*

“Energy in”

- Carbohydrate = 4 calories/gram (17 kJ/gram)
- Protein = 4 calories/gram (17 kJ/gram)
- Alcohol = 7 calories/gram (29 kJ/gram)
- Fat = 9 calories/gram (38 kJ/gram)



“Energy out”

- Thermic effect of food — digesting, absorbing, transporting and storing food (10% of “energy out”)
- Physical activity — all voluntary movement of muscles (20%–30% of “energy out”)
- Resting metabolism to sustain life — breathing, thinking, etc. (60%–70% of “energy out”)

Maintaining energy balance

“Energy in” equal to “energy out”



Weight does not change

Negative energy balance

“Energy in” less than “energy out”



Lose weight

Positive energy balance

“Energy in” greater than “energy out”



Gain weight

Achieve negative energy balance*

Weight loss occurs when a negative energy balance is achieved — “energy in” (calories eaten from food and drink) is less than the “energy out” (calories used for physical activity and basic body functions).

If BMI is: 25.0 to 34.9**Negative energy balance:**

500 calories (2,090 kilojoules) per day

For a weekly weight loss of:

about 0.5 kilograms or 1 pound

**If BMI is: 35.0 or greater****Negative energy balance:**

500 to 1,000 calories (about 2,090 to 4,180 kilojoules) per day

For a weekly weight loss of:

about 0.5 to 1 kilogram or 1 to 2 pounds
(about .5 to one kilogram)

Weight loss is usually more rapid in the first two to three weeks, since both fat and water are lost. As weight loss occurs, fewer calories are needed to maintain body weight. After six months, the rate of weight loss usually declines and your weight will likely plateau. To continue to lose weight, it is necessary to make further adjustments in meal and exercise plans. For example, a larger energy deficit may be needed to achieve the same rate of weight loss. As the rate of weight loss slows down, individuals often become discouraged and quit following their weight loss plans. Experience has shown that they will regain the weight unless they adopt a healthy weight management plan they can continue for a lifetime.

Resting metabolic rate and weight management*

Resting metabolic rate (RMR) is usually given as calories per day. Typically, RMR accounts for 60–70 percent of the calories a person burns throughout the day. Studies suggest that people with lower-than-expected RMRs are more likely to gain weight over a period of time than those with higher RMRs. People with lower RMRs have “thrifty metabolisms” that conserve energy and promote overweight. They also seem more likely to experience greater difficulty losing weight and may have to restrict their daily “energy in” (food) and/or increase their daily “energy out” (exercise) to lose a given amount of weight.

Factors affecting resting metabolic rate*

Factor	Effect on RMR
Body composition (proportion of lean-to-fat tissue in the body)	Resting metabolic rate depends primarily on body composition. Muscle tissue is far more metabolically active (burns more calories or kilojoules) than fat tissue, which is relatively inactive. The more lean (muscle) tissue, the higher the RMR. The more fat tissue, the lower the RMR.
Age	RMR is higher in youth and decreases with age, mainly due to changes in lean muscle tissue.
Gender	Men have higher RMRs than women primarily because they have more muscle tissue.
Height	Tall people have more surface area on their bodies and have higher RMRs.
Growth	Children and pregnant women have higher RMRs.
Activity level	Active people have higher RMRs.
Fever	Fever raises RMR.
Stress	Stress raises RMR.
Environmental temperature	Both heat and cold raise RMR.
Fasting/starvation	Fasting/starvation lowers RMR by 15–30 percent to conserve energy. The decline in RMR starts after several days of dieting.
Malnutrition (not eating essential nutrients for good health)	Malnutrition lowers RMR.
Thyroxin (thyroid hormone)	Thyroxin is a key RMR regulator. The more thyroxin produced, the higher the RMR.
Losing and regaining weight (weight cycling)	Typically, RMR decreases with weight loss. However, weight cycling does not seem to permanently affect RMR.



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