



sloths

are metabolic icebergs—and may be able to occasionally shut their metabolisms down entirely. It takes them days to digest their food, while we burn through ours in hours.

metabolism matters

The science behind how your body burns calories, and what does—and doesn't—speed up the process. By Barbara Brody

everyone has that lanky friend who still slides easily into the jeans she wore in high school—even though she's in her 40s and has been pregnant three times. You, on the other hand, can't even look at a piece of cake without going up a pants size. It's your slow metabolism, right?

Maybe not. The truth is that metabolism has less to do with your weight than you might imagine. In fact, most people have no clue what the term even means, says metabolism researcher Herman Pontzer, Ph.D., an associate professor of evolutionary anthropology and global health at Duke University and author of *Burn*.

You probably think of metabolism as how quickly your body burns calories, but technically it's much more than just that. "Metabolism refers to a range of biological processes taking place within your body's cells and how many calories it takes to do that work," explains Pontzer. In other words, it's the total amount of energy your body requires for doing everything from making

hormones and pumping blood to breathing and thinking. And whether you're worried about being able to power your basic bodily functions (unlikely) or are more concerned about how your clothes fit, that total breaks down into three categories: your resting metabolic rate, the thermic effect of food, and the thermic effect of physical activity.

First up is resting metabolic rate, which accounts for a whopping 60 to 75% of your total daily energy expenditure. And it's pretty much what it sounds like: the number of calories your body uses when you're just sitting around doing nothing. Then there's the thermic effect of food, a fancy term for the amount of calories you burn by chewing and digesting what you eat and absorbing and storing those nutrients. It accounts for about 10% of your total daily energy expenditure. (This phenomenon explains why "negative calorie" foods—which contain fewer calories than required to break them down—*might* exist, though there's no solid proof that munching celery will somehow subtract calories from your body.) Lastly, there's the thermic

effect of physical activity, meaning how much energy you use by being active. That comprises about 15 to 30% of the amount of energy you burn through every day—and it includes *everything* you do, including gym sessions, walking the dog and washing dishes. Seemingly insignificant motions—typing, tapping your toes, fidgeting—count too.

Each of these three components of metabolism play out differently from person to person, for reasons that are only partially understood. While it's easy to see why a Peloton instructor may burn more calories per day than a computer programmer, there's still quite a lot of variability. All things being equal (age, sex, size, etc.), research shows that range is plus or minus about 20%—meaning that you may require 2,400 calories a day to meet your body's energy needs, while another person needs 2,800 or just 2,000.

Measuring Metabolism

You can get a rough idea of your resting metabolic rate by breaking out a calculator and using the Mifflin-St Jeor formula. (Go to [eatingwell.com/metabolism](https://www.eatingwell.com/metabolism) to figure out how fast yours is.) We say rough because it assumes that biological sex, age, height and weight are the only factors in the equation, which is not true. (And, of course, resting metabolic rate is only one of the three parts of metabolism—although it does account for the largest percentage of it.) Things like genetics, the functioning of your thyroid and body composition also play key roles. “Metabolism is largely determined by how heavy you are—more specifically, how much muscle and body fat you have,” says Corby Martin, Ph.D., professor and director of the Ingestive Behavior Laboratory at Pennington Biomedical Research Center in Baton Rouge, Louisiana, which studies food intake and metabolism to develop novel weight-management strategies. It may seem counterintuitive, but the bigger you are, the more cells your body has to fuel, and the more energy you'll burn. Even the size of your organs matters significantly: research published in *PLOS One* found that up to 43% of the variation in metabolic rate between individuals can be attributed to differences in

the size of their kidneys, muscles, brain and liver. Age matters too. As you get up there in years, your cells aren't as metabolically active—though it probably doesn't happen as early as you think it does. (More on that on page 72.)

For scientists like Pontzer, the gold standard for measuring *total* daily energy expenditure—including physical activity and the thermic effect of food, in addition to resting metabolic rate—is via the “doubly labeled water” method. Study participants drink water that contains special hydrogen and oxygen isotopes and researchers then test their urine for up to a week so they can determine how quickly those components are flushed out of their systems, which indicates how fast or slow someone's metabolism is.

Revving the Engine

Chances are you'll never participate in such an experiment, and that's OK. For starters, metabolism is far from the final word when it comes to your weight. If your goal is to shed some pounds, rather than trying to overhaul your body's

internal furnace, Pontzer says the more effective strategy would be to focus on, “How do I get my diet to match my energy expenditure?” Yep, he's talking about the old calories-in versus calories-out math. That said, it is possible to give your metabolism a nudge, namely by strength training. Will it make you drop 25 pounds? No. But it could help peel off extra weight if you're already active and eating a healthy, lower-calorie diet.

Muscling Up

If you come back to the three components of metabolism—resting metabolic rate, the thermic effect of food, and physical activity—it's pretty clear that you have the most control over the third piece of that pie. Remember: it accounts for 15 to 30% of total energy expenditure. While any kind of movement you do increases your calorie burn, strength training has been shown to be especially helpful because it builds muscle—important because muscle requires more calories than fat just to maintain its presence on your body. Each pound of lean muscle you have burns about



hummingbirds

have metabolisms that are 77 times faster than ours due to their high activity level—they clock 60 to 80 wing beats per second!

6 calories per day (when you're sedentary) compared to 2 calories daily for the same amount of fat. To give you an idea of how that can add up, the average adult carries somewhere between 46 and 73 pounds of muscle (it ranges due to factors like body size, age and sex).

“It's the most metabolically active tissue in the body, so increasing muscle mass via resistance training will increase a person's resting metabolic rate,” says Len Kravitz, Ph.D., a researcher and professor of exercise science at the University of New Mexico in Albuquerque. “However, it's a mild increase because resting metabolic rate is multifactorial.” A study published in the *European Journal of Clinical Nutrition* determined that nine months of resistance training three times a week upped participants' muscle mass by nearly 4 pounds and increased resting metabolic rate by around 5% among people who were active but had not lifted weights for a year prior to the trial. But the researchers noted that “there was wide variability between individuals.” And a recent meta-analysis published in the

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Scan with your phone's camera to find out how speedy your metabolism is.

debunked

As science has marched onward and upward, several “facts” we’ve come to believe about metabolism have landed squarely in the myth category.

Metabolism takes a nosedive in your 30s. For decades, health experts echoed this claim, which was based on some small association studies and the simple observation that weight tends to trend upward around that age. But a recent groundbreaking study published in the journal *Science* has exploded that idea. The researchers measured the total energy expenditure of more than 6,400 people from 29 countries (with that doubly labeled water test) and found that metabolism actually remains fairly stable from your 20s until around age 60. And it only dips about 0.7% each year after that.

“I’m in my 40s, and I was as surprised as anybody that there wasn’t this change at midlife,” says metabolism researcher Herman Pontzer, Ph.D., who was the lead study author. “But I also have two kids and a job. So many other things change as you age. Your food environment changes. Hormones change.” In other words, weight gain during these decades may be common, but a slowing metabolism isn’t why. You may be eating out more than you did in your 20s, for example, or are more sedentary because of a demanding desk job.

People who are overweight have slow metabolisms; thin folks have fast ones. Surprise—it’s the opposite. Body size is the biggest determinant of metabolic rate because larger people require more calories to function. That also explains, in part, why people who manage

to lose a significant amount of weight often regain it: when their bodies become smaller, their metabolisms slow down. (Slashing calories can also cause metabolism to dip.) So if they keep consuming the same number of calories as they did when they were heavier, their weight will creep back up.

Eating mini-meals helps speed your metabolism. Some people have better luck maintaining a healthy weight when they stick to three squares a day; others find that grazing prevents excessive hunger and overeating. While one eating pattern might work better for you than the other, most experts no longer believe that eating every few hours stokes metabolism. A review of studies published in the *Journal of the International Society of Sports Nutrition* concluded that, “Increased meal frequency does not appear to significantly enhance diet-induced thermogenesis, total energy expenditure or resting metabolic rate.”

Men have faster metabolisms than women. Yep, it turns out that biological sex has nothing to do with it. This was another fallacy that came out of Pontzer’s latest study. When he and the other scientists controlled for body size, they found that there were no significant differences in metabolic rate between men and women. That said, men tend to be bigger and have more muscle mass—two things that make a big difference when it comes to metabolism.



MOMENTSTOCK/GETTY IMAGES

capsaicin
(the compound that makes hot peppers hot) can give your metabolism a temporary boost.

Journal of Sports Sciences found that people who engaged in strength training had a resting metabolic rate that was 96 calories per day higher compared to controls—an average taken from the findings of 18 earlier studies. The takeaway: Whether you get a big bump or a more modest one, there are so many other benefits to building strong muscles, like stronger bones and a reduced risk of injury, that it’s worth fitting in strength sessions—lifting weights, taking a conditioning class, doing power yoga, you choose—several times a week.

The Food Factor

You’ve probably seen a million stories on foods that supposedly stoke your metabolism. And although there is some science there, many experts, including Pontzer, don’t believe dietary tweaks have any impact. Yet others, like Mercedes Carnethon, Ph.D., vice chair of the department of preventive medicine at Northwestern University’s Feinberg School of Medicine, are more optimistic. She points to research—albeit mostly from small, preliminary studies—that suggests some foods can give your metabolism a kick, though she notes that they won’t “overcome a plate of nachos consumed at midnight.” Chief among them: upping your protein consumption, assuming you’re currently falling short, as many older adults are. (If you’re already eating plenty—like most other Americans—don’t eat extra or you could overtax your kidneys.) That’s because the thermic effect of digesting protein is much higher than that of fat or carbs. “An estimated 25 to 30% of the calories consumed in protein are used to break down and process it,” says Lyssie Lakatos, RDN, CDN, CFT, a dietitian, personal trainer and co-author of *Fire Up Your Metabolism*. To find out how much protein you need, multiply your weight in pounds by 0.36 to get the number of grams to aim for.

Research has also found that capsaicin (the compound that makes hot peppers hot) can give your metabolism a temporary boost. The catch is that most studies on the topic have been

small or only done on animals. (Diet trials are hard to do well because the way to get the highest-quality evidence is to closely control every aspect of the subjects’ diets. Easy to do in mice; not so easy in humans.) Plus, the added calorie-burn isn’t exactly impressive. For instance, one study found that people who ate 1 gram of red cayenne pepper (about ¼ teaspoon of the dried stuff) burned about 10 extra calories over the next four hours.

Capsaicin appears to work—at least a little—by heating you up from the inside, says Lakatos. (As body temperature rises, so does metabolism.) It might also help by increasing the amount of so-called brown fat in your body or making the brown fat you already have more active, so it burns more calories. This type of fat sits primarily in your neck and contains far more mitochondria—the energy powerhouses of cells—than white fat.

Then there’s caffeine. While you don’t want to go overboard—no one needs jitters or insomnia—this pick-me-up does seem to increase metabolism in a few ways. First, it’s a stimulant, so it literally revs up energy use. It might also help by increasing the metabolic activity of brown fat, according to a small 2019 study at the University of Nottingham, a public research institution in the United Kingdom. Studies have shown that caffeine can increase your resting metabolic rate by anywhere from 3 to 11%. In one trial, adults who consumed 100 milligrams of caffeine (roughly the amount in an 8-ounce cup of coffee) several times a day burned an extra 79 to 150 calories. But other research suggests that to get the most benefit, you’d have to slug way more java than that. (Not a great idea.)

Lakatos is also a fan of green tea. It has less caffeine than coffee; however, it also contains an antioxidant called EGCG, which appears to increase brown fat. “Think of all these foods as bonuses,” says Lakatos. “They’re not going to make a major difference, but little things can add up.” ☕

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