

What Happens in the Body When You Give Up Exercise

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October 21, 2026

If you think it's hard to keep patients exercising, it may comfort you to know that even exercise researchers have problems getting people to stick with it. Even in carefully designed exercise studies, attrition rates can [range from 25% to 50%](#), and the average adherence rate for those who do complete the study is about 66%.

The motivational message of physical activity always focuses on the positives: Here's what will happen if you start exercising — stronger heart and lungs, better balance, flexibility and mobility, lower blood pressure and lipid scores, improved brain health, quality of life — and more!

What if we could say here's what'll happen if you stop? It may or may not help motivate someone, but examining what happens on a cellular level when you quit exercise could indeed be useful information for someone recovering from an injury or surgery, for example, or someone undergoing cancer treatment or confined to bed rest. Others may be looking to take a break after a long-term fitness goal is achieved (such as a marathon).

How long before gains reverse? How long to become deconditioned? How long will it take to bounce back to reach previous levels? Your cells tell the tale.

It Begins in the Blood

Not much would happen in the first couple of days, possibly within the first week, said [Andrew M. Jones](#), PhD, DSc, professor of applied physiology at the University of Exeter, Exeter, England. That's especially true if you've been training intensely before you stop, which could help you get more fit as your body recovers and adapts.

After that point, however, things do start to go downhill, Jones said, starting with [plasma volume](#). “When you start to exercise, one of the first things that improves is that you get a larger blood volume, and that’s helpful to your cardiovascular system,” he said. And while there’s not as much evidence around detraining — and genetics and other factors may determine exactly how quickly the process occurs — he suspects that plasma volume would also be the first thing to go when someone stops training. This, in turn, may start to lower your maximal oxygen uptake. Similarly, Jones suspects that after 5-7 days, the activity and expression of various oxidative enzymes in the skeletal muscle that control those processes of mitochondrial respiration would decline, which would affect your ability to use oxygen when it arrives in the muscles.

Within a couple of weeks, you would likely see a decline in maximum strength, said [Jamie Pasquin, MS, CSCS, RSCC, CPSS](#), exercise physiologist at Hospital for Special Surgery in New York City, although [research](#) in *Sports Medicine* shows this could happen as soon as 5 days after complete bed rest. Structural changes, such as muscle size and muscle volume, tend to become more apparent with longer periods of detraining, although some muscle loss can occur earlier if, again, you’re completely immobilized vs simply not getting in your regularly scheduled lifts.

After a month without training, you’d likely really start to feel the effects of lost aerobic fitness, Jones said, as factors such as muscle capillary density and angiogenesis (when new capillary blood vessels form) decline. At a certain point, maybe after a few months, you’d likely experience structural changes in the heart, which could make an endurance runner’s heart look more like a “normal” heart, he said. “When you do long-term endurance training, the volume of the left ventricle increases so that when your heart is beating maximally, you’re able to push out more blood per beat,” Jones says. “Those things will go into reversal the longer you have off.”

We'll go ahead and say it: This sounds bad. But there is good news: Muscle memory is real. And that means if someone has been exercising consistently before this time away, they're more likely to bounce back faster once they start training again. Or maybe you have a patient for whom a surgery or illness is a wake-up call to start exercising for the first time or after a long period of inactivity — there's positive news for them, too. "While lifelong activity is ideal, substantial benefits can still be achieved when exercise is initiated later in life," said [Adam P. Sharples](#), PhD, professor of molecular physiology and epigenetics at the Norwegian School of Sport Sciences in Oslo, Norway. "Research consistently shows that middle-aged and older adults retain a remarkable capacity to adapt."

How Training History May Help You Bounce Back Faster

Whether you were an athlete all your life or you've never picked up a weight, the detraining process outlined above is pretty much inevitable. However, the evidence increasingly suggests that previous exercise is not simply erased. "Years of training appear to leave biological traces that may persist long after activity has stopped," said Sharples. He provides the metaphor of building infrastructure. "Previous exercise may leave behind cellular, molecular, and physiologic foundations that make future adaptation easier."

In resistance training, this is well documented: muscle memory. Pasquin likens the idea to sledding down a hill through fresh snow. "If you sled one time, it puts one streak through the snow, but if you were to repeatedly sled down, that pathway would get more and more refined," he said. "For somebody who's been doing a particular movement, whether that be a resistance training movement or something skillful like a golf stroke or a basketball shot, the thousands of repetitions that they practice over the years [make it so] that snow path gets ingrained in their system."

However, skeletal muscle tissue itself also appears capable of retaining biological information from previous exercise. A 2018 [study](#) in *Scientific Reports* co-authored by Sharples was the first in humans to demonstrate that resistance training can leave an epigenetic memory within skeletal muscle, whereby training-induced DNA methylation changes are retained during detraining and are associated with an enhanced molecular response during

retraining. “The memory does not permanently preserve muscle size or strength, but it may influence how effectively muscle adapts in the future,” Sharples said. He expects that accumulated training exposure, including both volume and intensity, matters. Still, definitive long-term human studies remain limited, Sharples said, so it’s not exactly clear how much additional biological memory is retained after years or decades vs months of training.

Thus far, much of the muscle-memory literature that does exist has focused on resistance training because changes in muscle size and strength are relatively easy to study. However, emerging evidence suggests that endurance exercise may also leave lasting molecular signatures within skeletal muscle, Sharples said. In a 2025 mouse [study](#) in *The American Journal of Physiology*, researchers concluded that prior endurance training primes the muscle to recover and adapt to subsequent retraining (mitochondrial pathways appear to be the key). And in Sharples’ [own research](#) in the same journal, high-intensity interval training led to epigenetic remodeling within skeletal muscle in humans.

Sharples also points to [a 2022 study](#) of cancer survivors who engaged in aerobic training and had detectable DNA methylation signatures associated with that training a decade later. Outside the lab, Sharples says that many experienced endurance athletes report regaining fitness more rapidly than they acquired it originally.

Jones agrees that endurance-trained athletes are likely to regain their fitness more rapidly than their sedentary counterparts. “When you’ve done lots of training, you develop a motor pattern that enables you to lock into a style of running that minimizes the energy cost,” he said. “I presume that once that’s learnt, it’s quite difficult to lose.”

Sharples believed that understanding “endurance memory” is likely to become a “major” area of research in the coming years. He and his team recently secured funding for a project called Epigenetic Memory of Mitochondrial Function in Ageing Skeletal Muscle from the Novo Nordisk Foundation to investigate whether mitochondrial DNA in aging skeletal muscle may exhibit a form of exercise memory.

Now, if a person doesn’t have a long history of exercise, Sharples says that it’s never too late to start. “The biology of adaptation remains responsive

throughout much of the lifespan,” he said, adding that improvements in strength, muscle mass, metabolic health, and physical function can begin within weeks of starting a structured exercise program. Pasquin agrees: “We even see people pick up resistance training for the first time in their late 70s and have improvements in functional strength, bone density, and quality of life.”

How to Avoid Fitness Losses During a Break

Back to the patient who has to take time off from the gym. Ideally, you can help them find ways to maintain some level of activity that doesn’t affect their condition, referring them to a trainer or physical therapist as needed. Or maybe you yourself have had periods of life where it’s been tough to get in multiple workouts a week. “The literature is really clear that you can maintain the adaptations from exercise really well with pretty extreme drops in volume so long as you keep training intensity high,” Pasquin said.

With resistance training, that could mean just hitting each muscle group once a week, pushing to within one or two reps of technical failure and/or pushing to 85% of your one-rep max, Pasquin said. “As long as you’re doing that, you can keep a meaningful percentage of your strength.”

With aerobic activity, a 2021 [review](#) in *The Journal of Strength & Conditioning Research* supports the idea that athletes can reduce volume by as much as two thirds so long as they maintain at least two sessions per week — for as long as 15 weeks — where intensity (eg, heart rate) is maintained.

How to Come Back to Fitness Safely After a Break

If it’s not possible to do much of anything due to illness, injury, etc., the key to getting back to it safely is patience, the experts agree. “I think it’s a ‘softly, softly catchee monkey’ thing,” Jones said. For runners, that could be going out for 20 minutes at whatever pace feels comfortable to start. “You should feel that next day or the day after that you can do 30 minutes a little bit quicker [than if you were brand new to running] and use your own perception to understand what’s appropriate,” he said. The cliché of “listen to your body” really applies here, he adds.

The same is true for resistance training. “The biggest mistake I see people make is they have an image in their head of what they were doing before they [stopped], and they use that as a reference for where they should begin,” Pasquin said. “No matter how long you’ve been exercising, it is still important to ease back in.” He experienced this himself after a recent knee surgery forced him to take time off. When he did get back in the weight room, he started with 50% of the weight he was lifting before. “There’s not really a precise recommendation for this, but the rule of thumb in practice is it’s easier to start conservatively, and then in the following sessions or weeks, progressively add more.”

Jones hopes that doctors reading this are reassured for themselves and their patients that taking required time off from workouts isn’t going to set them back as much as they maybe thought it would. “It takes a bit longer for people to lose a heck of a lot of fitness than they imagined, and it can be regained relatively rapidly,” Jones said. “So they can reassure their patients that these individuals will be able to get back to where they were as long as they’re careful about their comeback.”

Sharples seconds this. “Exercise is not only an investment in current fitness but also in the capacity to withstand future periods of illness, injury, and inactivity.”

The experts cited in this article reported having no relevant disclosures. Disclosure information for study authors is available in the original study publications.

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Cite this: Carlson C. What Happens in the Body When You Give Up Exercise - Medscape - October 21, 2026.

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