

# What Can Creatine Do for You?

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✓ Fact Checked

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## STORY AT-A-GLANCE

- › Creatine has been used by athletes to improve performance as it's immediately used by the body to convert ADP to ATP and supply energy muscles need for contraction
- › Muscle mass is a significant key to longevity and while your body metabolizes creatine from high-protein foods, athletes can't get enough to improve performance from only food
- › Creatine triggers incremental muscle growth by increasing proteins that create muscle fiber and raising insulin-like growth factors needed to increase muscle mass. But it also helps athletes perform longer and harder, which also improves muscle development
- › More strategies you can use to develop muscle include eating enough protein to build muscle mass, using resistance and aerobic training, and adding omega-3 fatty acids and leucine found in whey protein to your regimen
- › Data also show that creatine helps provide energy to the brain and may improve cognitive performance; early work also shows it demonstrates neuroprotective effects in an experimental model that mimicking mild traumatic brain injury

There is no doubt — muscle mass is a significant key to longevity.<sup>1</sup> If you've ever walked into a supplement store and asked about muscle mass, an employee has likely tried to sell you creatine. The promise is that you take it and suddenly you're ripped. While the good news is that creatine is well studied and has benefits, it's also accurate to say that if the promise sounds too good to be true, it likely isn't true.

According to the National Institutes of Health,<sup>2</sup> creatine is an amino acid your body produces in the muscle cells. It's used to help store energy and serves as a phosphate donor in the conversion of ADP to ATP. In short, it helps supply the energy your muscles need for contraction.

Some people use it to boost their athletic performance since it helps the body produce energy rapidly. When you're able to run faster or lift more weights, your muscle fibers rebuild stronger after your workout.

Creatine also helps pull more water into the body. One study published in 2003 found that there was a significant increase in total body water without a change in fluid distribution.<sup>3</sup> Although the water gain increases your weight gain, it's not muscle or fat gain.

Some people also find that creatine makes them feel bloated.<sup>4</sup> Some people are sensitive to using creatine and feel bloated if they don't drink enough water with the supplement. However, most of the time it goes away in just a few hours. Factors that affect bloating include how much water you drink, the intensity of your workout and your diet.

## **Reported Benefits of Creatine**

According to The New York Times,<sup>5</sup> there are roughly 20 different formulations of creatine you can purchase as a nutritional supplement. However, it is creatine monohydrate that has been studied more frequently, with strong evidence of health benefits.

Your body metabolizes creatine from high-protein foods. But, to get enough creatine to produce a performance benefit, you'd need to eat pounds of protein. A creatine supplement is not a replacement for protein as it is not a complete protein and cannot help your body repair after a workout.

Although many people do experience performance benefits and muscle growth, it does not have the same effect in all populations. A 2022 study<sup>6</sup> published in the journal

Nutrients evaluated the results of 16 randomized control trials for benefits associated with creatine supplements and found it was an efficient way to promote muscle growth in young healthy individuals who were undergoing adequate training.

However, the results of using creatine in individuals with muscular diseases were less conclusive. Jose Antonio, an associate professor of health and human performance at Nova Southeastern University in Florida, has studied creatine. He spoke with a reporter from The New York Times, saying,<sup>7</sup> “There’s probably more data on creatine monohydrate than any other supplement in existence.”

Researchers began studying creatinine in exercise performance in the early 1990s. A literature review<sup>8</sup> published in 2022, looked at 35 randomized controlled studies that in total included 1,192 participants. They concluded that creatine supplementation, when added to a resistance training program, could increase lean body mass. The results also showed that creatine worked better in men than women.

Eric Rawson, Ph.D., is a health, nutrition and exercise science professor at Messiah University in Pennsylvania. He also spoke with The New York Times reporter, saying that vegetarians and vegans may have a greater response to creatine supplements since their diet does not include as much creatine. Additionally, he said that while creatine may give athletes a boost, “whether it’s a 2 or 3 or 4% gain, no dietary supplements compare to proper training and sleep and nutrition habits.”<sup>9</sup>

Creatine may work by increasing proteins that create muscle fibers<sup>10</sup> and raising insulin-like growth factor,<sup>11</sup> which is a hormone that increases muscle mass. Data also suggest that creatine may help lower blood sugar levels.

One 12-week study evaluated participants who combined creatine and exercise after a high-carb meal and found the combination offered better blood sugar control than exercise alone.<sup>12</sup> Greater movement of blood sugar into the cells may contribute to other data<sup>13</sup> that show creatine reduces fatigue and increases energy when participants are sleep deprived.

## More Ways to Build Muscle

However, as researchers have demonstrated, taking creatine alone is not enough to build strong muscle. And, the gains from using creatine are usually incremental. Once you reach your forties, you can lose roughly 1% of muscle mass each year, which corresponds to a 1% to 3% drop in strength.<sup>14</sup>

This is a crucial loss, as it significantly impacts your ability to remain independent as you age. Loss of muscle is also linked with a downward decline in health and an increased risk of premature death.<sup>15</sup>

Stewart Phillips, Ph.D., is a professor of kinesiology at McMaster University in Canada. He's an expert in growing and maintaining muscle mass as you age. In an interview with Rhonda Patrick, Ph.D.,<sup>16</sup> he discussed the body's need for protein reserves to survive serious disease.

He explained that the recommended dietary allowance is the amount of protein you need to replace the amino acids your body loses. He believes you need 0.8 grams of protein per kilogram (kg) of body weight initially and goes on to say there is data from other scientists who suggest a minimum maybe closer to 1.2 grams per kg of body weight per day.

“And, you know, athletes and even older people could probably benefit from going up from that level to about 1.6,” he said.<sup>17</sup> As you consider your needs, it's important to make your calculation based on grams of lean body mass and not total body weight. This is because you do not need protein to maintain fat mass, only to maintain lean muscle mass.

The second pillar of gaining muscle strength and mass is to include aerobic and resistance exercises. Phillips notes that you will achieve the largest gains if you go from doing nothing to doing something. In fact, he goes so far as to say that regular resistance training is the key to building muscle, even more so than adequate protein.

Finally, you need to give your body time to recover and repair the damage from resistance training. As your body recovers from the stress, it reaches a point where you're better than you were in the beginning, and nutrition supports this process.

## **Consider These Nutritional Additions**

Nutrition in combination with resistance and aerobic exercises is key to maintaining and developing muscle. The amino acids from proteins are particularly important as they are building blocks and play a vital role in new muscle growth. Leucine is another amino acid with anabolic properties.

Older people not only experience accelerated muscle loss but also require more protein to stimulate muscle synthesis as compared to younger people. The richest source of leucine is whey protein.<sup>18</sup> Without whey, it can be difficult to consume enough leucine from diet alone.

A second addition to your nutritional intake that is often associated with heart health, is omega-3 fats. Phillips discussed<sup>19</sup> a trial he designed of young women who used one leg brace for 2 weeks to trigger local disuse atrophy. Half the women in the trial took a high-dose omega-3 fat supplement and the other half received a placebo.

The group that took the omega-3 fats experienced less atrophy and returned to normal far quicker than the placebo group. Although not a nutritional supplement, integrating heat into your weekly workouts can also help protein synthesis<sup>20</sup> and allow the proteins to function normally.

## **Creatine: Cognitive Performance and Healing Brain Injury?**

In the interview, Phillips commented on using creatine regularly, "You know, the stuff now with creatine that they're uncovering that makes me think, "Maybe this should be part of my regular routine." Actually [it] has less to do with the muscle and more to do with the brain and cognitive performance."<sup>21</sup>

Research has also demonstrated that creatine plays a critical role in brain function and in other tissues that have high energy demand.<sup>22</sup> Children who have genetic errors of creatine synthesis present with severe neurological symptoms and patients with other neurodegenerative diseases benefit from creatine supplements.

For example, creatine has demonstrated beneficial effects in mice<sup>23</sup> that have Parkinson's-like disease. It prevented 90% of the typical drop in dopamine levels that are associated with several of the serious symptoms, including loss of muscle function and speech impairment.

Although early research suggested that creatine may help delay the progression of Huntington's disease,<sup>24</sup> a more recent study published in 2017 found data from 553 participants did not support the use of creatine to delay functional decline.<sup>25</sup>

Data does show that creatine plays a significant role in brain health and function as the brain requires a large amount of ATP to function.<sup>26</sup> Although biological evidence<sup>27</sup> and animal models<sup>28</sup> demonstrate a positive effect after traumatic brain injuries, the data in humans is scarce.

In an experimental model<sup>29</sup> mimicking the effects of a mild traumatic brain injury, one research team found supplementing with creatine helped cognitive processing during oxygen deprivation. They concluded, "This is the first demonstration of creatine's utility as a neuroprotective supplement when cellular energy provision is compromised."

## **Consider This Before Adding Creatine to Your Routine**

It is important to choose creatine from a reputable manufacturer. Clinical trials that have lasted up to five years have reported no adverse effects in healthy individuals.<sup>30</sup> However, it is important to stay within the recommended dose. More of a good thing does not make it a better thing.

Keep in mind that it's not guaranteed that you will build muscle from using creatine. Consider creating specific goals for using the supplement so you are not disappointed.

If you're a vegan or a vegetarian, you might consider using creatine to help protect brain health.

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