

Creatine Boosts Brain Health and Function

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STORY AT-A-GLANCE

- › Creatine is a compound synthesized in the body, primarily stored in muscles and the brain, and obtained from animal-based foods like red meat
- › A study published in Sports Medicine found that creatine supplementation significantly increases brain creatine levels, which in turn enhances ATP (energy molecules) during mentally demanding activities
- › Research reveals creatine improves brain function and reduces fatigue when you're sleep-deprived, boosting memory and reaction times
- › A review in the Nutrients journal highlighted creatine's neuroprotective benefits, including protecting neurons and reducing oxidative stress, benefiting those with neurodegenerative diseases
- › To increase your creatine intake, I recommend prioritizing dietary sources like grass fed meat and milk; consider supplementation if higher doses are needed for enhanced cognitive and physical benefits

Creatine, commonly used by athletes to build muscle, is a naturally occurring compound that's synthesized in the body – 95% of your body's creatine supply is found in your skeletal muscle while 5% is in your brain. It is also obtained from animal-based dietary sources like red meat.

Creatine is stored in your muscles and brain, where it helps maintain optimal levels of the energy molecules ATP (adenosine triphosphate). Because of this, creatine plays a

role in helping your brain stay sharp and efficient, especially during demanding tasks, by supporting energy production.

Research shows that creatine enhances mental performance, making it a valuable tool for maintaining brain health as you age or during periods of metabolic stress. Creatine supplementation is being explored for its therapeutic benefits for various health conditions, such as traumatic brain injuries, depression and anxiety. With millions of people affected by these issues, understanding how creatine aids in their management is essential.

Creatine – A Natural Energy Booster for Your Brain

A study published in the journal *Sports Medicine* found that creatine supplementation significantly boosts brain creatine levels, enhancing the brain's ability to produce and manage energy. This increase in creatine acts as a high-energy phosphate buffer, ensuring that ATP, the brain's primary energy molecule, remains stable during periods of intense mental activity.

By maintaining ATP levels, creatine helps the brain function more efficiently, especially when under stress or during demanding cognitive tasks.¹ The authors explained:

“Creatine plays a vital role in the optimal functioning of the human brain. Acting as a temporal and spatial high-energy phosphate-storage buffer, creatine maintains intracellular levels of adenosine triphosphate (ATP) during energy-demanding cerebral activities, which account for about 20% of the body's energy consumption ...

[W]hen cerebral creatine is low or limited, creatine supplementation can positively affect brain creatine levels in a number of neurological conditions ...”

Moreover, the study highlighted that creatine supplementation leads to noticeable improvements in cognitive functions such as memory and executive function. These enhancements are particularly evident in older adults and individuals experiencing metabolic stress, such as sleep deprivation. By supporting the brain's energy

metabolism, creatine helps sustain mental performance even in challenging conditions, allowing for better focus and quicker cognitive processing.²

In addition to cognitive benefits, creatine aids the recovery process from traumatic brain injuries (TBIs), especially in children. The research indicates that creatine supports brain bioenergetics, helping the brain cells recover more effectively after an injury. This support leads to faster recovery times and improved neurological outcomes, making creatine a valuable supplement in the management of TBIs.³

The study also explored creatine's role in alleviating symptoms of depression and anxiety. By influencing brain creatine levels, creatine supplementation enhances mood regulation and reduces the severity of these mental health conditions. This effect is likely due to creatine's ability to improve overall brain energy metabolism, which plays an essential role in maintaining emotional stability and mental well-being.⁴

Creatine Boosts Your Brain Function Even During Sleep Deprivation

A February 2024 study published in Scientific Reports⁵ took a deeper dive into creatine's ability to counteract the effects of sleep deprivation. In this study, 15 healthy participants stayed awake through two consecutive nights. On the first night, they were given creatine, while on the second night, they received a placebo. To assess the impact, researchers evaluated participants' brain function through memory and reaction time tests.

Results showed that creatine supplementation helped offset energy-related declines associated with sleep deprivation, leading to reduced fatigue and improved cognitive performance. The participants demonstrated notable improvements in processing capacity and short-term memory on creatine compared to placebo. The researchers concluded:⁶

"[C]reatine has the potential to be used in prolonged cognitive activity during sleep deprivation. Our study showed the effect of a high dose of creatine

against sleep deprivation-induced deterioration in cognitive performance, lasting up to nine [hours] and showing its maximum cognitive effect at four [hours] after oral administration.”

Creatine Benefits Individuals with Post-Traumatic Stress Disorder

In a study⁷ involving U.S. veterans, researchers at the University of Utah School of Medicine found that creatine may help mitigate stress effects from traumatic experiences. They propose that creatine is a marker of resilience and recovery from trauma, and may explain why some people develop post-traumatic stress disorder (PTSD) while others recover more easily.

PTSD symptoms vary, generally encompassing intrusive memories, avoidance of reminders, mood shifts and heightened physical responses. While about 70% of adults have experienced at least one traumatic event, only 6.1% develop PTSD, suggesting natural resilience in most people.

This variability points to neurobiological differences in how people respond to trauma, highlighting the importance of factors like early experiences, personality and the number of traumatic incidents a person has faced.

One key area of focus is the anterior cingulate cortex (ACC), a brain region involved in processing negative emotions and regulating responses. Studies have shown that ACC is highly active in states of fear, sadness and pain, and that it influences decision-making and emotional regulation. Animal studies indicate that traumatic stress reduces creatine levels in this area, suggesting a potential link between creatine in the ACC and mental health following trauma.

To further explore this link, the University of Utah study⁸ examined creatine levels in the ACC of 25 U.S. veterans, analyzing how these levels correlated with mental health and trauma histories. Veterans with higher creatine levels in the ACC showed greater recovery from trauma, suggesting creatine acts as a protective factor in stress recovery.

Since creatine aids in cellular energy production, and the brain is the body's most energy-demanding organ, these findings underscore the need for ample brain energy to support mental resilience and cognitive function after traumatic events.

Creatine Enhances Brain Health by Protecting Neurons and Reducing Oxidative Stress

A review published in the journal *Nutrients*⁹ explores how creatine supplementation supports brain health, particularly through neuroprotective mechanisms relevant to various neurodegenerative disorders like Parkinson's disease. The researchers focused on its role in protecting neurons, which is vital for maintaining cognitive function and delaying neurological decline in progressive conditions.

For instance, in patients with amyotrophic lateral sclerosis (ALS), creatine has been found to protect neurons in key brain regions, such as the substantia nigra and motor cortex, which are heavily impacted by oxidative stress and mitochondrial dysfunction. This action slows the progression of the disease, providing both physical and cognitive support.¹⁰

Multiple sclerosis patients have also shown marked improvements in brain creatine metabolism through supplementation, though clinical outcomes vary. Studies indicate that creatine helps normalize elevated creatine kinase levels in cerebrospinal fluid and improves energy metabolism throughout the central nervous system. While objective strength measures have shown modest improvements, patients often report enhanced quality of life and daily function.¹¹

Additionally, the authors highlighted the other therapeutic benefits of creatine supplementation on physical health, including its ability to:¹²

Support recovery from exercise by decreasing exercise-induced damage and enhancing the adaptive response to training.

Help maintain muscle mass, strength and endurance during periods of immobilization while supporting healthy blood sugar regulation.

Improve physical function, lean mass and muscular strength in those with chronic arthritic diseases.

Enhance work capacity, strength and lean mass in individuals with spinal cord injury (SCI).

Improve physical function, lean mass, muscular strength, bone density and quality of life specifically in patients with muscular dystrophy.

Benefit patients with Charcot-Marie-Tooth disease through changes in muscle fiber composition and protein synthesis.

Enhance lean mass, muscular strength, endurance and health status in patients with chronic obstructive pulmonary disease (COPD).

Reduce inflammation and improve endothelial function in heart failure patients.

Improve muscular strength and endurance in patients with mitochondrial cytopathies.

How to Increase Your Creatine Intake

While the studies above focus on creatine supplementation, I recommend starting with whole food sources over supplements when it comes to meeting your daily nutritional needs. For creatine, animal-based foods are the best natural sources. Unlike many nutrients, creatine is found only in animal products, not plants.

Grass fed milk and meats are among the best sources, with the exception of conventionally raised pork and chicken, as they are high in **linoleic acid (LA)**, which is the most destructive ingredient in your diet. Excessive LA intake interferes with your

cellular energy production and cancels out the benefits you may be getting from creatine.

However, while grass fed meats contain creatine, it may not be enough to provide you with the higher doses linked to noticeable improvements in physical and cognitive health. In this case, consider creatine supplementation.

There are different formulations of creatine available. I recommend creatine monohydrate, as it's the most extensively researched form with well-documented health benefits. Choose a reputable brand and take only the recommended dose, which is typically 3 to 5 grams per day, according to Harvard Health Publishing.¹³

In terms of side effects, as long as you stay within the recommended dose creatine is safe and will not strain the kidneys. Higher doses, such as 10 grams daily, may cause gastrointestinal discomfort or diarrhea, while doses of 20 grams may lead to water retention. Stick to the recommended dose to avoid these issues.¹⁴

Sources and References

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