

## Boost Muscle Strength And Energy With Creatine

Creatine was discovered by French scientist Michel Eugène in 1832, when he discovered a natural product in meat that he named after the Greek word for flesh. The substance was subsequently found in mammalian muscle tissue by Leiberg, who later discovered such a significant larger proportion of creatine in wild animals than in their domestic or captive equivalent species that he put the increase down to exercise.

So what is creatine, apart from being a substance used by body builders and others trying to increase their muscle bulk? What is known about it is that it is a natural product of the kidneys, liver and pancreas, and that it is composed of the three amino acids, arginine, glycine and methionine. There are two forms of creatine: the free form and also the phosphorylated form, the latter comprising two thirds of the creatine found in the body. It appears that once the substance has been formed it is transferred to muscle tissue by the blood.

However, it is now known that biosynthesis is only one method by which your body can obtain creatine. It can also be obtained through ingestion, although cooking destroys most of the creatine content of meat. The substance is found in highest concentrations in beef, pork and fish, and is bioavailable mainly from rare or uncooked meat because it is degraded by heat.

The third way that the body can receive a supply of this substance is by supplementation. Supplements have been the most successful and popular means of getting the substance to where you want it, though that is not surprising given what it can do for you! Incidentally, creatine supplements are not the natural product, but are synthesized in the laboratory. So how does this substance work and why is it so popular among bodybuilders and others keen to increase muscular body mass?

Creatine is a substance that increases short term energy availability. If you need a rapid short-term supply of energy, such as for shot putting or running to catch a bus, creatine can provide it for you. Most energy is produced in the mitochondria where the process known as glycolysis takes place, whereby the glucose in your blood is converted to energy. However, this is a regular energy supply, and although the liver contains an emergency energy store in the form of glycogen, it is not enough for sudden high-energy demands. This is where creatine comes in with the help of phosphagens.

Phosphagens are molecules that are used to store energy, and are predominantly found in animal muscle tissue. They enable cells to maintain a high ATP/ADP ratio so that energy is available when needed. In vertebrates, and a few invertebrates, this involves the phosphagen phosphocreatine, together with the enzyme Creatine kinase. In most invertebrates it involves arginine/phosphoarginine in conjunction with the enzyme Arginine kinase.

The energy provided in this way is on sudden demand, or energy not immediately available through normal glycolysis or oxidative phosphorylation. Not only that, but the phosphagen/Creatine kinase system acts as an energy transport system, taking energy from the site of energy generation between cells to where it is required.

Because of this property of creatine, it is a very popular supplement amongst athletes, and it is estimated that as many as 80% of the athletes at the 1996 Atlanta Olympic Games used creatine as part of their training and supplementation regime. Creatine monohydrate is believed to be the most popular form of nutrition amongst United States sportsmen and women, and is certainly the most researched.

In aqueous solution, creatine is degraded to creatinine, the rate of degradation increasing with temperature and decreasing pH. If pH is maintained at 6.5 or above then creatine remains at least 98% stable at 25 Celsius for 72 hours, but studies have shown that even at pH 3.5 creatine remains 90% unchanged after 24 hours. It is therefore not completely degraded by stomach acid, and should be significantly absorbed by the body after ingestion. The proof of the pudding is in the eating, as they say, and creatine would not be used to the extent that it is were the effects purely psychological. The fact that it extensively used by bodybuilders and athletes can be taken as proof that it works.

However, the energy-providing properties of this substance have more uses than just to provide bursts of energy when needed. It is also used in the treatment of conditions such as congestive heart failure, arthritis and Parkinson's disease, and in neuromuscular conditions such as muscular dystrophy and diseases of the mitochondria. It is possible that this occurs by interfering with the chemical process leading to cell death, or by increasing the availability of energy to damaged nerve cells, but whatever the pathway, patients appear to become slightly more energetic after treatment.

It also appears to boost mental power, test subjects displaying an improvement in short-term memory, being able to remember long numbers better and also reduces mental fatigue. However, the long term effects of creatine supplementation for memory improvement are not known, though it is believed that it could be useful for students at certain periods such as exam time.

It is for its instant energy; however, that creatine is most used as a supplement, especially for short-term muscular activity or strength, such as is needed in sprinting and weight lifting. It delays fatigue and accelerates recovery, and from a medical viewpoint it reduces wasting of muscles in post-operative patients.

Although creatine has few reported short term effects, it can cause some gastric problems and muscle cramps, though less so with the serum or effervescent powder than with the powder. Longer term effects are as yet unknown, although many researchers believe that it should be safe. Some studies have indicated a benefit of using creatine over the longer term in reduced LDL cholesterol and triglycerides, thus providing protection against heart disease.

However, unused creatine is changed to creatinine that could put stress on the liver and so, as Benjamin Franklin rewrote Daniel Defoe's words: 'In this world nothing can be said to be certain, except death and taxes', and if you are using creatine be sure to take no more than the recommended dosage.

## About the Author

More information on [creatine monohydrate](#) is available at VitaNet &reg;, LLC Health Food Store. <http://vitanetonline.com/>

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