



The Creatine Truth

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While the potential performance and body composition enhancing benefits of the dietary supplement creatine monohydrate continue to be debated in the scientific literature, concerns also have arisen over its long-term safety. In the few studies that have looked at safety parameters up to 15 weeks, no significant medical side effects have been observed. In fact, the longest study to date used creatine in children for 3 years without side effects. Moreover, when examining the more than 150 clinical studies performed, only the monohydrate form improved performance.

In normal healthy individuals, muscle creatine is replenished at a rate of approximately 2 g/day by the body's own synthesis and/or dietary intake. When consumed orally, creatine is a derivative of three amino acids and is found almost exclusively in skeletal muscle. It is not a steroid. Dietary creatine is obtained primarily from meat intake; one kg of raw steak (the equivalent of nine Quarter Pounder's) contains about 4 g of creatine. However, the cooking process destroys creatine; therefore, it is unlikely that a person could load or super compensate solely by ingesting meat. Once absorbed, creatine does not leave muscle cells until it has degraded to creatinine, which is excreted easily by the kidneys. Although creatine supplementation can cause an increase in urinary creatinine excretion, which is often used as an indicator of kidney function, the increase in muscle creatine observed during supplementation reflects the increased rate of muscle creatine degradation to creatinine due to muscle saturation rather than abnormal renal function.

Muscular Performance

More than 150 clinically controlled trials attest to the performance benefits associated with creatine supplementation. While most of the trials showing no effect can be attributed to research design errors, about 20 percent of participants do not show a benefit. Overall, controlled laboratory experiments have demonstrated that the ingestion of four 5 g doses of creatine per day for 5 days can significantly increase the amount of work performed by normal healthy volunteers. In addition, creatine facilitates muscle phosphocreatine resynthesis during recovery from intense exercise and has been shown to improve

exercise tasks from 6 to 250 seconds for weight lifting, work performance during standardized bicycle testing, running and swimming.

Most studies also indicate that short-term supplementation increases total body mass by approximately 0.7 to 3.0 kg. This increased body mass has been theorized to be due to a creatine stimulated water retention and/or protein synthesis. Some other effects of creatine shown in clinical trials include:

1. Reductions in total cholesterol after four and eight weeks of supplementation;
2. Reduced triglycerides and VLDL cholesterol by 23 percent and 22 percent at weeks four and eight, respectively, that remain reduced by 26 percent following 4 weeks of supplement withdrawal;
3. Improved HDL cholesterol (13 percent) and total cholesterol/HDL ratio (7 percent);
4. Reduced circulating blood sugar concentrations after a single 3 g oral dose in insulin-dependent (Type I) diabetics;
5. Improved exercise tolerance in chronic heart failure patients;
6. Improved muscle mass in HIV+ and AIDS patients; and
7. Improved strength parameters in neuromuscular disease.

Purported Side Effects

Gastrointestinal upset and a tendency for a modest increase in the blood of some liver and muscle enzymes during strength training. This latter observation occurred with more prolonged supplementation (28 to 56 days of 10 to 20 g/day) and needs to be determined as it may indicate either a creatine overload or a clinically meaningless reflection of the higher training load that subjects can tolerate. However, it is important to note that creatine kinase (a muscle enzyme) is shown to be 5 to 10 times higher during exercise and can exceed the normal range by over 100-fold following prolonged exercise. However, in defense of the long term benefits versus side effects, infants between the ages of 2 and 4 years have shown remarkable clinical, biochemical and functional improvements following creatine supplementation. The dose used was 170 percent higher than the recommended loading dosage for athletes. During this time, no adverse effects were reported.

Muscle strains/pulls. Anecdotal reports have been reported from some athletic trainers and coaches who suggest that creatine may promote a greater incidence of muscle strains or pulls. The

theory is that since creatine promotes relatively rapid gains in strength and body mass, additional stress may be placed on bone, joints and ligaments leading to injury. To date, no study has documented an increased rate of injury following creatine supplementation.

Muscle cramping. There have been anecdotal claims that athletes training hard in hot or humid conditions may experience severe muscle cramps. Proponents for this theory suggest that creatine causes large fluid shifts into the muscle—serving to alter electrolyte status, promote dehydration, and/or increase thermal stress. However, no study has reported that creatine causes cramping, dehydration or changes in electrolyte concentrations, even though some of these studies have evaluated athletes training in hot/humid environments. To date, one published study has demonstrated an INCREASE in whole body and intracellular hydration showing exactly the opposite effect of dehydration.

Death. Recent press reports suggested that creatine supplementation may have been involved in the deaths of three wrestlers who died suddenly while exercising in the heat in rubber suits in an attempt to cut weight prior to competition. Based on these reports, the Centers for Disease Control and Prevention and the Food and Drug Administration launched investigations. They concluded that two of the wrestlers had not taken creatine, and one of the athletes had stopped taking creatine at least three months prior to his death. Given that the washout for creatine is about 30 days it is impossible to even suggest that creatine is the villain. The deaths of the wrestlers were officially attributed to hyperthermia, heart failure and heat exhaustion/dehydration.

Creatine Loading Guidelines

Loading Protocol: 0.30 g/kg (0.14 g/lbs) of body weight divided into 4 equal doses in a liquid containing 90-100 g of simple carbohydrate of simple carbohydrate, preferably glucose, dextrose, or sucrose. Slow Loading and Maintenance: 0.030 mg/kg (0.014 g/lbs) body weight in a single dose (loading takes 30 days). Supplementation in greater quantities is not likely needed.

