

Creatine, Muscle Cramping and Muscle Tightness

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In the early-to-mid 1990s, creatine burst on the sports nutrition scene. One estimate in 1996 was that 80 percent of the athletes in the Atlanta summer Olympics¹ had used or were using creatine. Research on creatine has paralleled its increasing use. Unlike many natural muscle-building aids, creatine sales continue to climb for one simple reason: It works in the gym and in the laboratory. In 1998 it was estimated that worldwide consumption of creatine was almost six million pounds. When you consider it is dosed in gram amounts, it is clear that many people are using it.²

Creatine was discovered in 1832, and was isolated from meat extracts. It is derived from the amino acids arginine, methionine and glycine. It is produced in the liver, pancreas and kidneys.² (For more information on creatine, see my previous articles in *Dynamic Chiropractic*, or go to my columnist page on chiroweb at www.chiroweb.com/columnist/andersen/.)

Five years ago, I tried creatine. Within a few days, I noticed a difference in my weightlifting workouts. My strength increased, and I felt a greater "pump" when lifting weights. After about 10 days on creatine, I noticed that my calves were getting very tight during my runs (3-4 times per week, 2-3 miles - "all out"), and this tightness began at about a quarter mile. At the time, there had been no reports of muscle cramping or muscle tightness with creatine use, either anecdotally or in the literature. I continued on creatine for one month. My weightlifting workouts were excellent, but my running was not and my calf tightness persisted. After a month, I stopped creatine. Three weeks later my calf tightness (which I best would describe as a feeling like I had just done two hundred toe raises and then started to run) abated. At the time I had no idea why I had this abnormal feeling in my calves. I certainly did not attribute the problems to creatine.

A few months later, I received a call from one of our country's leading sports chiropractors, Joseph Horrigan, DC, DACBSP, CSCS*. He asked me if I had heard or read anything about creatine causing muscle cramps. I told him I had seen nothing in the literature with creatine and cramping, nor had I heard any anecdotal reports. Joe informed me that he had begun to hear reports of people of having problems on creatine. A few weeks later, I put two and two together and realized my calf strains may have been due to creatine. When I tried another creatine cycle, my calves again tightened when I ran hard. My calves did not bother me during weightlifting, stationary exercise bike riding, walking or jogging, only during hard running. After I stopped my second creatine cycle, my calves again felt looser.

Many authorities have theorized that muscle tightening and cramping in a subset of individuals who use creatine is due to dehydration. The recommendation for creatine users is to drink more fluids. I disagree, for the simple reason that in my personal experience I was not dehydrated, and my muscle tightness was only present when I was running as hard as I could over a two-to-three-mile distance. Furthermore, it is known that creatine, especially during the "loading phase," reduces urinary volume.⁴ Fluid retention is the opposite of dehydration.

The problem of muscle tightness, muscle cramping and creatine use has frustrated researchers for the simple reason that it simply has not been found in any of the major studies. This would include retrospective analysis of multiple studies for the specific purpose of trying to ferret out this problem.³ After closely following the literature on creatine, and as new studies surfaced, I developed my own theory why a small subset of creatine users have suffered from muscle tightness or muscle cramping.

Dr. Andersen's Theory

Muscle cells have the ability to trap creatine.⁴ One molecule of creatine requires two molecules of sodium to enter the muscle cell.⁵ Higher intracellular sodium levels can cause secondary increases in intracellular calcium.⁶ Higher levels of intracellular calcium cause a more forceful muscle contraction.⁶ Creatine has been shown to shorten muscle relaxation time during repeated rapid contractions,⁷ and creatine is osmotically active, increasing the intracellular water content without affecting extracellular levels.⁸ Creatine increases anterior compartment pressure in the lower leg.⁹ Thus, when one has intracellular and extracellular fluid and electrolyte shifts, coupled with more forceful muscle contractions, shortened muscle relaxation phases and increased compartmental pressures, muscle hypertonicity, tightness and cramping can occur in susceptible individuals. Some athletes who have had cramping problems with creatine have been helped by increasing fluids, but not others.

Recommendation

Based on the chemistry and physiology described above, I feel that those athletes who have problems with creatine should increase their consumption of both sodium (4-10 mg per pound with food in divided doses) and magnesium 1-2 mg/pound at bedtime, along with water. This extra sodium and fluid will restore the extracellular balance of these substances. Magnesium is a natural calcium channel blocker. Start mineral dosing at the low end and increase as symptoms dictate.

Although it has not been proven in a lab, I have found that adding sodium and magnesium to the diets of athletes who have had problems with creatine has reduced the amount of muscle tightness and muscle cramping seen during explosive tasks.

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- Note: Dr. Horrigan was just named by the ACA Council on Sports Injuries and Physical Fitness as "Sports Chiropractor of the Year."

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NOVEMBER 2001