

## **WELLNESS UPDATE 2004, #6**

### **CREATINE SUPPLEMENTATION REVISITED**

Information on creatine supplements was originally published in the April 2000 Wellness Update. This Update (2004, #6) reflects the current research and scientific opinions on creatine supplementation. Not a great deal has changed since the April 2000 Wellness Update was published.

#### **WHAT IS CREATINE?**

**Creatine is a natural substance that is essential to the production of energy necessary for short-term, repetitive, high-intensity (anaerobic) exercise. To a certain degree, the more creatine muscle cells contain, the more intense, short term work can be done before the muscles reach exhaustion.**

**Creatine is produced by the liver, pancreas and kidneys.** About ½ of the body's supply of creatine is produced by these organs. **The remainder of the creatine the body utilizes comes from eating meat, poultry and fish.** On average, our bodies require about 2 grams of creatine a day. Creatine supplementation typically involves taking a loading dose of 20-30 grams of creatine per day for five days, then using a maintenance dose of 2 grams per day during the remainder of the training period. **These doses are recommended by the manufacturer, not based on scientific research.** Creatine is stored primarily in the skeletal muscles. **Taking creatine supplements has been shown to decrease the amount of creatine the body stores.** It is not known if this decrease is permanent, or not.

#### **ARE THERE BENEFITS TO CREATINE SUPPLEMENTATION?**

**During controlled laboratory studies, creatine supplementation seems to improve performance during brief (less than 30-seconds), high intensity exercise.** No benefits have been shown in exercise bouts lasting longer than 90-seconds. **The research is NOT consistent in confirming improved sports performance when using creatine supplements and many studies have shown no performance improvements from creatine supplementation. Even if the use of creatine supplements improves the quality of workouts that does not necessarily translate into improved athletic performance.** The research is very clear that athletes who use creatine supplements, but who do not perform high intensity training exercises receive no benefits from the supplement. It is also important to realize that performing high intensity exercises, such as strength training, causes the body to naturally increase creatine stores naturally.

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**Approximately 25%, or more, of people using creatine supplements do not have an increase in muscle creatine levels.** Those not showing an increase in muscle creatine levels may have naturally high levels of creatine which negates the use of the supplement. Those naturally high levels of creatine are probably the result of proper diet and good genetics.

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**Studies do show creatine supplements increase one's body weight and muscle mass. It is unclear what percent of this increase is from fluid retention within the muscles and what percent is from an increase in muscle tissue. Regardless of the reason for the increase, athletes should not use creatine while trying to maintain, or lose, weight.**

**WHAT ARE THE SHORT-TERM RISKS OF CREATINE SUPPLEMENTATION?**

**Research has not shown a direct cause-and-effect relationship between the use of creatine supplements and negative side effects when the supplement is taken in the dosage indicated by the manufacturer. No scientific research studies exist using doses higher than those recommended by the manufacturer as this would be unethical. However, many athletes believe the old adage, "if a little is good, more is better." Researchers do not know how the use of higher doses relate to negative side effects.**

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Medical professionals, and creatine users themselves, commonly report that **the use of creatine supplements appear to create a higher incidence of diarrhea, nausea, gastrointestinal problems, muscle cramps, muscle pulls, muscle tears, and longer injury recovery times** than in athletes not using creatine. Muscle-related injuries, and slower healing times, may occur due to changes in the muscle caused by water retention within the muscle cells.

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Because creatine is stored in the muscles, fluid is drawn into the muscles, taking it away from the vital organs of the body. **When fluid is shunted away from the vital organs, athletes may dehydrate very quickly and need to be monitored very carefully to avoid heat illness.** This is a concern especially among athletes exercising in the heat and humidity. The combination of creatine supplementation, high heat, and high humidity could be deadly! **Conditions creating high heat and humidity can be found naturally in the environment or created through the use of artificial weight loss methods such as rubber or plastic suits, saunas, or superheated wrestling rooms.** Regardless of how the conditions are created, there is definite concern for athletes who use creatine and work out in high heat and high humidity.

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**ARE THERE LONG-TERM RISKS FROM CREATINE SUPPLEMENTATION?**

**The greatest long-term risk of creatine supplementation may be that no one knows what the long-term risks are! Most studies regarding creatine supplementation have been conducted over the course of a few weeks to a couple of months at moderate doses. The possible long-term negative effects of creatine supplementation have not been studied nor have the possible negative effects of high doses.**

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One possible concern of long-term, high dose use of creatine supplements is possible kidney damage. Only a certain amount of creatine can be stored in the muscles and the excess is excreted through the kidneys. As the kidneys excrete creatine, a by-product called creatinine is produced and also excreted. Elevated creatinine levels are one measure of possible kidney damage and potential kidney failure. People who use creatine supplements have higher than normal creatinine levels. The long-term effect of these high levels is unknown. **Medical literature contains at least two documented cases of kidney damage related to creatine supplementation. Creatine supplements should never be used by someone with a preexisting kidney problem or someone with the potential for such problems, such as those with diabetes.**

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**WHAT ARE THE EFFECTS OF CREATINE SUPPLEMENTATION ON ADOLESCENTS?**

**Scientists do NOT know the effect of creatine supplementation on anyone under the age of 18. Scientists, and creatine manufacturers, state those under 18 years of age should not use creatine supplements because research has not been done on growing adolescents.**

### **HOW SAFE ARE CREATINE SUPPLEMENTS?**

**Creatine, like other nutritional supplements, is not regulated by the Food & Drug Administration (FDA).** Some supplements may have been evaluated, and approved, for purity and quality by independent labs. If so, that will be indicated on the package. **Even if testing has been done, there is no guarantee that all ingredients in a supplement are listed on the label and no guarantee all ingredients are safe.** Nutritional supplements are sold in a “buyer beware market.” When reading the claims made about creatine, or any nutritional supplement, remember the following four tips. **Supplement manufacturers:**

- 1) do not have to prove their products work!
- 2) do not have to prove their products are safe!
- 3) do not have to prove health claims before those claims are placed the product label, and,
- 4) do not have to manufacture supplements according to any specific quality standards.

Many promoters of creatine supplements state there is no need to study creatine's possible negative effects because it is a substance found naturally in the body. *The problem is that supplementation increases creatine levels within the muscles to unnaturally high levels.* Many natural substances, when taken in unnatural amounts, are potentially dangerous! While the ingredients in anabolic steroids are not the same as creatine, they are found naturally in the body and have been proven to be deadly.

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### **WHAT ARE THE OPINIONS OF THE MEDICAL EXPERTS?**

**The American College of Sports Medicine has stated, “Anyone under the age of 18 years of age should NOT use creatine supplements.”**

**The NCAA Committee on Competitive Safeguards and Medical Aspects of Sports believes more research must be done to determine what negative effects, if any, might result from long-term**

**creatine supplementation.** Until that research is completed, the Committee discourages its use. NCAA Bylaw 16 does not permit NCAA institutions to provide products to student-athletes.

**The Sports Medicine Advisory Committee of the National Federation of State High School Associations believes there is not enough scientific evidence to warrant the use of creatine supplementation by high school student-athletes.**

The Committee on Sports Medicine of the Iowa Medical Society supports the position statement of the Iowa High School Athletic Association. The Committee has concerns regarding the increasing number of students using nutritional supplements and the number of coaches who may be encouraging such use.

**IOWA HIGH SCHOOL ATHLETIC ASSOCIATION POSITION  
STATEMENT ON THE USE OF DRUGS, MEDICINE, AND FOOD  
SUPPLEMENTS IN INTERSCHOLASTIC SPORTS**

**School personnel, including coaches, should never dispense any drug, medication or food supplement except with extreme caution and in accordance with school district policies** developed in consultation with parents, health-care professionals and senior administrative personnel of the school or school district. **Use of any drug, medication or food supplement in a way not prescribed by the manufacturer should not be authorized or encouraged by school personnel, including coaches.**

In order to minimize health and safety risks to student-athletes, maintain ethical standards, and reduce liability risks, **school personnel, including coaches, should never supply, recommend, or permit the use of any drug, medication or food supplement solely for performance-enhancing purposes.**

There is not enough scientific evidence regarding the safety of performance-enhancing nutritional supplements to support their use by high school student-athletes. **Student-athletes and their parents/guardians should consult with their health care provider before taking any nutritional supplement.** Even natural substances in unnatural amounts may have short-term or long-term negative health effects.

*Adopted by the Board of Control, October 29, 1998*

## **HOW CAN COACHES COUNTERACT ADVERTISEMENTS PROMOTING CREATINE SUPPLEMENTS?**

- 1) **Be knowledgeable about the basic information regarding creatine.** Be familiar with this Wellness Update and the IHSAA Position Statement.
- 2) **Be sure athletes understand that if the claims about a product sound too good to be true, they probably are.**
- 3) **Be sure athletes know there are no shortcuts to success;** it takes hard work.
- 4) **Emphasize training, diet and rest.**
- 5) **Reinforce that no supplement, or drug, is completely harmless and free of consequences,** especially when taken in unnatural amounts.
- 6) **Be sure athletes are aware we just don't know the risks of using creatine supplements.**
- 7) **Be sure athletes know your opinion about supplements.** Hopefully, your opinion is that supplements are not a good choice. Your opinion may be much more powerful than the facts!

Questions and comments about nutritional supplements or any other areas of student wellness are welcomed and encouraged. They should be directed to Alan Beste, ATC, LAT, Administrative Assistant at the Iowa High School Athletic Association, PO Box 10, Boone, IA 50036. (515) 432-2011 abeste@

Sources: "Creatine," Supplement Watch; "Creatine," MayoClinic.com, January 1, 2004; "Creatine: Does it Work?," Mohr, Christopher, MS, RD, LDN. Training and Conditioning, December 2003; "Creatine Supplementation in High School Football Players, McGuire, TA, et. al., Journal of Athletic Training Supplement, Volume 36, Number 2, April-June 2001; "Elevated Anterior Compartment Pressure in the Leg After Creatine Supplementation: A Controlled Case Report," Potteiger, Jeff, Ph.D., et. al., Journal of Athletic Training, 2001: 36(1):85-88; "Long-term Oral Creatine Supplementation Does Not Impair Renal Function in Healthy Athletes," Kuehl, Kerry, M.D., et. al. Medicine & Science in Sports & Exercise, 2000 January: 32(1):248; "NCAA Committee on Competitive Safeguards and Medical Aspects of Sport Continues to Monitor Creatine Use in Sports," Robin Meiggs, Humboldt State University, April 12, 2004; "NCAA Position on Creatine Supplements, July 2003; "Neurosurgeons Link Supplements to Heatstroke Deaths," The Physician and Sports Medicine, Volume 30, Number 9, September 2002; "Nutrition Playbook: Creatine Controversy," Archer, Kim, M.Ed. Center for Sports Parenting; "Nutritional Supplements and the Athlete: Focus on Creatine," Sports Medicine Update, Winter 2001; "Oral Creatine Supplementation," Juhn, Mark, DO. The Physician and Sports Medicine, Volume 27, Number 5, May 1999; "Product Review: Muscular Enhancement Supplements: Creatine, HMB, and Glutamine," Consumerlab.com, September 24, 2003; "Scientifically Debatable: Is Creatine Worth Its Weight?," Rawson, Eric, Ph.D. & Clarkson, Priscilla, Ph.D., Gatorade Sports Science Exchange, Volume 16, Number 4, 2003; "Sports Medicine: Creatine & Androstenedione," National Federation of State High School Associations web site, www.nfhs.org "Sports Medicine; "Supplements: Benefit or Risk - Creatine," Penn State University Fitness Center Newsletter.



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