



AIS SPORTS SUPPLEMENT PROGRAM FACT SHEET

Creatine

Supplement Overview

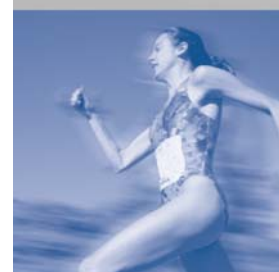
- Creatine is a naturally occurring compound found in large amounts in skeletal muscle as a result of dietary intake and endogenous synthesis from amino acids.
- Creatine monohydrate is the most practical form for supplementation with creatine.
- Phosphorylated creatine provides a number of important functions related to fuel supply in the muscle. The most well known role is as a source of phosphate to regenerate ATP. The creatine phosphate system is the most important fuel source for sprints or bouts of high-intensity exercise lasting up to 10 seconds.
- In 1992, the first studies were published to document that supplementation with large amounts of creatine monohydrate increases muscle content of creatine and creatine phosphate by ~20% to reach threshold level. There is considerable variability in response to creatine supplementation with some individuals (perhaps 30% of the population) failing to increase muscle creatine content by a sufficiently large amount to cause changes in exercise performance. Response to creatine supplements may be related to initial creatine stores, with individuals with the lowest initial levels showing the greatest response to creatine loading.
- Creatine loading protocols have been well studied. Rapid loading may be achieved by five days of repeated doses of creatine (e.g. 4 x 5 g doses). A similar loading will occur over a longer period (28 days) by taking a daily dose of 3 g (slow load). Co-ingestion with a substantial amount of carbohydrate (50-100 g) may enhance creatine uptake. Once the muscle creatine content has been saturated it will take about 4 weeks to return to resting levels. A daily dose of 3 g will allow elevated levels to be maintained (maintenance dose).
- Creatine supplementation has been shown to enhance the performance of exercise involving repeated sprints or bouts of high intensity exercise, separated by short recovery intervals. Therefore, competition or training programs involving intermittent high-intensity work patterns with brief recovery periods (<1 min), or resistance training programs may be enhanced by creatine loading. Performance enhancements may be seen as a result of an acute loading protocol, but chronic creatine use to promote superior training adaptations may offer the greatest benefits.
- Although creatine supplementation holds the promise of performance enhancement to the training or competition practices of many sports, most studies have not been undertaken with elite athletes or a sports specific outcome.
- Recent studies have shown that prior creatine loading enhances glycogen storage and carbohydrate loading in a trained muscle.
- An acute weight gain of 600-1000 g is typically associated with acute loading and may represent water gain. This associated weight gain may be counterproductive to athletes competing in sports where power-to-weight is a key factor in successful performance or in sports involving weight divisions.

Supplement Profile

- Although creatine supplementation is widely used across many sports, it is only proven to be beneficial in a small number of sports where athletes repeat short maximal efforts with brief recovery periods.
- Many athletes who use creatine are unaware of correct supplementation protocols.
- The long-term consequences of creatine use are unknown. There are anecdotal reports of an increased risk of muscle cramps, strains and tears, but studies to date have not reported an increased risk of these events. In fact, several studies show a *reduced* prevalence of muscle cramps and tears and *enhanced* thermoregulation during prolonged exercise in the heat in creatine users compared to a group

This fact sheet has been prepared by the AIS Department of Sports Nutrition as part of the AIS Sports Supplement Program. The AIS Sports Supplement Program has been designed for the specific needs of AIS athletes. It is recommended that other athletes and groups seek independent advice before using any supplement. For further details see www.ais.org.au/nutrition © Australian Sports Commission 2007

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receiving a placebo treatment. Creatine use in the doses presented above has not been seen to cause changes to kidney function in otherwise healthy people.

- Although creatine has received more scientific attention than any other supplement we are still unsure of the specific benefits and potential risks, and should continue to evaluate its use carefully. In view of this, the AIS will provide creatine to athletes only when it is taken under supervision as part of a well-organised plan. Importantly, we will keep to the prescribed dosage protocols that rigorous research and eminent scientists have shown to be effective in increasing muscle creatine levels.
- The AIS encourages sports to undertake research programs to test whether creatine supplementation provides benefits to the performance of their specific sport.
- *Rapid Loading Protocol*
 - 20 g daily, divided into 4 doses, for 5 days.
 - These doses should be taken with a meal or snack supplying a substantial amount of carbohydrate (50-100 g).
 - Weight gain of ~0.6-1.0 kg should be expected when using this protocol.
 - Maintenance dose: 3 g/day.
- *Slow Loading Protocol*
 - 3 g/day consumed with a substantial carbohydrate meal or snack.
 - Maintenance dose: 3 g/day.

Situations for Use in Sport

- A developed athlete undertaking resistance training to increase lean body mass.
- Interval and sprint training sessions where the athlete is required to repeat short explosive maximal efforts with brief recovery intervals.
- Sports with intermittent work patterns (e.g. soccer, basketball, football, racquet sports).

Concerns Associated with Supplement Use

- Creatine loading promotes weight gain due to fluid retention.
- Anecdotal reports of side-effects associated with creatine use require further study.
- Extended or excessive creatine loading protocols are not required although they are often reported to be commonly used by athletes.
- Overuse could potentially have a harmful effect on liver and kidney function.
- The AIS departments of Physiology and Sports Nutrition encourage sports-specific research to investigate any benefits or side-effects of creatine supplementation. We are happy to work with sporting programs to develop studies that test the effects of creatine on specific performance outcomes.

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