



PERFORMAMANCE ENHANCERS

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Creatine: an immediate energy source

Creatine (Cr) is one of the immediate sources for ATP formation and, therefore, production of energy. It's an immediate source because Cr is already available in the skeletal muscles ready to be used to create energy but for activities that last up to 15 sec. Within 15 sec from the start of any type of activity, independently by the intensity, Cr content is depleted. However, it is also quickly regenerated.

Cr is present for an average 2 g/ kg of body weight (BW). So, 60 kg person would naturally have around 120 grams of Cr in her/his skeletal muscles.

Cr supplementation has become a common practice among professional, elite, collegiate, amateur, and recreational athletes with the expectation of enhancing exercise performance.

When we talk about performance enhancers, first, we have to specify doses (how many grams per dose, how many doses per day and for how many days). Second, we have to specify the type of performance: short intense bouts of exercise like sprints, jumps, weight lifting or long (more than 5 minutes) endurance events like 400 m swimming, triathlons, cycling road races or marathons.

Doses

Several studies used an initial loading phase of 20 g/day for 5-7 days, followed by a maintenance phase of 3-5 g/day for 1 week to 6 months. However, others studies have shown that a high dose of 20 g/day is not necessary, as 3 g/day will achieve the same increase in Cr for given time.

What type of performance Creatine can enhance?

There is more scientific evidence that Cr is most effective for activities that involve repeated short bouts of high-intensity physical activity: increase in total power output in 30 sec all-out cycling sprints; improve in time for the last 50 meters sprint in 400 m swimming event. However one study [Glaister, 2006] in UK did not find any benefit with Cr intake for 35 sec running sprints. There is also some evidence that Cr enhances strength (1 Repetition Max) and muscle morphology (lean mass, fiber-specific hypertrophy and content of proteins involved in muscle contraction) after 11 weeks of resistance training. However, in these studies Cr was combined with whey protein (WP), therefore, it is not sure if the benefit comes from Cr per se' or from WP. Interestingly, same results are not shown for women, indicating that probably there is a gender difference in terms of response to Cr intake.

What type of performance Creatine does not enhance?

There is no enough scientific evidence of performance enhancement after Cr intake for long distance endurance sport events.

More importantly, Cr supplementation does not affect metabolic adaptations to endurance training. For example, it has not been found any improvement in glycogen storage as effect of Cr supplementation indicating that Cr does not help to save muscle glycogen storage, which is one of the most important determinants in long endurance events. Moreover, there is little benefit from Cr ingestion for the prevention or suppression of muscle damage or soreness following muscular activity.

Adverse effects

There appears to be no strong scientific evidence to support any adverse renal or gastrointestinal and/or muscle cramping effects but it should be noted that there have been no studies to date that address the issue of long-term Cr usage. Cr supplementation leads to weight gain within the first few days, likely due to water retention related to Cr uptake in the muscle. Ingestion of Cr before or during exercise is not recommended. In conclusion: the increases in performance are realized during very specific exercise conditions. If you are training for a triathlon, for a swimming event longer than 50 meters or for a rowing event, Creatine supplement is not the answer to enhance your performance.

CAFFEINE

Several research studies showed improvement in endurance performance followed by caffeine intake. Caffeine increases endurance and speed, but not maximal VO_{2max} and related parameters. Caffeine improves concentration, reduces fatigue, and enhances alertness. In addition, an increased free fatty acid and glycerol concentration was found after caffeine consumption compared with placebo. However the reasons why caffeine enhances endurance performance are still unknown. It appears unlikely that increased fat oxidation and glycogen sparing is the prime physiological mechanism.

Doses and legal limitations

A minimal dose of 5 mg/kg of body weight (BW) is necessary to induce performance enhancement. However, higher doses of 9 or 13 mg/kg of BW did not show a greater enhancement than the dose of 5mg/kg of BW. So, a person weighing 60 kg needs to intake 300 mg of caffeine 1 hour before the event to have improvements in his/her performance.

Considering that 1 cup of brewed coffee contains 115 mg of caffeine, one pill of caffeine supplement contains 84 mg of caffeine and 1 “espresso” contains 80 mg of caffeine, a 60 kg person would need to drink 3 cups of brewed coffee, or 4 espresso shots or take 4 pills of supplements or any

combination of these drinks (example: 2 espresso shots normally included in 1 large Latte at Amante + 2 pills of supplements).

The minimal dose of 5mg/kg of BW of caffeine results in urine caffeine concentrations below the doping limit of the International Olympic Committee of 12 micrograms/ml of urine in all individuals.

The effect of the caffeine intake lasts up to 6 hours later.

Habitual intake does not diminish caffeine's enhancement properties.

However, some studies showed that the duration and magnitude of the effect were greater in the nonusers compared with the users.

What caffeine does not enhance

Caffeine does not appear to enhance performance during incremental exercise tests lasting 8-20 min and during sprinting lasting less than 90 sec.

Adverse effects

Research shows that caffeine intake as supplement seems relatively safe nor does it cause significant dehydration or electrolyte imbalance during exercise. However, again, no assessment can be made for long term usage of these doses especially on insulin resistance and cardiovascular functionality.

In conclusion 4 espresso shots 1 hour before can enhance the performance your triathlon or long swimming event but it will not spare your glycogen storage.

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