

Supplement Performance

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Bodybuilding Supplements: Best of Research

Ephedrine and Athletic Performance

The purpose of the study by Dr. Douglass Bell and colleagues was to investigate the effects of ingesting caffeine, ephedrine and their combination on muscular endurance using double-blind, repeated measures design. Ninety minutes after ingesting either caffeine (four milligrams per kilogram bodyweight [mg/kg]), ephedrine (0.8 mg/kg), a combination of caffeine plus ephedrine, or a placebo (fake supplement), 13 male subjects performed a weight training circuit consisting of three supersets. Each superset consisted of leg press followed by bench press with two minutes of rest between supersets.

The trials involving ephedrine ingestion, when compared with the non-ephedrine trials (i.e., caffeine and placebo), showed ephedrine caused significant increases in the mean number of repetitions completed for both the leg press and bench press exercises, but only during the first supersets. Results indicated that the total weight lifted during all three sets was greater for the trials involving ephedrine ingestion. The performance enhancement was attributed primarily to the effects of ephedrine, as there was no evidence of an additive or synergistic interaction between the caffeine and ephedrine. The magnitude of the effect is highly significant for gym rats, considering it was induced only 90 minutes after ingesting caffeine plus ephedrine. Normally, the 16 percent improvement in bench press performance would be expected to require from four to about 12 weeks of strength training.

Creatine Loading Strategies

It's been reported that creatine ingested in combination with simple (high-glycemic) carbs substantially increases muscle creatine accumulation compared with the ingestion of creatine alone. It's very likely that the stimulatory effect of carbs on muscle creatine accumulation was due to insulin-enhancing muscle uptake. However, creatine supplements would need to be ingested with very large quantities of simple carbs to achieve an insulin-mediated stimulation of muscle creatine transport. Fortunately, there's some evidence suggesting that ingestion of proteins in combination with carbs can result in a greater increase in blood insulin concentrations than would be expected from the sum of their individual responses.

So, the aim of a study by Dr. G.R. Steenge and co-workers was to examine whether the ingestion of creatine in combination with a solution containing about 50 grams of protein and about 50 grams of simple carbs could increase blood insulin concentration to a level similar to that observed after the ingestion of about 100 grams of simple carbohydrates. The second aim was to determine whether this would facilitate creatine retention toward that reported with large quantities of simple carbs.

The investigators concluded that the ingestion of creatine, in conjunction with about 50 grams of protein and about 50 grams of carbs is

as effective in stimulating insulin release and whole body creatine retention as ingesting creatine in combination with almost 100 grams of carbohydrates.

According to Dr. Steenge and colleagues, "This information will be useful to individuals aiming to elevate their muscle total creatine store by supplementing with creatine, particularly those that regularly ingest CHO-protein [carbohydrate-protein] supplements after exercise or several meal replacement supplements per day...The potentiating effect of insulin on creatine disposal was less marked after the fourth oral challenge compared with the first. We would, therefore, propose that ingestion of CHO alone, or in combination with protein, in an effort to augment muscle creatine accumulation will probably only be highly effective on the first day of supplementation."

Amino Acid Supplementation: Timing Makes the Difference

Dr. Kevin Tipton and colleagues published a paper in the *American Journal of Physiology* examining the response of net muscle protein synthesis to ingestion of amino acids after a bout of resistance exercise. Subjects consumed in random order one liter of a mixed amino acid (40 grams) solution, an essential amino acid (40 grams) solution, or a placebo solution. The authors concluded that ingestion of oral essential amino acids results in a change from net muscle protein degradation to net muscle protein synthesis after heavy resistance exercise in humans similar to that seen when the amino acids were infused.

In other words, these results suggest that hyperaminoacidemia from ingestion of oral amino acids is an effective method of maximizing the anabolic effect of resistance exercise. The investigators pointed out that it doesn't appear necessary to include nonessential amino acids in a formulation designed to elicit an anabolic response from muscle after exercise, because net balance was similar for mixed and essential amino acids.

Another excellent study by Dr. Tipton and co-workers was designed to determine whether consumption of an oral essential amino acid/carbohydrate supplement before exercise results in a greater anabolic response than supplementation after resistance exercise. Interestingly enough, the response of net muscle protein synthesis to consumption of an essential amino acid-carbohydrate solution immediately before resistance exercise is greater than when the solution is consumed after exercise. According to the authors of this study, it's likely that the greater delivery to the muscle during pre-exercise supplementation accounts for the greater net uptake than during post-exercise supplementation. Providing amino acids at a time when blood flow is elevated (e.g., during an exercise bout) maximizes delivery to the muscle.

However, the question remained as to whether this acute response reflected the response of muscle over a longer time period. So, a third study by Dr. Tipton and colleagues was designed to determine if the response of net muscle protein balance to resistance exercise and amino acid ingestion, previously noted on an acute basis, reflects the response of net muscle protein balance over an entire 24-hour period. This study confirmed that muscle protein balance is increased, primarily because of

an increase in muscle protein synthesis (i.e., anabolism), when measured acutely and found that this response is additive to the basal response over a full 24-hour period.

Caffeine and Nicotine: The Super Thermogenic Stack?

It's well established that nicotine replacement therapy limits weight gain after smoking cessation. So, Dr. Anna Jessen and colleague examined the acutethermogenic effects of chewing gum containing different doses of nicotine and caffeine. This well-controlled study included 12 healthy, normal-weight men. Energy expenditure was measured with indirect calorimetry before and 2.5 hours after subjects chewed the gum.

Interestingly enough, one milligram of nicotine had a pronounced thermogenic effect, which was increased by about 100 percent when it was combined with 100 milligrams of caffeine. Also, no side effects were reported with the gum that contained one milligram of nicotine with 50 or 100 milligrams of caffeine. Nevertheless, if you want to give this stack a try, talk with your doctor first.

Post-Exercise Recovery Drinks

In an excellent study by Dr. van Loon and co-workers, after an overnight fast, eight male cyclists visited the laboratory on five occasions, during which a control and two different beverage compositions in two different doses were tested. After they performed a glycogen-depletion exercise, subjects received a beverage (3.5 mL/kg) every 30 minutes to ensure an intake of 1.2 g/kg/h carbohydrate and zero, 0.2 or 0.4 g/kg/h protein hydrolysate and amino acid mixture.

After the insulin response was expressed as the area under curve, only the ingestion of the beverages containing protein hydrolysate, leucine and phenylalanine resulted in a marked increase in insulin response compared with the carbohydrate-only trial. Further, a dose-related effect existed because doubling the dose (0.2-0.4 g/kg/h) led to an additional rise in insulin response. Blood leucine, phenylalanine and tyrosine concentrations showed strong correlations with the insulin response.

In addition, blood amino acid concentrations were generally lower after the ingestion of drinks containing protein hydrolysate plus phenylalanine plus leucine compared with the control drinks, although in the latter, a considerable amount of protein and amino acids were ingested. This suggests that tissue amino acid uptake and post-exercise muscle protein anabolism were increased after the ingestion of protein hydrolysate-amino acid mixture.

Leucine and Post-exercise Muscle Anabolism

A study by Dr. Koopman and colleagues was designed to determine post-exercise muscle protein anabolism following the combined ingestion of carbs with or without protein and/or free leucine. Eight male subjects were randomly assigned to three trials in which they consumed drinks containing either 1) carbs alone, 2) carbs plus protein, or 3) carbs plus protein plus leucine following 45 minutes of resistance exercise.

As expected, blood insulin response was higher in the carbs plus protein plus leucine group compared with the other groups. In addition,

muscle protein synthesis rates were higher when protein and free leucine were co-ingested compared with the ingestion of carbs only. Ingestion of carbs and protein resulted in intermediate muscle protein synthesis rates, so this study clearly shows that the combined ingestion of protein and leucine with carbohydrate stimulates protein anabolism.

The authors concluded, "The present data indicate that the additional ingestion of free leucine in combination with protein and carbohydrate likely represents an effective strategy to increase muscle anabolism following resistance exercise."

GAKIC: The Ultimate Anti-Fatigue Agent

The purpose of the first GAKIC™ study by Dr. Bruce Stevens was to quantify the effects of GAKIC supplementation on human muscle dynamic performance (strength, work, fatigue) measured under conditions of acute, exhaustive, high-intensity, anaerobic, isokinetic exercise. Thirteen healthy men were orally administered 355 milliliters of low-calorie cranberry juice containing either 11.20 grams of powdered GAKIC, or 9.46 grams of sugar isocaloric control. This was consumed in three equal aliquots (parts of a whole) over 45 minutes.

The results demonstrated that GAKIC supplementation significantly improved performance compared to control isocaloric sugar treatment. The investigators summarized the salient findings as follows:

1. GAKIC increased the ability to sustain muscle force (concentric torque) up to 28 percent during intense acute anaerobic muscle exercise;
2. GAKIC increased the ability to sustain muscle total work up to 12 percent during intense anaerobic muscle exercise; and
3. GAKIC increased the overall muscle performance by delaying muscle fatigue during the early phases of anaerobic exercise through 15 minutes.

The purpose of the second GAKIC study by Drs. Britni Buford and Alexander Koch at Truman State University was to determine the effects of GAKIC supplementation on repeated bouts of anaerobic cycling performance.

Again, subjects (10 healthy men) consumed the treatment beverage (GAKIC or sugar) in three equal aliquots over a 45-minute period. The dosing regimen employed was identical to the first study by Dr. Stevens and co-workers.

The results of this second study indicated that GAKIC supplementation significantly reduces the drop in mean power output associated with repeated sprints of anaerobic cycling. The authors concluded, "These findings reinforce the notion that GAKIC supplementation may be a useful aid for strength-power athletes, similar to creatine supplementation. Unlike creatine, which requires approximately five days of loading to produce improvements in high-intensity work, GAKIC appears to impart an ergogenic effect within minutes of consumption."

Forskolin Cuts Fat and Increases Free T

A recent study by Dr. Godard and co-workers examined the effect of forskolin on body composition, testosterone, metabolic rate, and blood pressure in overweight and obese men. Thirty subjects were studied in this randomized, double-blind, placebo-controlled study for 12 weeks. The results indicated that forskolin supplementation (250 milligrams of 10 percent forskolin extract twice a day) significantly decreases body fat percentage and fat mass while concurrently increasing bone mass. Furthermore, the investigators noted that there was a trend toward a significant increase for lean body mass in the forskolin group. Interestingly, forskolin also increased free (biologically active) testosterone levels.

In summary, this product may be useful supplement for gym rats, but well-controlled studies in healthy athletes are needed before firm conclusions can be drawn.

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