

PERFORMANCE NUTRITION

DECIPHERING THE LATEST SCIENTIFIC RESEARCH TO HELP YOU GET THE MOST FROM YOUR TRAINING, DIET AND SUPPLEMENTATION

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TRAINING LOW? USE CAFFEINE TO ELEVATE PERFORMANCE

Training with low muscle glycogen (energy) levels is a nutritional strategy used by some top athletes to improve physiological adaptations to exercise. The benefits include enhanced fat burning and enzyme activity during sub-maximal exercise, and elevated muscle glycogen content at rest.

Nevertheless, this strategy must be managed carefully to ensure the benefits of 'training low' outweigh the potential side-effects, such as an inability to reach a certain level of performance during the training session and an increased likelihood of pushing too hard and burning out.

Australian sports nutritionists appear to have identified a solution to one of these challenges. Their latest study, published in *Medicine & Science in Sports and Exercise* has found the consumption of caffeine before a training session moderates the performance declines commonly experienced as a result of low muscle glycogen.

MAIN FINDINGS

- Exercise performance, measured as power output, was reduced by 8% following the 'low' muscle glycogen treatment when compared to the 'high' muscle glycogen treatment.
- Caffeine consumption improved power output in the 'low' and 'high'

treatment groups by 2.8% and 3.5%, respectively.

SIGNIFICANT METHODOLOGY

Twelve endurance-trained cyclists/triathletes completed the study, which involved four visits to a laboratory. Before all visits, subjects followed a standardised diet and then during two visits completed a 100-minute steady-state cycle at around 70% VO₂ max (maximum oxygen capacity) to deplete muscle glycogen stores.

Each visit involved a high intensity performance trial (8 × 5 minute bouts at maximum self-selected intensity with 1 minute recovery), during which instantaneous power output was measured throughout. One hour before the performance trials, subjects ingested a capsule containing either anhydrous caffeine (3 mg per kg body mass) or a placebo.

TAKE-HOME MESSAGE

While elite performers often incorporate 'training low' sessions (such as the one used in the present study) into their training schedules to promote physiological adaptations, amateur athletes or regular gym-goers may also wish to utilise this training concept but

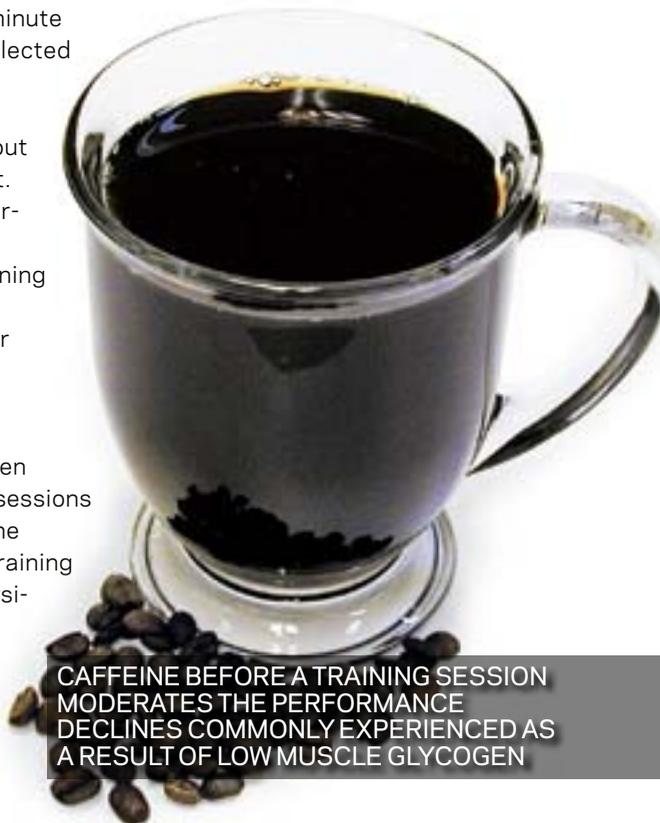
with the primary goal of increasing fat burning.

In order to maximise the benefits of 'training low', performers may consider using a caffeine dose of up to 3 mg per kg body mass one hour before undertaking the high intensity component of the session. It should be noted, however, responses to caffeine are highly individual and many performers can get positive effects from a smaller dose (of 1 mg per kg of body mass). This should be trialled in training first, using a lower dose as a starting point.

The performance enhancing properties of caffeine may help to maintain exercise performance even when the glycogen content of the working muscles is running low. Moreover, as caffeine is a powerful stimulant it may give you that extra boost and motivation to push yourself harder during key sessions.

REFERENCE

■ Lane SC, Areta JL, Bird SR, Coffey VG, Burke LM, Desbrow B, Karagounis LG, Hawley JA. (2013) **Caffeine Ingestion and Cycling Power Output in a Low or Normal Muscle Glycogen State.** *Medicine and Science in Sport and Exercise.* [Epub ahead of print]



CAFFEINE BEFORE A TRAINING SESSION MODERATES THE PERFORMANCE DECLINES COMMONLY EXPERIENCED AS A RESULT OF LOW MUSCLE GLYCOGEN

THE BENEFITS OF HMB SUPPLEMENTATION?

Beta-hydroxy-beta-methylbutyrate (known as HMB) is gaining popularity as a performance enhancer, especially amongst bodybuilders and strength/power athletes. The interest in HMB is largely due to studies suggesting its intake may promote increases in hypertrophy, strength and power while also leading to reductions in body fat. Furthermore, there is mounting evidence that HMB may augment recovery from resistance exercise.

HMB is a metabolite of the branched-chain amino acid leucine, which plays a key role in muscle development. There are currently two forms of HMB on the market—a free acid form and calcium HMB. Research on the free acid form is in its infancy,

THE OPTIMAL DOSE OF HMB APPEARS TO BE 3 G PER DAY FOR AT LEAST TWO WEEKS.

however there is some evidence that it may be better absorbed into the bloodstream than calcium HMB. Researchers from the USA recently set out to further investigate the performance enhancing properties of the free-acid form, focusing specifically on its impact on exercise recovery in a group of resistance training athletes.

MAIN FINDINGS

- Serum creatine kinase (a marker of muscle damage in the blood) increased to a greater extent in the placebo group (329%) than HMB group (104%)
- Perceived recovery status was found to be significantly lower in the placebo group than the HMB group
- There was a reduction in a urinary marker of muscle protein breakdown (3-methylhistadine) in the HMB group. However, there were no significant changes for anabolic hormones (total or free testosterone), stress hormone (cortisol) or inflammatory marker (C-reactive protein).

SIGNIFICANT METHODOLOGY

Twenty resistance-trained males took part in the study and were randomly assigned to receive either the free acid form of HMB or a placebo. The treatments were taken as 1 g doses at 30 minutes before a high-volume

resistance training session, at lunch and then at dinner (total of 3 g per day). The session involved full squats, bench presses and dead lifts. Biological samples (blood and urine) were taken before the exercise session and 48 hours post-exercise. These samples were analysed for serum

creatinase kinase, testosterone, cortisol and urinary 3-methylhistadine. Subjects' perceived recovery status was also recorded at these time points.

TAKE-HOME MESSAGE

There is growing evidence of the performance enhancing properties of HMB (improved recovery and potentially increased muscle mass, strength and power) and its intake is likely to be of particular benefit to those undertaking resistance training, such as bodybuilders, strength athletes and regular gym-goers.

The optimal dose of HMB appears to be 3 g per day for at least two weeks. On training days it is recommended that 1 g of HMB be taken approximately 30 minutes before the start of the training session. The chronic consumption of HMB is acknowledged to be safe in both young and old populations, however further studies are now warranted to determine the long-term effects of HMB on adaptations to a resistance training programme.

In order to maximise the benefits of HMB, users must first organise overall daily protein intake and timings, as this will boost amino acid pools and support physiological adaptations to resistance training. **M&F**

REFERENCE

- Wilson JM, Lowery RP, Joy JM, Walters JA, Baier SM, Fuller JC, Stout JR, Norton LE, Sikorski EM, Wilson SMC, Duncan NM, Zanchi NE, Rathmacher J. (2012) **B-Hydroxy-b-methylbutyrate free acid reduces markers of exercise-induced muscle damage and improves recovery in resistance-trained men.** *British Journal of Nutrition.* [Epub ahead of print]

Performance Nutrition is a London-based consultancy that supports elite and recreational athletes. Director James Collins is a sport and exercise nutritionist and head nutritionist for Arsenal FC. For more information visit www.theperformancenutritionist.com

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