

# PERFORMANCE NUTRITION

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

BY MARK HOBDEN AND JAMES COLLINS

### WHAT IS THE OPTIMAL PATTERN OF PROTEIN INTAKE TO INCREASE MUSCLE MASS?

Most athletes and recreational gym users know that consuming protein immediately after resistance exercise is essential to create an anabolic environment in the body and support an increase in muscle mass—a process known as hypertrophy. But the ideal amount of protein, and when it should be consumed throughout the day, has, until recently, remained unclear.

In 2012, a group of experts in the field of sports nutrition set out to investigate the most effective pattern of protein intake over a 12-hour post-exercise period. They found that the repeated consumption of a moderate amount of protein (20 g) at regular three-hour intervals post-exercise had the most beneficial impact on whole body protein metabolism, and therefore appears to be the best strategy for anyone looking to enhance or maintain lean body mass.

### MAIN FINDINGS

Rates of whole body protein turnover, protein synthesis and protein breakdown were beneficially affected when 10 g protein was consumed every 1.5 hours or 20 g taken every three hours in comparison to 40 g every six hours. Moreover, consuming 20 g protein every three hours appeared to have a more beneficial influence on net protein

balance than consuming 10 g protein every 1½ hours or 40 g every six hours.

### SIGNIFICANT METHODOLOGY

All participants completed an acute bout of bilateral knee extensions followed by the consumption of 80 g whey protein over a 12-hour recovery period. Eight participants consumed 10 g every 1½ hours; seven participants consumed 20 g every three hours and eight participants consumed 40 g every six hours. A baseline urine sample was collected before each exercise session and further urine samples were collected throughout the recovery period. These

were analysed and measured for whole body protein turnover, protein synthesis/breakdown and net protein balance.

### TAKE-HOME MESSAGE

This study highlights the importance of nutritional planning, not only around the time of exercise but also for the entire day. In order to maximise muscle gains you should look to consume approximately 20 g protein immediately after exercise followed by approximately 20 g feedings of protein at regular intervals (about every three hours) during the rest of the day.

The initial protein hit is best coming from a fast-releasing protein source, such as whey powder or skimmed milk but subsequent protein feeds can be obtained from a variety of dietary sources, including meat, fish, eggs, cottage cheese, yogurt, nuts and seeds. Ideally, these foods should form the basis of meals throughout the day.

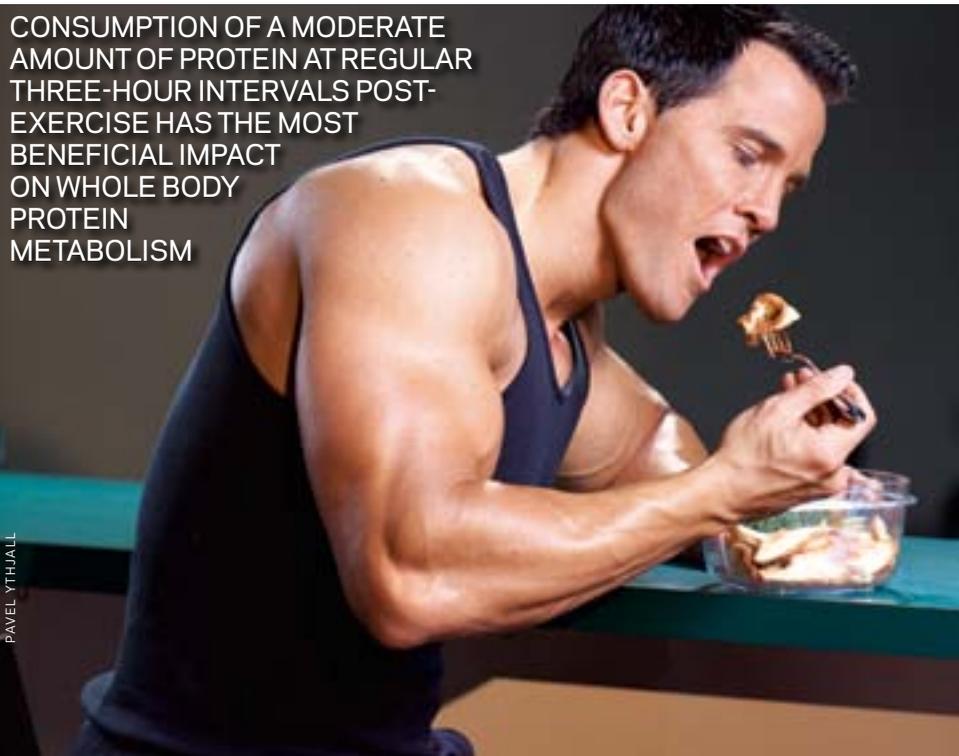
Before bed, it's a good idea to consume a source of protein, such as milk, yogurt or casein protein shake, which delivers a sustained release of amino acids into the circulation during the night.

### REFERENCE

■ Moore DR, Areta J, Coffey VG, Stellingwerff T, Phillips SM, Burke LM, Clérout M, Godin JP, Hawley JA (2012) **Daytime pattern of post-exercise protein intake affects whole-body protein turnover in resistance-trained males.** *Nutrition & Metabolism*, 9:91

CONSUMPTION OF A MODERATE AMOUNT OF PROTEIN AT REGULAR THREE-HOUR INTERVALS POST-EXERCISE HAS THE MOST BENEFICIAL IMPACT ON WHOLE BODY PROTEIN METABOLISM

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## BRANCHED CHAIN AMINO ACIDS PROVIDE PROTECTION AGAINST MUSCLE DAMAGE

Resistance training, especially when it incorporates lots of eccentric movements, results in a degree of damage to the skeletal muscles. This exercise-induced muscle damage is often accompanied by the onset of muscle soreness and a reduced ability to train for several days.

Therefore, there is considerable interest in strategies, both nutritional and physiological, that can reduce the negative effects of exercise-induced muscle damage. One nutritional strategy that shows promise is the use of branched chain amino acids (BCAAs) around the time of training. Interestingly, in a study recently published in the *Journal of the International Society of Sports Nutrition*, the administration of BCAAs before and after a strenuous resistance training session was found to reduce indices of muscle damage and accelerate recovery in a group of athletic men.

### MAIN FINDINGS

BCAA supplementation was shown to significantly reduce plasma creatine kinase efflux and muscle soreness in comparison to the placebo.

The amount of force that the group of knee extensor muscles could exert in a maximal voluntary contraction was shown to recover greater in the BCAA group, although vertical jump and thigh/calf circumferences were no different between groups.

### SIGNIFICANT METHODOLOGY

Twelve male rugby and football players took part in the study. Six were randomly assigned to a supplement group and six to a placebo group. For 12 days they consumed either a 10 g BCAA (ratio of 2:1:1 leucine, isoleucine and valine, respectively) or a placebo, consisting of an aspartame-based artificial sweetener powder. The BCAA and placebos were taken twice daily—once in the morning and once in the evening. On day eight of the study, a damaging exercise protocol consisting of 100 consecutive drop-jumps was performed. Markers of muscle damage

were measured immediately before the damaging exercise and at 24, 48, 72 and 96 hours post-exercise. Plasma creatine kinase levels, maximal voluntary contraction, muscle soreness, vertical jump, thigh circumference and calf circumference were all measured.

### TAKE-HOME MESSAGE

The administration of BCAAs before and after resistance exercise appears to reduce the severity of exercise-induced muscle damage, thus improving recovery rates and alleviating muscle soreness. Furthermore, the delivery of amino acids into circulation is known to improve whole body protein metabolism, which is necessary to support gains in muscle mass.

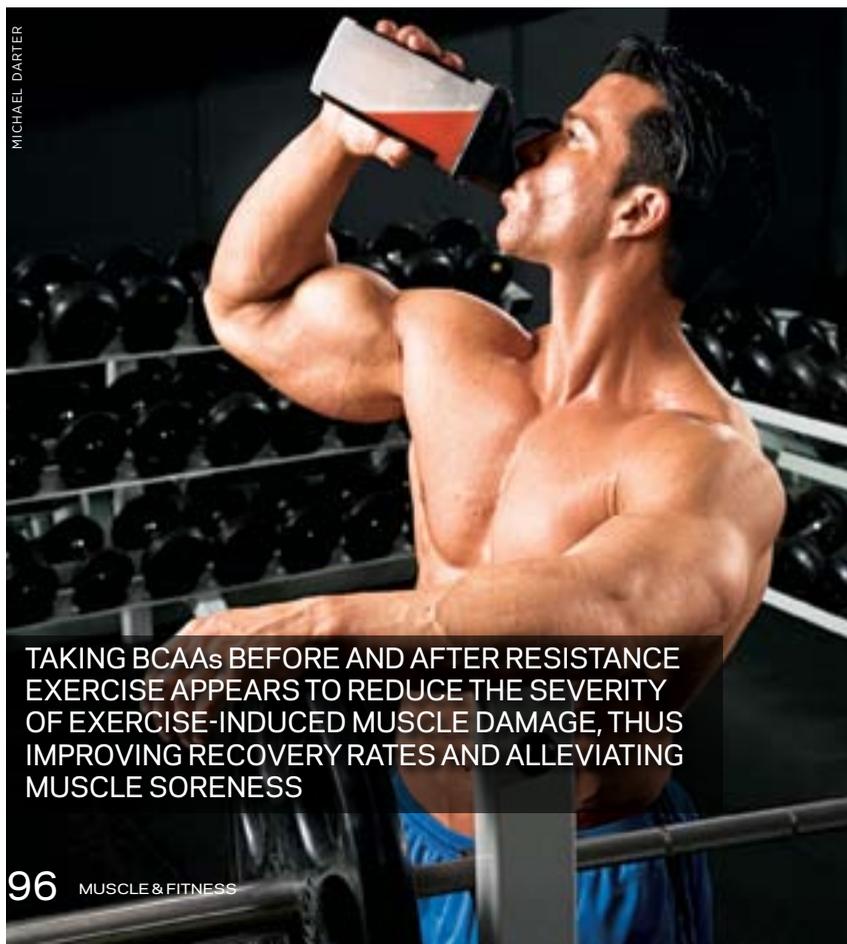
It is important to note that this study did not compare the effects of BCAA supplementation with that of whole protein. Recent studies have found that the consumption of 500 ml of skimmed milk following exercise can also reduce the extent of symptoms associated with exercise-induced muscle damage. For cost reasons, therefore, you may wish to consider BCAA alternatives, such as skimmed milk or whey protein powders, which are both great sources of the BCAAs leucine, isoleucine and valine. **M&F**

### REFERENCE

■ Howatson G, Hoad M, Goodall S, Tallent J, Bell PG, French DN (2012) **Exercise-induced muscle damage is reduced in resistance-trained males by branched chain amino acids: a randomized, double-blind, placebo controlled study.** *Journal of the International Society of Sports Nutrition*, 9:20

Performance Nutrition is a London-based consultancy, providing comprehensive support to elite and recreational athletes. Director James Collins is a leading Sport and exercise nutritionist, who worked with Elite Sports in Great Britain in the run-up to the 2012 Olympics. He is also head nutritionist for Arsenal FC. For further information visit [www.thepersonalnutritionist.com](http://www.thepersonalnutritionist.com)

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MICHAEL DARTER

**TAKING BCAAs BEFORE AND AFTER RESISTANCE EXERCISE APPEARS TO REDUCE THE SEVERITY OF EXERCISE-INDUCED MUSCLE DAMAGE, THUS IMPROVING RECOVERY RATES AND ALLEVIATING MUSCLE SORENESS**