



### PERFORMANCE ENHANCEMENT SUPPLEMENTS

#### Caffeine

A wide range of athletes and active people may benefit from caffeine as it reduces perceived effort and perceived fatigue. Proper dosage is about 1-3 mg/kg body weight -60 minutes before an event but could also be consumed during the event. Side effects include increased heart rate, shakiness, anxiety, GI upset, and sleep disturbances. According to the 2020-2025 Dietary Guidelines for Americans, adults should not consume more than 400 mg of caffeine per day.

#### Beta-Alanine

High intensity sports such as rowing, track, swimming, or weightlifting may benefit from beta-alanine supplementation. Beta-alanine increases carnosine in the muscles which decreases fatigue and potentially improves performance. Four to eight weeks of consistent supplementation (4-6 g per day) is optimal for use. Side effects could include skin tingling (paresthesia) but supplementing with less than 2 g at a time may help prevent this sensation in most populations.

#### Creatine Monohydrate

Creatine is helpful for building lean muscle mass in resistance training and for athletes with short recovery periods during events (e.g., sprinters). It is also supportive during long periods of immobilization in injury recovery. Creatine indirectly supplies the body with ATP (energy) and helps reduce fatigue and improve performance. There are two dosing protocols that are widely recognized. The first method includes a loading phase of 20-25 g/day (split up between 4-5 doses/day) for 5-7 days, followed by a maintenance phase of 3-5 g/day. The second method is consuming 3-5 g/day, surpassing the loading phase. Creatine should be taken with a protein + carbohydrate meal or snack. Side effects could include small weight gain which may be counterproductive in sports that emphasize power-to-weight ratio.

#### Branched Chain Amino Acids (BCAAs)

BCAA's are believed to stimulate muscle protein synthesis (MPS), prevent muscle protein breakdown, and reduce fatigue. It is questionable whether BCAA supplementation is any more effective than protein supplementation. For dosing, BCAAs that provide -2-3g leucine is recommended, and supplement timing needs vary.

There are no known adverse side effects. Overall, there is insufficient evidence to support a recommendation for BCAA's to promote MPS.

#### Sodium Bicarbonate

Supplementation of Sodium Bicarbonate (baking soda) is proposed to help regulate the pH in the cells by reducing acidity in high intensity exercise. Dosing is optimal at 0.2-0.4 g/kg body weight, 1-2 hours prior to exercise. Side effects could include GI upset if not taken with carbohydrate. There is insufficient evidence to determine whether supplementation results in performance enhancement or simply balances existing deficits in athletes.

#### Nitrate (Beetroot Juice)

Nitrate works to reduce blood pressure by acting as a vasodilator, increasing blood flow and oxygen to muscles during exercise. It is beneficial for a variety of sports, but particularly for athletes competing with low oxygen availability. Current dosing strategies are -300-600 mg nitrate with varied timing. Side effects could include GI upset and pink urine, which is harmless

### MUSCLE & INJURY RECOVERY SUPPLEMENTS

#### Hydroxymethylbutyrate (HMB)

HMB has been most widely studied to prevent muscle wasting in cancer patients. It is thought that HMB directly stimulates muscle protein synthesis (MPS). Supplementation would be appropriate after prolonged immobilization or recovery from injury with optimal dosing at 3 g/day. There are no known adverse effects of HMB.

#### Omega-3 Fatty Acids

Omega-3s increase muscle protein synthesis and enhance recovery of muscle damaging exercise at 2-4 g/day due to its anti-inflammatory properties. Omega-3s may also help reduce delayed onset muscle soreness (DOMS). Consuming omega-3s from food sources may be optimal.

#### Vitamin D

It improves response to exercise and decreases risk of fractures. Daily sunlight exposure (at least 10-30 minutes) may be sufficient for most populations. Daily dosing of about 600 IU is appropriate with no sun exposure.

#### Gelatin & Vitamin C

This supplement combination increases collagen production to help repair soft tissue injuries. The recommended dosing strategy is 5-15 g of gelatin and 500 mg of Vitamin C, at least 60 minutes prior to activity.