



## BCAA POWDER

BRANCHED-CHAIN AMINO ACIDS WITH ADDED L-GLUTAMINE

270 G POWDER | NPN80074597 | BCA270-CN

**BCAA Powder** combines the branched-chain amino acids (BCAAs)—leucine, isoleucine, and valine—along with the amino acid, L-glutamine, in a great-tasting, orange flavored powder. BCAAs make up 35% of the essential amino acids in muscle protein, and approximately 40% of the total amino acids required by mammals. BCAAs are unique in that they are a direct source of energy for skeletal muscles while also serving as intermediates in the ATP-producing citric acid cycle. They stimulate the building of protein in muscle, reduce muscle breakdown during exercise, and regulate protein metabolism throughout the body. BCAAs stimulate lean muscle synthesis even in the absence of resistance training, making them an effective raw material for lean tissue maintenance in athletes as well as in populations who are unable to exercise, but are at risk for muscle loss.<sup>1</sup>

This product is free of sucrose, fructose and artificial sweeteners, and is sweetened with the natural herb stevia.

### ATHLETIC PERFORMANCE AND RECOVERY

BCAAs can be oxidized as a fuel source in skeletal muscle cells. Supplementation with BCAAs before and after exercise has been shown to attenuate exercise-induced muscle damage and promote muscle protein synthesis, making them a useful addition to exercise and bodybuilding regimens. Supplemental BCAAs help reduce post-effort muscle soreness and suppress the rise in creatine kinase and lactate dehydrogenase after exercise, suggesting an inhibitory effect on the breakdown of muscle protein.<sup>2-4</sup> Moreover, due to the increased oxidation of BCAAs during endurance exercise, athletes may have higher requirements for these nutrients than sedentary populations.<sup>5</sup> Although not considered an athletic performance enhancer, per se, supplemental BCAAs have been shown to reduce the perceived rate of exertion among untrained athletes during physical exertion, which may allow exercisers to increase the intensity of their efforts, potentially leading to improved results.<sup>6-7</sup> BCAAs are shown to support the immune system and supplementation may reduce the immunosuppressive effect that strenuous activity has on the immune system.<sup>8</sup>

### MAINTENANCE OF MUSCLE MASS

Another area where BCAAs are of particular benefit is in attenuating the breakdown of muscle tissue in post-operative patients and those recovering from physical trauma.<sup>13</sup> Severe physical stress such as blunt trauma, burn, and septic infection markedly decreases protein levels and increases protein catabolism.<sup>13</sup> In surgically stressed patients receiving TPN containing 15%, 20%, 47%, and 50% BCAAs, those receiving 47% and 50% had an improved nitrogen balance at days 3 and 7 compared to the other groups.<sup>13</sup> Another study found BCAA levels significantly reduced in humans with mild traumatic brain injuries (TBI) compared to healthy subjects. The disability rating score in the BCAA-supplemented group of TBI patients was significantly higher than placebo group after 15 days of 19.6g/d of intravenous BCAA supplementation. A systematic review found depressed BCAA levels post-TBI, and that supplementation with BCAAs showed significant improvement post-injury in both animal and human trials.<sup>13,14</sup> BCAAs could be a powerful adjunct to post-operative care, particularly for patients who may have been underweight or weakened.

In addition to the post-surgical setting, the muscle-sparing effect of BCAAs may be beneficial in attenuating the dramatic weight loss and muscle wasting that are the most commonly reported causes of morbidity and mortality among cancer patients. Sixty-four patients given perioperative and postoperative BCAA intravenous supplementation for 14 days after a hepatectomy due to hepatocellular carcinoma (HCC) had a 34% decrease in postop morbidity compared with controls (55%), decreased need for diuretic therapy for ascites, and 0 kg weight loss compared with 1.4 kg in the control group.<sup>13</sup> In another study, patients who received BCAA supplementation in addition to sorafenib treatment for HCC showed to significantly increase overall survival and improve prognosis compared to non-supplemented controls.<sup>15</sup>

### SYNERGY WITH GLUTAMINE

Designs for Health's BCAA Powder combines leucine, isoleucine, and valine with the amino acid, glutamine, for a synergistic effect in building muscle tissue and supporting the immune system, intestinal health, and inflammatory pathways. Glutamine is the body's most versatile and abundant amino acid; however, during prolonged physiological and metabolic stress, glutamine stores are depleted.<sup>16</sup> BCAA oxidation is a precursor for glutamine synthesis, and many of the beneficial effects of BCAAs for those in catabolic states are related to the synthesis and maintenance of an adequate supply of glutamine.<sup>11</sup> Animal studies and clinical trials in humans demonstrate that sufficient supplies of glutamine improve nitrogen balance, recovery from various traumas, and restores immune balance. Glutamine is considered a "fuel for the immune system", regulating leukocyte function and is involved in signaling pathway activation and gene expression. Glutamine status plays a major role in redox balance and for antioxidant protection via the glutamine-glutathione axis, which can dictate overall recovery outcomes for patients at risk for immunosuppression.<sup>17</sup>

The presence of glutamine in a BCAA supplement may also be an additional boon to athletes. Lowered plasma glutamine may be used as a marker for overtraining without adequate recovery time as the stress caused by prolonged exercise increases the demand for glutamine to support gluconeogenesis. In this scenario, excessive exercise exhausts plasma glutamine levels which may negatively effect the immune system and may lead to intestinal dysfunction. In a controlled clinical trial, elite athletes who were given glutamine supplementation prior to maximal intensity exercise showed lowered levels of phosphorus, creatine kinase and IL-15 levels compared with controls, suggesting that glutamine supplementation may decrease exercise-induced fatigue and enhance inflammatory defenses and immune function.<sup>19</sup> Additionally, glutamine supplementation has been shown to reduce the exercise-induced increase in small intestinal permeability, which leads to inflammation and GI distress post-effort. In a small, randomized, double-blind placebo-controlled study involving healthy, endurance-trained subjects, compared to placebo, supplementation with glutamine for seven days (dosed at 0.9 g/kg of fat-free mass) resulted in significant decreases in exercise-induced intestinal permeability via multiple mechanisms.<sup>20</sup> In an animal model induced with activity-based anorexia (ABA), colonic mucosal permeability was enhanced while protein synthesis decreased; however, when given oral glutathione or BCAAs during ABA, intestinal permeability and protein synthesis was restored, and mRNA levels of mucin-2 were increased, a regulatory gut barrier mucus layer.<sup>21</sup>

### BCAA POWDER MAY BE BENEFICIAL FOR:

- Enhancing muscle building and recovery in athletes<sup>1,9,10</sup>
- Facilitating muscle tissue maintenance in aging populations<sup>8,11,12</sup>
- Reducing muscle mass catabolism during recovery from injury<sup>13</sup>

### Medicinal Ingredients (per scoop/8g):

|                   |        |
|-------------------|--------|
| L-Leucine.....    | 2.5 g  |
| L-Glutamine.....  | 2 g    |
| L-Isoleucine..... | 1.25 g |
| L-Valine.....     | 1.25 g |

**Non-Medicinal Ingredients:** Natural flavour, certified organic stevia leaf extract powder, natural orange flavour, citric acid, silicon dioxide, sunflower lecithin. **Recommended Dose:** Adults: Mix 1 scoop well in 1-2 cups of liquid (water, juice, etc.) immediately before consumption. Take once daily or as otherwise recommended by a health care practitioner. Can be taken pre, peri or post workout. Consider combining with Pure PaleoComplete®, VegeComplete™ or WheyCool™, or taking it along with food to increase the total BCAA levels as well as protein synthesis.

### REFERENCES

For a list of references cited in this document, please visit: [http://catalog.designsforhealth.com/assets/itemresources/BCAA-Powder\\_References.pdf](http://catalog.designsforhealth.com/assets/itemresources/BCAA-Powder_References.pdf)