THE ROLE OF PROTEIN, HMB AND LEUCINE IN SUPPORTING MUSCLE HEALTH

What is Beta-hydroxy-beta-methylbutyrate (HMB)?

- HMB is a metabolite derived from the amino acid leucine
- HMB stimulates muscle protein synthesis to a similar extent as leucine while also decreasing muscle protein breakdown[1-3]

What is Leucine?

- Leucine is one of nine essential amino acids, a branched chain amino acid, that must be consumed in the diet
- Leucine is important for muscle protein synthesis and serves as a building block for protein[4]

Importance of muscle and dietary protein intake with aging and illness:

Research shows that nutrition strategies that include dietary protein, amino acids and amino acid metabolites can improve muscle mass, strength and function [5-8]

DID YOU KNOW?

Most studied doses of HMB

1.5-3 g/day

Only about

0.5-5%

of dietary leucine is converted to HMB[1, 9]

Individuals need at least

60 grams of leucine to get 3 grams of HMB

60 g of leucine is equivalent to eating

110 eggs

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EFFECTS OF HMB AND LEUCINE ON MUSCLE HEALTH

EFFECTS OF HMB AND LEUCINE ON MUSCLE ANABOLISM AND MUSCLE HEALTH OUTCOMES

- **HMB** has been shown to increase muscle mass and strength in older adults, preserve muscle mass during extended bed rest, and enhance recovery during exercise rehabilitation.[10-14]
- Due to the longer half life of **HMB** in circulation, it may favor muscle anabolism especially during catabolic conditions.[15]
- **Recent systematic reviews** and meta-analyses in older adults or clinical population characterized by loss of muscle mass and strength have reported [13, 14, 16, 17]:
  - » HMB, or supplements containing HMB, have been shown to increase skeletal muscle mass
  - » HMB supported improvements in muscle strength
- **Leucine** supplementation increases muscle protein synthesis and may be useful to address the age-related decline in muscle mass in elderly individuals. The effect on muscle strength shows mixed results, and there is limited data on physical performance.[18]

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ESPEN GUIDELINE RECOMMENDATIONS

3.4. Recommendation 4 | Strong consensus 96% agreement
In malnourished polymorbid medical inpatients or those at high risk of malnutrition, high protein nutrient specific oral nutritional supplements (ONS) should be administered, when they may help maintain functional status and muscle mass, reduce mortality and improve QoL.[19*]

3.5. Recommendation 5 | Strong consensus 100% agreement
In polymorbid medical inpatients who are malnourished or at high risk of malnutrition and can safely receive nutrition orally, ONS shall be offered as a cost-effective way of intervention towards improved outcomes.[19*]

3.16. Recommendation 16 | Strong consensus 92% agreement
In polymorbid medical inpatients with pressure ulcers, specific amino-acids (arginine and glutamine) and HMB can be added to oral/enteral feeds to accelerate the healing of pressure ulcers.[19]

3.23. Recommendation 23 | Strong consensus 100% agreement
In polymorbid medical inpatients at high risk of malnutrition or with established malnutrition aged 65 and older, continued nutritional support post hospital discharge with either ONS or individualized nutritional intervention should be considered for more than two months in order to lower mortality/impact clinical course.[19]

***Supporting evidence for these guidelines referenced the NOURISH study:**
Supplementation with ONS (20g high protein, 1.5g CaHMB, 350kcal, 160 IU vitamin D, and other essential micronutrients) twice a day reduced the risk of mortality by 50% through 90 days post-hospital discharge in malnourished, cardiopulmonary patients 65 years or older compared to patients receiving a placebo and standard of care. [20]

HMB = β-hydroxy-β-methylbutyrate

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