THE ROLE OF AMINO ACIDS AND THEIR METABOLITES IN SUPPORTING MUSCLE HEALTH IN AGING AND ILLNESS

LEUCINE AND β-HYDROXY-β-METHYLBUTYRATE (HMB)

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 many metabolic functions.[1]

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

- HMB is a metabolite derived from the amino acid leucine.
- HMB works with protein and amino acids to support muscle protein synthesis while reducing protein breakdown that can lead to muscle loss.[2-4]

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 dose of CaHMB is

3 g/day

Only about

0.5-5%

of dietary leucine is converted to HMB[2,9]

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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DO LEUCINE AND HMB HAVE THE SAME EFFECTS ON PROTEIN ANABOLISM AND MUSCLE MASS?

- **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 are limited data on physical performance.[10]
- **HMB** has been shown to increase muscle mass in healthy aging adults, preserve muscle mass during extended bed rest, and enhance recovery during exercise rehabilitation.[11-13]
- **HMB** has a longer half-lifetime in the blood than that of leucine, which may favour the use of HMB above leucine to achieve protein anabolism.[14]
- **A systematic review** and meta-analysis of 15 randomized controlled trials reporting outcomes in adults with clinical conditions characterized by loss of skeletal muscle mass and weakness revealed:[15]
  - » HMB, or supplements containing HMB, have been shown to increase skeletal muscle mass.
  - » HMB supported improvements in muscle strength.

WHAT DO ESPEN GUIDELINES RECOMMEND?

2.2 In malnourished polymorbid medical inpatients or those at high risk of malnutrition, nutrient-specific ONS should be administered, when they may maintain muscle mass, reduce mortality, or improve quality of life.[16*]

7.1 In polymorbid medical inpatients with pressure ulcers, specific amino-acids (arginine and glutamine) and β-hydroxy-β-methylbutyrate (βHMB) can be added to oral/enteral feeds to accelerate the healing of pressure ulcers. [16]

9.3 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 shall be considered to lower mortality.[16*]

***Supporting evidence for these guidelines referenced the NOURISH study:**
Supplementation with ONS (20 g high protein, 1.5 g CaHMB, 350 kcal, 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.[17]

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HMB = β-hydroxy-β-methylbutyrate

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