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[9] is

3g/day

Only about

5% of dietary leucine is converted to HMB[9]

Individuals need at least

60 grams of leucine to get 3 grams of HMB[9]

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 favor the use of HMB above leucine to achieve protein anabolism.[14]
- **A systematic review** and meta-analysis of 15 randomised controlled trials reporting outcomes in adults with clinical conditions characterised 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 individualised nutritional intervention shall be considered to lower mortality. [16*]

***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. [17]

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HMB = β-hydroxy-β-methylbutyrate

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