Specialized nutrition with HMB for muscle recovery

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The Science of HMB: An important factor in muscle health
HMB supplementation and muscle health

- Why is muscle health important?
- What is HMB and where does it come from?
- How does HMB work to counteract muscle loss?
- How can HMB and ONS+HMB supplementation improve patient outcomes?
Why is muscle health important?
Muscle has more than a structural role: it also regulates critical metabolic processes.

Skeletal muscle accounts for about 30% to 40% of body weight.

Metabolic stress can lead to loss of muscle mass

Metabolic stress can be caused by aging, inflammation, malnutrition, and illness\(^1,2\)

Under stress, the body turns to muscle for energy and amino acids, which results in a shift from muscle protein synthesis (anabolism) toward increased muscle protein breakdown (catabolism)\(^2\)

Loss of muscle mass can have serious consequences

Healthy older adults
- ↓ strength and balance
- ↓ energy
- ↓ level of activity
- ↓ quality of life

Immobilized and recovering patients
- ↓ mobility
- ↓ immunity
- ↓ wound healing
- ↓ time to recovery
- ↓ morbidity and mortality
- ↑ weakness
- ↑ risk of infections
- ↑ quality of life
- ↑ level of activity
- ↑ energy
- ↑ mobility

After the age of 40, muscle mass may decrease by up to 8% per decade

How can HMB help?
How HMB is metabolized?

10-40% in Urine

Circulates to muscle

(0.3-0.6 g/day)

β-hydroxyβ-methylbutyrate (HMB)

KIC-dioxygenase

~ 0.5 - 5% conversion

HMG-CoA

Cholesterol

Protein

Leucine

Branch chain amino acid transferase

90-95% Leu catabolism

Liver

Δα-Ketoisocaproate (KIC)

HMG-CoA

Isovaleryl-CoA

Branch chain α-keto acid dehydrogenase

Acetoacetate + Acetyl-CoA

How to obtain HMB*?

- HMB is difficult to get from diet alone – only about 0.5% to 5% of leucine is converted to HMB\(^1\)\(^2\)\(^3\)
- To get 3 g of HMB,\(^2\) you would need to consume:

  ![Chicken](110 EGGS) or ![Avocado](6000 AVOCADOS) or ![Asparagus](6000 SERVINGS OF ASPARAGUS)

- Furthermore, levels of HMB in the body decrease with age\(^2\)

This is why supplementation is necessary to get HMB to support muscle health.

* HMB=β-hydroxy-β-methylbutyric acid, a metabolite of leucine, to help support muscle health.

How can HMB supplementation help improve patient outcomes?
HMB has been extensively studied across a variety of populations
HMB has been shown to improve **body composition** in older adults

In a group of 70 year old healthy adults participating in a strength training program, the HMB group significantly increased their fat free mass, compared to the control group (placebo).¹

Supplementation with HMB, along with exercise, has been shown to improve muscle quality and functionality in older adults as early as 8 weeks.¹²

HMB has been shown to improve **muscle functionality** in older adults.

In a group of older adults participating in a resistance training program, the HMB group needed significantly less time to get out of a chair, walk 6.6 m, turn around, walk back to the chair, and sit down (GUG) vs the control group (placebo), suggesting higher muscle functionality.²

Supplementation with HMB, along with exercise, has been shown to improve muscle quality and functionality in older adults as early as 8 weeks.¹²

HMB has been shown to **improve muscle mass** in older adults on bed rest in exercise rehabilitation programs.

In a randomized, controlled, double-blinded, parallel-group design study, older adults were confined to complete bed rest for 10 days, followed by resistance training rehabilitation for eight weeks. Intervention with HMB prevented the decline in muscle mass over bed rest ($p=0.02$).¹

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HMB has been shown to **improve muscle mass** in older adults on bed rest in exercise rehabilitation programs.

After 8 weeks of rehabilitation, the HMB group had significantly greater knee extensor strength compared to baseline at the end of rehabilitation ($p < 0.05$).

ONS+HMB
Clinically proven to support muscle health
Muscle loss leads to negative patient outcomes

Even a 10% loss of muscle mass can have serious consequences¹,²:

- Impaired immunity⁴
- Increased infection⁴
- Increased healthcare costs⁷

- Postoperative complications⁵
- Weakness, infection, decreased healing³
- Longer hospital stays⁶

- Too weak to sit, pressure sores, pneumonia¹,²
- Higher hospital readmission rates¹⁰
- Higher postoperative mortality and morbidity⁸,⁹

- Poor survival outcomes and death (usually from pneumonia)¹,²,⁵,⁶
- Longer hospital stays⁶
- Higher postoperative mortality and morbidity⁸,⁹

*Assuming no preexisting loss.

Supported by clinical evidence in both healthy older adults and recovering patients

Pioneer to advance scientific evidence for 45 years (1973-2019) 30+ clinical studies
ONS+HMB for recovering patients
Clinically shown to help patients get mobile faster

81% of patients supplemented with ONS+HMB were mobile 15 and 30 days after hip fracture vs. 27% in the control group.

Specialised ONS improved wound healing

NOURISH - Nutrition effect On Unplanned Readmissions and Survival in Hospitalized patients

→ prospective, randomised, double-blind, placebo-controlled, multicentre study

- HP-HMB ONS: 350 kcal, 20 g high quality protein, 1.5 g CaHMB, vitamins & minerals (2 servings/day)
- Placebo drink: 48 kcal, 12 g CHO, 10 mg vitamin C (2 servings/day)
THE NOURISH

HP-HMB está asociado con una reducción en la tasa de mortalidad del 50% 

Mortalidad en todos los pacientes

El número de pacientes que se necesita tratar para evitar una muerte fue de 20.3 (NNT: 95\% CI, 10.9 - 121.4)

HP-HMB durante 90 días (NOURISH)  
Simvastatina durante 5,4 años en pacientes alto RCV  
Ramipril Durante 5 años en pacientes alto RCV

Cramer et al: Adultos con malnutrición y sarcopenia

Objetivo: Evaluar los efectos de 2 suplementos nutricionales que difieren en cantidad y tipo de nutrientes clave en hombres y mujeres con malnutrición y sarcopenia

Diseño estudio
- Sujetos ≥65 años con malnutrición (Subjective Global Assessment class B and C) y sarcopenia (de acuerdo con European Working Group in Sarcopenia in Older People [EWGSOP]; n=330)
- 2 tomas al día de HP-ONS o HP-ONS+HMB durante 12 y 24 semanas

En adultos mayores con sarcopenia moderada la ingesta de ONS+HMB durante 12 semanas mejora la fuerza de la pierna y la calidad del músculo

Cramer JT et al. (2016) JAMDA
ONS+HMB for healthy older adults
Clinically proven to increase **strength** in healthy older adults

ONS+HMB, along with light exercise, improved **physical strength and performance** in as early as 8 weeks¹

**CHANGE IN PHYSICAL STRENGTH AND PERFORMANCE PARAMETERS AFTER 8 WEEKS**²³

- **PT isometric strength**
  - 11% improvement
  - \( p<0.02 \)

- **Handgrip endurance**
  - 31% improvement
  - \( p<0.01 \)

Adapted from Berton et al, 2015.

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PT=peak torque.

* The maximal voluntary force produced as the lower limb muscles contracted while pulling against an immovable object with the knees bent.²³

† The length of time for which the participant was able to maintain half of their voluntary contraction.¹

Clinically proven to increase **vitality** in healthy older adults

In healthy aging individuals, supplementation with ONS+HMB for 3 months has been shown to help support better **general health and physical QoL**\(^1\star\)

Nutritional intervention with specialised ONS+HMB provides nutritional, clinical, and functional benefits in community and hospitalised patients.

**Malnourished**

- Increased **muscle mass** (Malafarina 2017) and **strength** (Deutz 2016)
- Improved **quality of life** (de Luis 2015)
- Increased **nutritional status** (de Luis 2015; Malafarina 2017; Deutz 2016)
- Body **weight** gain (de Luis 2015; García Almeida 2015; Malafarina 2017)
- Improved **strength and muscle** quality in mild to moderate sarcopenia (Cramer 2016)
- Maintains **lean body mass** in COPD (Lopez 2015)

**Well-nourished**

- Increased **strength and resistance** combined with exercise (Berton 2015)
- Improved wound **healing, reduced immobilization** post surgery (Ekinci 2016)
- Combined with pulmonary rehabilitation, improved **quality of life**, increased **muscle mass** and **strength** (Oliveira 2016)