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A SUMMARY OF
STUDIES AND RECOMMENDATIONS

THE ROLE OF PROTEIN AND PROTEIN QUALITY IN THE NUTRITIONAL MANAGEMENT OF OLDER ADULTS WITH OR AT RISK OF MALNUTRITION

Information for Healthcare Professionals

Nestlé HealthScience

Introduction

In this brochure, we have collected some of the new and relevant references highlighting the importance of improving the nutritional status among patients, or geriatric individuals, with or at risk of disease-related malnutrition. This brochure includes guidelines for protein and energy requirements, as well as study summaries on the importance of protein quality to regain and build muscle mass. In particular, studies on leucine are included, since this is the most potent amino acid to stimulate muscle protein synthesis. Leucine has been proposed to have a beneficial effect on muscle mass, muscle strength and physical function.

New references will be updated on our website: www.nestlehealthscience.se

Importance of the composition of the nutritional supplements

SUMMARY OF REVIEW ARTICLE

An Update on Protein, Leucine, Omega-3 Fatty Acids, and Vitamin D in the Prevention and Treatment of Sarcopenia and Functional Decline.

Tessier AJ, Chevalier S. Nutrients 2018; 10: 1099.

BACKGROUND AND AIM

With age, the prevalence of sarcopenia and functional decline increases, which may lead to frailty and disability. Nutrition has been identified as a modifiable risk factor, which may help to prevent or postpone these conditions. High-quality protein, leucine, vitamin D, omega-3 and n-3 PUFA have been given extra attention in the literature, due to their demonstrated effect on skeletal muscle health. Thus, the aim of this review was to examine recent evidence on what role these nutrients have on muscle mass, muscle strength, mobility, and physical function in independent living older, healthy or frail, adults.

METHOD

Reviewing and examining recent observational and interventional (supplementation interventions, without physical exercise) studies in this research area.

RESULTS

Protein and Leucine

Protein supplements appear to have beneficial effects on physical function, especially in frail individuals with (risk of) malnutrition. The timing of protein intake and per-meal anabolic threshold seems to be important in healthy older adults with limited anabolic stimuli (i.e. low protein intake and physical activity levels).

Leucine is the most potent amino acid to stimulate muscle protein synthesis. Several studies show positive results that indicates a potential benefit of leucine for preserving muscle mass and function. However, more long-term interventions are needed.

Vitamin D

Vitamin D supplementation has been shown to improve physical performance in older adults and have positive effects on the muscle strength in frail seniors. However, the effect of vitamin D on physical function seems to be most beneficial in individuals with prior vitamin D deficiency.

N-3 Polyunsaturated Fatty Acids

There are some studies showing an increment in functional measures of muscle mass and volume, when supplemented with ≥3.0 g/day n-3 PUFA. While n-3 PUFA may prevent sarcopenia in healthy older adults, there is still a need for further studies in sarcopenic older adults.

Combined Supplements of Protein, Leucine, Vitamin D, and n-3 PUFA

The combined supplements of protein, leucine, vitamin D, and n-3 PUFA showed beneficial effects on muscle mass. Both by effectively stimulating the muscle protein synthesis in healthy older adults and promoting muscle mass maintenance in sarcopenic older adults. Taken together, the combined supplements may be a potential, promising and safe alternative in the prevention of sarcopenia.

CONCLUSION

Supplementation with protein, leucine, vitamin D, and n-3 PUFAs seems to individually, and in combination, have beneficial effects on the skeletal muscle health. Since it's a simple, low-cost treatment without major side effects, key nutrient supplementation in older adults is of interest in the prevention of sarcopenia and frailty.

STUDY SUMMARY

Effects of a Vitamin D and Leucine-Enriched Whey Protein Nutritional Supplement on Measures of Sarcopenia in Older Adults, the PROVIDE Study: A Randomized, Double-Blind, Placebo-Controlled Trial.

Bauer J, Verlaan S, Bautmans I, et al. JAMDA 2015; 16: 740-747.

BACKGROUND AND AIM

Sarcopenia is defined by age-related loss of muscle mass, strength, and function. It's a strong risk factor for reduced mobility, independence and quality of life, together with an increased risk of falls, fractures and disability. In addition, sarcopenia is associated with increased rates of hospital and long-term care admissions, and increased mortality. Nutritional supplementation with key nutrients, incl. high-quality protein, leucine and vitamin D, has been suggested to positively influence aspects of sarcopenia by preventing mobility disability. Thus, the aim of this study was to investigate the effect of a vitamin D and leucine-enriched whey protein nutritional supplement on measures of sarcopenia in older adults.

METHOD

A multicenter, randomized, controlled, double-blind, 2 parallel-group study including 380 sarcopenic, independent living older adults. The intervention group (n = 184) received a supplement containing 20 g whey protein, 3 g total leucine, 9 g carbohydrates, 3 g fat, 800 IU vitamin D, and a mixture of vitamins, minerals, and fibers, 2 times a day for 13 weeks. The control group (n = 196) received an iso-caloric control product. At baseline, week 7, and week 13 of the intervention, handgrip strength, lower-extremity function (Short Physical Performance Battery (SPPB; 0-12)), chair-stand test, gait speed, balance score, and appendicular muscle mass (by DXA) were assessed.

RESULTS

The intervention group had a greater improvement in the chair-stand test compared to the control group (mean estimated difference: 1.01 seconds, 95% CI: 1.77-0.19, p = 0.018), and gained more appendicular muscle mass (mean estimated difference: 0.17 kg, 95% CI: 0.004-0.338, p = 0.045). In addition, SPPB and gait speed improved significantly in both groups, and handgrip strength in the intervention group. However, without no significant between-group differences.

CONCLUSION

A 13-week intervention of a vitamin D and leucine-enriched whey protein oral nutritional supplement showed positive effects on muscle mass and lower-extremity function in sarcopenic older adults. While, exercise is considered the standard treatment for increasing muscle strength and improving physical performance in sarcopenic patients, an isolated effect of a targeted nutritional intervention was found. Consequently, specific nutritional supplementation alone, may benefit sarcopenic and geriatric patients, which can be especially important for patients unable to exercise.

STUDY SUMMARY

Effects of a Leucine-Enriched Amino Acid Supplement on Muscle Mass, Muscle Strength, and Physical Function in Post-Stroke Patients with Sarcopenia: A Randomized Controlled Trial.

Yoshimura Y, Bise T, Shimazu S, et al. Nutrition 2019; 58: 1-6.

BACKGROUND AND AIM

Worldwide, stroke is a leading cause of death but also a cause of disability in survivors. Consequently, many stroke survivors experience difficulties with activities of daily living (ADLs). Stroke-related sarcopenia is an emerging and multidimensional condition, which includes muscle fiber-type shifts, changes in physical function and metabolism, dysphagia and subsequent malnutrition, as well as physical inactivity etc. A daily intake/supplementation of protein and vitamin D has recently been recommended for preventing and treating sarcopenia. In addition, a leucine-enriched amino acid supplement may help to stimulate muscle protein synthesis. The aim of this study was to investigate the effects of a leucine-enriched amino acid supplement on muscle mass, muscle strength, and physical function in post-stroke patients with sarcopenia.

METHOD

An 8 week blinded, two-parallel group, randomized controlled trial including 44 post-stroke older patients with sarcopenia was conducted. The intervention group (n = 21) received a leucine-enriched amino acid supplement (3 g of leucine 40% enriched essential amino acids, 9,7 g carbohydrates, 20 µg vitamin D, and vitamin B1, B6, B12); the control group (n = 23) did not. Both groups performed low-intensity resistance training and followed a post-stroke rehabilitation program. At baseline and at the end of the intervention, physical function was assessed by the motor domain of Functional Independence Measure (FIM), Skeletal Muscle Mass Index (SMI) measured via bioelectrical impedance analysis, and muscle strength (handgrip strength).

RESULTS

The FIM-motor score and handgrip strength increased significantly in both groups over time, with significantly greater improvement in the intervention group compared to the control group; FIM-motor score (mean estimated difference: 9.2, 95% CI: 1.5-15.8, p = 0.045) and handgrip strength (mean estimated difference: 3.80, 95 % CI: 1.09–7.22, p = 0.002). In addition, the SMI significantly increased over time in the intervention group but not in the control group, with significantly greater improvement in the intervention group (mean estimated difference: 0.50 kg/m2, 95 % CI: 0.01-2.11, p = 0.041).

CONCLUSION

An 8-week intervention with leucine-enriched amino acid supplementation and low-intensity resistance training, showed an increase of muscle mass, strength, and physical function in post-stroke patients with sarcopenia. Leucine has a key role in activating the mTOR pathway stimulating the muscle protein synthesis, which is assumed to be the mechanism behind the results seen in the study. Consequently, leucine-enriched amino acid supplements may help preserve muscle mass and physical function in older sarcopenic adults with decreased food intake.

Protein Recommendations from the PROT-AGE Expert Group

Evidence-Based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper from the PROT-AGE Study Group.

Bauer J, Biolo G, Cederholm T, et al. JAMDA 2013;14: 542-559.

BACKGROUND AND AIM

Older adults (>65 years) are at greater risk of developing chronic and acute diseases associated with inflammatory and catabolic conditions, which increases the protein needs. In addition, the ability to utilize available protein is reduced and the protein intake is often inadequate. Taken together, the dietary protein needs are increased with age. Since a sufficient protein intake is important in order to maintain good health, functionality, and to promote recovery from illness, the aim of the study was to develop evidence-based recommendations for optimal protein intake by older people.

METHOD

The European Union Geriatric Medicine Society (EUGMS), in cooperation with other relevant scientific organizations, created an international study group to review dietary protein needs with aging (PROT-AGE Study Group). The developed recommendations were based on structured discussions, evidence-based reasoning, and iterative steps toward agreement.

RESULTS

To help maintain and regain lean body mass and function in older adults, the PROT-AGE group recommendations for dietary protein intake are as follows:

- Healthy older adults: 1.0–1.2 g protein/kg BW/d
- Acute or chronic diseases: 1.2–1.5 g protein/kg BW/d
- Severe illness or injury or with marked malnutrition: 2.0 g protein/kg BW/d
- Severe kidney disease (GFR* < 30 mL/min/1.73m2) with no dialysis: Limited protein intake.

In addition the PROT-AGE Study group suggest:

- Protein source, timing of intake, and amino acid supplementation may be considered when making dietary protein recommendations to older adults.
- Anabolic per-meal threshold: 25–30 g protein (2,5–2,8 g leucine).
- "Fast" proteins, incl. whey protein, seems to have some benefits over "slow" proteins in muscle protein metabolism.
- Dietary enrichment with leucine/branched-chain amino acids may help enhance muscle mass and muscle function, due to its involvement in the signaling pathways for muscle protein synthesis.
- The addition of a mixture BCAA (branched-chain amino acid) together with the nutritional support increased the muscle protein synthesis in severely ill patients at different settings.

CONCLUSION

Evidence shows that older adults need more dietary protein than younger adults to support good health, maintain functionality, and promote recovery from illness. Based on the PROT-AGE group findings, new protein recommendations for older adults were developed.

European Guideline

ESPEN Guideline on Clinical Nutrition and Hydration in Geriatrics.

Volkert D, Beck AM, Cederholm T, et al. Clinical Nutrition 2018; 38: 10-47.

BACKGROUND AND AIM

The prevalence of malnutrition and dehydration is high among older citizens. In clinical practice, it is often unclear which strategies are suitable and effective in the management of these conditions. The aim of this guideline is to provide evidence-based recommendations for clinical nutrition and hydration in older adults to prevent and/or treat malnutrition and dehydration.

METHOD

The guideline was developed by systematically reviewing and examining current evidence, meeting set inclusion criteria. The included studies were graded according to the SIGN grading system and based on this, recommendations were developed and agreed upon in a multistage consensus process.

RESULTS

Who could benefit from medical nutrition?

All older adults (above 65 years) shall routinely be screened for malnutrition with a validated tool in order to identify those with (risk of) malnutrition. A positive malnutrition screening shall be followed by systematic assessment, individualized intervention, monitoring and adjustment of interventions.

How much energy and protein should be delivered?

The recommended energy intake is 30 kcal/kg body weight/day and at least 1 g protein/kg body weight/day in geriatric individuals; these values should be individually monitored and adjusted in regards to nutritional status, physical activity level, disease status and tolerance.

How much should older persons drink each day?

Women should be offered at least 1.6 L of fluids each day, while men should be offered at least 2.0 L of fluids each day, unless there is a clinical condition that requires different approach.

Should older individuals with (risk of) malnutrition, be offered oral nutritional supplements (ONS)?

ONS should be offered when dietary counseling and food fortification are not sufficient to increase dietary intake in order to reach the individuals nutritional goals.

Hospitalized older adults with (risk of) malnutrition shall be offered ONS, in order to improve dietary intake and body weight, and to lower the risk of complications and readmission. After discharge from the hospital, ONS should be offered in order to improve dietary intake and body weight, and to lower the risk of functional decline.

ONS offered as a supplement shall provide at least 400 kcal/day, including 30 g or more of protein/day. In addition, ONS shall be continued for at least one month. Efficacy and expected benefit of ONS shall be assessed once a month. Type, flavor, texture and time of consumption shall be adapted to the patient's taste and eating capacities.

CONCLUSION

There is a range of effective interventions available to support adequate nutrition and hydration in older individuals, which can help to maintain or improve nutritional status and clinical course as well as quality of life. These interventions should be implemented in clinical practice and routinely used.

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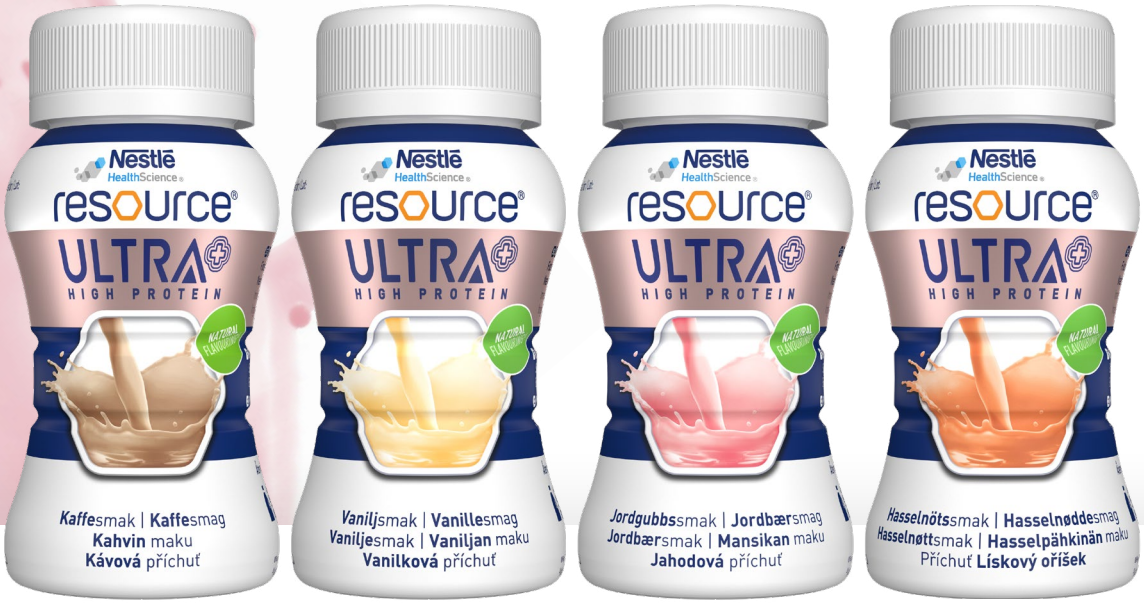
WHEN EVERY SIP COUNTS



Resource® Ultra is a powerful, delicious oral nutritional supplement, purposefully designed to maximize the compliance with the nutritional treatment. Thanks to Resource® Ultra, you help your patients reach their nutritional targets, one sip at a time.

- **Very high protein content**
  (16 g milk protein/100 ml *or* 28 E%)
- **Highest whey protein content on the market****
  (60 % whey, 40 % casein), which is naturally rich in leucine (1,7 g/100ml) for an increased muscle protein synthesis[1].
- **High energy content** (2,25 kcal/ml)
- **Low glycemic index (GI) and carbohydrate content**
  (15 g carbohydrates/100 ml *or* 27 E%)

NEW!
Improved formula* with more protein and less carbohydrates!

Natural flavouring

Highly concentrated to make every sip count

Delicious taste

For Healthcare Professionals

Resource® Ultra is a food for special medical purposes, to be used under medical supervision. For the dietary management of patients with malnutrition or at risk of malnutrition.

* Formula update from February 2024. ** Among equivalent products.

1. Bauer, J. et al. J. Am. Med. Dir. Assoc., 2013; 148: 542–559.

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