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Sarcopenia and protein intake in the elderly: Metabolic considerations for healthy aging.

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Introduction

Sarcopenia, the age-related loss of skeletal muscle mass and strength, is a growing public health concern affecting the elderly population worldwide. It contributes significantly to frailty, falls, decreased quality of life, and increased mortality. One of the central nutritional factors implicated in the development and progression of sarcopenia is inadequate protein intake, both in terms of quantity and quality.With advancing age, metabolic changes such as anabolic resistance, reduced physical activity, and hormonal alterations affect the body's ability to maintain muscle mass. Therefore, adequate protein consumption is essential not only to preserve muscle but also to support metabolic health, immune function, and overall aging processes. This article explores the relationship between sarcopenia and protein intake, including metabolic mechanisms, dietary strategies, and current research insights for optimizing elderly nutrition [1].

Sarcopenia typically begins after the age of 50 and accelerates beyond 65. Its pathogenesis involves multiple factors.Aging muscles show a blunted response to protein intake, requiring higher stimulation to trigger muscle protein synthesis (MPS).Decline in anabolic hormones such as testosterone, growth hormone, and insulin-like growth factor-1 (IGF-1) reduce muscle growth and repair.Aging leads to impaired mitochondrial biogenesis and energy production, which contributes to muscle atrophy.Low-grade inflammation ("inflammaging") promotes catabolism and impairs muscle regeneration [2].

Research consistently supports that older adults need more dietary protein per meal to achieve similar anabolic responses seen in younger individuals. The Recommended Dietary Allowance (RDA) for protein is 0.8 g/kg/day, but this may be insufficient for the elderly.Expert groups suggest 1.2–1.5 g/kg/day for healthy older adults, and up to 2.0 g/kg/day for those with chronic illness or acute sarcopenia.High-quality proteins rich in Essential Amino Acids (EAAs), especially leucine, are more effective at stimulating MPS.Animal proteins (eggs, dairy, lean meat) typically offer better amino acid profiles compared to plant proteins.However, combining plant proteins (e.g., legumes + grains) can provide a complete amino acid profile [3].

Spreading protein intake evenly across meals (approximately 25–30g per meal) is more effective than skewed consumption (e.g., all protein at dinner).Pre-sleep protein may help support overnight muscle repair and synthesis.Leucine acts as a potent trigger for MPS via the mTOR pathway.Supplementing with 3g leucine per meal (or 20–40g of high-quality protein) may help overcome anabolic resistance.Whey protein is rapidly absorbed and leucine-rich, making it ideal for elderly supplementation.Protein-enriched functional foods (like fortified yogurts or drinks) offer practical solutions, especially for those with reduced appetite.Physical activity, particularly resistance exercise, synergistically enhances the muscle-building response to protein intake [4].

Even moderate-intensity training can attenuate muscle loss and improve functional outcomes when paired with adequate protein.Sarcopenia is now recognized as a diagnosable condition (ICD-10 code M62.84), and nutritional interventions are being integrated into clinical

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guidelines. Key considerations include:Tools like the Mini Nutritional Assessment (MNA) can identify protein-energy malnutrition. Protein goals should account for renal function, co-morbidities, and physical activity levels. Community or hospital-based meal services should include protein-rich options suitable for older adults [5].

Conclusion

Sarcopenia represents a critical barrier to healthy aging, but it is not inevitable. Ensuring optimal protein intake both in quality and quantity is essential for preserving muscle mass and metabolic health in older adults. By addressing anabolic resistance, supporting muscle synthesis, and encouraging active lifestyles, we can reduce the burden of sarcopenia and promote independent living in aging populations.Precision nutrition, functional food innovations, and integrated exercise programs will play a vital role in shaping the future of geriatric care. Empowering the elderly with nutritional knowledge and accessible, high-protein foods is a cornerstone strategy in the global fight against age-related muscle loss.

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