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Opinion Article

# Sustaining Strength through Targeted Dietary Intervention in Aging Muscle

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## DESCRIPTION

As the global population ages, preserving physical function and independence among older adults becomes increasingly important. Sarcopenia not only leads to frailty and increased risk of falls, but also diminishes quality of life and raises the risk of hospitalization and mortality. Evidence increasingly points to the powerful role of targeted dietary interventions in sustaining muscle strength and mitigating the impacts of sarcopenia. Through specific nutritional strategies, older adults can maintain functional capacity, reduce disability, and enhance longevity. One essential factor contributing to sarcopenia is anabolic resistance, a reduced responsiveness of muscle tissue to dietary protein intake. In younger individuals, the ingestion of protein-rich meals stimulates muscle protein synthesis efficiently. Over time, this imbalance between protein synthesis and breakdown contributes to net muscle loss.

Timing and distribution of protein intake also plays a key role in sustaining muscle health. Rather than concentrating protein at one meal-typically dinner-spreading protein evenly across all meals enhances the anabolic response. For example, consuming 25 grams-30 grams of protein at breakfast, lunch, and dinner may be more effective in promoting muscle protein synthesis than a skewed intake pattern. Additionally, consuming a small dose of protein before sleep may support overnight muscle maintenance, as nocturnal muscle catabolism can be particularly pronounced in aging individuals.

Beyond protein quantity and quality, other nutrients are increasingly recognized for their synergistic effects on muscle preservation. Vitamin D deficiency, common in older populations, is associated with muscle weakness and poor physical performance. Vitamin D plays a role in muscle function through its interaction with vitamin D receptors in muscle tissue. Supplementing vitamin D in deficient individuals has been shown to improve strength and reduce the risk of falls. These long-chain polyunsaturated fatty acids possess anti-inflammatory properties and may enhance the muscle's anabolic response to protein. Studies have demonstrated that supplementation with omega-3s can increase muscle mass and function in older adults, especially when combined with protein intake and exercise.

Another compound of growing interest is β-Hydroxy β-Methylbutyrate (HMB), a metabolite of leucine. HMB has been shown to reduce muscle protein breakdown and promote muscle preservation, particularly in individuals at risk of muscle wasting due to inactivity or illness. While not essential for all older adults, HMB supplementation may be useful in clinical settings or during periods of immobilization. Creatine monohydrate, widely known for its use in athletic performance, also shows promise in aging populations. Supplementation with creatine enhances phosphocreatine stores in muscle, improving energy availability for short bursts of movement. When combined with resistance training, creatine has been shown to increase lean muscle mass, improve strength, and support functional performance in older adults.

Hydration status is another often-overlooked factor. Dehydration can impair physical performance and muscle function, particularly in hot climates or during physical activity. Older adults have a diminished sense of thirst and are at greater risk of dehydration, which may exacerbate the effects of sarcopenia. Ensuring adequate fluid intake throughout the day is critical to maintaining muscle performance and overall health. Dietary interventions are most effective when combined with resistance training, which remains the gold standard for stimulating muscle growth and strength. However, even in the absence of regular exercise, optimized nutrition can slow the rate of muscle loss. For older adults with limited mobility or chronic conditions, nutritional strategies may serve as the first line of defense against functional decline.

Recent advances in precision nutrition and nutrigenomics hold promise for tailoring dietary interventions to individual needs. Genetic variations can influence how individuals respond to protein intake or metabolize specific nutrients. As our understanding of these interactions grows, it may become possible to design highly personalized nutrition plans that maximize muscle preservation throughout aging. Cultural and socioeconomic factors must also be considered when implementing dietary interventions. Food insecurity, lack of access to high-quality protein sources, and limited nutrition literacy may hinder the ability of some older adults to meet their nutritional needs. Public health strategies should aim to address

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these barriers by promoting nutrition education, supporting community meal programs, and ensuring that older populations have access to nutrient-dense foods.

## CONCLUSION

Sustaining strength and muscle function during aging is not only possible but increasingly achievable through targeted dietary interventions. By optimizing protein intake, leveraging anabolic nutrients, and considering the timing, quality, and context of meals, it is possible to mitigate the effects of sarcopenia and maintain independence well into old age. As research continues to evolve, nutrition will remain a cornerstone of healthy aging strategies-offering a proactive, accessible, and cost-effective means to preserve physical vitality across the lifespan.