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COMBINING PROTEIN INTAKE AND STRENGTH TRAINING TO COMBAT SARCOPENIA

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ABSTRACT

Sarcopenia, the progressive loss of skeletal muscle mass, strength and function associated with aging, represents a significant public health concern due to its association with increased frailty, falls, and loss of independence ***(Cruz Jentoft et al., 2019).*** *Current evidence demonstrates that a synergistic approach combining optimal protein intake with progressive resistance training (PRT) can effectively counteract muscle decline in older adults. Research indicates that older individuals require 1.2–1.6 g of protein per kg of body weight per day to overcome age related anabolic resistance and maximize muscle protein synthesis* ***(Deer et al., 2023).*** *Additionally, consuming high quality protein sources rich in leucine (≥2.5 g per meal) enhances muscle hypertrophy when paired with structured resistance exercise* ***(Church ward Venne et al., 2016).*** *Despite these benefits, challenges such as digestive limitations, kidney function concerns, and dietary adherence must be addressed. Future research should explore personalized protein recommendations and alternative anabolic strategies, such as βhydroxy βmethyl butyrate (HMB) supplementation, for older adults at risk of sarcopenia.*

KEYWORDS: *Sarcopenia, Protein Intake, Resistance Training, Muscle Protein Synthesis, Aging, Leucine, Weakness, Hypertrophy*

INTRODUCTION

Sarcopenia affects approximately 10–27% of adults over 60 years old, contributing to increased morbidity, disability, and mortality **(Cruz Jentoft et al., 2019).** The physiological mechanisms underlying sarcopenia include reduced muscle protein synthesis (MPS), increased protein breakdown and diminished anabolic responsiveness to dietary protein and exercise **(Morton et al., 2018).** This phenomenon, termed "anabolic resistance," necessitates higher protein intake and targeted resistance training to preserve muscle mass in aging populations **(Phillips et al., 2016).**

Protein provides essential amino acids, particularly leucine, which serves as a key regulator of MPS by activating the mTOR signalling pathway **(Bauer et al., 2013).** Concurrently, resistance exercise induces mechanical tension and muscle fiber recruitment, further stimulating muscle growth **(Peterson et al., 2010).** This paper reviews:

1. Protein requirements for older adults compared to younger individuals.
2. The synergistic effects of protein and resistance training in preventing sarcopenia.
3. Practical dietary and exercise recommendations for optimizing muscle health in aging. **Protein Needs for Aging Muscles**

Aging is associated with anabolic resistance, a blunted muscle protein synthetic response to protein ingestion **(Bauer et al., 2013).** While the Recommended Dietary Allowance (RDA) for protein is 0.8 g/kg/day for healthy adults, older individuals require 1.2–1.6 g/kg/day to maintain muscle mass **(Deer et al., 2023).** Research suggests that leucine, a branched chain amino acid, plays a critical role in stimulating MPS, with a threshold of ≥2.5 g per meal required to maximize anabolic signalling **(Church ward Venne et al., 2016).**

High quality protein sources such as whey, eggs, lean meats and dairy are particularly effective due to their rapid digestibility and high leucine content **(Pennings et al., 2011).** In contrast, plant based proteins (e.g., beans, lentils) may require larger portions or strategic combining to achieve comparable leucine levels **(Gorissen et al., 2018).** Older adults should aim for even protein distribution across meals (25–30 g per meal) rather than consuming most of their protein at dinner, as this approach better supports sustained MPS **(Mamerow et al., 2014).**

Strength Training for Sarcopenia Prevention

Progressive resistance training (PRT) is the most effective exercise modality for combating sarcopenia, with studies demonstrating 8–12% increases in muscle mass after 12 weeks of training **(Peterson et al., 2010).** The American College of Sports Medicine (ACSM) recommends that older adults engage in resistance training 2–3 times per week, using loads corresponding to 70–85% of their one repetition maximum (1RM) to optimize muscle hypertrophy **(American College of Sports Medicine, 2018).**

Key principles of effective PRT for older adults include

a) Progressive overload (gradually increasing weight or resistance).
b) Compound movements (e.g., squats, deadlifts, bench presses) that recruit multiple muscle groups.
c) Eccentric focused training, which may be particularly beneficial for aging muscle due to its high mechanical tension **(Roig et al., 2009).**

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Combined Benefits of Protein and Resistance Training

The combination of adequate protein intake and structured resistance exercise produces superior muscle adaptations compared to either intervention alone **(Morton et al., 2018).** Consuming 20–40 g of protein within 2 hours postexercise enhances muscle repair and growth by capitalizing on the heightened anabolic sensitivity following training **(Schoenfeld et al., 2018).**

Protein Timing and Composition

a) Whey protein is often preferred post workout due to its rapid absorption and high leucine content **(Pennings et al., 2011).**
b) Casein protein, with its slower digestion rate, may be beneficial before bedtime to support overnight MPS **(Res et al., 2012).**
c) Plant based athletes should consider soy or pea protein blends combined with leucine supplementation to optimize MPS **(Gorissen et al., 2018).**

Challenges and Considerations

Kidney Function Concerns

Despite common misconceptions, high protein intake does not impair kidney function in healthy older adults **(Devries et al., 2018).** However, individuals with preexisting chronic kidney disease (CKD) should consult a healthcare provider before increasing protein consumption **(Bauer et al., 2013).**

Digestive and Practical Barriers

a) Reduced appetite and early satiety in older adults may hinder adequate protein intake **(Volpi et al., 2013).**
b) Dental issues or difficulty chewing can limit meat consumption, making protein shakes or soft protein sources (e.g., Greek yogurt, eggs) useful alternatives **(Deer et al., 2023).**

CONCLUSION

Sarcopenia poses a significant threat to functional independence and quality of life in aging populations, but emerging evidence demonstrates that a combined approach of optimal protein intake and structured resistance training can effectively mitigate muscle loss. Research consistently supports protein intakes of 1.2–1.6 g/kg/day for older adults, with an emphasis on leucine-rich sources (≥2.5 g per meal) to overcome age-related anabolic resistance **(Bauer et al., 2013; Deer et al., 2023).** Concurrently, progressive resistance training (PRT) performed 2–3 times per week at moderate-to-high intensity stimulates muscle protein synthesis and hypertrophy, leading to measurable improvements in strength and physical function **(Peterson et al., 2010; Morton et al., 2018).** Practical strategies such as even protein distribution across meals (25–30 g per meal) and post-exercise protein supplementation (20–40 g) further enhance muscle adaptation **(Schoenfeld et al., 2018).** Despite these benefits, challenges including digestive limitations, kidney health misconceptions, and dietary adherence must be addressed through individualized nutrition and exercise planning. Future research should explore personalized protein recommendations, alternative anabolic supplements (e.g., HMB, creatine) and innovative training adaptations to optimize outcomes for older adults at risk of sarcopenia. By integrating these evidence-based strategies, healthcare professionals and older individuals can work together to preserve muscle mass, maintain mobility and promote long-term health.

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