

Increasing Protein Ingestion Minimally Increases Lean Mass and Muscle Strength in Subjects Enrolled in Resistance Exercise Training: A Systematic Review and Meta-Analysis

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Objectives: This systematic review, meta-analysis, and meta-regression aimed to determine if increasing daily protein ingestion contributes to gaining lean mass (LM), muscle strength, and physical/functional test performance in healthy persons.

Methods: The present review was registered on PROSPERO - CRD42020159001. A systematic search in Medline, Embase, CINAHL, and Web of Sciences databases was undertaken. Randomized controlled trials (RCT) including healthy and non-obese adult participants increasing daily protein intake were selected. Subgroup analysis, splitting the studies by participation in resistance exercise training (RE), age (< 65 or ≥ 65 y), and daily protein ingestion were also performed.

Results: 74 RCT fit our inclusion criteria. The age range of the participants was 19 to 85 y, and study protocols in the trials lasted from 6 to 108 wks (76% of the studies between 8 and 12 wks). In ~80% of the studies, baseline protein ingestion was at least 1.2 g of protein/kg/d. Increasing daily protein ingestion may lead to small gains in LM in subjects enrolled in RE (SMD [standardized mean difference] = 0.22, CI95% [95% confidence interval] 0.14:0.30, $P < 0.01$, 62 studies, moderate level of evidence). Also, ≥ 65 y subjects ingesting 1.2–1.59 g of protein/kg/d and younger subjects (< 65 y) increasing their ingestion to ≥ 1.6 g of protein/kg/d during RE showed a higher LM gain. Lower-body strength gain was slightly higher at ≥ 1.6 g of protein/kg/d during RE (SMD = 0.40, CI95% 0.09:0.35, $P < 0.01$, 19 studies, low level of evidence). Bench press strength was slightly increased by ingesting more protein in < 65 y subjects during RE (SMD = 0.18, CI95% 0.03:0.33, $P = 0.01$, 32 studies, low level of evidence). Effects on handgrip strength are unclear and only marginal for performance in physical function tests.

Conclusions: The number of studies increasing daily protein ingestion alone was too low ($n = 6$) to conduct a meta-analysis. The current evidence shows that increasing protein ingestion by consuming supplements or food, resulted in small additional gain in LM, and lower body muscle strength in healthy adults enrolled in RE. Effects on bench press strength and performance in physical function tests are minimal. The effect on handgrip strength was unclear.

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