

Protein dose requirements to maximize skeletal muscle protein synthesis after repeated bouts of resistance exercise in young trained women

Mallinson JE, Wardle SL, O'Leary TJ, et al.
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Background:

The optimal dosing of protein to maximize muscle protein synthesis (MPS) has been the subject of much debate and in men is proposed to lie between 20 - 40g. The majority of studies examining the effect of protein on MPS after exercise are primarily performed in men, and the optimal amount of protein needed by women to show such a response is not known.

Objective:

To quantify acute (4h and 8h) and prolonged (24h) effects of two bouts of resistance exercise, along with protein intake, in 24 resistance exercise (RE)-trained women, and the protein requirement to maximize MPS.

Methods:

Twenty-four healthy RE-trained women (26.6 ± 0.7 years) performed two bouts of whole-body RE (3×8 repetitions at 75% 1-repetition maximum for lat pull down, single-leg press on both legs and chest press) 4 hours apart, with post-exercise intake of 15g, 30g, or 60g whey protein (n=8/group). Saliva, venous blood, and a vastus lateralis muscle biopsy were taken at 0h, 4h, 8h, and 24h post-exercise. Plasma leucine and branched chain amino acids were quantified using gas chromatography mass spectrometry (GC-MS) after ingestion of D₂O.

Results:

Fifteen grams protein did not alter plasma leucine concentration or myofibrillar synthetic rate (MyoFSR). Thirty and sixty grams protein increased plasma leucine concentration above baseline ($105.5 \pm 5.3 \mu\text{M}$; $120.2 \pm 7.4 \mu\text{M}$, respectively) at 4h and 8h. Ingestion of 30g protein increased MyoFSR above baseline ($0.068 \pm 0.005\%/h$) from 0 to 4h ($p < 0.05$), 0 to 8h ($p < 0.001$), and 0 to 24h ($p < 0.01$). Ingestion of 60g protein increased MyoFSR above baseline ($0.063 \pm 0.003\%/h$) from 0 to 4h ($p < 0.01$), 0 to 8h ($p < 0.01$), and 0 to 24h ($p < 0.01$).

Conclusions:

Post-exercise intake of 30g or 60g protein, but not 15g, acutely increased MyoFSR following two consecutive bouts of RE and extended the anabolic window over 24h. There was no difference between the 30g and 60g responses, suggesting that maximal increases in post-exercise MyoFSR was achieved with 30g protein in trained women performing whole-body resistance exercise.

Access the study here:

[Protein dose requirements to maximize MPS after repeated bouts of RE in young trained women -PubMed \(nih.gov\)](#)

