Higher Dietary Protein Intake Does Not Potentiate Training-induced Improvements in Lean Mass Gain or Muscle Strength in Healthy Middle-aged Adults

Isabel G. Martinez, M.S.[1], Joseph W. Beals, M.S (Ph.D)[2], Sarah K. Skinner, M.S.[1], Amadeo F. Salvador, M.S.[1], Susannah S. Scaroni[2], Naiman A. Khan, M.S (Ph.D)[1,2], Nicholas A. Burd, M.S (Ph.D)[1,2*]

[1]Department of Kinesiology and Community Health, University of Illinois at Urbana - Champaign, Urbana, IL, USA

[2]Division of Nutritional Sciences, University of Illinois at Urbana - Champaign, Urbana, IL, USA

* Corresponding author: Nicholas A. Burd, E-mail: naburd@illinois.edu

Abstract

Introduction: Exercise training with higher dietary protein intake is proposed to offset age-related muscle mass and strength loss. Therefore, we examined the effect of manipulating dietary protein density with resistance training on muscle performance adaptations in untrained adults.

Methods: 22 healthy middle-aged adults (age: 51 ± 2 y, BMI: 27.4 ± 0.6 kg/m^2) were randomized to consume protein at the Recommended Dietary Allowance (RDA; 0.8 – 1.0 g/kg/day) or twice the RDA (2×RDA; 1.6 – 1.8 g/kg/day) throughout a supervised 10-week progressive resistance training program. Participants consumed calorically-matched post-workout meal (214 Calories (KCAL) and a pre-sleep protein beverage (124 KCAL). Body composition was assessed by dual-energy x-ray absorptiometry (DXA) and performance was evaluated using one-repetition maximum (1RM) testing and a dynamometer for isometric and isokinetic contractions (MVC) pre- and post-intervention.

Results: Protein intake was higher in the 2×RDA group (1.79 ± 0.10 g/kg/day vs 1.17 ± 0.04 g/kg/day, $P < 0.001$). Whole body lean mass remained similar over time ($P = 0.16$) in both groups (4 ± 1% vs 1 ± 2%; $P = 0.22$). There were similar improvements over time ($P < 0.0001$) in both groups in 1RM for all upper and lower body exercises and knee strength dynamometry measures except for bicep curl (25 ± 4% vs 45 ± 7%, $P < 0.05$).

Conclusions: Training-induced gains in lean mass and muscle performance are not potentiated when consuming protein in far excess of the protein RDA in middle-aged adults. Thus, consuming protein slightly above the RDA is adequate to support training-induced muscle adaptations.

Keywords: Protein, Resistance training, Muscle, Performance, Aging