

ORIGINAL RESEARCH COMMUNICATION

Resistance training and dietary protein: effects on glucose tolerance and contents of skeletal muscle insulin signaling proteins in older persons^{1, 2, 3}

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Background: Resistance training (RT) and dietary protein independently influence indexes of whole-body glucose control, though their synergistic effects have not yet been documented.

Objective: This study assessed the influence of dietary protein intake on RT-induced changes in systemic glucose tolerance and the contents of skeletal muscle insulin signaling proteins in healthy older persons.

Design: Thirty-six older men and women (age: 61 ± 1 y) performed RT (3 times/wk for 12 wk) and consumed either 0.9 g protein · kg⁻¹ · d⁻¹ [lower-protein (LP) group; ≈112% of the Recommended Dietary Allowance (RDA)] or 1.2 g protein · kg⁻¹ · d⁻¹ [higher-protein (HP) group; ≈150% of the RDA]; the HP group consumed more total, egg, and dairy proteins.

Results: After RT, body weight was unchanged; whole-body protein and water masses increased, and fat mass decreased with no significantly different responses observed between the LP and HP groups. The RT-induced improvement in oral glucose tolerance (decreased area under the curve, AUC) was not significantly different between the groups (LP: -28%; HP: -25%). The insulin (-21%) and C-peptide (-14%) AUCs decreased in the LP group but did not change significantly in the HP group. Skeletal muscle insulin receptor, insulin receptor substrate-1, and Akt contents were unchanged, and the amount of atypical protein kinase C ζ/λ (aPKC ζ/λ), a protein involved with insulin signaling, increased 56% with RT, independent of protein intake.

Conclusion: These results support the hypothesis that older persons who consume adequate or moderately high amounts of dietary protein can use RT to improve body composition, oral glucose tolerance, and skeletal muscle aPKC ζ/λ content without a change in body weight.

Key Words: Protein • diet • resistance training • skeletal muscle insulin signaling • elderly • glucose tolerance

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