Dietary omega-3 fatty acid supplementation increases the rate of muscle protein synthesis in older adults: a randomized controlled trial.

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BACKGROUND: Loss of muscle mass with aging is a major public health concern. Omega-3 (n-3) fatty acids stimulate protein anabolism in animals and might therefore be useful for the treatment of sarcopenia. However, the effect of omega-3 fatty acids on human protein metabolism is unknown.

OBJECTIVE: The objective of this study was to evaluate the effect of omega-3 fatty acid supplementation on the rate of muscle protein synthesis in older adults.

DESIGN: Sixteen healthy, older adults were randomly assigned to receive either omega-3 fatty acids or corn oil for 8 wk. The rate of muscle protein synthesis and the phosphorylation of key elements of the anabolic signaling pathway were evaluated before and after supplementation during basal, postabsorptive conditions and during a hyperaminoacidemic-hyperinsulinemic clamp.

RESULTS: Corn oil supplementation had no effect on the muscle protein synthesis rate and the extent of anabolic signaling element phosphorylation in muscle. Omega-3 fatty acid supplementation had no effect on the basal rate of muscle protein synthesis (mean ± SEM: 0.051 ± 0.005%/h compared with 0.053 ± 0.008%/h before and after supplementation, respectively; P = 0.80) but augmented the hyperaminoacidemia-hyperinsulinemia-induced increase in the rate of muscle protein synthesis (from 0.009 ± 0.005%/h above basal values to 0.031 ± 0.003%/h above basal values; P < 0.01), which was accompanied by greater increases in muscle mTOR(Ser2448) (P = 0.08) and p70s6k(Thr389) (P < 0.01) phosphorylation.

CONCLUSION: Omega-3 fatty acids stimulate muscle protein synthesis in older adults and may be useful for the prevention and treatment of sarcopenia. This trial was registered at clinicaltrials.gov as NCT00794079.

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