Effects of Salmon Ingestion on Post-Exercise Muscle Protein Synthesis: Exploration of Whole Protein Foods Versus Isolated Nutrients

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Objectives: Healthy eating patterns consist of eating whole foods as opposed to single nutrients. The maintenance of skeletal muscle mass is of particular interest to overall health. As such, there is a need to underpin the role of eating nutrients within their natural whole-food matrix versus isolated nutrients on the regulation of postprandial muscle protein synthesis rates. This study assessed the effects of eating salmon, a potential food within a healthy Mediterranean style eating pattern, on the stimulation of post-exercise muscle protein synthesis rates versus eating these same nutrients in isolation in healthy young adults.

Methods: In a crossover design, 10 recreationally active adults (24 ± 4 y; 5 M, 5 F) performed an acute bout of resistance exercise followed by the ingestion of salmon (SAL) (20.5 g protein and 7.5 g fat) or its matched constituents in the form of crystalline amino acids and fish oil (ISO). Blood and muscle biopsies were collected at rest and after exercise at 2 and 5 h during primed continuous infusions of L-[*ring*-$^{2}H_5$]phenylalanine for the measurement of myofibrillar protein synthesis and plasma amino acid profiles. Data were analyzed by using a 2-factor (time × condition) repeated-measures ANOVA with Tukey's post hoc test.

Results: Plasma essential amino acid concentrations increased to a similar extent in both SAL and ISO during the postprandial period ($P > 0.05$). Likewise, postprandial plasma leucine concentrations did not differ between nutrient condition ($P > 0.05$). The post-exercise myofibrillar protein synthetic responses were similarly stimulated in both nutrition conditions early (0–2 h; 0.079 ± 0.039%/h (SAL) compared to 0.071 ± 0.078%/h (ISO); $P = 0.64$) and returned to baseline later (2–5 h; 0.046 ± 0.020%/h (SAL) compared to 0.038 ± 0.025%/h (ISO); $P = 0.90$). Similarly, there were no differences in the stimulation of myofibrillar protein synthesis rates between SAL and ISO during the entire 0–5 h recovery period (0.058 ± 0.024%/h compared to 0.045 ± 0.027%/h, respectively; $P = 0.66$).

Conclusions: We show that the ingestion of salmon or its isolated nutrients increases plasma amino acid concentrations and enhances the stimulation of post-exercise muscle protein synthesis rates with no differences in the temporal or cumulative responses in healthy young adults.

Funding Sources: USDA National Institute of Food and Agriculture Hatch project.