

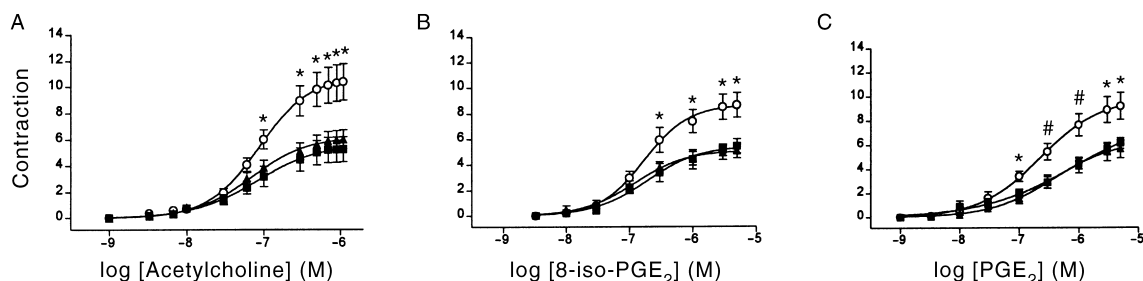
Dietary fish oil supplementation increases the *in vitro* contractility of rat ileum

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Supplementation with n-3 polyunsaturated fatty acid (PUFA) has been reported to promote gastrointestinal tract health by modifying anti-inflammatory mechanisms (1). However, n-3 PUFAs may also influence the contractility properties of smooth muscle via direct and/or indirect mechanisms. This was investigated in the present study using isolated ileal and colon tissue from rats fed different fat supplemented diets. Rats nine weeks of age were fed synthetic diets *ad libitum* for four weeks consisting of 17% Sunola (80% oleic acid) (Control, n = 5), 7% Sunola/10% animal fat (SF, n = 8), and 7% Sunola/10% fish oil (FO, n = 7). For the colon, there were no significant differences in the sensitivity (EC₅₀) or maximal contraction between the three dietary groups induced by acetylcholine or 8-iso-PGE₂. However, for the ileum, the FO group demonstrated significantly higher maximal contraction induced by acetylcholine and 8-iso-PGE₂ (11.0 ± 1.6 and 8.9 ± 0.9 V/g tissue calculated as the mean ± SEM from n = 5-8 rats) compared to SF group (6.3 ± 0.7 and 5.0 ± 0.6 V/g) and Control group (5.7 ± 0.9 and 5.4 ± 0.5 V/g) (P < 0.05) respectively. The FO group also had significantly higher maximal contraction induced by PGE₂ and PGF_{2α} (9.9 ± 1.2 and 8.9 ± 0.7 V/g) compared to SF group (6.2 ± 0.8 and 5.8 ± 0.6 V/g) (P < 0.05) respectively. In contrast to tissue specific changes in contractility, the FO diet resulted in similar compositional fatty acid profiles in both ileum and colon tissues. Compared to Control group, the total phospholipid fraction of ileum and colon tissue of FO group had significantly increased levels of n-3 PUFAs (α-linolenic acid, docosahexaenoic acid and eicosapentaenoic acid) with a concomitant decrease in oleic and linoleic acid, while SF group had increased saturated fats myristic, palmitic and stearic acids with concomitant decrease in oleic and linoleic acids (P < 0.05).



Effect of representative intestinal modulators (A) acetylcholine (B) 8-iso-PGE₂ and (C) PGE₂ on the contraction of isolated rat ileum plotted as mean ± SEM generated from pooled data expressed as volts per g of tissue (V/g) for (μ) FO group, (v) SF group and (σ) Control group. Significant differences for individual concentrations is indicated by *, P < 0.05 for FO versus Control and SF in (A) and (B) and *, P < 0.05 for FO versus SF and #, P < 0.05 for FO versus SF and Control in (C).

These results suggest that dietary fish oil enrichment may influence gut contractility, particularly the small intestine. However, the biochemical basis as well as the physiological relevance of the effect at the whole animal level needs to be further investigated.

1. Belluzzi A, Boschi S, Brignola C, Munarini A, Cariani G, Miglio F. Am J Clin Nutr 2000; 71: 339S-342S.