**Fish oil, but not flaxseed oil, decreases inflammation and prevents pressure overload-induced cardiac dysfunction.**

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AIMS: Clinical studies suggest that intake of omega-3 polyunsaturated fatty acids (omega-3 PUFA) may lower the incidence of heart failure. Dietary supplementation with omega-3 PUFA exerts metabolic and anti-inflammatory effects that could prevent left ventricle (LV) pathology; however, it is unclear whether these effects occur at clinically relevant doses and whether there are differences between omega-3 PUFA from fish [eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)] and vegetable sources [alpha-linolenic acid (ALA)]. METHODS AND RESULTS: We assessed the development of LV remodelling and pathology in rats subjected to aortic banding treated with omega-3 PUFA over a dose range that spanned the intake of humans taking omega-3 PUFA supplements. Rats were fed a standard food or diets supplemented with EPA+DHA or ALA at 0.7, 2.3, or 7% of energy intake. Without supplementation, aortic banding increased LV mass and end-systolic and -diastolic volumes. ALA supplementation had little effect on LV remodelling and dysfunction. In contrast, EPA+DHA dose-dependently increased EPA and DHA, decreased arachidonic acid in cardiac membrane phospholipids, and prevented the increase in LV end-diastolic and -systolic volumes. EPA+DHA resulted in a dose-dependent increase in the anti-inflammatory adipokine adiponectin, and there was a strong correlation between the prevention of LV chamber enlargement and plasma levels of adiponectin ($r = -0.78$). Supplementation with EPA+DHA had anti-aggregatory and anti-inflammatory effects as evidenced by decreases in urinary thromboxane B(2) and serum tumour necrosis factor-alpha. CONCLUSION: Dietary supplementation with omega-3 PUFA derived from fish, but not from vegetable sources, increased plasma adiponectin, suppressed inflammation, and prevented cardiac remodelling and dysfunction under pressure overload conditions.