

Omega-3 polyunsaturated fatty acids decrease spontaneous beating rate in the rat isolated atria

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Omega-3 polyunsaturated fatty acids (PUFA) from fish oil are incorporated into myocardial membranes and prevent arrhythmias in animal models. In man, reduced risk of sudden cardiac death has also been demonstrated with fish oil consumption. The mechanisms of antiarrhythmic action are not known, however altered cellular calcium handling may be a contributing factor [1]. Excess sympathetic activity is arrhythmogenic. The objective of this study was to examine the effects of dietary fish oil on heart rate responses to sympathetic activation and Ca^{++} . Male Wistar rats were fed a diet high in either saturated fat (SF) or omega-3 rich fish oil (FO) for 3-6 weeks. Rats were sacrificed under anaesthesia (Nembutal 60mg/kg), hearts were removed and right atria isolated and suspended in Krebs-Henseleit solution (5%CO₂ in O₂) at 38°C. Spontaneous beat rate was significantly lower in the FO group (203±10 bpm, mean±SEM) compared to the SF group (245±12 bpm, P< 0.01). Maximum beat rate response to phenylephrine (FO 388±20, SF 479±12) or Ca⁺⁺ (FO 248±15, SF 290±23) was significantly lower in FO atria, however maximum beat rate response to isoprenaline was not significantly different (FO 427±22, SF 447±16). These findings suggest that fish oil alters the response of atria to excessive activation of α -adrenoceptors, which may be indicative of reduced responsiveness to pathophysiological conditions including ischaemia, reperfusion and heart failure where overstimulation of α -receptors can trigger cardiac arrhythmias through Ca^{++} overload. The response to β -adrenoceptor activation is maintained and the reserve heart rate capacity is increased due to the lower resting intrinsic beat rate seen in FO atria.

- (1) 1. McLennan, P.L., Omega-3 polyunsaturated fatty acid prevention of cardiac arrhythmia and sudden death: cellular or circulating? *Current Topics in Nutraceutical Research*, 2004. 2(2): p. 101-111.