High saturated fat diet does not affect gut contractility in the rat

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Background - High dietary levels of saturated fat has been shown to have adverse effects on the contractility of cardiac and vascular smooth muscles in normal or hypertensive animal models. In contrast, we have recently shown that dietary long chain (LC) n-3 polyunsaturated fatty acids (PUFA) may have beneficial effects on gut smooth muscle contractility (1,2) in rats. However, the effect of a relatively high saturated fat diet on gut contractility has yet to be determined in animal models of health and disease.

Objective - To determine the effect of high saturated fat diet on contractility of rat isolated gut tissue in the normotensive (WKY) and hypertensive (SHR) models.

Design - Twelve week old WKY or SHR male rats were fed the following diets for 12 weeks: high saturated fat (30%) low carbohydrate (46%); high carbohydrate (73%) low fat 3%; or 10% fat 66% carbohydrate (Control). Contractility of isolated ileal and colonic tissue was determined in an organ bath system in response to muscarinic and eicosanoid agonists.

Outcomes - There was no significant dietary effects on the sensitivity or maximal contractility due to muscarinic or eicosanoid agonist induced contraction in the ileum or colon of SHR or WKY rats. However, there was a significant depression in contractility in the ileum of the SHR in response to prostanoid (PGE_2 or PGF_{2alpha}) stimulation.

Conclusions - In contrast to LC n-3 PUFA in fish oil (1,2), the saturated fat level in the diet did not affect the contractility parameters of gut smooth muscle. However, there appeared to be a defect in prostanoid receptor mediated signalling and contractility in the ileum of the SHR independent of the dietary effects.

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2. Patten GS, Abeywardena MY, McMurchie EJ, Jahangiri A. Dietary fish oil increases acetylcholine- and eicosanoid-induced contractility of isolated rat ileum. J Nutr 2002; 132: 2506-2513.