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Dietary fish oil and polyphenolics effects on caecal parameters including gene expression

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Background – Although the cardiovascular health benefits of dietary polyphenoilcs and longchain n-3 polyunsaturated fatty acids (LCn-3PUFA) in fish oil (FO) have been known for sometime, a paucity of data exists on their potential effects on the gastrointestinal tract. Most of the absorption of LCn-3PUFA occurs in the small intestine, whereas bulk of polyphenolics escape absorption in the upper gut and reach the large intestine, where they can act as potent modulators of microbial fermentation, and may influence both local and systemic health. Certain polyphenolics have been found to adversely affect caecal parameters such as digesta weight (bulk effect), hydration, pH, and short-chain fatty acid (SCFA) production. Recent evidence also implies that FO influences gut health (including smooth muscle contractility), and may protect against certain bowel disease conditions.
Objective – To investigate the effect of long-term intake of red wine polyphenolic compounds (RWPC; Provinol™) and FO on indices of bowel health, including expression of selected genes in colonic mucosal cells.
Design – Three groups of WKY rats were fed standard laboratory diet (5% w/w fat), low in LCn-3PUFA, further supplemented (5% w/w) with either lard or Hi-DHA fish oil. The control group and the rats fed the FO diet received water, whilst the third group fed the control diet received RWPC in drinking water (40 mg/kg/bodyweight). After 20 weeks of treatment, measures of caecal digesta and faecal weights were taken. Quantitative real-time PCR was employed to examine mRNA expression in colonic mucosal cells from a panel of selected genes.
Outcomes – Compared to the control, neither FO nor RWPC influenced any of the caecal parameters - digesta content, moisture, tissue mass and pH. The FO-fed group showed increased acetic, butyric and total SCFA concentrations ($P<0.05$ vs control) and changes in the expression of several key genes involved in apoptosis and nuclear signalling. RWPC up-regulated several candidate genes for antioxidant and gut mucosal function.
Conclusions – Long-term dietary intake of RWPC has no detrimental effect on caecal fermentation. The changes in SCFA following FO are consistent with the recently reported benefits of LCn-3PUFA in gut health.

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The effects of dark grape juice consumption on markers of oxidative status, and lipid profiles

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Background – Oxidative stress is an imbalance between free radicals and antioxidants. Free radicals can cause damage, which can lead to diseases. Endogenous antioxidants neutralise free radicals, however, rises in free radical production or intake can lead to oxidative stress and damage. Dietary antioxidants increase the total antioxidant status (TAS) of the body. Red wine has been found to protect against oxidative stress, but is high in alcohol. Dark grape juice (DGJ) is the non-alcoholic equivalent and may be more suitable for people of any age.
Objective – To determine if consumption of DGJ will improve antioxidant status, reduce oxidative stress and improve lipid profiles in healthy subjects.
Design – Twenty six subjects (17 M, 9 F: mean age 30.6 years: mean BMI 24.5) were recruited. Fasting blood samples were collected on day one, 14 and 28. Day one-14 was a baseline period. Day 15 to 28, subjects consumed DGJ (7 mL /kg /day). Diet and activity were recorded three days preceding blood collection.
Outcomes – There was no significant change in glutathione, malondialdehyde or TAS. HDL cholesterol significantly increased between one-14 days, but not between days 14-28. LDL cholesterol and triglycerides significantly increased between day 14 and 28. A trend of higher fat consumption/less exercise was seen between day 14 and 28, but was not significant.
Conclusion – With consumption of DGJ, no change in oxidative status was seen. This was unexpected due to the similar composition of DGJ to red wine. Triglycerides and LDL cholesterol may have increased as a result of lifestyle changes seen in subjects. Increased triglycerides may result from the high quantity of sugar in the DGJ.