New Zealand green lipped mussel (NZGLM) oil can reduce pro-inflammatory eicosanoids and cytokines and oxidation markers *in vivo*

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Arthritis is a chronic inflammatory disease, lacking an adequate therapeutic treatment with minimal side effects. Therapy has traditionally involved the use of non-steroidal anti-inflammatory drugs which are often accompanied by severe side effects. Clinical and animal studies have demonstrated oils rich in marine derived omega-3 polyunsaturated fatty acids (n-3 PUFA) can reduce the production of eicosanoids and cytokines associated with the inflammatory response and can reduce lipid peroxidation (1, 2). Past research has shown that the lipids of the NZGLM possess equal or greater anti-inflammatory activity than regular n-3 PUFA rich fish oils (3). The aim of this study was to compare the efficacy of the NZGLM oil in comparison with a regular fish oil rich in n-3 PUFA, in reducing markers of inflammation and cardiovascular disease risk factors. This was a double blind, randomised, parallel study, with a six week dietary intervention and a two week washout period following supplementation. Twenty eight healthy subjects were randomly assigned to consume either 2 mL/day of the NZGLM oil containing 241 mg n-3 PUFA or 2 mL/day of fish oil containing 181 mg n-3 PUFA. Subjects gave fasting blood samples at day 0, day 21, 42 and 56. Dietary restrictions were implemented to control the dietary intake of n-3 PUFA from other sources. Blood was analysed for neutrophil phospholipid fatty acids and serum levels of thromboxane B_2 (TXB_2). Stimulated monocyte production of prostaglandin E_2 (PGE_2), interleukin-1β (IL-1β) and tumor necrosis factor α (TNFα) were also measured. Lipid oxidation was assessed by measuring low density lipoprotein (LDL) concentration of cholesteryl esters and cholesteryl linoleate hydroperoxide (Ch18:2n-6-OOH). Plasma antioxidant status was assessed using the ferric reducing antioxidant power (FRAP) assay, tocopherol, retinol and carotenoids.

Following six weeks of supplementation, both groups showed a small, but significant increase in neutrophil phospholipid content of eicosapentaenoic acid and docosahexaenoic acid ($P < 0.05$), a significant reduction in serum TXB_2 and a significant reduction in endotoxin stimulated monocyte production of PGE_2 and IL-1β in subjects with high baseline levels ($P < 0.05$). There was an increase in plasma antioxidant status in both treatment groups ($P < 0.05$) and a trend to decrease LDL Ch18:2n-6-OOH and free cholesterol at day 42 compared with day 0 in both groups. These results are in agreement with past research (1–4), however the novel aspect of this study is that the dose of long chain n-3 PUFA was substantially lower than in many other studies. These data provide additional biochemical evidence that the NZGLM oil is anti-inflammatory *in vivo*, and could aid in reducing the symptoms associated with arthritis. It is possible that the marine oils reduced the level of these eicosanoids and cytokines by inducing a shift in cyclooxygenase and lipoxygenase substrate specificity, reducing eicosanoid and cytokine synthesis, inhibiting the expression of cell surface adhesion molecules and modulating gene transcription and peroxisome proliferator activated receptor activation.

References

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Key words: NZGLM, eicosanoid, anti-inflammatory