

## The effect of dietary fat type on lymphocyte proliferation and antibody production

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A wide range of immunological effects have been attributed to dietary fish oil and n-3 fatty acids. These include alteration to eicosanoid and cytokine production, changes to lymphocyte proliferation and cell mediated immunity and reduction in the severity of autoimmune disease. A decreased resistance to infection has been demonstrated in mice receiving a diet containing fish oil (1). The aim of this study was to investigate whether immunity to the influenza virus can be impaired by short term feeding with a fish oil diet.

One hundred SPF male Swiss mice received one of two diets, each providing 20% fat (w/w) as either a fish oil or beef tallow blend, for 33 days. On day 14, the mice were immunised orally with one of four doses of live influenza virus vaccine (A/Qld) or a placebo. On day 30, all mice were infected with live influenza virus by intranasal challenge. On day 33, the mice were killed and the spleens were removed from 50 mice (five mice were taken from each vaccine group and the placebo group). The spleens were pooled according to vaccine dose and dietary group for measurement of lymphocyte fatty acids and lymphocyte proliferation assay. Serum and lung homogenate were collected from all mice for antibody determination (by ELISA assay).

Non-specific proliferation was induced by adding the mitogen concanavalin A to lymphocytes in culture for 48 h. Antigen specific proliferation was induced by adding a range of dilutions of influenza virus to lymphocytes in culture for 72 h.

The lymphocyte membrane phospholipid fatty acid composition reflected the dietary intake with n-3 fatty acids representing  $19.5 \pm 1.5\%$  (mean  $\pm$  SEM) of total fatty acids in the fish oil group and only  $6.8 \pm 0.21\%$  of the beef tallow group.

The non-specific lymphocyte proliferation for the immunised fish oil fed mice (stimulation index  $13.2 \pm 0.92$ ) (mean  $\pm$  SEM) was significantly higher than the immunised beef tallow fed mice (stimulation index  $4.7 \pm 0.85$ ) ( $P < 0.05$ ). There was no significant difference in the antigen specific lymphocyte proliferation nor in the titers of influenza specific antibodies (serum IgG, lung IgG and lung IgA) between dietary groups.

These results suggest that a fish oil diet does not impair resistance to infection in mice after primary immunisation and challenge but is associated with increased non antigen specific lymphocyte proliferation. The proliferative response was lower after antigen specific stimulation than after non-specific stimulation for both diets and it is possible that this lower response was due to the use of primary immunisation only. Further studies are necessary to investigate the effect of diet on antigen specific stimulation after secondary immunisation.

1. Chang HR, Dulloo AG, Vladoianu IR, Piguët PF, Arsenijevic D, Girardier L, Pechère JC. Fish oil decreases natural resistance of mice to infection with *Salmonella typhimurium*. *Metabolism* 1992;41:1-2.