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The effects of increased oily fish intake during pregnancy on maternal immune cell subsets – results from the salmon in pregnancy study (SIPS)

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Fish provide not only long chain (LC) *n*-3 polyunsaturated fatty acids (PUFAs) (eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)) found in fish oils but also other nutrients. Studies show that LC PUFAs may affect immune responses and have anti-inflammatory effects⁽¹⁾. Also, fish oil supplementation during pregnancy alters maternal and offspring immunity in a way that would be consistent with lowered risk of atopy⁽²⁾. The present study is the first randomised controlled trial increasing intake of oily fish in pregnant women. The hypothesis examined here is that increased salmon consumption during pregnancy by women with high risk of having an atopic offspring will alter maternal blood immune cell subsets, which may potentially influence the immune system of the foetus.

Pregnant women (*n* = 123) with high risk of having atopic offspring and with low habitual intake of oily fish (≤ 2 /month) were randomised at 20 weeks of pregnancy to either consuming two portions of farmed salmon a week or continuing their habitual diet until the end of their pregnancy. All women were asked to keep a record of their fish intake during the study. The women attended a clinic in the fasted state at weeks 20, 32–34 and 38 of pregnancy, at which blood samples were collected, and health and food frequency questionnaires were administered. Maternal whole blood was incubated with combinations of fluorochrome-labelled monoclonal antibodies in order to identify various immune cell subsets including helper T-lymphocytes, cytotoxic T-lymphocytes, regulatory T-lymphocytes, natural killer (NK) cells, B-lymphocytes and toll-like receptor (TLR)-2 bearing monocytes. Flow cytometry was used to identify the labelled cells.

All 123 women attended the 20 week appointment, and 111 and 91 women attended the 34 and 38 week appointments, respectively. There was a significant increase in the proportion of T-regulatory cells (% total lymphocytes) progressively from 20 to 38 weeks of pregnancy in both the control and salmon groups ($P = 0.005$, $P = 0.033$, respectively). There was also a significant increase in the proportion of helper T-cells (% total leucocytes) during the course of pregnancy in both groups ($P = 0.02$, $P < 0.001$, respectively). The proportion of TLR-2 bearing monocytes was significantly increased during pregnancy in the control group ($P = 0.001$), but the increase seen in the salmon group did not reach significance ($P = 0.058$). Helper T-cell, cytotoxic T-cell, NK cell and B-cell proportions (% total lymphocytes) were not altered during pregnancy in either group. There were no differences between groups in the proportion of any cell type investigated at any time point during pregnancy.

In conclusion, pregnancy affects the proportions of some, but not all, immune cell subsets in the bloodstream. Increased intake of salmon during pregnancy does not affect immune cell subset proportions or alter the changes in these associated with pregnancy.

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