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## Dietary supplementation with oily fish in pregnancy: effects on neonatal immune responses

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The development of childhood allergic disease is frequently preceded by immunologic differences that are most evident in the neonatal period<sup>(1)</sup>. Preliminary studies also suggest that maternal environmental exposures (such as diet) can modify neonatal T-cell function, although the mechanisms are not clear<sup>(2)</sup>. With rising allergic disease rates, there is a continuing urgency to identify the pathways involved and to explore the effects of early interventions that could favourably influence the functional development of T-cell responses and prevent allergic disease. Dietary *n*-3 PUFA, found in oily fish and in fish oils, may represent a mode of allergy prevention. Fish oil supplementation during pregnancy alters neonatal immunity in a way that would be consistent with lowered risk of atopy<sup>(3)</sup>. The aim of this study was to determine whether oily fish intervention in pregnancy modifies neonatal immune responses and early markers of atopy.

Pregnant women (*n* 123) with high risk of having atopic offspring and with low-habitual intake of oily fish ( $\leq 2$  portions/month) were recruited. They were randomised to either continue with their habitual diet low in oily fish or to consume two portions of farmed salmon per week from week 20 of pregnancy until the birth. The salmon provided 3.45 g EPA+DHA per week. Umbilical cord blood was collected at birth (*n* 101) and blood was collected from the infants at 6 months of age (*n* 86). Cord blood cell immunological responses (both innate and adaptive) to various stimuli were measured. Total IgE was measured at birth and 6 months of age.

Oily fish consumption during pregnancy was associated with significantly lower neonatal regulatory cytokine (IL-10) responses to both lipopolysaccharide ( $P < 0.05$ ) and a T-cell mitogen ( $P < 0.05$ ). Similar trends were also seen for TNF- $\alpha$  (pro-inflammatory) and interferon- $\gamma$  (Th1) responses, although these were not statistically significant. There were no significant differences between groups in total IgE concentration at birth or at 6 months of age.

Oily fish intervention in pregnancy modified the pattern and magnitude of neonatal immune responses; however, it did not affect IgE, an early marker of atopy. Further assessment of cellular immune function and clinical follow-up of these infants will determine if there are any effects of maternal oily fish intake on postnatal immune development and expression of allergic disease.

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1. Prescott S, Macaubas C, Smallacombe T *et al.* (1999) *353*, 196–200.
2. Willers S, Devereux G, Craig L *et al.* (2007) *Thorax* **62**, 773–779.
3. Dunstan JA, Mori TA, Barden A *et al.* (2003) *Clin Exp Allergy* **33**, 442–448.