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Incorporation of *n*–3 polyunsaturated fatty acids into human peripheral blood mononuclear cells according to intakes representing consumption of oily fish one, two or four times per week over 12 months

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There is evidence that the *n*–3 polyunsaturated fatty acids (PUFAs), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), found in seafood and in marine oils, influence immune cell function[(1)], and the mechanisms of action of these fatty acids are being increasingly understood[(1)]. The functional effects of these fatty acids appear to be closely linked with their appearance in cell membrane phospholipids[(1,2)]. Maximal incorporation of EPA and DHA into immune cell phospholipids occurs within a few weeks of beginning a regimen of increased consumption and occurs in a linear dose-response fashion[(2)]. However, studies performed to date investigating the incorporation of EPA and DHA into human immune cells have used marine oils consumed daily. Thus, although much is known about the effect of very frequent intake of EPA and DHA, this situation does not mimic what occurs with less frequent intake of these fatty acids such as when oily fish are consumed just a few times per week. Therefore, the current study set out to describe the effect of increased *n*–3 PUFA intake mimicking the consumption of one, two or four oily fish meals per week on the fatty acid composition of human peripheral blood mononuclear cells (PBMC).

Healthy male and female volunteers ($n = 204$) aged 20–80 years were recruited into a double blind, placebo controlled trial and were randomly assigned to one of five groups ($n = 40$–42/group) each comprising equal gender and age distributions. Subjects consumed 6×1 g capsules per day for 12 months; capsules contained either placebo oil (an oil mix replicating the fatty acid composition of the average UK adult diet) or fish oil. Subjects in the placebo group consumed six placebo capsules/d; subjects in the '1 portion of oily fish/week' group consumed six fish oil capsules (providing 2.8 g EPA + DHA) on one day of each week and six placebo capsules on the other 6 days of each week; subjects in the '2 portions of oily fish/week' group consumed six fish oil capsules on two days of each week (i.e. a total of 5.6 g EPA + DHA) and six placebo capsules on the other 5 days of each week; subjects in the '4 portions of oily fish/week' group consumed six fish oil capsules on 4 days of each week (i.e. a total of 11.2 g EPA + DHA) and six placebo capsules on the other 3 days of each week; the fifth group consumed two fish oil capsules (providing 0.8 g EPA + DHA) and four placebo capsules/d. Blood was collected in the fasting state on nine occasions (at 0, 1, 2 and 4 weeks and 2, 3, 6, 9 and 12 months) and PBMC prepared using standard techniques. PBMC fatty acid composition was determined by gas chromatography.

One hundred and sixty three subjects completed the study ($n = 30$–35 per group). Preliminary dose-response and time course data for the appearance of EPA and DHA in PBMC lipids over 3 months are reported here. Both EPA and DHA were significantly higher in PBMC in the '4 portions/week' group than in the control group at 2 and 4 weeks and at 2 and 3 months. PBMC arachidonic acid was lower in the '4 portions/week' group than in the control group at 2 weeks and at 2 months. There were few other differences in PBMC EPA, DHA and arachidonic acid among groups over this time period.

In conclusion, providing EPA + DHA at the level of 11.2 g/week spread over 4 days/week can affect PBMC fatty acid composition and may influence PBMC function.

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1. Yaqoob P & Calder PC (2007) *Br J Nutr* **98**, S41–S45.
2. Calder PC (2008) *Prostaglandins Leukot Essent Fatty Acids* **79**, 101–108.