Evaluation of fatty acid status in children of different nationalities

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The fatty acid status of an individual can be estimated from the fatty acid composition of cellular or plasma lipid fractions, reflecting both dietary intake and metabolic processes[1]. For example, the odd chain fatty acids 15:0 and 17:0 are not synthesised *de novo* in humans and reflect dairy intake[1]. The long chain n-3 polyunsaturated fatty acids (PUFA) 20:5n-3 and 22:6n-3 are either obtained through the diet or, to a substantially lesser extent, through synthesis from 18 carbon precursors. 20:5n-3 plus 22:6n-3 are associated with health benefits such that the proportion of these PUFA in cellular phospholipids (PLs) is considered to be important for neurological function[2]. Buccal cell PL fatty acid composition can be obtained through non-invasive sampling and can be useful for gaining insight into dietary intake and fatty acid status[3]. The present study aimed to assess the relative intake of dietary fatty acids in children from different countries, using buccal cell PL fatty acid composition.

Buccal cells were collected from children aged 11–12 years, participating in the finals of the Danone Nations Cup, held at the University of Surrey in 2013. The event is an annual international soccer tournament for school-aged children, involving teams from 32 different nations. We obtained samples from 99 children (all boys) from 10 countries during the tournament, using a rinse and spit technique[4] and analysed the PL fatty acid composition by GC-MS (Figs 1–3). Differences between countries were assessed using ANOVA (with Welch's test for non-parametric data).
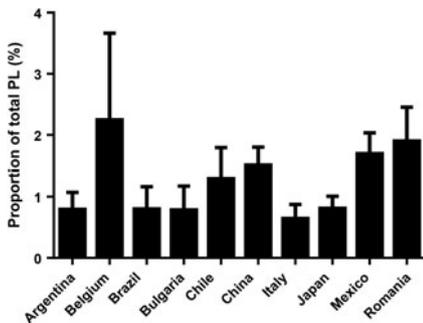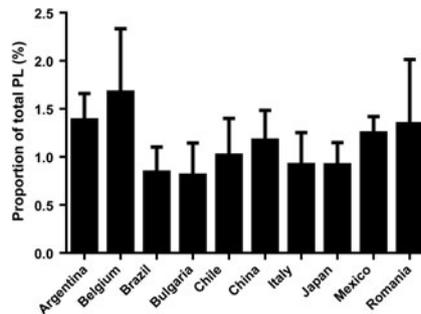

Fig. 1. Buccal cell PL 15:0
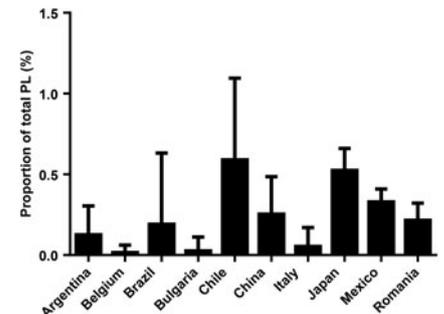

Fig. 2. Buccal cell PL 17:0

Fig. 3. Buccal cell PL 22:6n-3

Buccal cell PL 15:0 and 17:0, both markers of dairy intake, showed a significant positive correlation (r_s (Spearman's rho correlation coefficient) = 0·62, $P < 0·001$). Overall, we found significant differences between countries for 15:0, 17:0 and 22:6n-3 in buccal cell PLs ($P < 0·05$ for each fatty acid), reflecting differences in intake. The mean proportion of 22:6n-3 in buccal cell PL was less than 2% for all countries, comparable to values in infants[5]. Further analysis is underway, but the present results indicate that buccal cell sampling is an acceptable, non-invasive technique for measuring fatty acid status in children and could help inform nutritional advice.

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