Higher erythrocyte 22:6n-3 and 22:5n-6, and lower 22:5n-3 suggest higher Δ-4-desaturation capacity in women of childbearing age

Based on carefully executed labelling studies, Burdge & Wootton (2002) suggested that 28±4-year-old women possess a greater capacity for α-linolenic acid (18:3n-3) conversion to its long-chain polyunsaturated fatty acid analogues than 24–40-year-old men. Over 21 d, fractional excursions of labelled fatty acids in total plasma lipids of analogues than 24–40-year-old men. Over 21 d, fractional conversion to its long-chain polyunsaturated fatty acid n and 7·9 % for eicosapentaenoic acid (20:5n-3), 5·9 and 8·1 % for docosapentaenoic acid (22:5n-3), and 9·2 and 0 % for docosahexaenoic acid (22:6n-3), respectively (Burdge & Wootton, 2002; Burdge et al. 2002). To our knowledge this is the first report to observe gender differences in conversion efficiency of specific fatty acids. The only previously reported sex difference in fatty acid status in human subjects has been the higher average total unsaturation in males compared with females (Holman et al. 1979). Animal, mainly rat, studies observed differences in the relative activities of Δ-6-desaturase activity (Horrobin, 1981) and a greater requirement for essential fatty acids in males (Horrobin, 1995).

The suggested sex differences prompted us to reanalyse the erythrocyte (RBC) fatty acid compositions that were recently used for the assessment of biochemical essential fatty acid and n-3 deficiencies (Fokkema et al. 2002). Separate analyses were performed for babies, infants and adults, since Burdge & Wootton (2002) suggested that their observation could originate from the high 22:6n-3 demands of the fetus and neonate during pregnancy and lactation.

None of the RBC n-3 fatty acids showed sex differences in 2–46-d-old babies (n 59) and the 3-5-year-old infants (n 33). However, in sixty-one healthy omnivorous adults (twenty-eight men, 22–49 years; thirty-three women, 22–47 years) we found higher RBC 22:5n-3 in males, compared with females (P<0.0001, Student’s t test). In women, 22:6n-3 was higher but this did not reach statistical significance (P<0.075). This 22:6n-3 difference nevertheless became significant (P<0.029), when eight vegans (five men, 23–37 years; three women, 29–42 years) were included (Fig. 1). No such differences were observed in the n-6 series of RBC fatty acids, apart from higher RBC 22:5n-6 in women, compared with men (0·55 v. 0·47 mol %; P<0·0001, Student’s t test). In women, 22:6n-3 was higher but this did not reach statistical significance (P<0·075). This 22:6n-3 difference nevertheless became significant (P<0·029), when eight vegans (five men, 23–37 years; three women, 29–42 years) were included (Fig. 1).

Fig. 1. Relative amounts of erythrocyte n-3 fatty acids in thirty-three men (■) and thirty-six women (□). Mean values are shown, with standard deviations represented by vertical bars.

Abbreviation: RBC, erythrocyte.

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