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Craig S. Patch

University of Wollongong, cpatch@uow.edu.au

Karen J Murphy

University of Adelaide

Jackie Mansour

University of Western Australia

Linda C. Tapsell

University of Wollongong, ltapsell@uow.edu.au

Barbara J. Meyer

University of Wollongong, bmeyer@uow.edu.au

See next page for additional authors

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Authors

Craig S. Patch, Karen J Murphy, Jackie Mansour, Linda C. Tapsell, Barbara J. Meyer, Trevor A Mori, Manny Noakes, P Clifton, I Puddey, and P Howe

Erythrocyte biomarker-based validation of a diet history method used in a dietary intervention trial

¹C Patch, ²K Murphy, ³J Mansour, ¹L Tapsell, ¹B Meyer, ³T Mori, ⁴M Noakes, ⁴P Clifton, ³I Puddey, ²P Howe

¹Smart Foods Centre, University of Wollongong, NSW 2522

²Nutritional Physiology Research Group, Universities of Adelaide & South Australia, SA 5000

³School of Medicine and Pharmacology, University of Western Australia, WA 6000

⁴CSIRO Health Sciences & Nutrition, SA 5000

Background

Intervention trials provide the evidence for potential health benefits of dietary manipulations. The quality of the dietary data is critical for relating benefits to nutrient intakes. Although diet histories are often used to assess dietary intake in intervention trials, they have seldom been validated with objective measures.

Objective

To determine, in a dietary intervention trial, the validity of the diet history method using erythrocyte fatty acid composition as a gold standard indicator of fatty acid intakes.

Design

Overweight volunteers with mild cardiovascular risk factors and consuming less than one serve of fish per week were randomly assigned to either the intervention group (n=43) or the control group (n=48). Subjects were asked to choose at least eight serves per day from a selection of either omega-3 fatty acid enriched foods (~125 mg very long chain omega-3 (VLC n3) per serve) or matched control foods. Dietary intake was assessed using a diet history method and analysed using Foodworks (Australian Fatty Acids Rev 0.6 (Royal Melbourne Institute of Technology, 2002) with analytical data for the test foods added to the database. Erythrocyte fatty acid fractions were extracted from blood collected at baseline, three-months and six-months and was quantified by gas chromatography.

Outcomes

Dietary intakes of docosahexaenoic acid (22:6 n3), eicosapentaenoic acid (20:5 n3), VLC n3 and total n3 were related to levels of the same parameter seen in the erythrocyte membranes at three-months (Pearson's correlation; r=0.463, 0.418, 0.421, 0.341 respectively; P<0.001) and six-months (r=0.743, 0.663, 0.641, 0.515 respectively; P<0.05), but not at baseline.

Conclusions

The VLC n3 accumulated in erythrocytes after three-months of dietary supplementation reflect habitual dietary intakes assessed from diet histories. However, at customary lower rates of consumption (~200mg/day), they do not accurately reflect the n3 intakes of individuals.

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