

Summer Meeting, 15–18 July 2013, Nutrition and healthy ageing

Functional foods enriched with an omega-3 nanoemulsion – potential to improve the long-term health of vegetarians?

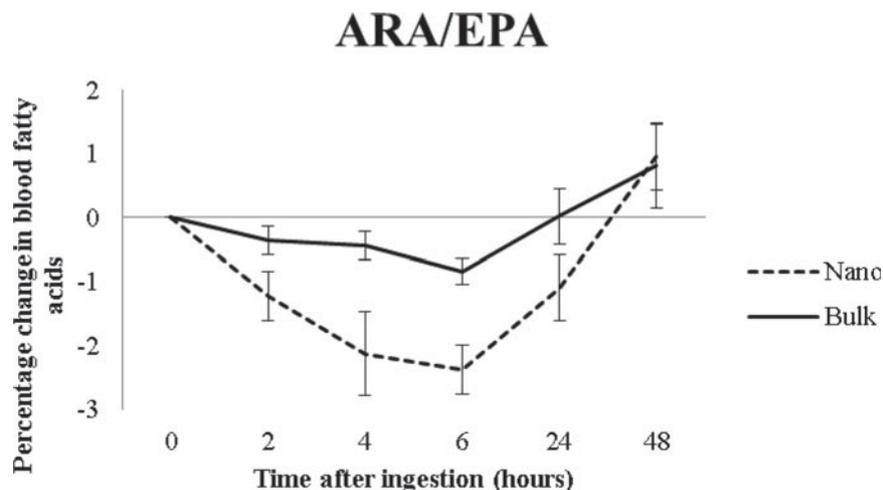
K. E. Lane and E. J. Derbyshire

Department of Food and Tourism Management, Manchester Metropolitan University (MMU), Hollings Campus, Old Hall Lane, Manchester, M14 6HR, UK

Long chain omega-3 (*n*-3) polyunsaturated fatty acids (LC3PUFA) have been linked to healthy ageing by exerting anti-inflammatory effects and improving markers of cardiovascular function⁽¹⁾ Research has shown that vegetarian diets are generally high in omega-6 (*n*-6) and provide only small amounts of LC3PUFA⁽²⁾. The ratio of *n*-6 to *n*-3 is important for long-term health and the arachidonic acid/eicosapentaenoic acid (ARA/EPA) ratio may be used as an indicator of fatty acid balance and long-term health⁽³⁾.

The aim of the present bioavailability study was to establish whether ingestion of a vegetarian nanoemulsion (versus a bulk oil control) led to improvements i.e. a reduction in the ARA/EPA ratio.

In a randomised crossover study nine volunteers (mean age 35.7 years SD 10.2; BMI 24 SD 2.2) were recruited and asked to ingest a: 1) Yogurt drink containing algae oil (1612 mg LC3PUFA) and water nanoemulsion, or 2) Formulated strawberry yogurt drink containing bulk algae oil providing the same amount of LC3PUFA (control). Blood fatty acid analysis was completed by fingertip blood sampling at 2, 4, 6, 24 and 48 hours using the validated 'The Omega Blood Count' test kit⁽⁴⁾. Percentage blood fatty acid changes were based on baseline adjusted values and the ARA/EPA ratio calculated using approaches by Bell *et al.*⁽⁵⁾.



Key: Mean baseline adjusted values. Error bars represent the standard error (SE). Data was analysed using paired *t*-test and ANOVA, repeated mixed measures for the crossover treatment. Time and treatment as fixed effects, subjects as random effects.

Using the paired *t*-test and mixed measures ANOVA statistical tests, there was a statistically significant decrease in ARA/EPA ratios for the nanoemulsion enriched yogurt drink ($P < 0.01$) compared with the vegetarian bulk oil control.

Larger and longer trials, specifically using vegetarian participants and additional markers of healthy ageing are now needed. However, findings from this preliminary trial indicate that ingestion of vegetarian LC3PUFA, when consumed as a nanoemulsion versus bulk oil, may help to improve the ratio of *n*-3: *n*-6, which in turn, has been associated with long-term health and well-being.

This research was conducted in adherence to the Helsinki Declaration. Thanks go to John Dobson at DSM UK for the donation of the 35 per cent DHA S algae oil. The authors would like to acknowledge the help of Dr W Li and Prof C Smith with the supervision of this project.

- Swanson D, Block R & Mousa SA (2012) Omega-3 Fatty Acids EPA and DHA: Health Benefits Throughout Life. *Adv Nutr.* 2012 January 1, **3**(1), 1–7.
- Sanders TA (2009) DHA status of vegetarians. *Prostaglandins Leukot Essent Fatty Acids* **81**(2), 137–41.
- Simopoulos A (2011) Evolutionary Aspects of Diet: The Omega-6/Omega-3 Ratio and the Brain. *Mol Neurobiol.* **44**(2), 203–15.
- Glasgow Health Solutions, McLellan R (2012) The Omega Blood Count. *Poulton Le Fylde.*
- Bell JG, Mackinlay EE, Dick JR *et al.* (2011) Using a fingertip whole blood sample for rapid fatty acid measurement: method validation and correlation with erythrocyte polar lipid compositions in UK subjects. *Br J Nutr.* **106**(09), 1408–15.