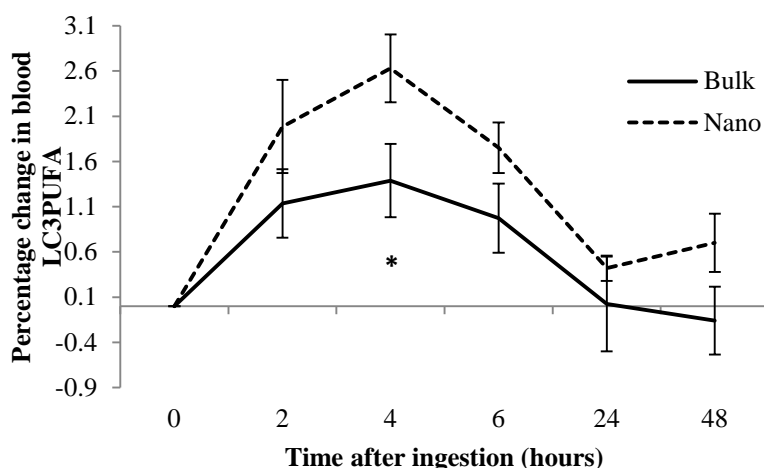


Nanoemulsion of vegetarian omega-3 fatty acids may enhance bioavailability – a preliminary trial. By K.E. Lane, W. Li, C. Smith and E.J. Derbyshire, *Department of Food and Tourism Management, Manchester Metropolitan University (MMU), Hollings Campus, Old Hall Lane, Manchester, M14 6HR*

Currently, Western diets are low in long chain omega-3 polyunsaturated fatty acids (LC3PUFA) which has been linked to a spectrum of health ramifications⁽¹⁾. Food-based oil in water nanoemulsion systems may offer a potential vehicle to improve LC3PUFA intakes when used to create enriched/functional food products especially for populations who do not consume fish or have restricted intakes i.e. during pregnancy. Nanoemulsions have been found to improve the bioavailability of certain lipophilic compounds such as curcumin and delta tocopherol^(2, 3) but its application to vegetarian sources of omega-3 fatty acids is understudied.

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 and water nanoemulsion, providing 1500mg docosahexaenoic acid (DHA), or 2) Formulated strawberry yogurt drink containing bulk algae oil providing the same amount of DHA (control). 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 increases were based on incremental area under the curve (iAUC) of baseline adjusted values.



	Mean incremental iAUC (percentage blood LC3PUFA)	
	Mean	SE
Bulk	29.93 ^a	10.22
Nano	46.21 ^b	8.25

Key: Analysed using paired t-test and ANOVA, repeated mixed measures for the crossover treatment. Time and treatment as fixed effects, subjects as random effects. Values with different subscripts are statistically significant ($P=0.045$).

Key: Mean baseline adjusted values. Error bars represent the standard error (SE). Asterisk denotes statistical significance (paired t-test $P=0.039$)

Results indicate that the absorption of LC3PUFA fatty acids peaked 4 hours after ingestion, for both treatments, with the baseline adjusted mean being statistically significantly higher for the nanoemulsion compared with the bulk oil ($P=0.039$). Furthermore, using iAUC data the overall absorption of the LC3PUFA nanoemulsion appeared to be statistically significantly higher when compared to the bulk oil ($P=0.045$). Larger and longer trials are now needed but this preliminary trial indicates that nanoemulsion of vegetarian LC3PUFA oils may help to improve omega-3 status.

This research was conducted in adherence to the Helsinki Declaration. Thanks go to John Dobson at DSM UK and Martek Biosciences Corporation, Columbia for the donation of the 35 per cent DHA S algae oil.

1. Simopoulos A. Evolutionary Aspects of Diet: The Omega-6/Omega-3 Ratio and the Brain. *Mol Neurobiol.* 2011;44(2):203-15.
2. Kotyla T, Kuo F, Moolchandani V, et al. Increased bioavailability of a transdermal application of a nano-sized emulsion preparation. *Int J Pharm.* 2008;347(1-2):5-.
3. Yu H, Huang Q. Improving the Oral Bioavailability of Curcumin Using Novel Organogel-Based Nanoemulsions. *J Agric Food Chem.* 2012 2012/05/30;60(21):5373-9.
4. Glasgow Health Solutions, McLellan R. The Omega Blood Count. Poulton Le Fylde. 2012.