

of the brachial artery using ultrasound technique. Resting arterial diameter (AD) was measured pre and post-treatment to ensure that measurements occurred in the same position. FMD, blood glucose, non-esterified fatty acids (NEFA) and triacylglycerol (TAG) were assessed at pre-treatment and after 6 weeks post-supplementation in fasting conditions. All measurements of the subjects were taken at the same time between 8:30 and 10:30 hours. Statistical analysis was carried out using pair *t*-test (Prism graph pad 4) on FMD and metabolic data. Ethical permission was obtained from University of Surrey Ethics Committee (EC/2006/108/SBMS).

Results: Mean %FMD increased by 44% from pre-treatment to week 6 but the increase was not statistically significant ($P < 0.25$) (Table 1). Resting AD measured pre and post-treatment was similar on both occasions (Table 1). No relationship between subject demographics and extent of %FMD improvements were found. No significant changes in plasma glucose, TAG or NEFA levels were observed over 6 weeks.

Table 1 Difference in arterial diameter (AD) and %FMD pre- and post-MVM supplementation (mean (SD))

Subjects	Gender	Pre-%FMD	Post-%FMD	Difference in AD (mm)
1	M	6.60	16.94	0.33
2	F	4.10	4.66	0.00
3	F	6.86	4.37	0.10
4	F	3.57	2.89	0.05
5	F	6.75	10.80	0.08
7	M	4.47	7.02	0.46
Mean		5.39(1.5)	7.78(5.27)	0.17(0.18)

Discussion: Oral antioxidant supplementation taken at night was found to slightly improve morning EF. Four subjects showed an improvement while two showed a reduction in %FMD. Antioxidant supplementation has been reported to improve endothelial function in hypertensive patients (Plantinga *et al.*, 2007). The small differences in AD between measurements showed the same area of artery was assessed indicating the study %FMD values are valid.

Conclusion: Six week supplementation at night with antioxidants tablets may increase %FMD, which is normally found to be attenuated in healthy adults during the morning. Further investigation is needed with a larger sample size and varying supplement doses to assess the possible future role of antioxidants in reducing early morning cardiovascular events. A sensitive measurement of subject antioxidant status may also be required to identify those that may benefit from antioxidant treatment.

References:

- Muller, J.E., Stone, P.H. & Turi, Z.G. (1985) Circadian variation in the frequency of onset of acute myocardial infarction. *N. Engl. J. Med.* 313, 1315–1322.
- Plantinga, Y., Ghiadoni, L., Magagna, A., Giannarelli, C., Franzoni, F., Taddei, S. & Salvetti, A. (2007) Supplementation with vitamins C and E improves arterial stiffness and endothelial function in essential hypertensive patients. *Am. J. Hypertens.* 20, 392–397.

Walters, J.F., Skene, D.J., Hampton, S.M. & Ferns, G.A.A. (2003) Biological rhythms, endothelial health and cardiovascular disease. *Med. Sci. Monit.* 1, 9–19.

Dietary antioxidant intake, wheeze and atopic status in 5-year-old children

S. Patel, C. Murray, G. Kerry, A. Woodcock and A. Custovic

North West Lung Centre, South Manchester University Hospital NHS Trust, Manchester, UK

e-mail: sumaiya.patel@postgrad.manchester.ac.uk

Background: The prevalence of asthma and wheeze has risen over the last few decades, with one in seven children in the UK now suffering from wheeze (Cookson, 2002). The cause of this remains unexplained but is likely to be due to changes in lifestyle and/or the environment, including nutrition. In particular a reduction in antioxidant intake consequent to a reduction in intake of fresh fruit and vegetables has been posed as a possible cause (Seaton *et al.*, 1994). This study aims to assess if frequency of dietary antioxidant intake is related to wheeze outcomes and atopic status in 5-year-old children.

Methods: A semi-quantitative food frequency questionnaire (FFQ) (Tinuviel Software, Anglesey, UK) was sent to parents of children prior to attending the 5-year follow up visits in a large prospective birth cohort ($n = 996$). An interviewer administered respiratory questionnaire was completed by parents. Children ($n = 696$) were skin-prick tested (*Dermaphagoides pteronyssinus*, cat, dog, grasses, moulds, milk and egg; Bayer Corporation, Elkhart, IN, USA) and classed as atopic if the wheal diameter to any allergen was 3 mm or greater than the negative control. Frequency of foods high in the antioxidant vitamins A, C and E were assessed from the FFQ. Logistic regression analysis was used to measure the association between frequencies of these vitamins with wheeze outcomes and atopic status. The study was approved by the local research ethics committee and informed consent was obtained from all parents.

Results: Of 794 completed questionnaires (80%), 157(19.8%) children had wheezed in the previous 12 months (current wheeze) and 152(19.1%) children had a doctor diagnosis of asthma by age 5 years. Frequency of vitamin A, C and E consumption was not associated with current wheeze or asthma. However, amongst atopic children (189/696, 27.2%) a lower frequency of vitamin C consumption was associated with current wheeze [odds ratio (95% confidence interval): 0.95 (0.90–1.00), $P = 0.05$] but not doctor diagnosed asthma [0.97 (0.92–1.01), $P = 0.16$]. No significant association was seen between intakes of vitamin A or E and current wheeze or doctor diagnosed asthma in either non-atopic or atopic children. Frequency of vitamin A, C or E consumption was not associated with atopic status at age 5 years.

Discussion: The weak association between frequency of vitamin C intake in atopic children agrees with previous

published work which has found that higher intakes of foods high in vitamin C are a protective factor for wheeze in children (Cook *et al.*, 1997).

Conclusion: These findings suggest a role for vitamin C in the development of current wheeze in 5-year-old atopic children. Future studies are required to determine whether increasing dietary vitamin C in atopic children with wheeze will have therapeutic effect.

References:

- Cook, D., Carey, I., Whincup, P., Papacosta, O., Chirico, S., Bruckdorfer, K.R. & Walker, M. (1997) Effect of fresh fruit consumption on lung function and wheeze in children. *Thorax* 52, 628–633.
- Cookson, W.O.C. (2002) Asthma genetics. *Chest* 121, 7S–13S.
- Seaton, A., Godden, D.J. & Brown, K. (1994) Increase in asthma: a more toxic environment or a more susceptible population? *Thorax* 49, 171–174.

Plasma long-chain n-3 polyunsaturated fatty acid status in patients receiving home parenteral nutrition

S. Paynton¹, D. Lloyd², B. Griffin¹ and J. Lovegrove³

¹School of Biomedical and Molecular Sciences, University of Surrey, Surrey, UK; ²St Marks Hospital, Harrow, UK and ³School of Food Biosciences, University of Reading, Reading, UK

e-mail: sarah.paynton@suht.swest.nhs.uk

Background: Parenteral feeds may contain lipids but most do not contain the essential metabolites eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). It has been shown previously that patients on long term parenteral nutrition (PN) have abnormal plasma fatty acid profiles (Jeppesen *et al.*, 1998). In view of the wealth of evidence for the health benefits of dietary EPA and DHA, it was hypothesized that low levels of these fatty acids may contribute to morbidity in these patients. The aim of this study was to assess the plasma EPA and DHA status of patients on long term PN, and to determine whether fatty acid status was influenced by clinical condition.

Methods: In a cross-sectional study, the plasma fatty acid profile of 44 patients with intestinal failure who had been on PN for more than 3 months, were compared to age, sex and BMI matched healthy controls. Case notes and parenteral prescription of all patients were reviewed. Parenteral feeds contained no EPA or DHA. Dietary intake of lipid was not analysed. Fasting plasma samples were obtained, plasma phospholipids were isolated by solid phase extraction and fatty acids quantified by gas chromatography. Logistic regression analysis was used to identify factors associated with fatty acid levels. Ethical approval was obtained from Harrow Local Research Ethics Committee.

Results: On average, PN provided 71% of estimated energy requirements. Levels of EPA and DHA plasma phospholipid were 50.2% ($P < 0.001$) and 46.1% ($P < 0.001$) lower than controls respectively, and were unaffected by the adminis-

tration of lipid infusion. Figure 1 shows the distribution of frequency of patient and control DHA status. Plasma DHA was inversely related to the duration of HPN ($r = -0.389$, $P = 0.009$) and showed a trend towards positive association with the length of small bowel remaining ($P = 0.064$, tested by ANOVA). There were no significant differences in arachidonic acid plasma phospholipid between patients and controls.

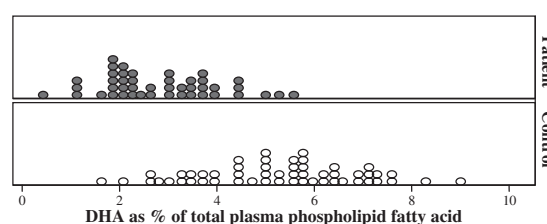


Fig. 1. Frequency of distribution of patient and control DHA status.

Discussion: The relative deficiency of EPA and DHA in these patients could reflect the combination of an absence of parenteral provision and poor or negligible oral intake with uncertain absorptive capacity. The accelerated consumption of fatty acids due to catabolic disease processes must also be considered. The impaired metabolic conversion of the shorter chain α -linolenic acid to EPA and DHA acid may also play a part. The abnormalities appear to be influenced by remaining small bowel length and duration of PN, which is indicative of patients with more severe pathology.

Conclusion: Patients on long-term parenteral nutrition have a relative deficiency of plasma DHA and EPA, which is affected by clinical condition.

References:

- Jeppesen, P.B., Hoy, C.E. & Mortensen, P.B. (1998) Essential fatty acid deficiency in patients receiving home parenteral nutrition. *Am. J. Clin. Nutr.* 68, 126–133.

During pregnancy food frequency questionnaires and 24 h recalls accurately reflects serum levels of folate, but not vitamin B₁₂

J.A. Thompson¹, J.K. Cruikshank², A. Khan², S. McElhone¹ and A. Vyas²

¹Department of Nutrition & Dietetics, Leeds Metropolitan University, Civic Quarter, Leeds, UK and ²Cardiovascular Research Group, School of Clinical & Laboratory Sciences, Core Technology Facility, University of Manchester, Manchester, UK

e-mail: julie.thompson@pat.nhs.uk

Background: Adequate folate and vitamin B₁₂ intake during early pregnancy is associated with the development of a healthy foetus. However, information is accumulating to suggest that low intakes during later pregnancy affect birth weight (Relton *et al.*, 2005), which is associated with future chronic disease development (Muskiet, 2005). Measurement of vitamin intake can be difficult and previous studies have not measured the validity of dietary assessment methods against biomarkers during pregnancy