Blood Omega-3 Concentrations Are Associated With Reading, Working Memory And Behaviour In Healthy Children Aged 7-9 Years.

Montgomery P., Burton JR., Sewell RP., Speckens TF., and Richardson AJ.
Centre for Evidence Based Intervention, University of Oxford, United Kingdom

Introduction
This novel study assessed the relationship between blood fatty acids and reading, working memory, behaviour and health in a large sample of schoolchildren. It was conducted as part of the DOLAB (DHA Oxford Learning and Behaviour) Trial. Objective-epidemiological evidence of LC-PUFA status in children is limited. Furthermore, studies with such data reporting learning and behaviour outcomes are scarce.

This large study reports robust measures of blood fatty acid concentrations, learning and behaviour in a representative sample of mainstream UK children for the first time.

Study Description

Procedure
Blood was taken by a finger stick sample as part of screening for the DOLAB trial where children were assessed for reading and working memory using the British Ability Scales and Behaviour using the Conner’s Parent Rating Scale (CPTRS). Health was measured using an adaptation of a scale used in Stevens et al (2003) which reports on symptoms of Constipation, Diarrhoea, Migraine, Other Headaches, and Stomachaches.

Objectives
1. To assess essential fatty acid concentrations in at-risk children by way of objective fingerstick tests from whole blood
2. Consider links between Omega-3 and reading, working memory, behaviour and health in this vulnerable population

Participants
Children aged 7-9 from mainstream schools who were underperforming in literacy skills according to nationally-standardised assessments of scholastic achievement at age 7 years were included. University and NHS ethics as well as parental consent and child assent was obtained.

Whole Blood Omega-3 LC-PUFA Concentrations in UK School Children

- Reading as assessed by the British Ability Scales was positively associated with Blood-DHA (Rho=0.11, p<0.01).
- Working memory as assessed by the Digit Forwards Measure of the British Ability Scales was positively associated with Blood-DHA (Rho=0.14, p<0.002).
- ADHD type symptoms as measured by the Global Index from the Conners Parent Rating Scale Long (CPTRS-L) were negatively associated with DHA (Rho=-0.14, p<0.01).
- The health scale was negatively associated with Blood-DHA (Rho=-0.13, p<0.01).

Conclusions
In line with previous studies we found that lower blood concentrations of Omega-3 LC-PUFA (particularly DHA) are associated with poorer reading and working memory performance, as well as more parent rated behaviour problems in otherwise healthy school children. Health problems were also lower in children with higher levels of DHA. These associations require further investigation in high quality intervention studies as improving Omega-3 status may lead to benefits in child behaviour and learning in the general population.

Acknowledgements
Funding was provided by Martek Biosciences Inc. (DBM Nutritional Lipids), who also carried out the blood fatty acid analyses.