

Science of Omega-3. Balancing the Scales.

Omega-3 Centre – Complimentary Medicines Australia: Joint Symposium

(Peter Nichols – CSIRO)

The joint Science of Omega-3 symposium was held at Doltone House, Sydney on September 14, 2016. The symposium brought together national and international experts with the overall aim being to update around 100 attendees on a suite of new developments in the Omega-3 field. A brief summary of the day's presentations follows. In addition to the excellent presentations on the day, robust discussion across a range of topics occurred after all talks. The omega-3 field in Australia and NZ is clearly well placed with much good science underway, and will continue to be at the forefront of international advancements.

Ellen Schutt – GOED. *The global omega-3 market: a look at the numbers and the consumer.*

In excess of 30,000 papers have been published in the international literature, including 3,000 RCT studies. RDIs now exist for a number of countries, although overall only a very low portion of the global population is achieving the recommended (GOED and a number of other groups) 500 mg/day. Of the current 7 billion global population, it is estimated that 6+ billion are well below the 500 mg/day target. Market details were presented for China, USA and also Australia. For the latter, 7% market growth is predicted for supplements and pharma. Australians are one of the top spenders on omega-3, although this is estimated at a mere \$12.83 pa per consumer. Globally 70 new products are in the pharma pipeline.

Jerome Harris – University of Melbourne. *Omega-3 fatty acids – potential use in the treatment of unipolar and bipolar depression.*

A suite of Meta analyses formed the basis of the presentation; the audience was well versed on Meta analyses after the presentation. A key aspect was that often where no effects of treatment are observed, it is due to insufficient dose or duration of

treatment. There appears to be better results for EPA versus DHA in a number of the studies. A link to inflammation markers was often observed. One of the Meta analyses showed for use of EPA and DHA at 1-4 g over an 8-12 week period a major favouring of adjunctive omega-3 in treatment of depression.

Andy Sinclair – Deakin University. *Divergent shifts in lipid mediator profile following supplementation in n-3 docosapentaenoic acid and eicosapentaenoic acid.*

The role of DPA remains understudied and unclear, although clearly emerging. In red blood cells DPA ~ DHA; in red meat DPA > EPA >> DHA. Historical studies show that hunter gatherer diets saw considerably higher levels of all long-chain omega-3, including DPA (overall ~5-100 fold higher than present day). Compared to EPA and DHA, DPA sees different metabolites formed, and these products have different roles to those derived from EPA and DHA. A number of pharmaceuticals are moving forward, and several recent reviews on DPA are now available. The take home message - DPA – watch this space.

Ross Walker – Cardiologist and author. *The place of omega-3 in cardiovascular disease prevention.*

Prescription drugs in current use are widely accepted and applied, although it is recognised they also can have considerable negative side effects. Against this observation, omega-3 are needed in cell membranes for good function. Considerable scientific and medical evidence exists for the role of omega-3 against CHD. Typically 6 g of fish oil, equating to ~1 g of omega-3 is required. Often studies that are not showing an effect for omega-3 have not been performed for long enough or other contributing factors including poor study design may be occurring; this was indicated to be the case in the recently cited JAMA Meta-analysis.

Dr Walker was particularly critical also of the recent papers and statements by University of Auckland scientists against fish oils, including on their use for treatment of CHD. The role of supplements is also seen as being more for longer term benefits. The American Heart Association has published an update in 2016 in

Circulation that highlights improvement in cardiovascular function at 4g intake of long-chain omega-3.

William Harris – University of South Dakota. *The Omega-3 Index - the standard for omega-3 status testing.*

Heart EPA+DHA correlates with red blood cell EPA+DHA (as % of total FA), with the plasma being more variable. Considerable data has now been gathered in the 10+ years since the Omega-3 Index (O3I = blood EPA+DHA) was initiated (by Bill Harris and Clemens von Schacky). An O3I of >8% is desirable (decreased risk), 4-8% intermediate and <4% undesirable (at risk). A global map for O3I is now available; Australia is in the intermediate category. DHA is better for raising O3I. Considerable variation is seen in individual responses to dose rate. On average, a dose of 1,500 mg EPA+DHA/day for 5 months will see a +4% increase in O3I. In addition to application of the O3I in the CHD area, other medical fields can benefit. Enhancement of O3I is associated with lowering the rate of telomere shortening; the latter is associated with cellular aging. A new study was presented that showed a decrease in total mortality with increasing O3I. Similarly, increased O3I has been correlated with positive results for depression and also for prisoner behaviour. A suitable target for the population is an O3I of 8%. An O3I Project Australia is now underway. The highest O3I to date is 22 (a Kansas woman).

Barbara Meyer – University of Wollongong. *DHA and Infant health.*

DHA and ARA both increase in the brain in the last trimester of pregnancy. It is also well recognized that the head of the baby is proportionally very larger. Periods of critical requirement do occur, including before pregnancy and e.g. at days 18-29 during pregnancy; the latter period sees closure of the developing neural tube.

Norman Salem – DSM Nutritional Products. *Essentiality of arachidonic acid for infant development*

New EFSA regulations sees that DHA should be added to formula, and contrasting to previous advice and recommendations ARA is not required. Considerable literature exists against this changed advice/ruling. Human milk shows a composition of – 0.32% DHA, 0.47% ARA. The human brain contains – 20% DHA, 15% ARA. Human capillaries have – 10% DHA, 25% ARA. In a range of trials where %DHA > % ARA, various cognition parameters do decrease. Considerable trial data were presented towards moving against this changed ruling. The overall conclusion is that DHA and ARA are both crucial.

Peter Nichols – CSIRO. *Australian and NZ fish oil – an update on current and future sources of long-chain omega-3 oils and their quality.*

Global including Australian aquaculture sees omega-6 PUFA now greater than omega-3 PUFA in farmed seafood. New sources of the health-benefitting long-chain omega-3 oils are therefore required. Results were presented for the Nuseed-CSIRO-GRDC canola-DHA crop under development. The new oil has approaching 40% omega-3, with 12+% as long-chain omega-3 with DHA being the major long-chain FA. DPA and EPA containing varieties are also possible; this aspect was touched on by Allan Green in discussions after the earlier DPA (Andrew Sinclair) and other presentations. Field trials have been performed for the canola-DHA crop, with promising agronomic results so far.

Several of the day's speakers had referred to negative findings from NZ – University of Auckland – researchers. New Omega-3 Centre results for May 2016 analyses were presented that, in stark contrast to the recent NZ papers, highlighted that Australian and NZ fish oils do meet their label claims for omega-3 content, and are NOT oxidized. Considerable discussion occurred at the symposium on the University of Auckland papers, and it was the view of many present that analytical issues were evident with the NZ studies.

Patti Virtue – University of Tasmania. *Utilising innovative fishing technology to investigate the oil and fatty acid composition of Antarctic krill.*

The University of Tasmania has commenced a new ARC-linkage project working with Aker Biomarine and other agencies. The collaboration is providing a unique sample set to the research team, and seasonal trends in lipid classes and fatty acid profiles are being examined. Collectively the results can be used by industry to potentially enhance the harvesting strategy, and by fisheries managers to better understand the food web dynamics of this keystone Southern Ocean species. The role of lipids in the krill life cycle was presented, and it is also evident that the fishery is well managed and certainly not overexploited. Two PhD poster presentations by Jessica Ericson and Nicole Hellessey from the UTas team on aspects of the krill oil research were also provided at the Symposium.