SeaHealthUCD

Issue 2: April, 2012: This e-bulletin is aimed at those in fisheries & aquaculture, at fish packers, processors, distributors, retailers, and finally consumers.

Be Brainy: - Eat Fish!

Our forefathers had an old saying that fish is good for the brain. This was not based on scientific evidence but presumably on 'wise observation' over generations. Current scientific information strongly suggests that fish is indeed good for the brain. Most attention is focused on oily fish as suppliers of the omega-3 polyunsaturated fatty acids (PUFAs) eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids. The latter is the one most linked to brain development/function while both are beneficial for cardiovascular health; and don't forget white fish as they also have a role in brain health/function.

Omega-3s and neurodevelopment

Neurodevelopment relates to the growth and development of the brain and central nervous system and embraces brain function, emotion, learning ability, memory and long-term cognition. DHA is essential for this development and expectant mothers have an increased need for DHA which they can get from a combination of supplementation (e.g. capsules) and eating oily fish (Nys & Debruyne, 2011). For pre-term infants DHA supplementation has a beneficial effect early in life on cognitive development at greater than 12 months of age. However, for term infants or for healthy children older than two there is no evidence for beneficial effects on cognitive performance following DHA supplementation (Eilander et al., 2007). However, some inconsistencies between studies may be due to genetic effects which are not yet fully understood. For example, some breast fed children attain higher IQ scores than those not fed breast milk, presumably because of PUFAs uniquely available in breast milk. However, in those with a quite common genetic variant (*FADS2*) involved in fat metabolism, the beneficial effect of breast feeding was not observed (Caspi et al., 2007).

Omega-3s in young, middle-aged and elderly adults

Current evidence suggests a protective effect of omega-3s against dementia and over 100 clinical trials are running globally on cognitive health and nutrition. A study (2011) in the Nehru Science Centre, Mumbai has shown that DHA decreases progression of neurodegenerative disorders in older age. In contrast, a recent UK study on young adults (18-29 years) showed that DHA

supplementation increased blood flow to the brain but was not accompanied by consistent improved cognitive performance in solving computerised cognitive tasks relative to a control group (Jackson et al., 2012). The so-called EPOCH trial is ongoing and is investigating the effect of omega-3 PUFAs on cognitive ageing and wellbeing in cognitively healthy older adults (391 individuals; 54% females). It includes persons with an alternative form of a particular gene which is thought to modify the effect of DHA supplementation (Danthiir et al., 2011). Tan et al. in 2012 confirmed that an EPA/DHA rich diet protects against brain ageing. Over 1500 dementia free patients (average age 67) underwent brain scans and were tested for mental function, body mass, and EPA/DHA content of their red blood cells. The group was divided in four; the bottom quartile having the lowest EPA/DHA levels in their blood and the top quartile the highest, with the two middle quartiles having intermediate levels. Those in the bottom quartile had lower brain volumes than those in the other three quartiles and also scored lower on visual memory tests and executive function, such as problem solving and multi-tasking.

PEP inhibitors

PEP inhibitors block the action of the enzyme prolyl endopeptidase (PEP). High levels of this enzyme in the blood are associated with neuro-degeneration, disturbance in memory and cognition (Husain & Nemeroff, 1990), and with disorders such as depression, schizophrenia and autism. Altered blood PEP activity is related to psychiatric disorders and Alzheimer's patients have abnormally high levels of PEP activity. The presence of PEP inhibitors is, therefore, important and they have been isolated from cod, salmon and trout flesh (Sorensen, et al., 2004). PEP inhibitors are also found in other foods and plant materials including red wine, green tea and herbal extracts. While PEP inhibitors have not received the level of attention given to EPA/DHA for brain health/function, nevertheless in time they may be proven to be important.

References

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