LCPUFA Requirement for brain development

Robert A. GIBSON

FOODplus Research Centre, University of Adelaide, Australia

Dietary docosahexaenoic acid (DHA) is known to accumulate in the infant brain and clinical trials have established that dietary DHA is associated with improvements in visual and neural function in preterm infants. Thus, an elevated DHA status is considered to be important throughout infancy for brain development. While DHA can be added directly to infant foods, there have been important studies to show that infants can partially meet their own DHA requirements by consuming adequate levels of the omega 3 alpha linolenic acid (ALA). A key requirement to allow for the conversion of ALA to DHA and for the maximal incorporation of DHA is a diet that is also low in omega 6 linoleic acid (LA). Such diets are hard to find commercially because dietary guidelines dictate that ~3%energy of infant diets should be in the form of LA. These estimates were based on early animal experiments in which basal diets were devoid of both LA and ALA. However, recent animal experiments have indicated that the level of LA required to avoid essential fatty acid deficiency is much lower when ALA is also present in the diet.

When diets are evaluated over a wide range in animal systems, it is possible to see that the level of DHA found in the blood of animals fed diets containing only LA and ALA can reach levels similar to that of animals fed diets rich in fish oil, but only when the ALA:LA ratio is high and the total amount of dietary PUFA is low. Diets that are rich in either monounsaturates or saturates meet these requirements. Importantly, there are human infant studies that have tested such diets and demonstrated that human infants accumulate greater amounts of DHA than when diets are high in LA.

It might be time to reconsider the dietary requirement of the two essential fatty acids LA and ALA in terms of their ability to enhance endogenous synthesis of DHA rather than more adult biomarkers like cholesterol levels.