The importance of long chain fatty acids in early life

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Fats are essential constituents of breast milk. They supply the infant with energy, and are also essential for growth and development. Some fatty acids, key components of dietary fats, play an important role in a child's development, even if present in very small amounts. These fats are currently declared on infant formula labelling in Europe as LCP's (long chain polyunsaturated fatty acids).

Breast milk

Breast milk is considered the 'nutritional gold standard' for infant feeding in early life and is relatively high in fat. Fat provides around half of the energy in breast milk.[1] 'Conditionally essential' nutrients can become essential under some developmental or disease conditions. The main ones present in breast milk are docosahexaenoic acid (DHA) and arachidonic acid (AA), both essential structural components in the human body.[1] The concentrations of DHA and AA in breast milk are around 0.3% and 0.5% (of total fats), respectively.[2] While the level of DHA in breast milk can vary, depending on the mother's diet (e.g. the amount of fish consumed), the level of AA is less influenced by diet.[3] Human breast milk also includes important long chain fatty acids that are also found in the milk of ruminants, such as vaccenic acid (0.4%) and nervonic acid (0.05%).[4,5]

The role in growth and development

The scientific evidence shows that dietary DHA plays a role for development of the central nervous system due to the body's limited ability to produce it. DHA is incorporated at high levels in the grey and white matter of the brain and in the rods and cones of the retina in the eye during growth, in particular during late pregnancy and the first two years of life, and is therefore essential for normal brain development.[1,3,6,7] A number of health claims relating to DHA, including infant brain and eye development, were recently permitted in Europe.[8] Evidence of long-lasting effects (beyond infancy) of DHA on cognition remains inconclusive.[1] This may be due to a lack of long-term follow-up studies on specific aspects of cognitive and behavioural function, and the complexity and difficulty of assessing neurodevelopment in children.[1,9]

The European Food Safety Authority (EFSA) advise pregnant and breastfeeding women to consume an extra 100-200 mg DHA per day in addition to 2 servings of seafood (fish and shell fish) per week (up to 3-4 servings).[10,11] Foods (e.g. bread, dressings, meat products, eggs) or supplements may be enriched with these omega-3 fatty acids.[10] The recommendation for infants aged 6-24 months is 100 mg DHA daily and for children aged 2-18 years 250 mg DHA daily.[12]

AA is also an important structural component of the brain, nervous tissue, lining of the blood vessels, heart, liver, kidneys, placenta and indeed, most important organs.[1,3] AA builds up in an infant's brain especially in early pregnancy.[1,6] The metabolic derivatives of AA control blood flow, platelet adhesion (when platelets in blood stick to a damaged blood vessel), immune function and reproduction. Indeed, the Food and

Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO) have stated "There can be little doubt about the essentiality of DHA and AA for the brain".[13] Whereas a recent EFSA opinion suggests it is still unclear whether dietary intake of AA plays a critical role relative to intake of DHA.[1,3]

Vaccenic acid, a naturally occurring trans fatty acid present in human breast milk, has been shown to be important, together with other long chain fatty acids such as DHA in the prevention of the development of allergies in small children.[4] Similarly, nervonic acid, present at levels of around 0.05% (of total fats) is incorporated into the developing central nervous system, mainly from mid-gestation, until the end of the second postnatal year.[5]

Infant and follow-on formulae

Over the years, a lot of effort has gone into making infant formula more similar to breast milk. While exclusive breastfeeding is the preferred choice for infants in the first 6 months of life, this is not always an option and some have to rely on formula feeding. Therefore, a recent EFSA opinion suggests that DHA should be added to infant formulae, and follow-on formulae (which may be used during complementary feeding), and that formula-fed infants should be given similar amounts of DHA as breast-fed infants.[1] This EFSA opinion considered that there is no necessity to add AA to infant formulae.[1] This is in contrast to Codex recommendations (internationally recognised standards), which outline that if DHA is added to infant formula, AA content should reach at least the same concentration as DHA.[14] The FAO/WHO requirement for AA and DHA for brain development and health is (0.2-0.3% of the energy or 0.4-0.6% of the fatty acids for formula milks for 0-6 months).[13] There are calls for more research in this area to test formula milk without added AA to confirm its suitability and safety.[15]

While further research is needed to elucidate the link between dietary intakes of conditionally essential fatty acids and neurological development, it is clear that in the human body these fatty acids play a key role.

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