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Benefits to cognitive function

Adequate intake of long-chain omega-3 polyunsaturated fatty acids (LC-PUFA) is essential for the brain to function: they increase fluidity of the neuronal membranes and some of them (mostly AA and EPA) act as second messengers in neurotransmission systems, as well as contributing to many other aspects of neuron function.(1,2) DHA is involved in myelination(3) and is important in synaptic efficacy (and the speed of transmission(2)), which may increase the efficiency of information processing. The effects of Omega-3 LC-PUFAs, especially, DHA, in visual development and perception and even dyslexia, may be related to the fact that they improve the photoreceptor function of the rods and visual acuity and ensure normal retina development in humans (5,6). These visual potentials in children may be improved with Omega-3 LC-PUFA supplements.(7) With respect to memory, animal investigations have shown that DHA significantly affects neuron development of the hippocampus and synaptic function in the developing hippocampus:(8) in neurons supplemented with DHA, spontaneous synaptic activity is significantly greater and DHA-deprived rat foetuses show growth and synaptogenesis inhibition in hippocampus neurons. These findings may explain the improvement in cognitive processes after DHA supplementation and why dietary Omega-3 LC-PUFA deficiency is associated with a learning deficit.(8) The speed with which information is perceived and acquired depends to a certain extent on the presence of DHA.(9)

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Benefits to cognitive function

Cognitive functions in children

Omega-3 fatty acid supplementation (1,600 mg EPA and 800 mg DHA/day) in adults (average age 33 years) produces an improvement in sustained attention, reduces errors in attention tests and produces improvements in reaction times measured by electromyography (EMG).(14)
Fish oil ingestion has a protective effect on age-associated cognitive deterioration in patients aged 65 years or over. Compared with people who consumed less than one portion of fish a week, who had a cognitive deterioration of –0.1 standard units/year, those who consumed one portion of fish a week had 10% less deterioration, and for those who consumed 2 or more a week the reduction was 13%.(15)

Epidemiological studies performed over the last decade have shown that people who ingest higher amounts of DHA and EPA have a relatively lower risk of incidence and progression of dementia. People consuming an average of 400 mg of Omega-3 a day have less cognitive deterioration than those who consume an average of 20 mg/day.(16)

People with Alzheimer's disease have a lower concentration of Omega-3 acids in their neurons. It has been suggested that dietary consumption of Omega-3 may reduce the inflammatory processes that cause the neurodegenerative changes produced in Alzheimer's.(17)

Morris et al. found that people who consume fish once a week have a 60% lower risk of suffering from Alzheimer's disease.(18)

In patients with Alzheimer's disease, consumption of Omega-3 fatty acids (1,700 mg DHA and 600 mg EPA/day for 6 months) helps improve cognitive function and slow cognitive decline.(19)

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Benefits to cognitive function

Attention deficit hyperactivity disorder (ADHD) related to learning and behavioural problems

There is evidence that Omega-3 LC-PUFAs can help treat problems related to attention deficit hyperactivity disorder (ADHD), such as lack of attention, hyperactivity and impulsivity, although additional research is required to confirm these findings.(20)

Benefits to cognitive function

Bibliography

1. Mirnikjoo B, Brown SE, Kim HF et al. Protein kinase inhibition by ω-3 fatty acids. J Biol Chem 2001;276(14):10888-10896. // 2. Yehuda S, Rabinovitz S, Mostofsky D I. Essential fatty acids are mediators of brain biochemistry and cognitive functions. J Neurosci Res 1999;56:565-570. // 3. Durand G, Antoine J M, Couet C. Blood lipid concentrations of docosahexaenoic and arachidonic acids at birth determine their relative postnatal changes in term infants fed breast milk and formula. Am J Clin Nutr 1999;70:292-298. // 4. Uauy R, Mena P, Rojas C. Essential fatty acids in early life: structural and functional role. Proc Nutr Soc 2000;59:3-15. // 5. Birch EE, Birch DG, Hoffman DR et al. Dietary essential fatty acid supply and visual acuity development. Invest Ophthalmol Vis Sci 1992;33:3242-3253. // 6. Birch EE, Hoffman D, Uauy R et al. Visual acuity and the essentiality of docosahexaenoic acid and arachidonic acid in the diet of term infants. Pediatric Research 1998;44:201-209. // 7. Birch EE, Garfield S, Hoffman DR et al. A randomized controlled trial of early dietary supply of long-chain polyunsaturated fatty acids and mental development in term infants. Dev Med Child Neurol 2000;42:174-181. // 8. Cao D, Kevala K, Kim J et al. Docosahexaenoic acid promotes hippocampal neuronal development and synaptic function. J Neurochem 2009;111:510-521. // 9. Cheatham CL, Colombo J, Carlson SE. N-3 fatty acids and cognitive and visual acuity development: Methodological and conceptual considerations. Am J Clin Nutr 2006;83:1458S-1466S. // 10. Oken E, Wright RO, Kleinman KP, Bellinger D, Amarasiriwardena CJ, Hu H, et al. Maternal fish consumption, hair mercury, and infant cognition in a U.S. Cohort. Environ Health Perspect. 2005;113:1376–80. // 11. Hibbeln JR, Davis JM, Steer C, Emmett P, Rogers I, Williams C, et al. Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observational cohort study. Lancet. 2007;369:578. // 12. Hibbeln JR, Davis JM, Steer C, Emmett P, Rogers I, Williams C and Golding J. Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observational cohort study Lancet 2007; 369: 578–85. // 13. Lindmark L, Clough P.A 5-month open study with long-chain polyunsaturated fatty acids in dyslexia. J Med Food. 2007;10:662-666. // 14. Fontani G, Corradeschi F, Felici A, et al. Cognitive and physiological effects of omega-3 polyunsaturated fatty acid supplementation in healthy subjects. Eur J Clin hivcst 2005:35:691-699. // 15. Morris MC, Evans DA, Tangney CC, Bienias JL, Wilson RS Fish Consumption and Cognitive Decline With Age in a Large Community Study. Arch Neurol. 2005;62:1849-1853. // 16. Kalmijn S, Launer L], Ott A, et al. Dietary fat intake and the risk of incident dementia in the Rotterdam Study. AMH Ncuwl 1997;42:776-782. // 17. Connor WE, Connor SL. The importance of fish and docosahexaenoic acid in Alzheimer disease. AmJ Clin Nutr 2007:85:929-930. // 18. Morris MC, Evans DA, Bienias JL, Tangney CC, Bennett DA, Wilson RS, Aggarwal N, Schneider J. Consumption of fish and n-3 fatty acids and risk of incident Alzheimer disease. Arch Neurol. 2003. // 19. Freund-Levi Y, Eriksdorrer-Jonhagen M, Cederholm T, et al. Otiiega-3 fatty acid treatment in 174 patients with mild to moderate Alzheimer disease: Omega-3AD study: a randomized double-blind trial. Arch Neurol 2006;63:1402-1408. // 20. Sinn N, Bryan J. Effect of supplementation with polyunsaturated fatty acids and micronutrients on learning and behavior problems associated with child ADHD. J Dev Behav Pediatr 2007 Apr,28(2).89-91.