

Omega-3 Fatty Acids in Health and Disease and in Growth and Development

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Several sources of information suggest that man evolved on a diet with a ratio of omega 6 to omega 3 fatty acids of approximately 1 whereas today this ratio is approximately 10:1 to 20-25:1, indicating that Western diets are deficient in omega 3 fatty acids compared with the diet on which humans evolved and their genetic patterns were established. Omega-3 fatty acids increase bleeding time; decrease platelet aggregation, blood viscosity, and fibrinogen; and increase erythrocyte deformability, thus decreasing the tendency to thrombus formation. In no clinical trial, including coronary artery graft surgery, has there been any evidence of increased blood loss due to ingestion of omega 3 fatty acids. Many studies show that the effects of omega 3 fatty acids on serum lipids depend on the type of patient and whether the amount of saturated fatty acids in the diet is held constant. In patients with hyperlipidemia, omega 3 fatty acids decrease low-density-lipoprotein (LDL) cholesterol if the saturated fatty acid content is decreased, otherwise there is a slight increase, but at high doses (32 g) they lower LDL cholesterol; furthermore, they consistently lower serum triglycerides in normal subjects and in patients with hypertriglyceridemia whereas the effect on high-density lipoprotein (HDL) varies from no effect to slight increases. The discrepancies between animal and human studies most likely are due to differences between animal and human metabolism. In clinical trials eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in the form of fish oils along with antirheumatic drugs improve joint pain in patients with rheumatoid arthritis; have a beneficial effect in patients with ulcerative colitis; and in combination with drugs, improve the skin lesions, lower the hyperlipidemia from etretinates, and decrease the toxicity of cyclosporin in patients with psoriasis. In various animal models omega 3 fatty acids decrease the number and size of tumors and increase the time elapsed before appearance of tumors. Studies with non-human primates and human newborns indicate that DHA is essential for the normal functional development of the retina and brain, particularly in premature infants. Because omega 3 fatty acids are essential in growth and development throughout the life cycle, they should be included in the diets of all humans. Omega-3 and omega 6 fatty acids are not interconvertible in the human body and are important components of practically all cell membranes. Whereas cellular proteins are genetically determined, the polyunsaturated fatty acid (PUFA) composition of cell membranes is to a great extent dependent on the dietary intake.