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n-3 fatty acids and the immune system in autoimmunity.

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In short-term studies, both in animals and in humans, fish oil seems to exert anti-inflammatory effects. However, these effects may vanish during long-term treatment. There is a possibility that in autoimmune diseases, supplementation of dietary n-3 fatty acids might lead to a decrease in the number of autoreactive T cells via apoptosis, as demonstrated in (NZBXNZW) F1 lupus mice [40]. Thus, the "fade away" effect might be due to regrowth of pathogenic autoreactive cells. In animal models of autoimmune diseases, diets high in n-3 fatty acids from fish oil increase survival and reduce disease severity in spontaneous autoantibody-mediated disease, while n-6 linoleic acid-rich diets appear to increase disease severity. The situation in human disease is probably more complex. Some of the discrepancy between studies can be attributed to methodologic problems. The effect of fish oil is dose, time and disease-dependent. Since the anti-inflammatory effects depend on the balance between n-3 and n-6 fatty acids, the relative proportion of EPA and DHA and possibly co-treatment with dietary vitamin E, the dose/effect ratio may vary between individuals. Furthermore, some animal studies demonstrating efficacy used very high doses that may be incompatible with human consumption. It seems that fish oil is only mildly effective in acute inflammation. In those chronic inflammatory disorders where it was found to be effective, several weeks are necessary to exhibit results. Yet, this mild anti-inflammatory effect, possibly through downregulation of pro-inflammatory cytokine production, leads to striking therapeutic improvement in critically ill patients. Fish oil supplementation seems advantageous especially in acute and chronic disorders where inappropriate activation of the immune system occurs. Fish oil has only a mild effect on active inflammation of diseases such as rheumatoid arthritis, SLE and Crohn's disease, but it could prevent relapse (in some of the studies). In diseases where the inflammation is mild, such as IgA nephropathy, fish oil may slow or even prevent disease progression. The above could explain the observation in some populations of a decreased incidence of inflammatory and autoimmune diseases [3], since the constant consumption of n-3 fatty acids could suppress any autoreactive (or hyper-reactive) T cells. However, if there is already an existing disease, increased consumption might not be beneficial over a long period. Therefore, the use of n-3 fatty acids can be recommended to the general healthy population, not only to prevent atherosclerosis but possibly also to reduce the risk of autoimmunity.