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Fish as a Nutritional Source of long chain Fatty acids

Abstract : The most valuable contribution of fish to human diet is not just protein of very high biological value, but also its unique lipid attribute - the long chain n-3 polyunsaturated fatty acids (LC-PUFA) mainly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which are involved in several vital physiological structure and function. The biosynthesis rate of these two vital fatty acids from α-linolenic acid requires action of consecutive desaturation and elongation and this process is either too slow or non-existent in humans. Fish is the only preformed source of these two fatty acids. Freshwater fishes though have higher levels of n-6 C_{18} PUFA contains only very low levels of EPA and DHA. Some species can however, produce these from α-linolenic acid once this is provided along with their diet. It is likely therefore that nutritional regulation of the key enzymes - desaturase and elongase could be possible for conversion of C_{18} n-3 PUFAs to biologically active C_{20} and C_{22} counterparts. Research is being conducted worldwide to determine what regulates LC-PUFA biosynthesis in fish and how it can be optimized to enable fish to make effective use of dietary vegetable oil sources for better human nutrition. The extent to which fish and higher vertebrates can convert C_{18} PUFAs 18:3n-3 and 18:2n-6 to long chain C20/22 HUFAs varies with species and correlates with their complement of microsomal desaturase and elongase enzyme system. The EPA, DHA content of farmed freshwater fishes needs to be enhanced since availability of long chain PUFA-enriched fish from freshwater aquaculture with a fairly good balance of n-3 and n-6 fatty acids would immensely contribute to better human health and nutrition.