

Is the Low Intake of n-3 Fatty Acids in Western Diet Contributing to the Obesity Epidemics?

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The general recommendations of low-fat diet and to substitute saturated fat for unsaturated fat have led to increased intake of carbohydrates and marked increase of the dietary n-6/n-3 ratio and sometimes even to a relative deficiency of n-3 fatty acids. Also in food products traditionally rich in n-3 fatty acids, processing has often increased n-6 fatty acids. In animal studies, results have indicated that the changed fat quality of Western diet might induce programming, i.e. that modifications of the maternal diet in the perinatal period can influence the development of diseases in adult animals, probably by modulating gene expression of enzymes involved in glucose and lipid metabolism. High levels of n-6 fatty acids have been shown to be adipogenic and in obese individuals high levels of n-6 fatty acids have been found both in serum and adipose tissue.

We have found that obese young adults have lower concentration of n-3 fatty acids in serum phospholipids, correlating to compartments of adipose tissues and to fasting insulin levels in serum and HOMA index of insulin resistance. We have also found that in healthy 4 yr-old children, higher body weight was associated with lower fat intake and with low n-3 fatty acid intake. In healthy 8-yr old children intake of high fat milk was associated with lower body weight, corroborating results from studies in adults. Both in 4 and 8 yr olds higher rate of weight gain were associated with higher fasting insulin levels, suggesting that the early adiposity rebound, which has been associated with later risk of obesity and diabetes, might be forced by high insulin level early in life. If this early increase of insulin is a result of neonatal programming by changed fat quality in maternal/postnatal diet or if it is related to high carbohydrate intake has to be established.