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THE RATIO OF OMEGA-6/OMEGA-3 POLYUNSATURATED FATTY ACIDS AS AN IMPORTANT COMPONENT OF HUMAN NUTRITION FOR DISEASE PREVENTION

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Introductions. Polyunsaturated fatty acids omega-3 and omega-6 are an important component of nutrition. In recent years, there has been an increasingly negative trend towards an increase in the incidence of cardiovascular diseases, autoimmune diseases, and various metabolic and mental disorders. This is likely to be closely correlated with environmental degradation, globalisation, and irrational diet factors that scientists are still working to understand. While they address these issues, each person can take control of their diet.

Polyunsaturated fatty acids omega-3 and omega-6 are crucial components of nutrition, differentiated by the location of the double bond in the carbon chain. The count is not from the first carbon alpha atom but from the last omega atom, determining the physiological value of the acid. In omega-3, the double bond is in the third place from the omega atom, and in omega-6, it is in the sixth place. Plant-based foods like nuts, oilseeds, avocados, and others contain a large amount of omega-6 PUFAs, while omega-3s are primarily found in seafood and oily marine fish. The human body is unable to convert omega-6 to omega-3 during metabolic processes,

contributing to the deficiency of the latter.

The importance of PUFAs in human life has been known for a long time. Studies on the dietary habits of Greenlandic Inuit, who consume sea fish and seafood regularly, show a correlation between sufficient omega-3 intake and lower rates of coronary heart disease, atherosclerosis, and other diseases compared to other Europeans. Omega-3 PUFAs have various metabolic effects, including a hypolipidemic effect, modulation of eicosanoid metabolism, altered inflammatory response, and a moderate antihypertensive effect [1].

Although recent studies haven't consistently shown a relationship between omega-3 intake and a lower incidence of coronary artery disease, it's undeniable that this nutrient is crucial for the healthy functioning of the human body. The ratio of omega-3 to omega-6 acids in the diet is also essential.

Materials and methods. Some studies indicate that in human evolution, the ratio of omega-3 to omega-6 in nutrition was approximately 1:1, while the modern European diet has a ratio of 1:15 or more. Excessive amounts of omega-6 PUFAs and very high omega-6/omega-3 ratios in modern western diets contribute to the pathogenesis of various diseases, including cardiovascular disease, cancer, inflammatory, and autoimmune diseases.

Eicosanoid products derived from omega-6 PUFAs, such as prostaglandin PGE2 and leukotriene LTB4, are more potent mediators of thrombosis and inflammation than similar products derived from omega-3 PUFAs (PGE3 and LTB5) [2]. An unbalanced ratio of omega-6/omega-3 in favor of omega-6 PUFAs is highly pro-thrombotic and pro-inflammatory, contributing to the spread of atherosclerosis, obesity, and diabetes.

Results and discussion. In the secondary prevention of cardiovascular disease, a ratio of 1:4 was associated with a 70% reduction in overall mortality. A ratio of 1:2.5 reduced the proliferation of colorectal cells in patients with colorectal cancer, while a ratio of 1:4 with the same amount of omega-3 PUFAs had no effect. A ratio of 1:3 suppressed inflammation in patients with rheumatoid arthritis, and a ratio of 1:5 had a favorable effect on patients with asthma, while a ratio of 1:10 had adverse

effects. These studies show that the optimal ratio may vary depending on the disease in question, aligning with the idea that chronic illnesses result from a combination of multiple genes and factors. Therefore, the therapeutic dose of omega-3 fatty acids may depend on the severity of the disease, a consequence of genetic predisposition [3].

Conclusions. Based on the results of numerous studies, it is clear that the right approach to diet composition and adherence to the optimal ratio of omega-3 and omega-6 PUFAs will have a positive preventive effect on cardiovascular, endocrine, metabolic disorders, and other diseases caused by the modern lifestyle.

REFERENCES

1. Dyerberg J. Coronary heart disease in Greenland Inuit: a paradox. Implications for western diet patterns. *Arctic Med Res.* 1989 Apr; 48(2) : 47-54. PMID: 2736000.
2. Simopoulos AP. An Increase in the Omega-6/Omega-3 Fatty Acid Ratio Increases the Risk for Obesity. *Nutrients.* 2016 Mar 2; 8 (3) :128. doi: 10.3390/nu8030128. PMID: 26950145; PMCID: PMC4808858.
3. Simopoulos, Artemis P. The importance of the omega-6/omega-3 fatty acid ratio in cardiovascular disease and other chronic diseases. *Experimental biology and medicine* (Maywood, N. J.) vol. 233,6 (2008): 674-88. doi:10.3181/0711-MR-311.