



"The impact of omega-3 fatty acids supplementation on the composition of erythrocyte membranes."


Introduction:

Omega-3 fatty acids, such as EPA and DHA, not only influence the body's ability to control inflammatory processes and regulate blood pressure, but they also play a crucial role in shaping the structure of cell membranes. Consuming these acids, which the body does not produce independently, is essential for maintaining the integrity and flexibility of cells, a factor that is significant for overall health.

Materials and Methods:

The study involved a 31-year-old professional football player, standing at 192 cm tall and weighing 82 kg, serving as a goalkeeper.

Over a period of 5 months, the participant consumed a dietary supplement containing omega-3 fatty acids. The supplement dosage was 4956 mg of omega-3 fatty acids (2566 mg EPA and 1366 mg DHA). The supplement included fish oil, olive oil, antioxidants, and 40 µg of vitamin D3. The consumed supplement was "Balance Oil" from the ZINZINO company. Throughout the supplementation period, the participant maintained a balanced mixed diet providing his daily energy requirements. The football player trained five times a week, with training sessions lasting an average of three hours per day. During the supplementation period, he participated in nine matches in the top league. After five months, on April 4, 2023, a fasting blood sample was collected to thoroughly examine the impact of the omega-3 supplement on the composition and erythrocyte membranes. During this period, the estimated caloric intake of the athlete was 3200 kcal, with a concurrent percentage of body fat content at 11%.

TEST SUBJECT	
	
Gender: Male	
Date of birth: 08.03.1992	
Nationality: Slovakia	
Occupation: Professional goalkeeper in the top league	
Height: 192 cm	
Weight: 82 kg	
First examination: November 18, 2022	
Second examination: April 4, 2023	

Conclusions:

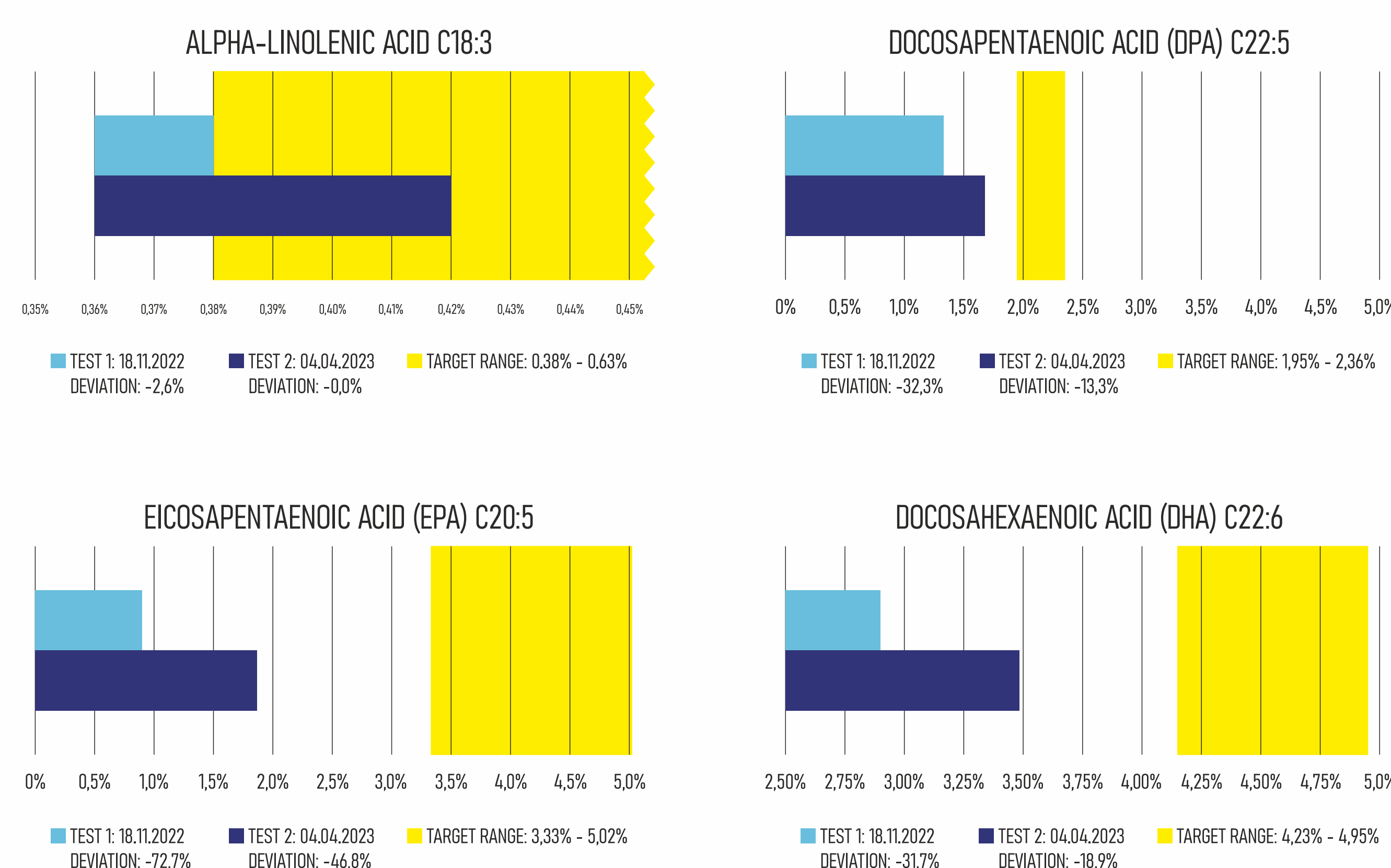
Omega-3 fatty acid supplementation had a positive impact on the composition of erythrocyte cell membranes. The significant increase in the concentration of unsaturated fatty acids likely minimally enhanced their fluidity, potentially favorably affecting the permeability of nutrients. Omega-3 supplementation led to an increase in the levels of alpha-linolenic acid, eicosapentaenoic acid, docosapentaenoic acid, and docosahexaenoic acid, although they did not always reach normative levels. The omega-6 to omega-3 ratio and membrane fluidity index both improved after five months of supplementation. In summary, Omega-3 fatty acid supplementation proved to be significant in maintaining the balance of fatty acids in erythrocyte cell membranes, positively influencing their functions and overall organism homeostasis.

Objective:

The aim of the study was to assess the influence of a five-month supplementation with omega-3 fatty acids on the composition of fatty acids in erythrocyte membranes. The study involved a detailed biochemical analysis of erythrocyte membranes.

Results:

The results indicated significant changes in the composition of erythrocyte membranes. Omega-3 supplementation improved the levels of fatty acids, normalizing alpha-linolenic acid (C18:3) to 0.39%, mitigating the deviation of eicosapentaenoic acid (EPA, C20:5) by -46.8%, and increasing the content of docosahexaenoic acid (DHA, C22:6) to 3.43%. The omega-6 to omega-3 ratio also significantly improved, approaching the normal range, and the omega-3 index increased to 5.2%, nearing the target level. The supplementation-induced improvement in erythrocyte membrane fluidity reached a ratio of 7.2:1.



OMEGA-6:3 BALANCE

	Test 1	Test 2
Target value	< 3:1	< 3:1
Result	11.0:1	5.1:1

OMEGA-3 INDEX

	Test 1	Test 2
Target value	> 8%	> 8%
Result	3.8%	5.2%

CELL MEMBRANE FLUIDITY

	Test 1	Test 2
Target value	< 4:1	< 4:1
Result	10.0:1	7.2:1

Keywords:
omega-3, omega-3 fatty acid supplementation, erythrocyte cell membranes

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