

## European Network on NMR Relaxometry

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### **The effect of Polyunsaturated fatty acids (PUFAs) on inflammatory processes inhibition – possible future applications of NMR relaxometry.**

**Anna Stolecka- Warzecha<sup>1</sup>, Aleksandra Żebrowska<sup>1</sup>**

*Department of Physiology,*

*Academy of Physical Education, Mikołowska 72A, 40-065, Katowice, Poland*

Action mechanism of Omega-3 fatty acids (DHA, EPA) is based on arachidonic acid (Omega-6) metabolism inhibition, which works pro-inflammatory through prostaglandins release. Prostaglandins are lipid autacoids derived from arachidonic acid. They both sustain homeostatic functions and mediate pathogenic mechanisms, including the inflammatory response. Inflammation is the immune system's reaction to infection and injury and has been implicated in the pathogenesis of arthritis, cancer and stroke, as well as in neurodegenerative and cardiovascular disease (Ricciotti 2011).

Omega-3 fatty acids inhibit inflammatory process through reducing Omega-6 fatty acids concentrations in tissues and reducing their reactions with enzymes (Galilia, Calderp 2009).

Clinical studies have shown that Omega-3 fatty acids regular consumption, affects to triglyceride reduction in blood and reduces heart attacks occurrences (Bucher, Hengstler I wsp. 2002). Additionally, there is evidence that Omega-3 fatty acids prevent cells ageing (Farzanech- Far, Lin i wsp.2010). Mickleborough's researches prove, that lipids supplementation (DHA, EPA) not physically active men, in comparison to placebo supplementation, increase muscle damage markers (TNF- $\alpha$ , sTnl, CK- MM) and decrease maximum muscle cramps loss (HVC) in different checkpoints after physical exercises.

Our study was carried out in long distance runners (ultra-marathoners), performing eccentric exercise. The following parameters were measured: biochemical markers of muscular damage, oxidative status, muscle tone and pain threshold. The measurements were taken prior to exercise, at rest, immediately after exercise and after 1 and 24 hours of the restitution period. In all athletes, the eccentric exercise test and biochemical markers analyses were repeated the obtained data showed that Omega-3 fatty acids supplementation, significantly reduced the level of biochemical muscles damage markers. The results indicate the possibility role of that acids in the prevention of the delayed muscle soreness (DOMS) in professional athletes.

Facts listed above results that PUFA consumption in diet, can be essential anti-inflammatory element which improve blood circulation and muscles parameters.

Unfortunately, we don't know exactly what kind of preservatives are used in our PUFAs enriched products. What kind of acids quality are in high acids content in diet components. NMR relaxometry

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could evaluate the molecular dynamics of PUFAs in products and in fluids depending on the temperature, composition, additives (food technology process). NMR relaxometry could also enrich our knowledge about evaluation of fatty acids molecular dynamics as well as about the influence of their dynamic condition on organism.