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Post-traumatic correction of the mechanokinetics of skeletal muscle contraction by administering water-soluble C60 fullerene

D.M. Nozdrenko¹, T.Yu. Matvienko¹, O.P. Motuziuk¹, O.O. Gonchar², D.V. Franskevych¹,
N.E. Nurishchenko¹, V.M. Soroca¹, V.O. Stetska¹, P. Scharff³, and Yu.I. Prylutskyi¹

¹Taras Shevchenko National University of Kyiv, Kyiv 01601, Ukraine

²Bogomoletz Institute of Physiology, NAS of Ukraine, Kyiv 01024, Ukraine

³Technical University of Ilmenau, Ilmenau 98693, Germany

Presenting author email: tamatvienko@gmail.com

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Open injury of skeletal muscles is a complex pathology that accounts for more than 70% of combat wounds and leads to numerous complications. The initial phase of any post-traumatic muscle recovery is characterized by inflammation and further degeneration of the damaged tissue. Therefore, the therapy for the restoration of damaged muscles is ineffective without reducing the inflammatory processes in it. In this work, the biocompatible and non-toxic C60 fullerenes in the aqueous phase were used as powerful antioxidants [1].

The structural organization of C60 fullerene nanoparticles in an aqueous solution, as well as their stability were studied using the atomic force microscopy and dynamic light scattering techniques [2].

The biomechanical parameters of contractions of the fast (muscle gastrocnemius) and slow (muscle soleus) muscles of rats, as well as biochemical indicators of blood and muscle homogenates were studied 15 days after trauma caused by the destruction of muscle cells of varying severity. The introduction of C60 fullerene aqueous solution at a dose of 1 mg/kg into the damaged muscle improved its contractile function by 30-35±2% and 15-20±1% in the fast and slow muscles, respectively, compared to the control. A tendency to decrease the biochemical indicators by 15-17±1% in the blood, as well as by 20-23±1% and 15-17±1% in the tissue of fast and slow muscles, respectively, was detected with the introduction of water-soluble C60 fullerenes.

The in vivo results obtained indicate the ability of C60 fullerenes to reduce the degree of muscle fibers damage and significantly weaken the course of the inflammatory process in them, which opens up the prospect of their use for the correction of pathological conditions of skeletal muscle that arise from its mechanical injury [3].

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