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Beneficial effect of exercise on muscle regeneration in a model of ischemia Reperfusion injury (IRI)

Noha El Hadary[1], **Yassin N**[1,2], **Gamal El Din M**[1,2] and **Kassem L**[1,2]
[1]German University in Cairo, Egypt
[2]Cairo University, Egypt

Objectives: The aim of this study was to explore the effect of exercise on skeletal muscle performance and muscle regeneration following ischemia reperfusion injury. Furthermore, the role of exercise induced IL-6 in this process was examined.

Methods: 70 Rats were divided into 7 groups: Control group (I), IR injury group with 2 hours reperfusion (IIa), IR injury group with 2 weeks recovery (IIb), swimming exercise trained group followed by IR injury with 2 hours reperfusion (IIIa), swimming exercise trained group followed by IR injury with 2 weeks recovery (IIIb), swimming exercise trained group treated with IL-6 receptor blocker followed by IR injury with 2 hours reperfusion (IVa) and swimming exercise trained group treated with IL-6 receptor blocker followed by IR injury with 2 weeks recovery (IVb). Muscle performance, physiological parameters [peak twitch tension (Pt), peak tetanic tension (PTT) and fatigue resistance (FR) time] as well as gene expressions of IL-6, neonatal MHC and CK were assessed in the gastrocnemius muscle.

Results: Rats that performed regular swimming exercise followed by IR injury with 2 hours reperfusion or 2 weeks recovery showed a significant improvement in the muscle contractile parameters compared to the untrained group evidenced by the significant elevation in Pt and PTT and significant prolongation in the FR time. Significant increase in IL-6 and significant decrease in CK gene expressions were also noticed in the trained groups. Muscle regeneration was significantly improved in the trained injured group with 2 weeks recovery compared to the untrained group with 2 weeks recovery as evidenced by the significant increase in neonatal MHC gene expression and by the positive areas of regeneration and the significant increase in αSMA. Rats treated with IL-6 receptor blocker showed a significant reduction in the skeletal muscle function as shown by the measured muscle contractile parameters and a significant reduction in muscle regeneration as shown by the measured neonatal MHC gene expression and αSMA compared to the untreated groups.Furthermore, IL-6 gene expression was significantly decreased and CK gene expression was significantly increased compared to the untreated groups.

Conclusion: Exercise-induced IL-6 production exerted a partial protective role against skeletal muscle dysfunction following IR injury through the improvement of skeletal muscle regeneration.

Biography

Noha El Hadary has completed her master degree in the field of molecular physiology in the year 2013 from the German University in Cairo. She is currently employed as an assistant lecturer in the physiology department in the same university. Her field of expertise includes but not limited to exercise immunology, cytokines, muscle physiology and regeneration, immunostaining, measuring physiological parameters especially for muscle performance and use of various computers based software for data acquisition.

dr_nohaelhadary@yahoo.com

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