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Quantifying the history dependency of muscle recovery from a fatiguing intermittent task

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Abstract

Muscle fatigue and recovery are complex processes influencing muscle force generation capacity. While fatigue reduces this capacity, recovery acts to restore the unfatigued muscle state. Many factors can potentially affect muscle recovery, and among these may be a task dependency of recovery following an exercise. However, little has been reported regarding the history dependency of recovery after fatiguing contractions. We examined the dependency of muscle recovery subsequent to four different histories of fatiguing muscle contractions, imposed using two cycle times (30 and 60 sec) during low to moderate levels (15 and 25% of maximum voluntary contraction (MVC)) of intermittent static exertions involving index finger abduction. MVC and low frequency electrical stimulation (LFES) measures (i.e., magnitude, rise and relaxation rates) of muscle capacity were used, all of which indicated a dependency of muscle recovery on the muscle capacity state existing immediately after fatiguing exercise. This dependency did not appear to be modified by either the cycle time or exertion level leading to that state. These results imply that the post-exercise rate of recovery is primarily influenced by the immediate post-exercise muscle contractile status (estimated by MVC and LFES measures). Such results may help improve existing models of muscle recovery, facilitating more accurate predictions of localized muscle fatigue development and thereby helping to enhance muscle performance and reduce the risk of injury.

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Keywords: Muscle fatigue; history dependency; muscle recovery; blood flow

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