NEUROMUSCULAR FATIGUE CAUSED BY EXHAUSTIVE SSC EXERCISE
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The basic muscle function is defined as the stretch-shortening cycle (SSC) (Komi 2000), where the preactivated muscle is first stretched (eccentric action) and then followed by the shortening (concentric) action. As the SSC taxes the skeletal muscles very strongly mechanically, its influence on neuromuscular function is very complex and different from isolated forms of muscle actions.

The complexity of SSC fatigue is well reflected by the recovery patterns of many neuromechanical parameters. The basic pattern of SSC fatigue response (e.g. when using the complete exhaustion model of hopping or jumping) is the bimodality showing an immediate reduction in performance during the exercise, quick recovery within 1-2 hours, followed by a secondary reduction, which may often show the lowest values on the second day post-exercise when the symptoms of muscle soreness/damage are also the greatest. The full recovery may take 4-8 days depending on the parameter and on the severity of exercise. Each subject may have their own time-dependent bimodality curve (for a review, see Nicol et al. 2007).

The bimodality concept is especially apparent for stretch-reflex responses, measured either in passive or active conditions. Interestingly, the reflex responses follow parallel changes with some of the pure mechanical parameters, such as yielding of the braking force during an initial ground contact of running or hopping. The mechanism of SSC fatigue and especially the bimodal response of performance deterioration and its recovery are often difficult to explain. The immediate post-exercise reduction in most of the measured parameters and their partial recovery 1-2 hours post-exercise can be explained primarily to be due to metabolic fatigue induced by exercise. The secondary reduction in these parameters takes place when the soreness is highest.

The literature gives several suggestions including the possible structural damage. Temporary changes in structural proteins and muscle-tendon interaction may be related to the fatigue-induced force reduction. Neural adjustments in the supraspinal level could naturally be operative, although many studies emphasise more the influences of exhaustive SSC fatigue on the fusimotor-muscle spindle system. It is, however, puzzling why the functional recovery lasts several days after the disappearance of muscle soreness.

References
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