Physical Therapy Department for Neuromuscular and Neurosurgical Disorder and Its Surgery

Doctoral Degree
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Abstract	**:**	

During dynamic exercise man, cooled muscle is fatigued more quickly, and by less cumulated work, is warm. what factor is warm. what factor is critical is unknown. we examined the possibility that efflux of potassium ions is of importance. 1. potassium concentraion in venous blood was studied, during maximal dynamic exercise of the wrist muscles. surface temperature was (mean +_SD) 34.5+_0.6 C (warm) and 22.1 +_ 0.4 C (cooled), in the first experiment using 6 subjects. potassium peak concentration occurred at fatigue, and was 6.18 +_ 0.49 mmo1/1 (warn), and 6.00 +_ 0.42 mmo1/1 (cooled) (NS). cumulated work to fatigue was significantly reduced by 53% by cooling (p < 0.001). 2. we also checked whether the muscle motor units were adequately stimulated by voluntary effort, when warm or cool, by measurement of the M-wave response to synchronous stimulation of the nerve supplying the adductor pollicis. in 7 volunteers , the area of the M-wave did not differ (26.4 +_5.8 warm and 25.2 +_ 8.7 "units of emf X time" cooled; NS). 3. In experiment III, 10 subjects performed wrist work to fatigue while warm or cooled, and (double-blind) either B-blocked or given placebo. the experiment as repeated on different occasions using every combination. A second bout of exercise was performed after 3 minutes of recovery from the first. Effects of temperature and blockade on work capacity and the concentrations of substances in blood were studied. in general, in the first bout of exercise, work was reduced markedly by cooling (52%) and slightly by B- blockade (11%). Half-time to fatigue was also reduced. Potassium reached nearly the same level in all cases, despite the reduction of cumulative work of to nearly 53% in some cases, a result consistent with the idea that potassium has a major role to play in the development of muscle fatigue in these circumstances .

Key words	**1.**	**muscle fatigue.**
	2.	**muscle cooling.**
	3.	**adrenergic B-blockade.**
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