

Exercise Associated Muscle Cramps: What's the Cause?

Exercise associated muscle cramps (EAMC) or exertional heat cramps are one of the most common environmental related injuries seen in sports. (1) However, there is no clear cut explanation for the cause or prevention of this heat illness. Most certified athletic trainer's (ATC) believe that EAMC are caused by dehydration/electrolyte imbalance. The problem with this theory is that it is based on anecdotal and observational research in which causal inferences cannot be made. It has been shown that body temperature and muscle cramping do not correlate, dismissing the term "heat cramps." Recent research by Miller, K., et al. supports the theory that EAMC may be caused by neuromuscular fatigue.



What do many professionals or layperson do when someone cramps? They often stretch the injured individual which causes the cramp to go away. As you can see there is disconnect between the dehydration/electrolyte balance theory and the treatment we often use. Stretching has been shown to have no effect on hydration or electrolyte levels. Currently, there is more research supporting the neuromuscular fatigue theory than the dehydration/electrolyte imbalance theory. The neuromuscular fatigue theory is based on the hypothesis that as you exercise and become fatigued your muscle spindles get over excited. (1)With the increased muscle spindle activity the muscle has decreased golgi tendon activity, thereby decreasing inhibition. When a muscle becomes fatigued, the muscle spindle reaches a point where it doesn't want to stop firing, but the golgi tendon can't make the muscle relax. This eventually leads to EAMC and the treatment that we use to relax the muscle: stretching. We can use more effective strategies to prevent and treat muscle cramping based on the neuromuscular fatigue theory.

Prevention and treatment strategies for cramping based on the neuromuscular fatigue theory:

- Strengthen synergists- by strengthening synergist muscle groups it takes longer for your primary muscles to become fatigued (ex. Strengthen the glutes to take some of the load off of the hamstrings)
- Plyometric exercise- performing plyometrics will directly train your muscle spindles taking them longer to become fatigued during performance
- Hydration- drinking fluids will increase your time to fatigue
- Rest- take adequate time off when possible during exercise
- Stretching- directly relieves cramping in most cases by relaxing the muscle spindles

Reference

- 1) Miller KC, Stone MS, Huxel KC, Edwards JE. Exercise-Associated Muscle Cramps: Causes, Treatment, and Prevention. *Sports Health* 2010;2(4):279-283.

McLeod Sports Medicine
2439 Willwood Dr.
Florence SC, 29501
(843) 777-5139

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