

## Curbing Muscle Cramps: More than Oranges and Bananas

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Everyone has seen heat cramps - the painful muscular spasms that can take an athlete out of the game. Common in football "two-a-days," heat cramps can also strike in long, hot tennis matches, 100-mile cycling races, and late in tropical triathlons. A common denominator here seems to be "salty sweating." Yet the causes and mechanisms of heat cramps continue to perplex.

Not all cramps are alike. Writer's cramp, fiddler's cramp, and golfer's yips are not from salty sweating. Nor is salty sweating key in exertional cramping of the torn hamstring of a hurdler or the legs of sickletrait athletes. And nocturnal calf cramps are not from salty sweating. But three lines of evidence implicate salty sweating - along with muscle fatigue - as the root cause of whole-body heat cramping.

The first line of evidence is 100 years of history. Every generation, it seems, rediscovers the role of salt depletion in heat cramping. In the early 1900s, stokers on ocean liners fought cramping with seawater in their drinking water. British coal miners added salt to beer and water. Their salty water was "about the composition of sweat." Salty milk cut cramps in men building the Hoover Dam. And the U.S. military gave a saline drink to WWII soldiers in desert heat.

The second line of evidence comes from research in athletes. We and others observed clinically that crampers in football and tennis seemed to be "early, heavy and salty sweaters." Researchers at GSSI and elsewhere gauged sweat rate and sweat sodium in individuals - runners, cyclists, tennis players, football players, and other athletes - and found that crampers tend to have high sweat rates and/or high sweat sodium concentrations. Working with GSSI researchers, in what may be the first on-field metabolic study in Division 1 football, we studied fluid balance, sweat rates, and sweat sodium and potassium levels during summer workouts and two-a-days in five known heat-crampers versus five matched noncrampers. We showed that crampers lose more sweat sodium and dehydrate more than non-crampers. It seems likely that the three-fold cause of whole-body muscle cramping is salt depletion, dehydration, and muscle fatigue.

The third line of evidence is therapeutic success. We find "the solution is saline." In general, football heatcrampers tend to be lean and fit, intense and explosive, able to stay in action for hours, heavy sweaters, and "salt-cakers." Paradoxically, some of them eat low-salt diets. We urge them to salt their food and eat salt-rich foods. We put pretzels in team meetings. Onfield for crampers, we rotate Gatorade with GatorLytes (about 3- or 4-to-1), with water only as a "chaser." If players do "lock up," we reverse it with the above sports drinks or in the face of vomiting, with intravenous normal saline. Even widespread, severe cramping usually subsides after 2-3 hours and 2-3 L of normal saline. In conclusion, to prevent heat cramping in athletes, forget potassium, calcium, magnesium, and phosphate. The prevention - and the cure - of heat cramping is salt and fluids. The solution is saline.