

MUSCLE CRAMPS



The brutal heat & humidity in Arizona has many players suffering from muscle cramps. Past research & theories on muscle cramps, conclude that the elusive causes of muscle cramps remains unanswered. The three main causes cited for causing **Exercise Associated Muscle Cramps** (EAMC) are:

Loss of serum electrolytes – such as sodium, potassium, magnesium, chloride, calcium, because of dehydration.

Premature muscle fatigue caused by performing exercise at a higher relative exercise intensity or duration, when compared with normal training.

Inhibited range of motion as a result of tight muscles.

The loss of serum electrolytes happens when you train & neglect to consume enough fluids. This dehydration occurs in all weather, training intensity, or terrains. However, it is most detrimental when you train in hot, humid conditions. It is detrimental because electrolytes are lost through sweat & perspiration. Electrolytes are a group of ions required by the body to stimulate multiple neurological reactions.

5 primary electrolytes =sodium, potassium, chloride, magnesium & calcium.

Sodium, potassium & chloride are the most important for muscle contraction.

Many people believe all muscle cramps can be explained by a lack of potassium, but most physiologists do not. While there is no replicated scientific evidence to date, most scientists believe it is the depletion of sodium & chloride, that causes cramping because of the role they play in maintaining fluid balance in the body.

How does depletion of sodium & chloride effect training? As a player exercises for an extended duration in hot weather, their core body temperature increases.

This leads to dehydration, which increases your heart rate & decreases your blood pressure. One of the ways the body tries to compensate for this is to

release hormones that increase sodium permeability in the kidneys. This, in turn, increases the uptake of water into the kidney. These combined responses slow the decrease in blood pressure & the body reserves water & sodium for necessary core body functions. When there is a higher percentage of water in & outside of cells than electrolytes, athletes experience hyponatremia. This disrupts

the balance of electrolytes inside & outside of cells, causing a decrease in neural signals within the muscle, thus decreasing performance.

Study 1: The only instance that may support the theory that **sodium loss causes cramping** was of an experienced triathlete in the Western Australian Ironman Triathlon. The athlete's sodium levels stayed the same from before the start of the race to transition two. From transition two to the end of the race, the athlete lost 2% of his body weight due to fluid loss. The athlete slowed during the run phase of the race after his core temperature rose to critically high levels. As he slowed & his core temperature increased, there was an unusually rapid reduction in blood sodium that preceded cramping, despite presenting with signs of dehydration.

Study 2: Noakes hypothesized a decreased serum sodium concentration would cause muscle cramping, but this was proved to be inconclusive at the South African Ironman. Athlete's serum electrolyte levels were analyzed & though the decrease in sodium concentrations was significant, the difference compared to a control group was within the normal clinical range of post-race serum sodium concentrations. They were unable to correlate decreased sodium concentration to an increase in exercise-associated muscle cramping. Instead, they concluded the increased activity of cramping muscles post-race may reflect increased neuromuscular activity.

Study 3: This study hypothesized the cause of cramping, is pre-mature muscle fatigue. No mechanism explains how such imbalances in serum electrolytes result in localized muscle cramping. The "muscle fatigue" hypothesis suggests that cramping is the result of an abnormality of neuromuscular control at the spinal level in response to fatiguing exercise. The development of premature muscle fatigue appears to explain the onset of cramping. The diagnosis is made clinically & the most effective immediate management, is rest & passive stretching. The key to the prevention, is to reduce the risk of developing premature muscle fatigue.

Study 4. Allen (USA cycling coach) agrees that rest & stretching are the best way to prevent muscle cramps. If you exercise your muscles when they are already in a stretched (weakened) state, you will not gain fitness or strength. As you exercise without stretching, your muscles will become tight & they aren't able to work in the range of motion necessary for optimal muscle recruitment. If you add the extreme conditions & intensity of a race, the muscles may not be able to respond without cramping. He recommends massage & yoga to keep muscles open. You can't use a "one size fits all" approach to muscle cramping since the cause will vary person to person.

Prevention: To reduce exercise-associated muscle cramping), **drink 16 ounces of an electrolyte drink** before your workout in hot conditions & sip an electrolyte drink during workouts lasting 60 minutes or longer in hot conditions. To prevent bloating & discomfort, the electrolyte drink should be non-carbonated & have low concentrations of carbohydrate. Carbonation & high sugar content inhibits the digestion & absorption of the electrolytes & glucose. If you usually eat a low-sodium diet, **think about adding salt to your meals** on the days you work out for 60 minutes or longer in hot conditions. If your diet consists of packaged foods

& eating out, you consume enough salt to compensate for loss during exercise & should not add it to your meals. **Create a customized training nutrition plan** to help you determine the amount of gels, snacks, water & electrolyte drink you should be consuming per workout. Avoid pre-mature muscle fatigue by **scaling down your workouts** during hot & humid conditions. Don't force the pace of your training even if it was scheduled to be a sub-threshold workout, back-off & adjust the workout even though you feel like your exertion level is low. Stay loose by using a foam roller & use it religiously, attend yoga class, or get a massage.

What to do when you get a cramp?

Once you get a cramp, you cannot make it disappear right away. This is why prevention is key. Most cramps are relieved through light stretching, massage, & hydration. During a game, prepare well, stay hydrated & relax your, quads, calves & hamstrings whenever you can. Have a walk at half time rather than sit down & stretch any potential cramping areas. Any cramps should be slowly stretched & massaged, until they disappear.