

Cramps and Stitch: Why Do We Get Them and How Can We Prevent Them?

P. Mauro, 2005 – www.trainingsmartonline.com

Most triathletes, at one time or another would have experienced either a cramp or a stitch during a triathlon or a training session. These complaints can range from mildly uncomfortable to severely debilitating, but there is no question that they are a great source of frustration to everyone from recreational exercisers to serious athletes. Unfortunately, scientists know very little about the two conditions and how to avoid them. Consequently, there is a lot of folklore surrounding the topic, making it difficult to know exactly how to deal with these problems.

What is Cramp?

Cramp is a sudden, tight and intense pain that most commonly occurs in the leg muscles: especially the gastrocnemius, hamstrings, and quadriceps. It can range from a slight twinge to an excruciating pain, and may last for a few seconds or several minutes. A cramp can be a one-off occurrence or repeat several times before the muscle relaxes and the pain goes away.

What Causes Cramp?

Cramp is caused when a muscle involuntary and forcibly contracts and does not relax. While this seems to be due to an abnormal stimulation of the muscle, the exact mechanism is unknown. Cramp is more likely to occur in tired muscles therefore poor fitness or exercising at high workloads can increase the likelihood. Inadequate stretching and poor biomechanics may also contribute.

Dehydration may contribute to cramp especially when fluid and sodium losses are high. Sodium is involved in initiating nerve signals that make muscles contract. A deficit of sodium and fluid may "irritate" muscles causing them to contract uncontrollably.

Cramp has been attributed to the depletion of potassium and minerals such as calcium and magnesium. However, this idea does not have strong support as very little potassium, calcium and magnesium is lost during exercise. Also deficiency is rare as these substances are abundant in the diet. It has been suggested that magnesium is relocated in the body during exercise rather than lost in sweat. Therefore, a magnesium imbalance in relation to other electrolytes (sodium and potassium) may be involved. Further evidence needs to be gained in this area.

A few studies have linked cramps to hyponatremia (low sodium levels). This condition may result from drinking large volumes of fluids that are low in sodium and may be aggravated by starting the event with low levels of sodium. Since serious athletes are particularly good at avoiding the use of salt on food, they may be highly susceptible to hyponatremia. The day before and the morning of a long race it may be a good idea to use salt more liberally to increase the body's levels. The sports drink used for the race should also provide adequate levels of sodium. For long races, eating salty foods may also help prevent not only cramping, but also the life-threatening symptoms of hyponatremia.

Another theory is that cramps result from burning protein for fuel in the absence of readily available carbohydrate. In fact, one study supports such a notion. In this research, muscle cramps occurred in subjects who reached the highest levels of ammonia release during exercise. High ammonia levels indicate that protein is being used to fuel the muscles during exercise. This may indicate a need for greater carbohydrate stores before, and replacement of those stores during intense and long-lasting exercise.

How Can I Avoid Cramp?

Although finding an exact cause for cramps is difficult, the following tips can be used to help prevent them from occurring:

- Allow adequate recovery and rest for muscles after hard training sessions
- Ensure that you have adequately prepared for your triathlon. Cramps are less common in athletes who are well trained for their events.
- Increase strength and fitness. Stronger, fitter muscles are more resilient to fatigue and therefore cramp. Be cautious when changing speed or intensity especially during the later stages of exercise. Fatigued muscles take longer to adapt to increased workloads. Also, be careful when changing directions quickly and try to avoid unusual movements that can trigger cramps.
- Wear comfortable, unrestrictive clothing and footwear. Loose comfortable clothes are best. Tight fitting clothes can reduce blood flow to muscles making them more susceptible to cramps
- Eat healthy. Cut out the saturated fats that clog arteries. Cramps occur in muscles that have a reduced blood supply due to narrowed arteries
- Acclimatise to the warmer weather to help avoid dehydration (ideally for 10 days or more)
- Stay well hydrated during exercise by drinking appropriate amounts of fluid. Sports drinks are a good option as they help to replace sodium losses, especially when sweating at high rates. In most cases, salt tablets are not recommended. However, during ultra-endurance exercise (particularly in very hot weather or when sweat losses are high) it becomes necessary to be more aggressive in the replacement of sodium. Sodium intakes of approximately 0.25-0.7 grams per hour may be necessary for ultra-endurance exercise lasting more than 3-4 hours (i.e. ironman triathlon). This may require the use of salty foods (i.e. vegemite sandwiches, crackers, pretzels) or special products such as electrolyte powders or tablets to keep pace with sodium requirements. You must be careful when taking salt tablets as they may make dehydration worse by drawing water from the blood stream into the intestine and increase the risk of further cramp. Dehydration and extremes of temperature don't appear to be the direct cause of cramp, but they do increase the risk. Speak to a Sports Dietitian if you think this situation applies to you.
- Lastly, the Schwellnus theory suggests that cramping could be prevented if the activity of the inverse stretch reflex is maintained during prolonged exercise. This is done by regularly stretching the tendons of the affected muscles, reactivating the dormant stretch reflex. The stretch reflex originates from the golgi tendons. Ensure that you take your muscles through their full range of motion.

How Should Cramp be Treated?

Stretching helps to decrease the muscle contraction and allow the muscle to relax. The effect of stretching the muscle increases the tension in the muscle, which in turn stimulates the tension receptors to increase their activity, and that signals the stretch receptors to decrease muscle contraction. This greatly relieves muscle pain as the muscle relaxes. Massaging the area may help to alleviate pain. When cramps are severe, applying ice can stop the spasm and help to relieve pain. Rest and replacing fluid losses will also bring improvement.

If all else fails, Quininesulphate could be used to prevent cramp, but should only be taken on the advice of a physician.

Does Cramp Indicate a more Serious Problem?

In most cases, cramps are a temporary event and do not lead to serious problems. However, sometimes cramps can indicate a more serious medical condition. You should always see your

doctor if cramps are severe, occur regularly, fail to improve with simple treatment or are not related to obvious causes such as strenuous exercise.

What is Stitch?

Stitch is a localised pain usually felt on the side, just below the ribs. It is sometimes accompanied by a stabbing pain in the shoulder joint. The pain can range from sharp or stabbing to mild cramping, aching or pulling. Sometimes people can exercise through the pain however, usually the sufferer is forced to slow down or cease exercise. The pain usually eases within a few minutes after ceasing exercise however some people experience some residual soreness for a few days, especially after severe pain. Stitch seems to be more prevalent in activities that involve vigorous upright, repetitive movement of the torso. Activities such as running (particularly when going down hill) and horse riding may be more prone to causing stitch however it can occur in any type of activity.

What Causes Stitch?

Scientists are unsure of the exact cause of stitch. For some time, stitch was thought to be caused by a reduction in blood supply to the diaphragm, a large muscle involved in breathing. It was thought that during exercise, blood was shunted away from the diaphragm and redirected to exercising muscles in the limbs. This theory has now lost favour with scientists. Both the diaphragm and the limb muscles need to work harder during exercise so it is unlikely that an inadequate blood flow is directed to the diaphragm.

Another popular theory is that stitch is caused by organs pulling on the ligaments that connect the gut to the diaphragm. Ligaments which support organs such as the stomach, spleen and liver are also attached to the diaphragm. Jolting during exercise may cause these organs to pull on the ligaments and create stress on the diaphragm.

A more recent idea is that stitch is caused by irritation of the parietal peritoneum. Two layers of membrane (peritoneum) line the inside wall of the abdominal cavity. One layer covers the abdominal organs. The other layer (parietal peritoneum) attaches to the abdominal wall. The two layers are separated by lubricating fluid, which allows the two surfaces to move against each other without pain. The parietal peritoneum is attached to a number of nerves. It is thought that the stitch occurs when there is friction between the abdominal contents and the parietal peritoneum. This friction may be caused by a distended (full) stomach or a reduction in the lubricating fluid.

Eating and drinking inappropriately prior to exercise may exacerbate stitch by causing a full stomach or dehydration. Poor fitness, an inadequate warm-up and exercising at high intensity may also be factors. A sudden change in biomechanics such as increased stride length or frequency may increase the risk of stitch by affecting the way that the torso moves.

How Can I Avoid Stitch?

Eating too closely to exercise or consuming inappropriate foods and fluids seems to exacerbate the stitch. High fat foods, and foods and fluids with a high sugar concentration are more likely to cause problems. The likelihood of stitch occurring may be reduced by allowing 2-3 hours before exercising after a large meal and choosing high carbohydrate, low fat and moderate to low protein options in the pre-exercise meal. Many studies have also found that avoiding dairy products in the lead up to key training sessions can help prevent the stitch and also gastrointestinal upset while running.

During exercise, it is possible that a full stomach contributes to stitch. Concentrated fluids such as soft drink and cordial empty slowly from the stomach therefore are likely to lead to a fuller stomach. Water and sports drink empty more quickly and are a better option. It is also preferable

to adopt a pattern of consuming small amounts of fluid at frequent intervals during exercise rather than trying to drink large volumes all at once. Isotonic sports drinks result in the least number of symptoms.

Stitch may also be minimised by following a training schedule that progressively increases in intensity and duration. Sudden increases in intensity are more likely to cause stitch. It is much better to start at an easy level and slowly build up.

Poor breathing patterns during exercise may also lead to stitch. When an athlete breathes too quickly and effectively 'pants', the diaphragm contracts in a shortened position and never gets to fully lengthen. Athletes need to control their breathing and ensure that they fully exhale.

Also, since spinal problems may play a role in stitch, efforts to optimize spinal integrity may be important.

How Should Stitch be Treated?

Sometimes the stitch eases if you slow down and drop your intensity for a period. However, the most common way to alleviate stitch is to bend forward while pushing on the affected area and breathing deeply. Sometimes this can be done while exercising but usually the pain eases more quickly when exercise is ceased. Another option is to lie down while elevating your hips.

Does Stitch Indicate a more Serious Problem?

The stitch is rarely a sign of more serious problems. However any pain that is persistent and does not ease when exercise ceases should be investigated by a doctor.

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