Oh the pain! Of those Muscle Spasms/Cramps.

(http://192.211.16.13/curricular/hhd2001/spasms.htm)

Muscle spasms are involuntary contractions that occur in skeletal muscle. They happen spontaneously and unexpectedly, with little or no stimulus. The cramp and accompanying pain may last for only a few moments or for several hours (as in sudden muscle spasms associated with "throwing one's back out"). Muscle spasms can occur in any skeletal muscle but are most likely to occur in the muscles of the calves, hands and feet. In most cases muscle spasms are not a signal of any neurological or muscular disorder. However, muscles spasms are a symptom of many diseases, such as Tourette's Syndrome. The word spasm comes from the Greek spasmos, (and even earlier from span– to draw, tear or rend) and means a convulsion.

To understand what causes muscle spasms, it is necessary to understand the process of normal muscle contraction. The process of muscle contraction begins in the brain. The brain sends an electrical signal down the spinal cord to the lower motor neurons in the spinal column and muscle fibers. When these motor neurons receive the electrical signal, they release chemicals at the muscle site. This stimulates the individual muscle cells to release calcium ions from their internal stores. These calcium ions in turn interact with two muscle proteins called actin and myosin. This interaction causes the filaments of actin and myosin to slide past each other, pulling "their fixed ends closer, thereby shortening the cell and, ultimately, the muscle itself" (lifehealthenergy.com). To relax the muscle, the cell's internal stores recapture the calcium ions, the actin and myosin unhook and slide back into their original places, slackening the muscle.

Unfortunately, this complex process allows a lot to go wrong. If any part of the process fails, the result can be a painful and temporarily debilitating muscle cramp or spasm. If the mechanisms in the brain controlling the original electrical signal are interrupted or fail to fire correctly, the result can be a cramp. Or, if the motor neurons of the spinal cord or muscle are oversensitive and fire below their normal thresholds, again, spasm may occur. The process can also fail at the muscle site itself. If the muscle membrane is over sensitive, contraction can occur without any stimulus. One other reason for muscle spasms is the failure of the internal stores of the muscle cells to reclaim the calcium ions fast enough, making the muscle contraction last longer than usual.

Failure at these various stages of the process can be caused by many things. The interruption or failure of the brain mechanisms, or the oversensitivity of the motor neurons is most often caused by damage to the nervous system. This can be caused by stroke, multiple sclerosis, cerebral palsy, neurodegenerative diseases, trauma, spinal cord injury, and nervous system poisons such as strychnine, tetanus, and certain insecticides. In some cases, damage to the nervous system can cause permanent or prolonged muscle contraction, called "contracture".

Changes of responsiveness at the muscle site itself may be due to prolonged exercise, dehydration and electrolyte depletion, or metabolic disorders that affect the supply of energy to the muscles. Interestingly enough, for the calcium to be recaptured into the internal stores of the muscle cell, the body must have sufficient energy. If the body is overly fatigued after prolonged exercise, the muscle cannot unlink the actin and myosin, and relax. Dehydration and electrolyte depletion are brought on by a loss of fluids and "salts", through diarrhea, vomiting or excessive sweating. The body loses water and minerals such as sodium, potassium, magnesium, and calcium. This loss of vital nutrients harms the body's ability to respond and recover from situations and stresses, causing a cramp/spasm. There are also a few metabolic disorders that affect the muscle's supply of energy (and since energy is necessary for the recapture of calcium, a lack of energy to the muscles can cause cramp). These diseases are inherited and affect particular muscle enzymes, such as deficiencies of myophosphorylase (McArdle's disease), phosphorylase b kinase, phosphofructokinase, phosphoglycerate kinase, and lactate dehydrogenase. A particular type of muscle cramping, called fasciculations, may be due to fatigue, cold, medications, metabolic disorders, nerve damage, or neurodegenerative disease, including amyotrophic lateral sclerosis. Most people experience brief, mild fasciculations from time to time, usually in the calves (lifehealthenergy.com).

Most cases of cramping require no treatment. Although the pain can be awful, there is really very little to be done about the cramping except to be patient, relax, and perhaps to stretch and massage the area. More prolonged or regular cramping may be a sign of dehydration, in which case fluid and electrolyte replacement may be necessary, sometimes intravenously. Some cases of regular cramping may be treated with drugs such as carbamazepine, phenytoin, or quinine. If the cramps are symptoms of metabolic or neurologic diseases, treatments may be possible to relieve the cramping. There are some alternative treatments available for muscle cramps, according to one source (check with your naturopath of choice however). Cramps can be treated or prevented with Gingko (Gingko biloba) or Japanese quince (Chaenomeles speciosa). Supplements of vitamin E, niacin, calcium, and magnesium may also help. Especially when taken at bedtime, these supplements may help to reduce the likelihood of night cramps. Dolomite (a calcium/magnesium combination, has also been said to help prevent muscle soreness, fatigue, and cramps.

Occasional muscle cramps/spasms are common and are not a sign of any dire medical situation. Instead, think of occasional muscle spasms as a sign to take better care of your body. Eat a healthy balanced diet with the appropriate levels of minerals, drink plenty of water to prevent dehydration, get regular exercise to reduce the risk of extreme muscle fatigue, and get enough rest. In times of extreme heat, avoiding exercise can prevent heat cramps. To prevent nighttime leg cramps, take a warm bath to increase circulation to the legs. Muscle cramps can be prevented and cared for appropriately, if you understand that your body needs water, minerals, energy and rest to work your muscles smoothly.