UNDERSTANDING MUSCLE CRAMPS

MUSCLE CRAMPS Most commonly occur at night and affect the legs, especially the thighs, calf muscles, and feet. These kinds of cramps occur more frequently in older adults.

PHYSIOLOGY OF MUSCLE CRAMPS

By far the most common causes of muscle cramping are dehydration and magnesium deficiency.

In a normal resting muscle, calcium is stored in the sarcoplasmic reticulum (reservoir within the muscle). Magnesium acts as a calcium blocker, inhibiting calcium release from the sarcoplasmic reticulum. Generally, for a muscle to contract, a nerve impulse must travel to the muscle and cause calcium to be released from the sarcoplasmic reticulum. This causes a series of reactions whereby ATP is used to cause the actin and myosin filaments in the muscle fibers to engage and cause muscle contraction. Any local irritating factor, such as metabolic abnormality of a muscle-such as severe cold, lack of blood flow to the muscle, or over-exercise of the muscle-can elicit pain and other types of sensory impulses that are transmitted from the muscle to the spinal cord, thus causing reflex muscle contraction. The contraction, in turn, stimulates the same sensory receptors more, which causes the spinal cord to increase the intensity of the contraction further. Thus, positive feedback develops so that a small amount of local irritation causes more and more contraction until a full-blown muscle cramp ensues. Reciprocal inhibition can help. This means purposely contracting the muscle on the side of the joint opposite to the cramped muscle while at the same time using the other hand or foot to prevent movement of the joint (isometric contraction). The reciprocal inhibition in the cramped muscle can sometimes relieve the cramp. This is often used in physical therapy as a treatment to relieve muscle tightness and spasms.

What Causes Muscle Cramps

• Muscle cramping is most commonly caused by an imbalance in the levels of calcium and magnesium in the body or a deficiency of Vitamin E. Magnesium is necessary for the release of PTH(Parathyroid Hormone) and the action of the hormone on its target tissues(PTH causes an increase in blood levels of calcium and magnesium and increases osteoblasts, bone-building cells). The most common clinical presentations of hypomagnesemia are caused by associated hypocalcemia(due to interference with the secretion and action of PTH) and hypokalemia(low potassium due to the inability of the kidney to preserve potassium). Magnesium inhibits calcium entry into the nerve terminal. Severe magnesium depletion can result in tonic-clonic convulsions.

Restless legs are often caused by:

- a deficiency of magnesium (try 250-500 mg of magnesium before bedtime)

• Hypothyroidism

• Hypoglycemia (low blood sugar)

• Hypoparathyroidism

• Hypocalcemia

• Hypo- and Hypernatremia (low and high sodium)

• Hypomagnesemia (low magnesium concentration in the blood) can cause neuromuscular hyperexcitability.

• Dehydration

• Anemia

• The use of tobacco

• Inactivity

• Fibromyalgia, arthritis

• Atherosclerosis can result in cramping

• heat stroke

• varicose veins

• or more rarely, the early stages of amyotrophic lateral sclerosis ALS, or Lou Gehrig's Disease

• The use of diuretic drugs for high blood pressure or heart disorders may lead to electrolyte imbalances, causing muscle cramps.

• Poor circulation also contributes to cramps.

A NOTE ON STATIN MEDICATIONS

Certain statin medications (cholesterol-lowering drugs) such as Lipitor, Lescol, Mevacor, Pravachol, Crestor, and Zocor can result in muscle cramping. Statin medications inhibit the enzyme HMG-CoA reductase. This rate-limiting enzyme is essential in synthesizing a vital precursor molecule called farnesyl pyrophosphate, from which our body makes cholesterol and CoQ10. Without CoQ10, our body's ability to produce ATP (our primary energy source) is significantly compromised. The human body utilizes the same biomechanical pathway to produce cholesterol and ATP. Research has shown that we can get about a 25 % reduction in CoQ10 when taking statins. In addition to driving ATP synthesis, CoQ10 also functions as an

essential antioxidant. It regulates skeletal muscle gene expression, so it should not be a wonder that muscles suffer from statin use.1

RECOMMENDED TREATMENT

These recommendations are listed here as a reference only. They are not intended to be used as direct medical advice. Consult your physician before taking any of the following and discuss any other medications or supplements you are currently taking that may interact with these supplements.


By far the most common causes of muscle cramping are dehydration and magnesium deficiency.

- Stay Well Hydrated. Adding a pinch of salt to a quart of water helps with absorption.

•. The RDA for magnesium is 350 mg/day. The average intake in the USA is between 143 and 266 mg/day.

• 500-1000 mg/day would suit most athletes and active individuals who exercise frequently, as they need this mineral more. Hard training seems to deplete the body of this mineral and other minerals.

• Be cautious about taking too much magnesium, as it may result in diarrhea.

- Best to take a magnesium supplement that comes in 100 mg tablets, so that you can dose it out twice daily. For example, Pure Encapsulations Magnesium Glycinate, 100 mg tablets can be taken 200 mg in the morning and 200 mg at night before bed.
- Magnesium supplementation before bed can improve the quality of sleep.

• Beans, nuts, seeds, and dark chocolate are rich sources of magnesium.

• A particular form of niacin (vitamin B3) called inositol hexanictinate is supposed to help treat chronic calf cramping and Raynaud's disease(vascular problem). Start with 500 mg 3 times daily and work up to 1 g 3 times a day after two weeks.

• Pyroxidine(vitamin B6) is also supposed to reduce leg cramps.

• Taurine, an amino acid in meat, can affect the treatment of leg cramps. It is often used in combination with glutamic acid and aspartic acid.

• Vitamin E (tocopherol) has a weak action and must be taken in doses of about 400 mg/day.

• Bananas, antioxidants (like pycnogenols, grape-fruit seed extract), and avoiding dehydration are good ways to prevent cramping.

The Restless Leg Syndrome Foundation promotes research and offers support. www.rls.org or The National Institute of Neurological Disorders and Stroke NINDS Restless Leg Syndrome Information Page http://www.ninds.nih.gov/disorders/restless_legs/restless_legs.htm

References

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