Magnesium

Magnesium (Mg) is required for over 300 vital enzymatic reactions in the body, including the synthesis of ATP (the body’s energy supply) and DNA (our genes). It is crucial in producing energy for healthy muscular, nervous, cardiovascular, gastrointestinal, and immune function. Magnesium deficiency has been associated with asthma, diabetes, and osteoporosis\(^{13}\). Magnesium supplementation has been shown to improve glucose availability in the musculoskeletal and central nervous systems, while increasing lactate clearance. This means during stress states (exercise, surgery, etc.) magnesium aids in improving energy utilization and accelerating recovery\(^{14}\). In addition, magnesium supplementation has been directly associated with improved isometric and isokinetic core strength performance in elite athletes\(^{15}\). Core strength is crucial to a healthy spine, especially during recovery.

One vital function of magnesium is its role as a noncompetitive antagonist of N-Methyl, D-aspartate (NMDA) receptors in the nervous system. Therefore, Magnesium regulates the release of acetylcholine from presynaptic terminals, \(^{16}\) preventing abnormal calcium influxes into the cell. This mechanism is responsible for magnesium positive analgesic and muscle relaxant effects, which explains why hypomagnesemia (low magnesium levels) is associated with increased pain, increased muscle tension, erratic blood pressure, abdominal ileus, and constipation around surgery; these processes all require healthy nerve conduction and muscle relaxation. Low magnesium has also been associated with prolonged hospitalizations and increased mortality in both medical and surgical patients\(^{17,18,19}\).

Magnesium’s second important role is in the regulation of blood concentration of catecholamines, epinephrine (E) and norepinephrine (NE). These neurohormones are part of the body’s natural stress response and independently increase blood pressure, heart rate, and arousal. However, unregulated release of these hormones (“hypercatecholaminemia”) causes hypersensitization of myocardial and nerve cells leading to abnormal cardiac irritability (arrhythmia) and neuronal hyperexcitability (tachycardia, seizure, pain sensitization, muscle tension). Ultimately, this leads to a state of oxidative stress. Preoperative oral magnesium supplementation effectively restores healthy serum magnesium levels, while blunting the catecholamine surge around surgery, decreasing oxidative stress and limiting surgical risks\(^{20}\).

Between 57-86% of adults and 68% of adolescents develop low magnesium levels after spine fusion surgery\(^{20-22}\). Between 5-22% developed cardiac arrhythmias, delirium, or an ileus. The adult study did not check pre-operative magnesium levels. In our series of patients who undergo MIS fusions, 20% of them have low magnesium PRIOR to surgery.

Supplementation of magnesium around surgery stabilizes blood pressure\(^{23}\), improves post-operative pain\(^{23}\) (reducing both narcotic and anesthetic requirements)\(^{23}\), and decreases the risk of cardiac arrhythmias, post-operative ileus\(^{26}\), and post-operative muscle spasms\(^{26}\).

Dr. Prusmack recommends a pre-operative intracellular red blood cell (RBC) magnesium level test, which is more accurate than the standard serum magnesium test and more accurately reflects the current biological effectiveness of magnesium on cell function\(^{26}\). Dr. Prusmack takes the following preoperative and postoperative magnesium supplements to restore and optimize RBC magnesium levels—the dose will be dependent on your levels. 2-4 g IV magnesium will also be administered during your surgery, in order to improve postoperative pain control, bowel function, muscle cramping, cardiovascular stability, and ultimately improve recovery\(^{26}\).

The recommended supplement can be found under “surgical support” at http://www.prutectrx.com. 2-4 caps per day.

www.prutectrx.com/collections/surgical-support/products/magnesium-citrate


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