

# Headache Toolbox

## Magnesium



The ideal medication for prevention and treatment of migraine would have no side effects, no risk, would be safe in pregnancy, as well as being highly effective while remaining inexpensive. Of course, no such medication exists, but magnesium comes closer than many interventions on all these fronts.

Magnesium oxide is frequently used in pill form to prevent migraine, usually at a dose of 400-500 mg per day. Acutely, it can be dosed in pill form at the same dosage, or given intravenously as magnesium sulfate at 1-2 gm. The most frequent side effect is diarrhea, which can be helpful in those prone to constipation. The diarrhea and abdominal cramping that is sometimes experienced is dose responsive, such that a lower dose or decreasing the frequency of intake usually takes care of the problem.

Magnesium oxide in doses up to 400 mg is pregnancy category A, which means it can be used safely in pregnancy. Magnesium sulfate, typically given intravenously, now carries a warning related to bone thinning seen in the developing fetus when used longer than 5-7 days in a row. This was discovered in the context of high doses being given to pregnant women to prevent preterm labor.

The strongest evidence for magnesium's effectiveness is in patients who have, or have had, aura with their migraines. It is believed magnesium may prevent the wave of brain signaling, called cortical spreading depression, which produces the visual and sensory changes that are the common forms of aura. Other mechanisms of magnesium action include

improved platelet function and decreased release or blocking of pain transmitting chemicals in the brain such as Substance P and glutamate. Magnesium may also prevent narrowing of brain blood vessels caused by the neurotransmitter serotonin.

Daily oral magnesium has also been shown to be effective in preventing menstrually related migraine, especially in those with premenstrual migraine. This means that preventive use can be targeted at those with aura and/or those with menstrually related migraine.

It is difficult to measure magnesium levels accurately, as levels in the blood stream may represent only 2% of total body stores, with the rest of magnesium stored in the bones or within cells. Most importantly, simple magnesium blood levels do not give an accurate measure of magnesium levels in the brain. This has led to uncertainty concerning whether correcting a low magnesium level is necessary in treatment, or whether magnesium effectiveness is even related to low blood levels in the first place. Measurement of ionized magnesium or red blood cell magnesium levels is thought to possibly be more accurate, but these laboratory tests but are more difficult and expensive to obtain.

Because magnesium may not be accurately measured, low magnesium in the brain can be difficult to prove. Those prone to low magnesium include people with heart disease, diabetes, alcoholism, and those on diuretics for blood pressure. There is some evidence that migraineurs may have lower levels of brain magnesium either from decreased absorption of

it in food, a genetic tendency to low brain magnesium, or from excreting it from the body to a greater degree than non-migraineurs. Studies of migraineurs have found low levels of brain and spinal fluid magnesium in between migraine attacks.

In 2012, the American Headache Society and the American Academy of Neurology reviewed the studies on medications used for migraine prevention and gave magnesium a Level B rating, that is, it is probably effective and should be considered for patients requiring migraine preventive therapy. Because of its safety profile and the lack of serious side effects, magnesium is often chosen as a preventive strategy either alone, or with other preventive medications.

Magnesium has also been studied for the acute, as-needed treatment of severe, difficult-to-treat migraine. Magnesium sulfate given intravenously was found to be most effective in those with a history of migraine with

aura. In those without a history of aura, no difference was seen in immediate pain relief or nausea relief by magnesium, but there was less light and noise sensitivity after the infusion.

Magnesium oxide, in tablet form, is very inexpensive, does not require a prescription, and may be considered as very reasonable prevention in those who have a history of aura, menstrually related migraine, no health insurance, or who may become pregnant. Because of the excellent safety profile of magnesium, any patient who has frequent migraines and is considering a preventive strategy to reduce the frequency or severity of their headaches may want to consider this option and discuss it with their physician.

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