

MindMag



Clinical Applications

- Supports Healthy Brain Magnesium Levels*
- Supports Healthy Synapse Number and Function*
- Supports Cognitive Health*
- Supports Stress Management, Sleep Quality, and a Healthy Mood*
- Helps Ensure an Optimal Magnesium Intake for Overall Health*

*MindMag features magnesium L-threonate (as Magtein®), the only form of magnesium known to cross the blood-brain barrier. Complemented by highly absorbable Albion® di-magnesium malate and TRAACS® magnesium lysinate glycinate chelate, this formula is designed to boost the brain's magnesium level. Magnesium is vital to supporting brain health and promoting healthy nervous system functions.**

All RXFX Formulas Meet or Exceed cGMP Quality Standards

Discussion

MindMag – Optimizes Magnesium Delivery to Body and Brain

Dietary intakes of magnesium are consistently below minimum recommended levels, and an insufficiency of magnesium is implicated in a wide range of health concerns, including those that affect the brain.^[1] Because many forms of magnesium have low bioavailability, RXFX carefully selected magnesium compounds backed by research and studies to formulate MindMag. Built upon the long-term clinical success of Magnesium Chelate, MindMag features a unique combination of Magnesium Chelate's highly absorbable, organic Albion minerals—di-magnesium malate and TRAACS® magnesium lysinate glycinate chelate—and Magtein®. Magtein is a groundbreaking organic magnesium compound that was developed by MIT (Massachusetts Institute of Technology) researchers to support "brain power."^{*}

Magtein – Patented Magnesium L-Threonate

Magtein is the result of 10 years of research at MIT. This novel form of magnesium is changing the way we support brain health. Unlike other brain products on the market that work via brain stimulation (often overstimulation), Magtein works via a completely different mechanism. When brain magnesium levels are not optimal, synapse function deteriorates. By delivering magnesium into synapses, Magtein helps brain cells stay healthy, without being overactivated; consequently, brain cells respond to signals with clarity and robustness.^{*}

Magtein Raises Brain Magnesium Levels

Studies show that Magtein crosses the blood-brain barrier and raises the brain's magnesium levels, which result in increased magnesium deposits in neural synapses, increased neural synaptic density, and improved brain function.^[2-4] One animal study showed that when the bioavailability of several magnesium compounds was compared to controls, only Magtein significantly enhanced magnesium bioavailability and produced a significant increase (7% to 15%) in rat cerebrospinal fluid.^[2] These small but significant increases in brain magnesium levels produced profound effects on neurological function.^{*}

Magtein Supports Healthy Synaptic Number and Function

Maintaining extracellular magnesium in the brain helps preserve synaptic density and keeps the synapses working properly.^{*[2,5]}

By increasing magnesium concentration in the extracellular fluid, researchers observed permanent enhancement of synaptic plasticity in networks of cultured hippocampal neurons.^[5] Delving deeper into the mechanisms involved, later animal research showed that magnesium increased receptor signaling; specifically, the signaling of the NR2B-containing N-methyl-D-aspartate (NMDA) receptor. NMDA receptors are rich in the hippocampus and play a pivotal role in memory processes.^{*}

Data from these studies suggest that increasing brain magnesium with Magtein "enhances both short-term synaptic facilitation and long-term potentiation and thereby supports synaptic plasticity and learning and memory functions in rats."^{*[2,3,6]}

Magtein Supports Cognitive Health

The cognitive effects of Magtein were studied by Liu et al in a randomized, double-blind, placebo-controlled trial (n = 51). At a dose of 1.5 g/d to 2 g/d (25 mg/kg/d) for 12 weeks, patients 50-70 years of age taking Magtein demonstrated reduced cognitive declines compared to age-matched controls.^[7] Furthermore, the researchers calculated a particularly compelling impact of Magtein using normative TMT-B† data from age-matched subjects: After six weeks of treatment, the average brain age of the Magtein group decreased from 69.6 ± 4.2 years to 60.6 ± 5.6 years, an improvement of 9.0 ± 3.5 years, and persisted after 12 weeks of treatment with 9.4 ± 3.5 years of improvement. These clinical benefits have been supported by the data of several animal studies.^{*}

Several pre-clinical animal studies that used assessments such as the NORT (novel object recognition test), T-maze, Morris water maze, conditioned fear memory, and conditioned taste aversion have also validated Magtein's effectiveness.^{*}

In these studies, researchers demonstrated that when brain magnesium levels were increased, significant benefits were detected in multiple aspects of learning and memory in young and aged rodents.^[2-4,8] For instance, NORT tests performed by Slutsky et al revealed that short-term memory improved approximately 135% and long-term memory improved approximately 85% in aged rats treated with Magtein compared to control (untreated) rats.^{*}

One study examined the effects of Magtein in test mice (genetically altered mice that model age-related cognitive changes). Li et al found that the test mice not given Magtein exhibited "unequivocal learning deficits," while the test mice given Magtein performed similarly to normal mice.^[9] In short, Magtein helped preserve normal brain function. When magnesium levels in the brain tissue were quantified, the relationship became even clearer: According to researchers, brain magnesium levels positively correlated with cognitive function; that is, the lower a mouse's brain magnesium level, the poorer its memory function in the NORT task. Furthermore, histological analysis of brain tissue showed that Magtein administration preserved synapse density and NMDA receptor signaling and also had positive effects on the expression of certain proteins associated with changes in memory.^{*[9]}

Magnesium in Stress Management, Sleep Quality, and Mood

Magnesium is known to benefit the body in ways that counter stress, promote restful sleep, and support a healthy mood. In rats, magnesium administration attenuated neurologic changes brought on by chronic mild stress.^[9] Additionally, by increasing fear memory extinction, Magtein showed promise as a modulator of worry.^[4,10] In human studies, magnesium supplementation partially reversed sleep changes associated with aging and improved objective and subjective measures of sleep.^[11-13] Improving sleep quality and countering the effects of chronic stress positively impact mood—another area that is beneficially influenced by optimal magnesium status.^{*[9,10,14,15]}

†The Trail Making Test - Part B (TMT-B) assesses executive function as well as impulsivity, visual search, visual attention, and motor speed.

***These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.**

Distributed by: RXFX
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Edmond, OK 73013

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Supplement Facts

Serving Size: 3 Capsules
Servings Per Container: 30

	Amount Per Serving	%Daily Value
Magnesium (as di-magnesium malate ^{S1} , magnesium L-threonate ^{S2} , and magnesium lysinate glycinate chelate ^{S1})	200 mg	48%
Magnesium L-threonate ^{S2}	1 g	**

** Daily Value not established.

Other Ingredients: Capsule (hypromellose and water), hydroxypropyl cellulose, ascorbyl palmitate, and silica.

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S2. Magtein® is protected under a family of U.S. Patents and Pending Patents and is protected worldwide. Magtein® is a registered trademark of Magceutics®, Inc. and is distributed exclusively by AIDP, Inc.



Directions

Take three capsules once or twice daily, or as directed by your healthcare professional.

Consult your healthcare professional before use. Individuals taking medication should discuss potential interactions with their healthcare professional. Do not use if tamper seal is damaged.

Formulated To Exclude:

Wheat, gluten, corn, yeast, soy, animal and dairy products, fish, shellfish, peanuts, tree nuts, egg, sesame, ingredients derived from genetically modified organisms (GMOs), artificial colors, artificial sweeteners, and artificial preservatives.

References

1. Moshfegh AJ, Goldman JD, Ahuja JK, et al. U.S. Department of Agriculture, Agricultural Research Service. What we eat in America, Nhanes 2005-2006. Usual nutrient intakes from food and water compared to 1997 dietary reference intakes for vitamin D, calcium, phosphorus, and magnesium. http://www.ars.usda.gov/SP2UserFiles/Place/80400530/pdf/0506/usual_nutrient_intake_vitD_ca_phos_mg_2005-06.pdf. Published July 2009. Accessed November 21, 2014.
2. Slutsky I, Abumaria N, Wu LJ, et al. Enhancement of learning and memory by elevating brain magnesium. *Neuron*. 2010 Jan 28;65(2):165-77. [PMID: 20152124]
3. Li W, Yu J, Liu Y, et al. Elevation of brain magnesium prevents synaptic loss and reverses cognitive deficits in Alzheimer's disease mouse model. *Mol Brain*. 2014 Sep 13;7(1):65. [PMID: 25213836]
4. Abumaria N, Yin B, Zhang L, et al. Effects of elevation of brain magnesium on fear conditioning, fear extinction, and synaptic plasticity in the infralimbic prefrontal cortex and lateral amygdala. *J Neurosci*. 2011 Oct 19;31(42):14871-81. [PMID: 22016520]
5. Slutsky I, Sadeghpour S, Li B, et al. Enhancement of synaptic plasticity through chronically reduced Ca²⁺ flux during uncorrelated activity. *Neuron*. 2004 Dec 2;44(5):835-49. [PMID: 15572114]
6. Wang D, Jacobs SA, Tsien JZ. Targeting the NMDA receptor subunit NR2B for treating or preventing age-related memory decline. *Expert Opin Ther Targets*. 2014 Oct;18(10):1121-30. [PMID: 25152202]
7. Liu G, Weinger JG, Lu ZL, et al. Efficacy and safety of mms-01, a synapse density enhancer, for treating cognitive impairment in older adults: a randomized, double-blind, placebo-controlled trial. *J Alzheimers Dis*. 2015 Oct 27;49(4):971-90. [PMID: 26519439]
8. Mickley GA, Hoxha N, Luchsinger JL, et al. Chronic dietary magnesium-L-threonate speeds extinction and reduces spontaneous recovery of a conditioned taste aversion. *Pharmacol Biochem Behav*. 2013 May;106:16-26. [PMID: 23474371]
9. Pochwat B, Szewczyk B, Sowa-Kucma M, et al. Antidepressant-like activity of magnesium in the chronic mild stress model in rats: alterations in the NMDA receptor subunits. *Int J Neuropsychopharmacol*. 2014 Mar;17(3):393-405. [PMID: 24067405]
10. Abumaria N, Luo L, Ahn M, et al. Magnesium supplement enhances spatial-context pattern separation and prevents fear overgeneralization. *Behav Pharmacol*. 2013 Aug;24(4):255-63. [PMID: 23764903]
11. Held K, Antonijevic IA, Künzel H, et al. Oral Mg(2+) supplementation reverses age-related neuroendocrine and sleep EEG changes in humans. *Pharmacopsychiatry*. 2002 Jul;35(4):135-43. [PMID: 12163983]
12. Abbasi B, Kimiagar M, Sadeghniaat K, et al. The effect of magnesium supplementation on primary insomnia in elderly: A double-blind placebo-controlled clinical trial. *J Res Med Sci*. 2011 Dec;17(12):1161-69. [PMID: 23853635]
13. Hornyak M, Voderholzer U, Hohagen F, et al. Magnesium therapy for periodic leg movements-related insomnia and restless legs syndrome: an open pilot study. *Sleep*. 1998 Aug 1;21(5):501-05. [PMID: 9703590]
14. Fromm L, Heath DL, Vink R, et al. Magnesium attenuates post-traumatic depression/anxiety following diffuse traumatic brain injury in rats. *J Am Coll Nutr*. 2004 Oct;23(5):529S-533S. [PMID: 15466958]
15. Eby GA, Eby KL. Rapid recovery from major depression using magnesium treatment. *Med Hypotheses*. 2006;67(2):362-70. [PMID: 16542786]

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