

Magnesium L-Threonate SAP

Science-based Magnesium L-threonate for optimal health

Magnesium is the second most abundant intracellular cation and the fourth most affluent cation in the body. Magnesium is a cofactor in more than 300 enzymatic reactions and is critically involved in energy metabolism, glucose utilization, protein synthesis, fatty acid synthesis and breakdown, and ATPase functions. It is a critical ion as it helps to maintain the ionic balance of other minerals such as sodium, potassium, and calcium. Magnesium deficiency is commonly found in chronic diseases, leading to inflammation of various pathologies. Diabetes mellitus, chronic renal failure, nephrolithiasis, osteoporosis, and heart and vascular disease alter magnesium balance. Magnesium L-threonate is beneficial, providing an enhanced absorption capacity. It has various health benefits, including elevating the brain's magnesium levels, increasing cognitive function, neuroprotection and neurotransmitter regulation, increasing mental clarity and focus, synaptic plasticity, and memory augmentation. **NFH Magnesium L-Threonate SAP** provides high quality Magnesium L-threonate to help support optimal health.

ACTIVE INGREDIENTS

Each vegetable capsule contains:

Magnesium L-threonate. 625 mg
Providing: Elemental magnesium. 50 mg

NON-MEDICINAL INGREDIENTS: Microcrystalline cellulose, vegetable magnesium stearate, and silicon dioxide in a capsule composed of vegetable carbohydrate gum and purified water.

This product is non-GMO and vegan friendly.

Contains no: Gluten, soy, wheat, corn, eggs, dairy, yeast, citrus, preservatives, artificial flavour or colour, starch, or sugar.

Magnesium L-Threonate SAP contains 90 capsules per bottle.

DIRECTIONS FOR USE

Adults: Take 1 capsule three times daily with food or as directed by your healthcare practitioner.

INDICATIONS

Magnesium L-Threonate SAP can:

- Help support cognitive and mental health and improve symptoms of dementia
- Help promote nerve health
- Help improve sleep quality and mood balance in women with breast cancer
- Help promote cardiovascular health
- Help support healthy muscle function and electrolyte balance

SAFETY, CAUTIONS, AND WARNINGS

Colour, size, and smell may vary from one lot to another.
Keep out of reach of children. Do not use if seal is broken.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for all **Magnesium L-Threonate SAP** lot numbers have been tested by a third-party laboratory for identity, potency, and purity.



Scientific Advisory Panel (SAP):
adding nutraceutical research
to achieve optimum health



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Magnesium is the second most abundant intracellular cation and the fourth most affluent cation in the body. Magnesium can exist in bound and free ionized forms, which rely on factors such as temperature, pH, ionic strength, and competing ions. [1] Magnesium ions possess high mobility because of their small size. Furthermore, they maintain high charge density and binding affinity toward molecules such as water and other oxygen-containing ligands. [2]

The total magnesium of an average adult is around 1000 mmol, equivalent to 20 mmol/kg of lean body mass. [3] Approximately 60 to 65% of total body magnesium is present in the teeth and bones, and the remaining is distributed in the muscles and body fluids. [4] Magnesium is a cofactor in more than 300 enzymatic reactions and is critically involved in energy metabolism, glucose utilization, protein synthesis, fatty acid synthesis and breakdown, and ATPase functions. [5] Activation of ATP is critical for any living organism, as it is an essential energy-yielding molecule for survival. [4] It is also involved in hormonal reactions and indispensable in the central and peripheral nervous systems. It is a critical ion as it helps to maintain the ionic balance of other minerals such as sodium, potassium, and calcium. [4]

Primary dietary sources of magnesium include seeds, cocoa, nuts like almonds, unrefined grains, and green leafy vegetables; additionally, hard water consumption is also considered a good source of magnesium. [6] As of late, many countries have revised the dietary reference intakes for magnesium as advised by multiple nutrition societies, including the US Institute of Medicine in 1997 and the German, Austrian, and Swiss Nutrition Societies (DA-CH) in 2000. According to these revisions, it is recommended that adults consume between 300 and 420 mg of magnesium per day. [7]

Magnesium homeostasis is mainly achieved by renal handling (kidneys). The magnesium ions are reabsorbed or excreted based on the serum magnesium status. [8] Thus, a common cause of magnesium deficiency is increased urinary output and reduced intestinal absorption. This condition can be a concern for individuals with inflammatory bowel disease, chronic diarrhea, or those on diuretics. It is also essential to consider older adults and patients with alcoholism, as they may be at a higher risk for magnesium deficiency. [9] Magnesium deficiency is commonly found in chronic diseases, leading to inflammation of various pathologies. Diabetes mellitus, chronic renal failure, nephrolithiasis, osteoporosis, and heart and vascular disease alter magnesium balance. [10]

Magnesium L-threonate is beneficial, providing an enhanced absorption capacity (15% approximately). It has various health benefits, including elevating the brain's magnesium levels, increasing cognitive function, neuroprotection and neurotransmitter regulation, increasing mental clarity and focus, synaptic plasticity, and memory augmentation [11], and may have a mild laxative effect. [12]

MENTAL HEALTH

Animal studies on the effects of Magnesium L-threonate on mental health revealed that it can help resolve cognitive problems. A randomized, double-blind study was conducted on adult male rats by administering 609 mg/kg/d of Magnesium L-threonate for two weeks before or after inducing a spared nerve injury (SNI). The study results showed that the drug helped in resolving short-term memory (STM) deficits. [13] Another animal study showed that Magnesium L-threonate can effectively resolve oxaliplatin-induced (OXA) memory and emotional deficits. This study used Magnesium L-threonate (604 mg/kg per day) on adult male Sprague-Dawley rats who received intraperitoneal injections of OXA. The result showed an upregulation of tumor necrosis factor (TNF- α) and phospho-p65 (p-p65), suggesting that it can help alleviate the chemotherapy-induced ill-effects and result in memory or emotional deficits. [14] A randomized, double-masked, placebo-controlled study on 109 healthy adults showed that receiving capsules (Magnesium L-threonate 400 mg, vitamin D3 80 IU, vitamin C 12 mg, vitamin B6 4 mg, phosphatidylserine 50 mg) can significantly improve directed memory (DM), paired-association learning (PAL), free recall of pictures (FRP), recognition of meaningless figures (RMF), portrait-features memory (PFM) and memory quotient (MQ) scores. [15] Similarly, another randomized, double-blind, placebo-controlled, parallel-designed study on older adults with cognitive impairment showed that receiving 1500 to 2000 mg of Magnesium L-threonate per day for 12 weeks could help in improving cognitive ability and substantially decline cognitive fluctuation in the affected individuals. [16]

In Alzheimer's disease-affected rats, the administration of Magnesium L-threonate and environmental enrichment (EE) showed synergistic improvement in recognition and spatial memory. This effect is the result of a decline in synaptic loss and the restoration of the N-methyl-D-aspartate receptor (NMDAR) signaling pathway. [17] In an open-label clinical trial, 15 patients affected by mild to moderate dementia were treated with 1800 mg of Magnesium L-threonate per day for two months, and they showed a significant improvement in the regional cerebral metabolism. Additionally, there was a substantial improvement in cognitive abilities, including executive function, attention, processing speed, verbal fluency, and memory. [18]

Another animal-based study showed that Magnesium L-threonate can help reverse the aversive memory towards a particular food. The rats used in the study were allowed to feed on saccharin consecutively, resulting in conditioned taste aversion (CTA), which quickly resolved after administering Magnesium L-threonate. [19]

NERVE HEALTH

A decline in the intracellular magnesium status during menopause can be observed as the estrogen levels drop; this effect results in neuroinflammation, chronic pain, and cognitive deficits related to memory and emotions. An animal-based research study on ovariectomized and aging mice showed that receiving chronic oral dosage of Magnesium L-threonate can help increase intracellular magnesium status and resolve menopause-related neuronal disorders. [20] Magnesium L-threonate is also proven effective against surgery-induced mechanical allodynia. A study on a rat model with skin/muscle incision and retraction (SMIR) showed an increase in pro-inflammatory cytokines post-procedure,

which substantially declined after receiving magnesium, thus helping in recovering from chronic pain and negative emotions. [21] Another animal study showed that acquiring 604 mg/kg/day of Magnesium L-threonate can resolve the neuropathic pain caused by chemotherapy. Magnesium supplementation can help alleviate the side effects caused by antineoplastic agents, including vincristine, by attenuating the activation of tumor necrosis factor- α / nuclear factor- κ B signaling and nociceptive sensitization. [22] A study on a mouse model affected by Alzheimer's disease revealed that Magnesium L-threonate can help reduce oxidative stress and hippocampal neuronal apoptosis by decreasing the reactive oxygen species (ROS) formation and increasing the viability of the cell. [23]

An open-label clinical study on adults affected by attention deficit hyperactivity disorder showed that administering 1000 mg of Magnesium L-threonate daily for 12 weeks could significantly help improve Adult ADHD Investigator Symptom Report Scale and Clinical Global Impression scores. Also, it helped in a substantial change in Matrix and full-scale IQ and Wechsler Abbreviated Scale of Intelligence-II. [24]

IMMUNE SUPPORT

An animal-based clinical study on a chronic-plus-binge alcohol-feeding mouse model showed that Magnesium L-threonate supplementation could help in downregulating the expression of inflammation markers in the serum, such as tumor necrosis factor- α , interleukin- β and white blood cells. Thus, this magnesium supplement has promising activity against alcohol-mediated inflammation and memory impairment. [25] The safety of immunoregulation of Magnesium L-threonate was also studied and proven in a clinical trial on patients affected by X-men disease. The supplementation of 670 mg of Magnesium L-threonate per day for 12 weeks was safe. [26]

CANCER

In a prospective, randomized, double-blind, placebo-controlled clinical study on 116 cancer patients under opioid treatment, consumption of 1500 to 2000 mg of Magnesium L-threonate per day for 90 days enhanced the analgesic effect, thereby reducing the opioid dosage, and there was also substantial relief from opioid-induced constipation. [27] In a similar study, 109 patients undergoing breast cancer surgery were supplemented with 1200 mg of Magnesium L-threonate daily for 12 weeks. The study result showed a moderate improvement in the sleep quality of the patients affected by pain post-surgery, and there was a decline in the anxiety scale. [28]

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INDICATION SPECIFIC DOSAGE SUMMARY BASED ON HUMAN CLINICAL RESEARCH#

#Please note these suggestions are guidelines based on the clinical studies. Evidence for efficacy and safety have been qualitatively (study quality in terms of study design, sample size, appropriate methods of analysis, use of appropriate placebo/control, bias etc) assessed and have been rated using a 5 star ★ rating classification.

Indication	Suggested dosage	Supporting evidence and study outcome	Study design	Outcome measures	Safety	Evidence quality rating
Mental Health						
Cognition ^{1,2}	3 capsules/day	Significant improvement in directed memory (DM), paired-association learning (PAL), free recall of pictures (FRP), recognition of meaningless figures (RMF), portrait-features memory (PFM), and memory quotient (MQ) scores	Randomized, double-blind, placebo-controlled study. (n=109); 1600 mg of Magnesium L-Threonate per day for 30 days Per capsule contained: Magnesium L-Threonate 400 mg; Vitamin D3: 80 IU Vitamin C: 12 mg Vitamin B6: 4 mg Phosphatidylserine 50 mg	The Clinical Memory Test, sleep, diet, excretion, heart rate, blood pressure, serum total protein, albumin, alanine, aminotransferase, aspartate aminotransferase, urea, creatinine, cholesterol, triglycerides, blood glucose	No severe adverse effects reported	★★★
	2 to 3 capsules/day	Significant improvement in cognitive ability, also a substantial decline in cognitive fluctuation	Randomized, double-blind, placebo-controlled, parallel-designed study. (n=44); 1500 to 2000 mg of Magnesium L-Threonate per day for 12 weeks	Hamilton Anxiety Questionnaire sub-score A (HAM-A), change in the body's magnesium status, The Trail Making Test – Part B (TMT-B), DigitSpan test, Eriksen Flanker Congruent/Incongruent test, sleep, Cognitive ability fluctuation analysis, emotion	Mild gastrointestinal disorders	★★★
Dementia ³	3 capsules/day	Significant improvement in the regional cerebral metabolism, also a substantial improvement in a global index of cognitive functioning	Open label study. (n=17); 1800 mg of Magnesium L- Threonate per day for 2 months	Alzheimer's Disease Assessment Scale (ADAS-COG), Mini Mental Status Examination (MMSE), Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), cognitive Function (DKEFS Color-Word Test), Wechsler Adult Intelligence Scale - Fourth edition (WAIS-IV)	No severe adverse effects reported	★★
Immune Health						
Cancer ⁴	2 to 3 capsules/day	Significant enhancement in analgesic effect which in turn reduced the necessary opioid dosage, also a substantial relief from opioid-induced constipation	Randomized, double-blind, placebo-controlled, prospective study.(n=116); 1500 to 2000 mg of Magnesium L- Threonate per day for 90 days	Increases in oral morphine equivalent daily doses (OMEDDs), dynamic changes in breakthrough cancer pain (BTcP), average visual analog scale (VAS) pain scores, relief of anxiety and depression symptoms, remission of opioid-induced constipation (OIC)	No severe adverse effects reported	★★★

Indication	Suggested dosage	Supporting evidence	Study design	Outcome measures/ selection criteria for studies	Safety	Evidence quality rating
Immune Health (continued)						
X-men disease ⁵	1 capsule/day	Significantly safe supplementation of magnesium in X-men disease affected patients, although no significant positive effects noted	Randomized, double-blind, placebo-controlled, crossover study. (n=8); 670 mg of Magnesium L-Threonate per day for 12 weeks	NKG2D expression change in CD8 + T cells, incidence and severity of adverse events (AEs) and improvement in EBV viral load	No severe adverse effects reported	★★
Nerve Health						
ADHD ⁶	1 to 2 capsules/day	Significant improvement in Adult ADHD Investigator Symptom Report Scale and Clinical Global Impression, also a substantial favorable change in Matrix and full-scale IQ and Wechsler Abbreviated Scale of Intelligence-II	Open label, pilot study. (n=15); 1000 mg of Magnesium L-Threonate per day for 12 weeks	Adult ADHD Investigator Symptom Report Scale (AISRS), Clinical Global Impression (CGI) – ADHD severity rating, Wechsler Abbreviated Scale of Intelligence-II (WASI-II) Matrix and full-scale IQ, and the Delis-Kaplan Executive Function System Trail-making substest	No severe adverse effects reported	★★
Women's Health						
Breast cancer ⁷	2 capsules/day	Moderate improvement in sleep quality and anxiety scale	Randomized, double-blind, placebo-controlled study.	McGill Pain Questionnaire (SF-MPQ), Generalized Anxiety Disorder Scale (GAD-7), Patient Health	No severe adverse effects reported	★★★

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