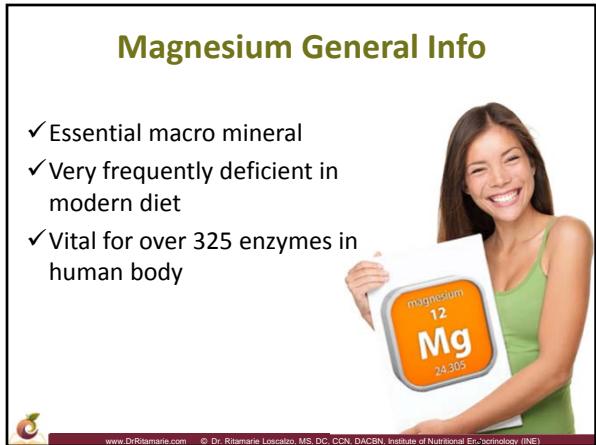


## INE: Micronutrients - Minerals: Magnesium



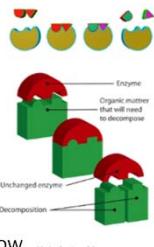
**Medical Disclaimer:** The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, [drritamarie.com](http://drritamarie.com), and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.



# INE: Micronutrients - Minerals: Magnesium

## Magnesium and Enzyme Regulation

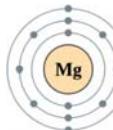
- ✓ Energy production, transport, storage and utilization
- ✓ Nerve conduction
- ✓ Heart and skeletal muscle contraction
- ✓ Skeletal strength
- ✓ DNA and RNA synthesis
- ✓ Cell reproduction and growth
- ✓ Heart activity
- ✓ Neuromuscular transmission
- ✓ Blood pressure and peripheral blood flow
- ✓ Entry and release of calcium from the cells



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## Magnesium Functions

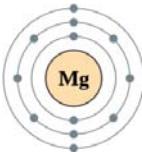
- ✓ Catalyst in enzyme activity, especially in energy production
- ✓ Assists in calcium and potassium uptake
- ✓ Necessary to prevent the calcification of soft tissue
- ✓ Protects the arterial linings from stress caused by sudden blood pressure changes
- ✓ Plays a role in the formation of bone
- ✓ Important in carbohydrate metabolism and insulin sensitivity
- ✓ Helps reduce and dissolve calcium phosphate kidney stones, and may prevent calcium-oxalate kidney stones (Along with vitamin B6)



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## Magnesium Functions – Part 2

- ✓ May reduce cholesterol levels
- ✓ Effective in preventing premature labor and convulsions in pregnant women
- ✓ Activating muscles and nerves
- ✓ Creating energy in your body by activating adenosine triphosphate (ATP)
- ✓ Helping digest proteins, carbohydrates, and fats
- ✓ Serving as a building block for RNA and DNA synthesis
- ✓ It's also a precursor for neurotransmitters like serotonin



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## Things That Deplete Magnesium

- ✓ Gluten
- ✓ Processed and overly cooked foods – they strip minerals from the body.
- ✓ Alcohol
- ✓ Herbicides and pesticides
- ✓ Refined sugar, corn syrup and artificial sweeteners.
- ✓ Prolonged stress
- ✓ table salt
- ✓ Tap water - sodium fluoride
- ✓ Unfermented soy products.
- ✓ Regular and decaffeinated coffee or black tea
- ✓ Excess zinc and Vitamin D



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## Magnesium Nutrient Interactions: Zinc

- ✓ High doses of zinc in supplemental form interfere with the absorption of magnesium.
- ✓ One study reported that zinc supplements of 142 mg/day in healthy adult males significantly decreased magnesium absorption and disrupted magnesium balance



Spencer H, Norris C, Williams D. Inhibitory effects of zinc on magnesium balance and magnesium absorption in man. *J Am Coll Nutr*. 1994;13(5):479-484. (PubMed)

## Magnesium Nutrient Interactions: *Protein*

- ✓ Magnesium absorption was lower when protein intake was less than 30 grams/day in adolescent boys.
- ✓ Higher protein intakes (93 grams/day vs. 43 grams/day) were associated with improved magnesium absorption in adolescents



Schwartz R, Walker G, Linz MD, MacKellar I. Metabolic responses of adolescent boys to two levels of dietary magnesium and protein. I. Magnesium and nitrogen retention. Am J Clin Nutr. 1973;26(5):510-518.

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## Cause of Magnesium Deficiency

- ✓ Deficient soil
- ✓ Processed foods
- ✓ Fluoride in water
- ✓ Food antagonists – high protein, tannins, oxalates, phytate
- ✓ Excess mineral antagonists – calcium, phosphorus
- ✓ Drugs
- ✓ Deficient vitamin D



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## Impact of Magnesium Deficiency

- ✓ Anxiety and panic attacks – adrenals
- ✓ Asthma – bronchial spasms and histamine
- ✓ Blood clots – blood becomes thicker
- ✓ Bowel disease – slower bowel function
- ✓ Cystitis (bladder infection) – bladder spasms
- ✓ Diabetes and blood sugar imbalances – glucose transport into cells
- ✓ Fatigue – important in Krebs cycle – glycolysis
- ✓ Irritability and nervousness
- ✓ Diabetes/insulin resistance



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## Impact of Magnesium Deficiency

- ✓ Heart disease – heart contraction, even fatal arrhythmias
- ✓ Hypertension – blood vessel spasm
- ✓ Insomnia – melatonin deficiency
- ✓ Kidney disease and kidney stones
- ✓ Migraine – serotonin related, muscle spasms
- ✓ Fibromyalgia
- ✓ Muscle cramping and spasms
- ✓ Vertigo
- ✓ Interferes with the transmission of nerve and muscle impulses



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## Impact of Magnesium Deficiency

- ✓ Osteoporosis
- ✓ Raynaud's
- ✓ Tooth decay
- ✓ Complications of pregnancy
  - preeclampsia
- ✓ PMS and menstrual cramps
- ✓ Mental confusion
- ✓ Depression – serotonin is magnesium dependent
- ✓ Slow detoxification



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## Magnesium Deficiency Signs from Nutrient Assessment Chart

<input type="checkbox"/> Anxiety <input type="checkbox"/> Breast cysts <input type="checkbox"/> Confusion <input type="checkbox"/> Constipation <input type="checkbox"/> Chronic stress <input type="checkbox"/> Cramps <input type="checkbox"/> Dandruff <input type="checkbox"/> Depression <input type="checkbox"/> Excess ear wax <input type="checkbox"/> Heart attack <input type="checkbox"/> Hyperactivity <input type="checkbox"/> Insomnia	 <p style="text-align: center;"> <b>magnesium</b>  <b>12</b>  <b>Mg</b>          24.305       </p>	<input type="checkbox"/> Irregular heartbeats <input type="checkbox"/> Irritability <input type="checkbox"/> Irritable Bowel Syndrome <input type="checkbox"/> Muscle weakness <input type="checkbox"/> Nausea <input type="checkbox"/> Nervousness <input type="checkbox"/> Noise sensitivity <input type="checkbox"/> PMS <input type="checkbox"/> Restlessness <input type="checkbox"/> Spasms <input type="checkbox"/> Twitching <input type="checkbox"/> Sores around mouth <input type="checkbox"/> Breaking nails
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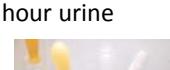
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## Assessing Magnesium Status

- ✓ Serum is not accurate: only 1% of magnesium is in blood
- ✓ Red and white blood cell magnesium
- ✓ Buccal Smear – EXATest – Intracellular Diagnostics
- ✓ Magnesium Challenge- IV plus 24 hour urine
- ✓ Blood Ionized magnesium
- ✓ Oral Challenge
- ✓ Spectracell
- ✓ NutrEval by Genova / Metametrix
- ✓ Questionnaires and good history taking for signs and symptoms





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# INE: Micronutrients - Minerals: Magnesium

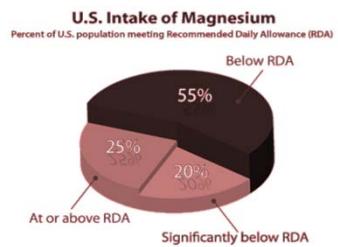
## Magnesium RDA

Table 1: Recommended Dietary Allowances (RDAs) for Magnesium [1]

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months	30 mg*	30 mg*		
7-12 months	75 mg*	75 mg*		
1-3 years	80 mg	80 mg		
4-8 years	130 mg	130 mg		
9-13 years	240 mg	240 mg		
14-18 years	410 mg	360 mg	400 mg	360 mg
19-30 years	400 mg	310 mg	350 mg	310 mg
31-50 years	420 mg	320 mg	360 mg	320 mg
51+ years	420 mg	320 mg		

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## Magnesium Intake in US



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## Methods of Magnesium Administration

- ✓ Food and herbs
- ✓ Oral supplements – to bowel tolerance
- ✓ Topical – magnesium oil
- ✓ Intravenous
- ✓ Intramuscular



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## INE: Micronutrients - Minerals: Magnesium

## Good Sources of Magnesium

- ✓ greens
- ✓ apples
- ✓ apricots
- ✓ avocados
- ✓ bananas
- ✓ brewer's yeast
- ✓ brown rice
- ✓ cantaloupe
- ✓ dulse
- ✓ figs
- ✓ watercress
- ✓ garlic
- ✓ grapefruit
- ✓ kelp
- ✓ lemons
- ✓ lima beans
- ✓ millet
- ✓ nuts
- ✓ peaches
- ✓ black-eyed peas
- ✓ sesame seeds



# Herbs High In Magnesium

Food Sources of Magnesium					
Food	Serving Size	Magnesium (mg)	Food	Serving Size	Magnesium (mg)
Spinach	1 cup	156.60	Oats	0.25 cup	69.03
Swiss Chard	1 cup	150.50	Tofu	4 oz	65.77
Beet Greens	1 cup	97.92	Almonds	0.25 cup	61.64
Pumpkin Seeds	0.25 cup	190.92	Papaya	1	57.96
Summer Squash	1 cup	43.20	Flaxseeds	2 TBS	54.88
Turmeric Greens	1 cup	31.68	Green Peas	1 cup	53.72
Soybeans	1 cup	147.92	Tuna	4 oz	47.63
Sesame Seeds	0.25 cup	126.36	Scallops	4 oz	41.96
Black Beans	1 cup	120.40	Collard Greens	1 cup	39.90
Quinoa	0.75 cup	118.40	Beets	1 cup	39.10
Cashews	0.25 cup	116.80	Broccoli	1 cup	32.76
Sunflower Seeds	0.25 cup	113.75	Brussels	1 cup	31.20
Navy Beans	1 cup	96.46	Raspberries	1 cup	27.06
Tempeh	4 oz	87.32	Winter Squash	1 cup	26.65
Buckwheat	1 cup	85.68	Cabbage	1 cup	25.50
Pinto Beans	1 cup	85.50	Asparagus	1 cup	25.20
Brown Rice	1 cup	83.85	Kale	1 cup	23.40
Lima Beans	1 cup	80.84	Green Beans	1 cup	22.50
Millet	1 cup	76.56	Tomatoes	1 cup	19.80
Kidney Beans	1 cup	74.34	Cantaloupe	1 cup	19.20

# INE: Micronutrients - Minerals: Magnesium

## Forms of Magnesium Supplementation

Absorption of oral magnesium supplements vary from 4% absorbed to about 50%.

Mineral salt forms	Acid Complexes – "Organic Salts"	Amino Acid Complexes – Chelates (most expensive)
✓ Bicarbonate	✓ Ascorbate	✓ Glycinate
✓ Carbonate	✓ Aspartate*	✓ Lysinate
✓ Chloride	✓ Citrate	✓ Orotate
✓ Hydroxide	✓ Fumarate	✓ Taurate
✓ Oxide – low bioavailability – 4%	✓ Gluconate	
	✓ Glutamate*	
	✓ Lactate	
	✓ Malate	
	✓ Pidolate	

\*Magnesium aspartate and glutamate break down into neurotransmitters that, when not bound with other amino acids, are neurotoxic.

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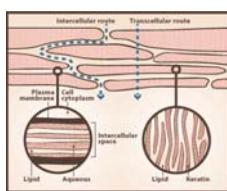
## Ionic Magnesium Liquid



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## Topical Magnesium

- ✓ Magnesium chloride Oil - 1 teaspoon ≈ 560 mg of elemental magnesium.
- ✓ Magnesium chloride bath flakes - 1 cup ≈ 15 g of elemental magnesium.
- ✓ Epsom salts – Magnesium sulfate – 2 cups dissolved in 15 gallons of water



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## INE: Micronutrients - Minerals: Magnesium

## Nebulized Magnesium

- ✓ 7.5 g Magnesium per 100 ml distilled water for pulmonary infections and lung problems
- ✓ Nebulized magnesium sulfate for acute asthma attack similar in studies to effectiveness of albuterol



<http://medind.nic.in/iac/t05/i1/iact05i1p29g.pdf>  
<http://www.ncbi.nlm.nih.gov/pubmed/9727782>

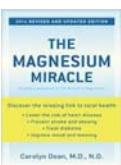


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## Resources

- ✓ Advanced Nutrition and Human Metabolism – Gropper, Smith and Groff
- ✓ The Magnesium Miracle
  - Carolyn Dean, MD
- ✓ Magnesium Factor
  - Mildred Seelig, MD
- ✓ Transdermal Magnesium Therapy
  - Mark Sircus
- ✓ Linus Pauling Institute:  
<http://lpi.oregonstate.edu/mic/minerals/magnesium>
- ✓ Ancient Minerals Website:  
<http://www.ancient-minerals.com/magnesium-supplement>
- ✓ Detailed article on Magnesium Function  
<http://www.iwm.edu.nl/old/doi/1532010/jurnal-16.pdf>



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