

MAGNESIUM SUPPLEMENTS (Systemic)

Introduction

Revised: 07/11/95

This monograph includes information on the following: 1) Magnesium Chloride b; 2) Magnesium Citrate d ; 3) Magnesium Gluceptate a; 4) Magnesium Gluconate ; 5) **Magnesium Hydroxide** c, d ; 6) Magnesium Lactate b; 7) Magnesium Oxide c, d ; 8) Magnesium Pidolate a; 9) Magnesium Sulfate#.

INN:

Magnesium gluceptate³/₄Magnesium glucoheptonate
Magnesium pidolate³/₄Magnesium pyroglutamate
VA CLASSIFICATION (Primary)³/₄TN406

Commonly used brand name(s): Almora⁴; Chloromag¹; Citro-Mag²; Citroma²; Concentrated Phillips' Milk of Magnesia⁵; MGP⁴; Mag 28; Mag-2007; Mag-L-1001; Mag-Ox 4007; Mag-Tab SR⁶; Maglucate⁴; Magnesium-Rougier³; Magonate⁴; Magtrate⁴; Maox⁷; Phillips' Chewable Tablets⁵; Phillips' Magnesia Tablets⁵; Phillips' Milk of Magnesia⁵; Slow-Mag¹; Uro-Mag⁷.

c See Antacids (Oral-Local) for antacid use of magnesium hydroxide and magnesium oxide.

d See Laxatives (Local) for laxative use of magnesium citrate, magnesium hydroxide, magnesium oxide, and magnesium sulfate.

e See Magnesium Sulfate (Systemic) for use in seizures and uterine tetany.

Note: For a listing of dosage forms and brand names by country availability, see Dosage Forms section(s).

a Not commercially available in the U.S.

b Not commercially available in Canada.

Category

Antihypomagnesemic³/₄Magnesium Chloride; Magnesium Citrate; Magnesium Gluceptate; Magnesium Gluconate; Magnesium Hydroxide; Magnesium Lactate; Magnesium Oxide; Magnesium Pidolate; Magnesium Sulfate.

Electrolyte replenisher³/₄Magnesium Chloride Injection; Magnesium Sulfate.

Nutritional supplement (mineral)³/₄Magnesium Chloride; Magnesium Citrate; Magnesium Gluceptate; Magnesium Gluconate; Magnesium Hydroxide; Magnesium Lactate; Magnesium Oxide; Magnesium Pidolate; Magnesium Sulfate.

Indications

Note: Bracketed information in the Indications section refers to uses that are not included in U.S. product labeling.

Accepted

Electrolyte depletion (treatment)¼Parenteral magnesium chloride and magnesium sulfate are used in conditions that require an increase in magnesium ions for electrolyte adjustment. 1, 48

Hypomagnesemia (prophylaxis and treatment)¼Magnesium supplements are indicated for correction of hypomagnesemia in patients with low or restricted oral intake 4, 38, 47 or conditions in which requirements for magnesium are increased, such as chronic alcoholism, 6, 7, 20, 42 diabetic ketoacidosis, 44, 46, 47 gastrointestinal disease (chronic diarrhea, Crohn's, ulcerative colitis), 44, 45 hyperaldosteronism, 44 hypercalcemia, 44 hypomagnesemic hypocalcemia, 74, 75 hypomagnesemic hypokalemia, 39, 40, 76 hyperparathyroidism, 44 hyperthyroidism, 44 pancreatic insufficiency, 44 renal tubular acidosis, 47 stress, 69, 47 or possibly patients who are receiving thiazide or loop diuretics, 6, 7, 10, 28, 34, 67 cisplatin, 49, 50 amphotericin B therapy, 51 cyclosporine, 41 gentamicin, or digitalis glycosides, 78, 79 or are on total parenteral nutrition (TPN) therapy. 47, 65, 66 For prophylaxis of magnesium deficiency, dietary improvement, rather than supplementation, is advisable. For treatment of magnesium deficiency, supplementation is preferred.

Deficiency of magnesium may lead to irritability, 4, 76 mental derangement, 4 muscle weakness, 4, 76 tetany, 37, 76 and cardiac arrhythmias. 43, 69

Recommended intakes for all vitamins and most minerals are increased during pregnancy. Many physicians recommend that pregnant women receive multivitamin and mineral supplements, especially those pregnant women who do not consume an adequate diet and those in high-risk categories (i.e., women carrying more than one fetus, heavy cigarette smokers, and alcohol and drug abusers). 90 Taking excessive amounts of a multivitamin and mineral supplement may be harmful to the mother and/or fetus and should be avoided.

Recommended intakes for all vitamins and most minerals are increased during breast-feeding. 4

Antacid¼See Antacids (Oral-Local) .

Laxative¼See Laxatives (Local) .

Seizures (treatment)¼See Magnesium Sulfate (Systemic) .

[Tachycardia, ventricular, atypical (treatment)]¼See Magnesium Sulfate (Systemic) .

Tetany, uterine (treatment)¼See Magnesium Sulfate (Systemic) .

Pharmacology/Pharmacokinetics

Physicochemical characteristics:

Molecular weight¼Elemental magnesium: 24.3 6

Magnesium chloride: 203.3 2

Magnesium citrate: 451.1 2

Magnesium gluceptate: 474.7 3

Magnesium gluconate: 450.6 3

Magnesium hydroxide: 58.3 2

Magnesium lactate: 202.4 3

Magnesium oxide: 40.3 2

Magnesium pidolate: 280.5 3

Magnesium sulfate: 246.47 2

Mechanism of action/Effect:

Magnesium is necessary for the proper functioning of over 300 enzymes, including several in glycolysis and the Krebs cycle, adenylyl cyclase, which forms cyclic-AMP, and various phosphatase reactions in protein and nucleic acid synthesis. Magnesium is also necessary for neuromuscular transmission and activity, bone mineralization, and parathyroid hormone function. 4, 37

Other effects

Calcium homeostasis is dependent on magnesium, with hypomagnesemia often being accompanied by hypocalcemia. 6 Magnesium is necessary for secretion of parathyroid hormone (PTH) and also for the action of PTH at the site of its target organs. 6, 74, 76 High doses of magnesium have been found to inhibit calcium absorption due to suppression of PTH secretion. 27, 36, 76 Hypokalemia is frequently found with hypomagnesemia, possibly due to magnesium deficiency enhancing renal excretion of potassium or magnesium deficiency effecting the sodium-potassium pump. 5, 6, 39, 44, 76

Absorption:

Approximately 35 to 40% of dietary magnesium is absorbed through the jejunum and ileum. 5, 6 Some magnesium is reabsorbed from bile and pancreatic and intestinal juices. 6 High fat diets or fat malabsorption syndromes have been found to interfere with magnesium absorption. 69

Protein binding:

Approximately 30% of magnesium is bound intracellularly to protein and energy-rich phosphates. 6

Storage

Primarily bone, skeletal muscle, kidney, liver, and heart; small amounts found in extracellular fluid and erythrocytes. 5

Time to peak concentration:

Oral³/₄ hours. 6

Duration of action:

Oral³/₄ to 6 hours. 6

Elimination:

Parenteral magnesium is eliminated renally. 1, 6 Oral magnesium is eliminated renally and fecally. 6

Precautions to Consider

Pregnancy/Reproduction

Pregnancy³/₄Parenteral magnesium sulfate³/₄

When magnesium sulfate is parenterally administered in the treatment of eclampsias (toxemias) of pregnancy, it readily crosses the placenta and rapidly attains fetal serum concentrations that approximate those of the mother. The effects of magnesium on the neonate are similar to those on the mother and may include hypotonia, hyporeflexia, hypotension, 33 and respiratory depression when the mother has received magnesium sulfate prior to delivery. It is therefore usually not administered to the mother during the 2 hours preceding delivery unless it is the only therapy available to prevent eclamptic seizures. Magnesium sulfate can be administered continuously by intravenous drip at a rate of 1 to 2 grams every hour, provided the patient is closely monitored for magnesium plasma concentrations, blood pressure, respiratory rate, and deep tendon reflexes. 64, 80

FDA Pregnancy Category D. 64

Other magnesium salts and oral magnesium sulfate³/₄

Problems in humans have not been documented with intake of normal daily recommended amounts. FDA pregnancy categories have not been assigned.

Breast-feeding

Problems in humans have not been documented with intake of normal daily recommended amounts.

Pediatrics

Problems in pediatrics have not been documented with intake of normal daily recommended amounts. Magnesium chloride injection that contains benzyl alcohol as a preservative should not be used in newborn and immature infants. The use of benzyl alcohol in neonates has been associated with a fatal toxic syndrome consisting of metabolic acidosis and CNS, respiratory, circulatory, and renal function impairment.

Geriatrics

Problems in geriatrics have not been documented with intake of normal daily recommended amounts.

The elderly may be at risk of developing a magnesium deficiency due to poor food selection, decreased absorption, diseases that cause magnesium depletion, or medications that may increase urinary loss of magnesium. 28, 60, 61, 62, 63

Drug interactions and/or related problems

The following drug interactions and/or related problems have been selected on the basis of their potential clinical significance (possible mechanism in parentheses where appropriate)³not necessarily inclusive (>> = major clinical significance):

Note: Combinations containing any of the following medications, depending on the amount present, may also interact with magnesium supplements.

Alcohol or

Glucose 69

(high alcohol or glucose intake has been found to increase urinary excretion of magnesium 6, 7, 20)

Amphotericin B or 51

Cisplatin or 49, 50

Cyclosporine or 41

Gentamicin 47, 65, 66

(magnesium requirements may be increased in patients receiving these nephrotoxic medications due to renal magnesium wasting 49, 50, 51)

Calcium (intravenous salts)

(concurrent use may neutralize effects of parenteral magnesium sulfate; however, calcium gluconate and calcium gluceptate are used to antagonize the toxic effects of hypermagnesemia 1, 21 , also, calcium sulfate may precipitate when a calcium salt is admixed with magnesium sulfate in the same intravenous solution; calcium salts and magnesium sulfate may be administered through separate intravenous lines if required in post-parathyroidectomy "hungry bones" syndrome or tetany associated with hypocalcemia and hypomagnesemia 22)

Calcium-containing medications, oral

(concurrent use with magnesium supplements may increase serum calcium or magnesium concentrations in susceptible patients, primarily patients with renal insufficiency 1)

>> Cellulose sodium phosphate

Edetate disodium 68

(concurrent use with magnesium supplements may result in binding of magnesium; patients should be advised not to take magnesium supplements within 1 hour of cellulose sodium phosphate or edetate disodium 8, 9, 83)

CNS depression-producing medications, other (See Appendix II)

(CNS depressant effects may be potentiated when these medications are used concurrently with parenteral magnesium 1)

Digitalis glycosides

(hypomagnesemia has been reported in patients receiving digitalis glycosides 79 and may lead to digitalis toxicity 78 ; therefore, serum magnesium concentrations should be monitored in patients receiving digitalis glycosides, as magnesium supplements may be necessary 81)

(concurrent use with magnesium supplements may inhibit absorption, possibly decreasing plasma concentrations of digitalis glycosides; 18 magnesium salts in digitalized patients must be administered with extreme caution, especially if intravenous calcium salts are also employed; cardiac conduction changes and heart block may occur 1)

Diuretics, loop or

Diuretics, thiazide 34

(long-term use of loop or thiazide diuretics may impair the magnesium-conserving ability of the kidneys and lead to hypomagnesemia; 6, 7, 10, 28 serum magnesium levels should be monitored in patients receiving thiazide or loop diuretics)

Diuretics, potassium-sparing

(long-term use of potassium-sparing diuretics has been found to increase renal tubular reabsorption of magnesium; use with magnesium supplements may cause hypermagnesemia, especially in patients with renal insufficiency 10, 11, 28)

Etidronate, oral

(concurrent use with oral magnesium supplements may prevent absorption of oral etidronate; patients should be advised to avoid using magnesium supplements within 2 hours of etidronate 26)

>> Magnesium-containing preparations, other, such as:

Antacids

Laxatives 30, 31, 35

(concurrent use with magnesium supplements may cause magnesium toxicity, especially in patients with renal insufficiency 29)

Misoprostol

(concurrent use with magnesium supplements may aggravate misoprostol-induced diarrhea 12)

Neuromuscular blocking agents

(concurrent use with parenteral magnesium may result in severe and unpredictable potentiation of neuromuscular blockade 13, 14, 15, 16)

>> Sodium polystyrene sulfonate

(sodium polystyrene sulfonate may bind with oral magnesium supplements; 23 concurrent use is not recommended, although the risk may be less with rectal administration of sodium polystyrene sulfonate 24, 25)

>> Tetracyclines, oral

(concurrent use with magnesium supplements may decrease absorption of tetracyclines because of possible formation of nonabsorbable complexes; patients should be advised not to take magnesium supplements within 1 to 3 hours of taking an oral tetracycline 17, 18, 19, 27)

Medical considerations/Contraindications

The medical considerations/contraindications included have been selected on the basis of their potential clinical significance (reasons given in parentheses where appropriate)¼ not necessarily inclusive (>> = major clinical significance).

Risk-benefit should be considered when the following medical problems exist

Heart block or 1, 64

Myocardial damage 1, 64

(conditions may be exacerbated; magnesium should be infused at a slower rate with careful monitoring of serum magnesium concentrations 82)

Renal function impairment, severe

(may cause high levels of magnesium; reduction of magnesium supplement dosage may be necessary 1)

Sensitivity to parenteral magnesium 32

(sensitivity has been reported with use of parenteral magnesium in higher doses; sensitivity to oral magnesium supplements in recommended doses has not been reported)

Patient monitoring

The following may be especially important in patient monitoring (other tests may be warranted in some patients, depending on condition; >> = major clinical significance):

Magnesium concentrations, serum and urinary

(recommended daily for severe deficiency 82 and monthly for chronic deficiency 83 to determine status; magnesium equilibrates slowly with the intracellular compartment 5, 70 ; thus serum magnesium concentrations may not be reliable indicators of normal tissue levels 58, 59, 69)

Side/Adverse Effects

The following side/adverse effects have been selected on the basis of their potential clinical significance (possible signs and symptoms in parentheses where appropriate)¾not necessarily inclusive:
Those indicating need for medical attention

Incidence rare (with parenteral magnesium only)

Flushing 1, 58; hypotension (dizziness or fainting) 1, 58; irritation and pain at injection site¾for intramuscular administration only 86; muscle paralysis 1, 58; respiratory depression (troubled breathing) 1, 58

Those indicating need for medical attention only if they continue or are bothersome

Incidence less frequent (with oral magnesium)

Diarrhea 57

Overdose

For specific information on the agents used in the management of magnesium overdose, see

· Calcium Gluconate in Calcium Supplements monograph.

For more information on the management of overdose or unintentional ingestion, contact a Poison Control Center (see Poison Control Center Listing).

Clinical effects of overdose

The following effects have been selected on the basis of their potential clinical significance (possible signs and symptoms in parentheses where appropriate)¾not necessarily inclusive:

Symptoms of overdose (rare in patients with normal renal function) 4, 53

Asystole 31; bradycardia (slow heartbeat) 55; CNS depression (severe drowsiness) 53; coma 54; hypotension (dizziness or fainting) 31, 54, 56; muscle paralysis 30, 55; renal failure (blurred or double vision ; increased or decreased urination) 31; respiratory failure (troubled breathing) 30, 54, 55

Treatment of overdose

Discontinue magnesium-containing preparations.

Supportive care¾

Maintain respiration. 52

Specific treatment¾

If serum magnesium levels exceed 5 mEq per liter and adult patient is symptomatic, giving 10 mL of 10% calcium gluconate over several minutes. The dose may be repeated one time. 53

Patient Consultation

As an aid to patient consultation, refer to Advice for the Patient, Magnesium Supplements (Systemic). In providing consultation, consider emphasizing the following selected information (>> = major clinical significance):

Description of use

Description should include function in the body; signs of deficiency

Importance of diet

Importance of proper nutrition; supplement may be needed because of inadequate dietary intake

Food sources of magnesium; effects of processing

Recommended daily intake for magnesium

Before using this medication

>> Conditions affecting use, especially:

Sensitivity to magnesium

Use in the elderly: More likely to develop magnesium deficiency

Other medications, especially cellulose sodium phosphate, oral tetracyclines, other magnesium-containing preparations, or sodium polystyrene sulfonate

Other medical problems, especially heart block, renal function impairment, hypotension, or respiratory depression

Proper use of this medication

>> Proper dosing

Taking with meals to prevent diarrhea

Proper administration technique

Not crushing or chewing extended-release dosage forms, unless otherwise directed

Proper mixing for powder form

Missed dose: No cause for concern because of length of time necessary for depletion; remembering to take as directed

>> Proper storage

Side/adverse effects

Signs of potential side effects, especially dizziness or fainting, flushing, irritation and pain at injection site for intramuscular injection only, muscle paralysis, or troubled breathing (with injection)

General Dosing Information

Magnesium supplements should be taken with meals because taking them on an empty stomach may cause diarrhea. 87

The action of magnesium supplements depends upon their content of magnesium ion. There are 12.2 mg of elemental magnesium per 1 mEq elemental magnesium. The various magnesium salts contain the following amounts of elemental magnesium:

Magnesium salt	Magnesium (mg/gram)	Magnesium (mEq/gram)	Magnesium (mM/gram)	Magnesium %
Magnesium chloride (hydrous)	120	9.8	4.9	12
Magnesium citrate (anhydrous)	162	4.4	2.2	16.2
Magnesium gluceptate (anhydrous)	51.3	4.2	2.1	5.1
Magnesium gluconate (hydrous)	54	4.4	2.2	5.4
Magnesium hydroxide (anhydrous)	417	34.3	17.2	41.7
Magnesium lactate (anhydrous)	120	9.8	4.9	12
Magnesium oxide (anhydrous)	603	49.6	24.8	60.3
Magnesium pidolate (anhydrous)	87	7.2	3.6	8.7
Magnesium sulfate (hydrous)	99	8.1	4.1	9.9

For parenteral dosage forms only

In most cases, parenteral administration is indicated only when oral administration is not acceptable (for example, in nausea, vomiting, preoperative and postoperative conditions) or possible (for example, in malabsorption syndromes or following gastric resection).

Diet/Nutrition

Recommended dietary intakes for magnesium are defined differently worldwide.

For U.S.¼

The Recommended Dietary Allowances (RDAs) for vitamins and minerals are determined by the Food and Nutrition Board of the National Research Council and are intended to provide adequate nutrition in most healthy persons under usual environmental stresses. In addition, a different designation may be used by the FDA for food and dietary supplement labeling purposes, as with Daily Value (DV). DVs

replace the previous labeling terminology United States Recommended Daily Allowances (USRDA). 4, 88

For Canada³

Recommended Nutrient Intakes (RNIs) for vitamins, minerals, and protein are determined by Health and Welfare Canada and provide recommended amounts of a specific nutrient while minimizing the risk of chronic diseases. 89

Daily recommended intakes for elemental magnesium are generally defined as follows: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

The best dietary sources of magnesium include green leafy vegetables, nuts, legumes, and cereal grains in which the germ or outer layers have not been removed. 4, 6 Hard water has a higher concentration of magnesium than soft water. 5 The magnesium content of food is reduced by refining and cooking. 6

MAGNESIUM CHLORIDE

Summary of Differences

Category: Injection may also be used as an electrolyte replenisher.

Precautions: Drug interactions and/or related problems³Possible additive effects when parenteral calcium chloride given with CNS depression-producing medications and neuromuscular blocking agents.

Oral Dosage Forms

MAGNESIUM CHLORIDE TABLETS

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)³

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children	40-80	20-50
Birth to 3 years of age		
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.^{3/4}64 mg elemental magnesium (OTC)[Slow-Mag]

Canada^{3/4}Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM CHLORIDE ENTERIC-COATED TABLETS

Usual adult and adolescent dose

See Magnesium Chloride Tablets.

Usual pediatric dose

Dosage form not appropriate for use in children.

Strength(s) usually available

U.S.¾100 mg elemental magnesium (833 mg magnesium chloride) (OTC)[Mag-L-100]

Canada¾Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM CHLORIDE EXTENDED-RELEASE TABLETS

Usual adult and adolescent dose

See Magnesium Chloride Tablets.

Usual pediatric dose

Dosage form not appropriate for use in children.

Strength(s) usually available

U.S.¾64 mg elemental magnesium (535 mg magnesium chloride) (OTC)[Slow-Mag 88]

Canada¾Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Parenteral Dosage Forms

MAGNESIUM CHLORIDE INJECTION

Usual adult and adolescent dose

Electrolyte replenisher^{3/4}

For intravenous infusion, 4 grams of magnesium chloride (39.2 mEq of elemental magnesium) diluted in 250 mL of dextrose 5% and infused at a rate not to exceed 3 mL per minute. 48

Hypomagnesemia (prophylaxis)^{3/4}

Intravenous infusion, as part of total parenteral nutrition solution, the specific amount determined by individual patient need.

Usual adult prescribing limits

40 grams a day. 48

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Intravenous infusion, as part of total parenteral nutrition solution, the specific amount determined by individual patient need.

Note: Magnesium chloride injection that contains benzyl alcohol as a preservative should not be used in newborn and immature infants. The use of benzyl alcohol in neonates has been associated with a fatal toxic syndrome consisting of metabolic acidosis and CNS, respiratory, circulatory, and renal function impairment.

Strength(s) usually available

U.S.^{3/4}200 mg magnesium chloride per mL (Rx)[Chloromag 89] [Generic]

Canada^{3/4}Not commercially available.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM CITRATE

Oral Dosage Forms

MAGNESIUM CITRATE ORAL SOLUTION USP

Usual adult dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.^{3/4} 47 mg elemental magnesium (290 mg magnesium citrate) per 5 mL (OTC)[Citroma] [Generic]

Canada^{3/4} 40.5 mg elemental magnesium (250 mg magnesium citrate) per 5 mL (OTC)[Citro-Mag]

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM GLUCEPTATE

Oral Dosage Forms

MAGNESIUM GLUCEPTATE ORAL SOLUTION

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.¼Not commercially available.

Canada¼25 mg elemental magnesium (500 mg magnesium gluceptate) per 5 mL (OTC)[Magnesium-Rougier]

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM GLUCONATE

Oral Dosage Forms

MAGNESIUM GLUCONATE ORAL SOLUTION

Usual adult and adolescent dose

Deficiency (prophylaxis)¼

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Deficiency (treatment)¼

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Deficiency (prophylaxis)¼

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Deficiency (treatment)%

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.%454 mg elemental magnesium (1 gram magnesium gluconate) per 5 mL (OTC)[Magonate 88, 90]

Canada%Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

MAGNESIUM GLUCONATE TABLETS USP

Usual adult and adolescent dose

See Magnesium Gluconate Oral Solution.

Usual pediatric dose

See Magnesium Gluconate Oral Solution.

Strength(s) usually available

U.S.%27 mg elemental magnesium (500 mg magnesium gluconate)[Almora 88 (OTC)] [Magonate 88 (OTC)] [Magtrate 88 (OTC)] [MGP (Rx)] [Generic]

29 mg elemental magnesium (550 mg magnesium gluconate) (Rx) [Generic]

Canada%29.3 mg elemental magnesium (500 mg magnesium gluconate) (OTC)[Maglucate]

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM HYDROXIDE

Oral Dosage Forms

MAGNESIA TABLETS USP

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on intake of normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.¼135 mg elemental magnesium (325 mg magnesium hydroxide) (OTC) [Generic]

Canada¾Not commercially available.

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIA TABLETS (CHEWABLE) USP

Usual adult and adolescent dose

See Magnesium Tablets USP.

Usual pediatric dose

See Magnesia Tablets USP.

Strength(s) usually available

U.S.¼130 mg elemental magnesium (311 mg magnesium hydroxide) (OTC)[Phillips' Chewable Tablets]

Canada¾129 mg elemental magnesium (310 mg magnesium hydroxide) (OTC)[Phillips' Magnesia Tablets]

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MILK OF MAGNESIA USP

Usual adult and adolescent dose

See Magnesia Tablets USP.

Usual pediatric dose

See Magnesia Tablets USP.

Strength(s) usually available

U.S. ¼164 mg elemental magnesium (400 mg magnesium hydroxide) per 5 mL (OTC)[Phillips' Milk of Magnesia] [Generic]

328 mg elemental magnesium (800 mg magnesium hydroxide) per 5 mL (OTC)[Concentrated Phillips' Milk of Magnesia]

Canada ¼170 mg elemental magnesium (408 mg magnesium hydroxide) per 5 mL (OTC)[Phillips' Milk of Magnesia]

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM LACTATE

Oral Dosage Forms

MAGNESIUM LACTATE EXTENDED-RELEASE TABLETS

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)¾

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)¾

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Dosage form not appropriate for use in children.

Strength(s) usually available

U.S. 84 mg elemental magnesium (840 mg magnesium lactate) (OTC)[Mag-Tab SR]

Canada Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM OXIDE

Oral Dosage Forms

MAGNESIUM OXIDE CAPSULES USP

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.^{3/4} 4.5 mg elemental magnesium (140 mg magnesium oxide) (OTC)[Uro-Mag] [Generic]

Canada^{3/4} Not commercially available.

Note: The strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM OXIDE TABLETS USP

Usual adult and adolescent dose

See Magnesium Oxide Capsules USP.

Usual pediatric dose

See Magnesium Oxide Capsules USP .

Strength(s) usually available

U.S.^{3/4} 200 mg elemental magnesium (332 mg magnesium oxide)[Mag-200 88]

241.3 mg elemental magnesium (400 mg magnesium oxide) (OTC)[Mag-Ox 400 (scored) 88] [Generic]

250 mg elemental magnesium (420 mg magnesium oxide) (OTC)[Maax (tartrazine)] [Generic]

302 mg elemental magnesium (500 mg magnesium oxide) (OTC) [Generic]

Canada 50 mg elemental magnesium (OTC) [Generic]

Note: Some strengths of these magnesium preparations may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

MAGNESIUM PIDOLATE

Oral Dosage Forms

MAGNESIUM PIDOLATE FOR ORAL SOLUTION

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children	40-80	20-50

Birth to 3 years of age		
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.^{3/4}Not commercially available.

Canada^{3/4}122 mg elemental magnesium (1500 mg magnesium pidolate) per 4 grams (OTC)[Mag 2]

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Preparation of dosage form:

Pour contents of one pouch into a glass, add some water and stir quickly. 39

Auxiliary labeling:

- Take before meals.

MAGNESIUM SULFATE

Summary of Differences

Category: Injection may also be used as an electrolyte replenisher.

Precautions: Drug interactions and/or related problems^{3/4}Parenteral magnesium sulfate may form a precipitate when mixed with calcium salts. Possible additive effects when given with CNS depression-producing medications and neuromuscular blocking agents.

Oral Dosage Forms

MAGNESIUM SULFATE CRYSTALS

Usual adult and adolescent dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Adolescent and adult males	270-400	130-250
Adolescent and adult females	280-300	135-210
Pregnant females	320	195-245
Breast-feeding females	340-355	245-265

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Usual pediatric dose

Hypomagnesemia (prophylaxis)^{3/4}

Oral, amount based on normal daily recommended intakes of elemental magnesium: 4, 89

Persons	U.S. (mg)	Canada (mg)
Infants and children Birth to 3 years of age	40-80	20-50
4 to 6 years of age	120	65
7 to 10 years of age	170	100-135

Hypomagnesemia (treatment)^{3/4}

Treatment dose is individualized by prescriber based on severity of deficiency.

Strength(s) usually available

U.S.^{3/4}40 mEq per 5 mg (OTC) [Generic]

Canada^{3/4}Not commercially available.

Note: The strength of this magnesium preparation may exceed the dosage range recommended by USP DI Advisory Panels based on the amount necessary to meet normal nutritional needs.

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Parenteral Dosage Forms

MAGNESIUM SULFATE INJECTION USP

Usual adult and adolescent dose

Antihypomagnesemic or
Electrolyte replenisher^{3/4}

Intramuscular, 1 to 2 grams of a 50% solution (8.1 to 16.2 mEq elemental magnesium) four times a day until serum magnesium is within normal limits. 1

Intravenous infusion, 5 grams (40.5 mEq elemental magnesium) in 1000 mL of dextrose 5% or sodium chloride 0.9% infused over 3 hours. 71

Hypomagnesemia (prophylaxis)^{3/4}

Intravenous infusion, as part of total parenteral nutrition solution, the specific amount determined by individual patient need.

Usual pediatric dose

Antihypomagnesemic or
Electrolyte replenisher^{3/4}

Intramuscular, 20 to 40 mg (0.16 to 0.32 mEq elemental magnesium) per kg of body weight in a 20% solution, repeated as necessary. 1

Hypomagnesemia (prophylaxis)^{3/4}Intravenous infusion, as part of total parenteral nutrition solutions, the specific amount determined by individual patient need.

Strength(s) usually available

U.S.^{3/4}10% w/v (100 mg, 0.8 mEq, 0.8 mOsm per mL) (Rx) [Generic]

12.5% w/v (125 mg, 1 mEq, 1 mOsm per mL) (Rx) [Generic]

25% w/v (250 mg, 2 mEq per mL) (Rx) [Generic]

50% w/v (500 mg, 4 mEq, 4 mOsm per mL) (Rx) [Generic]

Canada^{3/4}50% w/v (500 mg per mL) (Rx) [Generic]

Packaging and storage:

Store below 40 °C (104 °F), preferably between 15 and 30 °C (59 and 86 °F), unless otherwise specified by manufacturer.

Incompatibilities:

Magnesium sulfate in solution may form a precipitate when mixed with solutions containing: 82

Alcohol (in high concentrations)	Heavy metals
Alkali carbonates and bicarbonates	Hydrocortisone sodium succinate
Alkali hydroxides	Phosphates
Arsenates	Polymyxin B sulfate
Barium	Procaine hydrochloride
Calcium	Salicylates
Clindamycin phosphate	Sodium bicarbonate
Dobutamine	Strontium
Fat emulsions	Tartrates

The potential incompatibility will often be influenced by changes in the concentration of reactants and the pH of the solution. 72

It has been reported that magnesium may reduce the antibiotic activity of streptomycin, tetracycline, and tobramycin when any of those medicines and magnesium are given together. 72