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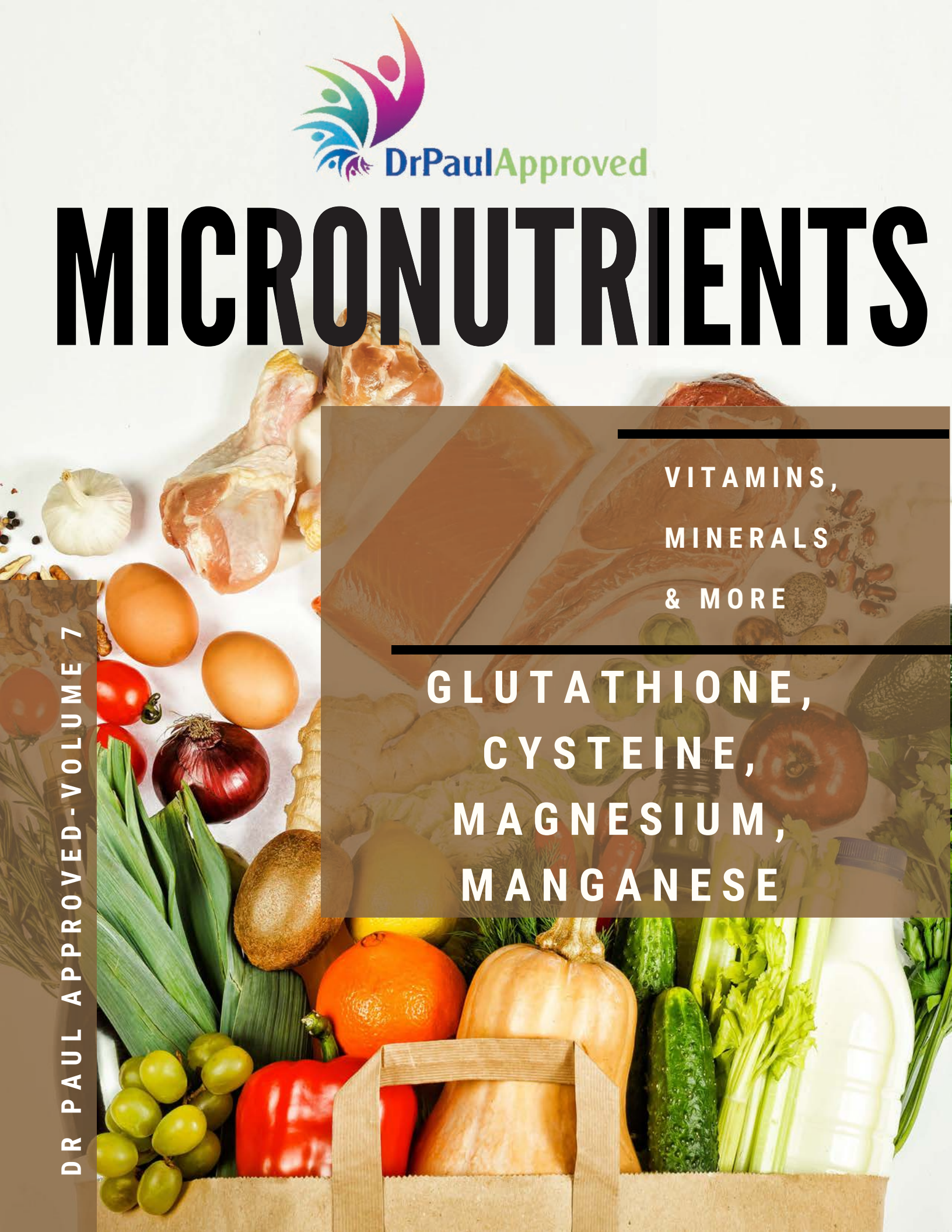
MICRONUTRIENTS



VITAMINS,

MINERALS

& MORE

GLUTATHIONE, CYSTEINE, MAGNESIUM, MANGANESE

DR PAUL APPROVED-VOLUME 7

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Check Vitamin Levels At Home:
https://trylgc.com/paulthomasvitamin

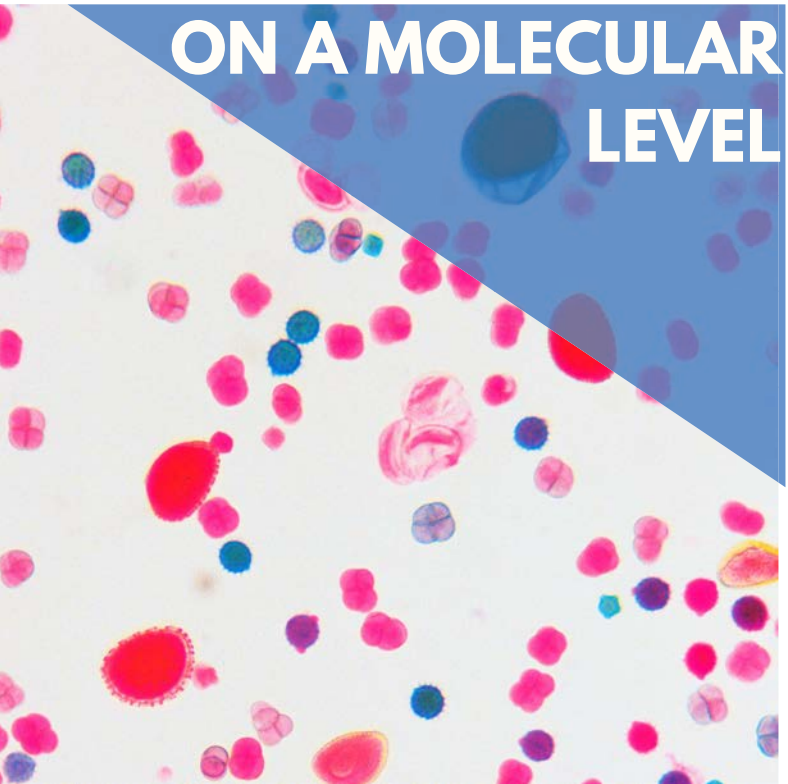
GLUTATHIONE

WHY IS IT IMPORTANT?

Glutathione is a tri-peptide made from three amino acids: cysteine, glycine and glutamate. Cysteine seems to be the rate limiting amino acid, hence it's use in replacement by those attempting to increase glutathione levels.

Glutathione is perhaps the most important molecule in our bodies in the areas of antioxidant protection and detoxification (getting toxins out of the body). Glutathione is involved in the binding of toxic metals to prepare them for excretion in the urine. Mitochondria are not only the power houses for energy in the cells but also the location where most reactive oxygen species (ROS) from oxygen consumption and the death of cells occurs. It is these redox reactions that are involved in most inflammatory disorders, oxidative stress and diseases. Gutathione is perhaps the most important anti-oxidant and it is vulnerable when the methylation cycle is compromised, or cell membrane mitochondrial carriers are compromised (the mitochondria do not make their own glutathione).

ON A MOLECULAR LEVEL

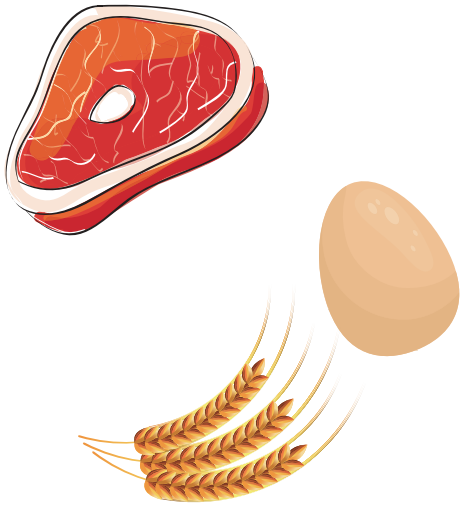


Glutathione spares the other key antioxidants (vitamin C and vitamin E, carotenoids and selenium) by reducing oxidized forms and by eliminating hydrogen peroxide by reacting with glutathione peroxidase. Glutathione is involved in the formation of certain prostaglandins, important in inflammation and to decrease oxidized LDL that is implicated in atherosclerosis.

SYMPTOMS OF DEFICIENCY

Most diseases of civilization; aging, atherosclerosis and heart disease, arthritis and auto-immune disorders, neurodegenerative diseases, autism, and infections and pulmonary diseases are made worse by oxidative stress and free radicals. In AIDS, T-lymphocytes become glutathione depleted and function better when it is supplemented.

It may be safe to say that glutathione depletion or inadequate glutathione function could be one of the most significant issues in the development of many chronic diseases - but you won't be aware of this until decades later in most cases.



Meats, yogurt, wheat germ and eggs are highest in cysteine, the key amino acid needed for the production of glutathione.

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FOOD SOURCES

SAFETY AND TOXICITY

RDA (Recommended Daily Allowance)

Supplementation of NAC (N-Acetyl-Cysteine) has been shown to be safe up to doses of 2000 mg daily. Many do not recommend it's use as it can promote yeast over growth in the intestines if you have a yeast issue. Anti-fungal treatments may be needed before or after use of glutathione or cysteine and a diet low in sugars may be helpful in minimizing the yeast overgrowth issue.

There is no RDA listed for glutathione. This is one supplement you would be wise to undertake under the care of a knowledgeable physician.

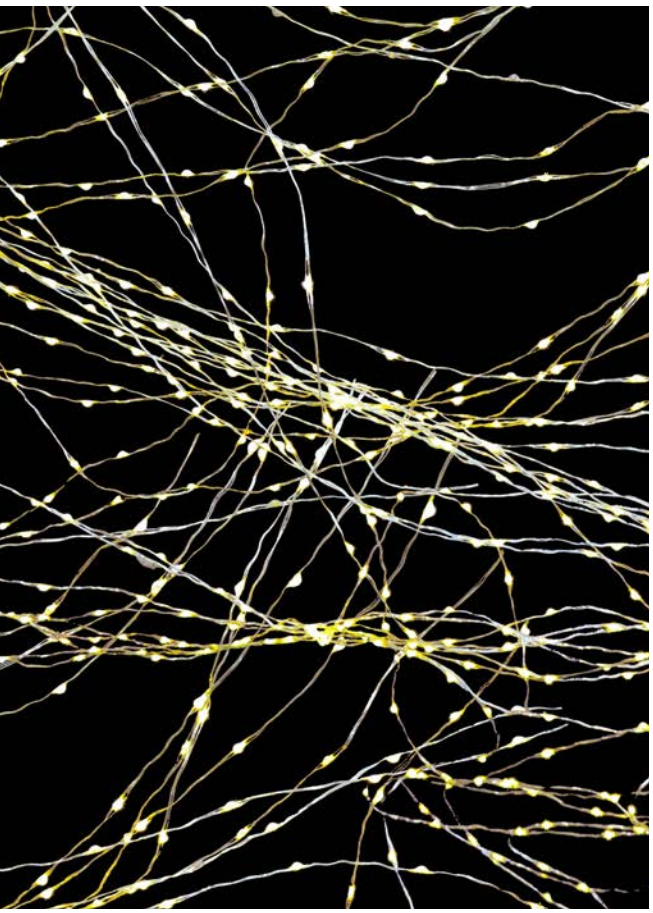
Vitamin C at 500 mg daily has been shown to increase glutathione levels. Support of the methylation cycle with, methyl-B12, methyl-folate, and TMG (trimethylglycine) has been shown to increase glutathione levels.

By itself glutathione is not stable and thus generally not advisable to be taken as a supplement. There may be some liposomal preparations of glutathione that may be safe and prevent the oxidation (spoiling) of the glutathione, but this is questionable, and oxidized glutathione would do more harm that good. There is no specific toxicity reported for glutathione.

Oral glutathione is only 10% absorbed. There are transdermal preparations that also get absorbed at about 10% and often smell bad, however they have the advantage of not causing GI upset that is common with oral preparations. Oral doses have been used at 10 - 15 mg / Kg / day, and should not to exceed 300 mg daily.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4079069/
http://www.ncbi.nlm.nih.gov/pubmed/22708999
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3578987/

CYSTEINE



WHY IS IT IMPORTANT?

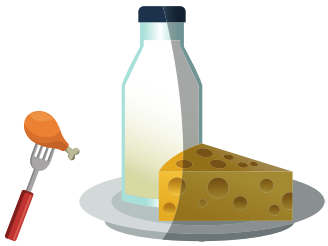
Cysteine is a sulfur containing amino acid. Cysteine has six major function in the body:

- Building block for proteins
- The rate limiting precursor for glutathione (the bodies major detox and antioxidant molecule)
- Precursor for taurine (important for nerve function and bile production)
- Provides sulfate for connective tissue
- Source of pyruvate for energy or glucose production
- Acts as a neurotransmitter.

SYMPTOMS OF DEFICIENCY

Chronic diseases like aging, atherosclerosis and heart disease, arthritis and auto-immune disorders, neurodegenerative diseases, autism, and infections and pulmonary diseases are made worse by oxidative stress and free radicals due to that lack of antioxidant function. Increased infections or the accumulation of toxins may result. Disorders that have been known to improve with cysteine supplementation include: skin disorders, hair loss, asthma, allergies, bronchitis, lung disease including cystic fibrosis, diabetes and it's complications, seizures, HIV and alcoholism.

The fact that benefits have also been seen with addiction disorders to cocaine, cannabis and tobacco, Alzheimer's, Parkinson's, autism, schizophrenia and bipolar, speaks to the importance of this amino acid and likely the importance of proper glutathione function.



Cysteine is found in all proteins but is highest in eggs, meats, dairy and wheat germ. Cooking can oxidize the cysteine.

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FOOD SOURCES

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SAFETY AND TOXICITY

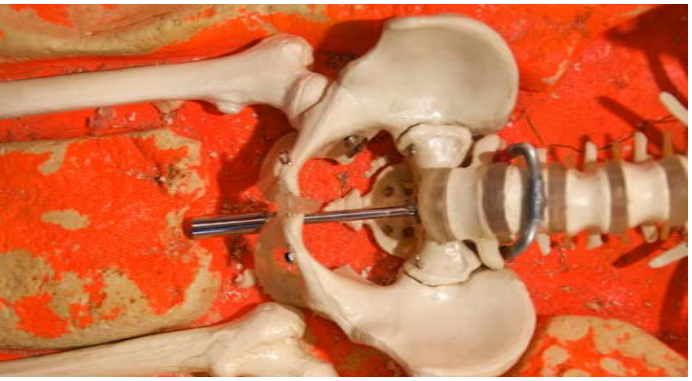
NAC is life-saving in cases of Tylenol/ acetaminophen / paracetamol poisonings.

RDA (Recommended Daily Allowance)

Supplementation should be given as NAC (N-acetyl-cysteine). It has been found to be safe up to doses of 2000 mg in adults. Many do not recommend its use as it can promote yeast overgrowth in the intestines if you have a yeast issue. Anti fungal treatments may be needed before or after use of cysteine and a diet low in sugars may be helpful in minimizing the yeast overgrowth issue.

http://www.ncbi.nlm.nih.gov/pubmed/22697593
http://www.ncbi.nlm.nih.gov/pubmed/23369637
http://www.ncbi.nlm.nih.gov/pubmed/18990082
http://www.ncbi.nlm.nih.gov/pubmed/24676047
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4009342/

MAGNESIUM



WHY IS IT IMPORTANT?

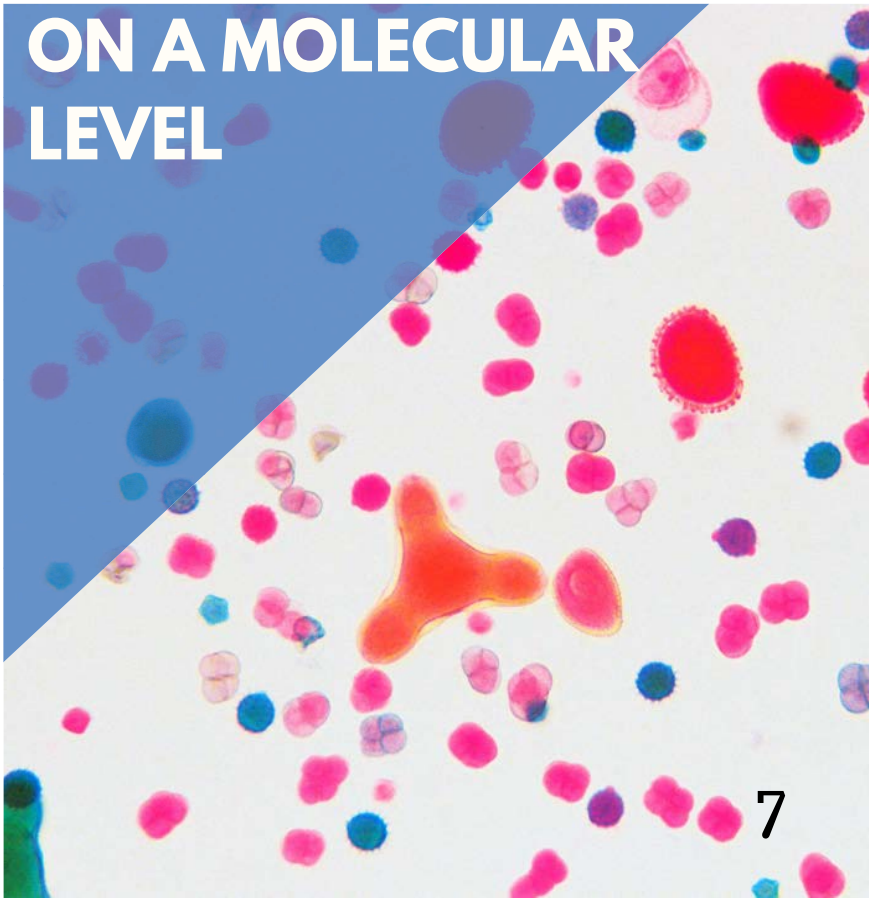
Magnesium is the second most abundant cation inside our cells. Most is in the bones or muscles, with about 7% inside other cells and less than 1% outside our cells. Like potassium (the most abundant cation in the cells), blood levels will basically always be normal except for changes made by intravenous solutions that are out of balance.e.

Magnesium is vital for hundreds of metabolic reactions including:

- Required for ATP (energy for all cells)
- Required for DNA and RNA and making proteins
- Required for bone structure
- In cell membranes is needed for potassium (K) and calcium (Ca) transport
- Nerve impulses and muscle contraction requires Mg
- Cell signaling requires Mg-ATP and cyclic adenosine monophosphate (cAMP)
- Cell migration requires Ca and Mg, important in wound healing.

The absorption of magnesium can be reduced by high dose zinc supplements (over 100 – 150 mg/day). Low protein (less than 30 grams a day) and high fiber diets can reduce Mg absorption.

ON A MOLECULAR LEVEL



SYMPTOMS OF DEFICIENCY

Deficiency severe enough to cause symptoms is rare. When you become magnesium deficient, (hypomagnesemia) the body also develops low calcium (hypocalcemia) which results in increased parathyroid hormone (PTH). This normalizes blood calcium, so only ongoing severe deficiency can lead to the symptoms of low Mg which really are also due to low calcium:
low Ca, low K, increased sodium, low PTH
nausea, vomiting and loss of appetite
tremor, muscle spasms, tetany
personality changes.

Deficiency is usually seen when there is a lack of absorption:
inflammatory bowel disease (Crohn's)
malabsorption syndromes and surgical resection of bowel
Diabetes or long term diuretic use causing renal wasting
Alcoholism
Older age due to lower intake and increased urinary loss.

In pregnancy, about 7% of women develop pre-eclampsia (high BP, protein in urine and edema) or eclampsia (the above plus seizures). Magnesium has long been the treatment that prevents seizures and death, by stopping the spasm of blood vessels in the brain and increasing blood flow. Migraines also seem to be caused by blood vessel spasms and are often helped by adequate magnesium intake.

Green vegetables, legumes, nuts and unrefined grains have the highest content of magnesium.

FOOD SOURCES

Food Source	Mg
100% bran cereal (all bran) (1/2 cup)	129
oat bran (¼ cup dry)	96
brown rice (1 cup cooked)	84
spinach/ chard/ leafy greens (1/2 c)	75
lima beans (1/2 c)	63
nuts (1 ounce)	49
banana (1)	34

*Harder water will have some magnesium.

SAFETY AND TOXICITY

No side effects are reported from natural intake from food. When magnesium is used in laxatives, or high doses of supplements are used the first sign is diarrhea. Those with kidney problems may not excrete magnesium adequately, and can develop high levels (hypermagnesemia).
Beyond diarrhea, the next effect of high Mg is low blood pressure (BP). It is probably the low BP (hypotension) that results in the symptoms of lethargy and confusion. In severe cases, the heart rhythms can be affected and cardiac arrest can occur.

RDA (Recommended Daily Allowance)

The recommended daily allowance for pregnancy and breast - feeding is 350 – 400:

Infants 65 mg
children 110 mg
Teen & adults 350 mg

If you are not eating enough high magnesium foods, or if you have migraines or are pregnant consider an appropriate dose of magnesium as a supplement.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1222323/pdf/11802770.pdf
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3495906/
http://www.ncbi.nlm.nih.gov/pubmed/24500444
http://www.ncbi.nlm.nih.gov/pubmed/15591002
http://ods.od.nih.gov/factsheets/Carnitine-HealthProfessional/

MANGANESE

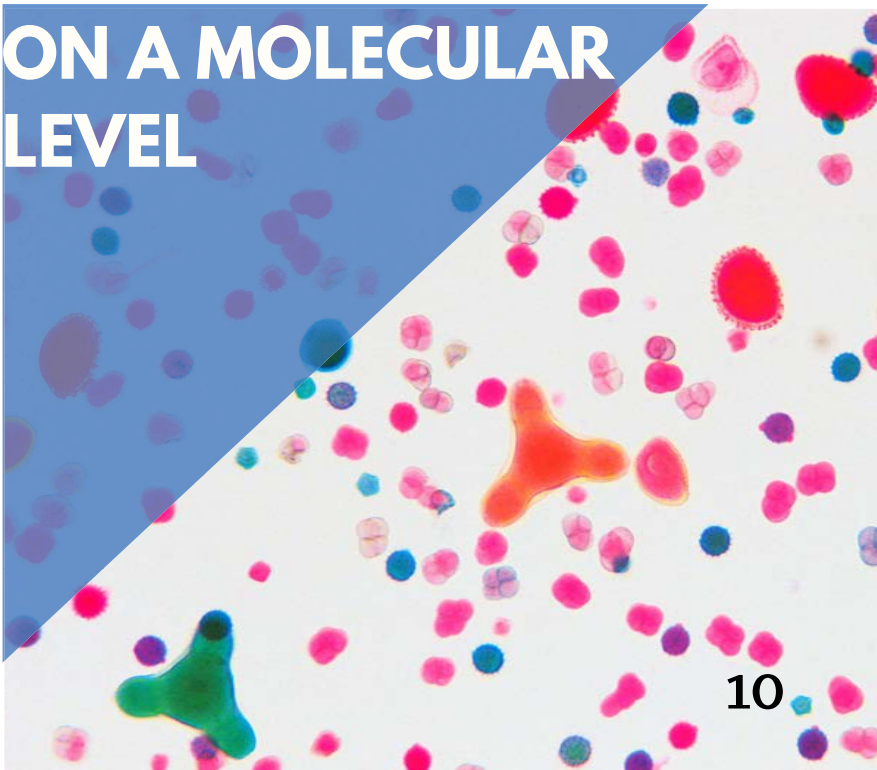
WHY IS IT IMPORTANT?

There are studies suggesting iron and manganese share similar absorption and transport pathways, with less manganese absorption when iron is high in a meal or taken as a supplement. Increased ferritin levels (suggesting high iron stores) is associated with lower manganese absorption.

Manganese is both an essential nutrient and one that can very easily become toxic if you take too much. Manganese is needed for the following enzymes:

- Superoxide dismutase (SOD) the main antioxidant in the mitochondria where oxidative stress can be a major factor
- Phosphoenolpyruvate carboxykinase needed to produce glucose (gluconeogenesis)
- Arginase needed in the liver to detoxify ammonia produced during amino acid synthesis
- Glycosyltransferases, needed for normal bone and cartilage formation, and wound healing.
- Glutamine synthatase is involved in converting glutamate to glutamine.

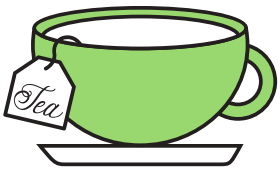
ON A MOLECULAR LEVEL

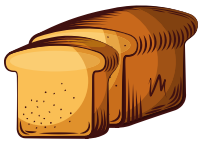


SYMPTOMS OF DEFICIENCY

No symptoms have ever been shown unless a person was intentionally fed a manganese deficient diet or were on total parenteral nutrition (fed through an IV) that was lacking manganese. In these unusual circumstances, rash, poor bone mineralization, higher calcium and alkaline phosphatase, and impaired glucose tolerance has been reported.

Manganese is highest in whole grains, nuts and green leafy vegetables. The average in take in the US is about 2 mg a day and for vegetarians and the health conscious, who eat whole grains, intake is typically around 10 mg a day. There is no RDA (recommended daily allowance).





FOOD SOURCES

Food Source	mg
Bran cereal w/raisins (1 cup)	1.4 - 2.5
Pineapple (1/2 cup)	1.3
Nuts (1 oz)	0.6 - 1.1
Brown rice (1/2 cup)	0.9
Spinach/greens (1/2 cup cooked)	0.8
Whole wheat bread (1slice)	0.7
Sweet potato (1/2 cup)	0.6
Beans (1/2 cup cooked)	0.5
Tea (black / green) (8 oz)	0.2 - 1.6

SAFETY AND TOXICITY

Symptoms of toxicity typically begin with irritability, aggressiveness and hallucinations and can mimic Parkinson's disease, (tremors, difficulty walking and facial spasms) and permanent neurological changes including impaired memory, loss of facial expression. Hypertension has been reported.
Toxicity is typically after prolonged inhalation of dust contaminated with manganese and rarely from water that was high in manganese. The water that caused symptoms had 14 mg/L. There is a case report of manganese toxicity from taking supplements high in manganese (manganese, or bone and joint health supplements of chondroitin or glucosamine).

The developing brain is particularly vulnerable to manganese, so this supplement and the bone health supplements with chondroitin and glucosamine should be avoided in pregnancy and for infants.
This is one nutrient to avoid in supplement form unless you are documented deficient (perhaps by functional testing like spectracell www.specracell.com). In minimal amounts as part of a multivitamin (not for infants) at a dose of 1 - 2 mg a day, this might supply needs and avoid deficiency if you are not eating a diet that includes some of the foods listed above.

This is a nutrient that is much more likely to be a toxin than one that you are suffering from a deficiency. Since 2006, manganese (along with fluoride, chlopyrifos, dichlorophenyltrichloroethane, tetrachloroethylene and polybrominated biphenyl ethers) has been added to the five other known industrial neurotoxicants: lead, methymercury, polychlorinated biphenyls, arsenic and toluene. Clearly a bad list to be a part of. Be very careful is you supplement manganese.

RDA (Recommended Daily Allowance)

TOLERABLE UPPER LIMITS	
	mg/d
infants	unknown
children 1 - 8	2-3
children 9 - 13	6
teens/adults	9 - 11

http://www.ncbi.nlm.nih.gov/pubmed/24556010
http://lpi.oregonstate.edu/infocenter/minerals/manganese/

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DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

(Visit wellevate.me/drpaul
to get 25% discount)

MitoCORE 120 caps

MitoCORE Powder Strawberry

(Mix with frozen berries and almond for best flavor)

DrPaulApproved

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

(Visit wellevate.me/drpaul
to get 25% discount)

Cal/Mag/D liquid 480 ml

Calcium-Magnesium
Malate 240 vegcaps

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

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to get 25% discount)

The Black Box II 1 Kit

Quick Sliver Scientific offers a comprehensive body cleanse detox program. This 4-week Black Box II® is designed to support the body's natural cleansing processes.

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DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

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Liposomal
Glutathione 4 oz
Oral liquid

Glutathione
Liposomal 1.7 oz
Topical

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

(Visit wellevate.me/drpaul
to get 25% discount)

NAC 600 mg
60 caps