



MICRONUTRIENTS

VITAMINS,
MINERALS
& MORE

SELENIUM,
SERINE,
ZINC, ALPHA
LIPOIC ACID

DR PAUL APPROVED - VOLUME 8



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

SELENIUM

WHY IS IT IMPORTANT?

Selenium is a trace mineral that is essential for vital functions, especially the antioxidant enzyme glutathione peroxidase that recycles vitamin C and E in the antioxidant cascade. Toxic hydrogen peroxide is made into harmless water by glutathione peroxidase with the help of selenium. Selenium seems to be involved in all cellular oxidative reactions including those involving copper and zinc (superoxide dismutase), and iron (catalase).

Selenium is involved in numerous enzyme and protein (selenoproteins) functions:

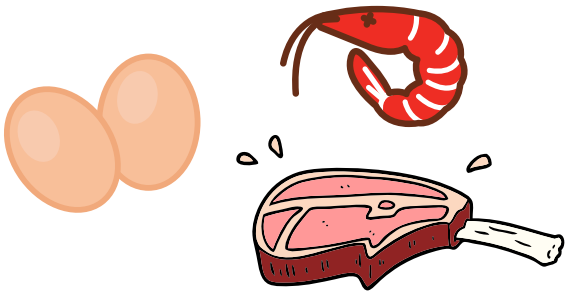
- Glutathione peroxidase
- Phospholipid hydroperoxidase, reducing oxidative damage from hydrogen peroxide
- Thioredoxin reductase, vital for regeneration of vitamin C and other antioxidants
- Iodothyronine deiodinases, are vital in many steps in activation or deactivation of thyroid hormone
- Selenoprotein P is found in vascular endothelial cells and may be protective against reactive nitrogen
- Selenophosphate synthetase is vital in selenocysteine formation

Numerous studies are showing benefits in improved immune function, reduced infections especially from viral infections, cancer prevention and reduced cardiovascular disorders (atherosclerosis, heart attacks and stroke).

ON A MOLECULAR LEVEL

SYMPTOMS OF DEFICIENCY

Due to the vital role in reducing oxidative stress, deficiency can lead to increased risks of heart disease, stroke, cancer and depressed immune function. Inflammatory conditions like rheumatoid arthritis, eczema, psoriasis and most inflammatory conditions may be worse when deficient in selenium. Selenium improves natural killer cells that are important in destroying cancer and bacterial and viral infections. Selenium is important for male fertility, normal thyroid function which is vital for brain development especially in the womb. Selenium has been shown to benefit those with heavy metal toxicity.



Biologically active forms of selenium, like selenomethionine seem to be much more effective than inorganic selenium salts, making food sources more important for the health benefits.


Brazil nuts are particularly high in selenium, and adults may benefit from eating one or two nuts a day (avoid high intake as high selenium can be toxic).




FOOD SOURCES

Food Source	Mg Selenium
Brazil nuts (1 oz = 7 nuts)	544 - 839
Shell fish/ fish	34 - 40
Meat (chicken, beef, pork)	20 - 33
Cottage cheese (1 cup)	20
Whole grains, wheat germ	7 - 15
Egg	15
Greens (1 cup)	11
Dairy (1 cup)	8
Lentils (1 cup)	6

SAFETY AND TOXICITY



RDA



(Recommended Daily Allowance)

UPPER TOLERABLE LIMITS

micrograms/day

infants 45-60

children 1-3 90

children 4-8 150

children 9 - 13 280

adults 400

For these reasons pregnant moms and children should probably limit Brazil nut consumption to 1 a day (perhaps even one every other day). Adults should limit Brazil nut consumption to 1 - 2 a day. Having said that, it may be equally important if you are not getting selenium elsewhere, that you consume your one Brazil nut daily. The RDA (recommended daily allowance) for infants is 15 - 20 micrograms daily, children 20 - 40, and adults 55 - 70.

Selenium is one of those essential nutrients that can also be toxic at high doses. While it is vital that you have some, you want to avoid taking too much. In the world, those suffering from too much selenium are typically either living in an area (parts of China) where selenium levels are high in soil and water, eating too many Brazil nuts, or taking too much selenium as a supplement.

Initial symptoms of selenium toxicity might include neurological and emotional issues, irritability, fatigue, intestinal symptoms like nausea and vomiting, diarrhea or a rash. When your exposure is high over long periods of time (selenosis) symptoms include nail and hair brittleness and hair loss. You may detect a garlic odor to your breath.




<http://www.ncbi.nlm.nih.gov/pubmed/11683552>
<http://ods.od.nih.gov/factsheets/Selenium-HealthProfessional/>
<http://lpi.oregonstate.edu/infocenter/minerals/selenium/>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0021942/>
<http://www.ncbi.nlm.nih.gov/pubmed/21683713>
<http://www.nutrition-and-you.com/brazil-nuts.html>
<http://www.ncbi.nlm.nih.gov/pubmed/24853282>

SERINE

WHY IS IT IMPORTANT?

Serine is an amino acid we all typically get from the protein in our diet and it can be made in our bodies from other amino acids. It is therefore extremely rare to have a serine deficiency. We do need serine for making other proteins (protein synthesis), making phospholipids (phosphatidyl serine and ethanolamine) and for DNA and RNA synthesis. Serine is an attachment point for carbohydrates in protein chains.



Serine is involved in many enzymes: serine protease, serine racemase, serine palmitoyltransferase, serine protease inhibitor, serine threonine and serine threonine inhibitor, serine threonine kinase and serine hydroxymethyltransferase, phosphatidyl serine, serine hydrolase, serine threonine-protein kinase and serine threonine phosphatase.

There are rare disorders where a person cannot make enough serine and must get it in the diet or suffer severe neurological symptoms. These disorders are known to affect:

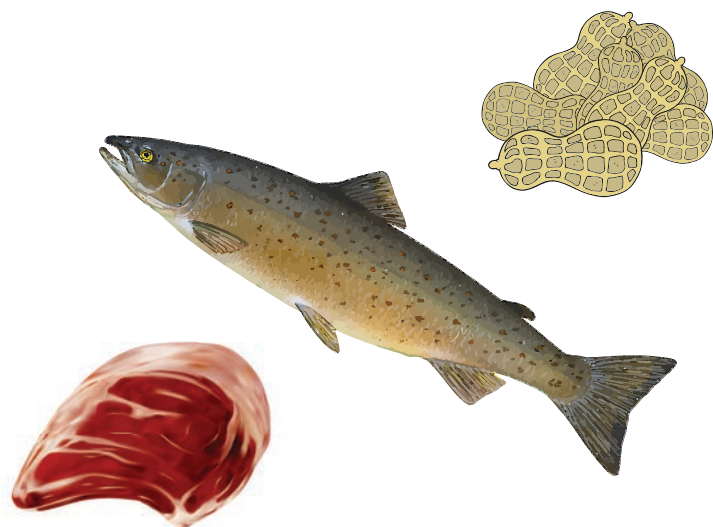
- 3-phosphoglycerate dehydrogenase
- 3-phosphoserine phosphatase
- phosphoserine aminotransferase

ON A MOLECULAR LEVEL



SYMPTOMS OF DEFICIENCY

For those born with an enzyme defect limiting their ability to make enough serine, severe neurological symptoms develop with loss of brain function and motor skills progressing to seizures. Less severe but chronic deficiency can lead to polyneuropathy in adults. Newborn screening programs do not yet test for these very rare disorders which are easily treated by giving enough serine in the diet. Measurement of amino acids in the serum and urine is the typical way one detects these rare disorders. Spectracell micronutrient testing (www.spectracell.com) may detect that you have a functional deficiency of this nutrient.



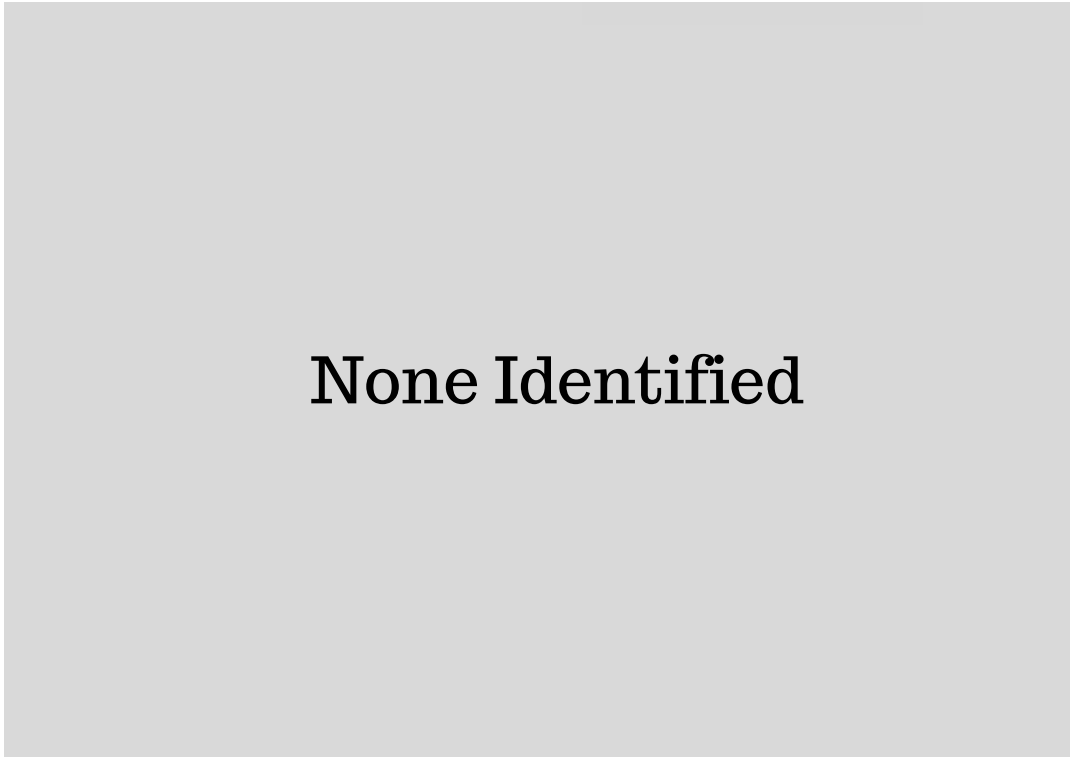
FOOD SOURCES



Serine is present in all foods that are high in protein, and 1-2 grams a day can be given as a supplement. There is no RDA nor any listed symptoms of toxicity.

<http://www.ncbi.nlm.nih.gov/pubmed/23463425>
<http://www.babysfirsttest.org/newborn-screening/states>



SAFETY AND TOXICITY



 **RDA** 
(Recommended Daily Allowance)

None Identified



None Identified





ZINC

WHY IS IT IMPORTANT?

Hundreds of studies have been published on the benefits of adequate zinc with good scientific evidence that it:

- Reduces severity of diarrhea
- Promotes the healing of stomach ulcers
- Reverses known symptoms of zinc deficiency (growth and development problems, hair loss, diarrhea, impotence, eye and skin issues, poor appetite, poor wound healing, and mental slowness)
- Reduces or prevents acne
- Improved ADHD, hyperactivity and impulsivity
- Benefits those who are over weight or obese
- Benefits the immune system, helps with herpes, the common cold and perhaps most infections
- Helps block copper absorption for those with Wilson's disease (excess copper)

Zinc has an important role in the activation of over one hundred enzymes. Zinc is important for:

- Antioxidant superoxide dismutase (along with copper)
- Protects membranes from oxidative damage
- "Zinc finger proteins" bind to DNA affecting transcription and cell signaling
- Helps regulate apoptosis important for cell growth, development and prevention of many chronic diseases
- Normal neurological and behavioral development
- Proper immune system to fight infections

Some evidence suggests zinc may be helpful for age related macular degeneration, as an appetite stimulant, to help with bad breath, helps boils, burns and cancer sores indeed many skin conditions, and helps with cancer prevention and chemotherapy side effects. Zinc seems to help anything involving brain function or lack of it, serious diseases like celiac, cystic fibrosis, Down's syndrome or any disorder affecting the immune system, including HIV, malaria and parasitic infections. Diabetics have better blood sugar control with adequate zinc intake, and it can reduce nerve pain. Zinc supplementation has shown improved HDL to LDL ratios, improves thyroid function, helps inflammatory bowel disease and can improve kidney and liver function. Zinc seems to be important in reducing symptoms of inflammation, like rheumatic diseases, psoriasis and vaginitis to name a few. Zinc may be effective for the treatment of warts.



ON A MOLECULAR LEVEL

SYMPTOMS OF DEFICIENCY

Although zinc deficiency wasn't recognized until 1961, we now have lots of good information, much learned from the study of those born with acrodermatitis enteropathica (genetic impaired uptake and transport of zinc). Severe deficiency results in slowed growth and development, delayed sexual maturation and rashes, diarrhea, immune dysfunction and poor wound healing, poor appetite and loss of taste, night blindness, behavioral issues and clouding of the cornea along with vision problems. Other than those with the genetic disorder, zinc deficiency is most often seen in countries with limited food choices, those with severe and chronic diarrhea, bowel disorders and diseases and severe burn victims.

Strict vegetarians with high intake of grains and legumes will have increased phytic acid that reduces zinc absorption resulting in a 50% greater need for zinc.


Pregnancy is another very important time to be sure you get adequate zinc due to its importance in normal growth and development.



FOOD SOURCES

Food Source	mg Zinc
Oysters (3)	43 - 74
Beef (3 oz)	5 - 7
Crab (3 oz)	5
Chicken (dark 3 oz)	3
Pork (3 oz)	3
Beans and nuts (1oz)	1
Dairy (1 oz/cup)	1
Peas (1 cup)	1
Seeds/ wheat germ	1
Zinc fortified cereals	

SAFETY AND TOXICITY



RDA (Recommended Daily Allowance)

UPPER TOLERABLE LIMITS

mg/day

infants 4 - 5

children 1- 3 7

children 4 - 8 12

children 9 - 13 23

teens 34

adults 40

Zinc supplements come as:

- zinc acetate (30% elemental)
- zinc gluconate (14% elemental)
- zinc picolinate (35% elemental)
- zinc sulfate (23% elemental).

100 mg of zinc acetate would thus be 30 mg of elemental zinc. RDA (recommended daily allowance) for zinc and upper limits are based on elemental zinc. RDA ranges from 2 mg a day for newborns to 13 mg a day for breast feeding moms.

Immediate exposures (acute toxicity) occurs with exposures to over 225 mg of zinc. Symptoms are abdominal pain, nausea, diarrhea, vomiting, fever and muscle pain. This is usually from zinc bleached out of galvanized containers in which food or drinks were stored. If the exposure is from metal fumes this can result in sweating, weakness and rapid breathing that can last 12 - 24 hours. Mild gastrointestinal symptoms have been reported at zinc doses above 50 - 150 mg a day. Long term intakes above 150 mg a day can result in impaired immune function, decreased HDL, and impaired copper status leading to anemia, in addition to some of the above symptoms.

The FDA warned against the use of zinc in nasal sprays as it was leading to the loss of smell (anosmia).

<http://lpi.oregonstate.edu/infocenter/minerals/zinc/>
<http://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/>
<http://www.mayoclinic.org/drugs-supplements/zinc/evidence/hrb-20060638>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0058802/>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0048387/>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0052235/>



ALPHA LIPOIC ACID

WHY IS IT IMPORTANT?

In diabetes it reduces the glycosylation reactions and promotes nerve healing. Several studies have recently shown benefit of ALA for diabetes particularly with prevention of neuropathy and cardiovascular disease.

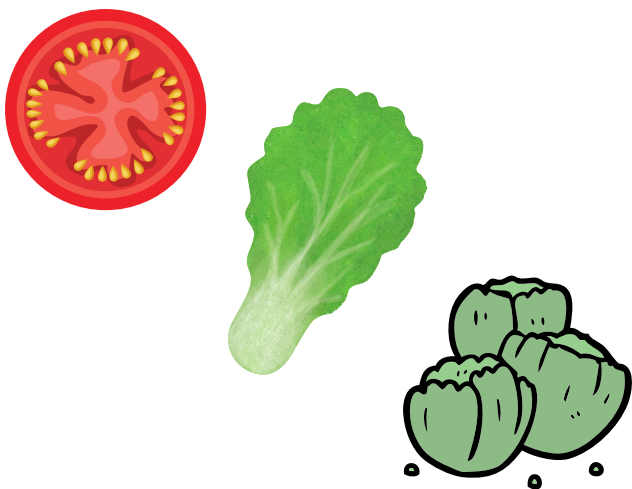
Alpha lipoic acid is a sulfur containing substance that, like some vitamins, is a vital cofactor for some energy producing reactions making ATP in the cells. Being soluble in both fat and water it is a very important antioxidant that can restore antioxidant functions of vitamin C, vitamin E, glutathione and coenzyme Q₁₀. These vital reactions occur in the mitochondria of the cell - the power house for all our cells. Lipoic acid is synthesized within the mitochondria by the enzyme lipoic acid synthase.

ON A MOLECULAR LEVEL

SYMPTOMS OF DEFICIENCY

There is no known syndrome specifically related to deficiency of ALA. Because oxidative stress depletes glutathione and other antioxidants, and ALA is so important in replenishing the antioxidants, those who are deficient in ALA and happen to get HIV- AIDS, diabetes, atherosclerosis and neurodegenerative diseases like Alzheimer's seem to benefit from replacing ALA. This makes a case for the fact that alpha lipoic acid is necessary for the proper function of our antioxidant system and vital in the prevention of most diseases of civilization. The poor diets and added stress from toxins and stressful environments have combined to challenge our health today. ALA may just be one of those nutrients to keep at an optimal level to promote wellness and avoid these diseases.

The first symptoms of deficiency would probably be a weakened immune system, decreased muscle mass or memory problems like those seen with aging.



FOOD SOURCES

Alpha lipoic acid is formed as part of photosynthesis by plant chloroplasts. It is thus naturally found in green plants. Highest food sources include broccoli and spinach, with lesser amounts in peas, brussel sprouts and tomatoes. Organ meats (kidney, heart and liver) contain the most lipoic acid at about 1 - 3 micrograms per gram of dry weight. The lipoic acid in food is bound to lysine. In supplements, the ALA is free (unbound) thus supplements containing 200 - 600 mg would contain as much as 1000 times the lipoic acid available from food. This is one supplement best taken on an empty stomach (an hour before a meal or two hours after a meal) to improve absorption.

Humans make their own lipoic acid, but perhaps in the toxic world we live in - our needs have increased and we now could benefit from supplementing this nutrient.



SAFETY AND TOXICITY



(Recommended Daily Allowance)

TOLERABLE UPPER LIMITS

These have not been established, but a dose of 50 - 100 mg a day in children and 200 - 400 mg a day for adults should be optimal and safe.

No contraindications are listed for lipoic acid. High doses (over 600 mg a day) have been reported to contribute to thiamin deficiency and minor side effects rarely might include rash or itching, headache, and muscle cramps. Doses of 2-300 mg a day have been used for years to treat those with diabetic neuropathy and IV doses of up to 600 mg a day have been tolerated for a few months at a time.



<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0046575/>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0049896/>
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0026436/>
<http://www.ncbi.nlm.nih.gov/pubmed/22632266>
<http://www.ncbi.nlm.nih.gov/pubmed/25045030>
<http://lpi.oregonstate.edu/infocenter/othernuts/la/>

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

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



**Selenium 200mcg
by PURE Encapsulations**

**Alpha Lipoic Acid 200mg
by Pure Encapsulations**



Disclaimer: Please check with your health care provider to see if this supplement is appropriate for you and what dose to use.

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

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



Zinc 30mg by Pure
Elderberry



Pure L-Serine 500mg
By Montiff

Disclaimer: Please check with your health care
provider to see if this supplement is appropriate for
you and what dose to use.

DR. PAUL'S SUPPLEMENT RECOMMENDATIONS

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



**Amino Acid Complete
150 vegcap**



**Athletic Nutrients 180
vcaps**

Multivitamin/mineral complex for
exercise performance and training*

Indications:

- Support for athletic training and physical performance
- Promotes energy, stamina and helps lessen muscle fatigue

Disclaimer: Please check with your health care provider to see if this supplement is appropriate for you and what dose to use.

WHAT DR. PAUL ACTUAL TAKES EVERYDAY

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



MitoCore 120 Caps

Vitamin D3 +K2



Disclaimer: Please check with your health care provider to see if this supplement is appropriate for you and what dose to use.