MICRONUTRIENTS:
Part II Water-Soluble Vitamins

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Water Soluble Vitamins

• Water-soluble vitamins dissolve in water and are not stored by the body.

• Since they are eliminated in urine, we require a continuous daily supply in our diet.

• The water-soluble vitamins include the vitamin B-complex group and vitamin C.
Water Soluble Vitamins

B-complex vitamins and vitamin C are water-soluble vitamins that are not stored in the body and must be replaced each day.

These vitamins are easily destroyed or washed out during food storage and preparation.
B Complex Vitamins

B1: Thiamin
B5: Pantothenic Acid
Riboflavin
Niacin
B6
Folate
B12
Biotin

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Thiamin: Vitamin B1

“anti-stress vitamin”

- Important for Liver
- Releases energy from foods
- Converts to TPP which works to form DNA/RNA
- Maintains proper nervous system and heart function.
Thiamin: Vitamin B1
“anti-stress vitamin”

- Deficiency results in generalized muscle weakness and mental confusion
- Increases energy production
- Maintains memory
- Improves carbohydrate tolerance
- Athletes may require a higher than average intake of thiamine to help process extra carbohydrates into energy
- Needs may be temporarily elevated during stress
- Supplementation improves quality of life in elderly
- Lowers blood pressure
- Deficiency exacerbates effects of alcohol on memory

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*Organs such as liver are often recommended for nutrient density, such as the case with B1. However, organ meats are highly contaminated and not a clean source of nutrients, despite propaganda to the contrary. (In addition to the obvious ethical considerations).
Not Using Organ Meats for Nutrient Consumption:

One of the jobs of the liver is to safely remove toxins, or to store them when removal is not possible. This explains why any successful cleansing protocol must begin with a liver cleanse.

The liver is also the body's long-term storage area for toxic materials. Taking liver to get B1 or other nutrients would be akin to taking a lead pill with a multivitamin. No amount of nutrition can compensate for the problems generated.

The liver, along with fat cells, are the storehouses for toxic materials that a body cannot eliminate. Consuming liver is the act of eating all of the toxins that an animal was unable to expel throughout its entire lifetime.
Nutrients that can help with absorption of vitamin B1 are vitamins B2, B3, B5, and B12, as well as copper, choline, manganese, magnesium, molybdenum, phosphate, and zinc.
Pantothenic Acid: Vitamin B5
“the cholesterol producer”

• Forms coenzyme A (CoA), which is used in a wide variety of chemical reactions in the body.

• In its CoA form, vitamin B5 helps release energy from sugars, starches, and fats

• Important for adrenals

• Healthy Digestive Tract
Pantothenic Acid: Vitamin B5
“the cholesterol producer”
Nutrients that can help with absorption of vitamin B5 are vitamins B1, B2, B3, B12, and C, as well as biotin, folate, chromium, glycine, phosphate, sodium, potassium, and zinc.
<table>
<thead>
<tr>
<th>Vitamin B3: Niacin Effects</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood Pressure</strong></td>
<td>Lowers high blood pressure.</td>
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<tr>
<td><strong>Blood Sugar</strong></td>
<td>Helps to regulate blood sugar levels. However, niacin can make certain types of diabetes worse.</td>
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<tr>
<td><strong>Circulation</strong></td>
<td>Improves circulation.</td>
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<tr>
<td><strong>Digestion – General</strong></td>
<td>A deficiency can lead to poor digestion or appetite loss.</td>
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<tr>
<td><strong>Heart</strong></td>
<td>Lowers bad cholesterol (LDL) and raises good cholesterol (HDL).</td>
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<tr>
<td><strong>Hormone Balance</strong></td>
<td>Helps to regulate hormone production.</td>
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<tr>
<td><strong>Hydrochloric Acid</strong></td>
<td>Regulates production of hydrochloric acid in the stomach.</td>
</tr>
<tr>
<td><strong>Muscles</strong></td>
<td>A deficiency can lead to muscle weakness.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Works with other B vitamins to maintain healthy skin. A deficiency can lead to skin infections. An overdose can cause an itchy rash known as &quot;niacin flush.&quot;</td>
</tr>
<tr>
<td><strong>Weight Loss</strong></td>
<td>Helps the body process fats.</td>
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Niacin: B3
Sources

The best plant based sources of vitamin B3 can be found in beetroot, sweet potatoes, sunflower seeds, wild rice, avocado, lambs quarters and tomatoes. Food with the amino acid tryptophan can be converted by the body into niacin.
Niacin: B3

Synergistic Nutrients

Nutrients that can help with vitamin B3 absorption are vitamins B1, B2, B6, B12, and C, along with chromium, zinc, potassium, manganese, chromium, phosphorus, copper, folic acid, iron, magnesium, selenium, and tryptophan.
Pyridoxine: B6

- Essential molecule production
- Nervous system support
- Inflammation prevention
Pyridoxine: B6

Food Sources

Avocados, bananas, brewer's yeast, carrots, egg yolks, legumes, lentils, and sunflower seeds

samins: Vitamin B1
Pyridoxine: B6

Synergistic Nutrients

Nutrients that can help with absorption of vitamin B6 are vitamins, B1, B2, B5, B12, C, and E, as well as chromium, biotin, copper, folate, magnesium, potassium, phosphate, selenium, sodium, and zinc.
Folate: B9

- Folate helps to complete the development of red blood cells
- Maintains healthy circulation
- Critical in helping to prevent neural tube defects in newborns
- Utilized in other nervous system functions and helps to prevent general mental fatigue, depression, confusion, and insomnia.
Folate: B9

Spinach — 1 cup = 263 mcg of folate (65% DV)
Collard Greens — 1 cup = 177 mcg of folate (44% DV)
Turnip Greens — 1 cup = 170 mcg of folate (42% DV)
Mustard Greens — 1 cup = 103 mcg of folate (26% DV)
Romaine Lettuce — 1 cup = 76 mcg of folate (19% DV)
Folate: B9

Synergistic Nutrients

Nutrients that can help with vitamin B9 being utilized are vitamins B2, B3, B5, B6, B7, B12, and C, as well as copper, iron, magnesium, serine, and zinc.
B2: Riboflavin

- B2 helps to produce energy.
- B2 is an antioxidant working to rid the body of free radicals.
- Riboflavin is needed to help the body change vitamin B6 and folate into usable forms.
- Body growth and red blood cell production.
B2: Riboflavin

Riboflavin takes the form of flavin adenine dinucleotide (FAD) or flavin mononucleotide (FMN) when it is active in the body's energy pathways.

Among many of FAD's roles one is to be a cofactor for an enzyme called methylenetetrahydrofolate reductase (MTHFR).

Being a cofactor means FAD is required to be present for the creation of MTHFR. This is important because MTHFR is involved in the breakdown of homocysteine, and high levels of homocysteine have been linked to an increased risk of heart disease.
Energy production and metabolic processes in the body require the use of oxygen. However, oxygen containing molecules are highly reactive and can cause harm to many structures in the body, including blood vessel linings and joint tissues.

**Glutathione helps to prevent this damage.** And, glutathione must be constantly recycled. Vitamin B2 allows this to happen, as it is a cofactor for the enzyme glutathione reductase, which reduces the oxidized form of glutathione back to its reduced version.
B2: Riboflavin

Sources

The majority of healthy people who eat a well-balanced diet will get enough riboflavin. The best sources of riboflavin include almonds, whole grains, wild rice, mushrooms, soybeans, eggs, broccoli, Brussels sprouts, and spinach.
B12: Cobalamin

- Energy production
- Blood formation
- DNA synthesis
- Myelin formation
B12: Cobalamin

Vitamin B12 is found almost exclusively in animal tissues and is not readily available in an easily assimilated form in plants.

The few plant foods that are sources of B12 are actually B12 analogs.

An analog is a substance that blocks the uptake of true B12, so your body's need for the nutrient actually increases.
B12: Cobalamin

• Unlike some of the other B vitamins, B12 deficiency is fairly common. B-12 deficiency can cause a type of anemia that is characterized by fewer but larger red blood cells. Other effects include walking and balance disturbances, confusion, and in seriously advanced cases, dementia.

Symptoms of B-12 deficiency and B-12-related anemia include:

• ~ Feeling tired or weak
• ~ Pale appearance to the lining of lower eyelids
• ~ Palpitations, fast or irregular heart beat.
• ~ Faintness and breathlessness.
• ~ Hair loss
• ~ Bruising that occurs without reason
• ~ Dizziness
• ~ Long or unusually heavy menstrual periods
B12: Cobalamin

Consider a supplement: Methylcobalamin. Get a baseline blood test to determine your levels. Cyanocobalamin is bound to cyanide molecules and toxic to the liver.

Also, to help with B12 absorption, improve iron absorption:

~ Eat more foods that are good sources of iron. Concentrate on green, leafy vegetables, dried fruit.

~ Help your body absorb iron better by eating foods high in vitamin C.

~ Avoid antacids, phosphates (found in soda, beer, ice cream, candy bars, etc.) and the food additive EDTA. These block iron absorption.
B7: Biotin
(Also called Vitamin H)

Biotin is used in the body to metabolize both sugar and fat. In metabolizing sugar, biotin transports sugar from its beginning stages to its eventual conversion into usable energy.

An enzyme called acetyl Co-A carboxylase requires biotin to function properly.

This enzyme forms the building blocks of fat production in the body, and is critical as all cell membranes in the body need to contain the correct fat components in order to function effectively.
B7: Biotin

Skin cells rely heavily on fat production, and since biotin plays a role in fat synthesis, a deficiency of biotin often involves skin-related symptoms.

Biotin also functions as a supportive vitamin in the nervous system as both glucose and fats are utilized for energy within the nervous system.
B7: Biotin

Sources

Soybeans, mushrooms, pumpkin seeds, sunflower seeds, bean sprouts and cashews.
Vitamin C

- Vitamin C benefits the body by holding cells together through collagen synthesis; collagen is a connective tissue that holds muscles, bones, and other tissues together. Vitamin C also aids in wound healing, bone and tooth formation, strengthening blood vessel walls, improving immune system function, increasing absorption and utilization of iron, and acting as an antioxidant.

- Since our bodies cannot produce or store vitamin C, an adequate daily intake
Vitamin C

Vitamin C is easily lost from foods during cooking.

Raw fruits and vegetables are the best way to get Vitamin C.

The foods which are rich in Vitamin C are oranges, watermelon, cabbage, cauliflower, papaya, cantaloupes, grapes, strawberries, kiwi, broccoli, mango, tomatoes, Brussels sprouts, kale leaves, and citrus juices.