<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Function</th>
<th>Deficiency</th>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitamin A</strong></td>
<td>Vision, bone, teeth, immune, skin and mucus membranes</td>
<td>Difficulty seeing in the dark or adjusting to bright lights.</td>
<td>Liver damage.</td>
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<td>Follicular Hyperkeratosis (goose flesh — follicles on the skin become plugged, causing bumpy rough skin which is on the palms, soles of the feet, elbows, knees, etc.).</td>
<td>Digestive problems.</td>
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<td></td>
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<td>Decreased gland secretion — vaginal, peristipation decrease, dry mouth, dry eyes.</td>
<td>Decrease bile.</td>
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<td></td>
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<td>Kidney stones</td>
<td>Essential Fatty Acid deficiency.</td>
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<td>Sites in the eye lid</td>
<td>Zinc deficiency.</td>
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<td></td>
<td></td>
<td>Poor immune system</td>
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<td></td>
<td></td>
<td>Acne</td>
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<td></td>
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<td>Fatigue</td>
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<td></td>
<td></td>
<td>Burning, itching eyes</td>
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<td></td>
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<td>Sinus mucous membrane trouble</td>
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<td>Dryness of the eye (conjunctivitis)</td>
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<tr>
<td><strong>Vitamin B1</strong></td>
<td>Carbohydrate metabolism, needed for acetylcholine, which is needed to myelin production, nervous system function and cardiovascular function. Provides the co-factor for glucose metabolism. Makes neurotransmitters.</td>
<td>Tired weak heart</td>
<td>Decreases pancreas function</td>
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<td>Loss of myelin — peripheral neuropathy</td>
<td>Decrease liver function</td>
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<td>Call tenderness</td>
<td>Decrease adrenal function</td>
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<td></td>
<td></td>
<td>Nightmares</td>
<td>Diabetic</td>
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<tr>
<td></td>
<td></td>
<td>Restless legs</td>
<td>Excess sugar, alcohol (alcoholics) or refined carbohydrate function.</td>
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<tr>
<td></td>
<td></td>
<td>Nervous</td>
<td>Gastric bypass and stomach stapling.</td>
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<td></td>
<td></td>
<td>Anxiety</td>
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<td></td>
<td></td>
<td>Muscle weakness</td>
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<td></td>
<td></td>
<td>Loss of appetite</td>
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<td>Headache</td>
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<td>Depression</td>
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<td></td>
<td></td>
<td>Muscle wasting</td>
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<td>Edema (fluid retention in legs)</td>
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<tr>
<td><strong>B2 (Riboflavin)</strong></td>
<td>Energy production, required for the metabolism of fats, carbohydrates and proteins.</td>
<td>Cracked red lips and tongue</td>
<td>Decrease iron</td>
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<tr>
<td></td>
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<td>Cracked corners of lips</td>
<td>Intestinal issues</td>
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<tr>
<td></td>
<td></td>
<td>Blood shot eyes</td>
<td>Deficiency of B2 depletes B6</td>
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<tr>
<td></td>
<td></td>
<td>Itchy, watery eyes</td>
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<td></td>
<td></td>
<td>Scotial skin inflammation</td>
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<td>Sore throat</td>
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<td></td>
<td></td>
<td>Inflamed tongue</td>
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<tr>
<td><strong>B3 (Niacin)</strong></td>
<td>DNA repair, raw material for steroids (ex. Adrenal hormones), assist in keeping cholesterol normal, breaks down fat and assist in stabilizing blood sugars. Lowers cholesterol.</td>
<td>Muscle weakness</td>
<td>Decreased tryptophan, which makes B3</td>
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<tr>
<td></td>
<td></td>
<td>Lack of appetite</td>
<td>Decrease in the consumption of protein.</td>
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<td></td>
<td>Digestive problems</td>
<td>Alcohol depletes this nutrient.</td>
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<tr>
<td></td>
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<td>Low tolerance to cold</td>
<td>Deficiencies of iron can create deficiencies of B3</td>
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<tr>
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<td></td>
<td>Loss of memory (dementia)</td>
<td>Excessive corn products inhibit B3, because corn binds with niacin – adding lime will release it.</td>
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<td>Skin inflammation (dermatitis)</td>
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<td>Redness around neck</td>
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<td>Diarrhea</td>
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<tr>
<td><strong>B5 (Pantothenic acid)</strong></td>
<td>Supports the metabolism of proteins, carbohydrates and fats</td>
<td>Morning stiffness</td>
<td>People on low vegetable and fruit diets have low B6</td>
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<td></td>
<td></td>
<td>Fatigue</td>
<td>Alcohol depletes B6</td>
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<tr>
<td></td>
<td></td>
<td>Burning feet</td>
<td>Liver damage inhibits B6</td>
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<td></td>
<td></td>
<td>Acne</td>
<td>Mega doses (2000mg/day) can cause irreversible nerve damage and numbness.</td>
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<td>Excess soreness after exercise (poor recovery).</td>
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<td>Irritability</td>
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<td>Insomnia</td>
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<td></td>
<td></td>
<td>Anxiety</td>
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<td></td>
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<td>Fatigue</td>
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<td></td>
<td></td>
<td>Tingling, pricking, or numbness</td>
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<tr>
<td><strong>B6</strong></td>
<td>Supports more than 100 different enzymes involved in metabolism, blood cell creation, amino acids creation and neurotransmitter synthesis. Without B6, all amino acids become essential, meaning they can’t be made from the body. Needed to make serotonin. Converts tryptophan to B vitamins.</td>
<td>High homocysteine levels</td>
<td>B12, B6 deficiency can increase the need for B9.</td>
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<tr>
<td></td>
<td></td>
<td>Cardiovascular weakness</td>
<td>Diet low in raw vegetables</td>
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<td></td>
<td></td>
<td>Depression</td>
<td>Alcohol depletes B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Headaches</td>
<td>Excessive dieting creates deficiencies.</td>
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<tr>
<td></td>
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<td>Dandruff</td>
<td>Damaged GI tract</td>
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<td></td>
<td>Carpal Tunnel Syndrome</td>
<td>Pregnancy and lactation increases the need for B9</td>
</tr>
<tr>
<td><strong>B9 (Folate)</strong></td>
<td>Important in the formation of new cells, especially infancy and pregnancy. Supports metabolism, blood and growth development and nerves. Needed for energy production.</td>
<td>Anemia</td>
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<td></td>
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<td>Neural tube defects (spinal bifida)</td>
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<td>Cleft palate</td>
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<td>Sore tongue</td>
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<td>Depression</td>
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</tbody>
</table>
| **B12** | Support liver function, blood cells and gastro-intestinal tract. | • Feeling of strange tiredness despite sufficient sleep.  
• Shortness of breath.  
• Heavy breathing while climbing stairs  
• Sighs or yawns frequently  
• Swollen tongue  
• Feeling of stomach fullness  
• Brittle nails both on hands and feet  
• Pins and needles, especially on tips of fingers and toes  
• Brain fog  
• Loss of memory  
• Irritability, mood swings  
• Numbness in fingers and feet as though you are wearing socks and gloves  
• Nerve pain in bottom of feet (peripheral neuropathy)  
• Loss of intrinsic factor through ulcers of the stomach  
• Stomach damage |
| **Vitamin C** | Necessary for the production of connective tissue (collagen) - supporting gums, blood capillaries, bone; necessary for the transport of fatty acids into the mitochondria. Vitamin C supports the lymphocyte enhancing immunity. | • Gums bleed easily after brushing.  
• Swollen, red gums.  
• Dental periodontal destruction  
• Sore burning mouth  
• Anemic  
• Shortness of breath *Bruises easily  
• Nose bleeds  
• Loss of cartilage  
• Slow wound healing  
• Poor immunity  
• Fatigue  
• Insomnia  
• Low tolerance to stress (instability)  
• Joint pain, especially in the knees  
• Loose teeth  
• Atherosclerosis  
• History of high doses of ascorbic acid can deplete vitamin C complex factors leading to symptoms of vitamin C deficiency  
• Excess vitamin C will enhance iron in the blood, so people who have excess iron disorders need to be aware of this. |
| **Vitamin D** | Supports bones, heart, kidneys, nervous system, and teeth. | • Easily gets sunburn or sun stroke  
• Osteoporosis or osteopenia (loss of bone)  
• Burning in mouth  
• Insomnia  
• Irregular heart beat  
• Myopia (blurry with distance)  
• Nervousness  
• Pale skin  
• Soft teeth  
• Poor immune system  
• Nose bleeds  
• Insufficient bile or gallbladder problems  
• Excess vitamin F  
• Parathyroid insufficiency |
| **Vitamin E** | Support blood vessels, heart, lungs, nerves, pituitary gland and healing. | • Dry hair  
• Hair loss  
• Sterility  
• Muscle weakness  
• Slow healing  
• Leg cramps  
• Cardiovascular problems  
• Intermittent claudication (pain and cramps in the calf’s while exercising, but relieved by rest)  
• Enlarged prostate  
• Allows the absorption of calcium and magnesium  
• Deficiency of zinc prevents vitamin E |
| **Vitamin K** | Supports bone, blood, metabolism and liver function. Helps convert glucose into glycogen for storage in liver. | • Bruises easily  
• Poor clotting  
• Low platelets  
• Brittle bones  
• Low blood sugar  
• Coumadin medication blocks vitamin K, creating a thinned blood. |
| **Calcium** | Supports bone, circulation, immune system, nervous system, heart, muscles, skin, soft tissues and teeth. | • Numbness in the legs and arms  
• Brittle finger nails  
• Eczema (skin rash)  
• Bone loss as in osteoporosis and osteopenia  
• Heart palpitations  
• High blood pressure  
• Insomnia  
• Irritability, nervousness  
• Muscle cramps  
• Dental cavities and loss of teeth.  
• Calcium needs vitamin A for absorption or possible kidney stones can form  
• Without vitamin C, bones can become decalcified  
• Without vitamin D, calcium doesn’t get absorbed in the intestines  
• Without vitamin E and F, calcium doesn’t get absorbed in the nerves and muscles  
• Without vitamin B2 (G), cataracts can develop  
• Parathyroid insufficiency can decrease calcium absorption  
• Excess stress can cause the adrenals to release calcium through the urine  
• Excess posterior pituitary secretion can cause calcium to deposit in the walls of the blood vessels. |
| **Potassium** | Supports nerve function (including brain), osmotic fluid balance between cells and interstitial spaces, supports blood, kidneys, muscles and skin. Supports the parasympathetic nervous system | • Decrease in bowel movements  
• Muscle weakness  
• Nervousness, irritability  
• Irregular heart beat  
• High blood pressure  
• Acne  
• Excess thirst  
• Insomnia  
• Fluid retention  
• Diarrhea, long term laxatives and vomiting can deplete potassium  
• Potassium together with B1 deficiencies effect the heart function  
• Diuretics deplete potassium  
• Kidney disease can cause the potassium to become excessive in the body (kidney dialysis patients need to make sure they do not consume excessive potassium) |
| **Iron** | Supports blood, bone, muscles, nails, skin and teeth. Iron is necessary for production of hemoglobin, which carries O2 | • Breathing difficulty  
• Brittle nails  
• Dry hair  
• Hair loss  
• Dizziness  
• Pale skin  
• Fatigue  
• Constipation  
• Sore inflamed tongue  
• Poor immune system |
<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Functions and Effects</th>
</tr>
</thead>
</table>
| **Iodine** | Supports immune system, thyroid, ovary and brain.  
  - Slow metabolism  
  - Weight gain  
  - Mental sluggishness |
| **Zinc** | Supports bones, eyes, heart, liver and prostate. Needed for many enzymes to work.  
  - Acne  
  - Brittle nails  
  - Eczema  
  - Fatigue  
  - Loss of taste  
  - Loss of smell  
  - Poor appetite  
  - Poor memory  
  - Skin problems  
  - Splitting hair  
  - Hair loss  
  - Sterility  
  - White spots on nails  
  - Prostate problems  
  - Poor immunity  
  - Vitamin E prevents the absorption of Zinc |
| **Magnesium** | Supports arteries, bones, immune system, nervous system, reproductive system, heart and teeth.  
  - Anxiety (mitable)  
  - Low blood pressure  
  - Insomnia  
  - Nervousness  
  - Dizziness |
| **Manganese** | A trace mineral that participates in many enzyme systems in the body. Involved in growth and reproduction. It is a catalyst in the synthesis of fatty acids and cholesterol, facilitates protein and carbohydrate metabolism, and may also participate in the production of sex hormones and maintaining reproductive health.  
  - Nausea  
  - Vomiting  
  - Poor glucose tolerance (high blood sugar levels)  
  - Skin rash  
  - Loss of hair color  
  - Excessive bone loss  
  - Low cholesterol levels  
  - Fuzziness  
  - Hearing loss  
  - Reproductive system difficulties |
| **Phosphorus** | Supports bone, brain cells, circulation, digestive system, eyes, liver, muscles and teeth.  
  - Appetite loss  
  - Bone pain  
  - Fatigue  
  - Irregular breathing  
  - Bone and teeth loss |
| **Selenium** | Is an important anti-microbial nutrient. It is also a strong anti-viral mineral. Important in many enzymes. Important in thyroid function and immune system.  
  - Weakness or pain in the muscles  
  - Discoloration of the hair or skin  
  - Whitening of the fingernail beds  
  - Heart arrhythmias  
  - Deterioration of the joint tissue  
  - Acne  
  - Infertility in males  
  - Ovarian cysts  
  - Piodosis  
  - High cortisol, and cortisol medication (prednisone) reduce selenium  
  - Selenium is responsible for keeping vitamin E and C supply in a normal range, so deficiencies of selenium can reduce E and C.  
  - A shortage of selenium can increase replication of certain viruses.  
  - If on a completely plant-based diet, sodium will be low.  
  - Normal ratio of potassium to sodium is 4 to 1.  
  - MSG foods can give excessive sodium.  
  - Diarrhea, leg cramps, dehydration and fever can deplete sodium.  
  - Omega 6 without omega 3 can be inflammatory. |
| **Omega 6** | Supplies the raw material for your cell membrane. The cell membrane allows the proper amounts of necessary nutrients to enter the cell, and ensures that waste products are quickly removed from the cell. Decreases the risk of cancer. Reduce inflammation  
  - High blood pressure  
  - High triglycerides  
  - Inflammation  
  - Dry skin  
  - Poor immune system  
  - Arthritis  
  - Excessive ear wax  
  - Depression  
  - Cardiovascular problems  
  - Diabetes  
  - Fatigue  
  - Dry, itchy skin  
  - Brittle hair and nails  
  - Inability to concentrate  
  - Joint pain |
| **Omega 3** | Leucine supports the regulation of blood-sugar levels, the growth and repair of muscle tissue (such as bones, skin and muscles), growth hormone production, wound healing as well as energy regulation. It can assist to support repair in trauma or severe stress. |
| **Leucine** | Leucine supports the regulation of blood-sugar levels, the growth and repair of muscle tissue (such as bones, skin and muscles), growth hormone production, wound healing as well as energy regulation. It can assist to support repair in trauma or severe stress.  
  - Hypoglycemia symptoms  
  - Headaches  
  - Dizziness  
  - Fatigue  
  - Depression  
  - Irritability |
<table>
<thead>
<tr>
<th>Amino Acid</th>
<th>Function and Uses</th>
<th>Deficiencies / Symptoms</th>
<th>Additional Notes</th>
</tr>
</thead>
</table>
| Lysine     | Required in calcium absorption and maintaining lean body mass. It is needed to produce antibodies, hormones, enzymes, collagen formation as well as repair of tissue. It is beneficial for people recovering from injuries and recovery after operations. It also seems to assist in fighting herpes and cold sores. | • Herpes and cold sores  
• Anemia  
• Lack of energy  
• Poor appetite  
• Irritability  
• Poor concentration  
• Hair loss  
• Bloodshot eyes  
• Weight loss  
• Reproductive disorders  
• Bloodshot eyes |  

| Threonine  | Required to help maintain the proper protein balance in the body, as well as assist in the formation of collagen and elastin in the skin. It is involved in liver functions as well as assisting the immune system by helping the production of antibodies promoting thymus growth and activity. | • Irritability  
• Moody  
• Fatty liver  
• Digestive difficulties |  

| Valine     | Has a stimulating effect and is needed for muscle metabolism, repair and growth of tissue. It can be used as an energy source in the muscles, and can preserve the use of glucose. Valine is also beneficial for supporting a healthy liver, as well as nerve and brain physiology. | • Problem with myelin covering of the nerves (burning pain or numbness in the feet) | • Liver or kidney problems can aggravate the deficiency of isoleucine as well as increase ammonia in the body |

| Isoleucine | Promotes muscle recovery after physical exercise and is needed for the formation of hemoglobin as well as assisting with regulation of blood sugar and energy levels. It is also involved in blood-clot formation. | • Hypoglycemia symptoms  
• Headaches  
• Dizziness  
• Fatigue  
• Depression  
• Irritability |  

| Tryptophan | This amino acid is required for the production of niacin (vitamin B3). It is used by the human body to produce serotonin, a neurotransmitter that is important for normal nerve and brain function. Serotonin is important in sleep, stabilizing emotional moods, pain control, and inflammation. It assists in alleviating stress, helps with weight loss and reducing appetite. | • Anxiety  
• Moody  
• Irritability  
• Insomnia |  

| Phenylalanine + Tyrosine | Phenylalanine can have an effect on a person's mood since it is closely involved with the central nervous system. It also can reduce appetite. It is needed to make neurotransmitters (epinephrine, dopamine, and norepinephrine). The action of Tyrosine assists in the production of skin and hair pigment. Thyroid, pituitary and adrenal gland all requires this amino acid. Makes many important brain chemicals that help regulate appetite, pain sensitivity, and the body's response to stress. | • Lethargy  
• Fluid retention  
• Weakness  
• Skin problems  
• Liver issues  
• Low blood pressure  
• Low body temperature (including cold hands and feet)  
• Restless leg syndrome  
• Hypothyroidism  
• Chronic fatigue  
• Sluggish metabolism  
| People with high blood pressure and or migraines should avoid phenylalanine. |

| Cysteine + Methionine | Your skin and the detoxification of your body, requires cysteine. It is found in nails, skin as well as hair. It not only is important in collagen production but also assists in skin elasticity and texture. | • Poor immune system |  

| Methionine | Assists in the breakdown of fats, as well as assisting in detoxification. It also supports digestion and possibly the detoxifications of heavy metals from the body. | • Fatty liver  
• Weakness  
• Fluid retention  
• Skin problems |  

| Cysteine | Your skin and the detoxification of your body, requires cysteine. It is found in nails, skin as well as hair. It not only is important in collagen production but also assists in skin elasticity and texture. | • Poor immune system |  

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