



Nutrient Deficiency Side-effects

Vitamin A: Chronic deficiency can lead to susceptibility of cancer, acne, night blindness, or other ocular problems. Plays an important role in maintaining the integrity of all epithelial tissue and is associated with a reduced risk of various epithelial cell cancers. Long term deficiency causes skin to become dry, scaly, and rough.

Vitamin B1 (Thiamine): Deficiencies manifest primarily as disorders of the neuromuscular, gastrointestinal (decrease in stomach acid), and cardiovascular systems. Symptoms include depression, irritability, memory loss, mental confusion, indigestion, muscular weakness, heart palpitations, and defective muscle coordination. It's required by every cell in the body to make ATP. It's necessary for the maintenance of nerve tissues, nerve function and transmission and required for the synthesis of acetylcholine, the neurotransmitter involved in thought and memory processes.

Vitamin B2 (Riboflavin): Deficiencies primarily affect the skin and mucus membranes. Symptoms include Cheilosis (cracks in the corners of the mouth), and inflamed mucous membranes. Reddening, tearing, burning, and itching of the eyes, eyes that tire easily, and eyes are very sensitive to light. Seborrheic dermatitis can occur.

Vitamin B3 (Niacin): Can lead to impaired metabolism of starches, fats, and proteins. Niacin containing coenzymes NAD and NADP are involved in more than 200 different reactions in the metabolism of carbohydrates, fatty acids, and amino acids making it critical in supplying energy to every cell of the body. Niacin is especially important in the oxidation-reduction reactions in the Krebs cycle involving the production of energy from carbohydrates.

Vitamin B5 (Pantothenic Acid): Symptoms of deficiency are similar to other vitamin B deficiencies. There is impaired energy production, due to low CoA levels, which could cause symptoms of irritability, fatigue, and apathy. Acetylcholine synthesis is also impaired therefore neurological symptoms can also appear. They include numbness, paresthesia, and muscle cramps. Deficiency can also cause hypoglycemia, or an increased sensitivity to insulin.

Vitamin B6 (Pyridoxine): Irritability, nervousness and insomnia as well as general weakness, skin changes such as dermatitis and acne as well as asthma and allergies.

Vitamin B7 (Biotin): Deficiency symptoms are characterized progressive hair loss, loss of hair color, scaly dermatitis, and seborrhea. Biotin-dependent enzymes are involved in the metabolism of sugar, fat, and amino acids. Specifically, biotin is involved in the utilization of glucose, and the breakdown and utilization of fatty acids.

Vitamin B9 (Folic Acid): Folic acid is critical in the development of a fetus. Birth defects, miscarriage and neural tube defects. Some cancers have been associated with abnormally low levels of folic acid. As folic acid is such an important part in your central nervous system health, if you are deficient you may experience symptoms such as fatigue, depression or forgetfulness. High homocysteine levels as folic acid works to lower homocysteine. People with high homocysteine have been shown to have an increased risk of heart attacks and strokes.

Vitamin B12: Deficiencies manifest primarily as anemia and neurological changes. Vitamin B12 deficiency inhibits DNA synthesis, which can affect growth and repair of all cells. Low levels can cause fatigue, peripheral neuropathy, tongue and mouth irregularities, macrocytic anemia (abnormally enlarged red blood cells), depression, confusion and memory loss (especially in the elderly), dermatitis, skin sensitivity, and loss of appetite.

Vitamin C: Plays a major role in the synthesis of collagen and elastin, the major structural components of skin, tendons, bone matrix, tooth dentin, blood vessels and connective tissue. Collectively collagen is the most abundant protein in the body, comprising 25-30% of total body protein. Is also one of the body's most powerful and most important antioxidants. Being water soluble it provides protection in all body fluids, within every cell in the body, and is highly concentrated in the brain. Called the "stress vitamin" because is required for the synthesis of the body's main stress response hormones in the adrenal glands, including adrenalin and cortisol.

Calcium: Symptoms of deficiency include osteopenia, osteomalacia, osteoporosis, periodontal disease, muscle spasms, and decreases cell wall permeability.

Carnitine: Symptoms of deficiencies include elevated blood lipids, abnormal liver function, muscle weakness, reduced energy, and impaired glucose control. It regulates fat metabolism (especially in the heart) by facilitating the transport of fat across cell membranes into the mitochondria for energy production.

Chromium: The symptoms of long-term chromium deficiency are severely impaired glucose tolerance, loss of weight, and confusion.

Coenzyme Q10 (Ubiquinone): Deficiencies can cause congestive heart failure, increased blood pressure, cardiomyopathy, muscle cramps, and periodontal disease.

CoQ10 plays a critical role in the production of energy within the mitochondria. It is a coenzyme for numerous enzymes that are involved in the production of adenosine triphosphate (ATP), which is a high energy fuel in every living cell. It is also an important antioxidant. Because it is fat-soluble, it is able to reside in the mitochondrial cell membrane where it provides protection against free radical damage to DNA.

Copper: Important in the formation of bone, collagen, elastin and hemoglobin. Deficiency causes fatigue (due to anemia), loss of color in skin and hair (due to decreased synthesis of melanin), nervous system disorders, and reduced resistance to infection. Copper is a component of many important enzymes like copper-zinc. Copper deficiency can decrease production of superoxide dismutase which is one of the body's most important antioxidant enzymes, and dopamine beta-hydroxylase which synthesizes norepinephrine.

Vitamin D: Can lead to osteoporosis, osteopenia, osteomalacia, and in children retarded growth, muscle weakness, late development of teeth, and rickets. Promotes absorption of calcium and phosphorus in the intestines for growth of bones and teeth. Cholecalciferol (D3), the active form of Vitamin D may be helpful in the prevention and treatments of some cancers and is considered to have hormone like activity. Evidence that vitamin D is a key element in immune system health and function.

Glutathione: Low levels can cause decreased capacity for hepatic detoxification, decreased immunity, and suppression of macrophage activity. A lack of glutathione may lead to increased free radical damage throughout the body, especially in the membranes of red blood cells and mitochondria. Glutathione participates in the hepatic detoxification of many compounds via glutathione S-Transferase. This enzyme participates in the detoxification of compounds from cigarette smoke, ethanol, and acetaminophen. It is part of the antioxidant enzyme system glutathione peroxidase, which is one of the body's most important antioxidants. It is also the most abundant antioxidant in the brain and lungs.

Inositol: An inositol deficiency could be a contributing cause of abnormal platelet aggregation, heart disease (along with B-vitamin deficiencies), liver disease, memory loss, panic/anxiety attacks, and tardive dyskinesia. Other symptoms such as eczema, hair loss, constipation, and abnormalities of the eyes and raised cholesterol may be observed. Is an essential component of phospholipids in cellular membranes.

Iron: Symptoms of deficiency include anemia, weakness, fatigue, spooning of the nails, brittle nails, and greater susceptibility to infection. Plays an important role in the cytochrome P450 liver detoxification enzymes, and is necessary for the synthesis of the amino acid carnitine which plays an essential role in the metabolism of fatty acids.

Vitamin K: Deficiency may lead to impaired blood clotting. Necessary for the synthesis of osteocalcin, a unique protein that attracts calcium to the bones. Symptoms of vitamin K deficiency include easy bruisability, epistaxis, gastrointestinal bleeding, menorrhagia and hematuria.

Magnesium: Deficiency symptoms include muscle cramps, weakness, insomnia, loss of appetite, kidney stones, osteoporosis, nervousness, restlessness, irritability, fatigue and high blood pressure. It is a cofactor in over 300 enzymatic reactions in the body. It is necessary for the transmission of nerve impulses, muscular activity, temperature regulation, detoxification reactions, and formation of healthy bones.

Melatonin: A deficiency could cause insomnia. Melatonin is involved in the synchronization of hormone secretions. The natural biorhythm of hormone secretion is referred to as the "circadian rhythm". Melatonin plays a key role as the biological time keeper of hormone secretions. It also control periods of sleepiness and wakefulness.

Phosphorus: Low levels can affect mineral balance and result in adverse reactions with kidney function. Decreased bone/tooth formation. It is important in the formation of phospholipids.

Potassium: Low levels can lead to heart irregularities, elevated blood pressure, muscle spasms, and fluid alterations in the body. The primary cation in intracellular fluids, controls the conduction of nerve impulses, maintains normal cardiac rhythm, muscle contraction, and acid/alkaline balance.

Probiotics (Lactobacillus and Bifidobacterium): Intestinal microflora are a complex microbial ecosystem that plays a critical role in overall health. Lactobacillus primarily colonize the small intestine, and the anaerobic bifidobacteria are predominately in the large intestine. In a healthy intestinal environment, these bacteria attach themselves to the surface of the intestinal tract where they multiply rapidly and become an important part of our immune system.

Sodium: Symptoms of deficiency include muscle weakness, poor concentration, dehydration, and loss of appetite. Has a major role in the regulation of blood pressure, and plays a critical role in the transmission of electrochemical impulses for nerve function and muscle contraction. Regulates the acid/alkaline balance in the blood and lymph fluids, and maintains cellular permeability.

Zinc: Deficiency leads to slow wound healing, lowered immune function, and impaired sense of taste and smell. It is necessary for prostate health, DNA/RNA synthesis, and promotes conversion of T4 to T3.