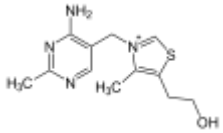
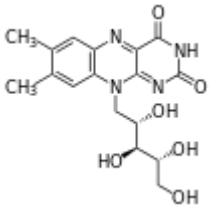
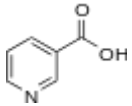
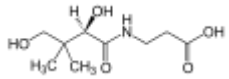
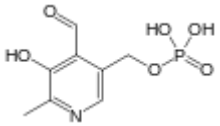
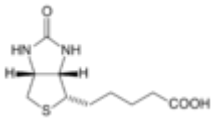
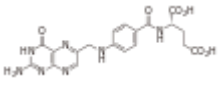
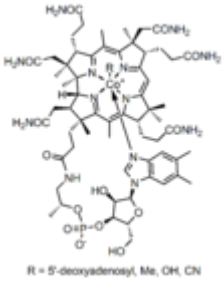
Micronutrients: Vitamins – Vitamin B Charts

Vitamin	Name	Structure	Molecular Function
Vitamin B_1	Thiamine		Thiamine plays a central role in the generation of energy from carbohydrates. It is involved in RNA and DNA production, as well as nerve function. Its active form is a coenzyme called thiamine pyrophosphate (TPP), which takes part in the conversion of pyruvate to acetyl coenzyme A (CoA) in metabolism.
Vitamin B_2	Riboflavin		Riboflavin is involved in the energy production for the electron transport chain, the citric acid cycle, as well as the catabolism of fatty acids (beta oxidation)
Vitamin B_3	Niacin		Niacin is composed of two structures: nicotinic acid and nicotinamide. There are two co-enzyme forms of niacin: nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP). Both play an important role in energy transfer reactions in the metabolism of glucose, fat and alcohol. NAD carries hydrogens and their electrons during metabolic reactions, including the pathway from the citric acid cycle to the electron transport chain. NADP is a coenzyme in lipid and nucleic acid synthesis.
Vitamin B_5	Pantothenic acid		Pantothenic acid is involved in the oxidation of fatty acids and carbohydrates. Coenzyme A, which can be synthesized from pantothenic acid, is involved in the synthesis of amino acids, fatty acids, ketones, cholesterol, phospholipids, steroid hormones, neurotransmitters (such as acetylcholine), and antibodies.

Source: http://www.drritamarie.com/go/WikiBVitamins Retrieved on 2015-11-22

Vitamin	Name	Structure	Molecular Function
Vitamin B_6	Pyridoxine, Pyridoxal, Pyridoxamine		The active form pyridoxal 5'-phosphate (PLP) (depicted) serves as a cofactor in many enzyme reactions mainly in amino acid metabolism including biosynthesis of neurotransmitters.
Vitamin B_7	Biotin		Biotin plays a key role in the metabolism of lipids, proteins and carbohydrates. It is a critical co-enzyme of four carboxylases: acetyl CoA carboxylase, which is involved in the synthesis of fatty acids from acetate; propionyl CoA carboxylase, involved in gluconeogenesis; β-methylcrotonyl CoA carboxylase, involved in the metabolism of leucine; and pyruvate CoA carboxylase, which is involved in the metabolism of energy, amino acids and cholesterol.
Vitamin B_9	Folate		Foliate acts as a co-enzyme in the form of tetrahydrofolate (THF), which is involved in the transfer of single-carbon units in the metabolism of nucleic acids and amino acids. THF is involved in pyrimidine nucleotide synthesis, so is needed for normal cell division, especially during pregnancy and infancy, which are times of rapid growth. Folate also aids in erythropoiesis, the production of red blood cells.
Vitamin B_{12}	Cobalamin		Vitamin B12 is involved in the cellular metabolism of carbohydrates, proteins and lipids. It is essential in the production of blood cells in bone marrow, and for nerve sheaths and proteins. Vitamin B12 functions as a co-enzyme in intermediary metabolism for the methionine synthase reaction with methylcobalamin, and the methylmalonyl CoA mutase reaction with adenosylcobalamin.

Vitamin	Name	Deficiency effects – Classic Syndromes
Vitamin B_1	Thiamine	Deficiency causes beriberi. Symptoms of this disease of the nervous system include weight loss, emotional disturbances, Wernicke's encephalopathy (impaired sensory perception), weakness and pain in the limbs, periods of irregular heartbeat, and edema (swelling of bodily tissues). Heart failure and death may occur in advanced cases. Chronic thiamin deficiency can also cause Korsakoff's syndrome, an irreversible dementia characterized by amnesia and compensatory confabulation.
Vitamin B_2	Riboflavin	Deficiency causes ariboflavinosis. Symptoms may include cheilosis (cracks in the lips), high sensitivity to sunlight, angular cheilitis, glossitis (inflammation of the tongue), seborrheic dermatitis or pseudo-syphilis (particularly affecting thescrotum or labia majora and the mouth), pharyngitis (sore throat), hyperemia, and edema of the pharyngeal and oral mucosa.
Vitamin B_3	Niacin	Deficiency, along with a deficiency of tryptophan causes pellagra. Symptoms include aggression, dermatitis, insomnia, weakness, mental confusion, and diarrhea. In advanced cases, pellagra may lead to dementia and death (the 3(+1) Ds: dermatitis, diarrhea, dementia, and death).
Vitamin B_5	Pantothenic acid	Deficiency can result in acne and paresthesia, although it is uncommon.
Vitamin B_6	Pyridoxine, Pyridoxal, Pyridoxamine	The classic clinical syndrome for vitamin B6 deficiency is a seborrhoeic dermatitis-like eruption, atrophic glossitis with ulceration, angular cheilitis, conjunctivitis, intertrigo, and neurologic symptoms of somnolence, confusion, and neuropathy[16] (due to impaired sphingosin synthesis) and sideroblastic anemia (due to impaired heme synthesis).
Vitamin B_7	Biotin	Deficiency does not typically cause symptoms in adults but may lead to impaired growth and neurological disorders in infants. Multiple carboxylase deficiency, an inborn error of metabolism, can lead to biotin deficiency even when dietary biotin intake is normal.
Vitamin B_9	Folate	Deficiency results in a macrocytic anemia, and elevated levels of homocysteine. Deficiency in pregnant women can lead to birth defects. Supplementation is often recommended during pregnancy. Researchers have shown that folic acid might also slow the insidious effects of age on the brain.

Vitamin	Name	Deficiency effects – Classic Syndromes
Vitamin B_{12}	Cobalamin	Deficiency results in a macrocytic anemia, elevated homocysteine, peripheral neuropathy, memory loss and other cognitive deficits. It is most likely to occur among elderly people, as absorption through the gut declines with age; the autoimmune disease pernicious anemia is another common cause. It can also cause symptoms of mania and psychosis. In rare extreme cases, paralysis can result.

Vitamin	Name	Tolerable Upper Intake Level	Harmful effects
Vitamin B_1	Thiamine	None	No known toxicity from oral intake. There are some reports of anaphylaxis caused by high-dose thiamin injections into the vein or muscle. However, the doses were greater than the quantity humans can physically absorb from oral intake.
Vitamin B_2	Riboflavin	None	No evidence of toxicity based on limited human and animal studies. The only evidence of adverse effects associated with riboflavin comes from in vitro studies showing the production of reactive oxygen species (free radicals) when riboflavin was exposed to intense visible and UV light.

Vitamin	Name	Tolerable Upper Intake Level	Harmful effects
Vitamin B_3	Niacin	35 mg/day from supplements, drugs or fortified food	Intake of 3000 mg/day of nicotinamide and 1500 mg/day of nicotinic acid are associated with nausea, vomiting, and signs and symptoms of liver toxicity. Other effects may include glucose intolerance, and (reversible) ocular effects. Additionally, the nicotinic acid form may cause vasodilatory effects, also known as flushing, including redness of the skin, often accompanied by an itching, tingling, or mild burning sensation, which is also often accompanied by pruritus, headaches, and increased intracranial blood flow, and occasionally accompanied by pain. Medical practitioners prescribe recommended doses up to 2000 mg per day of niacin, usually in time release format, to combat arterial plaque development in cases of high lipid levels.
Vitamin B_5	Pantothenic acid	None	No known toxicity
Vitamin B6	Pyridoxine, Pyridoxal, Pyridoxamine	200mg/day	Primary symptoms are pain and numbness of the extremities. In severe cases, motor neuropathy may occur causing difficulty in walking. Sensory neuropathy typically develops at doses of pyridoxine in excess of 1,000 mg per day, but adverse effects can occur with much less, so doses over 200 mg are not considered safe.[33] Symptoms among women taking lower doses have been reported
Vitamin B_7	Biotin	None	No known toxicity
Vitamin B_9	Folate	1 mg/day	Masks B12 deficiency, which can lead to permanent neurological damage.
Vitamin B_{12}	Cobalamin	None established.	Skin and spinal lesions. Acne-like rash [causality is not conclusively established].