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# Water Soluble Vitamins

**WATER-SOLUBLE VITAMINS**  
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 <b>Vitamins B1, B2 &amp; B3</b> They nourish the nervous system Stress, sleepness, students 	<b>Vitamin B5</b> Collaborates in making hormones	<b>Vitamin C</b>  
<b>Vitamin B6</b> Improves circulation 	<b>Vitamin B7</b> Skin, nails and hair health 	<b>Vitamin B9 &amp; B12</b> Fertility, pregnancy, fetus development, anemia prevention. 



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# Vitamin C (Ascorbic acid)

- Water soluble vitamin
- Essential for the formation of collagen which is found in the blood vessels of teeth and bones
- Required for the absorption of iron as it reduces ferric to ferrous form which is easily absorbed

## • Functions of Vitamin C

- Essential for the formation of collagen
- Required for wound healing because it helps in the formation of connective tissue
- Essential for the synthesis of norepinephrine a neurotransmitter , activities growth hormone, calcitonin,gastrin releasing peptide
- Excellent antioxidant



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# Sources & Deficiency

- Food sources- amla, guava, cashew nut, drumstick leaves, oranges, tomatoes
- Prolonged deficiency causes scurvy in both infants and adults
- Infantile scurvy- loss of appetite, defective growth of bones, defective formation of teeth, swollen gums, ends of ribs become prominent resulting in scorbutic rosary
- Adult scurvy- fever, susceptibility to infection, delayed wound healing, microcytic hypochromic anaemia develops due to failure of absorption of iron, swollen ulcerated, spongy and bleeding gums, swollen & tender joints, fragile blood vessels, rough and dry skin



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# Vitamin B1(Thiamine)

- Thiamine is converted to Thiamine pyrophosphate (TPP) which is an coenzyme in carbohydrate metabolism
- TPP is also an essential cofactor for the conversion of tryptophan to niacin
- Involved in the transmission of nerve impulses across the cells
- Sources- whole wheat, millets parboiled rice, bran of cereals, gingelly , groundnut, pork, liver, eggs

## Deficiency

- Dry beri-beri-tingling, numbness & burning sensation in hands & legs , tender calf muscle, complete loss of sensation in hands



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# Vitamin B1 Deficiency

- Wet beri-beri-enlargement of the heart ,odema in legs and face , palpitations
- Infantile beri-beri-restlessness,enlargement of the heart, breathlessness

## • Vitamin B2(Riboflavin)

- Yellow enzyme that is heat stable
- Combined with proteins to form flavo-proteins-FAD,FMN
- Conversion of vitamin B6 and folate to active coenzymes
- Essential for the formation of red blood cells and synthesis of glycogen



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# Vitamin B2

- Food sources- egg,milk,fish,whole cereals,legumes& greens
- **Deficiency** – soreness and burning of the mouth and tongue,lesiot at the angles of mouth, inflammation of the tongue (glossitis),dry chapped appearance of the lip with ulcers (cheilosis), photophobia, normocytic anaemia, lacrimation

# Vitamin B3(Niacin)

- Nictotinamide is essential for the tissue metabolism,the active forms are NAD,NADP
- NADis involved in catabolic reactions &NADP is involved in anabolic



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# Vitamin B3

- **Food sources**-dried yeast ,peanuts,whole cereals,legumes,meat, Tryptophan present in dietary proteins is converted to niacin (60mg yields 1 mg)
- **Deficiency** causes a disease Pellagra characterised  
by dermatitis,diarrhoea&dementia
- **Dermatitis**- rough skin characterised by reddening, followed by exfoliation leading to parchment
- **Diarrhoea**-structural & absorptive defects in small intestine
- **Dementia**- irritability , depression,loss of memory



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# Vitamin B6(Pyridoxine)

- Functions primarily in protein metabolism
- Three forms that are present in our body:
- Pyridoxine, Pyridoxal & Pyridoxamine
- **Functions:**
- Essential for the process of transamination
- Removal of amino group ( deamination)
- Removal of carbonyl group (decarboxylation)
- Involved in the conversion of tryptophan to niacin
- Aids in conversion of linoleic to arachidonic acid
- Helps in release of glycogen from liver and muscle





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# Vitamin B6(Pyridoxine)

- **Food sources-** meat,pulses, wheat
- **Deficiency** leads to abnormalities in protein metabolism as poor growth , anaemia,skin lesions decreased antibody function, severe deficiency leads to microcytichypochromic anaemia
- **VitaminB9 (Folic acid)**
- Made of three acids – Pterotic,Para amine benzoic acid , glutamic acid
- **Functions** – coenzyme is essential for transferring single carbon & a no.of key compounds are formed: Thymine
- Purines that are essential components of cells
- Conversion of phenylalanine to tyrosine



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# Vitamin B9

- **Sources-** Greens ,gingelly seeds,cluster beans
- **Deficiency-**bone marrow producing immature cells(megaloblasts) & few matured red bloodcells
- Reduced oxygen carrying capacity – megaloblastic anaemia,cause neural tube disorders of foetus

## • **VitaminB12(Cyanocobalamin**

- Necessary for normal growth and maintenance of healthy nervous tissue
- Involved in DNA synthesis (cell replication)
- Essential for RBC formation
- Facilitates the formation of folate coenzymes needed for nucleic acid synthesis



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- **VitaminB12(Cyanocobalamin**
- **Food sources** – present in foods only of animal origin, liver sheep, eggs, mutton, milk, and shrimp
- **Deficiency** causes pernicious anaemia- characterized by very large immature red blood cells with normal amounts of haemoglobin
- **Requirements-** man/woman-1.0mg/day, children- 0.2-10mg/day