WATER SOLUBLE VITAMINS

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WATER SOLUBLE VITAMINS

- Include vitamin C and the B vitamins.
- Taken in excess are excreted in the urine but sometimes associated with toxicity.
- Both the B vitamins and vitamin C also stored in the liver.

- B complex vitamins: a group of 8 vitamins
  - Thiamine (B₁)
  - Riboflavin (B₂)
  - Niacin (B₃)
  - Pyridoxine (B₆)
  - Folic acid (B₉)
  - Cyanocobalamin (B₁₂)
  - Pantothenic acid
  - Biotin
GENERAL ROLE OF WATER SOLUBLE VITAMIN

1. Breakdown of carbohydrates into glucose.
2. Breakdown of fats and proteins.
3. Muscle tone in stomach and intestinal tract.
4. Skin, hair, eyes, mouth and liver.

Source:
- B complex vitamins found in brewer’s yeast, liver, whole-grain cereals, rice, nuts, milk, eggs, meats, fish, fruits, leafy green vegetables.
THIAMINE (B₁) (THIAMIN PYROPHOSPHATE- TPP)

💡 Essential for:
- Metabolism of carbohydrates into the simple sugar glucose.
- Nervous system.
- Coenzyme in the production of neurotransmitter acetylcholine.

🌡️ Thiamine deficiency - occurs in alcoholics.

 ويم Diseases
- Beriberi: anemia, paralysis, weakness
- Wernicke’s encephalopathy: lack of coordination
- Karsakoff’s psychosis: affects short-term memory
- The mouth: sensitivity of the teeth, cheeks and “cracks” in the lips.
Beriberi may be characterized as "wet" (referring to edema) or "dry" (with muscle wasting, but no edema). Physical examination confirms that this woman has wet beriberi. Notice how the impression of the physician's thumb remains on her leg.
Important in the breakdown of carbohydrates, fat and protein: acts as coenzyme in the process.

- Flavin Mononukleotida (FMN)
- Flavin Adenina Dinukleotida (FAD)

Significant for

- Maintenance of the skin, mucous membranes, cornea of the eyes and for the nerve

Deficiency of riboflavin: dermatitis, angular cheilosis (mouth), glossitis.
In a B vitamin deficiency, the tongue becomes smooth due to atrophy of the tissue (glossitis).
NIACIN (B₃)

- Also known as nicotinic acid and nicotinamide
  - metabolism of food, the maintenance of healthy skin, nerves and gastrointestinal tract.
  - Nicotinamide Adenine Dinucleotide (NAD)
  - Nicotinamide Adenine Dinucleotide Phosphate (NADP)

- Deficiency: pellagra - mental illness.
  - Symptoms: three “D’s”: diarrhea, dermatitis, dementia.
  - Resulting in a fourth “D”, death.
  - The mouth affected by pellagra: inside of the cheeks and tongue become red and painful.
Pellagra is often characterized by a scaly skin rash.
PYRIDOXINE ($B_6$)

- Known as pyridoxal phosphate and pyridoxamine,
  - Breakdown of carbohydrates, proteins and fats.
  - Used in the production of red blood cells
  - Biochemical reactions in the metabolism of amino acids.

- Deficiency is rare except in alcoholics.
- Deficiency:
  - Skin disorders, neuropathy, confusion, poor coordination and insomnia.
  - Oral signs of pyridoxine deficiency: inflammation of the lips, tongue and the rest of the mouth.
Cyanocobalamin (B₁₂)

Role of Cyanocobalamin
- Processing carbohydrates, proteins, and fats
- Make all of the blood cells in the bodies.
- Maintenance of the nerve
- As coenzyme in the synthesis and repair of DNA.

Deficiency
- Strict vegetarians who do not take supplements
- Inability to absorb the vitamin.

Diseases
- Pernicious anemia: weakness, pallor, fever.
- Mouth irritation and brain damage
FOLIC ACID (B<sub>9</sub>)

_known as folacin / folate_
- Interacts with B<sub>12</sub> vitamin for the synthesis of DNA for all cells.
- Combine with B<sub>12</sub> and vitamin C for the breakdown of proteins
- Formation of hemoglobin.

_deficiency_
- Anemia
- Poor growth
- Irritation of the mouth

_deficiency among_
- alcoholics, malnourished, elderly, unable to absorb food due to certain diseases.
Role of Pantothenic acid:
- Breakdown of carbohydrates, lipids and some amino acids.
- Synthesis of coenzyme A.

Role of Biotin
- Coenzyme

Bacteria in the intestines can produce both pantothenic acid and biotin.
Other name for vitamin C is ascorbic acid.

Human don’t have ability to make their own vitamin C.

Role of vitamin C:
- Required for synthesis of collagen.
- Synthesis of the neurotransmitter (norepinephrine).
- Metabolism of cholesterol to bile acids.
- Antioxidant.
**VITAMIN C**

- **Deficiency:** scurvy.
- **Symptoms**
  - Bleeding
  - Hair and Tooth Loss,
  - Joint pain and swelling.
- **Sources:**
  - Orange, grapefruit, strawberries, tomato, melon, apple, rambutan, guava, papaya, pineapples, starfruit, sweet red pepper, broccoli, potatoes.
THANK YOU