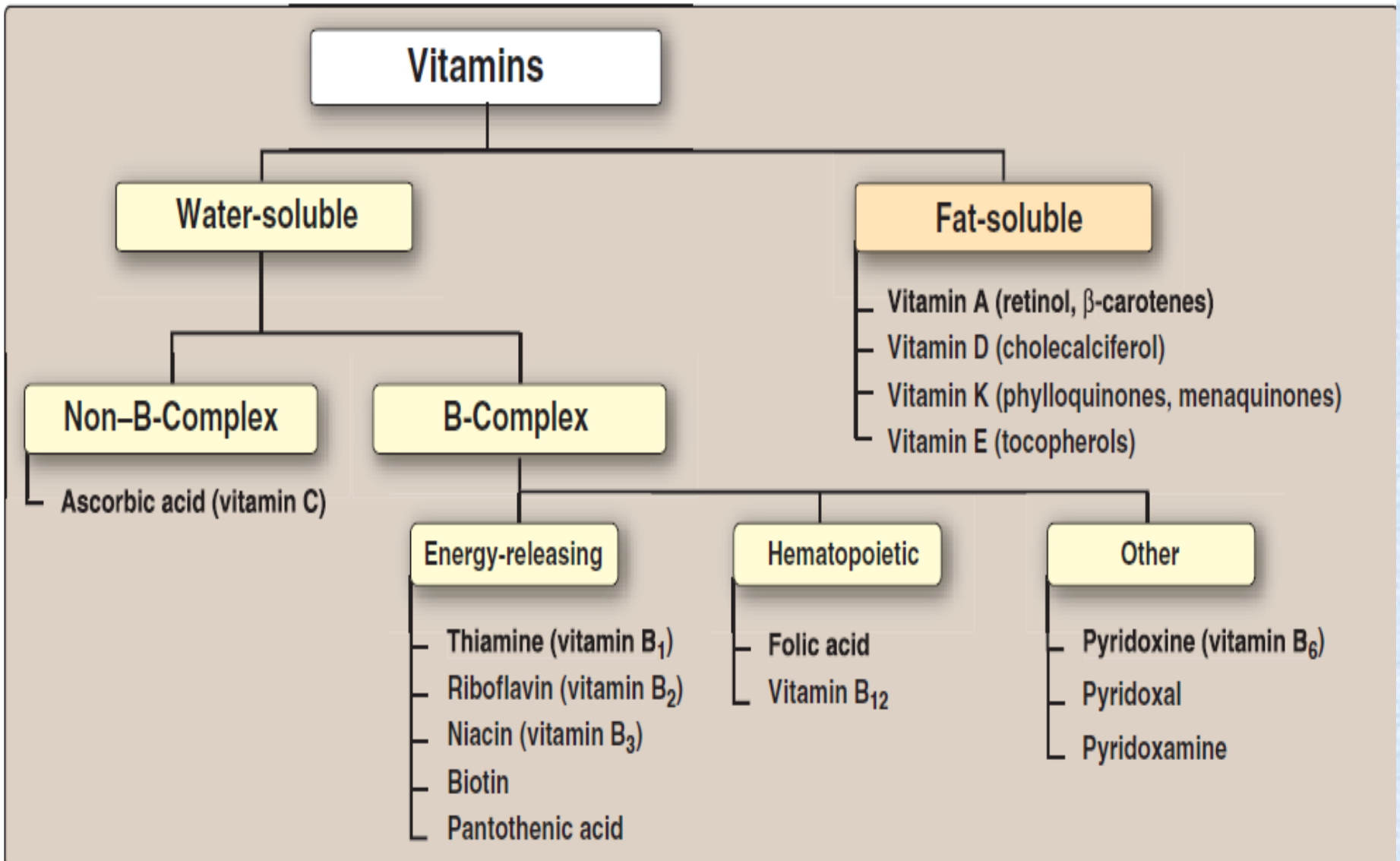


THE B COMPLEX VITAMINS

(VITAMIN B₁)

أ.م.د. شيماء سبتي مطلق

Vitamins Classification Chart



The vitamin B-complex refers to **all of the known essential water-soluble vitamins except for vitamin C**.

Each member of the B-complex has a unique structure and performs unique functions in the human body, and often coexists in the same foods.

Vitamins B1, B2, B3, and biotin participate in different aspects of energy production, vitamin B6 is essential for amino acid metabolism, and vitamin B12 and folic acid facilitate steps required for cell division.

However, contrary to popular belief, **no functions require all B-complex vitamins simultaneously.**

VITAMIN B₁

- **Properties White, crystalline substance**
Water-soluble

Heat labile Unstable at high temperature and in alkaline medium Stable in acid medium On oxidation it gives a yellowish dye called thiochrome.

- **Sources** : Rice polishing, dried yeast and wheat germ are rich sources of vit. B1. Whole cereals like wheat, oats, legumes, oil seeds and nuts are good sources. Milled cereals, vegetables, fruits, meat and fish are poor sources. On milling, vit. B1 is lost from cereals.
- **Functions** : Acts as a co-enzyme in carbohydrate metabolism. Requires for the synthesis of glycine. It has a specific action on nerve tissue. Requires for the maintenance of normal gastro-intestinal tone and motility. Maintains normal appetite.

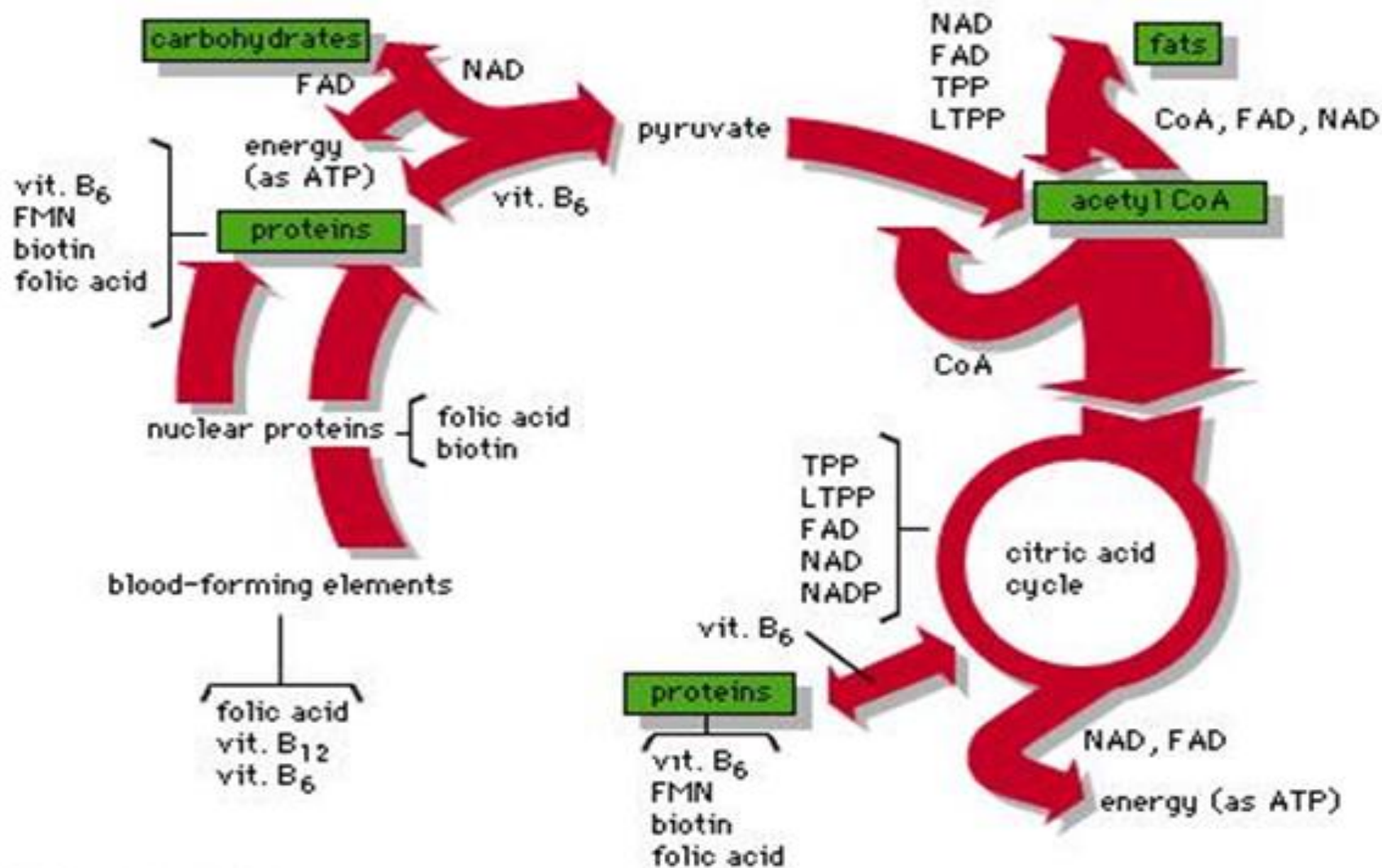
Vitamin B1



Vitamin B1 (Thiamine)
is found in fortified breads
and cereals, fish, lean meats and milk

- The Vitamins B-complex are family due to :
- 1-They are found together in the **same food**.
- 2-Do **similar work** in the body, maintain healthy skin and muscles tone enhance immune and nervous system functions and promote cell growth and divisions.
- 3-Symptoms of one vitamins **deficiency** may be **undistinguishable** from others.

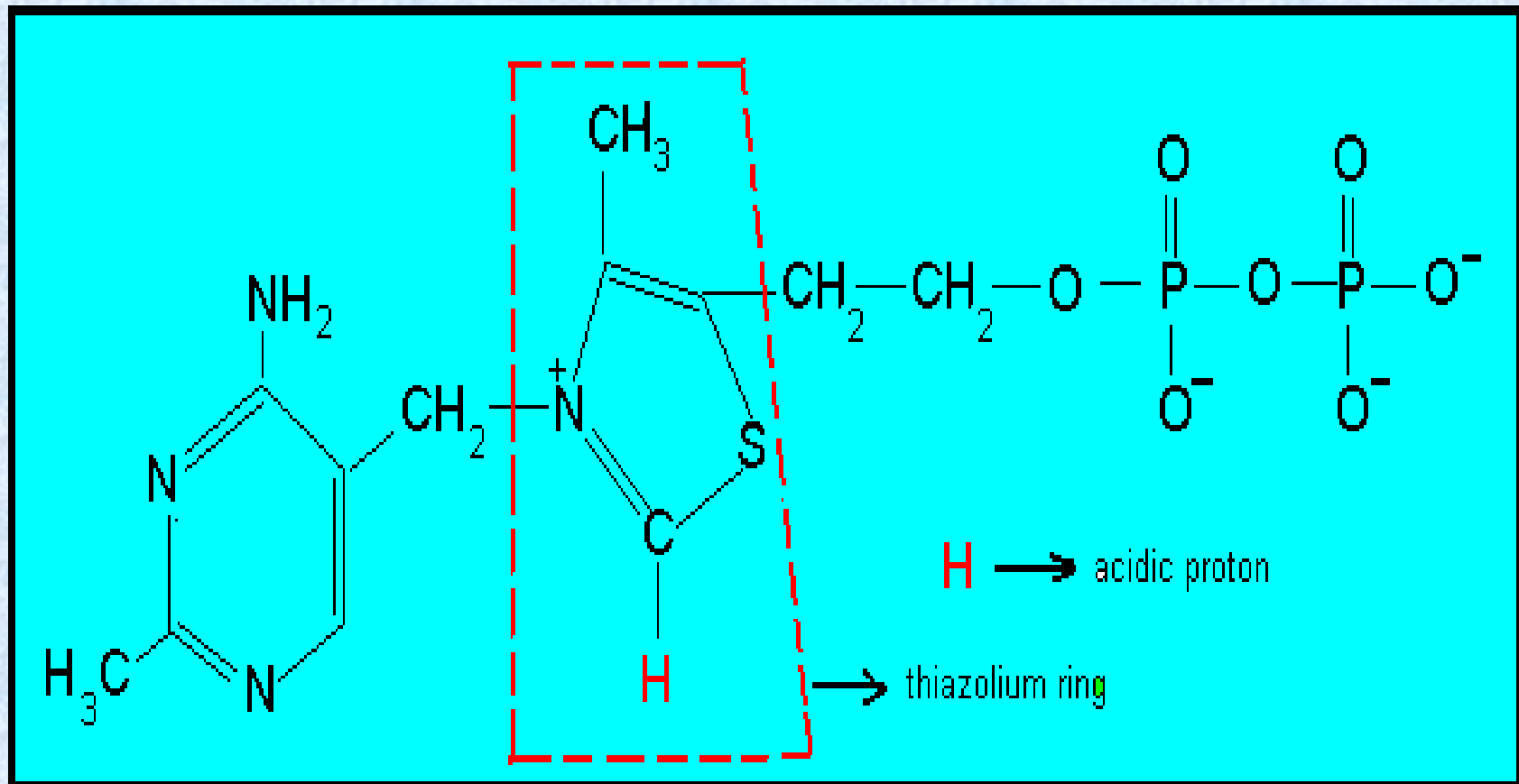




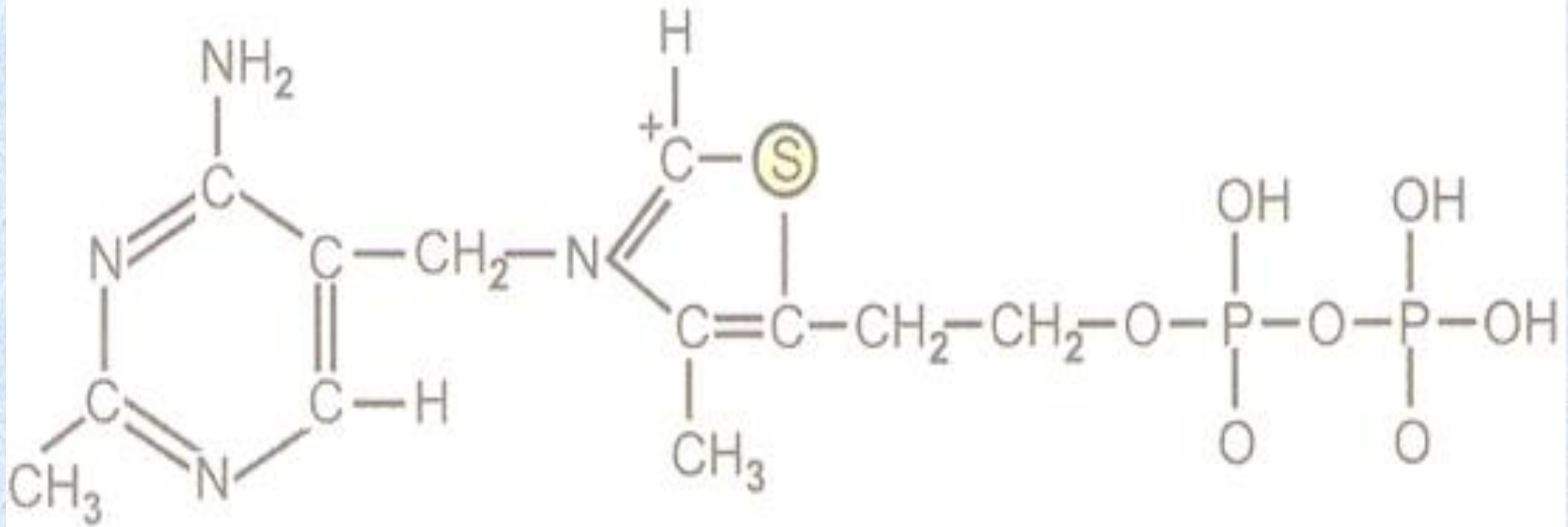
CoA—coenzyme A
 FAD—flavine adenine dinucleotide
 FMN—flavine mononucleotide

LTPP—lipothiamide pyrophosphate
 NAD—nicotinamide-adenine dinucleotide
 NADP—nicotinamide-adenine dinucleotide phosphate
 TPP—thiamine pyrophosphate

Water-soluble vitamins are carried through the bloodstream. Whatever the bodies do not use up is eliminated in urine. Therefore, we need a continuous supply of vitamin B1 - we need to be consuming it daily. Thiamine is a co-enzyme - it helps some enzymes work properly.



Thiamine is a colorless compound with a chemical formula $C_{12}H_{17}N_4OS$. Its structure contains an amino pyrimidine ring and a thiazole ring with methyl and hydroxyethyl side chains linked by methylene bridge.



Structure of thiamine

- * The primary function of B-1 is to help the body **convert food to energy**.
- When we eat, the body breaks food down for fuel use. The body's **primary fuel source is glucose**, which we get from carbohydrate foods.
- **B-1** helps the body **turn carbohydrates into glucose** for fuel.
- **B-1**, along with the **other B vitamins**, also helps the body **metabolize fats and protein**.
- * Helps keep the liver, skin, hair and eyes healthy.

- **Absorption**
- Thiamine is released by the action of **phosphatase and pyrophosphates** in the **upper small intestine**.
- At low concentrations, the process is carrier-mediated, and, at **higher concentrations**, absorption occurs via **passive diffusion**.
- **Active transport** is greatest in the **jejunum and ileum**. The cells of the intestinal mucosa have **thiamine pyrophosphokinase activity**.
- The **majority of thiamine present** in the intestine is in the **pyrophosphorylated form**.
- The uptake of thiamine by the mucosal cell is likely coupled in some way to its **phosphorylation/dephosphorylation**.

- **Deficiency Diseases**

- Beriberi - nervous, system affected, muscles become weak and painful paralysis can occur. Heart failure, wet beriberi, dry beriberi, infantile beriberi, oedemia, children's growth is impaired, keto acids accumulate in the blood, wernicke's-korsakoff's syndrome etc. Loss of appetite, fatigue, irritability, depression and constipation occur.

-

• Beriberi

- Beriberi is a **disorder of nervous system** which is **actually cause by the deficiency of the thiamine in the diet of the individual**, thiamine is basically found in the membranes of neurons and it is involved in the break down of the energy molecules such as glucose.
- Beriberi may be found in people whose diet consists mainly of **polished white** rice, which is very low in thiamine
- It can also be seen in **chronic alcoholics**, Arsenic poisoning causes alterations in cellular metabolism resulting in blockage of thiamine use which results in thiamine deficiency without any dietary shortfall.

Three major forms of the of beriberi •

- **1-Dry beriberi** :affecting distal more than proximal limb segments and causing calf muscle tenderness.
- **2-Wet beriberi** :is associated with mental confusion, muscular atrophy, edema, tachycardia, cardiomegaly, and congestive heart failure in addition to peripheral neuropathy.
- **3-Infantile beriberi** :occurs in infants breast-fed by thiamin-deficient mothers (who may show no sign of thiamine deficiency).

