

VITAMIN B₁

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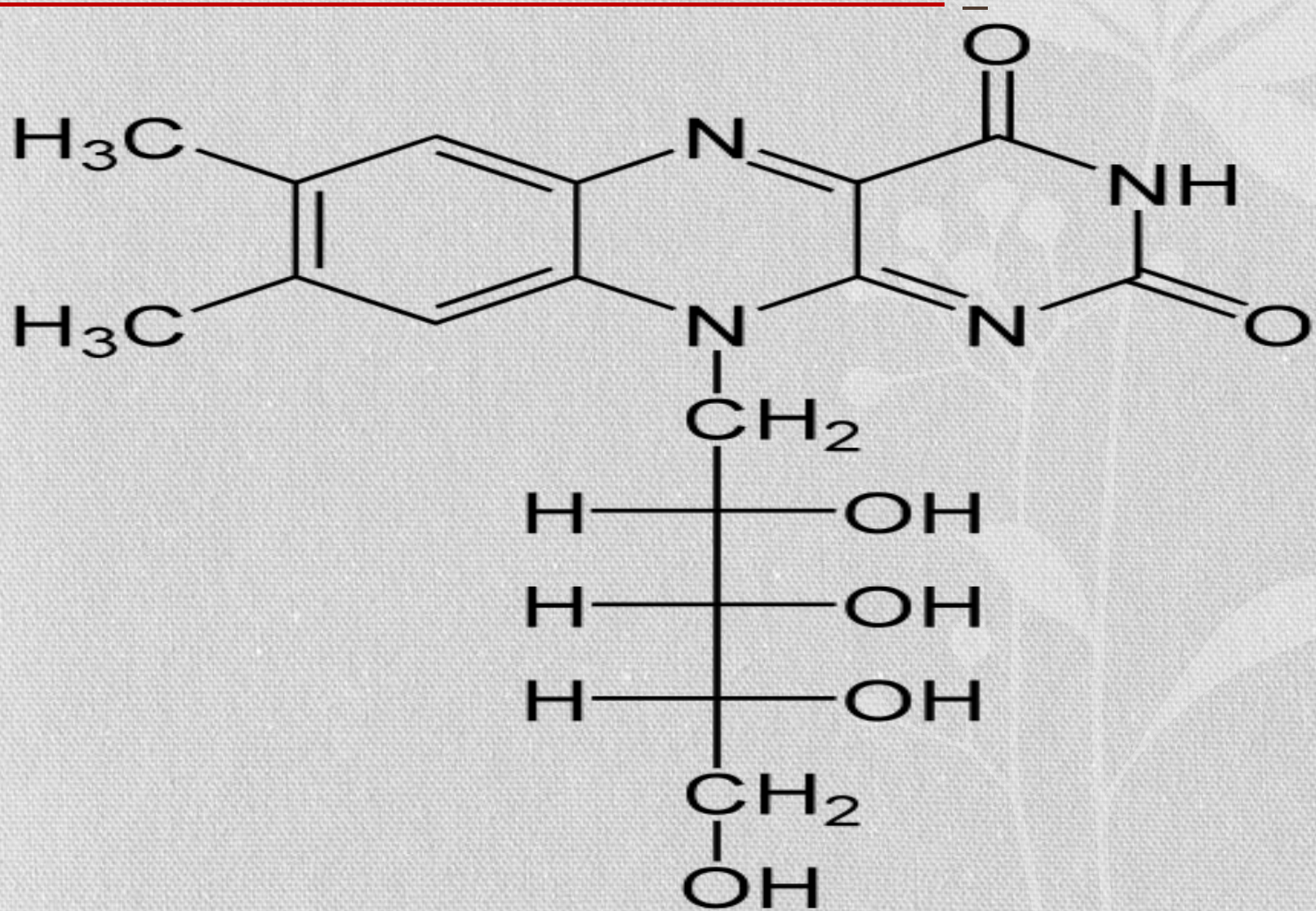
- Vitamin B₂ , which is also known as Riboflavin, is an easily absorbed colored micronutrient with a key role in maintaining health in humans and other animals.
- It is the central component of the cofactors FAD (flavin adenin dinucleotide) and FMN (flavin mononucleotide), and is therefore required by all flavoproteins.

- As such, vitamin B₂ is required for a wide variety of cellular processes.
- It plays a key role in energy metabolism, and for the metabolism of fats, ketone bodies, carbohydrates, and proteins
- The reduced form, which occurs in metabolism along with the oxidized form, is colorless.

- The name "riboflavin" comes from :
 1. "Ribose" (the sugar whose reduced form, ribitol)
 2. "Flavin", the ring-moiety which imparts the yellow color to the oxidized molecule (from Latin flavus, "yellow")

- It's best known visually as :
 1. The vitamin which imparts the orange color to solid B-vitamin preparations
 2. In addition to the yellow color to vitamin supplement solutions
 3. And the unusual fluorescent-yellow color to the urine of persons who supplement with high-dose B-complex preparations.

The Chemical Structure:



B₂ In Food

Sources:

- Yeast extract is considered to be exceptionally rich in vitamin B₂, and liver and kidney are also rich sources.
- Wheat bran, eggs, meat, milk, and cheese are important sources in diets containing these foods.

- Cereals contain relatively low concentrations of flavins , but are important sources in those parts of the world where cereals constitute the staple diet.
- The milling of cereals results in considerable loss (up to 60%) of vitamin B2, so white flour is enriched in some countries such as USA by addition of the vitamin .

- Free B2 is naturally present in foods along with protein-bound FMN and FAD.
- Bovine milk contains mainly free vitamin B2, with a minor contribution from FMN and FAD.
- In whole milk, 14% of the flavins are bound non-covalently to specific proteins.

- Egg white and egg yolk contain specialized B2-binding proteins, which are required for storage of free B2 in the egg for use by the developing embryo.
- It is difficult to incorporate vitamin B2 into many liquid products because it has poor solubility in water.


- Hence the requirement for riboflavin-5'-phosphate 'a more expensive but more soluble form of riboflavin.
- *Stability:*
- Vitamin B2 is generally stable during the heat processing and normal cooking of foods if light is excluded.

- The alkaline conditions in which B2 is unstable are rarely encountered in foodstuffs.
- B2 degradation in milk can occur slowly in dark during storage in the refrigerator.

Uses:

- B β is yellow or yellow-orange in color
- In addition to being used as a food coloring, it is also used to fortify some foods.
- It is used in baby foods, breakfast cereals, pastas, sauces, processed cheese, fruit drinks, vitamin-enriched milk products, and some energy drinks.

Biochemical Function:

- Vitamin B₂ is the precursor of:
 1. (FMN)
 2. (FAD) Which function as coenzymes.
- Flavins can act as oxidizing agents.
- Reduction of isoalloxazine ring  FMNH₂ and FADH₂.

Deficiency:

- B γ is continuously excreted in the urine of healthy individuals, making deficiency relatively common when dietary intake is insufficient.
- However, B γ deficiency is always accompanied by deficiency of other vitamins.

• A deficiency of vitamin B2 can be :

I. Primary , poor vitamin sources in one's daily diet .

2. Secondary, may result from:

A. Conditions that affect absorption in the intestine.

B. The body not being able to use the vitamin.

C. Or an increase in the excretion of the vitamin from the body.

- Signs and symptoms of vitamin B2 deficiency (ariboflavinosis) include :
 - Cracked and red lips.
 - Inflammation of the lining of mouth and tongue.
 - Mouth ulcers.
 - Cracks at the corners of the mouth (angular cheilitis).
 - A sore throat.

- Dry and scaling skin.
- Fluid in the mucous membranes.
- Iron-deficiency anemia.
- The eyes may also become bloodshot, itchy, watery and sensitive to bright light.



Toxicity:

- Vitamin B2 is not toxic when taken orally.
- Toxic doses can be administered by injection , any excess at nutritionally relevant doses is excreted in the urine.

- No evidence for B2 toxicity produced by excessive intakes.
- Even when 400 mg of vitamin B2 per day was given orally to subjects in one study for three months.

• Summary :

- B₂ is also known as riboflavin.
- It plays a key role in maintaining health in human and other animals.
- It's important in energy metabolism as well as the metabolism of fats, ketone bodies, carbohydrates, and proteins
- It's yellow or yellow-orange color so it's used in food coloring.

- Milk, cheese, leaf vegetables, liver, kidneys, legumes, yeast, mushrooms, and almonds are good sources of vitamin B2.
- A deficiency of vitamin B2 can be :
 - primary - poor vitamin sources in one's daily diet
 - secondary, which may be a result of conditions that affect absorption in the intestine, the body not being able to use the vitamin, or an increase in the excretion of the vitamin from the body.

- Common symptoms of vitamin B2 deficiency (ariboflavinosis) include cracked and red lips, inflammation of the lining of mouth and tongue, mouth ulcers, and a sore throat.

• *Thank you*

