

Water soluble vitamins



Vitamin B2

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Vitamin B Group

1. Vitamin B1 (Thiamine)

5. Vitamin B6 (Pyridoxine)

2. Vitamin B2 (Riboflavin)

6. Vitamin B7 or Vitamin H (Biotin)

3. Vitamin B3 (Niacin)

7. Vitamin B9 or Vitamin M or (Folic acid)

4. Vitamin B5 (Pantothenic acid)

8. Vitamin B12 (Cyanocobalamin)



Vitamin B2 (Riboflavin)

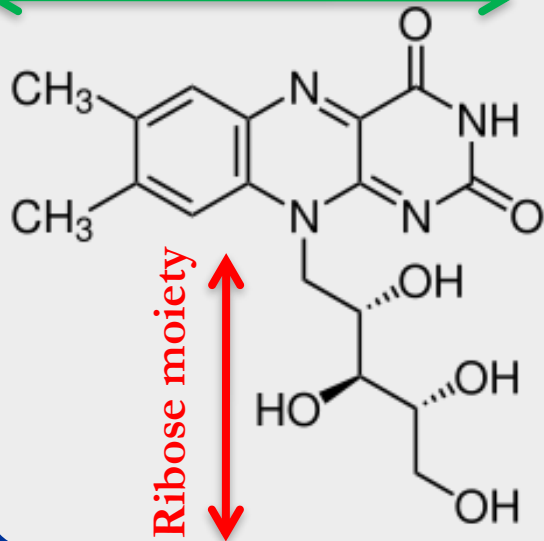


Vitamin B2 (Riboflavin)

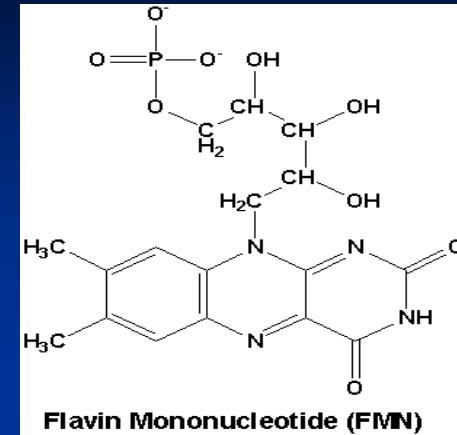
- ❖ **Riboflavin** is defined chemically as 7,8-Dimethyl-10-[(2S,3S,4R)-2,3,4,5-tetrahydroxypentyl] benzo [g] pteridine-2,4-dione and is a yellow to orange-yellow powder and soluble in water.
- ❖ **It is the precursor of phosphorylated coenzymes:** FMN, FAD, and flavin coenzymes linked covalently to specific tissue proteins, at the 8- α methyl position of the isoalloxazine ring.

Riboflavin is stored mainly in **liver, kidney and heart** as it is or as **FAD** (70- 90%) or **FMN**.

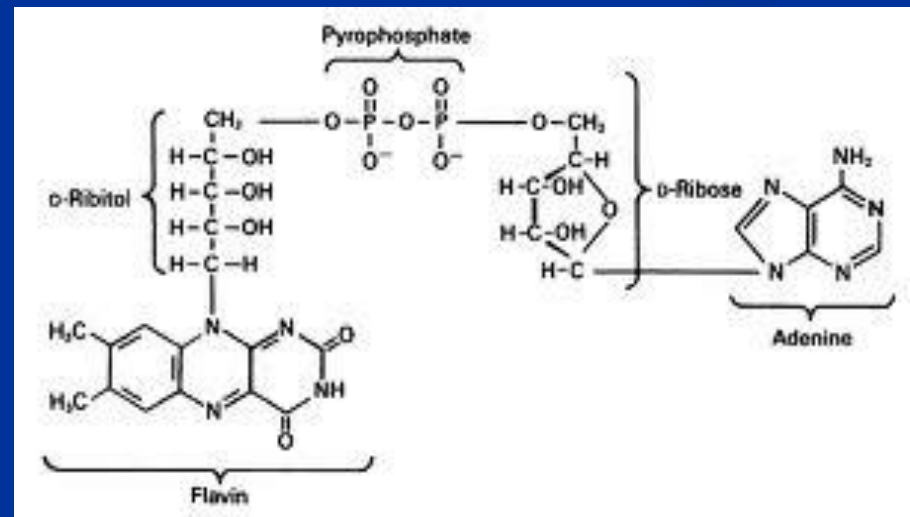
Isoalloxazine moiety



Riboflavin = Vitamin B2



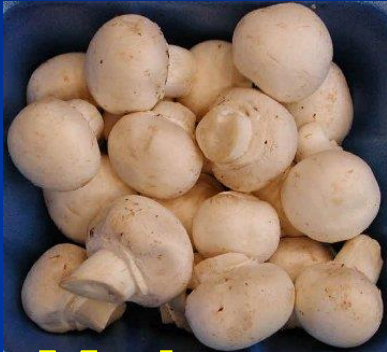
Riboflavin phosphate



Flavin adenine dinucleotide (FAD)

Required Daily Amount and Sources

RDA is an average of 1.5 mg/ day



Mushrooms



Yoghurt



Milk – Egg



Mature Soya beans



Spinach



Calf liver

Stability of Riboflavin

- ❖ Riboflavin and its coenzymes are sensitive to alkali and acid but in the presence of light or UV light.
- ❖ Riboflavin is photodegraded to yield **lumiflavin** (7,8,10-trimethylisoalloxazine) **under alkaline conditions** and to **lumichrome** (7,8-dimethylalloxazine) **under acidic conditions**, and these products are biologically inactive .
- ❖ Therefore, phototherapy of neonatal jaundice and of certain skin disorders may promote systemic riboflavin deficiency.

Functions of Vitamin B2

1. Energy production:

The active forms of riboflavin are the phosphorylated coenzymes FMN and FAD which play central roles in about 150 oxidation-reductions reactions and are involved in:

- Metabolism of carbohydrates, fat, and protein.
- Production of adenosine triphosphate (ATP) through cellular respiration in mitochondria.
- Activation of vitamin B12, folate, vitamin B6 and the conversion of tryptophan to niacin.

2. Antioxidant action:

Riboflavin is a cofactor of glutathione reductase. This enzyme helps in recycle of oxidized glutathione, which plays a key role in maintaining proper function and preventing oxidative stress in human cells including erythrocytes.

Causes of Riboflavin Deficiency

- **Malnutrition.**
- **Health conditions which affect intestinal absorption.**
- **Increase of vitamin excretion from the body.**

Diagnostic testing for vitamin B2 Deficiency

A positive diagnostic test of serum riboflavin is by measuring **glutathione reductase levels of erythrocytes.**

Symptoms of vitamin B2 deficiency (Ariboflavinosis)

- **Red, scaly, painful, and itchy patches on sensitive skin** (around nose, ears, mouth, labia majora (female), and the scrotum (male)).
- Painful fissures and cracks form at the angles of the mouth (**angular stomatitis**) and on the lips (**cheilosis**), usually associated with bacterial and fungal infection. The tongue and throat become purplish and painful.
- **Mouth ulcers**



Red, scaly, painful skin



angular stomatitis



Cheilosis



Mouth ulcers

➤ Redness, burning, excessive tearing of eye.

➤ **Anemia** with decreased production of red blood cells.

➤ Deficiency of riboflavin typically produces symptoms of vitamin B6 and niacin deficiency.



**Redness, burning,
tearing of eyes**



Anemia



**Symptoms of niacin
deficiency**

People at high risk of vitamin B2 deficiency

- Children, and adolescent, athletes, as well as during pregnancy and lactation (cases with a high-energy output) need additional vitamin B2.
- People under high stress
- Diabetics may have low level of riboflavin as a result of increased urinary excretion.
- The elderly people (nutritional inadequacy and problems with absorption)
- Patients administering thyroid hormones, oral contraceptives, phenothiazines, barbiturates, probenacid, and Tricyclic antidepressant.

Use of Vitamin B2 in Prevention and Therapy

- **Detoxification:** Riboflavin helps liver to detoxify pesticides, chemicals, and other environmental toxins.
- Increasing the **antioxidant** capacity throughout the body and especially for **lens of the eye**.
 - ❖ Ample intake of riboflavin help **decrease the incidence of cataracts**.
 - ❖ As a cofactor of glutathione reductase, riboflavin with vitamin C increase body's level of glutathione (antioxidant).
- Ample riboflavin intake maintains **healthy skin and mucous membranes**.
- It may be beneficial in **stomatitis, cheilosis, and skin eruptions and rashes**.

Vitamin B2 – Drug interaction

- **Probenecid** (anti-gout) and **propantheline bromide** (antipeptic ulcers) both **delays and impairs its absorption.**
- **Phenothiazines** (antipsychotic drugs) **increase the excretion of riboflavin**, thus lowering serum levels.
- **Oral contraceptives** may also **decrease its serum levels.**
- **Riboflavin interferes** with the **absorption and effectiveness** of anti-malarial (ex. chloroquine), tetracycline antibiotics and sulfa-containing drugs.



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