


Vitamin B Functions and Uses in Medicine




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B- Vitamins and their function

- ▶ B vitamins are a group of 8 water-soluble vitamins. The body does not store them, so they need to be replaced daily. B vitamins are found in animal proteins, dairy products, leafy green vegetables, and beans. Overall, their function can generally be divided into catabolic metabolism, leading to energy production, and anabolic metabolism, resulting in bioactive molecules. They are critical cofactors for axonal transport, synthesis of neurotransmitters, and many cellular metabolic pathways. B vitamins are cofactors for many essential enzymes involved in the biosynthesis of RNA and DNA.
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- B vitamin deficiencies have been considered as etiological factors in the development of various neurologic disorders and a broad spectrum of pathological states. Reductions in food intake and absorption efficiency in some populations, including the geriatric population, may warrant attention to their dietary B vitamin levels. Most B vitamins are generally safe even at intake levels reached with fortified food or supplements




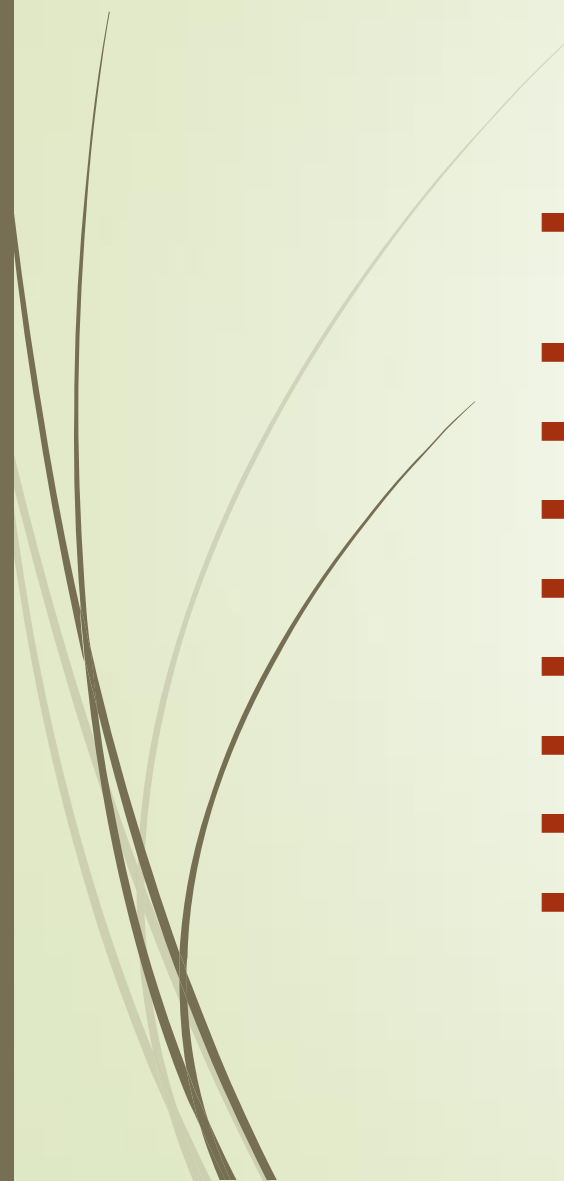
B Vitamins: Functions and Uses in Medicine

- ▶ B vitamins, also known as B-complex vitamins, play essential roles in catabolic and anabolic metabolism. These 8 water-soluble vitamins are excreted in urine and require repletion daily.
- ▶ The B vitamins are identified as follows: thiamine(B1), riboflavin (B2), niacin (B3),pantothenic acid (B5), pyridoxine(B6), biotin (B7), folate (B9), and cobalamin (B12).
- ▶ B vitamins act as coenzymes in several enzymatic processes that support every aspect of cellular physiological functioning, including major functions within the brain and nervous system. Any B vitamin deficiency can negatively affect mitochondrial metabolism of amino acids, glucose, and fatty acids through the citric acid cycle and electron transport chain.



The recommended daily amount of each B vitamin varies.


- According to the National Institutes of Health (NIH) Trusted Source, the recommended daily intake for women is:
 - B1: 1.1 milligrams (mg)
 - B2: 1.1 mg
 - B3: 14 mg NE
 - B5: 5 mg
 - B6: 1.3 mg
 - Biotin: 30 micrograms (mcg)
 - Folic acid: 400 mcg DFE
 - B12: 2.4 mcg
- For men, the NIH recommends the following daily intake:
 - B1: 1.2 mg
 - B2: 1.3 mg
 - B3: 16 mg NE
 - B5: 5 mg
 - B6: 1.3 mg
 - Biotin: 30 mcg
 - Folic acid: 400 mcg DFE
 - B12: 2.4 mcg

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- ▶ Certain underlying health conditions can prevent body from properly absorbing vitamin B such as:
 - ▶ celiac disease
 - ▶ HIV
 - ▶ Crohn's disease
 - ▶ alcohol use disorder
 - ▶ kidney conditions
 - ▶ rheumatoid arthritis
 - ▶ ulcerative colitis
 - ▶ inflammatory bowel disease



What foods are high in B vitamins?

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- ▶ milk
 - ▶ cheese
 - ▶ eggs
 - ▶ liver and kidney
 - ▶ meat, such as chicken and red meat
 - ▶ fish, such as tuna, mackerel, and salmon
 - ▶ shellfish, such as oysters and clams
 - ▶ dark green vegetables, such as spinach and kale
 - ▶ vegetables, such as beets, avocados, and potatoes
 - ▶ whole grains and cereals
 - ▶ beans, such as kidney beans, black beans, and chickpeas
 - ▶ nuts and seeds
 - ▶ fruits, such as citrus, banana, and watermelon
 - ▶ soy products, such as soy milk and tempeh
 - ▶ blackstrap molasses
 - ▶ wheat germ
 - ▶ yeast and nutritional yeast



How can you tell if you're deficient in B vitamins?

- ▶ Most people get enough B vitamins by eating a balanced diet. However, it's still possible to be deficient, especially if you've been taking certain medications for a while, such as proton pump inhibitors, or if you follow a very strict vegan or vegetarian diet.
- ▶ The following symptoms may signal you're not getting enough B vitamins:
 - ▶ skin rashes
 - ▶ cracks around the mouth
 - ▶ scaly skin on the lips
 - ▶ swollen tongue
 - ▶ fatigue
 - ▶ Weakness
 - ▶ Anemia
 - ▶ confusion
 - ▶ irritability or depression
 - ▶ nausea
 - ▶ abdominal cramps
 - ▶ diarrhea
 - ▶ constipation
 - ▶ numbness or tingling in the feet and hands

Riboflavin

(B₂)

- To treat stomatitis, cheilitis, and glossitis²⁴
- Cataract prevention⁴
- Migraine prophylaxis²⁴
- 0.5 mg/kg orally daily until symptoms resolve
- 400 mg daily for 5-6 y⁴
- 400 mg daily for a minimum of 3 mo (evidence level B)²⁴

Niacin


(B₃)

- To treat pellagra^{6,7}
- Nicotinamide 100 mg every 6 h orally until resolution of acute major symptoms^{6,7}

Pantothenic acid

(B₅)

- Acne, anxiety, allergies, rheumatoid arthritis^{8,26}
- Accelerate wound healing, lowers triglyceride levels^{8,17,26} (Small studies)
- 5 mg orally daily^{2,8}



Pyridoxine, pyridoxal,
pyridoxamine
(B₆)

- INH overdose-related seizure or toxic INH dose without seizure^{19,20}
- Ethylene glycol overdose²⁰
- Nausea and vomiting of pregnancy²⁷
- Premenstrual syndrome²⁸
- Pyridoxine dose should be equivalent to the maximum suspected amount of ingested isoniazid. If ingested isoniazid is unknown, 5 g of pyridoxine should be given IV at a rate of 0.5-1 g/min pending seizures to discontinue or maximum dose given^{19,20}
- 50-100 mg IV every 6 h²⁰
- 10-25 mg orally every 8 h (evidence rating A)²⁷
- 50-100 mg daily (limited evidence)²⁸

Biotin

(B₇)

- Inherited enzyme deficiency¹²
- Brittle hair syndrome¹²

- 10,000–30,000 µg/d orally²⁹
- 300–3000 µg/d (low-quality evidence)¹²

Folic acid, folate

(B₉)


- Megaloblastic anemia³⁰
- Pregnancy
- Dialysis and malabsorption
- Hemolysis³⁰
- High risk for neural tube defects³⁰

- 1–5 mg orally once daily for 4 mo or until term in pregnancy³⁰
- 0.4–0.8 mg/d (Grade A)
- 5 mg orally once daily³⁰
- 1 mg orally daily
- 4 mg orally daily³⁰

Cobalamin (B₁₂)

- B₁₂ deficiency maintenance dose
- Megaloblastic anemia/B₁₂ deficiency without neurologic symptoms^{14,30}
- In symptomatic anemia, neurologic symptoms, or pregnancy^{14,29,30}
- Bariatric surgery³¹
- Concurrent folate and B₁₂ deficiency³¹

- 1000 mcg IM monthly or 1000–2000 mcg orally daily until deficiency is corrected^{14,30}
- 1000 mcg IM 3 times weekly for 2 wk^{14,29-31}
- 1000 mcg IM every other day for 3 wk followed by 1000 mcg orally once monthly^{14,29,30}
- 1000 mcg orally daily indefinitely³¹
- B₁₂ should be replaced first³¹



What happens if you get too much vitamin B complex?

- ▶ When consumed in excess, a few different B vitamins can have specific side effects. For instance:
- ▶ Vitamin B6. Too much B6 may lead to peripheral neuropathy, which is a loss of feeling in the arms and legs.
- ▶ Folate or folic acid. Too much of this vitamin can cover up the symptoms of a vitamin B12 deficiency, which can eventually lead to nervous system damage.
- ▶ Niacin. Too much niacin may cause skin flushes. Long-term excessive use may lead to liver damage.



Thank you for listening