

History of vitamin B₁₂: In 1934, Whipple, Murphy, and Minot shared the Nobel Prize in Physiology or Medicine for their life saving discovery found in liver. The disorder was referred to as “pernicious anemia” because before this discovery (1926), death was inevitable. In 1948, the substance in liver was isolated and named cobalamin (vitamin B₁₂).

What is the incidence?

Low B₁₂ or overt B₁₂ deficiency affects 19% (61.6 million U.S. or 12.4 million in the U.K.), 40% of Latinos, 70% Indians, and 70% of Kenyans.² Others report it to strike 25% in the U.S.³ Tufts University researchers analyzing data from the large-scale Framingham Offspring Study, found that nearly 40% of people age 26 to 83 had B₁₂ levels in the “low normal” range—a level at which many begin experiencing neurological symptoms.

Who to test & who is at risk?

- Neurologic or motor symptoms
- Mental status changes
- Dementia or Alzheimer’s disease
- Psychiatric disorders, including depression
- Gastrointestinal disorders & surgeries
- Gastric bypass
- Anemia or macrocytosis
- Age 50 and over
- Vegans, vegetarians, macrobiotic diets
- Autoimmune & thyroid disorders
- Diabetics
- Cancer patients
- Hepatitis C patients
- Children and breast fed infants of at-risk mothers
- Developmental delay in infants & young children
- Autism spectrum
- Eating disorders
- Family history of pernicious anemia
- Proton pump inhibitor, metformin/Glucophage use
- Occlusive vascular disorders (MI, CVA, DVT, PE)

What are the causes?

- Low or absent stomach acid (achlorhydria)
- Atrophic gastritis
- Autoimmune pernicious anemia
- Helicobacter pylori
- Gastrectomy, intestinal resection
- Gastric bypass surgery
- Malabsorption syndromes
- Crohn’s disease
- Celiac disease (gluten enteropathy)
- Chronic pancreatitis
- Bacterial overgrowth (small bowel)
- Fish tapeworm
- Alcoholism
- Malnutrition—Eating disorders
- Vegetarianism
- Advanced liver disease
- MTHFR, MTRR gene mutations
- Transcobalamin II deficiency
- Inborn errors of B₁₂ metabolism
- Medications (e.g. PPI, metformin, nitrous oxide)

Neurologic signs & symptoms:

- Numbness—tingling
- Weakness of legs, arms, trunk
- Impaired vibration—position sense
- Abnormal reflexes
- Unsteady or abnormal gait
- Balance problems
- Difficulty ambulating
- Dizziness
- Tremor
- Restless legs
- Visual disturbances
- Forgetfulness, memory loss
- Dementia
- Impotence
- Urinary or fecal incontinence

Psychiatric symptoms:

- Depression/suicidal ideations
- Irritability
- Paranoia
- Mania
- Hallucinations
- Psychosis
- Violent behavior
- Personality changes

Hematologic signs & symptoms:

- Anemia
- Macrocytosis (need not be present)
- Hypersegmented neutrophils
- Generalized weakness, fatigue
- Shortness of breath
- Pallor

Signs & symptoms in infants & children:

- Developmental delay or regression
- Apathy—Irritability
- Hypotonia
- Weakness
- Tremor
- Involuntary movements
- Seizures
- Ataxia
- Anorexia
- Failure to thrive
- Poor weight gain
- Poor head growth
- Poor socialization
- Poor motor skills
- Language delay
- Speech problems
- Lower IQ—Mental retardation
- Anemia
- Macrocytosis

Why is B₁₂ deficiency an epidemic?

- Knowledge deficit amongst physicians and other health care providers.
- Poor or absent screening in symptomatic and at-risk patients.
- Current range for “normal” serum B₁₂ extends far too low.
- Lack of use of other sensitive tests to aid in diagnosis (urinary methylmalonic acid).
- Clinicians wait for enlarged red blood cells or macrocytic anemia to be present.
- Elderly are frequently misdiagnosed due to increased incidence of preexisting diseases and comorbid conditions.
- B₁₂ screening not included in older adults who fall, at risk for falling, cognitive changes or dementia.

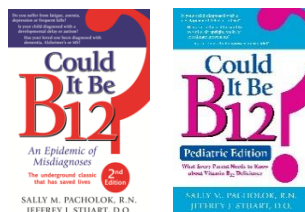
Disorders with possible underlying B₁₂ deficiency:

- Dementia—Alzheimer’s disease
- Multiple sclerosis
- Depression (post-partum/psychosis)
- Bipolar disorder
- Neuropathy (diabetic, CIDP)
- Vertigo
- Anemia
- Congestive heart failure
- Autism, ADHD
- Cerebral palsy
- Seizures
- AIDS dementia complex
- Restless leg syndrome
- Radiculopathy, chronic pain disorder
- Chronic fatigue syndrome, fibromyalgia
- Chronic renal failure (hemodialysis patients)
- Essential tremor—Parkinson’s like symptoms
- Erectile dysfunction
- Infertility

What are the tests?

- B₁₂
- Methylmalonic acid
- Homocysteine
- Holotranscobalamin II

For more information:



B12awareness.org

B12deficiency.info

September: B₁₂ Deficiency Awareness Month

1. Pacholok SM, Stuart JJ. **Could It Be B₁₂? An Epidemic of Misdiagnoses, 2nd Ed.** Quill Driver Books—Linden Publishing, 2011, 324 pp. (1st Ed., 2005, 220 pp.)
2. Allen, LH. How common is vitamin B-12 deficiency? *Am J Clin Nutr.* 2009 Feb;89(2):693S-6S.
3. Dharmarajan, T.S., Norkus, E.P. **Approaches to vitamin B₁₂ deficiency: Early treatment may prevent devastating complications.** *Post-graduate Medicine* 2001;110(1): 99-105.
4. Stabler, et al. **Vitamin B₁₂ deficiency as a worldwide problem.** *Annu Rev. Nutr* 2004;24:299-326.
5. Vogiatzoglou, A. et al. **Vitamin B₁₂ status and rate of brain volume loss in community-dwelling elderly.** *Neurology* 2008;71:826-832
6. Graham SM, et al. **Long-term neurologic consequences of nutritional vitamin B₁₂ deficiency in infants.** *J Pediatr* 1992 Nov;121:710-4.
7. Muhammad, R., Fernhoff, P. et al. **Neurologic impairment in children associated with maternal dietary deficiency cobalamin—Georgia, 2001** *MMWR Weekly*, 2003;52(04);61-4.



Mission statement: Unmasking the epidemic of misdiagnosed vitamin B₁₂ deficiency through education and advocacy.

Goals: 1) Raise awareness to the dangers of B₁₂ deficiency by reeducating the medical community and educating the public; 2) Promote early diagnosis and treatment to prevent neurologic injury, disability, poor outcomes, and premature death; 3) Educate society on the role B₁₂ deficiency plays in overall health, cognitive decline, mental health, fall-related trauma and vascular occlusions; 4) Enlist help from medical professionals, the media, Congress, and governmental agencies to expose and eliminate billions of wasted health care dollars; 5) Protect the public and save lives; 6) Promote further research; 7) Work with other countries to create Worldwide B₁₂ Awareness Day.

What is vitamin B₁₂? Vitamin B₁₂ (cobalamin) is one of the 13 vitamins our body needs for health and life. It is essential for the production of red blood cells and aids in the maintenance of a healthy nervous system. B₁₂ deficiency damages the brain, spinal cord, peripheral nerves, and nerves of the eye. It is a crucial element in the construction of DNA. A B₁₂ deficiency can result in symptoms ranging from severe anemia requiring blood transfusions, to serious and permanent nerve damage. B₁₂ is found naturally in animal foods (meat, poultry, fish, shellfish, dairy, and eggs). B₁₂ must follow a complex pathway of several steps for proper absorption. A roadblock in any part of this pathway can cause malabsorption and subsequent deficiency.