

## MeritCare Health System



**Aunt Cathy**

Cathy Breedon PhD, RD, CSP, FADA  
Perinatal/Pediatric Nutrition Specialist  
Clinical/Metabolic Nutrition Specialist  
Sanford Medical Center and  
UND School of Medicine

## **Aunt Cathy's Guide to Nutrition: A Vitamin B12 Update**

(Minimal Reference Version)

Vitamin B12 is needed in only tiny amounts, and unlike most B vitamins, it is stored well in the body. Most Americans eat foods that provide lots of it. So there shouldn't be any problem with vitamin B12, right? This is a Trick Question of course; if there were no problem I would not be here talking about it! ☺

Most references for the information provided here are included at the end. A few newer ones are sprinkled around in the text. As always, this handout is not intended to take the place of your physician or health care provider. It is simply a summary of the most recent information available in the scientific literature on this topic as of the date shown.

### **What does B12 do?**

1. B12 is involved in making important chemical messengers and myelin in the brain and nervous system, so some of the major symptoms of deficiency are neurologic problems.
2. B12 is involved in the making DNA, the genetic center of every cell in the body. It is especially important during periods of growth (pregnancy, infancy and childhood), and in tissues that continually make a lot of new cells (red blood cells and the armies of cells in the immune system.)

### **What happens if B12 is too low?**

Besides serious nerve damage and mental confusion, B12 deficiency damages the retina of the eye, and may play a role in conditions such as heart disease, stroke, Alzheimer's disease, incontinence and loss of hearing.

When deficiency is severe, people can have unusually high heart rates and have trouble breathing. Vitamin B12 deficiency causes changes in testicular tissues in men, and it may be related to increased risk of breast cancer in older women.

During pregnancy, inadequate B12 causes birth defects such as neural tube defects and brain damage. A new study suggests that underlying vitamin B12 deficiency may be involved in the development of HELLP Syndrome, a serious complication of pregnancy. [HELLP syndrome-like by vitamin B12 Deficiency: Report of seven cases. J Gynecol Obstet Biol Reprod (Paris). 2009 Mar 20]

## What foods have B12?

The only natural food sources are animal products like meat, poultry, fish, milk, cheese and eggs. Other foods may have it added.

## Who is at risk of low B12 status?

### 1. People with inadequate B12 in their diet.

**Strict Vegans** (people who use no animal products) **and their breast-fed babies** are at high risk unless they take a B12 supplement. **Some people just eat a really poor diet** that happens to be very low in both meats and dairy foods.

### 2. Some people do not absorb B12 well in spite of an adequate diet.

#### Stomach problems that may decrease B12 absorption:

Gastrectomy (stomach removal);

Gastric surgery for weight loss

[Anemia after bariatric surgery: more than just iron deficiency. Nutr Clin Pract. 2009]

Low stomach acid production or atopic gastritis (both common problems among the elderly);

Infection with H. Pylori, a bacteria that causes ulcers and gastritis;

Genetic factors causing low levels of "Intrinsic Factor," a B12 carrier made in the stomach.

**Conditions that affect the part of the small intestine where it joins the large intestine (called the "terminal ileum"):**

Surgical removal of that part of the intestine;  
Crohn's disease (inflammatory bowel disease) or celiac disease;  
Overgrowth of the intestine surface by bacteria or parasites such as giardia. This is especially common among adults older than 70 who have chronic diarrhea, loss of appetite, or nausea.

[Vitamin B12 status, methylmalonic acidemia, and bacterial overgrowth in short bowel syndrome. J Pediatr Gastroenterol Nutr. 2009 Apr;48(4):495-7.]

**Some medications interfere with absorption of B12 from food.**

Medications probably account for the surprisingly greater number of younger adults now being found to be deficient in B12. Drugs that block stomach acid production (like **Tagamet, Zantac and especially "proton pump inhibitors" like Prilosec, Nexium, Previcid and Protonics**) and the diabetes drug **Metformin (Glucophage)** all interfere with B12 absorption. Additionally, people with low vitamin B12 status are at great risk if **nitrous oxide anesthesia** is used.

**People with autoimmune disorders such as insulin-dependent diabetes, celiac disease, multiple sclerosis, and certain thyroid disorders have a higher risk of deficiency for several reasons.**

Sometimes it is related to nutrient malabsorption related to intestinal damage from poorly controlled celiac disease. However, as another autoimmune disorder, the severe vitamin B12 deficiency called pernicious anemia is also more common in this population. In some people with celiac disease, neurologic symptoms are not uncommon ... it is important to monitor their B12 levels carefully.

**In insulin dependent diabetes or multiple sclerosis, however, neurologic symptoms of pernicious anemia are often missed because they are written off as likely due to neurologic damage from those overriding conditions.** An adult friend of mine with type 1 diabetes experienced extremely debilitating neurologic symptoms because of having developed the autoimmune disease pernicious anemia. She could no longer walk and the pain was severe. Her symptoms were ascribed to complications of diabetes,

and I am sorry to report that it took quite a lot of pressure and several months to get the health care professionals involved in her care to check her vitamin B12 level.

She has improved greatly on vitamin B12 shots since then, but the painful neurologic damage will never be completely gone. Pernicious anemia has been documented in adolescents with diabetes, celiac disease, and autoimmune thyroid disorders as well as in adults, especially among those already identified as having two or more autoimmune diseases. [

Pernicious anemia in an adolescent with type 1 diabetes mellitus. Arch Pediatr Apr;16(4):357-9]

Interestingly, parenteral vitamin B12 does look like it can be helpful in diabetic neuropathy, whether related to underlying pernicious anemia or not.

[Vitamin B12 may be more effective than nortriptyline in improving painful diabetic neuropathy. Int. J. Food Sci 2009 Feb 12:1-6]

## How is B12 deficiency recognized?

Most commonly it is recognized when a blood test called a CBC shows red blood cells that are very large ("macrocytic anemia.") Unfortunately, this is a very **late-appearing symptom** and some nerve damage will have already happened by the time the problem is recognized. **It takes up to three years for symptoms of deficiency to develop**, so people often fail to associate the symptoms with a change in diet or health (such as having had stomach surgery, starting to use a certain medication, or deciding to follow a vegan diet.)

Some researchers estimate that as many as **30% of elderly people have unrecognized B12 deficiency**, often due to changes in the stomach and intestine caused by aging. This can contribute to symptoms such as confusion and other mental changes; correcting B12 inadequacy often results in great improvement.

Doctors can check **B12 levels in the blood**, and there are other markers called **homocysteine** and **methylmalonic acid (MMA)**. This testing is not commonly done unless symptoms or risk factors suggest that there is a problem. However, it is impractical, expensive and unnecessary to do these tests regularly on everyone.

## **What should be done?**

Quite a lot can be done to decrease the likelihood of B12 deficiency ever developing. Why risk possible inadequacy? **Assuring adequacy** is by far more cost-effective, health-protective and safe than waiting to act until symptoms of inadequacy become apparent.

- 1. An inexpensive generic standard multivitamin with minerals is likely a very good investment for most people.** These provide the adult RDA of 2 mcg of well-absorbed B12. Products designed for older adults ("**Silver**"-type **multivitamins**) often have 25 mcg. Some have quite a lot more, as do some "B-100 complex" supplements. **Some researches now recommend >50 mcg/day. B12 is a very safe vitamin and overdose is extremely unlikely.** For some of the conditions (such as **low stomach acid**), simply taking a generous amount of vitamin B12 in a supplement form can solve the problem.
- 2. For other conditions (such as surgical removal of the stomach or part of the intestine or autoimmune-related pernicious anemia), prescription B12 shots are often needed** to assure that there is enough in the body. New techniques include nasal inhalers, sub-lingual (under the tongue) versions, or extremely high oral doses of B12. As always, it is extremely important to monitor the effectiveness of any of these methods.

### **Summary:**

**Vitamin B12 deficiency is not uncommon (although it is often unrecognized) and it is very dangerous.**

**Certain diet patterns or health conditions increase the risk of unrecognized B12 deficiency.** People with any of the risk factors described above should be sure to ask their doctors about this issue. Sharing this column with the doctor may be helpful.

**The problem of unrecognized vitamin B12 deficiency is just one of the many reasons why it is regarded as "prudent" for all adults to take a daily multivitamin.** (Journal of the American Medical Association, June 2002.)

(References and abstracts are available on the full-reference version)

Sanford Medical Center

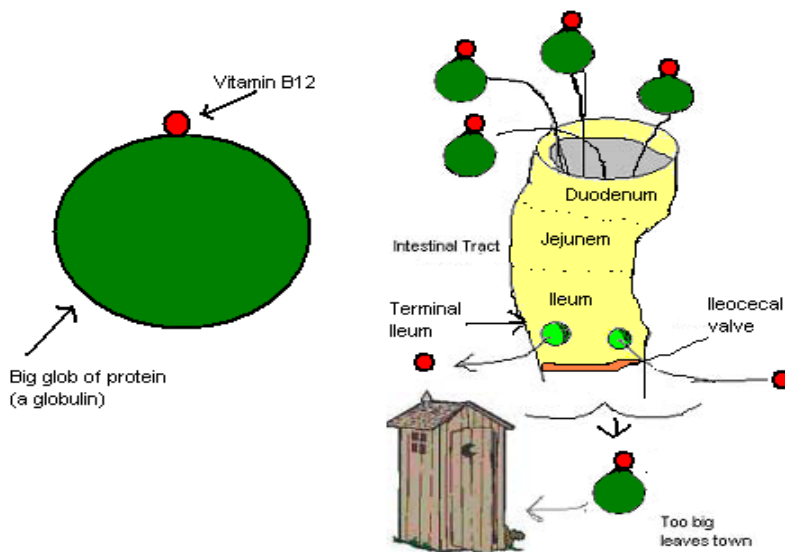
## Aunt Cathy's Guide To: Vitamin B12 Absorption

(not scientifically correct)

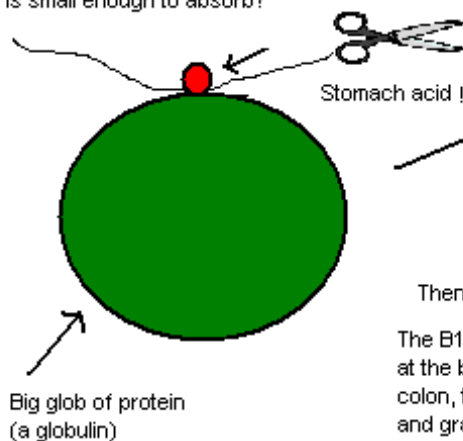


Aunt Cathy

Cathy Breedon PhD, RD, CSP, FADA  
Clinical/Metabolic Nutrition Specialist  
Sanford Medical Center and  
UND School of Medicine, Fargo, ND

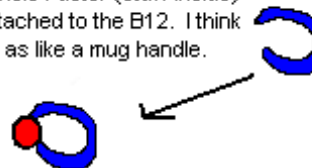


How do you cleave the glob off the B12  
so it is small enough to absorb?



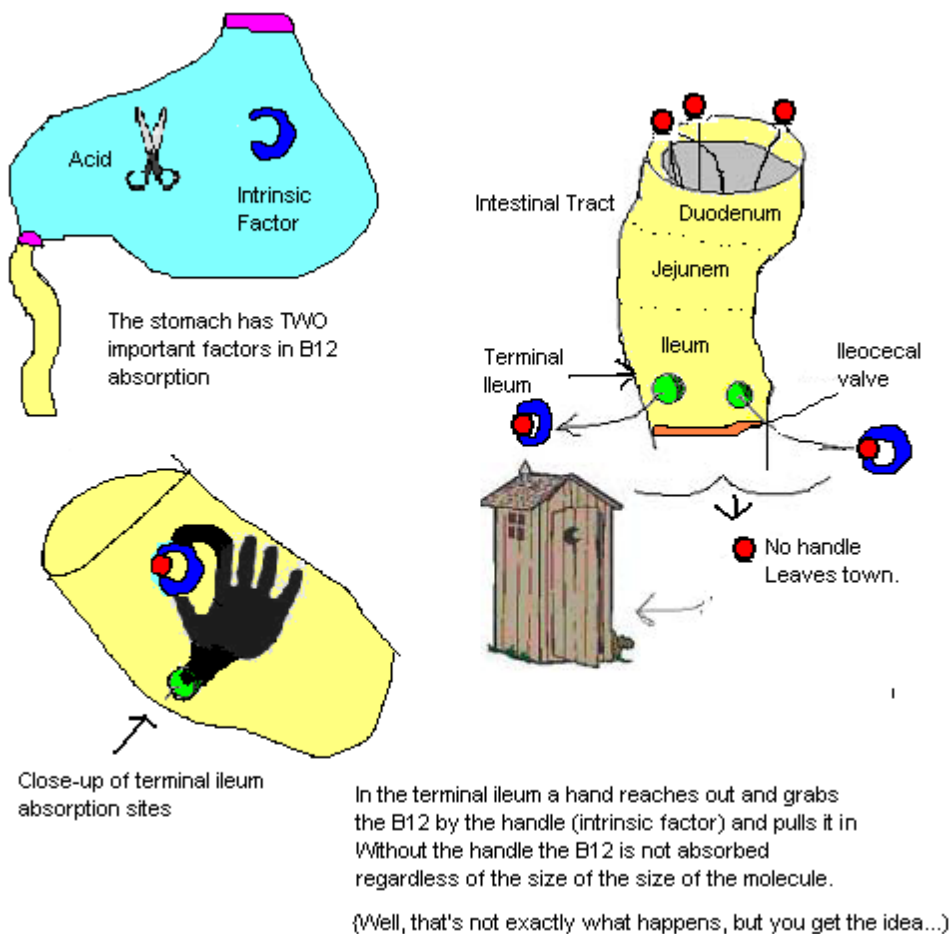
Then what happens?

Then (also in the stomach)  
"Intrinsic Factor (stuff inside)  
is attached to the B12. I think  
of IF as like a mug handle.



Then what?

The B12 with its handle enters the intestines and way  
at the bottom of the small intestine where it meets the  
colon, there is one spot where ha hand reaches out  
and grabs the handle to pull B12 in. This place (the  
"terminal ileum") is the only spot in the intestines where  
B12 can be absorbed.



### Health situations that can impair vitamin B12 absorption:

1. Having inadequate stomach acid due to aging (achlorhydria) or the use of PPI acid blocking medications for gastroesophageal reflux means that the protein glob cannot be removed and the B12 is too big to absorb. **Solution:** The form in vitamin pills is just the vitamin B12 without the protein glob, so the problem is eliminated.
2. Failure to make or use intrinsic factor in the stomach (as in the genetic condition pernicious anemia or in people with stomach removal, stomach damage or gastric bypass surgery.) **Solution:** The “handle” is not available to efficiently absorb B12 regardless of the molecular size. This requires an alternate route of administration, such as B12 shots or supplement forms that are inhaled or sublingual.
3. The diabetes medication Metformin (Glucophage) impairs vitamin B12 absorption in the intestine. **Solution:** A generous intake can help, but vitamin B12 levels should be monitored for anyone on this medication, especially with long term use. Again, looking at “Mean Cell Volume” on a blood test will not detect a problem soon enough. At least a vitamin B12 serum level should be monitored.
4. Injury to terminal ileum can impair absorption as well: bacterial overgrowth, inflammatory bowel disease, poorly controlled celiac disease, surgical removal, etc. **Solution:** This may require an alternate route of administration, such as B12 shots or supplement forms that are inhaled or sublingual.