First off I want to thank you for your good work in Columbia.  So needed and only with your dedication has the word gotten out. You have been wonderful in helping people.  We must stick together.  The best way is to identify personal opinions as such.  Stay clear of making claims, especially in highly debatable health issues.  Make friends not foes.  Why alienate homeopaths or vegans or anyone else?.

We are on the same page for so many things.  We have shared MMS with hundreds and told hundreds more about MMS as we travel.  We agree people should not take vaccinations.  We agree that big business is controlling everything.

We have always admired your tendency to avoid telling people what to do for their preventive health practices.  Personal research is the only way to make these decisions.  You wield a lot of power to developing nations – you are the gods in white coats. Like missionaries.  We feel you have overstepped this power by recommending red meat without fully researching the facts.  And all this over B-12.  You can get all the B-12 you need from eating one egg a year.  The most powerful mammal on earth is the elephant, a vegan.  SEE RESEARCH on both sides BELOW WITH REFERENCES FOR YOUR CONVENIENCE!)

Your recent newsletter was disturbing.  Recommending eating red meat is not something to be taken lightly.  Please do your research.  What social implications are you putting on these cultures? On readers.  You can personally recommend anything you find true after extensive research but do not attach it to MMS or certainly don’t write about it as anything more than your personal opinion.  There needs to be a clear line of demarcation.  Use your power wisely.  Stick to facts on MMS.  Tell people to live a healthy lifestyle so their health problems do not return.  Tell them to research.  So much disease has been caused by eating meat, drinking milk, especially caused by chemicals.  Cancer/bacteria/virus grow – thrive -  multiply in acidic bodies.  Acidity is mainly from consuming animal products. High acidity causes osteoporosis.

I am writing this email because I eliminated meat from my diet when diagnosed with cancer 12 years ago.  I fired my doctors and began researching my own plan.  So much information is available.  (see Thoughts on Health – [www.worldglobetrotters.com](http://www.worldglobetrotters.com) – based on years and years of research.)

Info from health professionals who have documented thousands and thousands of people curing themselves from life threatening diseases:

Watching the video: Healing Cancer from the Inside Out is loaded with facts (google it)

Watch:  Any videos by the Gersen clinic (google them)  
  
Read any information from Dr Lorraine Day ([www.dr.day.com](http://www.dr.day.com) – no supplements only info) or Dr Richard Schulze ([WWW.herbdoc.com](http://WWW.herbdoc.com) – information plus supplement sales) highly regarded US physicians   
  
Why are these Columbians not suffering from white man’s/ rich societies diseases?  Because they don’t eat like us.  New immigrants end up with a syndrome that is caused by eating more meat/ junk food/ etc.  Directly proportional their disease level increases.

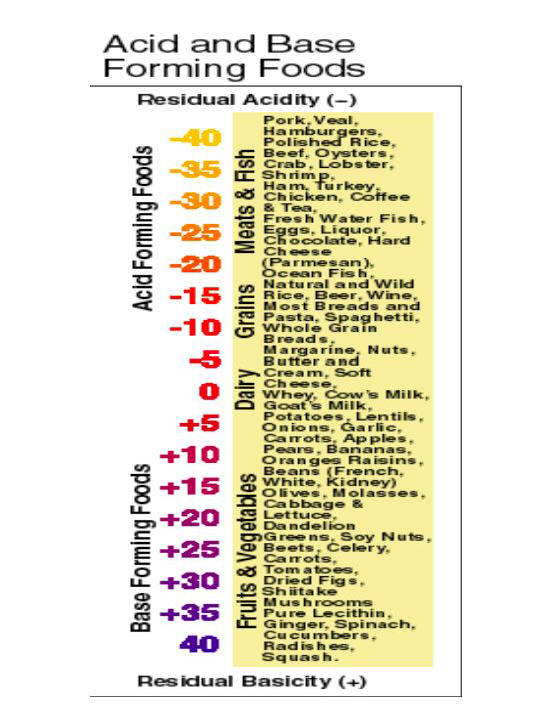
People need MMS because what they have been eating.  Because of the mistakes we have made with our diets and lifestyles.  Poor people are often the healthiest worldwide because they eat what they raise.  They can’t afford the chemicals to use.  When a little extra money is available they buy the cheapest- most horrible food they can afford.  Cast-offs from the west.  We see this in all remote villages.  Tainted meat from mad cow was sold in Asia.  DDT is still used here in Central America – only the name has changed.  We use DDT  in America to make chemo- therapy.  Follow the money.

The basis of all health plans is building the immune system.   Bottom line.

Basic Organic Chemistry

Cancer/bacteria/virus grow – thrive -  multiply in acidic bodies.  Acidity is mainly from consuming animal products.

It takes 20 times more land to raise cows than feeding people on vegetables..  Switching to raising cows completely alters a society and the surrounding land and environment. Overpopulation is depleting resources.



Thank you for taking the time. Please reply.

Nancy & Joseph  
www.worldglobetrotters.com

**Vitamin B12 (cobalamin) & Is it Important to Measure Your Body pH**

**Notes from Joseph Gill (each with references below).**

Are Vegetarians Deficient in Vitamin B12?

Doctors and nutritionists Claim that Vitamin B12 I is only available from animal products, such as

beel, therefore vegetarians, who don't eat animal products, must take supplemental Vitamin B12

shots or pills in order to be healthy. But if beef and other animal products are the only sources of

Vitamin B12. then how do the cows, who eat grass , and other animals sud'l as horses, deer,

camels and elephants who are also total vegetarians, obtain their Vitamin B12?

The answer is, the same place we humans get our vitam in B12: from by-products of bacterial

activity in our tntesttnattract, as well as from greens, grains and vegetables.

When the body is healthy because one is eating and living right, the intestine is clean and

populated with the type of bacteria that are necessary to maintain health. All doctors are aware

that the intestine contains bacteria described as "normal intestinal flora." This normal bacterial

flora can be altered dramatically by many different drug medications, particularly antibiotics , that

destroy many of the "good" bacteria and allow others to overgrow, causing conditions such as

candidiasis or "Candida:

TIle wrong diet and lifestyle also can significantly alter the bacterial flora in the intestine. A

diet high in sugar. a diet high in animal fat, or fast food and processed food containing farge

amounts 01chemicals sud'l as preservatives, dyes and fillers will alter the normal flora 01 the

intestine. Lack 01sleep, lack 01sunlight, dehydration, or stress can have the same effect. Under

these conditions, the intestinal tract does not function properly in many different ways, including

its normal production of Vitamin B12 .

**Vitamin** B12 **is Found in Vegetables**

In the past, scientists claimed that Vitamin B 12 was not found in vegetable sources. The

reason was that technology had not yet advanced sufficiently to detect the small amounts present.

Vitamin B12 has now been found in vegetables, such as spinach and alfalfa, sea vegetables such

as dulse, kelp, kombu and nori, and grains such as barley. Vitamin B12 is present in very tiny

amounts in produce because only small amounts are needed to remain healthy. **The amount of**

**vitamin B12 needed by a human being for his entire lifetime is less than one hundredth of an**

**ounce**, which is approximately the amount that would fit into the period at the end of this sentence.

Most people assume that if they are low in Vitamin B12, theymust take vitamin B12 2supplements.

However, Vi rtually all supplemental vitamin B12 on the market is made from ground up toxic cow

livers or activated sewage sludge, according to Dr. Richard Schulze, a nationally known herbologist

who has investigated the problem in depth. Do you want to put this in your body?

The answer to the Vitamin B12 problem is to clean up your diet and lifestyle by following the

ten-step plan, Change the way you are living so your body can keep you healthy and produce the

necessary Vitamin B12 as it is designed to do, and eat the natural vegetables and grains that

contain Vitamin B12 .

Is it Important to Measure Your Body pH?

The body's acid or alkaline level is measured by the pH. Too much acid in the body is primarily

a result of eating animal products, particularly meat. poultry. fish , eggs . milk, cheese and other

clairy products. High protein diets are damaging to health because they produce large amounts

of acid that promotes tumor growth and osteoporosis . Ange r, stress and fear also contribute to

an acid condition.

For the most part, meal-based diets are more acid-producing than plant-based diets. Not

surprisingly, tacto-ovc vegetarian diets are more acid-producing lhan vegan diets. Hence, meats

containing animal foods will tend to cause more calcium loss and a greater osteoporosis risk. Journal 01 Nutrition 1900 Jan;120(1):134-136

Generally. for every excess gram of prot ein consumed. calcium loss increases by about 1 mg.

One study reported thai increasing animal prot ein consumption caused a fivefold increase in

blood aCid levels! And th et means calcium loss from the bones and teeth.

American Journal or ClinicalNulrilion 1994 June:59(6): 13511-1361

Osteoporosis is most common in countries where the largest amount of dairy products are

consumed.

Amefican Journal of Clinical Nutrition *19n;25;5 18*

Clri;aI Orthopae<ics 1980;152:35

FAa Production Yearbclok 1~;37:263

While daily calcium intake is important, numerous studies have dearly demonstrated that too

much dietary protein, not 100little calcium, is a ma;or cause of osteoporosis. Why?

Too much protein causes an excess of hydrogen ions in the blood , which elevates blood acid

levels. Because high acid levels can be dangerous, the body "buffers," or neutralizes the blood

acid levels by drawing calcium from the bones. The resulting waste products , including calcium,

are excreted in the urine.

American Journal 01 Clinical Nulril;on 1987;4 6:685'687

American Journal of Clinical NUI l'il;on 1991 :53:132· 142

Joumal 01 Nutrition 198 1:111:545,553

Joumal of Nutrition 1974; 104(6) ;695·700

Joumal of the American Oietel ie Assoeie.tiOn 1980:76: 148-15 1

Hospital Practice 1994 Nov 15;68

Dairy and Calcium, Protein

Fruits, vegetables and nuts, are good sources of boron, whiCh helps stop calcium loss in the

body. Because milk is low in boron and high in phosphorus and protein, it is not a good

osteoporosis-lighting food.

Dr. Forrest H\_ Nielsen. USDA. in Nutrition Today JarVFeb 1988;4-7

FSAEBJoumal l987;1:394'397

Protein, Calcium and Osteoporosis

Osteoporosis is caused by a number 01 things, 0fIE! of the most important being too much dietary

protein!

Amenca.nJoumal 01Clinical Nutrition 1974;27(9):916-925

Joumal of Nutrition 198 1:111(3):345'552; 553·562

$dan<::e 1986:233(4763):5 19·520

153

Dietary protein increases production Of acid (in the blood) which can be neulralized by calcium

mobilized Irom the skeleton.

AmefiCllfl Jc:unal of Clinical Nutntion 1995:6 H():909

When the body metabolizes more 01 these (animal) proteins than it needs. sullur·based acids are

produced. To neutralize these acids , the body draws on its stores 01ca lcium. Instead 01being

used to build bone. the calcium spills into the urine.

HoJaIlI'I 1993 Sept 28

Excessive protein intake could account tor the 1.0% 10 1.5% loss in bone mass eaChyear typically

seen in post-menopausal women.

Journal of LaboratOfY and Clinical Medicine 1982:99( I):46-5S

Sulfur amino acids in animal products seem to be primari ly responsible for the increased calcium

loss .

C-,eified Tissue Inlematio nal *19B9:44(5):335-33B*

Meat-based otets are more acid producing than recto-eve vegetarian (LOV) diets; and l OVdiets

are more acid producing than vegan diets.

Journal of 1he American Dietetic: Association 1985:85(7 ):841-845

Increasing protei n intake by 50 grams caused an exira 60 mg of calcium 10 be excreted in the

urine.

JoumaI 01 NuIntIon 1990;120(1):134-136

Study subjects had a negative calcium balance eating 142 glday of protein and 1,400 mgfday of

calcium: a positive eatcium balance resulted when subjects got 50 glday of protein and 500 mg of

calcium.

Fadaralion Proceedings 19B1:4O(9):2429-2433

The researchers also found that for women who consumed higher amounts of animal protein

during both their adult and teenage years, the risk offorearm fracture was" significantly increased

by 44%."

Such increases in fracture rates were observed for protein derived from animal sources, but no

Increased risk was found with higher consumption of vegetable protein.

The American Journal of Clinical Nutrition 1995 April;61(4):909

ACCOrding to the American Academy 01 Pediatrics , cow's milk is not the best food for infants

because it contains 100 much sodium. potassium , and protein , too Iitlle iron and linoleic acid, and

not enough vitamins C and E.

Pediatrics 1992:89(6):11()5. 1I (l9

American JoumaI of Clinical Nutnlion 1993:58:343-348

Journal of Pediatrilllic GastroentefOIogy and Nutrilion 1993;16(1):1-3

Be sure your diet is highly nourishing and alkaline. A diel of fruits. grains and vegetables as

thiShealth program promotes, is an alkaline diet. Fruit juice. such as orange juice and grapefruit

juice. are alkaline foods , not acid. and are helpful with this condition.

Meats, poultry. fish. dairy products and eggs are acid proclucing and should be avoided

pennanently.

**A Vegetarian Diet**

Plant sources of protein alone can provide adequate amounts of the essential and nonessential

amino acids, assuming that dietary protein sources from plants are reasonably varied and that

caloric intake is suffic ienl lo meet energy needs. ..Conscious combini ng of lhese foods within a

given meal as the complementary prolein dictum suggests is unnecessary.

Journal of the American Dietet;c Assoc iation 1993:93(11) :1317-1319

In 1972, author Frances Moore lappe claimed that animal foods are superior protein, while plant

foods are inferior. If eating plant proteins , she wrote, a complicated method of combining

"complementary protein" foods had to be followed. Ten years later, she realized her error and

wrote: "In combating the myth that meat is the only way to get high~quality protein, 1reinforced

anothermyth. I gave the impression that in orde r to get enough protein without meats, considerable

ca re was needed in choosing foods."

Nutrition Action Newsletter, *Oct* 1982, p. 10

**Vegetable Protein ALONE is Sufficient**

The ab ility of vegetable pro tein alone to meet protein need s was demonstrated in the

Mich igan State Bread Study. For 50 days, university students, aged 19 to 27, ate diets that

provided 70 g of protein daily, 90% to 95% of which came from the wheat flou r in bread. The

othe r 5% to 10% of their protein came from fruits and vegetables. They didn't consume .am-:

animal protein. Test results showed that, on the average, subjects had a proper nitrogen balance ,

revealing adequate protein intake.

American Journal 01 Clinical Nutrition 1971:24(3)518·528

**Vegetar ians Live Longer**

In a study of over 34 ,000 Califo rnia Seventh-Day Adventists, the combination of a vegetarian

diet, exercise, and absen ce of smoking accou nted lor an increase in life expectancy up to 10

years, perhaps the highest life expectancy of any formally described popu lation.

Arch Intern Med, 2001:161 :1645·1652

159

Less Calo ries Means Longer Life

Only ()(IEl intervention has been proven to eKtend both the average and maximum lifespan of all

animal species testeo: reducing the consumption of dietary calories, or caloric restriction (CR).

caloric Restrict ion not only extenos me lifespan of laboratory animals , but also reduces the

incidence of virtually ALL diseases of aging such as cancer, heart disease, diabetes, osteoporosis,

autoimmune disorders, Alzheimer's and Parkinson's.

-

twllilion Reviews. Feb:43(2);61·3

Journal o1lhe American Medical AsllOCia.lion . Jan 16;257(3):353-8

NewEngland Joumal of Medicine. Sapt 14:3J3(11);6n -B5

**"Getting Started on Getting Well" - Dr. Lorraine Day Apr. 2003**

Head of Orthopedic Surgery SF General Hospital and Medical professeur UCLA for over 15 years

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**Encyclopedia of Diets, Gale, Vol 1-2 - Jacqueline L. Longe 2008**

Page 166Seaweed and other sea vegetables: They contain

beta-carotene, protein, vitamin B12, fiber, and chlorophyll,

as well as chlorophylones, which are important

fatty acids that may help in the fight against breast

cancer. Many sea vegetables also have high concentrations

of the minerals potassium, calcium, magnesium,

iron, and iodine.

Page 391-2

Folate

Definition

Folate is a naturally occurring water-soluble vitamin

that the body needs to remain healthy. Folic acid is

a stable synthetic form of folate that is found in dietary

supplements and is added to fortified foods such as

flour and cereal. Humans cannot make folate or folic

acid, so they must get it from foods in their diet or as a

dietary supplement. Folic acid and folate are both converted

into an active form in that the body can use,

although folic acid is more easily used (more bioavailable)

in the body. Folic acid is also called vitamin B9

Purpose

Folate is necessary to create new DNA (genetic

material) andRNA when cells divide. It plays a critical

role in developing healthy red blood cells. Folate also

helps protect DNA from damage that may lead to

diseases such as cancer. Along with vitamins B6 and

B12, folate helps regulate the level of the amino acid

homocysteine in the blood. Homocysteine regulation

is related to cardiovascular health. In the fetus, folate

is necessary for the proper development of the brain

and spinal cord.

Description

Folate is one of eight B-complex vitamins. Its

function is closely intertwined with that of vitamins

B6 and B12. Folate, from the Latin word folium meaning

leaf, was discovered in the late 1930s in yeast and

later found in spinach and other green leafy vegetables

and in liver. Starting in 1998, the United States Food

and Drug Administration (FDA) required certain

foods, such as flour, corn meal, bread, cereal, rice,

and pasta, to be fortified with a folic acid. In Canada

and Chile fortification of flour is mandatory.

page 616

Vitamin B12 is essential for healthy blood and

nerve cells. This vitamin is not naturally found in

plant foods and the main sources of this vitamin are

from animal based foods. Alternative sources for lactovegetarians

include dairy produce, yeast extracts, some

vegetable stocks, soya milks, fortified breakfast cereals

and textured vegetable protein.

Page 894

There is a high vitamin B12 content in spirulina. For

this reason, it has often been recommended as a supplemental

source of the vitamin for vegans and other strict

vegetarians, who are unlikely to have adequate dietary

vitamin B12. Unfortunately, spirulina is not an effective

source of the usable vitamin.Much of the vitamin B12 is

in the form of analogs that are unusable for humans,

and may even block the active forms of vitamin B12

consumed from other sources.

(The previous theory about B-12)

Page 971

Vitamin B12

Definition

Vitamin B12 is a water-soluble organic compound

that the body needs to remain healthy. The only organisms

that can make vitamin B12 are bacteria, fungi,

yeast, molds, and algae. Humans must get it from

foods in their diet. Vitamin B12 is sometimes called

cobalamin.

Purpose

Vitamin B12 playsmajor roles in developing healthy

red blood cells, creating new deoxyribose nucleic acid

(DNA, genetic material), and in maintaining the health

of nerve cells. It is also involved in making certain

nutrients available to the body.

Description

Vitamin B12 is one of the least understood vitamins.

Although some of its effects were experimentally

discovered in the 1930s, Vitamin B12’s structure was

not determined until the 1960s. Questions still remain

about some of its functions. Vitamin B12 is different

from other vitamins in several ways. It is the only

vitamin not made by any plant or animal, but only

by microorganisms. It is the only vitamin to contain

the metal cobalt (thus the name cobalamin), and it is

the only vitamin that must combine with another substance,

called the intrinsic factor (IF), before it can be

absorbed by the body.

Although vitamin B12 is made only by microorganisms,

it is found in association with animal protein.

In nature, it comes in a variety of chemical forms that

the body converts into two active forms of B12. Most

B12 dietary supplements contain the form called cyanocobalamin.

B12 is included in over-the-counter multivitamins

and in vitamin-B-complex supplements. It

is also sold as a stand-alone dietary supplement and in

an injectable form available only by prescription.

When people eat animal protein-beef, fish, pork,

chicken, eggs, milk, cheese-the stomach is stimulated

to secrete hydrochloric acid and enzymes that break

down the protein and release vitamin B12. B12 then

binds with IF, which is made in the stomach. Vitamin

B12 cannot be absorbed into the body unless it is

combined with IF. Therefore, either an absence of

B12 in diet or inability of the stomach to make IF can

result in B12 deficiency.

Some fermented bean products such as tofu, tempeh,

natto, tamari, and miso may or may not contain

**Vitamin B12**

**Recommended**

**Age Dietary Allowance**

Children 0–6 mos. 400 ng (AI)

Children 7–12 mos. 500 ng (AI)

Children 1–3 yrs. 900 ng

Children 4–8 yrs. 1.2 mcg

Children 9–13 yrs. 1.8 mcg

Children 14–18 yrs. 2.4 mcg

Adults 19\_ yrs. 2.4 mcg

Pregnant women 2.6 mcg

Breastfeeding women 2.8 mcg

**Food Vitamin B12 (mcg)**

Mollusks or clams, cooked, 3 oz. 84

Calf’s liver, cooked, 4 oz. 41

Cereal, 100% fortified, 3/4 cup 6.0

Salmon, baked or broiled, 4 oz. 3.3

Beef, top sirloin, broiled, 3 oz. 2.4

Cheeseburger, fast food, double patty 1.9

Shrimp, steamed or broiled, 4 oz. 1.7

Taco, fast food, 1 large 1.6

Cereal, 25% fortified 1.5

Tuna, white, canned in water, 3 oz. 1.0

Milk, 1 cup 0.9

Ham, canned or roasted, 3 oz. 0.6

Chicken breast, roasted, ½ breast 0.3

Egg, 1 whole, cooked 0.3

AI \_ Adequate intake

mcg \_ microgram

ng \_ nanogram

(Illustration by GGS Information Services/Thomson Gale.)

vitamin B12 depending on which bacteria were used to

ferment these products. Nutritional yeast also may or

may not contain vitamin B12 depending on the type of

yeast used. Consumers should read labels of these

products carefully. The best source of vitamin B12 for

people who do not eat meat or animal products is

fortified breakfast cereal. Cereals can be fortified at

various strengths, ranging from in amounts ranging

from 100% of the daily requirement to 25% of the

daily requirement. The label must contain information

about vitamin fortification.

Vitamin B12’s role in health

Vitamin B12 is crucial to the development of healthy

red blood cells. As red blood cells mature, they need

new DNA. In the absence of adequate vitamin B12, the

newDNAis defective. This results in red blood cells that

are too large and poorly shaped. These malformed cells

have a reduced ability to carry oxygen and result in

pernicious anemia or megaloblastic anemia.

Vitamin B12 also is necessary to maintain healthy

nerves. Nerves are covered with a fatty sheath called

myelin. The myelin covering is necessary for effective

transmission of nerve impulses. When vitamin B12 is

absent, the myelin sheath does not form correctly.

Proteins in the diet are broken down into small

molecules called amino acids that are then used by the

body to build new proteins. Vitamin B12 helps make

amino acid available to the body. High levels of one

particular amino acid, homocysteine, are associated

with increased risk of heart disease. Vitamin B12,

along with vitamin B6 and folic acid help reduce the

level of homocysteine in the blood. Vitamin B12 is

also thought to play a role in making carbohydrates

and fats available to the body. Clinical trials

are underway to determine safety and effectiveness

of vitamin B12 in a variety of situations. Individuals

interested in participating in a clinical trial at

no charge can find a list of open trials at <http://

www.clinicaltrials.gov>.

Normal vitamin B12 requirements

TheUnited States Institute of Medicine (IOM) of

the National Academy of Sciences has developed

values called Dietary Reference Intakes (DRIs) for

vitamins and minerals. The DRIs consist of three sets

of numbers. The Recommended Dietary Allowance

(RDA) defines the average daily amount of the

nutrient needed to meet the health needs of 97–98%

of the population. The Adequate Intake (AI) is an

estimate set when there is not enough information to

determine an RDA. The Tolerable Upper Intake

Level (UL) is the average maximum amount that

can be taken daily without risking negative side

effects. The DRIs are calculated for children, adult

men, adult women, pregnant women, and breastfeeding

women.

The IOM has not set RDAs for vitamin B12 in

children under one year old because of incomplete

scientific information. Instead, it has set AI levels for

this age group. No UL levels have been set for any age

group because no negative (toxic) side effects have

been found with B12, even when people have taken

many hundreds of times the RDA for years. RDAs

for vitamin B12 for people three years and older are

measured in micrograms (mcg).

The following are the RDAs and IAs for vitamin

B12 for healthy individuals:

\_ children birth–6 months: AI 400 nanograms

\_ children 7–12 months: AI 500 nanograms

\_ children 1–3 years: RDA 900 nanograms

\_ children 4–8 years: RDA 1.2 mcg

\_ children 9–13 years: RDA 1.8 mcg

\_ people 14 years and older: RDA 2.4 mcg

**Vitamin B12**

**Recommended**

**Age Dietary Allowance**

Children 0–6 mos. 400 ng (AI)

Children 7–12 mos. 500 ng (AI)

Children 1–3 yrs. 900 ng

Children 4–8 yrs. 1.2 mcg

Children 9–13 yrs. 1.8 mcg

Children 14–18 yrs. 2.4 mcg

Adults 19\_ yrs. 2.4 mcg

Pregnant women 2.6 mcg

Breastfeeding women 2.8 mcg

**Food Vitamin B12 (mcg)**

Mollusks or clams, cooked, 3 oz. 84

Calf’s liver, cooked, 4 oz. 41

Cereal, 100% fortified, 3/4 cup 6.0

Salmon, baked or broiled, 4 oz. 3.3

Beef, top sirloin, broiled, 3 oz. 2.4

Cheeseburger, fast food, double patty 1.9

Shrimp, steamed or broiled, 4 oz. 1.7

Taco, fast food, 1 large 1.6

Cereal, 25% fortified 1.5

Tuna, white, canned in water, 3 oz. 1.0

Milk, 1 cup 0.9

Ham, canned or roasted, 3 oz. 0.6

Chicken breast, roasted, ½ breast 0.3

Egg, 1 whole, cooked 0.3

AI \_ Adequate intake

mcg \_ microgram

ng \_ nanogram

(Illustration by GGS Information Services/Thomson Gale.)

972 GALE ENCYCLOPEDIA OF DIETS

Vitamin B12

\_ pregnant women: RDA 2.6 mcg;

\_ breastfeeding women: RDA 2.8 mcg

Sources of vitamin B12

Vitamin B12 is found in food that comes from

animals, including meat, fish, poultry, eggs, milk,

and cheese. It is also added to fortified breakfast cereals

and is found in some fermented bean products.

Heating or cooking foods does not reduce their vitamin

B12 content very much.

The following list gives the approximate vitamin

B12 content for some common foods:

\_ calf’s liver, cooked, 4 ounces: 41 mcg

\_ salmon, baked or broiled, 4 ounces: 3.3 mcg

\_ shrimp, steamed or boiled, 4 ounces: 1.7 mcg

\_ mollusks or clams, cooked, 3 ounces: 84 mcg

\_ tuna, white, canned in water, 3 ounces: 1.0 mcg

\_ beef, top sirloin, broiled, 3 ounces: 2.4 mcg

\_ cheeseburger, fast food, double patty: 1.9 mcg

\_ taco, fast food, 1 large: 1.6 mcg

\_ ham, canned or roasted, 3 ounces: 0.6 mcg

\_ chicken breast, roasted, 1/2 breast: 0.3mcg

\_ milk, 1 cup: 0.9 mcg

\_ egg, 1 whole, cooked: 0.3 mcg

\_ breakfast cereal, fortified 100%, 3/4 cup: 6.0 mcg

\_ breakfast cereal, fortified 25%, 3/4 cup: 1.5 mcg

Vitamin B12 deficiency

Vitamin B12 deficiency is hard to determine, and

there is little agreement on how many people are vitamin

B12 deficient. This is partly because the body can

store 5–10 year’s worth of vitamin B12, so symptoms of

deficiency are slow to show up, especially in adults.

Researchers estimate that anywhere from 300,000–3

million Americans are vitamin B12 deficient.

Most meat-eating Americans get enough vitamin

B12 from diet alone. However, the elderly are at higher

risk than younger people of developing mild vitamin

B12 deficiency. Other people at greater risk of vitamin

B12 deficiency include:

\_ vegans who eat no animal products

\_ breastfed babies of vegan mothers

\_ people who have had part of their stomach or intestine

removed

\_ people with diseases that interfere with the absorption

of nutrients such as Crohn’s disease, celiac disease,

or ulcerative colitis.

\_ people with alcoholism

\_ people with liver or kidney damage

\_ people with HIV/AIDS

Symptoms of vitamin B12 deficiency include shaky

movements, loss of balance, muscle weakness and

spasms, vision problems, reduced mental functioning,

and changes in mood and mental state. These symptoms

are quite general and have many other causes

besides vitamin B12 deficiency.

Precautions

Breast-fed infants of strict vegan mothers are particularly

likely to develop vitamin B12 deficiency, as

they have little or no B12 stored in their bodies at birth.

Failure to get enough B12 during the infancy and childhood

can result in permanent damage to the nervous

system. Vegan mothers should consult a pediatrician

about appropriate Vitamin B12 supplementation.

Individuals with the eye disorder Leber’s optic

atrophy should not use vitamin B12 supplements.

High levels of B12 will accelerate degeneration of the

optic nerve, leading to blindness.

Folic acid may mask vitamin B12 deficiency. Folic

acid supplements will reverse anemia symptoms, but

they do not stop nerve damage caused by B12 deficiency.

Permanent nerve damage may result. People

with suspected folic acid deficiency who begin taking

folic acid supplements should also be evaluated for

vitamin B12 deficiency.

Interactions

Many drugs used to treat gastroesophageal reflux

disease (GERD) such as omeprazole (Prilosec), lansoprazole

(Prevacid), cimetidine (Tagamet), famotidine

(Pepsid), nizatidine (Axid), or ranitidine (Zantac)

decrease the amount of hydrochloric acid secreted by

the stomach. In turn, this may limit the amount of B12

available from food, but not from dietary supplements.

Antacid abuse may also limit the absorption of B12.

Metaformin (Fortamet, Glucophage, Glucophage

XR, Riomet), a drug used to treat diabetes,

may indirectly decrease vitamin B12 absorption by

altering calcium metabolism. When metaformin is

taken for a long time (years), the risk of megaloblastic

anemia and cardiovascular disease may increase.

Nitrous oxide (‘‘laughing gas’’) can inactivate the

cobalamin form of vitamin B12. Nervous system symptoms

can develop in people exposed to nitrous oxide if they

already havewith low vitaminB12 levels.This is unlikely to

occur with people who have normal levels of B12.

Complications

No complications are expected from taking vitamin

B12.

Parental concerns

Parents whose children are vegetarians should be

concerned that they are getting enough vitamin B12.

The nervous system grows rapidly in children and B12

is essential to its proper development. Nervous system

damage caused by a lack of B12 is usually irreversible

in children.

Resources

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FL: Taylor & Francis, 2007.

ORGANIZATIONS

Linus Pauling Institute. Oregon State University, 571

Weniger Hall, Corvallis, OR 97331-6512. Telephone:

(541) 717-5075. Fax: (541) 737-5077. Website: <http://

lpi.oregonstate.edu>

Office of Dietary Supplements, National Institutes of

Health. 6100 Executive Blvd., Room 3B01, MSC 7517,

Bethesda, MD 20892-7517 Telephone: (301)435-2920.

Fax: (301)480-1845. Website: <http://dietarysupplements.

info.nih.gov>

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**Vitamin B12 contains cobalt and it is hence known as cobalamin. It is another member of the water-soluble B complex, and is sometimes known as "anti-pernicious" factor after its ability to prevent the condition pernicious anaemia. The absorption of vitamin B12 is dependent on the presence of a certain substance known as "intrinsic factor" in the gastric juices. Vitamin B12 is freely soluble and therefore lost into cooking water. It is sensitive to strong acid, alkali and light.**

**What does it do?**Vitamin B12 is needed at a very basic level for the synthesis of DNA and hence for cell production - particularly red blood cells. Vitamin B12 also functions in the metabolism of fatty acids, and in maintaining the myelin sheath around nerves.

B12 is needed for synthesis of DNA, metabolism of fatty acids, and maintenance of the myelin sheath around the nerves. It has been investigated for use by MS sufferers.

**What are the deficiency signs?**A deficiency of vitamin B12 leads inevitably to the condition pernicious anaemia (a type of megaloblastic anaemia). This is characterised by a fall in the number of red blood cells. Those still produced are irregular in size, but generally too big.

Unfortunately there is an unpleasant twist to vitamin B12 deficiency, in that symptoms of pernicious anaemia can be effectively masked if folic acid intake is inadequate. This can allow vitamin B12 deficiency to progress silently, showing itself eventually in irreversible neurological damage.

## SUPPLEMENTAL USES

**Vegans:**  
Vegans and vegetarians may do well to supplement orally with vitamin B12. This is a suitable precaution because of the absence of this vitamin from plant foods (1).

**Pernicious Anaemia:**  
To treat or prevent pernicious anaemia, vitamin B12 is often injected intramuscularly in large amounts. Through this method, pernicious anaemia> has changed from being a fatal to a treatable disease (2).

High levels of vitamin B12 have also been used therapeutically for reasons other than treating pernicious anaemia. Certain mental conditions (especially in the aged) have been seen to be improved with vitamin B12, but there is no hard evidence for this.

**Who should supplement?***Vegans:*Vegans and vegetarians may do well to supplement orally with vitamin B12.

This is a suitable precaution because of the absence of this vitamin from plant foods (1).

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## SAFETY

No toxic effects have been noted with vitamin B12 in man. Injections of as much as 3 mg/day have been used to treat [Fatigue](file:///E:\ENTER\Science\Biology\Health\www.questhealthlibrary.com\questhealthlibrary\www.questhealthlibrary.com\health-conditions\fatigue.htm) and various neurological disorders, whereas 1 mg/day has been used to treat vitamin B12 - responsive errors of metabolism.

**Is it toxic?**No toxic effects have been noted with vitamin B12 in man. Injections of as much as 3 mg/day have been used to treat fatigue and various neurological disorders, whereas 1 mg/day has been used to treat vitamin B12-responsive errors of metabolism.

**Intake levels: micrograms (µg)**RDA 1µg  
Upper safe level for daily supplementation 500µg

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| **Which foods?** | **Micrograms (µg/100g)** |
| Lamb's liver | 54.0 |
| Pig's liver | 23.0 |
| Beef, lamb, pork | 2.0 |
| Fish, white | 2.0 |
| Egg | 1.7 |
| Fortified breakfast cereal | 1.7 |
| Yeast extract | 0.5 |
| Milk | 0.4 |

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**Cobalamins: Vitamin B-12**

**Biochemical Functions:**

* Involved in DNA synthesis
* coenzyme for Met synthase: homocysteine → Met
* adenosylcobalamin coenzyme for methylmalonyl CoA mutase: methylmalonyl →succinyl CoA
* synthesis of SAMe
* involved in normal functioning of the nervous system and immune system.

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| **DIGESTION** | **ABS. Loc.** | **ABSORPTION**  **HIGH CONC.** | **ABSORPTION**  **LOW CONC.** | **TRANSPORT** | **CELLULAR UPTAKE** | **METABOLISM** | **STORAGE** | **EXCRETION** |
| pepsin, IF,  r-proteins, trypsin, HCO3- | ileum | diffusion | Ca2+ dependent active transport | transcobalamins: 1-circ. storage, 2-newly abs., 3-tissue to liver | receptor mediated endocytosis | freed from TC2→methylated or reduced→adenosyl- | 1.adenosyl-2.hydroxo-  3. methyl-liver, muscle, bone, brain kidney, heart, spleen | Hydroxycobalamine has one less cyanide than cyanocobalamine, hydroxy & cyanide ­ cyano which is excreted in the urine. |

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| **FACTORS THAT ↑ ABSORPTION** | **FACTORS THAT ↓ ABSORBTION** | **Nutrient Interaction** | **Drug Interaction** |
| intrinsic factor | * vit C (>500mg C) * Cu (?) * thiamin (?) * from food, not supplements, is inhibited by drugs that interfere with gastric acid secre-tion, antacids, po-tassium, citrate, chloride, colchicine, some oral hypoglycemic medications. | * prevents folate trap * deficient B6 * iron increases likelihood of deficient B12 * Leucine | * autoimmune disease medications * NSAIDs * tobacco ambliopia assoc. w/ smoking: Hydroxycobalamine is specific antidote for cyanide toxicity (injection of B 12 cured dimness of vision-amblyopia in smokers that was due to chronic cyanide toxicosis). Hydroxocobalamin acts as a sink to draw cyanide out of the body, transient cyanide toxicity. * Nitrous oxide inactivates B 12 and can cause megaloblastic anemia |

The methylated form, methylcobalamine inhibits the toxic effect of methylmercury on nerve fibers in animals (possibly by increasing phosphatidyl choline synthesis). B 12 and C have been shown to reduce Pb toxicity and CCl4 toxicity. B 12 with choline and inositol reverses Aflatoxin induced fatty liver.

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| **Dosage and Administration:** RDA: 3μg. Dosage is variable depending on route of administration and condition being treated. For most conditions, IM hydroxocobalamin 1 ml (1,000 μg) is recommended. Hydroxocobalamin is longer acting and achieves higher serum levels than cyanocobalamin. Methylcobalamin has been used in some studies. Oral, sublingual or intranasal administration is usually not effective for conditions requiring high serum concentrations. However, large oral doses have been used successfully to treat pernicious anemia. |

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| **Food Sources:** Fish, liver and organ meats, meat, poultry, cheese, yogurt, milk, eggs, bivalves |

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| **Deficiency Signs:** Cobalamin deficiency is more likely to occur in the elderly and may also occur vegans and patients with hypochlorhydria.   * tachycardia, pallor secondary to macrocytic anemia * atrophic lingual papillae paleness, glossitis * dementia * peripheral neuropathy, ataxia, decreased tendon reflexes (in B 12 deficiency the myelin sheath is malformed.)   15% of CS pts at the Environmental Heath Center in Dallas were found to be deficient in B 12. |

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| **Toxicity Signs** |

**Clinical Indications**

In conventional treatment, B12 is only given in B12 deficiency: pernicious anemia (1000 mcg /day orally), acid blocking drugs.

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| **Behavioral and Psychological Conditions** | | |
| Dementia | IM: therapeutic trial of a minimum of 4-8 injections of 1000 mcg 1-2 x wk | Based on low B 12 levels in cerebrospinal fluid, despite normal blood levels (possible accelerated breakdown) |
| Fatigue, anxiety, depression, insomnia |  | **\*\*\*study supporting vit B 12 as a general tonic\*\*\*** |

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| **Dermatologic Conditions** | | |
| Vitiligo | oral, 2,000 μg/day plus folic acid 10 mg/day | Uncontrolled trial: Induced varying degrees of repigmentation after 3-6 months. Sun exposure enhanced the effect of the vitamin therapy. |
| Seborrheic Dermatitis | IM 10-30 μg q 1-3 weeks for 2-3 injections, maintenance injections as needed q 2-3 weeks | Uncontrolled trial |
| Xanthelasma | IM weekly for 6-20 weeks | Controlled trial: Induced regression of plaques |

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| **Endocrine Conditions** | | |
| Thyrotoxicosis | IM | May inhibit some of the adverse effects of hyperthyroidism but does not reduce TH levels (in animals and clinical observation: A Gaby). Thus, may buy time for other therapy. |

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| **Immune Conditions** | | |
| HIV infection | can add folic acid also | Levels of B12 and folic acid are commonly low in HIV pt which may increase the toxicity of zidovudine (AZT) |
| Acute Viral Hepatitis | 30 mcg IM every other day for 10 days w/ oral folic acid 5 mg tid for 10 days | reduced duration by 17% compared w/ untreated control group |

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| **Male Conditions** | | |
| Infertility | IM hydroxocobalamin 1,000 μg/week for a minimum of 12 weeks | Uncontrolled trial: Increased sperm counts in 27% of men with oligospermia. |

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| **Musculoskeletal Conditions** | | |
| Bursitis, heel spurs | 1000 mcg daily for 7-10 days then taper depending on response | uncontrolled trial, w/ spurs the pain resolves but still visible on x-ray |
| Nocturnal leg cramps | IM, also consider vit. E and Cal/Mag | Effective in 16 elderly patients (uncontrolled). |

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| **Neurological Conditions** | | |
| Diabetic neuropathy | IM in varying doses and frequencies and varying periods of time | uncontrolled trials |
| Neurological disorders: sciatica, trigeminal neuralgia, Bell’s palsy, prevention of postherpetic neuralgia | 1000 mcg IM 2-3 x/wk for 2-3 wk then taper according to response. Tx is said to work better when given w/ thiamine, 50 mcg per injection. | mostly anecdotal, one trial w/ Bell’s palsy: 500 mcg 3x wk for 8 wk (better compared with glucocorticoids for Bell’s palsy; however, very little evidence support glucocorticoids in Bell’s palsy anyway) |
| Tinnitus/Noise induced hearing loss | IM | Low blood levels found in patients |

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| **Ophthalmological Conditions** | | |
| Diabetic retinopathy in IDDM children | 100 mcg w/ insulin injection | Studies: 7 out of 15 children had regression of retinopathy |

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| **Pulmonary Conditions** | | |
| Asthma | 1000 mcg IM 1-3 x wk | Studies showed benefit in 56% of 85 asthmatics. Children respond better than adults. |
| Sulfite induced asthma | Pretreatment w/ B 12 (1-5 mcg orally) | Evidence that B12 destroys sulphites |