

Water Soluble Vitamins

Essential for Growth, Vitality and Health

Two Types of Vitamins

Fat Soluble

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

Water Soluble

- B1 (Thiamin)
- B2 (Riboflavin)
- B3 (Niacin)
- B5 (Pantothenic Acid)
- B6 (Pyridoxine)
- B7 (Biotin)
- B9 (Folic Acid)
- B12 (Cobalamin)
- Vitamin C

Two Types of Vitamins (Another way of looking at it!)

Food Source Only

- Vitamin A
- Vitamin D*
- Vitamin E
- B1 (Thiamin)
- B3 (Niacin)*
- B6 (Pyridoxine)
- Vitamin C

Food & Intestinal Bacteria

- Vitamin K
- B2 (Riboflavin)
- B5 (Pantothenic Acid)
- B7 (Biotin)
- B9 (Folic Acid)
- B12 (Cobalamin)

* May be produced by bacteria

Vitamin Deficiency Diseases

Food Source

- Vitamin A – Night Blindness
- Vitamin D - Rickets
- Vitamin E - Infertility
- B1 (Thiamin) - Beriberi
- B3 (Niacin) - Pellegra
- B6 (Pyridoxine) - Anemia
- Vitamin C - Scurvy

Intestinal Bacteria

- Vitamin K - ?
- B2 (Riboflavin) - ?
- B5 (Pantothenic Acid) - ?
- B7 (Biotin) - ?
- B9 (Folic Acid) - ?
- B12 (Cobalamin) - ?

Thought Question:

Since we don't know the "normal" amount of vitamins produced by our intestinal bacteria, how can we know what the nutritional effects of "deficiency" will be on our bodies if the bacteria are reduced or destroyed?

The Water Soluble Vitamins

- **B1 (Thiamin)**
- **B2 (Riboflavin)**
- **B3 (Niacin)**
- **B5 (Pantothenic Acid)**
- **B6 (Pyridoxine)**
- **B7 (Biotin)**
- **B9 (Folic Acid)**
- **B12 (Cobalamin)**
- **Vitamin C**

Vitamin B Complex

All the water-soluble B vitamins work as a “team” to promote healthy nerves, skin, eyes, hair, liver, muscle tone and cardiovascular function,

AND

they protect us from mental disorders, depression and anxiety.

Vitamin B Complex Sources

- **Intestinal bacteria!**
- Organ meats
- Whole grains
- Fresh fruits
- Vegetables
- Nuts
- Legumes
- Seafood

Vitamin B1 (Thiamin)

- Can be destroyed by cooking—especially by boiling or moist heat
- Also depleted by the use of sugar, coffee, tannin (from black teas), nicotine and alcohol
- Of fruits, avocado is highest in B1
- Pork also has a high amount

Vitamin B1 Functions

- Plays a key metabolic role in the cellular production of energy, mainly in glucose metabolism
- Plays an important role in the synthesis of acetylcholine which carries messages between the nerves and the muscles
- Important for the development and maintenance of the myelin sheath around nerves
- Linked to learning and growth in children

Vitamin B1 Uses

- Treatment of fatigue, irritability and depression
- Helps the nerves, heart and muscular system function well
- Aids hydrochloric acid production and thus aids digestion
- Can remedy constipation by increasing intestinal muscle tone
- Improves healing after dental (or any other) surgery
- Treatment of stress and muscle tension, diarrhea, infections, cramps & headaches.

Vitamin B1 Deficiency

- Beriberi (in people whose diets consist mostly of polished rice)
- “Teenage Diets” (colas, sweets, fast foods) can lead to skin problems & symptoms of neurosis – Jekyll-and-Hyde dispositions
- Carbohydrate digestion and glucose metabolism are diminished
- Pyruvic acid builds up in the blood (one of the factors noted by researchers in patients with FMS---and mentioned by Dr. St. Amand)

Symptoms of Vitamin B1 Deficiency

- Fatigue & instability
- Confusion, loss of memory
- Depression
- Insomnia
- Gastrointestinal disturbances
- Abdominal pain
- Constipation
- Slow heart rate
- Burning chest pains
- Prickling sensations in the legs
- Tender and atrophied muscles

Thought Question:

**How much of the
degeneration and disease of old age
may be a result of
a poor diet
and lowered digestive capabilities,
leading to deficiencies of
various vitamins
and other necessary nutrients?**

Vitamin B1 Toxicity

“There is no known toxicity from thiamin (B1) taken orally.”

Elson M. Haas, MD

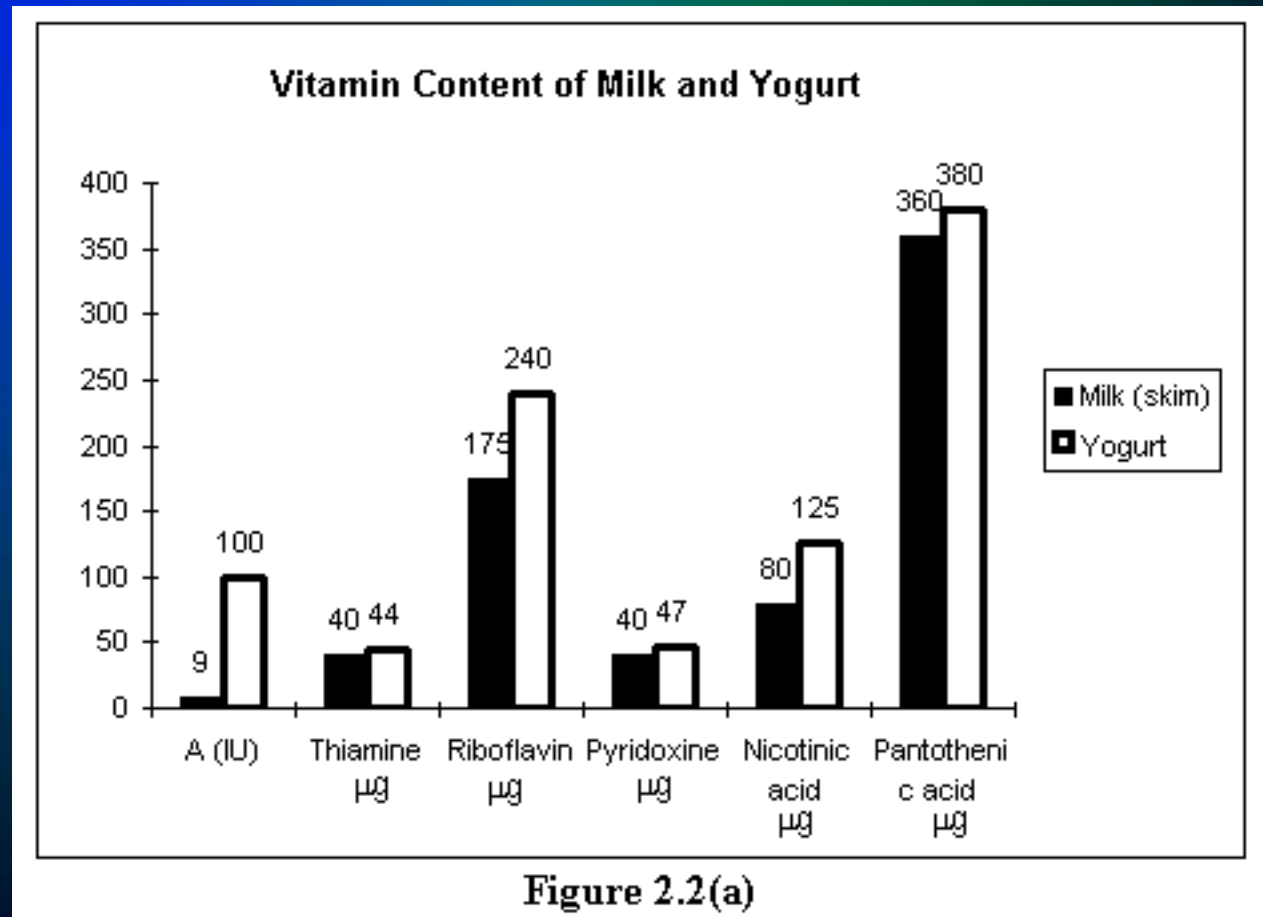
Vitamin B2 (Riboflavin)

- Stable to heat, acid and oxidation
- SENSITIVE TO LIGHT---especially sunlight
- Excess is excreted in the urine—bright yellow color!
- Is not stored well in the body, so it is needed regularly in the diet
- **Produced by intestinal bacteria**---provided they have not been destroyed by antibiotics!!
- Heavy exercise may increase the need for B2 by 10-15 times!

Vitamin B2 Sources

- **Intestinal Bacteria**
- Good Dietary Sources
 - Brewer's yeast
 - Liver, tongue & other organ meats
 - Oily fish (mackerel, trout, eel, herring, shad)
 - Nori seaweed
- Contain Some B2
 - Milk products
 - Eggs
 - Shellfish
 - Dried peas & beans
 - Dark leafy green vegetables

Vitamin Content of Milk Increases by Culturing (Yogurt)



Vitamin B2 Functions

- Riboflavin functions as the building block for two coenzymes that act as hydrogen carriers to help make energy as ATP (mentioned by Dr. St. Amand)
- Instrumental in cell respiration
- Helpful in maintaining good vision, healthy hair, skin, and nails
- Necessary for normal cell growth
- B2 is required by the body for the proper usage of B3 and B6

Vitamin B2 Uses

- Prevent and treat visual problems
- Stress conditions and fatigue
- Skin conditions such as acne, dermatitis, eczema and skin ulcers
- Leg cramps
- Given during cancer treatment
- Headaches, especially migraines

Vitamin B2 Deficiency

- May be the most common deficiency in America! Seen most often in alcoholics, the elderly, the poor and depressed patients.
- Cracks or sores at the corners of the mouth or sore tongue
- Eye redness or sensitivity to light; dry sandy feeling of the eyes
- Fatigue and/or dizziness
- Hair loss, weight loss, general lack of vitality
- Digestive problems

Vitamin B2 Toxicity

“There are no known toxic reactions to riboflavin, although high doses may cause losses of other B vitamins.”

Elson M. Haas, MD

Note: Women who take estrogen or birth control pills, people on antibiotics, and those under stress need additional amounts of B2!

Vitamin B3 (Niacin)

- Very stable
- Resistant to heat, light, air, acid and alkali.
- Can be manufactured in the body from tryptophan in protein foods
- Also may be produced by intestinal bacteria

Vitamin B3 Sources

- Excellent Sources:
 - Liver and other organ meats
 - Poultry
 - Fish (tuna, salmon, halibut)
 - Peanuts
- Good Sources:
 - Yeast
 - Dried beans and peas
 - Wheat germ and whole grains
 - Avocados, dates, figs, prunes
 - Milk, eggs
- **May be produced by intestinal bacteria**

Vitamin B3 Functions

- Acts as part of two coenzymes, NAD and NADP, involved in more than 50 metabolic reactions in the body
- Needed for formation of red blood cells
- Stimulates blood circulation
- Needed for synthesis of sex hormones
- DNA requires B3 for production
- May be important in preventing cancers

Vitamin B3 Uses

- Used in treating fatigue, irritability and digestive disorders
- Helps in regulating blood sugar, particularly in those with hypoglycemia
- Helpful in treating anxiety and depression
- Used for skin and gum problems
- Used for treating migraine-type headaches and arthritis (stimulates blood flow in the capillaries)
- Helps reduce blood pressure

More Vitamin B3 Uses

- May reduce LDL cholesterol levels while raising the “good” HDL cholesterol
- Has been used to prevent heart attacks and strokes
- In osteoarthritis, helps reduce joint pain and improve mobility.
- It has also been used to stimulate the sex drive, to help detoxify the body and to protect it from certain toxins and pollutants.

More Vitamin B3 Uses

- Used for a variety of mental disorders
 - Senility
 - Alcoholism
 - Drug Problems
 - Depression
 - Schizophrenia
- Exercise and niacin (B3) are helpful to people with adult diabetes

Vitamin B3 Deficiency

- Pellagra – “3-D’s”: Dermatitis, diarrhea, and dementia (4th “D” was death!)
- Skin becomes rough, thick and dry, then darkly pigmented. The first stage is extreme redness – where the term “redneck” came from!
- Other symptoms: weakness, fatigue, anorexia, indigestion, skin eruptions
- Sore red tongue, canker sores, nausea, tender gums, bad breath, and diarrhea.
- Neurological symptoms: Irritability, insomnia, headaches, tremors, extreme anxiety, depression.

Extra Vitamin B3 Needs

- Athletes
- Stress, illness and tissue injury
- People who eat a lot of refined, processed foods

Note: The other B vitamins should also be supplemented along with niacin (B3) so as to not create an imbalanced metabolic condition.

Vitamin B3 Toxicity

- High doses of niacin may increase blood homocysteine levels
- Niacin supplementation is **NOT** recommended for people on high blood pressure medications and those who have ulcers, gout, or diabetes.
- Niacin “flush” may be uncomfortable for some
- Possible irritation of GI tract or liver symptoms may occur with high doses

Vitamin B5 (Pantothenic Acid)

- Present in all living cells and important for metabolism
- Stable to moist heat
- Easily destroyed by acids (such as vinegar) or alkalis (such as baking soda) and by dry heat
- Present in many whole foods and made by intestinal bacteria

Vitamin B5 Sources

- Organ meats
- Brewer's yeast
- Egg yolks
- Fish, Chicken
- Whole grain cereals
- Cheese
- Peanuts, dried beans
- Sweet potatoes, green peas, cauliflower, mushrooms, avocados
- **Bacteria in the human gut**

Vitamin B5 Functions

- As coenzyme A, it is closely involved in adrenal cortex function – “The Anti-Stress Vitamin”
- Helps prevent aging and wrinkles
- Healthy skin and nerves
- Important for cellular metabolism of carbohydrates and fats
- Supports the synthesis of acetylcholine, required for neuro-muscular reactions

Vitamin B5 Uses

- Relieve fatigue and stress
- Allergies
- Headaches
- Insomnia
- Asthma
- Infections
- Arthritis joint pain and stiffness

Vitamin B5 Deficiency

- Deficiency is unusual **UNLESS** there has been a destruction of the intestinal flora
- Symptoms of deficiency:
 - Fatigue
 - Decreased adrenal function
 - Depression
 - Digestive problems
 - Hypoglycemia
 - Insomnia
 - Tingling of hands and feet
 - Muscle cramps
 - Recurrent upper respiratory infections
 - Worsening of allergy symptoms

Vitamin B5 Toxicity

“There are no specific toxic effects from high doses of pantothenic acid (B5). However, it is possible that if B5 is taken without other B vitamins, it may create metabolic imbalance.”

Elson M. Haas, MD

Vitamin B6 (Pyridoxine)

- Stable in acid, less stable in alkali
- Easily destroyed by ultraviolet light
- Lost in cooking
- Fasting & reducing diets deplete B6
- **Also produced by intestinal bacteria**

Vitamin B6 Sources

- Liver and other organ meats
- Meat, fish, poultry
- Whole grains
- Wheat germ
- Egg yolk
- Dried beans, peanuts, walnuts
- Bananas, prunes, avocados
- Potatoes, cauliflower, cabbage, greens
- Garlic, mushrooms, bell peppers
- **Intestinal bacteria**

Vitamin B6 Functions

- Important in the utilization of food sources for energy
- Helps in antibody & red blood cell production
- Aids fluid balance regulation and the electrical functioning of the nerves, heart & musculo-skeletal system
- Helps maintain normal intracellular magnesium levels
- Norepinephrine, acetylcholine & histamine depend on B6 in their metabolism
- The brain needs B6 to convert tryptophan to serotonin (antidepressant neurotransmitter)

More Vitamin B6 Functions

- Protein metabolism – Helps in the transport of amino acids across the intestinal mucosa into the blood and from the blood into the cells (Dr. St. Amand says lab abnormalities in blood of FMS patients include 7 lowered amino acids!)
- Sulfur and methyl metabolism – Supports the body's detoxification process of pesticides, additives & heavy metals
- During pregnancy, important for maintaining the mother's hormonal & fluid balance, and for the baby's developing nervous system

Vitamin B6 Uses

- Premenstrual symptoms, water retention
- Acne, eczema, psoriasis
- Stress conditions such as headaches, nervous disorders, anemia and low blood sugar
- In men, used for prostatitis, low sex drive or hair loss
- Skin problems
- Muscle fatigue, muscle pain, joint pain
- Depression
- Carpel tunnel syndrome
- Kidney stones

Vitamin B6 Deficiency

- Muscle weakness, nervousness, irritability and depression. (Many symptoms similar to those of both niacin & riboflavin deficiencies)
- Headache, dizziness, inability to concentrate
- Water retention
- Dry skin, dandruff, a cracked or sore mouth and tongue

Vitamin B6 Toxicity

“There is no toxicity with pyridoxine (B6) at reasonable daily doses, although very high doses (exceeding 200 mg/day) are correlated with episodes of peripheral neuritis (weakness & tingling in the arms or legs).”

Elson M. Haas, MD

Vitamin B7 (Biotin)

- Discovered by the deficiency symptoms created through consuming large amounts of raw eggs (30% of the diet)
- One of the most stable of the B vitamins

Biotin - Sources

- Hard to obtain enough from diet alone
 - Egg yolks
 - Liver
 - Brewer's yeast
 - Brown rice
 - Peanuts, almonds
 - Carrots, tomato, chard, onion, cabbage
 - Milk
- Most is obtained from friendly intestinal bacteria

Biotin - Functions

- Needed for fat metabolism and the synthesis of fatty acids
- Particularly important for formation of new tissue, especially skin tissue
- Helps in the formation of DNA & RNA

Biotin - Uses

- Normalize fat metabolism in weight reduction programs
- Reduce blood sugar in diabetes patients
- Prevent or slow the graying of hair or baldness
- Dermatitis, eczema, cradle cap
- Muscle pains
- Overgrowth of intestinal yeast

Biotin – Deficiency

- Dry & flaky skin
- Loss of energy
- Insomnia
- Increases in cholesterol
- Sensitivity to touch
- Inflamed eyes
- Hair loss
- Muscle weakness and cramps
- Lack of coordination
- Depression
- Impaired fat metabolism

Biotin – Toxicity

“There is no known toxicity with biotin, even in high amounts---unless you are on a raw egg diet!”

Elson M. Haas, MD

Vitamin B9 (Folic Acid)

- Easily destroyed by light, heat, any type of cooking, or an acid pH below 4.
- Potency is diminished in most food processing and food preparation
- **Eat FRESH, UNPROCESSED food!**
- Discovered in 1931 as a “cure” for the anemia of pregnancy

Folic Acid - Sources

- Best sources:
 - Leafy green vegetables
 - Liver & kidney
 - Brewer's yeast
- Contain some folic acid:
 - Corn
 - Lima beans, garbanzo beans, peas
 - Sweet potatoes, artichokes, okra
 - Parsnips, bean sprouts
 - Whole wheat bread
 - Oranges, cantaloupe, pineapple, banana, berries
- Also manufactured by intestinal bacteria!!

Folic Acid - Functions

- Has a fundamental role in the growth and reproduction of all cells
- Is essential during pregnancy & plays a critical role in the development of the infant's nervous system (spina bifida)
- Allows for proper balancing of epinephrine and norepinephrine
- Reduces high blood levels of homocysteine (a primary risk factor in heart disease)

Folic Acid - Uses

- Restless leg syndrome
- Depression, dementia & brain disorders
- Healing skin ulcers
- Gingivitis or other periodontal diseases
- Prevent graying of hair

Folic Acid - Deficiency

- Still one of the most common vitamin deficiencies—especially in the elderly, women on birth control pills, and **those taking antibiotics**
- Inadequate nutrition, particularly lack of fresh fruits and vegetables
- Poor absorption, with intestinal problems or after stomach or intestinal surgery
- Metabolic problems, such as those created by smoking, alcohol or drug use
- Similar to B12 deficiency: anemia, fatigue, irritability, weight loss, headache, sore & inflamed tongue, diarrhea, forgetfulness, and decrease in basic mental powers

Folic Acid - Toxicity

“There are no specific toxic symptoms from folic acid intake, at least up to 1 mg. daily...However, excess folic acid intake in the face of a B12 deficiency may lead to nerve damage. Higher doses of folic acid may also depress B12 levels.”

Elson M. Haas, MD

Vitamin B12 (Cobalamin)

- The only vitamin that contains an essential mineral---cobalt
- Stable to heat; slightly sensitive to light
- Note: A mucoprotein enzyme produced by the stomach is needed for B12 to be absorbed into the body. The enzyme is the “intrinsic factor”, while the B12 is the “extrinsic factor”.

Vitamin B12 (Cobalamin)

- Aging, stress, problems with the stomach, or stomach surgery weaken the body's ability to produce the intrinsic factor.
- **B12 is produced by bacteria in the intestine.** Some is also made during the fermentation of foods.
- B12 cannot be synthesized but, like penicillin, must be grown in bacteria or molds and then processed.

Antacids Block B12

- Hydrochloric acid (in the stomach) helps the absorption of B12. If HCL acid production is weak, the absorption is lessened.
- Indigestion is often caused by TOO LITTLE HCL rather than too much!
- Your body NEEDS HCL to properly digest food and absorb vitamin B12.
- Take DGL (licorice) instead of Tums or other antacids for indigestion.

Vitamin B12 Sources

- Animal protein foods
 - Organ meats (liver, heart, and kidney)
 - Meat
 - Fish, crab, scallops, shrimp, oysters
 - Egg yolks
 - Milk products, especially live culture yogurts and kefir
- Vegans (strict vegetarians) will **NOT** get enough B12 & will need absorbable supplements or injections.

Vitamin B12 Functions

- Necessary for a healthy nervous system
- Stimulates growth in children
- Referred to as the “energy vitamin”, it often increases the energy level
- Is important for the synthesis of DNA and RNA, choline (another B vitamin) and methionine (an amino acid).

Vitamin B12 Uses

- Helpful for the energy level and activity of the nervous system in the elderly
- Fatigue (but only if the fatigue is a result of B12 deficiency)
- Prevents (and cures) anemia
- In adults, helps with appetite suppression in weight loss programs
- Stimulates growth in children
- Has been used for nervousness, irritability, insomnia, memory problems, depression, and poor balance.

Vitamin B12 Deficiency

- Result of the restricted diet of some vegetarians or people in poor nations
- Poor digestion and assimilation or deficient production of the intrinsic factor.
- Menstrual problems (even lack of menstrual flow) may occur in B12 deficient women
- Nerve symptoms include: soreness or weakness of the arms or legs, decreased sensory perceptions, difficulty walking or speaking, neuritis, nerve and spinal chord degeneration.
NERVE DAMAGE MAY BE PERMANENT!
- Psychological symptoms include: mood changes and mental slowness

Vitamin B12 Toxicity

- We have consistently advised obtaining vitamins from food rather than with vitamin supplements. One good reason to avoid supplements derives from research indicating that they can interfere with B12 uptake, exacerbate the symptoms of B12 deficiency or even cause the creation of B12 analogs that increase the body's need for B12.
- However, when it comes to B12 itself, supplementation with isolated B12 is often necessary and appropriate. The many factors in our modern lifestyle that block the complicated uptake pathways of this important nutrient--from nutrient deficiencies to exposure to toxins to factors in processed foods that cause reduced stomach acid, autoimmune disease and enzyme disruption--make it difficult to obtain sufficient quantities from our normal diet; and since vitamin B12 in supplements is produced in exactly the same way as B12 in nature, that is, by bacterial fermentation, the danger of high doses in most cases is negligible.

Sally Fallon and Mary G. Enig, PhD

B12 Shots or Supplements?

A recent study showed that oral supplementation with 2000 micrograms per day was three times as effective as injections in increasing B12 levels in pernicious anemia patients (*Journal of the American Geriatrics Society*, January 1997 45(1):124).

Vitamin C (Ascorbic Acid)

- **Must be obtained from diet**
- Found only in fresh fruit and vegetables
- Cooking destroys most vitamin C; Eat veggies raw or cultured---or minimize losses by steaming vegetables
- Vitamin C is out of the blood within 3 or 4 hours, so supplements should be taken at mealtimes rather than once a day (or eat a vitamin C-filled snack between meals)
- Requirements increase with fever, viral illness, antibiotics, cortisone, aspirin and other pain meds, environmental toxins, and exposure to heavy metals.
- **Antibiotics increase elimination of Vitamin C from the body by 2 to 3 times.**

Vitamin C Sources

- Citrus fruits, rose hips and acerola cherries
- Papayas, cantaloupes, strawberries
- Red and green peppers (the best!)
- Broccoli, Brussels sprouts
- Tomatoes, asparagus, parsley
- Dark leafy greens, cabbage
- Sprouted grains

Salicylate Concerns

Previously, bioflavonoids and rose hips were considered “sal-full” (or containing salicylates). New information on the Guai-Support website says that they are “OK, but there has been concern about contamination. However, there have been no confirmed reports of these blocking guaifenesin.”

Vitamin C Functions

- Formation & maintenance of collagen which is needed to give support and shape to the body, help wounds heal and maintain healthy blood vessels
- Needed to convert tryptophan to serotonin and tyrosine to dopamine and epinephrine.
- Stimulates adrenal function
- Helps thyroid production
- Aids in cholesterol metabolism (lowers blood cholesterol)
- Anti-oxidant; protects against free radicals

Vitamin C Functions

- Protects levels of vitamins E and A, as well as some of the B vitamins.
- Stimulates the immune system – May activate neutrophils and increase the production of lymphocytes.
- May help in the prevention and treatment of infections and other diseases.
- Helpful against bacterial, viral and fungal diseases.

Vitamin C Uses

- Common cold and flu
- Cancer therapy
- Adrenal and thyroid support
- Counteract side effects of cortisone drug therapy
- Inflammatory problems such as cystitis, bronchitis, prostatitis, bursitis, both osteo-and rheumatoid arthritis, and dermatitis.
- Back pain and pain from rigorous exercise

More Vitamin C Uses

- Burns, fracture healing, bedsores, wound healing, pre- and post-surgical use.
- Drug addiction withdrawal
- Constipation (natural laxative)
- Prevent cataract formation and glaucoma

Vitamin C Deficiency

- Early:
 - Poor resistance to infection
 - Slow wound healing
 - Easy bruising & tiny hemorrhages in the skin
 - Weakness, loss of appetite, poor digestion
- Later:
 - Nosebleeds
 - Sore & bleeding gums
 - Joint tenderness and swelling
 - Mouth ulcers
 - Loose teeth
 - Bone brittleness

Vitamin C Toxicity

“Vitamin C or ascorbic acid in its many forms of use is non-toxic. However, amounts over 10 grams (10,000 mg) a day are associated with some side effects such as diarrhea, nausea, and skin sensitivities.”

Elson M. Haas, MD

Recent Vitamin Research

- Vitamins do not exist as single components but as parts of a complex of compounds which work together synergistically.
- Most vitamins produce optimum results in the presence of “cofactors” such as trace minerals, enzymes and coenzymes, as well as other vitamins.

What does that mean?

**The Best Source
Of Vitamins
Will Always Be
Properly Prepared**

WHOLE FOODS!

The future of vitamins?

- It is estimated that there may be thousands of food-based substances essential to our health.
- How many more will eventually be “discovered”?
- What will be the effects of genetically modified food?
- What more will we learn about therapeutic dosages?
- How might genetic testing enable specific nutritional treatments?

What Are the Super Foods?

- Liver and organ meats
- Egg yolks
- Butter, cream
- Whole milk & cultured milk products (yogurt, kefir, cheese)
- Fish
- Shellfish (crab, scallops, shrimp, oysters)
- Cod liver oil, Brewer's yeast, Wheat germ
- Yellow & orange fruits and vegetables
- Leafy green vegetables
- Whole grains and sprouted grains
- Nuts, seeds, legumes
- Avocados, bananas, prunes
- Garlic, mushrooms, berries