



# The Christian and Health Series

Randall L. Braddom, M.D., M.S.

[randybraddom@gmail.com](mailto:randybraddom@gmail.com)



## 1 Corinthians 6:19-21 (KJV-R)

- Do you not know that your body is a **temple of the Holy Spirit**, who is in you, whom you have received from God? **You are not your own:** you were bought at a price. Therefore **honor God with your body.**



**Today's topic**

**Vitamins:  
Use and  
Abuse**



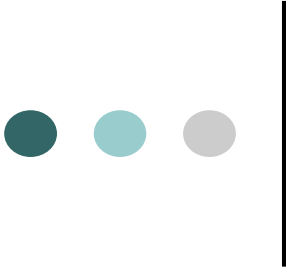
# Disclosure

- The opinions expressed in this lecture are my own and are not necessarily the opinion of the North Lake Presbyterian Church.
- These opinions are based on my own review of the literature, and should not necessarily be construed as scientific proof.



# What is a Vitamin?

- A chemical your body needs...but cannot make



# Vital Amines = Vitamine = Vitamin

- Cassimir Funk in 1912 formulated the concept of substances the body couldn't do without
- He found one of them (Vitamin B3 or niacin)
- He called these “vital amines,” then Vitamines
  - Ultimately the “e” was dropped when it was discovered that not all vitamins were amines



# Lind's experiment for scurvy

- 1747 Scottish physician did an experiment on the ship Salisbury
  - Divided sailors dying of scurvy into several groups and fed them different diets.
  - The ones whose diet included 2 oranges and a lemon every day recovered.
    - The others died
- This was reported to the British Admiralty
  - They ignored it



# Scurvy known since Hippocrates

- Bleeding gums, hemorrhage, and death
- It is estimated that at least a million people died from scurvy from 1600-1800
- Sir Richard Hawkins found that oranges and lemons cured it in 1593
- Despite many reports of cure with citrus, the British Admiralty did not require oranges, lemons and limes until 1795
- After this, British sailors were called “Limey’s”





# What in the Citrus Cured Scurvy?

- Many theories
- Confusion because most experimental animals (dogs, rats, mice, etc.) don't get scurvy
- It was discovered that guinea pigs got scurvy



# Professor Szent-Gyogyi

- 1930: Hungarian professor of medicinal chemistry at University of Szeged
- Discovered Ascorbic Acid
  - Proved that it prevented and cured Scurvy in Guinea Pigs
- Extracted large quantities of Vitamin C from Paprika
  - Couldn't get it from citrus because of the sugar content interfering with his chemical process

# Professor Szent-Gyogyi



- Won the Nobel Prize in 1934



# Vitamins come in 2 broad types

## ○ Fat-soluble

- Bind to fat and stored
- Less likely to become deficient
- More likely to build up to toxic levels
- **A, D, E, K**

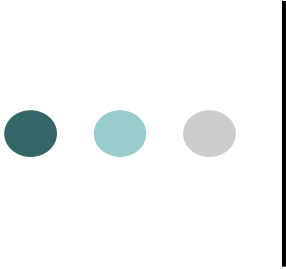
## ○ Water-soluble

- Get washed out of our bodies when in excess, and can become deficient more easily
- **B's and C**



# Vitamin Definitions

- **RDA**: Recommended Dietary Allowance
  - 1941
- **AI**: Adequate Intake
  - Used more by scientists and might replace RDA
- **UL**: Upper Level of Intake
  - The upper level that is believed to be safe for the average individual



## **Some essential dietary things are not vitamins (by convention)**

- Minerals such as calcium, iron, magnesium, etc.
- Essential fatty acids
- Essential amino acids



# There are 13 vitamins

- Many substances are sold as vitamins that are not really vitamins
- The real list is only 13
  - A
  - B1,2,3,5,6,7,9,12
  - C
  - D
  - E
  - K



# Vitamin A: Retinol

- **Oral: 900 mcg/day**
- Deficiency causes many eye problems including night blindness
- Retinoids are from meat and poultry, carotenoids are from plants
- Body converts the carotenoid called beta-carotene to retinol
- Main plant sources are carrots and sweet potatoes
- Deficiency is rare but can occur in some vegetarians





# B1 (Thiamine)

- 1.5 mg/day
- Beri-Beri
- Wernicke's encephalopathy
  - Confusion, dementia, abnormal eye movements
  - Mainly seen in alcoholism
- Korsakoff Syndrome
  - Dementia, hallucinations, confabulation
  - Mainly seen in alcoholism
- Thiamine found in fish, nuts, seeds, whole wheat bread, vegetables



# B2 (Riboflavin)

- 1.7 mg/day
- Skin problems
  - Stomatitis, glossitis
  - Anemia
- Wernicke's encephalopathy
  - Confusion, dementia, abnormal eye movements
- Deficiency mainly in severe hyponutrition and in Alcoholism
- Riboflavin found in many foods including
  - Dairy, eggs, green leafy vegetables, meat, legumes, milk, nuts



# B3 (Niacin)

- 20 mg/day
- Pellagra, dysesthesias, glossitis, stomatitis, vertigo
- Mainly found in severe malnutrition and alcoholism
- Found in
  - Fish
  - Chicken
  - Pork
  - Liver
  - Peanuts
  - Beef
  - Mushrooms
  - Peas
  - Sunflower seeds



# B5 (Pantothenic Acid)

- 10 mg/day
- Deficiency causes fatigue, abdominal pain, vomiting, insomnia and paresthesias
- Deficiency only in Alcoholism
- Sources include many foods:
  - Eggs
  - Yeast
  - Poultry
  - Meat
  - Seeds
  - Beans



# B6 (Pyroxidine)

- 2 mg/day
- Deficiency causes stomatitis, glossitis, irritability, depression, confusion, anemia
- Deficiency in alcoholism, celiac sprue disease, chronic isoniazid use
- Sources include many foods:
  - Sunflower seeds
  - Pistachio nuts
  - Fish
  - Turkey, Chicken
  - Pork
  - Prunes
  - Bananas
  - Avocadoes
  - Spinach



# B7 (Biotin)

- 300 mcg/day
- Deficiency causes change in mental status, muscle pain, hyperesthesias
- **Warning: Biotin can interfere with lab tests and cause erroneous values**
- Deficiency only in alcoholism
- Sources include many foods:
  - Mushrooms
  - Tuna
  - Turkey
  - Avocados
  - Swiss chard
  - Eggs



# B9 (Folic Acid)

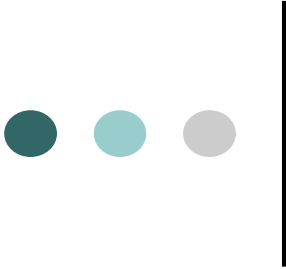
- 400 mcg/day
- Deficiency causes anemia, bone marrow suppression, glossitis, diarrhea
- **Critical in prevention of spina bifida**
  - **Incidence decreasing**
- Deficiency in Alcoholism, celiac, chronic sulfasalazine use
- Sources include many foods:
  - Leafy vegetables
  - Citrus
  - Beans
  - Cereals



# B12 (Cobalamin)

- 6 mcg/day
- Deficiency causes bone marrow suppression, pernicious anemia, glossitis, diarrhea, subacute combined degeneration, neuropathy
- Deficiency in vegetarians, alcoholism, celiac sprue, Crohn's disease, post-gastrectomy and ileal resection
- Sources include: meat, fish, poultry, eggs, dairy





**B4 (adenine), B8, B10  
(PABA), and B11**

**○ THESE ARE NOW  
KNOWN NOT TO BE  
VITAMINS**



# C (Ascorbic Acid)

- 60 mg/day
- Deficiency causes scurvy, ossification problems
- Seen with fruit deficient diet, ESRD, smokers
- Sometimes used in high dose to acidify urine
- Sources include:
  - Papaya
  - Bell peppers
  - Broccoli
  - Brussels sprouts
  - Strawberries
  - Pineapple
  - Oranges



# D (Ergocalciferol)

- 600 IU, >70 800 IU
- Deficiency causes rickets, osteomalacia
- Need 20 minutes of sunlight per day
- Deficiency in any malabsorptive state, dark skin in cold climate?, use of sunblock?
- Sources include:
  - Fatty fish
  - Fortified foods
  - Beef liver
  - Cheese
  - Egg Yolk
  - Sunlight



# E (Tocopherol)

- 30 IU/day
- Deficiency causes neuropathy, spinal cord degeneration, anemia
- Deficiency in any malabsorptive state
- Sources include:
  - Tofu
  - Spinach
  - Almonds
  - Sunflower seeds
  - Avocados
  - Shellfish
  - Fish
  - Plant oils
  - Pumpkin/squash



# K (Phylloquinone)

- Deficiency causes hemorrhagic disease, coagulopathy
- Deficiency in any malabsorptive disease or liver disease
- Used as Antidote to Coumadin (warfarin)
- Sources include:
  - Basil
  - Green leafy vegetables
  - Salad vegetables like onions and scallions



# Should we be taking Vitamins?

- Any malabsorptive condition: YES
- Known vitamin deficiency: YES
- Pregnancy: YES
  - Folic acid dramatically reduces neural tube defects such as spina bifida
- Macular Degeneration: YES
- Healthy Individuals: NO



# Recommendations for folic acid use in women

- 400-800 micrograms per day one month before pregnancy to 3 months after pregnancy.
  - Mayo Clinic
    - The neural tube closes in the fetus typically in the 3<sup>rd</sup> week of pregnancy
- In women of child bearing age not using birth control, some now recommend constant use of folic acid supplementation
  - Still more common in the poor...probably due to diet



# Vitamins in Macular Degeneration

- Age-related Eye Disease Study (AREDS) and AREDS2 showed that a combination of antioxidants C, E, lutein, zeaxanthin plus zinc and copper reduced progress of macular degeneration by about 25%
- This combination did not improve vision or preserve vision in normal individuals





# BREASTFED INFANTS AND VITAMIN D and IRON

- AAP recommends that infants breastfed get 400 IU/day of vitamin D until they begin using vitamin D-fortified milk.
- Iron... 1mg/kg/day from 4 months until introduction of iron-containing foods (usually at 6 months)
  - All infants should be screened for iron-deficiency anemia at 1 year



# Major studies have shown no benefit of MVT

- **Memory:** 6000 doctors over 65 yoa randomized into 2 groups
  - One group took Centrum Silver multivitamin
  - At end of 12 years...no memory problem differences in the two groups
- **Heart Health:** 1700 heart attack survivors divided into 2 groups
  - One group took multivitamins
  - At mean of 55 months:
    - No difference in the two groups in heart or stroke outcome



# Major studies of MVT have shown no benefit

- “We believe it is clear that vitamins are not working.”
  - Dr. Eliseo Guallar, Prof. of Epidemiology at Johns Hopkins Bloomberg School of Public Health
- Vitamin industry says:
  - “We all need to manage our expectations about why we’re taking multivitamins.”
    - Duffy MacKay

# Older Americans Hooked On Vitamins Despite Scarce Evidence They Work

More than half of Americans take vitamin supplements, including 68 percent of those age 65 and older.

By LIZ SZABO  
*Tribune News Service*

When she was a young physician, Dr. Martha Gulati noticed that many of her mentors were prescribing vitamin E and folic acid to patients. Preliminary studies in the early 1990s had linked both supplements to a lower risk of heart disease.

She urged her father to pop the pills as well: "Dad, you should be on these vitamins,



*Dreamstime | Tribune News Service*  
**Many older Americans take several kinds of vitamins, despite a lack of evidence that they prevent disease.**

deficiency. Oranges and limes were famously shown to prevent scurvy in vitamin-deprived 18th-century sailors. And research has long shown that populations that eat a lot of fruits and vegetables tend to be healthier than others.

But when researchers tried to deliver the key ingredients of a healthy diet in a capsule, Kramer said, those efforts nearly always failed.

It's possible that the chemicals in the fruits and vegetables



# Toxic effects of vitamins

- Beta-carotene (Vitamin A precursor) or placebo was given to 5,442 women smokers to see its effect on cancer
  - Beta-Carotene is a known anti-oxidant
  - Women who took the beta-carotene had **more lung cancer and more deaths**



# Hypervitaminosis

- Occurs with supplement use, but not from food
  - Babies overfed with carrots may turn yellow
- Vitamin overdoses reported to be 68,000 in USA (2014)
  - 73% of these were in children under 5 years of age



# Toxic effects of vitamin A

- Teratogenic
- Skin exfoliation
- Intracranial hypertension
- Liver damage
- Alopecia (baldness)
- Ataxia (loss of balance)
- And many other symptoms and conditions



# Toxic effects of Vitamin D

- Up to 2000 IU/day is usually safe
  - But some people take up to 50,000 IU/day
- Hypercalcemia
- Hyperphosphatemia
- Systemic calcification





# Toxic effects of Vitamin E

- Hemorrhagic stroke
- Interference with vitamin-K mediated coagulants



# Toxic effects of Vitamin B6

- Peripheral neuropathy
- Photosensitivity



## Mayo Clinic Recommendation on Vitamin use

- If you're generally healthy and eat a wide variety of foods, including fruits, vegetables, whole grains, legumes, low-fat dairy products, lean meats and fish, **you likely don't need supplements**



## **Mayo Clinic: Use vitamins or fortified foods in**

- Women who may become pregnant should get 400 micrograms a day of folic acid from fortified foods or supplements, in addition to eating foods that naturally contain folate.
- Women who are pregnant should take a prenatal vitamin that includes iron or a separate iron supplement.



## **Mayo Clinic: Use vitamins or fortified foods in**

- Adults age 50 or older should eat foods fortified with vitamin B-12, such as fortified cereals, or take a multivitamin that contains B-12 or a separate B-12 supplement.
- Adults age 65 and older who live in assisted living or nursing homes should take 800 international units (IU) of vitamin D daily to reduce the risk of fall fractures.

# Keep in mind that many processed foods have supplements added



Protein 8g

Vitamin A 6% • Vitamin C 0%

Calcium 30% • Iron 0%

Vitamin D 25%

\* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g
Protein		50g	65g

USE IF SEAL UNDER CAP IS MISSING



# Who should take vitamins

- Pregnant women
- Macular degeneration
- Those who are Vitamin deficient
- Some elderly people
- Some with gastric bypass





# Permissive Underfeeding

- Many animal studies show that those slightly underfed live the longest
- Underfeeding is taking in less than required calories intentionally
- There are underfeeding clubs for adults
- Some studies have shown that underfeeding helps those in ICUs



# Medication induced vitamin problems

- Chronic Metformin
  - Vitamin B12 deficiency
- Chronic Proton pump inhibitors...deficiency of:
  - B12
  - Calcium
  - Magnesium



## How can health food stores make claims about the effectiveness of their products when their claims have not been proven?

- Because dietary supplements are under the "umbrella" of **foods**, FDA's Center for Food Safety and Applied Nutrition (CFSAN) is responsible for the agency's oversight of these products. The Dietary Supplement Health and Education Act (DSHEA) of 1994, which amended the Federal Food, Drug, and Cosmetic Act, created a new regulatory framework for the safety and labeling of dietary supplements. **FDA is not authorized to review dietary supplement products for safety and effectiveness before they are marketed.**



# Vitamins and Supplements

- Are a \$37 billion industry in the USA



## 1 Corinthians 6:19-21 (KJV-R)

- Do you not know that your body is a **temple of the Holy Spirit**, who is in you, whom you have received from God? **You are not your own:** you were bought at a price. Therefore **honor God with your body.**



# FDA to more closely regulate Homeopathic Remedies

- FDA announced in December, 2017
  - Director Gottlieb said “In many cases, people may be placing their trust and money in therapies that may bring little to no benefit in combating serious ailments, or worse – that may cause significant and even irreparable harm because the products are poorly manufactured, or contain active ingredients that aren’t adequately tested or disclosed to patients.”