

# Nutrition and Immunity: 6

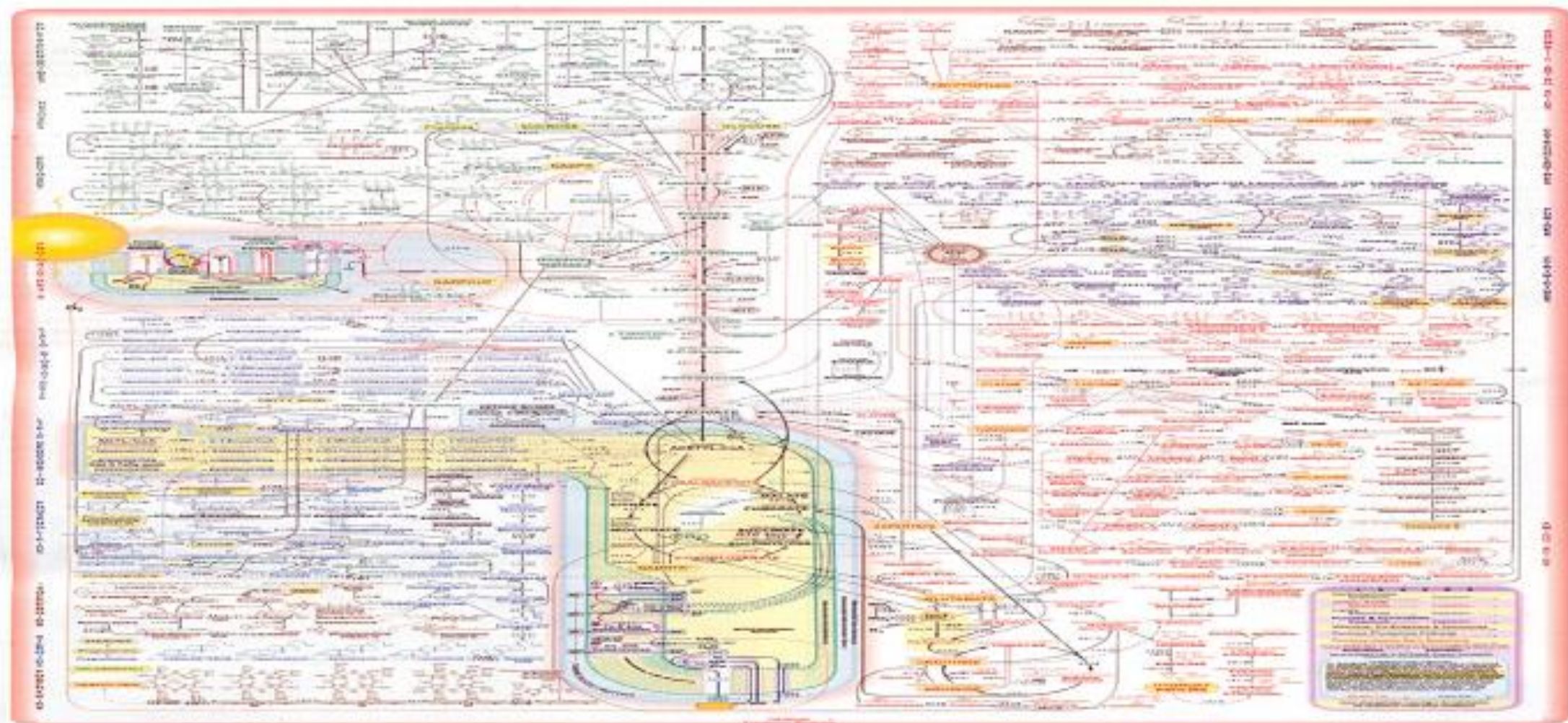
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# Metabolic Dysfunction: The Key to Health

- All cells need to:
  1. Produce energy
    - a. Micronutrients (vitamins, minerals, amino acids, fatty acids) needed to use protein, fat, carbohydrates
    - b. Macronutrients (protein, fat, carbohydrates) needed to provide energy
  2. Reproduce and repair itself
    - a. Micronutrients needed to use fats and proteins
  3. Get rid of waste
    - a. Micronutrients and Macronutrients needed

# Your Metabolism: Micronutrients are the catalysts



# Essential Metabolic Nutrients That Run Your Metabolism

## Vitamins

- Biotin
- Vitamin B1-Thiamin
- Vitamin B2- Riboflavin
- Vitamin B3- Niacin
- Vitamin B4- Choline
- Vitamin B5- Pantothenate
- Vitamin B6- Pyrodoxine
- Vitamin B9- Folate
- Vitamin B12- Cobalamin
- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K
- Vitamin C

## Minerals

- Calcium
- Chloride
- Chromium
- Cobalt
- Copper
- Iodine
- Iron
- Magnesium
- Manganese
- Molybdenum
- Phosphorus
- Potassium
- Selenium
- Sodium
- Zinc

# Essential Metabolic Nutrients

## Amino Acids(Proteins)

- Leucine
- Isoleucine
- Valine
- Methionine
- Threonine
- Tryptophan
- Phenylalanine
- Lysine

## Fatty Acids

- Omega 3 fat- alpha linolenic acid
- Omega 6 fat- linoleic acid

# Immune Function and Micronutrient Requirements Change over the Life Course

## Nutrients 2018, October 17

- **As humans age, the risk and severity of infections vary in line with immune competence according to how the immune system develops, matures, and declines.** Several factors influence the immune system and its competence, including nutrition. A bidirectional relationship among nutrition, infection and immunity exists: changes in one component affect the others. For example, distinct immune features present during each life stage may affect the type, prevalence, and severity of infections, while poor nutrition can compromise immune function and increase infection risk. Various micronutrients are essential for immunocompetence, particularly vitamins A, C, D, E, B2, B6, and B12, folic acid, iron, selenium, and zinc. Micronutrient deficiencies are a recognized global public health issue, and poor nutritional status predisposes to certain infections. **Immune function may be improved by restoring deficient micronutrients to recommended levels, thereby increasing resistance to infection and supporting faster recovery when infected.**



## **Impact of Micronutrients on the Immune Response of Animals**

**Annu Rev Anim Biosci: 2018 Feb 15;6:227-254**

- Vitamins and minerals (micronutrients) play an important role in regulating and shaping an immune response. Deficiencies generally result in inadequate or dysregulated cellular activity and cytokine expression, thereby affecting the immune response. Decreased levels of natural killer, granulocyte, and phagocytic cell activity and T and B cell proliferation and trafficking are associated with inadequate levels of micronutrients, as well as increased susceptibility to various adverse health conditions, including inflammatory disorders, infection, and altered vaccine efficacy.

# Contribution of selected vitamins and trace elements to immune function

Annals of Nutrition and Metabolism: 2007; 51(4): pp.321-23

- Adequate intakes of vitamins and trace elements are required for the immune system to function efficiently. Micronutrient deficiency suppresses immune functions by affecting the innate T-cell-mediated immune response and adaptive antibody response, and leads to dysregulation of the balanced host response. This increases the susceptibility to infections, with increased morbidity and mortality. In turn, infections aggravate micronutrient deficiencies by reducing nutrient intake, increasing losses, and interfering with utilization by altering metabolic pathways.
- Antioxidant vitamins and trace elements (vitamins C, E, selenium, copper, and zinc) counteract potential damage caused by reactive oxygen species
- Vitamin A deficiency impairs both innate immunity (mucosal epithelial regeneration) and adaptive immune response to infection resulting in an impaired ability to counteract extracellular pathogens. Vitamin D deficiency is correlated with a higher susceptibility to infections due to impaired localized innate immunity and defects in antigen-specific cellular immune response



# Top 10 Purchased Items in Grocery Stores

1. Soda
2. Milk
3. Bread
4. Beer
5. Salty Snacks
6. Cheese
7. Frozen entrees
8. Cold cereal
9. Wine
10. Cigarettes

*Grocery Store Index 2016*

**Priority is fast, tasty and convenience**





# Processed Foods are the Number 1 Problem

- Main Ingredients:
    - White flour, or other processed flour
    - High omega 6 vegetable oils
    - Sugar in many forms
    - Preservatives
    - Colors and flavors
- ~ 70% of American diet is Processed Foods
- Very few micronutrients/highly toxic





# Micronutrient Dense Whole Foods



# Vegan Diets?

- Vegetarian or vegan?
- No processed items
- Tend to be carbohydrate based
- Where to get B12, K2, A, zinc, and long chained omega 3's EPA and DHA
- Amino acid profile of plant foods is inferior to animal foods, food combinations can help (rice and beans)





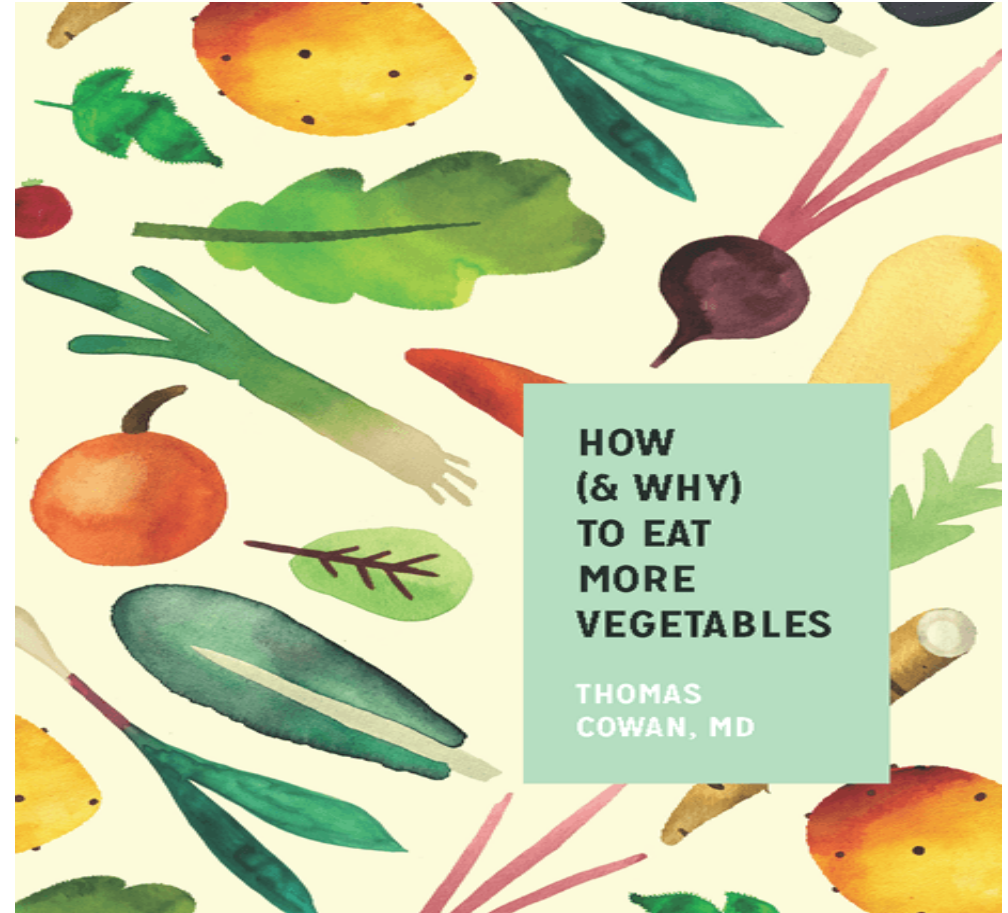
# Immune Supporting Diets

- At least 50% veggies (above ground preferably, below ground if no metabolic damage like obesity , diabetes, high triglycerides, etc.
- Protein sources (preferably wild or pastured)
- Healthy fats supplying the fat soluble vitamins A, D, and K
- Whole fruits
- Healthy plant fats: nuts, seeds, avocados, etc.
- Grains and beans sparingly if prepared correctly by sprouting and/or fermenting



# The Importance of Vegetables

- Consume a variety of types and colors
- Colors are nutrients for animals but are produced by plants to attract insects for reproduction
- Colors are produced by chlorophyll, carotenoids, polyphenols, etc.
- Red, blue, and purple plants contain anthocyanins
- Orange and yellow contain carotenoids
- White plants contain polyphenols like anthoxanthin
- Green plants have chlorophyll which is a major detoxifier for humans and contain magnesium
- Book on [drcowansgarden.com](http://drcowansgarden.com)





# Perennials and Wild Vegetables

- Micronutrient dense giants
- Perennials do not produce seeds so they live many years
- Perennials produce rhizomes (root) which causes a new plant to grow (ginger and turmeric)
- Produce food year after year with little work and are very hardy
- Ashitaba and tree collards
- Wild vegetables include burdock root, dandelion, and nettles
- These micronutrient powerhouses are less sweet and slightly bitter compared to their cultivated cousins



# Is There A Difference?

**Polyculture**



**Monoculture**





# Is There A Difference?

**Pastured**



**Feedlot**





# Is There A Difference?

**Pastured**



**Caged**





# Is There A Difference?

**Wild**



**Farmed**





# Is There A Difference?

**The Bread of Yesterday**



**The Bread of Today**





# Preparation Is the Key

- Modern Processing:

Stone grinding, soaking, and fermenting has been replaced by high temperature drying, chemical extraction, added preservatives, added synthetic vitamins and minerals, and added refined ingredients.



# Sourdough Culture



# Bread Comparison

## Sara Lee 100% Whole Wheat

Whole Wheat Flour, Water, **High Fructose Corn Syrup**, Wheat Gluten, Sugar, Yeast. Contains 2% or less of each of the following: Soybean Oil, Calcium Sulfate, Salt, Dough Conditioners (May Contain One or More of the Following: Mono- and Diglycerides, Ethoxylated Mono-and Diglycerides, Sodium Stearoyl Lactylate, Calcium Peroxide, Datem, Ascorbic Acid, Azodicarbonamide, Enzymes), Wheat Bran, Guar Gum, Distilled Vinegar, Calcium Propionate (Preservative), Yeast Nutrients (Monocalcium Phosphate, Calcium Phosphate, Ammonium Phosphate), Corn Starch, Vitamin D3, Soy Lecithin, Milk, Soy Flour.



## Ezekiel 4:9® Sesame Sprouted Grain Bread

100% Flourless, Complete Protein

*Item #123*

Serving Size:	1 Slice (34g)	Potassium:	75mg
Calories:	80	Carbohydrates:	14g
Total Fat:	0.5g	Dietary Fiber:	3g
Cholesterol:	0mg	Protein:	4g
Sodium:	80mg	Net Wt:	24 oz (680g)

**INGREDIENTS:** Organic Sprouted Wheat, Filtered Water, Organic Sprouted Barley, Organic Sprouted Millet, Malted Barley, Organic Sprouted Lentils, Organic Sprouted Soybeans, Organic Sprouted Spelt, Fresh Yeast, Organic Wheat Gluten, Sea Salt. Rolled in Organic Unhulled Sesame Seeds.



# The New Farm

- Farming techniques
  - chemical fertilizers*
  - pesticides*
  - genetic engineering*
  - polyculture to monoculture*



# GMO (GE) crops

- \* First introduced in 1996
- No human studies
- Corn, soybeans, canola, Sugar beet, alfalfa, cotton are major crops
- Wheat? GE wheat found in Oregon and Washington
- Most GE crops have been modified to be resistant to herbicides like glyphosate or glufosinate
- Glyphosate disrupts shikimate pathway in plants and bacteria
- Glyphosate was patented as an antibiotic in 2010
- Banned in many industrialized countries
- Patented



# GMO Wheat

- **USDA investigates unapproved GMO wheat found in Washington state**

- Reuters June 2019
- 3 Min Read
- CHICAGO (Reuters) - The U.S. Department of Agriculture has confirmed the discovery of unapproved, genetically modified (GM) wheat plants growing in an un-planted agricultural field in Washington state.
- There was no evidence the wheat had entered the food supply, the USDA's Animal and Plant Health Inspection Service said in a statement on Friday. The wheat is resistant to glyphosate, a widely used herbicide commonly referred to as Roundup.
- There are currently no commercially approved genetically modified wheat varieties, and incidences of rogue plants are rare. However, unapproved plants were found in 2018 in Alberta, Canada, in 2016 in Washington state, in 2014 in Montana and in 2013 in Oregon.

- **Genetically Altered Wheat Flagged; Thailand Detects Shipment Not Cleared for Commercial Sales**

- Oct 18, 1999
- Spokesman Review (Spokane, WA) | October 14, 1999 | Hannelore Sudermann, Staff writer
- Scientists in Thailand claim they found genetically modified wheat in a recent grain shipment from the Pacific Northwest.
- The discovery may jeopardize Northwest wheat exports at a time when a growing number of foreign governments and consumers are rejecting genetically altered products.
- "This is not good for the two countries at all," said Prakarn Virakul, minister for agriculture with the Royal Thai Embassy in Washington, D.C.
- The Thai government hasn't said what it plans to do with the suspect shipment. But the country wants to work with U.S. grain marketers to ensure that genetically modified wheat, called transgenic wheat, isn't shipped again, he said.
- The news shocked Northwest agricultural interests because transgenic wheat hasn't been approved for commercial sales and is grown only in test plots.

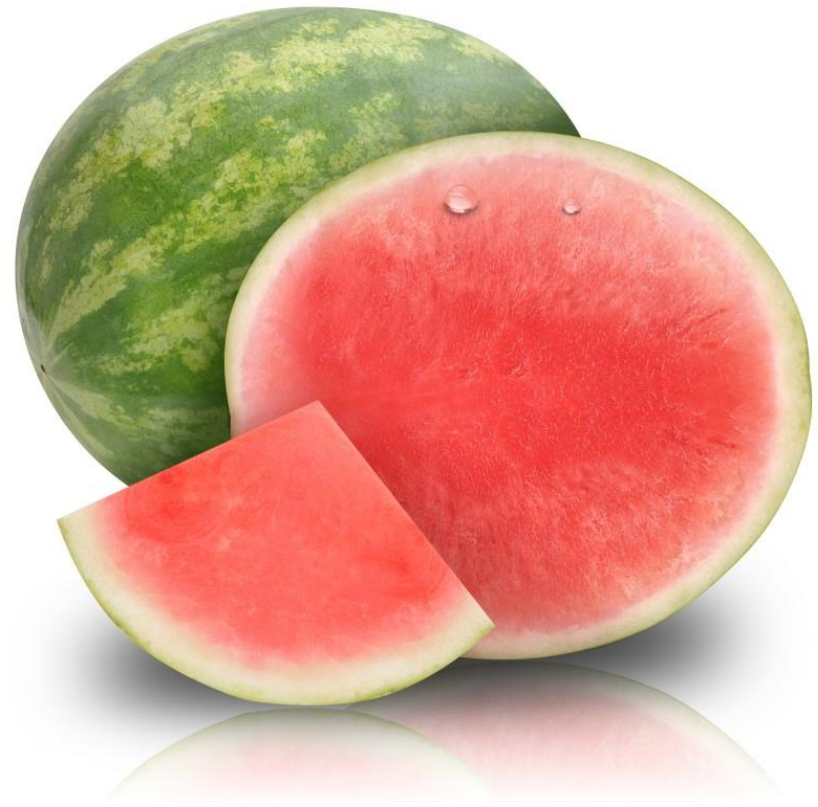


# Improvement?

- Hybridization

Breed out characteristics we don't want (bitterness, seeds, tough skins, etc.) for characteristics we do want (sweetness, size, high yield)

*We have bred out many of the beneficial nutrients.*



# Pastured

- You are what you eat and what it eats
- Healthier animals produce healthier dairy and meat
- Grass finished and pastured has more omega 3 fats, vitamins, and antioxidants (carotenoids)
- Grain feeding herbivores can create health issues in the animal
- Feedlot and confined animals need more antibiotics





# Pastured

- Commercial feed has pesticides
- Growth Hormones in cows
- Breeding practices to get more meat, dairy, and eggs
- Organic animal products over organic plant foods?



# Seafood

- Farmed fish topped farmed beef in production in 2012
- Alaskan over wild over farmed
- Farmed fish tend to have fewer omega 3 fats and more omega 6 fats (grain feeding)
- Depleting smaller fish like anchovies and sardines
- Mercury? Selenium to the rescue
- All seafood tends to be mineral dense





# Farm Raised

- Higher fat (mostly omega 6), lower protein
- “Wild” labeling is only half truth as many are born and partially raised in hatcheries
- Studies show higher levels of PCB's (polychlorinated biphenyls) and other contaminants in farmed fish due to fishmeal
- Sea lice treated with pesticides or pressure washing
- GMO fish





# What To Do

- Buy local (Farmers Markets)
- Grow your own
- Choose fresh or frozen
- Choose organic (animal/plant)
- Choose pastured
- Confirm if it is wild
- Proper storing techniques
- Better preparation and cooking techniques





# Why Supplements MAY Be Warranted

## Farming Techniques

Monoculture vs. Polyculture  
Quality vs. Quantity

## Food Quality

### Food Anti-nutrients

phytates, enzyme inhibitors  
(reduced by soaking, sprouting,  
fermenting)

## Food Processing

-Nutrients removed

## Food Preservation

Many preservatives can  
block nutrient absorption

## Storage

Loss during storage



# Why Supplements May Be Warranted- cont.

## Genetics

e.g. MTHFR mutation

## Gender

e.g. male/zinc, female/mag.

## Current health status

e.g. no gall bladder

## Lifestyle Habits

e.g. sun avoidance,  
personal tastes, diet choice

## Exercise (Stress)

## Medication Interaction

## Diagnosed deficiency (labs)

e.g. Vit. D, B12



# Why Supplements May Not Be Warranted

## Current health condition-

- severe kidney disease (minerals)

## Medication Interaction-

- blood thinners (vitamin K)
- potassium sparing diuretics

## Allergy

- iodine
- milk, wheat, etc

## High Lab Value

- vitamin D





# Medication Interactions

## Acid Reflux drugs-

zinc, magnesium, B12,  
folate, etc

## Anti-Hypertensives-

potassium, magnesium,  
zinc, B vitamins, Vit. C

## Cholesterol reducers (statins)-

CoQ10, vitamin K2

## Antibiotics-

Most minerals, B vitamins

## Oral hypoglycemics-

B12, folate, magnesium

## Hormone replacement-

B6, folate, B12, magnesium



# B vitamins

- B6, B9, and B12 are synergistic
- B6-pyridoxal-5-phosphate
- B9-methylfolate over folic acid (MTHFR)
- B12- methylcobalamin or adenosylcobalamin over cyanocobalamin
- Get b12 levels checked
- Sublingual forms are safest bet





# Vitamin C

- Formation of collagen (bone)
- Formation of carnitine
- Formation of norepinephrine, adrenaline,
- Formation of peptide hormones (insulin, leptin), and bile acid
- Water soluble antioxidant
- Formation of immune cells
- Anti-viral
- Humans are one of a few species that cannot make vitamin C from glucose



# Vitamin C

- Whole food sources are best to get full spectrum vitamin C
- Mineral ascorbates work well
- Freeze dried powder supplements of:
  - camu camu
  - acerola
  - amla berry

Taken to bowel tolerance





# Ascorbates



# Vitamin K2 and Vitamin D

- Vitamin D levels should be checked to figure out optimal dose
- Choose vitamin D3 (cholecalciferol) over vitamin D2 (ergocalciferol)
- An upper dose of K2 has not been established, no known toxicity
- Work with physician if on blood thinners





# Magnesium

- Involved in over 1,000 enzymatic reactions
- Critical to balance with calcium
- “relaxing” mineral
- Magnesium required for chlorophyll production  
(dark greens)
- 200-800 mgs/ daily  
(bowel tolerance)
- Malate, taurate, and glycinate are best forms
- Magnesium oxide poorest form



# Mushrooms

- Mushrooms have many immune enhancing functions:

Shitake

Maitake

Turkey tail

Reishi

Lion's mane



# Conclusion

- Focus should be on eating right first
- Go for food sources first
- Be aware of supplement interactions
- Watch combinations of multiple supplements: A good multi may provide everything
- Get the right form
- Get a good brand:
  - Thorne
  - Pure Encapsulations
  - Designs for Health
  - Biotics Research
  - Jarrow