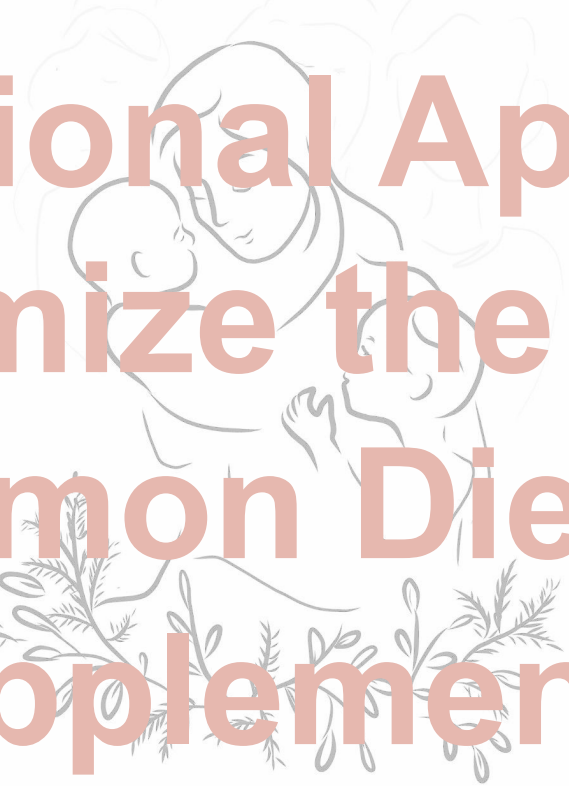
A Functional Approach to Optimize the Use of Common Dietary Supplements

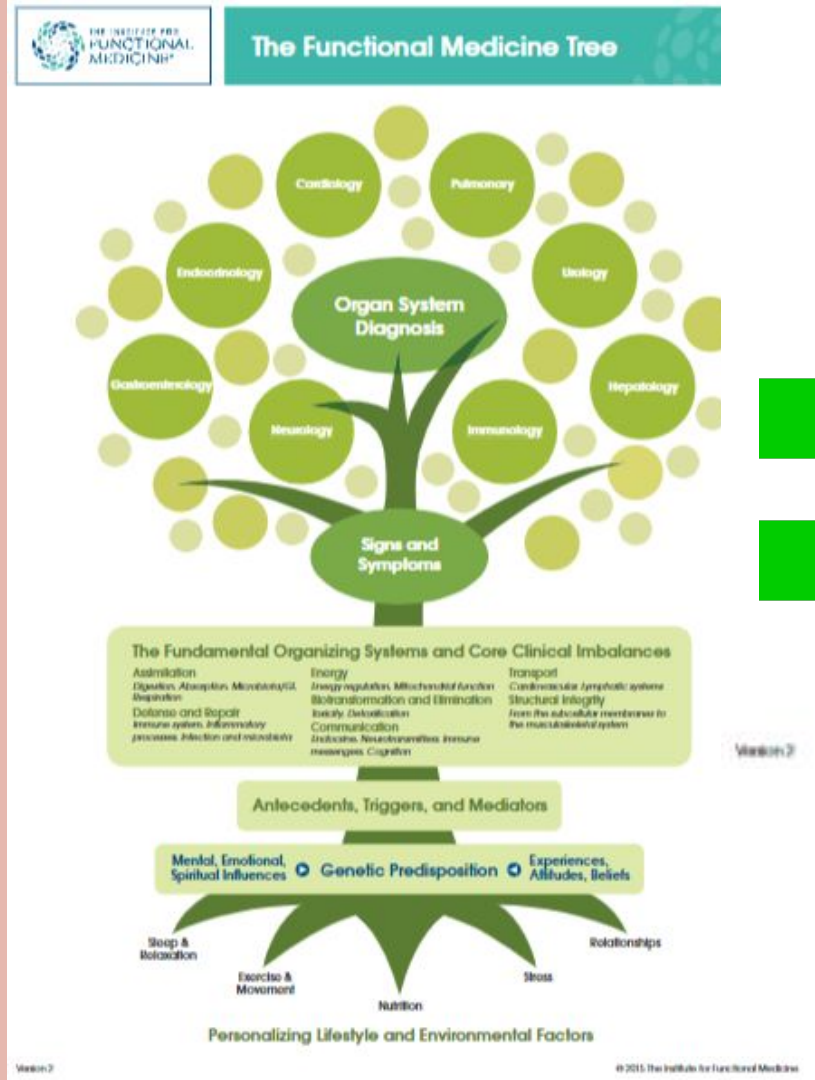


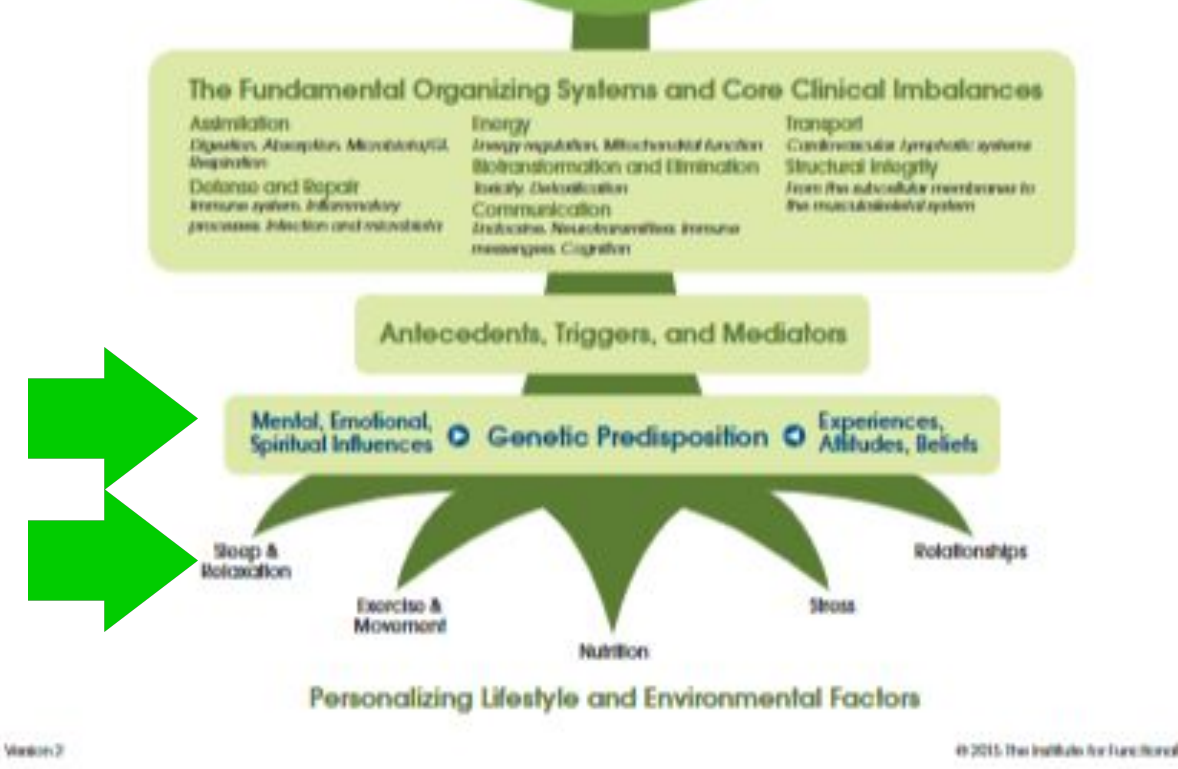
Amy Sapola, Pharm.D., FAIHM, IFMCP

www.amysapola.com

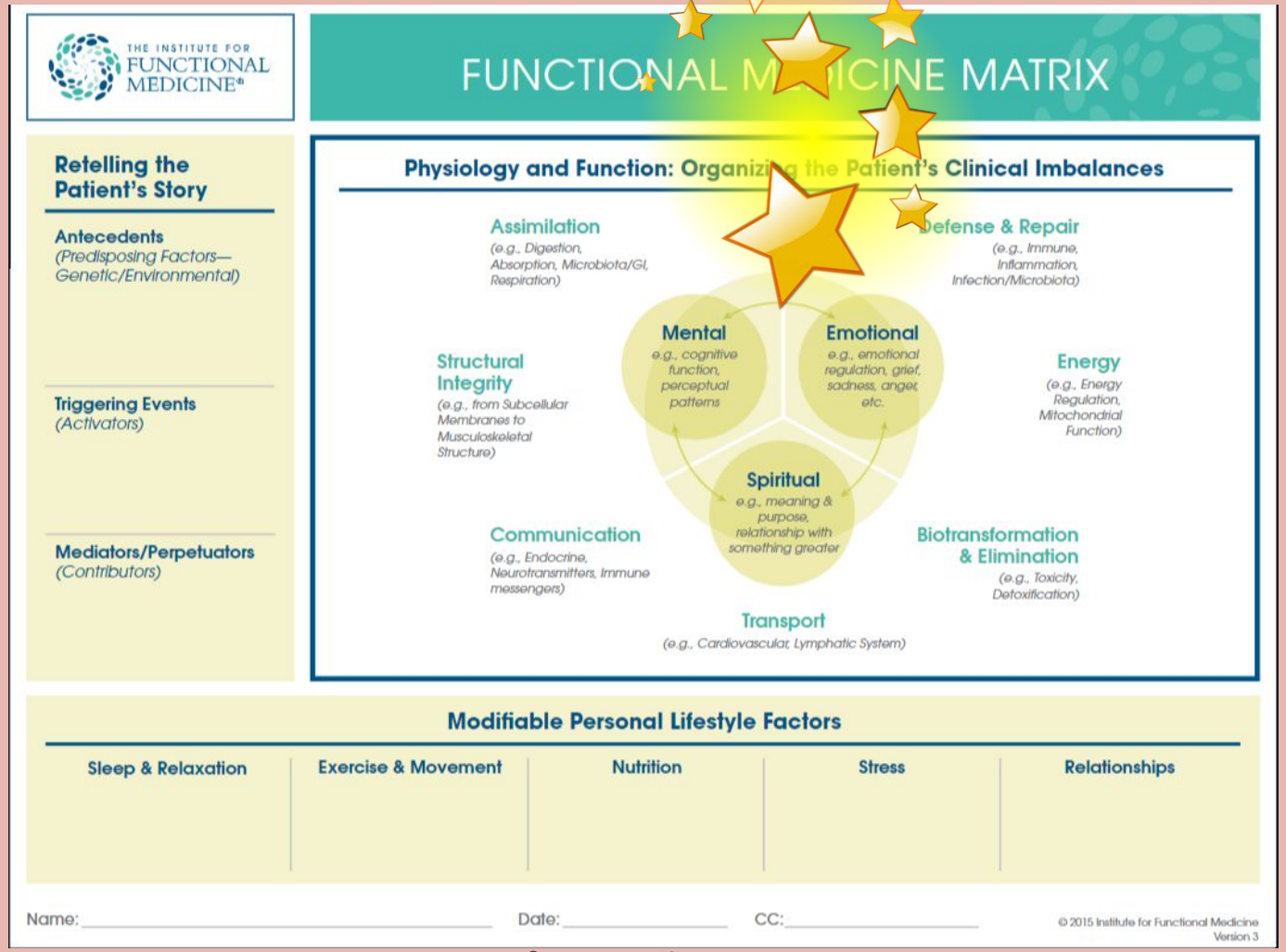
Copyright 2020, Sapola Integrative Wellness, LLC

No Financial Disclosures



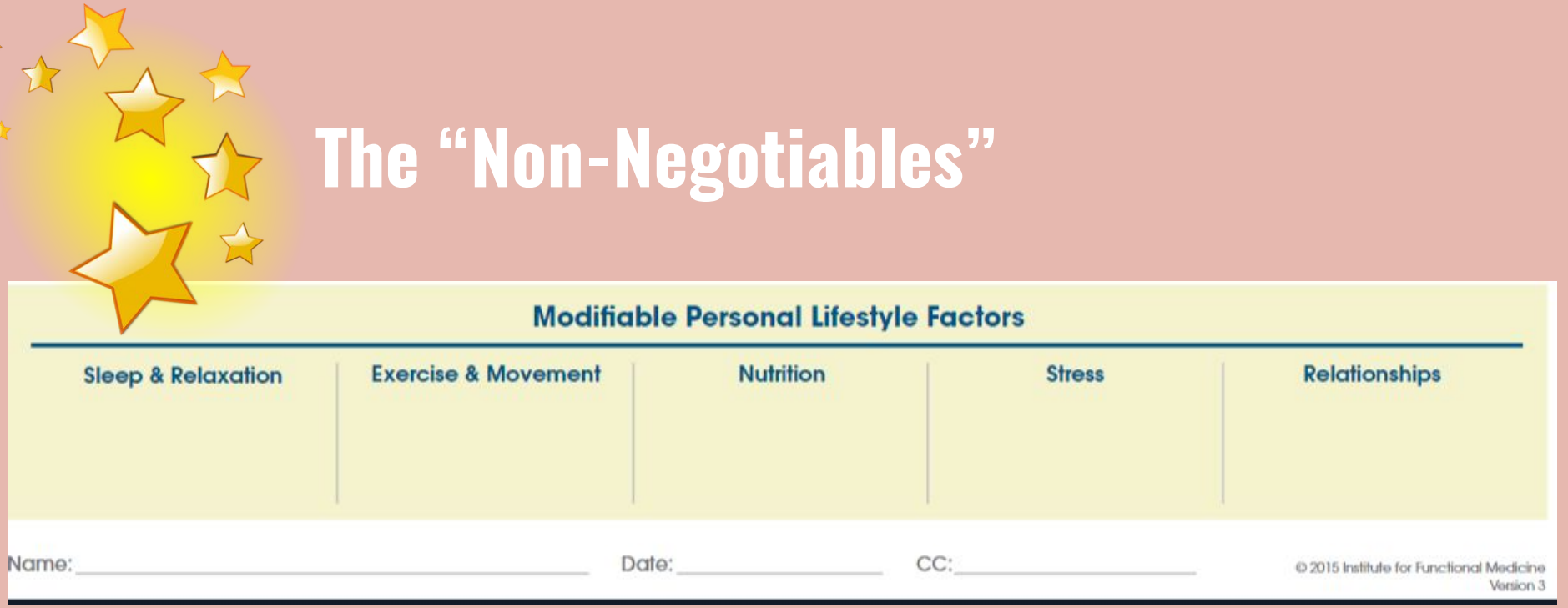


Source: www.ifm.org



Source: www.ifm.org

The “Non-Negotiables”



Modifiable Personal Lifestyle Factors

Sleep & Relaxation	Exercise & Movement	Nutrition	Stress	Relationships

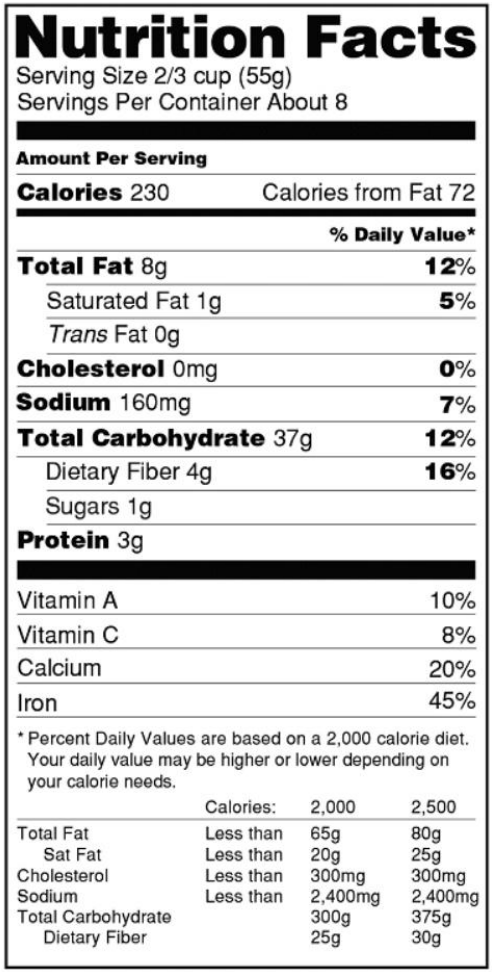
Name: _____ Date: _____ CC: _____

© 2015 Institute for Functional Medicine
Version 3

Source: www.ifm.org

Nutrition & Supplement Facts Change…

Before



Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily value 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

Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

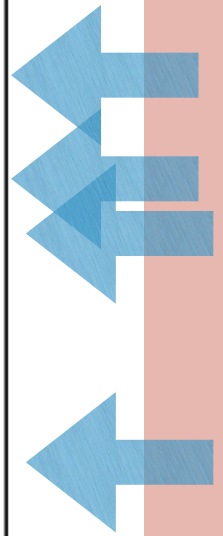
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

After

Supplement Facts

Serving Size 1 Gelcap
Servings Per Container 100

	Amount Per Serving	% Daily Value
Vitamin A (as retinyl acetate and 50% as beta-carotene)	900 mcg	100%
Vitamin C (as ascorbic acid)	90 mg	100%
Vitamin D (as cholecalciferol)	20 mcg (800 IU)	100%
Vitamin E (as dl-alpha tocopheryl acetate)	15 mg	100%
Thiamin (as thiamin mononitrate)	1.2 mg	100%
Riboflavin	1.3 mg	100%
Niacin (as niacinamide)	16 mg	100%
Vitamin B_6 (as pyridoxine hydrochloride)	1.7 mg	100%
Folate	400 mcg DFE (240 mcg folic acid)	100%
Vitamin B_{12} (as cyanocobalamin)	2.4 mcg	100%
Biotin	3 mcg	10%
Pantothenic Acid (as calcium pantothenate)	5 mg	100%

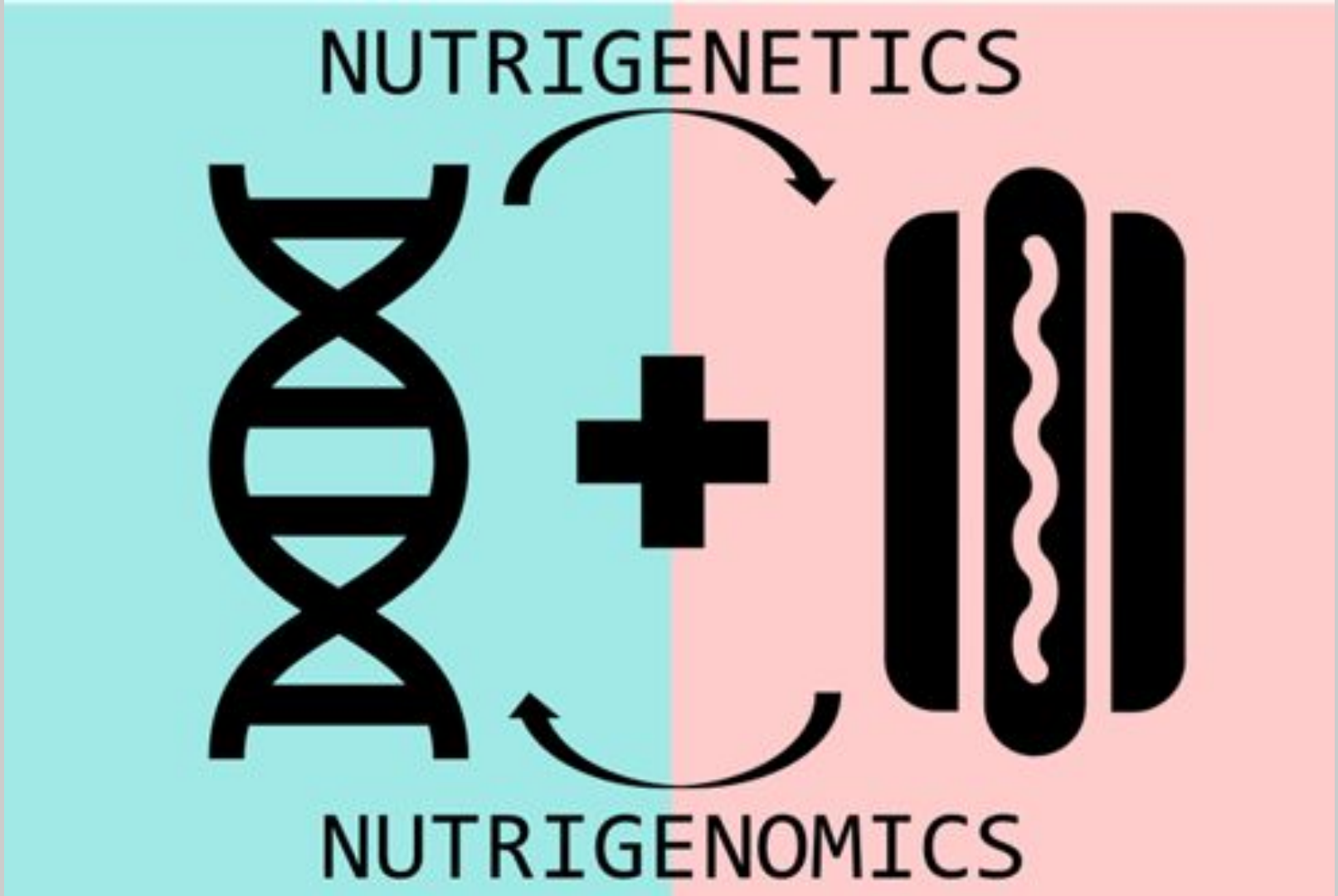


Other ingredients: Gelatin, lactose, magnesium stearate, microcrystalline cellulose, FD&C Yellow No. 6, propylene glycol, preservatives (propylparaben and sodium benzoate).

- Recommended Dietary Allowance (RDA): Average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%–98%) healthy individuals; often used to plan nutritionally adequate diets for individuals.
- Adequate Intake (AI): Intake at this level is assumed to ensure nutritional adequacy; established when evidence is insufficient to develop an RDA.
- Tolerable Upper Intake Level (UL): Maximum daily intake unlikely to cause adverse health effects.
- Daily Value (DV): Developed to help consumers compare the nutrient contents of products within the context of a total diet. **The DV is for adults and children age 4 and older.**

Source: Dietary Fact Sheets ads.od.nih.gov/factsheets

Nutrigenetics and Nutrigenomics


NUTRIGENETICS
NUTRIGENOMICS

HEALTH
+
ANCESTRY
Welcome to you
saliva collection kit

"There is increasing evidence that genome instability, in the absence of overt exposure to genotoxicants, is itself a sensitive marker of nutritional deficiency."

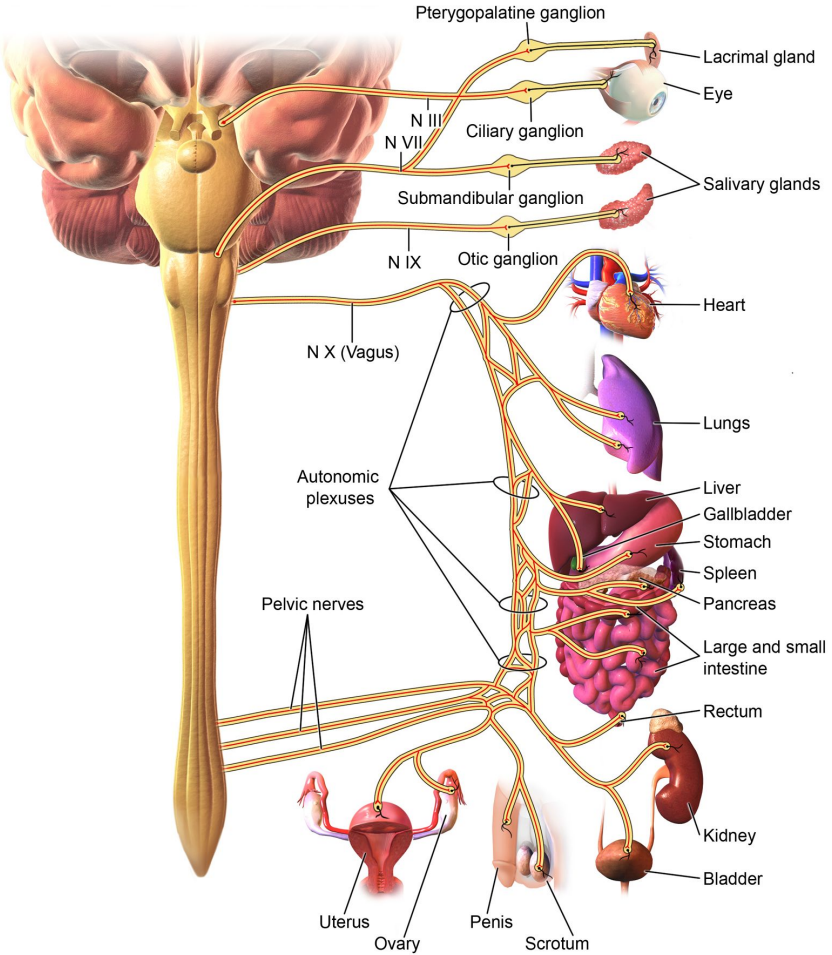
–Michael Fenech, CSIRO Genome Health and Nutrigenomics Laboratory

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2137135/

Optimizing Vitamins, Minerals, and Supplements

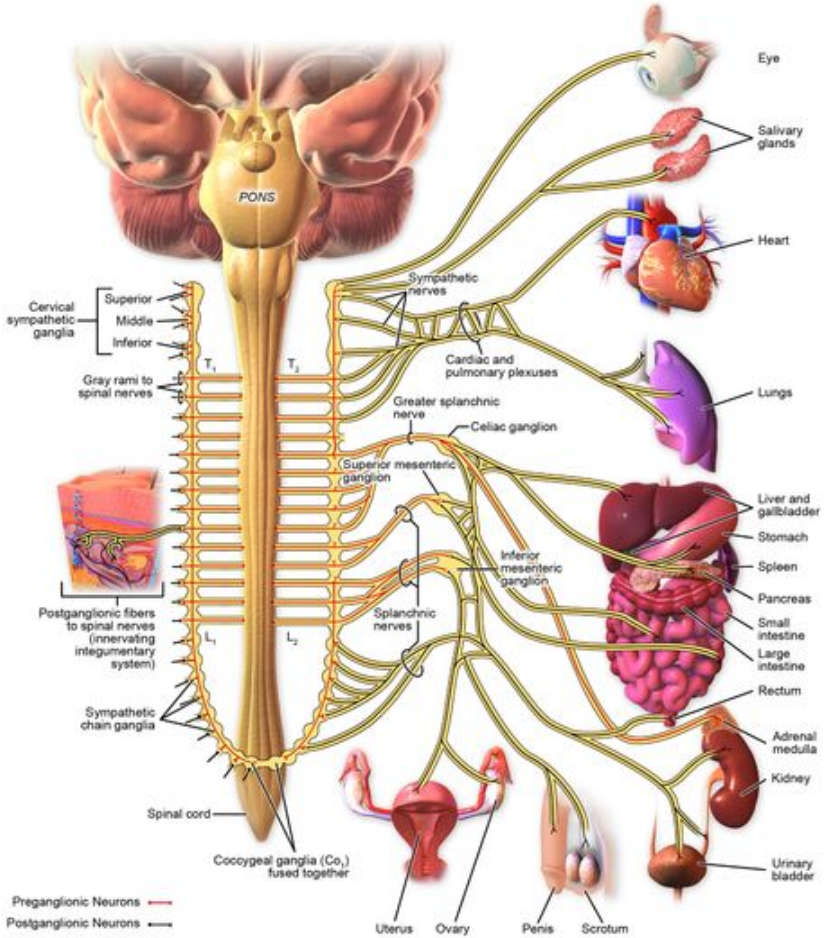
What does "Nourish" mean to you?

Mindset & Digestion: Stress and Anxiety



Parasympathetic Innervation

VS.

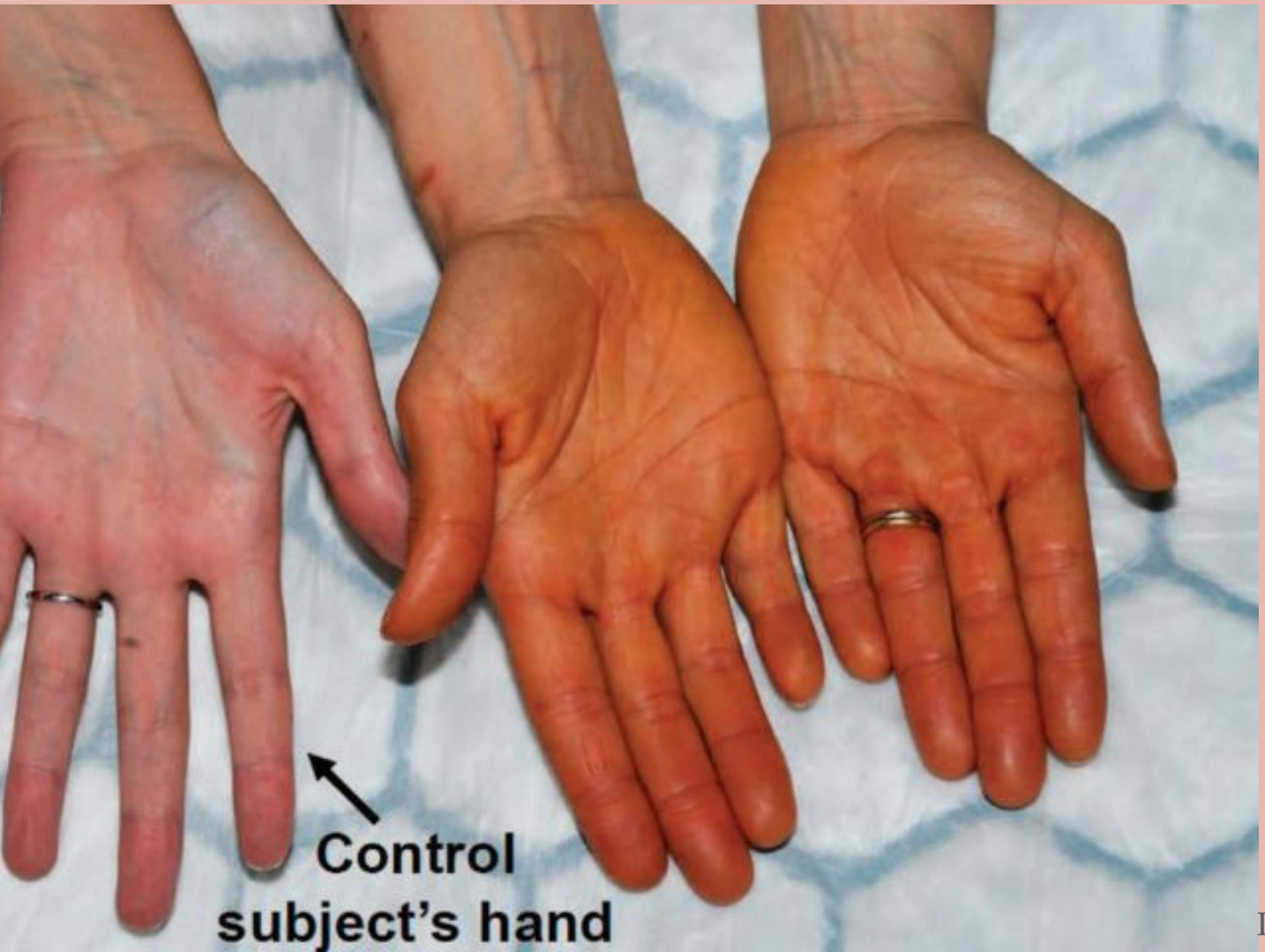


Sympathetic Innervation

Photo Credit: Google Images (https://www.myfunctionalsportsnutrition.com/why-the-standard-american-diet-causes-fatigue/)

Vitamin A

- Vision, **immune function**, thyroid function, reproduction, and cellular communication
- Two forms
  - Animal Derived or Synthetic (**preformed**: retinol, retinyl ester))
    - Liver, shrimp, eggs, full fat dairy, fortified cereals (synthetic)
  - Plant Derived (**provitamin A**: beta-carotene)
    - Body only converts to active form when needed
    - Not associated with birth defects
    - Yellow and orange vegetables (ex. carrots, pumpkin), leafy green vegetables, tomatoes, and fruit (cantaloupe)
      - Increase absorption by eating with fat
      - Lutein, lycopene, zenaxanthin are not converted to Vitamin A
    - BCMO1 gene mutation
- Drug interactions: Orlistat (deficiency), Acitretin and Bexarotene (excess)



Cartoenoderma

Photo credit: Google images

Supplement Facts

Serving Size 1 Gelcap
Servings Per Container 100

	Amount Per Serving	% Daily Value
Vitamin A (as retinyl acetate and 50% as beta-carotene)	900 mcg	100%
Vitamin C (as ascorbic acid)	90 mg	100%
Vitamin D (as cholecalciferol)	20 mcg (800 IU)	100%
Vitamin E (as dl-alpha tocopheryl acetate)	15 mg	100%
Thiamin (as thiamin mononitrate)	1.2 mg	100%
Riboflavin	1.3 mg	100%
Niacin (as niacinamide)	16 mg	100%
Vitamin B_6 (as pyridoxine hydrochloride)	1.7 mg	100%
Folate	400 mcg DFE (240 mcg folic acid)	100%
Vitamin B_{12} (as cyanocobalamin)	2.4 mcg	100%
Biotin	3 mcg	10%
Pantothenic Acid (as calcium pantothenate)	5 mg	100%

Other ingredients: Gelatin, lactose, magnesium stearate, microcrystalline cellulose, FD&C Yellow No. 6, propylene glycol, preservatives (propylparaben and sodium benzoate).

Vitamin C

- Increases Iron absorption from supplements & plant based irons
- Absorption is dose dependent (70-90% at 180mg/day, 50% at 1g/day)
- Calcium ascorbate (Ester C) vs. ascorbic acid vs. ascorbic acid with bioflavonoids
  - No difference in plasma or urinary excretion
  - Calcium ascorbate higher concentration in leukocytes after 24 hours
- “Natural” Rose Hips in same form as synthetic (L-ascorbic acid), benefit additional bioflavonoid compounds
- Sodium ascorbate “buffered” less acidic but caution in patients w/ sodium restriction
- Liposomal formulations: increased absorption
- Based on cost and efficacy ascorbic acid is preferred

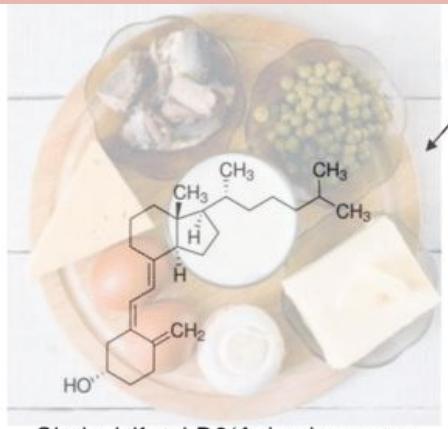
Vitamin C

- Antioxidant
  - Vitamin C levels decline during periods of illness, emotional and physical stress
  - Role in cancer? Plasma concentrations lower in people with cancer vs. controls
    - Nurses Health Study: post-menopausal women with family hx of breast cancer
      - Highest intake (205mg/day) vs. lowest (70mg/day) associated with 63% lower risk of breast cancer
- Treatment of colds, bronchitis, upper respiratory tract infections
  - Prophylaxis does not reduce incidence of cold (only high physical stress such as marathon runners or extreme cold weather exposure)
  - Taken at onset of cold did not effect duration or severity

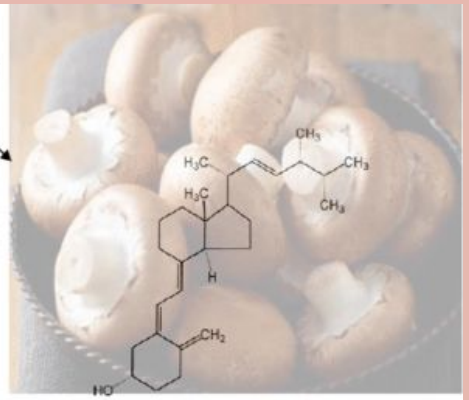
Vitamin C

- Important in synthesis of collagen
  - Health of skin, connective tissue, gums and wound healing
  - 300 mg four times daily after surgery
- Smokers
  - RDA Men 90mg/Women 75mg
    - Consume an additional 35 mg/day
- Food Sources: Citrus fruit, peaches, peppers (red>green), strawberries, broccoli
  - Vitamin C levels decrease with cooking (destroyed by heat) and long storage
- Long term use of **chewable** Vitamin C can erode tooth enamel
- UL: Unabsorbed Vitamin C = Osmotic effect= Diarrhea/Cramping

ALL I NEED IS
VITAMIN
sea



Diet or Dietary Supplements



Cholcalciferol D3(Animal sources, dairy, eggs, fish)

Ergocalciferol (Plant sources peas, nuts, seeds, mushrooms)

Liver hydroxylation (CYP2R1; CYP27A1)

Liver/Kidney

Calcidiol (25-hydroxy vitamin D)

1,25-hydroxy vitamin D2

Kidney Hydroxylation (CYP27B1)

1,25-hydroxy vitamin D (calcitriol; active D3)

24,25-hydroxy vitamin D

Vitamin D

- Two forms
  - Ergocalciferol (D2) from Yeast & Mushrooms
    - Vegan
  - Cholecalciferol (D3) synthesized from lanolin or fish liver oil
- Food sources: Fatty fish, fish liver oils, and eggs. Fortified cereals, milks, orange juice. Mushrooms exposed to light (D2).
- Better absorption with fat
- Dose depends on blood level (>1000 IU/day increase by 1 nmol/L per 40 IU)
  - Lab: Serum 25-Hydroxyvitamin D
    - Deficient if < 12 ng/mL (<20 nmol/L), Optimal >30-50 ng/mL, Adverse effects possible >50 ng/mL (>125 nmol/L)
  - Usual dose 400 IU to 5000 IU daily

Upper Limit of Vitamin D Intake

Age	Male	Female	Pregnancy	Lactation
0–6 months	1,000 IU (25 mcg)	1,000 IU (25 mcg)		
7–12 months	1,500 IU (38 mcg)	1,500 IU (38 mcg)		
1–3 years	2,500 IU (63 mcg)	2,500 IU (63 mcg)		
4–8 years	3,000 IU (75 mcg)	3,000 IU (75 mcg)		
9–18 years	4,000 IU (100 mcg)	4,000 IU (100 mcg)	4,000 IU (100 mcg)	4,000 IU (100 mcg)
19+ years	4,000 IU (100 mcg)	4,000 IU (100 mcg)	4,000 IU (100 mcg)	4,000 IU (100 mcg)

Source: Office of Dietary Supplements Fact Sheet, Vitamin D

Supplement Facts

Serving Size 1 Gelcap
Servings Per Container 100

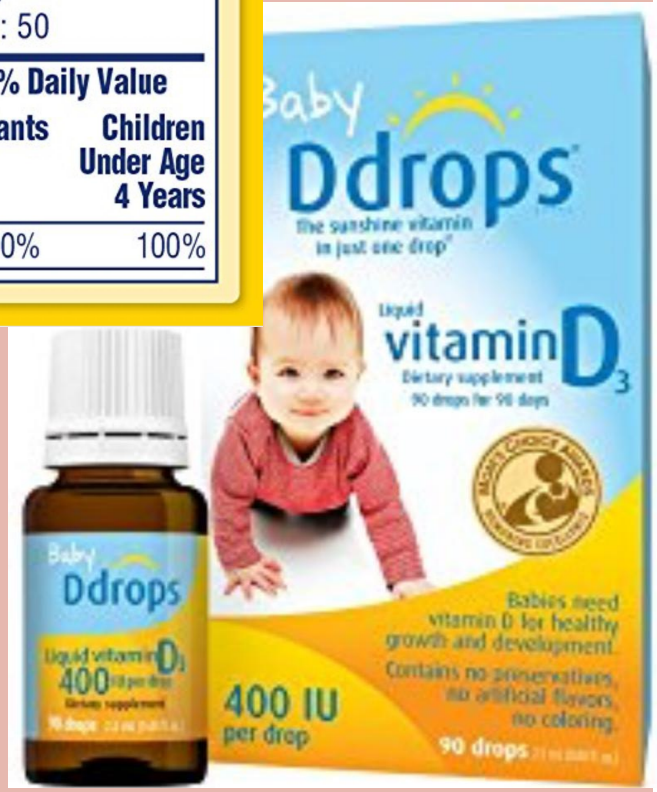
	Amount Per Serving	% Daily Value
Vitamin A (as retinyl acetate and 50% as beta-carotene)	900 mcg	100%
Vitamin C (as ascorbic acid)	90 mg	100%
Vitamin D (as cholecalciferol)	20 mcg (800 IU)	100%
Vitamin E (as dl-alpha tocopheryl acetate)	15 mg	100%
Thiamin (as thiamin mononitrate)	1.2 mg	100%
Riboflavin	1.3 mg	100%
Niacin (as niacinamide)	16 mg	100%
Vitamin B_6 (as pyridoxine hydrochloride)	1.7 mg	100%
Folate	400 mcg DFE (240 mcg folic acid)	100%
Vitamin B_{12} (as cyanocobalamin)	2.4 mcg	100%
Biotin	3 mcg	10%
Pantothenic Acid (as calcium pantothenate)	5 mg	100%

Other ingredients: Gelatin, lactose, magnesium stearate, microcrystalline cellulose, FD&C Yellow No. 6, propylene glycol, preservatives (propylparaben and sodium benzoate).

Supplement Facts

Serving Size 1 mL Daily
Servings Per Container: 50

Amount Per 1 mL	% Daily Value Infants	% Daily Value Children Under Age 4 Years
Vitamin D 400 IU	100%	100%



SUGGESTIONS FOR USE: For infants 0 months+, administer 0.25 mL daily, using the enclosed syringe. Can be administered directly into the mouth or mixed with food or drink.

Shake well before use. Clean syringe after each use.

As with any product you introduce to your child for the first time, please consult your health care professional before use. Do not use if child is allergic or sensitive to any of the ingredients.

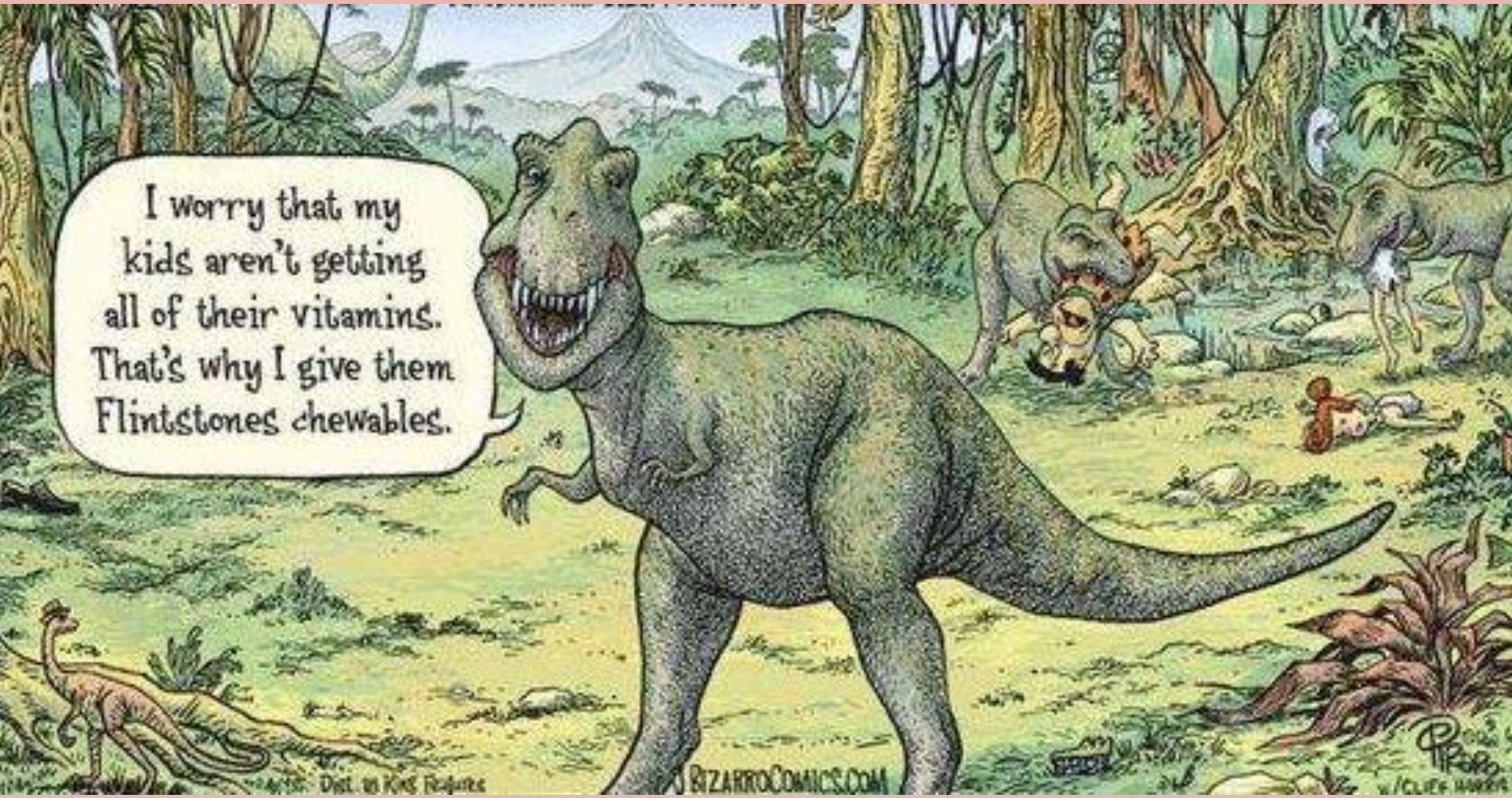
Supplement Facts

Serving Size: 0.25 mL
Servings Per Container: 56

Amount Per Serving:		% DV † Infants	% DV † Children Under 4 Years
Vitamin D3 (as cholecalciferol)	400 IU	100%	100%

† = Daily Value (DV)

OTHER INGREDIENTS: MEDIUM CHAIN TRIGLYCERIDES


I worry that my kids aren't getting all of their vitamins. That's why I give them Flintstones chewables.
BIZARROCOMICS.COM

Magnesium

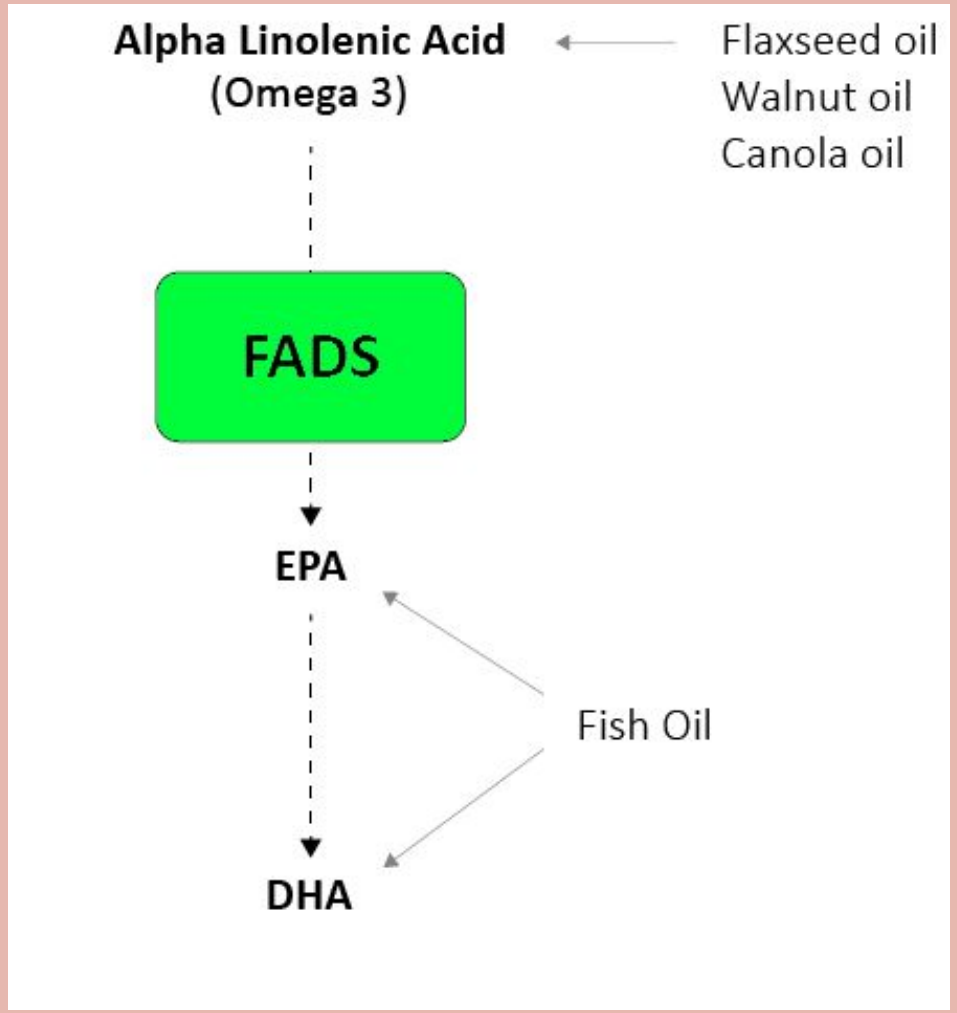
- Low levels = common in U.S. population
  - Diabetes, high bp, heart disease, sudden cardiac death, migraines, menstrual cramps, depression and osteoporosis
- Women taking estrogen may be at increased risk of blood clots/strokes if low Mg
- Increase effectiveness of BP medications (230-460 mg/day)
- Menstrual cramps (500 mg/day)
- Migraine Headaches (300 mg twice daily)

Magnesium

- Interactions with prescription medications
  - PPI's = hypomagnesemia when taken for more than 1 year
  - Diuretics= increased loss of Mg in urine
- Mg citrate = well absorbed, mild laxative
- Mg glycinate = well absorbed & less diarrhea, anxiety and sleep
- AVOID Mg supplements in kidney disease
- Food sources: Dark chocolate, green leafy vegetables, legumes, nuts, seeds, avocado, brown rice, salmon, milk, etc.

Fish Oil

- Omega 3 Fatty Acids (ALA, EPA, DHA)
  - Alpha-linoleic acid is only essential Omega 3
  - ALA can be converted to make EPA (5-10%) & DHA (2-5%)
    - Not efficient, higher conversion rate in women & pregnancy
    - Fish contain EPA & DHA no need to convert
  - Important for cardiovascular system, nervous system, eyes, inflammation and fetal development
  - Babies born to mothers consuming fish or fish oil during pregnancy scored higher on intelligence, attention, and visual acuity tests (>DHA)
  - Food sources: Walnuts, flax, chia, brussel sprouts, fatty fish, enriched eggs and grass fed beef


Alpha Linolenic Acid
(Omega 3)
Flaxseed oil
Walnut oil
Canola oil
FADS
EPA
Fish Oil
DHA

Fish Oil

1200 mg | 360 mg of Omega-3

May Reduce Risk of Coronary Heart Disease*

HEART HEALTH

200 Coated Softgels

DIETARY SUPPLEMENT

Serving Size 2 Softgels
Servings Per Container 100

Amount Per Serving		%Daily V
Calories	30	
Total Fat	3.5 g	4
Saturated Fat	1 g	5
Polyunsaturated Fat	1.5 g	
Monounsaturated Fat	1 g	
Cholesterol	20 mg	
Fish Oil	2,400 mg (2.4 g)	
provides 720 mg of Total Omega-3 Fatty Acids† comprising of:		
EPA (Eicosapentaenoic Acid)		
DHA (Docosahexaenoic Acid)		
Other Fatty Acids		

**Percent Daily Values are based on a 2,000 calorie
***Daily Value not established.

Other Ingredients: Gelatin, Vegetable Glycerin. **Co**
<2% of: Acetylated Monoglycerides, Food Glaze, Natural Tocopherols, Polysorbate 80, Potassium S (preservative), Sodium Alginate.

Contains fish (anchovy, herring, mackerel, sardine) ingre

†As Natural Triglycerides

Product of Peru

Supplement Facts

Serving Size 2 Softgels
Servings Per Container 50

Amount Per Serving	% Daily Value
Calories 35	
Total Fat 3 g	4%**
Saturated Fat 1 g	5%**
Polyunsaturated Fat 1 g	
Monounsaturated Fat 0.5 g	
Cholesterol 25 mg	8%**
Total Carbohydrate 1 g	< 1%**
Protein less than 1 g	
Fish Oil 2400 mg	*
Total Omega-3 Fatty Acids 720 mg	*
Omega-3 EPA (Eicosapentaenoic Acid) 360 mg	*
Omega-3 DHA (Docosahexaenoic Acid) 240 mg	*
Omega-3 Other 120 mg	*

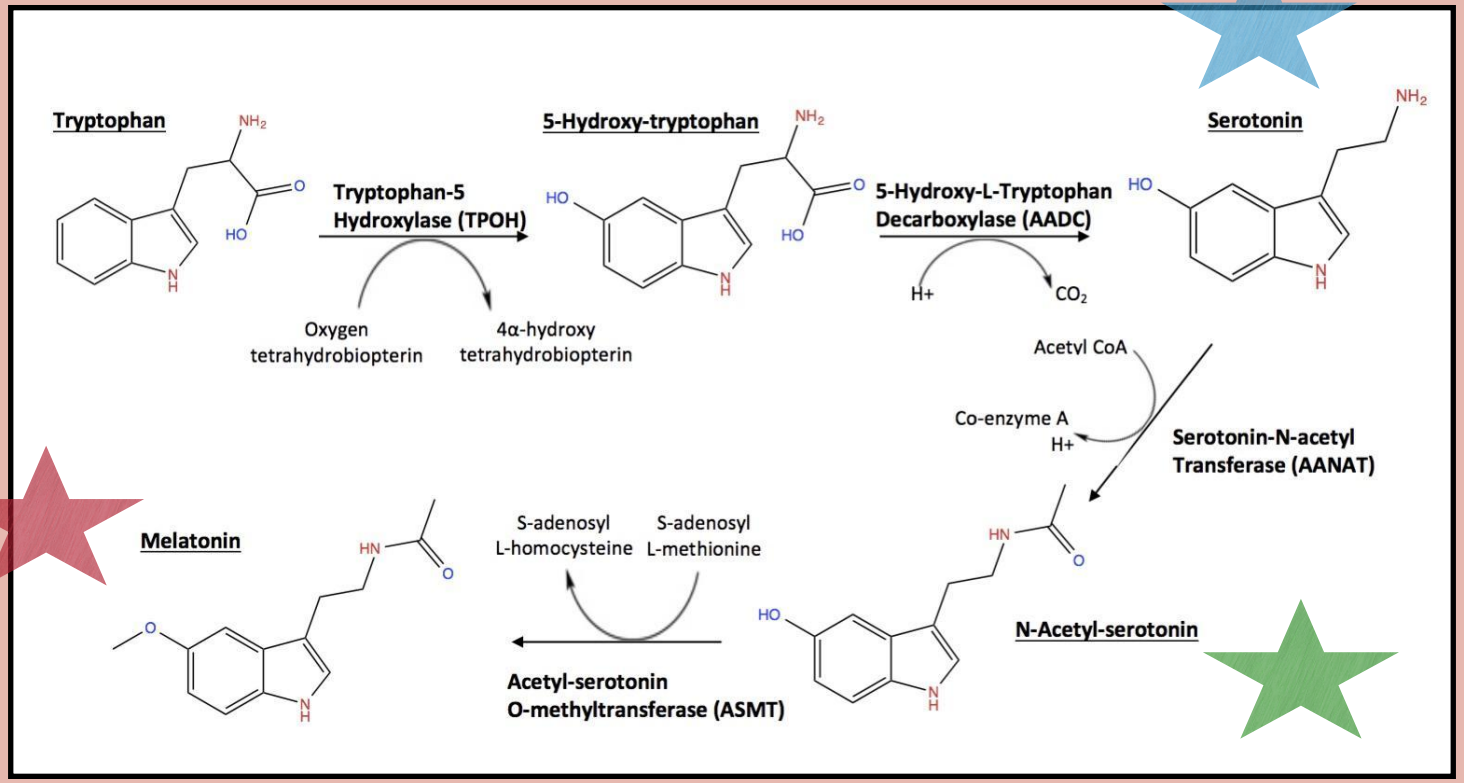
*Daily Value not established.
**Percent Daily Values are based on a 2,000 calorie diet.

Melatonin

- Natural body rhythm increases melatonin at sunset which decreases body temperature and increases tiredness
  - Blue light from sun or electronics decreases melatonin production
- Most common side effect is vivid dreams
- Usual dose 1-6mg 2 hours prior to bedtime
- GERD
  - 3mg of melatonin at bedtime after 8 weeks no different from omeprazole in effectiveness
    - Melatonin tightens esophageal sphincter unlike PPI’s

Melatonin

- Available in regular release and sustained release formulations
  - Sustained released best if troubles staying asleep
  - Regular release best for GERD and falling asleep
- Caution taking along with other sleeping medications and may impair coordinator.



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2908021/

General Takeaways

- *Consider and Correct Reasons for Deficiency (aka the Root Causes)*
- *Optimize Formulation, Absorption, and Timing*
- *Food First (Organic, Local, Whole)*
- *When Ordering Labs*
  - *What's Average vs. Optimal?*

Questions?

Instagram: @amysapola
Facebook: @asapolapharmd
Podcast: Nourish and Shine
www.amysapola.com