

Cutting-Edge Nutrition for Family Physicians

What Should You Know?

Steven Masley, M.D., F.A.A.F.P., C.N.S.

- Medical Director, Masley Optimal Health Center
- Clinical Assistant Professor, University South Florida
- Certified Nutrition Specialist, American College Nutrition
- Florida Academy Family Physicians
- Author 3 books, including Ten Years Younger
- Chef internship at the Four Seasons Restaurant, Seattle

2 Disclosures:

- Book Author
 - I speak to both public and medical audiences across the country on issues related to optimal health and how to optimize nutritional intake and exercise
- Commercial website
 - www.tenyearsyounger.net
- Books, supplements, and skin care products, plus detailed vitality tips
 - www.drmasley.com
- Free of commercial products
- Physician handouts available (no charge)
- It does have a link to my commercial site

Total alternative provider visits passed primary care physicians in 1997, over the last 10 years, the gap is growing

If physicians are to offset this trend, we need to meet the needs of patients who want nutritional therapy options

Medical School Education Lacks Adequate Nutrition Education

- Most medical schools provide little nutrition education, although this is improving
 - I had a 4 hour “elective” during 4 years of medical education
- The problem is that patients EXPECT US TO HAVE DETAILED NUTRITION KNOWLEDGE!
- This lecture aims to bridge the gap

Talk Outline

- Identify the most common nutrient deficiencies
- Give you nutrient intake targets for these nutrients
 - Your patients expect you to know this!
- Clarify supplements that your patients are taking
- Clarify strategies to enhance nutrient intake in your patients

Top 10 Nutritional Deficiencies

- Fiber
- Essential Fatty Acids (*long chain omega-3 fats*)
- Vitamin D
- Folic Acid
- B 12
- Calcium
- Magnesium
- Iron
- Vitamin E (*dietary*)
- Selenium

(USDA) Center for Nutrition Policy and Promotion: Healthy Eating Index for 1999-2000

- They found:
 - 10% of the population had a good diet, 74% inadequate, 16% were poor
 - Poor or inadequate diets are linked to four of the top 10 causes of death -- heart disease, cancer, stroke, and diabetes

What Deficiencies Do We Not See in the USA?

- Calories and dietary toxins
- Most people might be nutrient deficient, both they also have an excess intake of calories
- 3,500 calories forms 1 pound of fat
- Add 100 extra calories daily (100 x 365 days per year = 36,500)
 - They makes >10 pounds of fat, which is about 10 oranges or 2 footballs in fat volume)
 - Cut a 100 calorie “treat” daily and lose 10 pounds of fat mass in one year!

Two Most Common Toxins in the American Diet?

- Corn syrup
 - Metabolic poison, bypasses normal glucose & insulin regulation
 - Is converted by the liver into triglycerides
 - Most common sweetener in America
- Hydrogenated fat (trans fat)
 - Increases insulin resistance, worsens lipid profiles, stiffens tissues, increases cancer risk
 - Best described as embalming fluid!

Deficiency #1:

Fiber

Fiber Goal: >30 grams daily

•**Insoluble fiber:**

- Found in whole grains, fruits, and vegetables
- Prevents colon cancer and constipation.

- Contains many nutrients

•**Soluble fiber:**

- Pectins and guar gum
- Found in citrus fruits, vegetables, nuts, oats.
- Reduces cholesterol if taken in substantial quantities
- Slows down the digestion of sugars thereby reducing insulin resistance.

EB-CME: Fiber

- Fiber consumption is inversely associated with**
 - insulin levels**
 - weight gain**
 - other cardiovascular disease risk factors (central adiposity, blood pressure, HDL and LDL cholesterol, fibrinogen and triglycerides). Bandolier**
- If you only had your patients track one thing, fiber might be the best bet**

Fiber Goals:

- 30-50 grams daily
- For cholesterol and blood sugar reduction, >50% should be soluble fiber
 - 5 cups of fruits and vegetables daily
 - Oats, beans, nuts are other great sources

Deficiency #2:

- Long chain omega-3 fats
- FISH OIL AND OMEGA-3 SUPPLEMENTATION
- Should we all take an omega-3 (n-3 fatty acid) supplement?*

SOURCES OF OMEGA-3 FATS (n-3 fatty acids)

LONG CHAIN

- Seafood and fish oil
- Seaweed supplements

MEDIUM CHAIN

- Flax (Ground flax seed better than oil)
- Soy products
- Nuts
- Green leafy veggies
- Canola oil (organic, expeller-pressed)

Plant sources of omega-3 (only medium chain sources)

- Include flax, soy, and some nuts
 - Ground flax seed has documented clinical benefits
 - Flax seed oil, despite incredible marketing, has not documented benefits and may be harmful

- Lower LDL cholesterol levels
 - Provide fiber that may decrease cancer risk
 - Have been shown in studies in subjects with known CVD to decrease event rates
 - Mediterranean and Indian Diet Interventions
- Seafood Source of n-3 F.A.'s
- Seafood includes fish, shellfish, and seaweed products
 - Provides a rich source of omega-3 and are associated with decreased rates of sudden death

Mechanism of Benefit Behind Fish Oil

- Increases nitric oxide production through activation of eNOS (endothelial nitric oxide synthase)
- Inhibits ICAM and VCAM (critical markers of endothelial dysfunction)
- Decreases endothelial cytokine levels
- Decreases platelet activation
- Improves insulin sensitivity (P-PAR γ)
- Enhances cell membrane flexibility

Activity of n-3 Fatty Acids

- Reduce triglyceride levels 20-30% Curr Opin Lipido 2003;14:9-14
- Seafood sources decrease clot formation Ibid
- Associated with improved insulin sensitivity Am J Clin Nutr 1997;66:S991-S97
– Fish Oil acts as a P-PAR γ agonist Diabetes Metab 2003;29:289-95
- Decreases inflammation seen in Crohn's and Rheumatoid Arthritis Am J Clin Nutr 2000;71:339-S-42S

Clinical Benefits from Long Chain Omega-3 Fat Intake

- Increasing omega-3 fat intake is more important than cutting saturated fat intake Ascherio, BMJ 1996;313:84
- The Mediterranean Diet Study and DART showed lower death rates with greater omega-3 fat intake
- The Italian, GISSI-Prevenzione Trial showed that omega-3 fat intake decreased mortality Lancet 1999;354:471

Omega-3 Fats for CVD

- In people with heart disease, adding omega-3 fat intake decreases rates of sudden death and MI's > cutting saturated fat intake
- In Italy, with known CAD,
– 1 gram of fish oil daily decrease MI's and deaths Lancet 1999;354:471
- In people in the USA and Northern Europe with known heart disease
– 1-2 servings of seafood weekly decreases overall mortality

Omega-3 Fats for Preventing Alzheimer's Disease?

- N-3 F.A.s decrease inflammation

- DHA plays a role in COX-2 inhibition Int J Dev Neuroscience 2000:July 1,383-399
- Fish Oil acts as a P-PAR γ agonist Diabetes Metab 2003;29:289-95
- Intake of DHA is strongly related to Alzheimer’s disease Arch Neurol 2003;60:940-46
- Omega-3 intake is associated with cognitive function Br J Nutr 2000;83:337-39
- DHA impacts gliogenesis, neurogenesis synaptogenesis (Int J Dev Neuroscience 2000:July 1,383-399)

Omega-3 Fat Dosing

- For routine health, aim for 1 gram daily in a supplement (~300 mg of both EPA and DHA)
- For high triglycerides: 3-4 grams daily
- For inflammatory problems: 2-4 grams daily
- For disc herniations: 2-4 grams daily
- For arrhythmias: 1-2 grams daily
- Associated with lower Alzheimer’s risk: 1-2 grams daily
- For metabolic syndrome: 1-2 grams daily

Food Sources

- 1 gram per day = 2-3 servings of fatty fish per week
- Canned wild Alaskan salmon or canned sardines are the most affordable sources

Balancing High Omega-3 Sources with Low Mercury Content

- BEST CATCH (Cold water small mouth fish, and omega-3 filter feeders from “pristine waters”)
 - Salmon, trout, sardines, herring, mussels, oysters
- GOOD CATCH (lower fat fish with smaller mouths)
 - Other shellfish such as shrimp, crab, and clams, sole, cod, small mahi mahi, halibut (mercury < 2ppm)
- OCCASIONAL CATCH (large mouth fish) Limit to 2-4 servings/month; (mercury > 2ppm)
 - Blue-fin tuna, grouper, snapper, bass
- THROW IT BACK (huge mouth fish)
 - Swordfish, King fish, Shark

Choosing Fish Oil Supplements

- Mercury and heavy metal free
 - Should be distilled or independently testing for heavy metals (usually not an issue)
- Lipid peroxides should be low
 - It shouldn’t taste or smell highly fishy
 - Look for brands that have been 3rd party tested to have low levels of lipid peroxides
 - Products that can be sold in Europe have guaranteed quality

FISH OIL SIDE EFFECTS

- High dosages (>2 grams/day) may impact bleeding risk during procedures and/or with anticoagulation
- 2 grams per day of fish oil is not associated with a bleeding risk
- 3-4 grams per day is associated with rare bleeding events
- Fish oil will increase bleeding risk when used with potent anti-coagulants (not adequately studied)

Deficiency #3

- Vitamin D

VITAMIN D

- You could get it from sun exposure
- Most people need it as a supplement

BENEFITS OF VITAMIN D

- Increases calcium absorption
- Improves bone health
- Low vitamin D associated with increased auto-immune rates
 - Multiple sclerosis
- Blocks progression of pre-cancerous cells to cancer cells
 - Vitamin D deficiency is associated with higher cancer rates
- Prostate, breast, colon

Sources of Vitamin D

- Multi-vitamin: 200-500 IU
- Fish oil or cold water fish: 150 IU
- Calcium food (milk or soy milk) or calcium supplement: 150 IU
- Sunshine exposure: 20-30 minutes short pants 3 times per week: 150-200 IU / day
- Total should be 800-1,000 IU per day
 - If you have multiple sclerosis, or other autoimmune disease, check a vitamin D level; goal is >70

Vitamin D Intake

- 200 IU daily = RDA
- 1,000 IU daily evidenced based to achieve levels that minimize disease risk (Willet et al, NEJM xxxx)
- Up to 3,000 IU daily has substantial safety

Measure Vitamin D Levels?

- Indications would include:

- suspicious of rickets, severe osteoporosis, multiple sclerosis, or other poorly controlled auto-immune disorder

- To measure vitamin D levels, order a 25-OH vitamin D level

- The 1,25-OH level is not an appropriate measure

- Goal is a 25-OH vitamin D level of at least 40, 70-100 is likely optimal (optimal levels needs further study)

Deficiency #4 & #5:

- B vitamins, folate and B12

- Folate comes from food, folic acid is a synthetic form that comes from food

GET FOLIC ACID & B vitamins!

- Folic acid is a B vitamin, as are B₆ and B₁₂

- Adequate B vitamin intake is essential for many aspects of health, including cancer, dementia, & CVD prevention

- One mechanism of benefit is that folic acid lowers homocysteine

- Homocysteine is toxic to your arteries and brain cells

- Elevated homocysteine levels are strongly associated with and elevated risk for CVD events and Alzheimer's disease

- This makes homocysteine a marker, but not clearly the cause

Folate Intake

- Everyone needs > 400 mcg (.4 mg) daily

- You can get 800 mcg folate (=400 mcg folic acid) with: 1 glass O.J., 2 servings beans, grain servings, and 2-3 servings green leafy veggies daily

- But most people don't eat this way!

- Most people need to take a supplement

- Such as a multi-vitamin with at least 400 mcg of folic acid

- In theory, mixed forms of folate would be better but this has not been confirmed with clinical trials

Recommend a Multi-vitamin with B vitamins

- I recommend at least 400-600 mcg of folic acid for everyone (diet and multi-vitamin)

- You also need B₆ (10-25mg) and B₁₂ (10-1000 mcg)

- High doses of folic acid are inexpensive and very safe, but high dosages have not been shown in 3 randomized studies to reduce overall CVD events in patients with known CVD

Higher Dosages of Folic Acid?

- 1-4 grams daily did not decrease cardiovascular risk with known CVD

- Adding 1 gram daily may increase colon polyp growth in existing polyps, despite that long term folic acid may limit colon polyp formation

- There are many forms of folic acid (folicin, 5-methyl tetrahydrofolate, etc) and giving one form in excess may be a mistake. This is a big area of controversy that requires further study.

Folate/Folic Acid and Spina Bifida

- Ensuring 400 mcg daily markedly reduces the rate of spina bifida.
- For high risk women (those with a prior history of spina bifida) 4,000 mcg of folic acid recommended daily prior to becoming pregnant
- Starting a multi-vitamin after a positive pregnancy test is too late
- All women at risk of pregnancy should ensure at least 400 mcg daily; this is an excellent reason to recommend a multi-vitamin daily
- This is an excellent reason to start a multi-vitamin in teens

B12

- Deficiency associated with anemia and irreversible neurological injury
- B12 absorption depends upon intrinsic factor and stomach acid
- 2-3 mcg of B12 needed daily for health
- 50-100 mcg in a supplement may not be absorbed with intrinsic factor loss or markedly suppressed acid production

B12 Sources

- Animal protein
- Intestinal tract bacteria
- Supplements

Signs of B12 Deficiency

- Elevated MCV on CBC testing
- Elevated homocysteine levels
- Paresthesias
- Memory loss
- Ataxia
- Neuropathy
- Don't Miss It!

Testing for B12 Deficiency

- Serum B12 level
- Low normal levels may still be associated with intracellular deficiency
- Urine methyl mevalonic acid level more definitive
- Vegans are at high risk and should be tested yearly, or take a good supplement (500 mcg daily)

Treating B12 Deficiency

- Use acid blocking agents with caution (do no harm)
- 1,000 to 2,000 mcg daily in oral dosages will be absorbed by passive diffusion
- B12 shots 150 mcg every 2-4 weeks will rapidly restore low B12 levels

—Once reloaded can shift to oral therapy

Deficiency #6

- Calcium
- Most teens and adults have a diet deficient in calcium

CALCIUM FOR BONE SUPPORT

- You need 800-1500 mg daily depending upon your lifestyle (diet and activity)
- Sodium, phosphate, excessive animal protein, caffeine, nicotine, and inactivity all increase your calcium needs
- Optimal lifestyle ~ 800 mg daily
- ³/₄ Optimal lifestyle ~ 1,200 mg daily
- Osteopenia or Osteoporosis ~ 1,500 mg daily

To Calculate Your Calcium Supplement Need

- Calculate Your Dietary Intake
 - Milk, Calcium fortified OJ, soy milk: 300 mg / cup
 - Green leafy veggies: 100 mg / cup
 - Beans: 100 mg / cup, Whole grains: 20 mg / cup
- Assess Your Total Need
 - (800, 1200, or 1500 daily)
- Subtract your intake from your need
- Supplement if you are short in calcium intake

How much calcium do you need?

RECOMMENDED CALCIUM INTAKE FOR WOMEN

<u>Age</u>	<u>US RDA</u>	<u>NIH</u>
1-5	800 mg per day	800 mg per day
6-10	800 mg per day	800-1200 mg/day
11-25	1200 mg per day	1200-1500mg per day
>25	800 mg per day	1000 mg per day
Pregnant	1200 mg per day	1200-1500mg per day
Menopause	1200 mg per day	1200 mg per day
Osteopenia	1500 mg per day	1500 mg per day

What Is an Optimal Lifestyle for Bone Health?

- Weight bearing exercise for 45-60 min daily
- Strength training (weight lift) 2-3 times weekly
- A diet low in animal protein, salt, phosphate, caffeine; plus without excessive Vitamin A
- Avoid more than 2 servings of alcohol daily
- No tobacco
- Adequate Vitamin D, calcium, & magnesium
- Adequate plant foods (alkaline) to balance animal protein acids that HCO₃ pull from bone

CALCIUM NEEDS VARY WITH DIET AND ACTIVITY

•Calcium needs vary by lifestyle!!!

–A vegan (no animal protein) who exercises for 90 minutes 6 days per week and strength training 3 times per week, doesn't drink coffee or colas, doesn't smoke, doesn't eat salt can maximize her/his bone strength with less than 700 mg daily

•*The WHO calls for 500 mg calcium intake daily*

–A person who smokes, drinks coffee and colas, has a high meat and salt intake, and does not exercise may not get adequate calcium with over 1500 mg daily--they may fracture

A person following an optimal lifestyle should be in positive calcium balance with 800 mg of calcium daily

A person following 75% of an optimal lifestyle would need 1200 mg of calcium daily

If you already have osteopenia or osteoporosis, 1500 mg of calcium daily

Calcium Sources

•Dairy and soy, green leafy veggies, whole grains

•Calcium is well absorbed from food with a few exceptions

–Wheat bran and spinach are not absorbed due to high phytate levels

–Cottage cheese is absorbed, but sodium and animal protein induced losses negate gains from calcium

QUANTITATE YOUR CALCIUM INTAKE

•Calculate your calcium needs

•Calculate your calcium intake

•Add the extra calcium you need

•Don't exceed your calcium needs

–Excess calcium can block other mineral absorption

–High calcium intakes (excessive) linked but not proven to cause prostate cancer

Common Calcium Supplements

•Calcium carbonate

– Must be taken with food to be absorbed

– May cause constipation, may contain lead

– Makes the smallest pill

•Protein-bound calcium (Albion Chelate[®])

– BEST ABSORBED

– Best tolerated and no contaminants

– Twice the pill size of calcium carbonate

•Calcium citrate

– Can be taken with or without food & no contaminants

– Twice the pill size of calcium carbonate

CAUTION WITH CALCIUM CARBONATE SUPPLEMENTS

- Calcium carbonate can contain lead
- Both natural (oyster shell and coral) and synthetic forms can contain lead
- Calcium carbonate is cheaper and makes smaller pills, but is it worth it?

Deficiency #7

- Magnesium

MAGNESIUM

- Magnesium is good for bone health
- Magnesium improves bowel function (if you don't exceed 500 mg daily)
- Magnesium improves blood sugar control
- Magnesium is involved in multiple anti-aging enzyme processes
- Good dietary sources include whole grains, green leafy veggies, and legumes

Magnesium Sources

- Good dietary sources include whole grains, green leafy veggies, and legumes
- In a supplement, choose magnesium citrate, glycinate, or best is a Albion chelate form
- Avoid magnesium oxide that causes intestinal distress

MAGNESIUM

- Good for intestinal function
- Enhances blood sugar regulation
- Involved with over 100 anti-aging enzyme reactions in the body
- Commonly deficient in the American diet
- Without an optimal diet, add 400 mg daily

Calcium Competes with Magnesium for Absorption

- Calcium supplements block magnesium absorption
- The problem is we lack clinical outcome guidelines for calcium/magnesium supplementation
- Expert opinion recommendation is to use calcium supplements with a 2:1 to 3:1 calcium/magnesium ratio

Deficiency #8

- Iron
- Some would call this the most common deficiency, although not the most clinically important in relation to morbidity and mortality
- Iron excess may be a greater clinical problem than iron deficiency

Iron Sources:

- Green leafy veggies
- Lean animal protein
- Legumes (beans)
- Whole grains
- Vegetarians don't suffer from iron deficiency (this is a myth)
- FeS04 commonly prescribed for anemia, but may cause GI distress
 - Amino acid chelated iron (bis glycinate chelate) is much better tolerated

Deficiency #9

- Selenium

SELENIUM

- Enhance immunity, get sick less often
- May lower cancer rates
- Optimal selenium dosage appears to be ~200 mcg daily
 - Improves blood sugar regulation
 - I usually add only 100 mcg in a supplement as most people following an optimal diet obtain 100 mcg daily with their food
 - Safe up to 300-400 mcg daily
- Above this dosage is toxic

Deficiency #10

- Vitamin E (in food)
 - Good sources are nuts, olive oil, and Canola oil

VITAMIN E

Alpha, gamma, delta tocopherols

- Alpha, gamma, delta tocotrienols
- These all come from food
- Alpha tocopherol makes up about 20% of vitamin E in food, and >95% of sources from supplements

Why Shouldn't Everyone Take alpha-Tocopherol?

- Alpha tocopherol lowers HDL levels
- In people with low HDL taking niacin and a statin, taking alpha tocopherol appears to increase cardiac events and plaque formation
- In contrast, tocotrienols do not appear to lower HDL, but we don't have clinical outcome data regarding their use
 - More than 800 IU daily increases bleeding risk

VITAMIN E MAY BE INDICATED FOR OXIDATIVE STRESS

- Always review the risks (? Bleeding & lowering HDL) and benefits before using vitamin E

- Expert opinion: Choose Vit E with mixed tocopherols and tocotrienols rather than just alpha-tocopherol (usually at 200 IU daily)

- Gamma Tocotrienol doesn't lower HDL Naguib Y, J Nutr Sci Vitaminol (Tokyo). 2003 Aug;49(4):217-20.

- Indications for vitamin E rely on lab data:

- Alzheimer's (maybe)

- Macular degeneration (maybe)

- Cancer related immune enhancement after chemotherapy (maybe)

- Common cold benefit (maybe) JAMA 2004;292:828

VITAMIN E

- Vitamin E has been shown to improve lab tests, namely decreasing LDL oxidation and decreasing clotting; but:

- Vitamin E also lowers HDL2 levels, and in subjects with low HDL taking niacin and a statin medication to raise their HDL, adding vitamin E with their meds increased event rates

- No Vitamin E benefit in the >9,000 person HOPE trial (N ENGL J Med 2000;342:154), nor the Italian Trial

- If taking niacin or a statin medication (which raises HDL), don't take more vitamin E than found in a multi-vitamin (45-150 IU)**

SUPPLEMENTS ARE POPULAR

- Nationwide, 44% of women and 35% of men use supplements (Arch Fam Med 2000;9:258)

- Now more than 50% of people taking some form of a supplement

- Higher supplement use with

- Higher income, more education, Asian and Caucasian, elderly

- Nationwide 21.7% of Emergency Dept patients are using supplements (Acad Emer Med 1997;4:209)

- 28.5 % women; 17.2% men; Asians 36.8%

What Are Your Patients Taking?

Sources of Supplements

Quality Issues

- USP (Labs assessed and samples in stores tested for active agents and contaminants)

- GMP (Good Manufacturing Practices--Lab)

- Pharmaceutical laboratory production

- Are they approved in the European Community (they have higher drug company level standards)

- Consumerlab.com

- Independent testing for dosing and contaminants

IF YOU RECOMMEND (TAKE) SUPPLEMENTS

- Ensure that they are safe
- Confirm they meet unique needs
- Keep up to date with state-of-the-art information

What Do You Need?

- Basic multi-vitamin
 - EB components include B vitamins, vitamin D, and probably selenium
- Calcium (EB) and magnesium
- Fish oil (EB)
- Vitamin D (EB)
- You may also need:
 - Other EB herbal and nutritional supplements WITHIN specific situations
- Ginkgo, Glucosamine sulfate, Saw palmetto

Multi-Vitamin Tablet

- Take appropriate vitamin A, <5,000 IU / day
 - Excess vitamin A may promote osteoporosis
- Get at least 400-800 IU of Vitamin D
 - Calcium sources and multi-vitamins contain vitamin D
- Appropriate iron (individualized)
- Get at least 400-600 folic acid, 100 mcg B₁₂, 7-10 mg of B₆
- Can't contain significant calcium and magnesium
- Other trace elements

HOW DO YOU OPTIMIZE NUTRITIONAL INTAKE?

Enhancing Nutritional Intake

- Add foods (adding is easier than cutting)
- Use group visits for type 2 diabetes, hypertension, and dyslipidemia
 - Studies have shown marked improvements in dietary intake in a group setting
- Involve family members
- Give out recipes!

SWEET SIXTEEN VITALITY FOODS

- Greens
- Lean not mean protein
- Seafood
- Beans
- Soy
- Whole grains
- Crucifers

- Berries
- Nuts
- Flax for hormone symptoms
- Fresh garlic
- Herbs
- Green tea
- Nonfat yogurt is the best dairy food
- Red wine is great (but 1-2 servings or none)
- Chocolate & cocoa

Ten Simple Principles

- Eat > 30 grams of fiber daily
- Eat 4-5 cups of colorful produce daily
- Reduce saturated fat and shun trans fat
- Eat healthy omega-3 fats (or supplement)
- Choose whole grains, not refined, limit flour
- Seek calcium and magnesium
- Hydrate
- Save room for a planned healthy dessert
- Watch portion sizes
- Select healthy snacks

For Additional Information

- Visit:
- www.drmasley.com (non commercial website)
- www.tenyearsyounger.net (commercial site)