

Nutrition Nuggets



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Nutrients of Concern for Vegetarians:

“Essential Substances and Interactions Often Unrecognized”



Outline of Nutrients of Concern

Crucially Important

- Vitamin D
- DHA Omega-3 Fatty Acid
- Vitamin B12
- Calcium

Important

- Choline
- Iron
- Soluble Fiber

Save for Future

- Magnesium
- Folic Acid

Nutrients of Concern

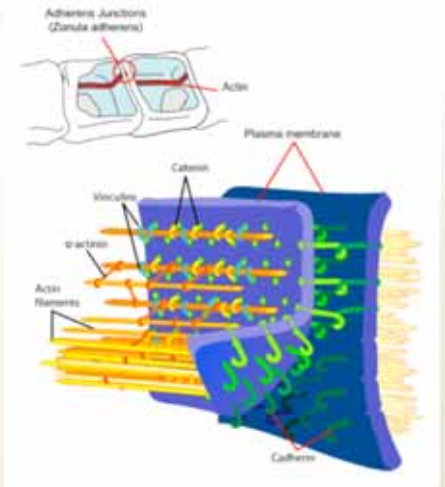
Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infan
Vitamin D	Sun, fortified milk	X	X	X	X	X
DHA	Fish, oil from algae	X	X	X	XX	XX
Vitamin B12	Animal food until 50 yrs old	>50 yr	X	X	X	X
Calcium	Dairy, turnip/beet greens	X	X	X	X	X
Choline	Animal foods, egg yolk		X	X	X	X
Iron	Beans, dry fruit, (add vit C)				X	X
Fiber, soluble	All plant food	X			X	
Magnesium	Deep green color veges	X			X	
Folic Acid	Folage, plant foods, WW				X	X

Vitamin D



- **Function**

- Calcium absorption, bone build & harden
- Interactions
- Autocrine function in all cells
 - Waits in VDR for "orders"
- Chemoprevention in all cells
- Strengthen cell adhesion molecules



- **Sources**

- Sun (10am-2pm, 50% expose)
 - 5-15 min only - then sunscreen
- Supplements - D2 vs D3
- Fortified food - milk



Holick MF. American Journal of Clinical Nutrition, 2004;79(3):362-371.

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Vitamin D	Sun, fortified milk	X	X	X	X	X

Vitamin D

- **Deficiency**
 - Ricketts, osteomalacia
 - Osteopenia, osteoporosis
 - Decreased immunity
 - Cancer, heart disease
 - Autoimmune diseases
- **Toxic**
 - Hypercalcemia only
 - Can deposit in soft tissue
 - >30,000 per day
 - One case study of 88,000 per day



Everyone needs more Vitamin D

Supplements: Vitamin D



- **2000 IU probably become RDA**
 - Loading dose of 6000 IU for 3 months
 - THEN back to 2000 IU
 - Softgel or drop
 - One /day or weekly dose of 7 at one time
 - Ask MD for serum 25(OH)D (25 hydroxy vitamin D)
- **In Future - infections, colds or flu**
 - 2000 IU/kg body weight for 3 days
 - Or 80,000 IU per day for 3 days only



Omega-3 Fatty Acids



- **Function**

- Anti-inflammatory
- Suppress COX-2:Omega 3 prostaglandins
- Inhibit NF-kB, allow apoptosis, inhibit cachexia



- **Sources**

- Fish (Do not eat shark, swordfish, king mackerel or tilefish)
- Soybean, tofu
- Walnuts, canola, flax
- Some greens
- Some algae



Omega-3 Fatty Acids



Parts of Omega-3 Fatty Acid

- **ALA** - alpha linoleic acid
 - Pre omega-3: human make EPA
- **EPA** - eicosapentaenoic acid
 - Fish oil or made from pre-omega-3 oils
- **DHA** - docosahexaenoic acid
 - Fish oil or algal oil
 - Prescription PreNexa



Omega 3 Fatty Acids

- **Deficiency**

- Memory, nerve development
- Nerve conductivity
- Irritation, agitation, anger, depression
- DHA - ADHD
- CVD, CHD, and MI



- **Toxic**

- No known toxicity below 4,000 mg EPA + DHA



Supplements: Omega 3 Oil



- Fatty fish or fish oil
- Comes in **1000 or 1200 mg/capsule**
 - This is total amount of fish oil
 - If burp - put in freezer
- Rx: **1000 mg EPA + DHA each day**
 - Label on back - count EPA + DHA
 - **Fish oil at 360 mg/gel = 3 softgels/day**
 - Krill oil at 150 mg/gel = 9 softgels/day



<http://www.umm.edu/altmed/articles/omega-3-000316.htm>

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Omega-3	Fish, soy, tofu, walnuts, canola, flax	X	X	X	X	X

Reading a Label

How many capsules?



Supplement Facts	
Serving Size 2 Softgels	
Servings Per Container 50	
Amount Per Serving	% Daily Value
Calories 25	
Calories from Fat 20	
Total Fat	2.5 g 4%*
Saturated Fat	0.5 g 3%*
Polyunsaturated Fat	1 g **
Monounsaturated Fat	0.5 g **
Cholesterol	<5 mg 2%
Protein	<1 g 1%*
Fish Oil	2,400 mg (2.4 g) **
EPA (Eicosapentaenoic Acid) **	
DHA (Docosahexaenoic Acid) **	
Total Omega-3 Fatty Acids	720 mg **

Supplements: Omega 3 Oil

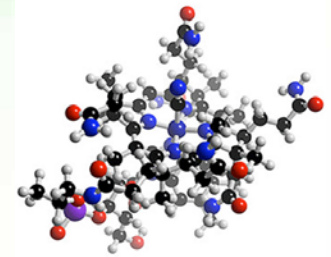


- Vegetarian
 - ALA in plants make EPA
 - Flax, soy, tofu, walnuts, canola
 - Flax oil capsules
 - DHA from algae
 - Suggest 400-600 mg/day
 - 200 mg/gel = 2 softgel/day
 - 600 mg/gel = 1 soft



Arterburn LM, et al. Lipids, 2007. Nov;42(11):1011-24 (Martek)

Vitamin B12

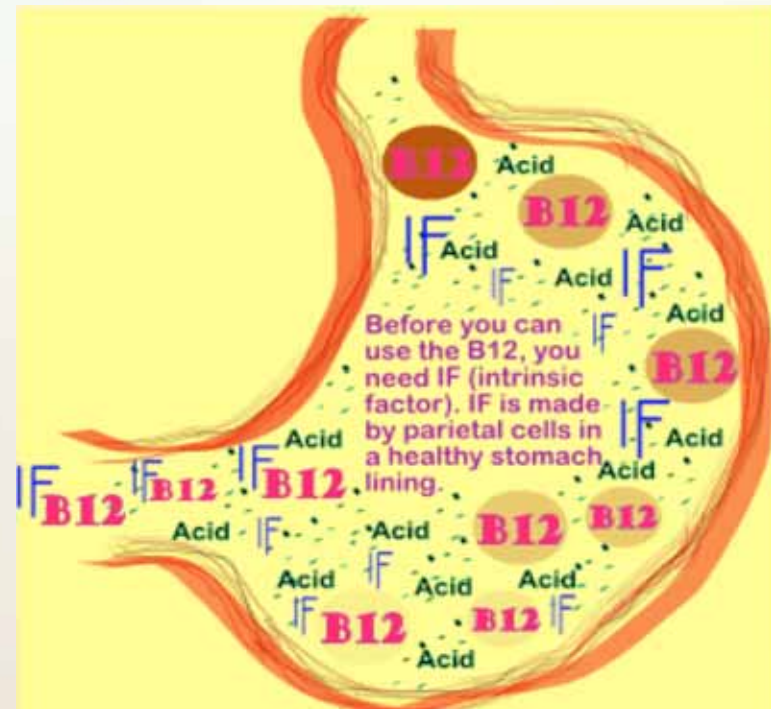


- **Function**

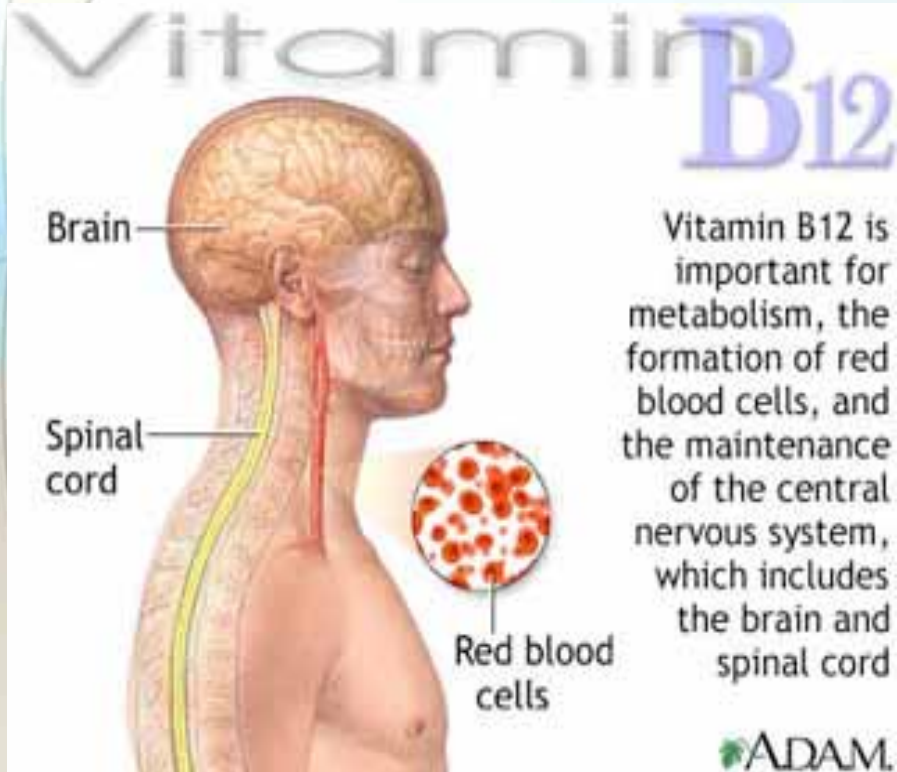
- Cobalamin: cyano and methyl
- Intrinsic factor aids absorption
- Maintain healthy nerve cells, help make DNA

- **Cause of Deficiency**

- Gastritis
- Reduced intake
- Lack Intrinsic Factor

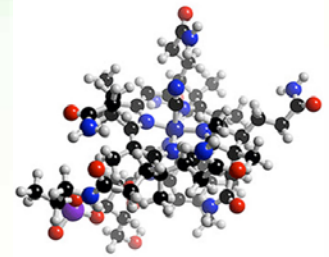


Vitamin B12



- **Results of Deficiency**
 - Pernicious anemia
 - Memory loss
 - Irritated nerves
- **RDA = 6mcg per day**

Vitamin B12



- Sources
 - Animal foods including milk and eggs
 - Vitamins and supplements
 - (Not found in plant foods)
- Toxic
 - No known toxic effects
- Supplement
 - Fortified brewers yeast
 - Vitamin supplement
 - 500 mcg per day



<http://lpi.oregonstate.edu/infocenter/vitamins/vitaminB12/>

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Vit B 12	Animal food until 50 yrs old	>50y	X	X	X	X

Calcium



- **Function**

- Bones and teeth
- Nerve conductivity, muscle contract and relax
- Monitor blood pressure
- Chemoprevention of colon Ca
- Cell adhesion molecules
- Still lots to learn, but cannot do without



- **Sources**

- Milk, cheese, yogurt
- Broccoli, turnip greens, kale, legumes (not spinach)
- Calcium set tofu, fortified soy milk

Weaver + Heaney. Calcium in human health. Humana Press:New Jersey, 2005

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Calcium	Dairy, turnip/beet green	X	X	X	X	X

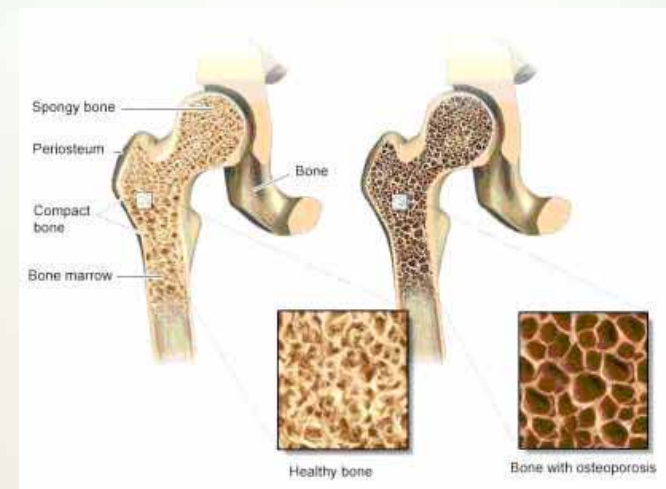
Calcium

- **Deficiency**

- Body sends **no** signals
- Bone **loss** (osteoporosis, osteopenia)
- Stunted **growth** (Rickets, osteomalacia)
- High blood pressure
- Calcium tetney

- **Toxic**

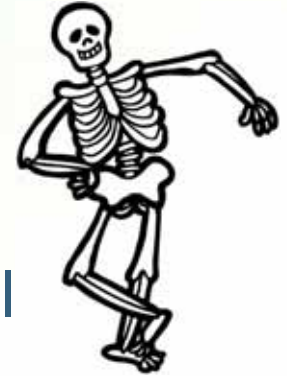
- Almost impossible
- Calcium not absorbed in GI
- (Kidney stones - not calcium)



Food (1/2 cup / 125 ml serving unless otherwise stated)	Serving size (g)	Calcium content (mg)	Estimated absorp (%)	Calcium absorbed (mg)	Servings to equal 1 cup/ (250 ml) of milk
Milk (1 cup)	260	315	32	101	1.0
Turnip greens boiled	76	104	52	54	1.8
Kale boiled	69	95	59	56	1.8
Cabbage (Bak-choi) boiled	90	84	54	45	2.2
Almonds , dry roast, unblanch	73	206	21	43	2.3
Mustard greens boiled	74	55	58	32	3.2
Rutabaga boiled	90	43	61	26	3.9
Broccoli boiled	100	46	53	24	4.1
Brussels sprouts boiled	83	30	64	19	5.3
Sesame seed kernels, toastd	68	89	21	19	5.3
Cabbage, green boiled	79	25	65	16	6.2
Watercress raw	18	22	67	15	6.6
Kohlrabi boiled	87	22	67	15	6.7
Beans, white boiled	95	85	17	14	7.1
Radish raw	61	15	74	11	9.2
Cauliflower boiled	66	10	69	7	14.0
Beans, pinto boiled	90	42	17	7	14.4
Spinach boiled	95	129	5	6	16.8
Beans red boiled	94	26	17	4	25.3

Connie Weaver at Purdue University in the U.S. and by work by Brenda Davis

Supplements: Calcium



- 1200 to 1500 mg/day for Post-menopausal
- One dose at night - nocturnal mineral
- Do not use shells, coral or bones
- Bone Density test or DEXA



Choline: Unknown Essential Nutrient



- **Function**

- Precursor of betaine
- Deficiency: abnormal functioning of all cells, including membrane
 - Especially during pregnancy and early infancy
- Proper liver, brain and nerve function, and memory
- Donates methyl groups
- Transporting nutrients
- Control cholesterol
- Kidney - maintain water balance



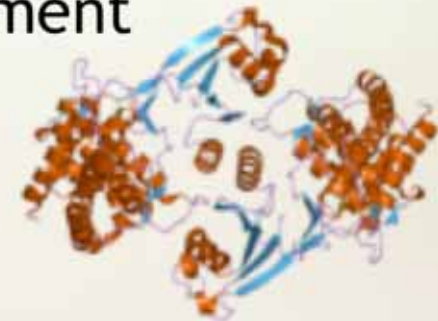
<http://lpi.oregonstate.edu/infocenter/othernuts/choline/>

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Choline	Animal foods, egg yolk		X	X	X	X

Choline: Unknown Essential Nutrient



- **Deficiency**
 - Poor fetal brain development
 - Possibly liver disease like fatty liver
 - High cholesterol levels
 - Memory and brain function impairment
 - Systemic inflammation



<http://knol.google.com/k/marcia-greenblum/choline-the-unknown-essential-nutrient/j40it7v2kg6/14#>

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Choline	Animal foods, egg yolk		X	X	X	X

Choline: Adequate Intake



Adequate Intake (AI) Recommendations for Choline

Women	425 mg
Pregnant Women	450 mg
Breastfeeding Women	550 mg
Men	550 mg
Children (1-3 yrs)	200 mg
Children (4-8 yrs)	250 mg

Choline: Food Sources

RDA: Women 425 mg, Men 550 mg



Animal Foods/100g

- Beef Liver 418mg
- Egg 251mg
- Chicken roasted 78mg
- Milk (7 Tbsp) 16mg



Plant Sources/100g*

- Wheat germ 152mg
- Soy, dried 125mg
- Peanuts 52mg
- Broccoli 40mg
- Cauliflower 39mg
- Tofu, soft 27mg
- Banana 10mg

*100g= 1/3 cup

Choline



- **Toxic**
 - May leave fish smell
 - Possible nausea, depression
- **May need more if use**
 - Alcohol
 - Refined sugar
 - Large amount nicotinic acid



<http://lowcarbdiets.about.com/od/nutrition/a/choline.htm>

<http://www.nal.usda.gov/fnic/foodcomp/Data/Choline/Choline.html>

Nutrients for the Brain

- Vitamin D
 - DHA Omega 3 Fatty Acids
 - Vitamin B12
 - Choline
 - Iron
-
- Deficiency of these have been related to ADHD and autism.



Soluble Fiber

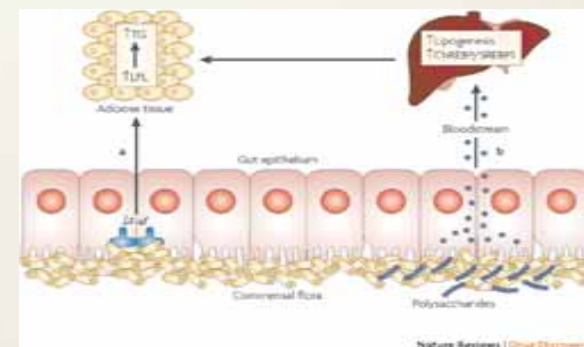


- **Function**

- Act as sponge - keep stool moist + easy to pass
- Act as sponge - absorb extra bile, lower cholesterol
- Act as sponge -- absorb extra estradiol
- Food for microbiota in large intestine

- **Sources**

- Plant foods
- Legumes - beans + peas
- Psyllium fiber



Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Fiber, soluble	All plant food	X			X	

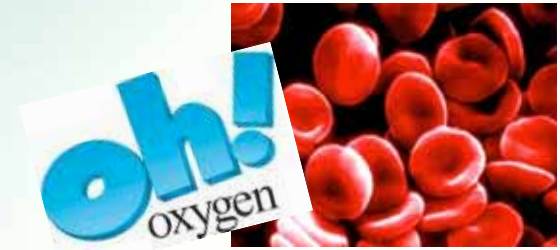
Soluble Fiber



- **Deficiency**
 - Constipation
 - Colon cancer
 - High blood cholesterol and consequent problems
- **Toxic**
 - None
 - If on narcotics; do not use extra fiber
- **Supplement**
 - Metamucil or Benefiber
 - Glucomannan



Iron



- **Function**
 - Hold + carry oxygen in muscle and blood stream
 - Symptoms include SOB, dizzy, fatigue, headache, nausea, anorexia, lack of color in skin
- **Deficiency Anemia**
 - Lack of adequate iron
 - Bleeding, frequent blood donation
 - Gastrointestinal conditions
 - Long-distance runners

http://www.cdc.gov/nccdphp/dnpa/nutrition/nutrition_for_everyone/iron_deficiency/index.htm

Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Iron	Beans, dry fruit, add Vit C				X	X

Vege Sources of Iron



- Eggs (especially egg yolks)
- Nuts, dried fruit, legumes, whole grains, dark green vegetables, iron-fortified cereals, chocolate
- Mixed meals improve absorption
- Vitamin C improves absorption
- Teas and milk at meals prevent absorption

Sources of non-heme Iron



Non-heme Iron



Vegetable Iron

- Iron Fortified Cereals
- Legumes
- Dried fruits
- Vegetables
- Nuts and seeds
- Whole grains

Vitamin C Foods

- Citrus fruits
- Orange juice
- Tomatoes
- Cabbage
- Broccoli
- Leafy green veges

Iron

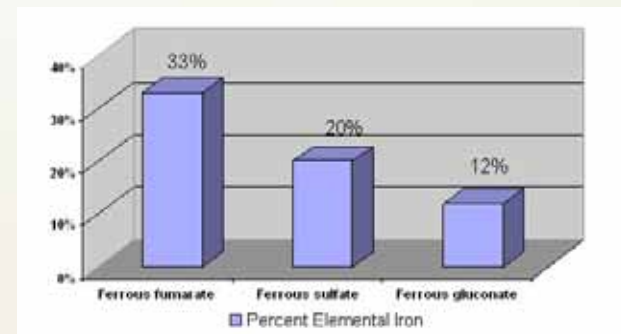


- Toxic

- Hemochromatosis from over exposure to iron
- Overdose for several years
 - Supplement - Extra iron in bread
 - Lots of Oysters

- Supplement

- 8 mg/day to 18 mg/day
- Iron sulfate supplement
- Pregnant and nursing mother needs supplement
- Older adult not need more, unless very ill



Magnesium

- Functions
 - Nerve conductivity and muscle relaxation
- Source
 - Foods with chlorophyll - Mg in molecule
- Deficiency
 - Constipation
 - Cramps in back of legs



Nutrients	Primary Source	Adult	Vege	Vgan	Preg	Infant
Magnesium	Deep green color	X			X	



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Resources

References

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- Zeisel SH, Mar MH, Howe JC, and Holden JH. Concentrations of Choline-Containing Compounds and Betaine in Common Foods. J. Nutr. 2003;133:1302-1307

Resources

Web sites

- [...ods.od.nih.gov/factsheets/calcium.asp#h7](#)
- [...vitaminhealth.org/](#)
- [...ods.od.nih.gov/factsheets/vitaminb12.asp.](#)
- [...lpi.oregonstate.edu/infocenter/vitamins/vitaminB12](#)
- [...cdc.gov/nccdphp/dnpa/nutrition/nutrition_for_everyone/iron_deficiency/index.htm..](#)
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- [http://www.nal.usda.gov/fnic/foodcomp/Data/Choline/Choline.html](#)

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