FOOD FOR THOUGHT: THE ROLE OF VITAMIN B12 AND VITAMIN D IN MENTAL ILLNESS (AND HEALTH!)

DMH Spring Institute 2015, May 29, 2015
By Pamela Gulley, M.D., ABPN, FAPA
Graduate Integrative Medicine, Univ of AZ, 2003
Adjunct Assistant Professor, UMC Dept of Psychiatry

VITAMIN D

- Two forms—ergocalciferol (D_2) and cholecalciferol (D_3)
- Formed in the skin from ultraviolet B radiation from sunlight (D_3)
- Fat soluble, but overdose very rare

VITAMIN D DEFICIENCY CAN CAUSE:

- Depression/suicide?
- Schizophrenia?
- Autism?
- Increased weight?
- Cognitive changes?

VITAMIN D AND DEPRESSION:

Vitamin D deficiency and depression:

Lack of sunlight leads to low vitamin D

Light therapy effective for depression

Low vitamin D (from lack of sunlight) causes depression?

VITAMIN D AND DEPRESSION:

"There is compelling evidence that depressed adults have lower Vitamin D concentrations than nondepressed adults…well-conducted RCTs are required to test the causal relationship of hypovitaminosis D with depressed mood more specifically."

(Annweiler et al, J Clin Psych 74:11, November 2013, 1121-1122)

VITAMIN D AND SUICIDE:

"Low Vitamin D Status and Suicide: A Case-Control Study of Active Duty Military Service Members," John C. Umhau, et al, PLOS 8:1, 1-7, 2013.

"Low vitamin D status is common in active duty service members. The lowest 25(OH)D levels are associated with an increased risk for suicide."

VITAMIN D AND SCHIZOPHRENIA

Study comparing Vitamin D levels in 100 schizophrenics, 100 depressed patients and 100 healthy subjects in Iranian population showed "Vit D levels in healthy participants was significantly higher than depressed patients and schizophrenics while there was no significant difference between Vit D level in depressed and schizophrenic patients.

International J Psychiatry in Clin Pract, Jamilian et al, 2013; 17:30-34.

VITAMIN D IN PREGNANCY: EFFECTS ON KIDS

"Maternal Vitamin D Status Tied to Long-Term Outcomes in Kids", Diana Phillips, Medscape, December 16, 2014

901 mother and offspring pairs

Children born to Mothers with 25-hydroxyvitamin D<50 nmol/L at 18 weeks' gestation:

VITAMIN D IN PREGNANCY: EFFECTS ON KIDS

Language—Kids ages 5-10 at 2X risk of significant language.

Autism—Risk in early adulthood higher in kids born to mothers with lowest Vit D at 18 wks relative to those with highest levels.

Eating disorder-2X risk in kids born to moms with lowest Vit D levels.

VITAMIN D AND AUTISM:

"Children and adolescents living in states with higher solar UVB doses in summer or autumn had half the rate of autism as their counterparts living in states with lowest UVB doses."

From Dermatoendocrinol. 2012:4:4, 1-6, William Grant, Ph.D.

VITAMIN D AND WEIGHT:

In a study by Shalamar Sibley, MD, on 100 people, those with adequate Vit D levels lost more weight than Vit D deficient people with same food intake! For every 1 ng/mL increase in Vit D, participants lost .5 lb. more ("Plasma Vit D: Predictor of Subsequent Weight Loss Success," presented at 91st Annual Endocrine Mtg, 2009, from "The 7 Day Slim Down" by Alisa Bowman, next slide).

VITAMIN D AND WEIGHT:

The 7-Day Slim Down: Drop Twice the Weight in Half the Time with the Vitamin D Diet, by Alisa Bowman, Rodale, 2012.

VITAMIN D AND WEIGHT:

"A potential role for adjunctive vitamin D therapy in the management of weight gain and metabolic side effects of second-generation antipsychotics," J Pediatr Endocrinol Metab. 2011; 24(0): 619-626.

Reviews antiobesity effects of Vit D and recommends further study exploring the use of Vit D in children and adolescents to limit the weight gain of young people on second-generation antipsychotics .

CAUSES OF VITAMIN D DEFICIENCY

Inadequate supply in food, or problems absorbing Vit D

Inadequate exposure to UVB rays of sunlight

Race/skin color

Obesity

Impaired renal function; kidneys "activate" Vitamin D

Medications

VITAMIN D "Drug-muggers"

Acid Blockers

Antacids

Antibiotics

Anticonvulsants (low Vitamin D lowers seizure threshold)

Antifungals (Ketoconazole)

VITAMIN D "Drug-muggers"

Antituberculosis meds
Barbiturates
Blood pressure meds
Cholesterol meds
Corticosteroids

VITAMIN D "Drug-muggers"

Laxatives with magnesium
Lipase inhibitors (orlistat); olestra
Breast cancer meds
Alcohol
Many OTC diet aids and fat blockers

Vitamin D "Drug-muggers"

Over 75 medications are identified as potentially interfering with Vitamin D absorption and metabolism!

(From Drug-Muggers, by Suzy Cohen, Rodale, 2011)

TESTING FOR VITAMIN D LEVEL

- Lab—order 25-hydroxyvitamin D, also called 25(OH)D test. This is the inactive, circulating form of Vitamin D in your body, which becomes activated in the kidneys. Cost: $35.
- Activated Vitamin D (1,25-vitamin D) does not give an accurate measure of Vitamin D in your body; only a small amount of Vitamin D in your body is active at any one time, and it only lasts a few hours.

TESTING FOR VITAMIN D LEVEL

- Who to test?
- The US Preventive Services Task Force (USPSTF) concluded that data are insufficient to recommend vitamin D screening in routine clinical practice.
- That being said, it is of course appropriate to do screening labs on persons deemed at risk of low Vitamin D levels.

TESTING FOR VITAMIN D LEVEL

Expected values of 25-hydroxyvitamin D:

"Sufficient": 30 ng/mL or higher

Deficient: <30 ng/ml

Recommended: 40 ng/ml or above

TREATING VITAMIN D DEFICIENCY

Food sources of Vitamin D:

- Fish (salmon, sardines, mackerel, tuna, cod liver oil, mushrooms)
- Fortified foods (fortified milk, fortified orange juice, fortified yogurts, fortified cheeses, fortified breads, grains, and cereals)
- It is almost impossible to get an adequate supply of Vitamin D from food sources alone.

TREATING VITAMIN D DEFICIENCY

Vitamin D supplements:

$D_2 = D_3$

Recommended daily amount varies widely; the Institute of Medicine recommends 600 IU/day for 1-70 years old, and 800 IU/day for 71 years and older

100 IU of Vitamin D_3 increased 25(OH)D level by only 1 ng/mL.

Risk of toxicity with excessive doses.

TREATING VITAMIN D DEFICIENCY

Best source of Vitamin D is SUNSHINE (UVB)!!

-Self-regulating; cannot make toxic amounts. Excess broken down.

-Lasts up to twice as long in storage

-Reaction makes 5-10 extra associated products unavailable elsewhere, but possibly beneficial.

-FREE!

-Recommend only enough to maintain good Vitamin D levels, usually <15 minutes late morning-early afternoon sun, exposing legs and arms, which is NOT recommended by American Academy of Dermatology!

VITAMIN B12

- Water soluble; no risk of toxicity
- Requires co-factor called intrinsic factor to be absorbed in the gut
- Can only be made by microorganisms—bacteria, algae, yeast, molds

VITAMIN B12

Important in DNA synthesis; neurologic functioning, sleep, hematologic functioning (blood), energy, cardiac function, positive mood, memory

VITAMIN B12 DEFICIENCY

General symptoms:

Peripheral neuropathy; demyelination of the corticospinal tract (can lead to falls); macrocytic anemia; hyperhomocysteinemia (risk factor for cardiac disease), insomnia, poor energy

VITAMIN B12 Deficiency: Psychiatric symptoms

- Impaired memory/dementia (possibly irreversible!)
- Treatment resistant depression and irritability
- Personality change
- Rarely, psychosis (may be due to depression or dementia)

VITAMIN B12 DEFICIENCY-CAUSES

Autoimmune disorders:

Pernicious anemia (atrophic gastritis), Sjogren's syndrome

VITAMIN B12 DEFICIENCY-CAUSES

Surgical causes:

Post-gastrectomy; ileal resection or any other stomach or intestinal surgeries

VITAMIN B12 DEFICIENCY-CAUSES

Decreased intake or malnutrition:

Vegetarians, elderly, chronic alcoholics

VITAMIN B12 DEFICIENCY-CAUSES

Increased need:

Pregnancy and lactation

VITAMIN B12 DEFICIENCY-CAUSES

Genetic:

Transcobalamin II deficiency

VITAMIN B12 DEFICIENCY-CAUSES

Malabsorption:

Whipple's disease, Celiac disease; Intestinal lymphomas; pancreatitis; Crohn's disease; Bacterial overgrowth; tapeworms; amyloidosis; scleroderma

VITAMIN B12 DEFICIENCY-CAUSES

Food-B12 malabsorption:

Atrophic gastritis (common in elderly); chronic gastritis (common in alcoholics); drug interactions, including metformin; proton-pump inhibitors, H2 blockers, and antacids, all of which reduce gastric acid and increase risk of small intestine bacterial overgrowth.

Vitamin B12 "Drug-muggers"

Acid blockers
Antacids
Antibiotics
Anticonvulsants (seizure meds)
Antigout (Colchicine)

Vitamin B12 "Drug-muggers"

Antimetabolic (Methotrexate)
Antivirals
Blood pressure (Methyldopa)
Cholesterol meds
Diabetes meds

Vitamin B12 "Drug-muggers"

Hormone Replacement meds
Several drugs for Breast cancer
Oral contraceptives
Parkinson's meds

Vitamin B12 "Drug-muggers"

Psychiatric meds (Thorazine, Haldol, Prolixin, Mellaril)
Alcohol
Exposure to nitrous oxide (dental, abuse)
Potassium supplements and drugs

Vitamin B12 "Drug-muggers"

Over 75 medications are identified as potentially interfering with B12 absorption and metabolism!

(From Drug-Muggers, by Suzy Cohen, Rodale, 2011)

To summarize, who is at risk of low B12?

Vegetarians; the elderly; alcoholics; pregnant women; persons with pernicious anemia and other autoimmune disorders; people who've had stomach and GI surgeries; people with malabsorption syndromes; people who take medications; people born with deficiencies of transcobalamin II; persons with tapeworms; people with bacterial overgrowth; drug abusers; infants; malnourished individuals…

VITAMIN B12 Deficiency-Who is at risk?

Everyone!!

TESTING FOR VITAMIN B12 LEVELS--LABS

- Who to test?
- The US Preventive Services Task Force (USPSTF) does not have published guidelines on screening asymptomatic adults for Vitamin B12 deficiency.

TESTING FOR VITAMIN B12 LEVELS--LABS

- Vitamin B12 level.
- "Normal" B12 level >200 pg/mL.
- Cost of test: B12 level $22

TESTING FOR VITAMIN B12 LEVELS--LABS

- Vitamin B12 is necessary to convert homocysteine to methionine and methylmalonic acid to succinyl coenzyme A.
- Elevated serum methylmalonic acid (MMA) and/or homocysteine levels may therefore be more sensitive in diagnosing low B12 levels.
- Normal homocysteine level 4-17 mcmol/L; normal MMA level 0.07-0.56 mcmol/L.
- Cost of tests: Serum MMA $55
  Homocysteine $86

TREATING VITAMIN B12 DEFICIENCY

- Food Sources of Vitamin B12—Animal and dairy products, eggs; fortified cereals
- Oral supplements, readily available and safe.
- Injections—no longer recommended. Injections were recommended due to concerns that low levels could be related to decrease or lack of intrinsic factor, but alternate routes of absorption have been found. Studies have shown that low B12 levels improve as well with high dose (1000-2000 mcg/day) oral supplements, even in patients who have had gastrectomy.

RECOMMENDED RESOURCES:

The Vitamin D Solution, by Michael F. Holick, Ph.D, M.D., 2010.

Could It Be B12?, by Stuart and Sally M. Pacholok, Linden Publishing, 2011.

Drug Muggers, by Suzy Cohen, R.Ph., Rodale, 2011.

www.vitamindhealth.org

QUESTIONS?

FOOD FOR THOUGHT: THE ROLE OF VITAMIN B12 AND VITAMIN D IN MENTAL ILLNESS (AND HEALTH!)

DMH Spring Institute 2015, May 29, 2015
By Pamela Gulley, M.D., ABPN, FAPA
Graduate Integrative Medicine, Univ of AZ, 2003
Assistant Clinical Professor, UMC Dept of Psychiatry