The Case for Vitamin D

John J Cannell, MD

Executive Director, Vitamin D Council

- Disclosures
  - I am paid a salary as the Executive Director of the Vitamin D Council, a 501(c)(3) non-profit.
  - I receive royalties from Purity Products for a vitamin D formula with my name and likeness on it (but I don’t have any of it with me).
  - I have a book out on athletic performance and vitamin D, entitled *Athletes Edge, Faster, Quicker, Stronger with Vitamin D* (but I don’t have any copies with me).

FRIENDS FOR EDUCATION CONTEST

The Cleanest Public School In Raleigh County

Send In Your Vote Today

The Cleanest School Wins $100 For Their School Activity Fund

Winners Will Be Announced On May 10

I Want To Help Clean Up Our Public Schools.
I Want To Join Friends

— Individual	$10.00
— Family	$25.00
— Business	$100.00
— Corporation	$200.00

Clean Schools Ballot

The Following Schools Are Clean Enough For West Virginians

__________ Elementary School
__________ Junior High
__________ Senior High

Friends For Education
Box 358
Daniels, WV 25832-0358

Authority —
John Jacob Cannell
President
Friends For Education

FRIENDS FOR EDUCATION CONTEST

The Dirtiest Public School In Raleigh County

Send In Your Vote Today

The Dirtiest School Wins $100 Worth of Mops, Brooms And Soap.

Winners Will Be Announced On May 10.

I Want To Help Clean Up Our Public Schools.
I want To Join Friends

— Individual	$10.00
— Family	$25.00
— Business	$100.00
— Corporation	$200.00

Dirty Schools Ballot

The Following Schools Are Not Clean Enough For West Virginians

__________ Elementary School
__________ Junior High
__________ Senior High

Friends For Education
Box 358
Daniels, WV 25832-0358

Authority —
John Jacob Cannell
President
Friends For Education

THE "LAKE WOBEGON" REPORT

How Public Educators Cheat on Standardized Achievement Tests

John Jacob Cannell

FRIENDS FOR EDUCATION

The New York Times

By Edward B. Fiske

was below the national average." improved in the 1980s. Although

THE NEW YORK TIMES **EDUCATION** WEDNESDAY, FEBRUARY 17, 1988

Standardized Test Scores: Voodoo Statistics?

Schools suffering from 'Lake Wobegon effect'

THE WALL STREET JOURNAL.

Western Edition — THURSDAY, NOVEMBER 2, 1989 — Denver, Colorado

Tests Often Match Materials in Kits And Study Booklets

* * *

How a California Exam Has Same Question Included In Commercial Workbook

By Gary Putka

THE WALL STREET JOURNAL.

Western Edition — THURSDAY, NOVEMBER 2, 1989 — Denver, Colorado

Tests Often Match Materials in Kits And Study Booklets

* * *

How a California Exam Has Same Question Included In Commercial Workbook

By Gary Putka

EDUCATION

Newsweek

We need to produce students who know how to think. And we need new tests to help us.

EDUCATION

Newsweek

We need to produce students who know how to think. And we need new tests to help us.

The Washington Post

MONDAY, FEBRUARY 8, 1988

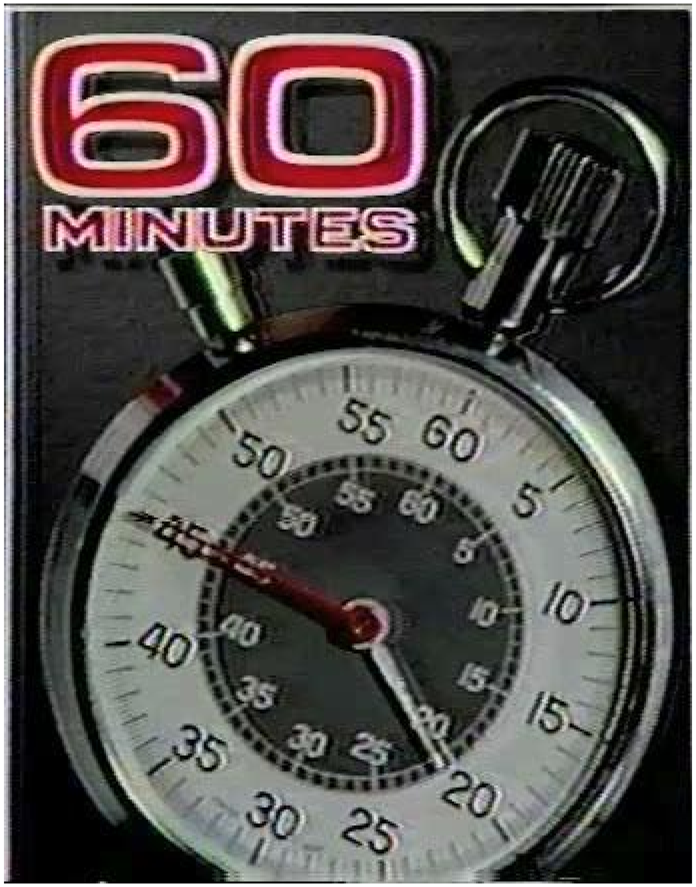
Above Average Has Become Testing Norm

States' Scores Called Misleadingly High

By Lawrence Feinberg

Washington Post Staff Writer

Above-Average Scores Become Norm



- Appeared on 60 Minutes but widespread cheating continued.

- The educational administrators in Raleigh County were glad to see me leave in 1988.

- Now I am obsessed with the autism (highly heritable) epidemic
- How can a genetic condition explode in incidence (now more than 1:54 male 8-year-olds)?
- If it is better case recognition now, that means this <u>non-subtle condition</u> was <u>completely missed</u> by parents, teachers, and doctors in the 50s, 60s, 70s and early 80s.
- My experience in medical school (1975), in WV (1981-88), then in private practice (1991-1996).

  – Cannell JJ. Autism and vitamin D. Med Hypotheses. 2008;70(4):750-9.
  – Cannell JJ. On the aetiology of autism. Acta Paediatr. 2010 Aug;99(8):1128-30.
  – Grant WB and Cannell JJ. Autism prevalence in the United States with respect to solar UV-B doses: An ecological study. Dermato-Endocrinology 2013 Volume 5 Issue 1.
  – Cannell JJ and Grant WB. Autism and Vitamin D. Accepted, J. of Dermato-Endocrinology.

- Cannell JJ, Vieth R, Umhau JC, Holick MF, Grant WB, Madronich S, Garland CF, Giovannucci E. Epidemic influenza and vitamin D. Epidemiol Infect. 2006 Dec;134(6):1129-40.
- Cannell JJ, Zasloff M, Garland CF, Scragg R, Giovannucci E. On the epidemiology of Influenza. Virol J. 2008 Feb 25;5:29.
- Cannell JJ, Hollis BW, Sorenson MB, Taft TN, Anderson JJ. Athletic performance and vitamin D. Med Sci Sports Exerc. 2009 May;41(5):1102-10.

Now Into Vitamin D…

The Case for Vitamin D

- What is vitamin D?
  - It is a nutritional compound that animals and plants produce when exposed to ultraviolet-B radiation.
    - Animals produce D3, which is called cholecalciferol.
    - Plants produce D2, which is called ergocalciferol.

The Case for Vitamin D

- Nutritionally, humans can get vitamin D from three sources:
  - Skin when exposed to sunlight
  - Supplements (D3 not D2)
  - Found in small quantities in fortified foods (like milk) and cold water fatty fish
- Historically, humans got vitamin D from two sources:
  - Skin is exposed to sun (probably made up 95% of average daily input)
  - Fatty fish up 100% of daily input (Inuit and whale blubber) depending on area
  - No civilization has survived the extremes of latitude without finding a food source of D.

The Case for Vitamin D

- Humans evolved on the equator, where they received lots of sun exposure.
- Studies demonstrate that when humans get enough UVB exposure to produce a slight pinkness to the full naked body, humans produce up to 25,000 IU.
- Full body sunburns (3 MED) produce > 50,000 IU.
- At this latitude (38*N), when full-body sunbathing at solar noon in the summer, you make about 1,000 IU/min sunbathing.

Holick MF. The Photobiology of Vitamin D. Vitamin D Third Edition by Feldman, Pike & Adams, 2011

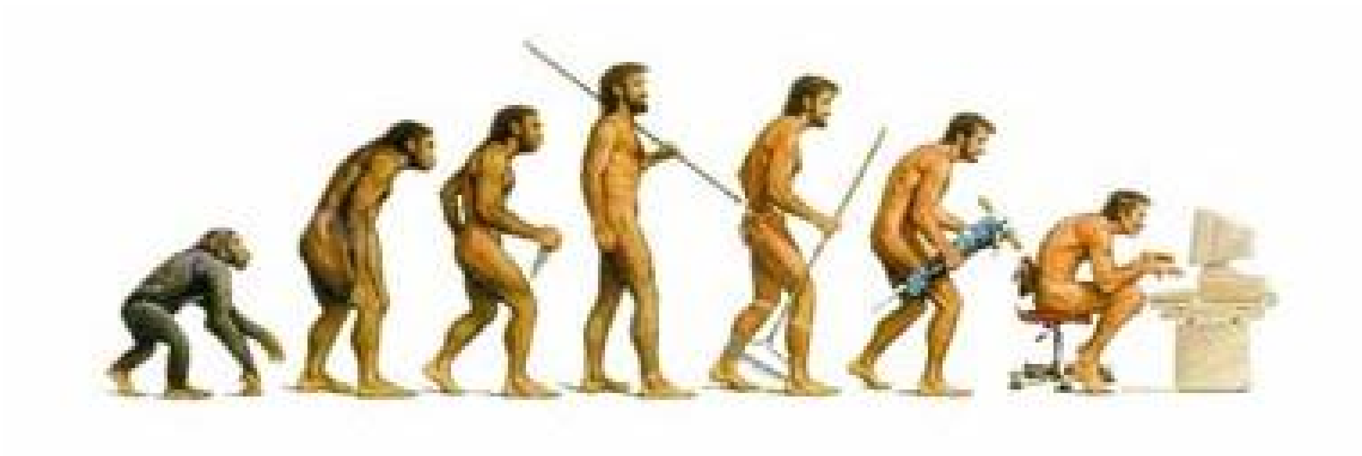
The Case for Vitamin D

- When humans moved away from the equator, skin color lightened.
  – Why? The less melanin in the skin, the more vitamin D you can make in less time and under less intense sun exposure.
  – That is, the body evolved to still be able to produce robust quantities of vitamin D, even in less sunny climates.

Jablonski NG. The evolution of human skin colouration and its relevance to health in the modern world. J R Coll Physicians Edinb, 2012

The Case for Vitamin D

- Now the problem:
  - We don't get much sun exposure in the 21st century

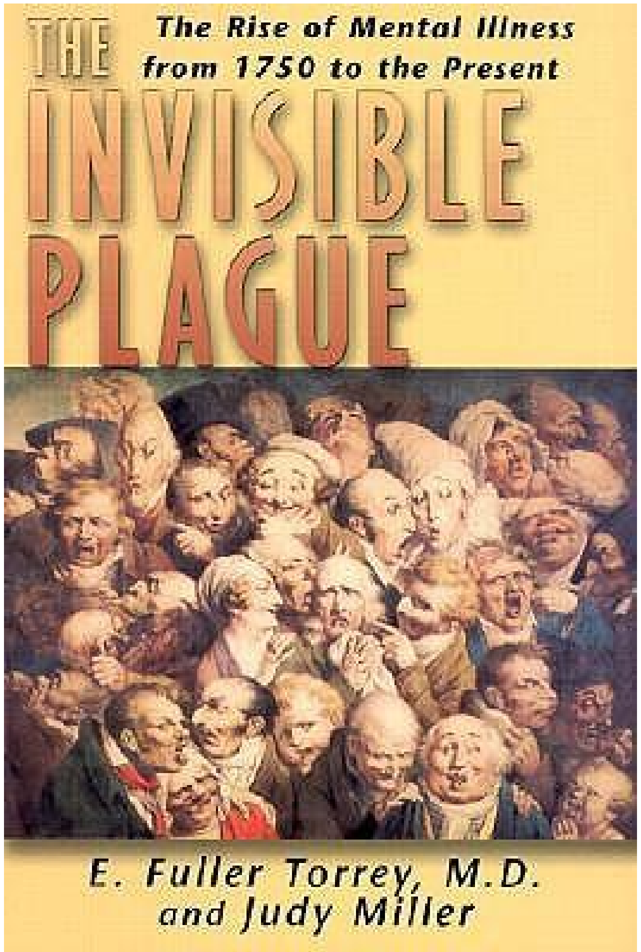


The Case for Vitamin D

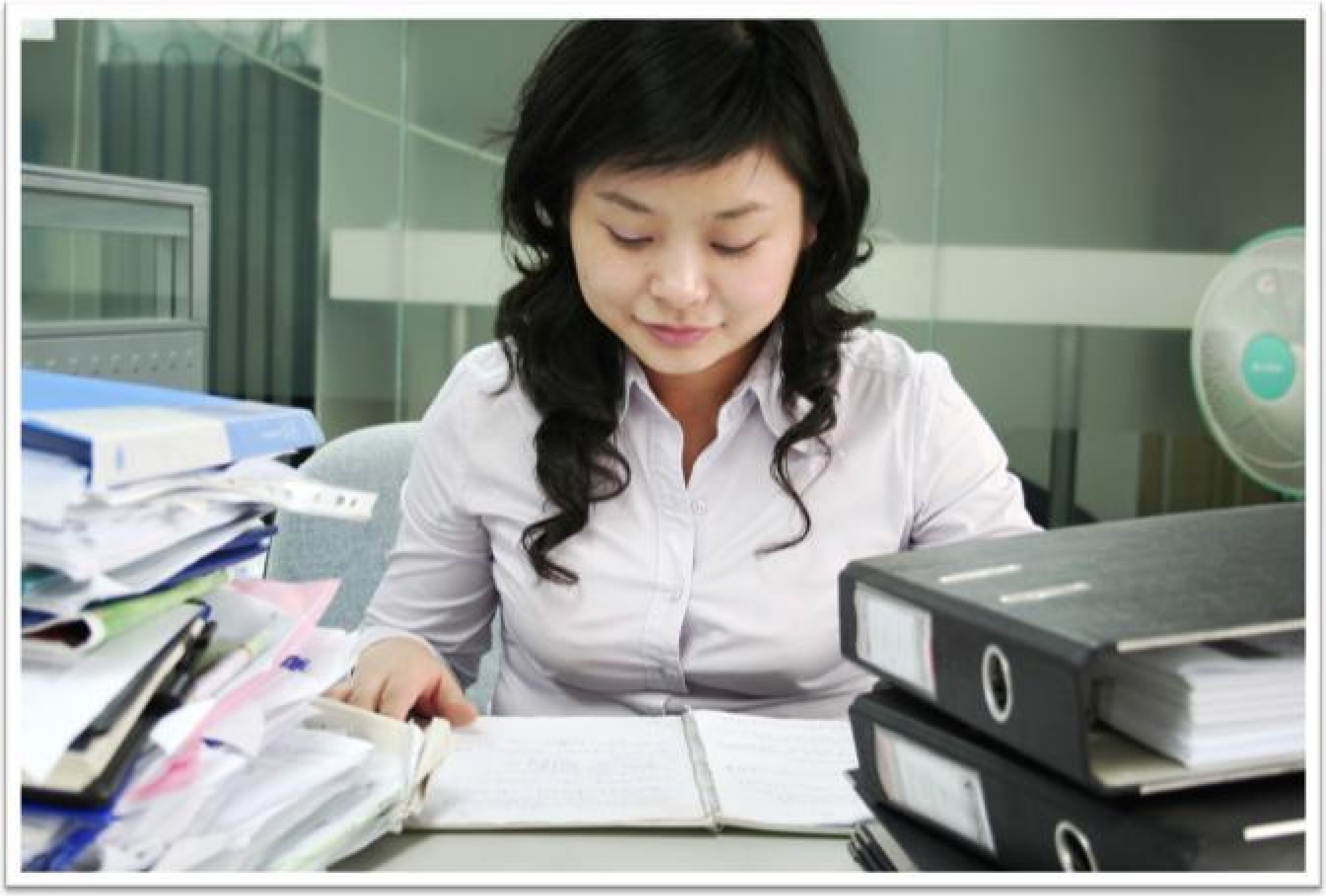
The Case for Vitamin D

Strict sun avoidance and sunscreen, is new to the human population.

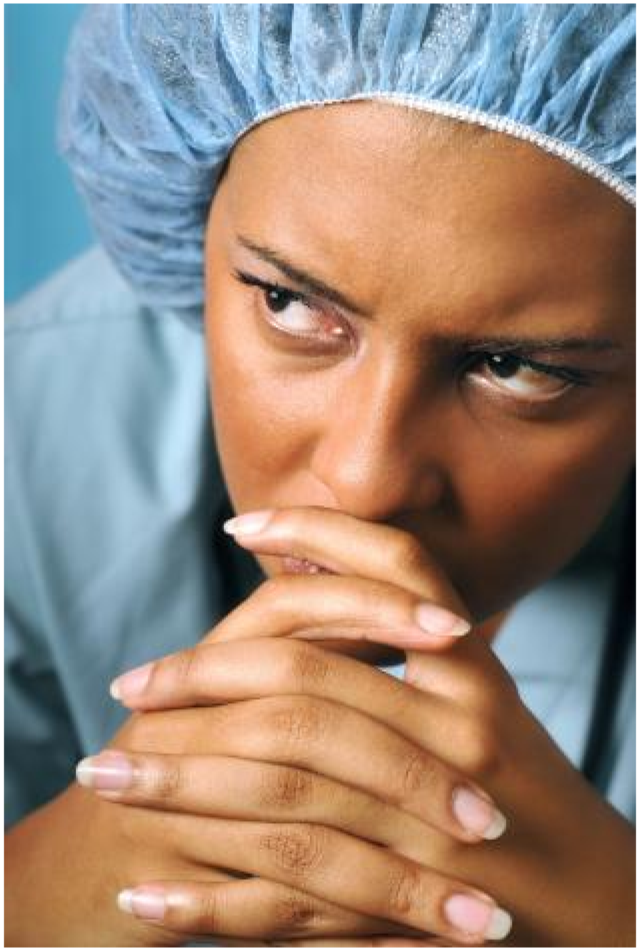
The Case for Vitamin D



The Case for Vitamin D

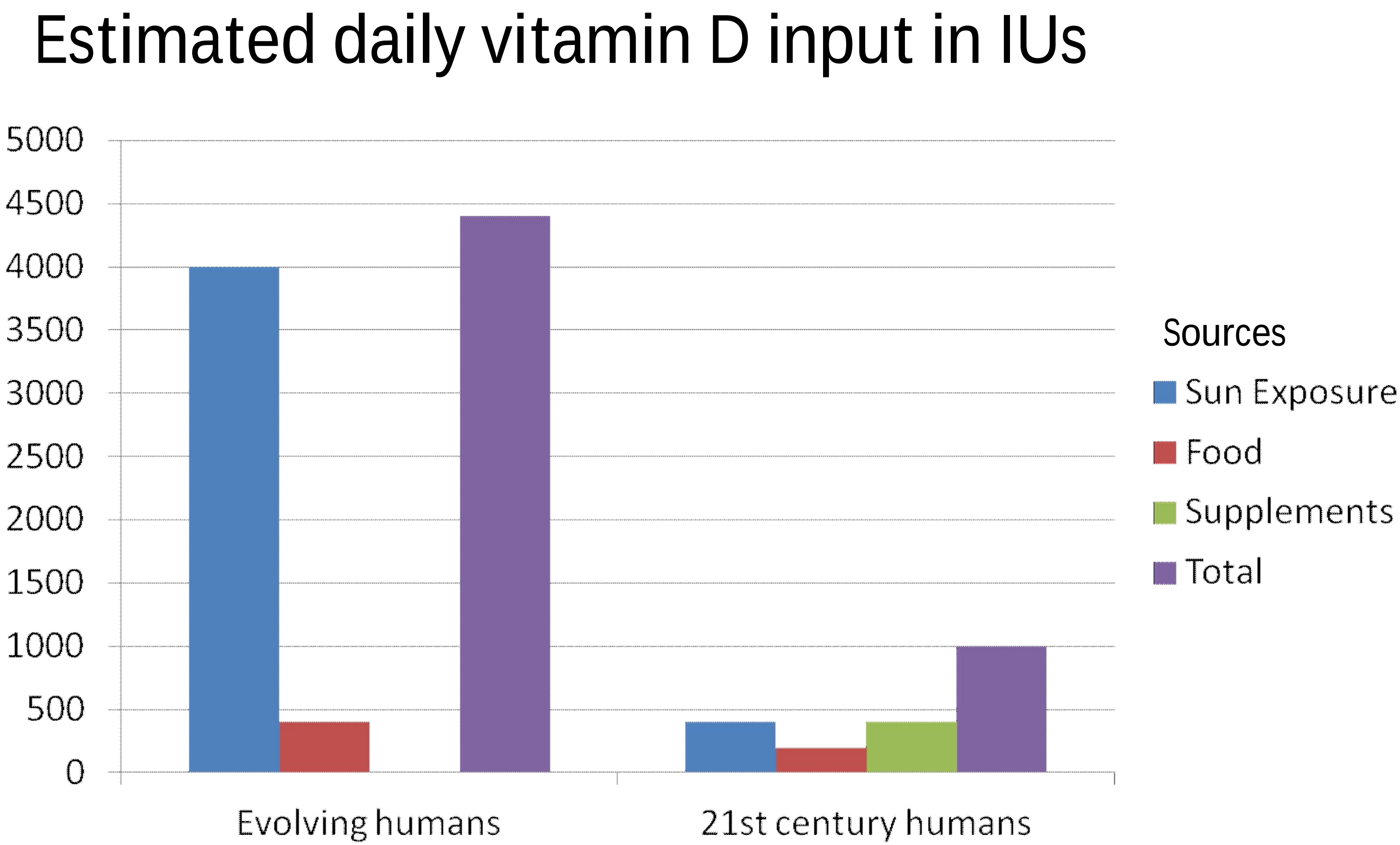


The Case for Vitamin D



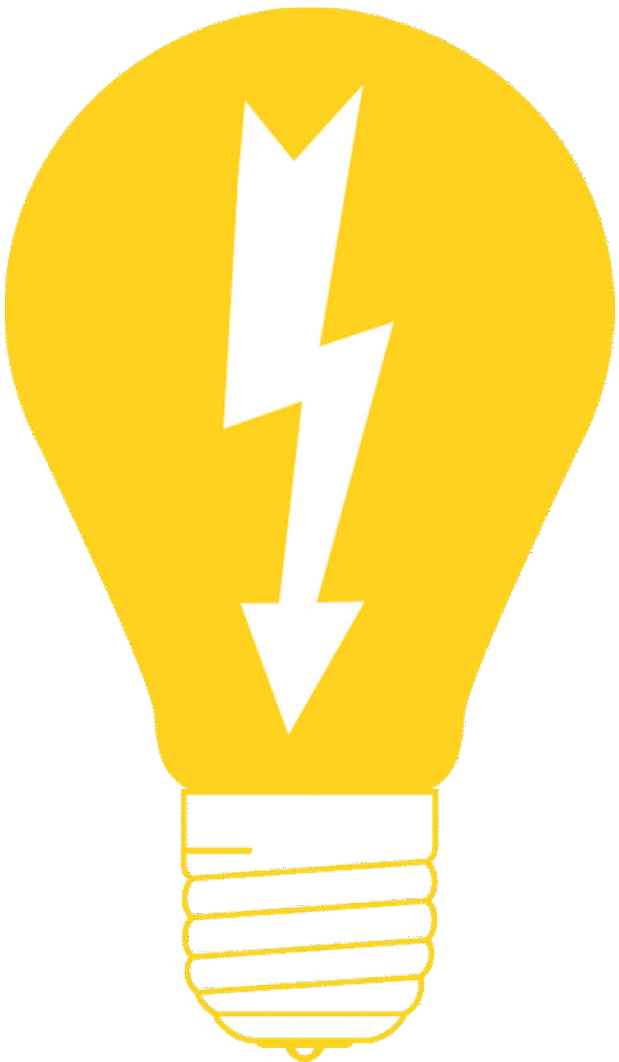
- The outcome:
  - We are in the midst of a vitamin D deficiency pandemic, and research is slow to unravel its potential ill-consequences.

The Case for Vitamin D



The Case for Vitamin D

- How do we know how many IUs of vitamin D evolving humans got?
  - Let’s first look at how the body produces and metabolizes vitamin D.



The Case for Vitamin D

- Photobiology of vitamin D
  - When human skin is exposed to sunlight, UVB causes photolysis of 7-dehydrocholesterol to previtamin D3.
  - This previtamin D3 is <u>heat transformed</u> (sunburn) into vitamin D, then jettisoned into extracellular fluid space.

The Case for Vitamin D

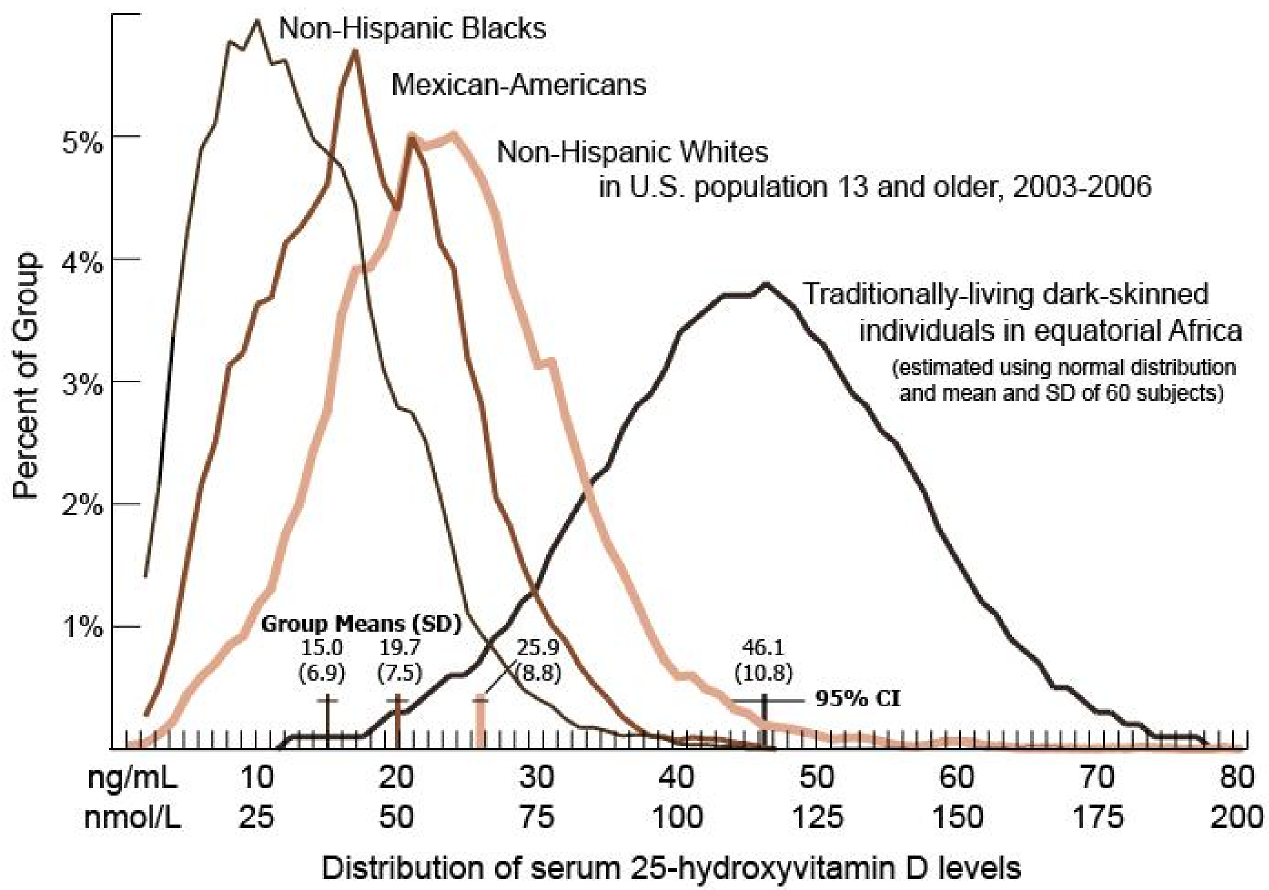
- Metabolism of vitamin D
  - Once vitamin D reaches the liver, the liver hydroxylates vitamin D into 25(OH)D.
  - 25(OH)D is how we measure vitamin D clinically.
    - 25(OH)D is often just called “vitamin D level”

The Case for Vitamin D

- 25(OH)D levels of studied cohorts
  – Lifeguards after summer (1971): 60 ng/ml
  – Equatorial hunter-gatherers (2012): 46 ng/ml
  – Caucasian Americans (2001): 26 ng/ml
  – Mexican Americans (2001): 19 ng/ml
  – African-Americans (2001): 15 ng/ml

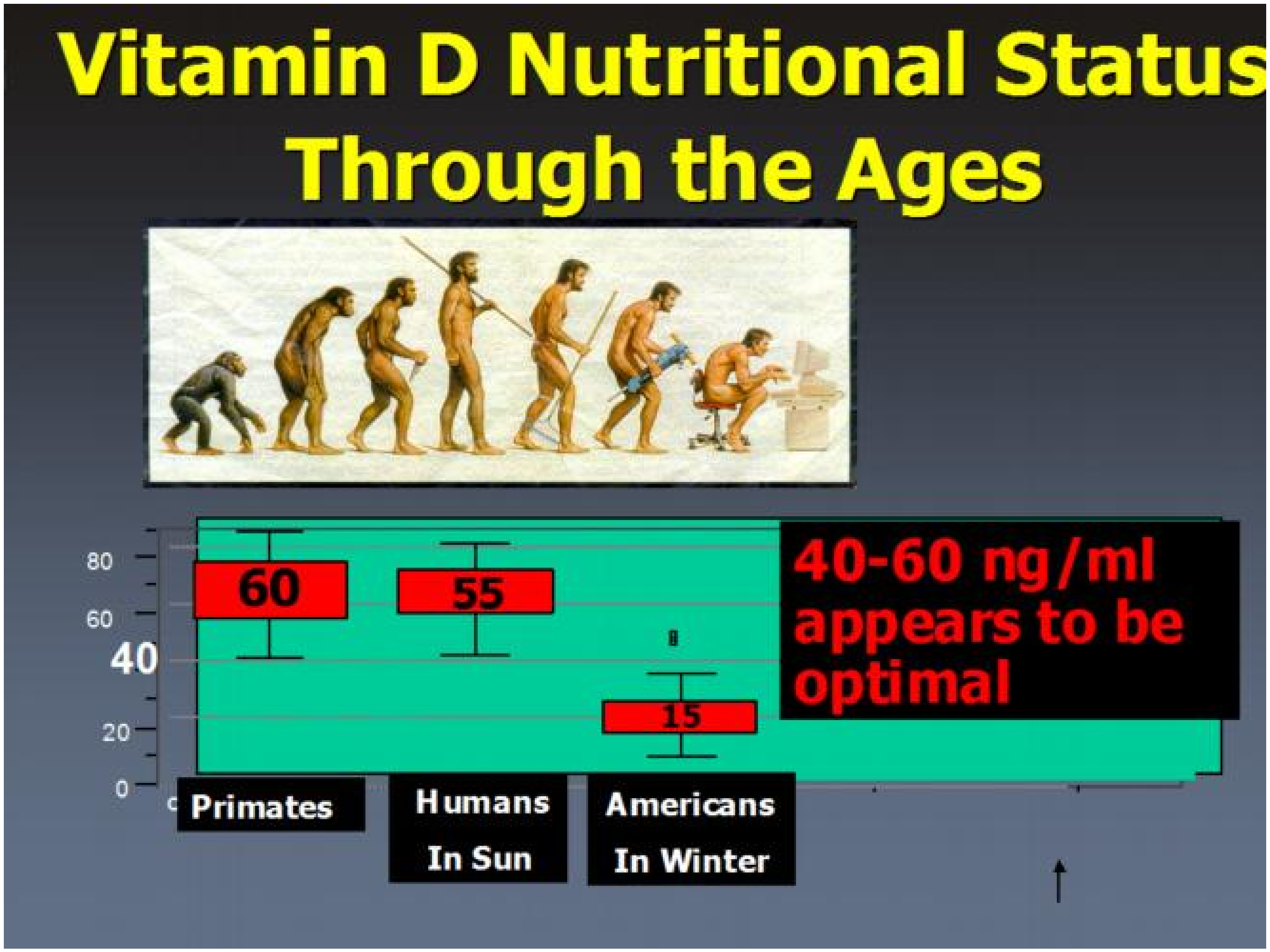
Hadadd JG and KJ Chyu. Competitive protein-binding radioassay for 25(OH)D. The Journal of Clinical Endocrinology and Metabolism. 1971.
Luxwolda MF et al. Traditionally living populations in East Africa have a mean serum 25-hydroxyvitamin D concentration of 115 nmol/l. Br J Nutr, 2012.
Weishaar T and Vergili JM. Vitamin D Status Is a Biological Determinant of Health Disparities. J of the Acad of Nutr & Dietetics, 2013

The Case for Vitamin D



100% of each group lies below its line. Smoothed by averaging each set of three adjacent data points.
U.S. data are from the National Health and Nutrition Examination Survey (NHANES).
African data are from Luxwolda MF, Kuipers RS, Kema IP, Dijck-Brouwer DAJ, Muskiet FAJ.
Traditionally living populations in East Africa have a mean serum 25-hydroxyvitamin D concentration of 115 nmol/l.
Br. J. Nutr. Nov 2012;108(9):1557-1561.

The Case for Vitamin D



The Case for Vitamin D

- USA mean vitamin D levels were 30 ng/mL during National Health and Nutrition Examination Survey or NHANES III (1988-1994) but decreased to 24 ng/mL during NHANES 2001-2004 (2001-2004). The prevalence of 25(OH)D levels of 30 ng/mL or more decreased from 45% to 23% from 1994 to 2004.

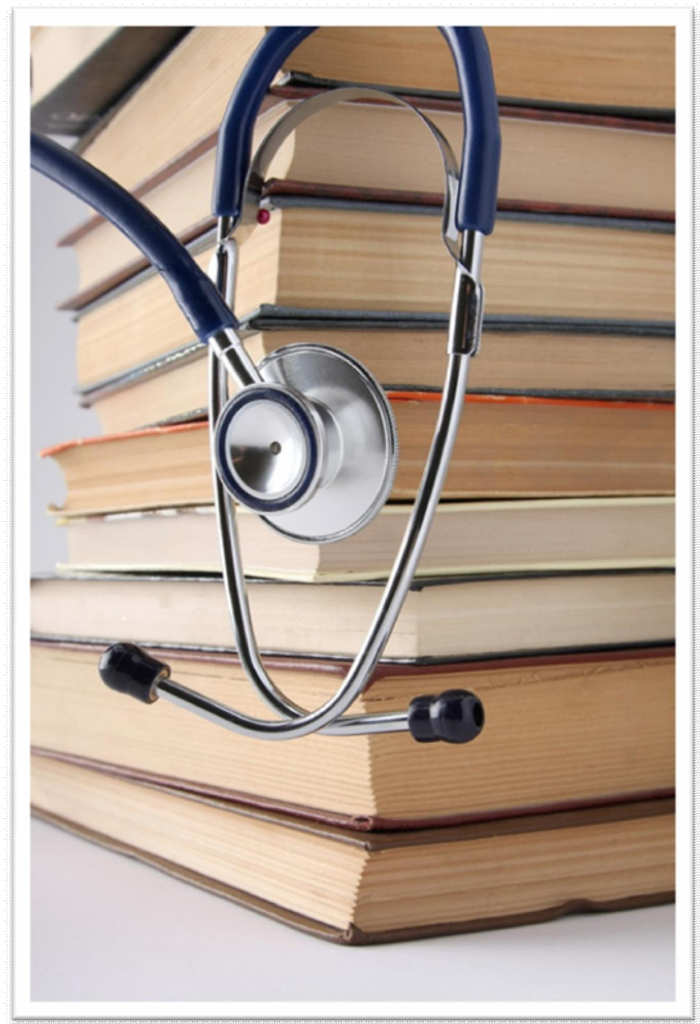
- Ginde AA, Liu MC, Camargo CA Jr. Demographic differences and trends of vitamin D insufficiency in the US population, 1988-2004. Arch Intern Med. 2009 Mar 23;169(6):626-32

The Case for Vitamin D

- In essence, we know that natural levels are around 40-60 ng/ml.
- Mean normal levels in developed countries range from 10-30 ng/ml.
  - "Natural" and "normal" are two very different things.
    - "Natural" vitamin D levels are what sun-exposed people have (40-60 ng/ml).
    - "Normal" vitamin D levels are based on those who live and work indoors (10-30 ng/ml).
- Many researchers, clinicians and health officials think this gives basis for the call that we are in the middle of a vitamin D deficiency pandemic.

The Case for Vitamin D

- What are the consequences of widespread vitamin D deficiency?
  - Back to vitamin D metabolism and how the body uses vitamin D.



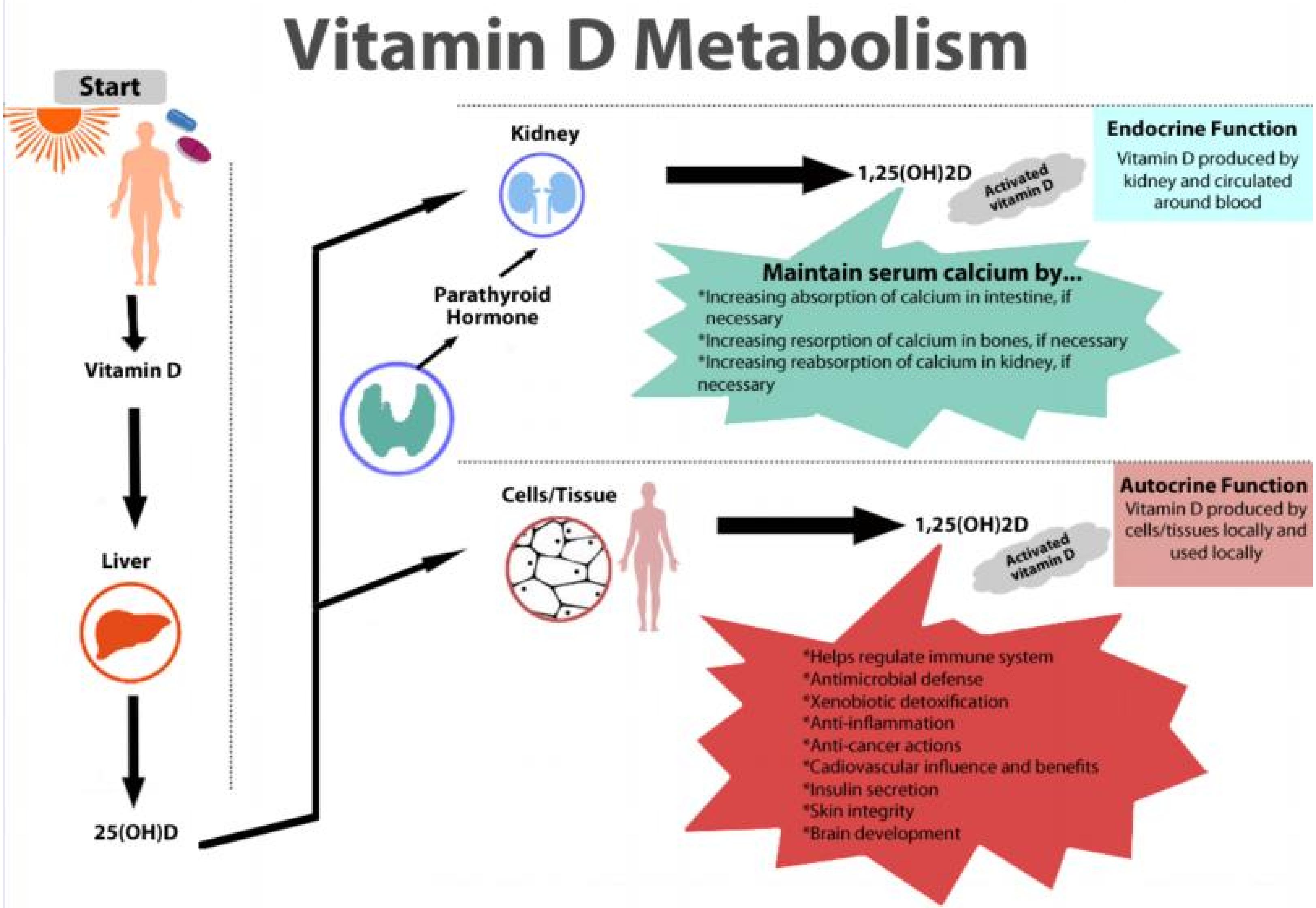
The Case for Vitamin D

- Metabolism of vitamin D
  - After the liver produces 25(OH)D, DBP takes this to the kidney and 36 other tissues all around the body.
  - The kidney pumps 1,25(OH)2D, also known as “activated vitamin D” into the blood (endocrine).
  - Other tissues produce 1,25(OH)2D locally, intracellulary (autocrine).

The Case for Vitamin D

- Function of activated vitamin D
  - Endocrine function
    - Kidney produces activated vitamin D, which circulates in the blood to maintain calcium homeostasis, which is one reason why it's important for bone health.
  - Autocrine function (substrate dependent)
    - 36 other tissues in the body produce activated vitamin D locally, which is why vitamin D is important for a host of bodily functions and diseases.

The Case for Vitamin D

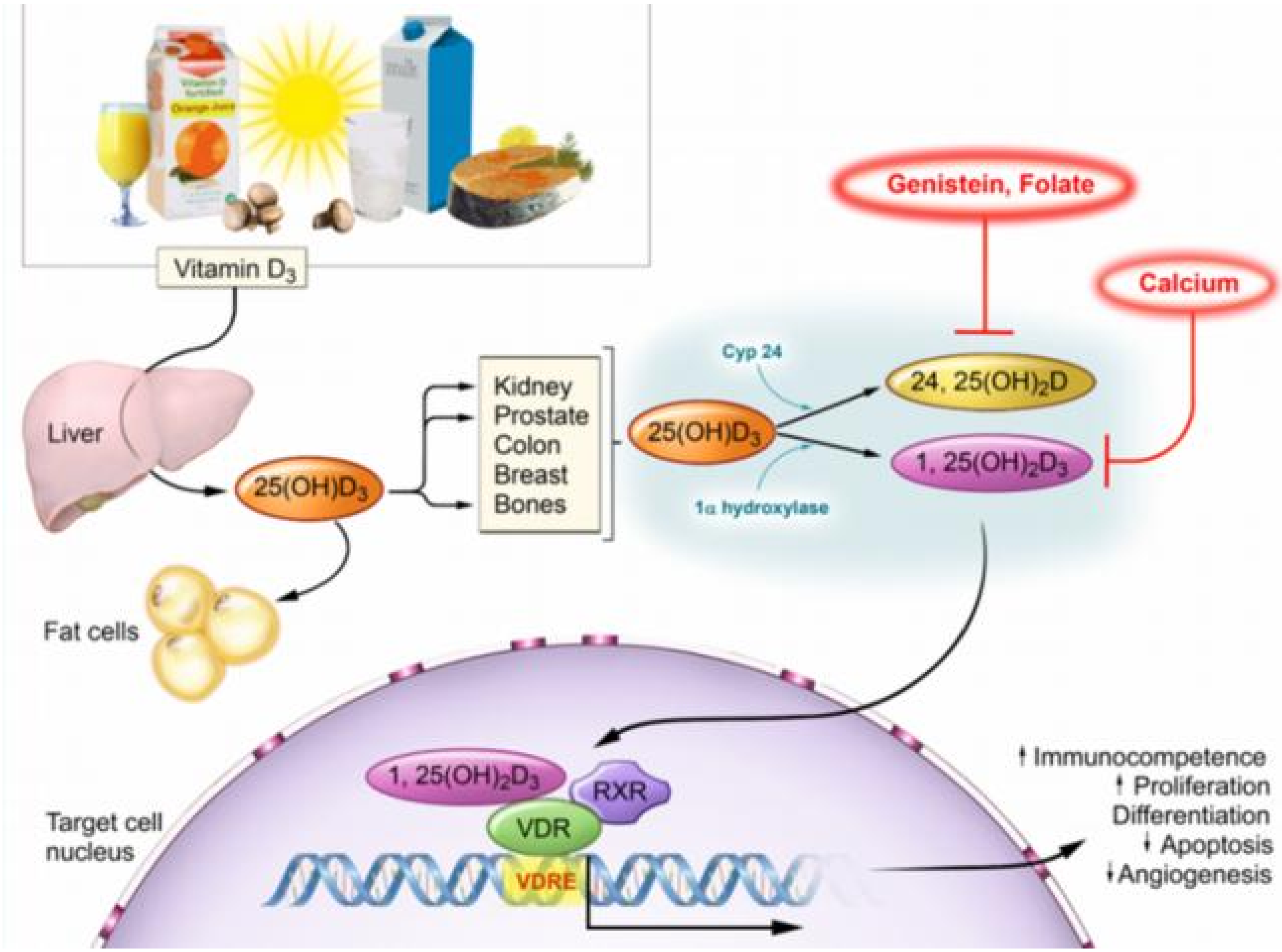


Haussler MR, et al. Nuclear Vitamin D Receptor: Natural Ligands, Molecular Structure-Function, and Transcriptional Control of Vital Genes. Vitamin D: Third Edition, Feldman, Pike, Adams. Elsevier Press, 2011.

The Case for Vitamin D

- Activated vitamin D is a seco-steroid hormone operating via the super family of thyroid/steroid hormone receptors either up-regulating (90%) or down-regulating (10%) the gene.
- This means it has <u>as many mechanism of action as genes it regulates</u>.
- Directly or indirectly it regulates anywhere from 3% to 10% of the active human genome, depending on the review paper.
- Renin and tyrosine hydroxylase are two examples of the genes it directly regulates.
- It down-regulates the renin gene (reducing blood pressure in high renin hypertension).
- It upregulates the tyrosine hydroxylase gene (perhaps improving depression via the brain's monoamine neurotransmitters).
- Two widely different conditions because 2 totally different genes.

The Case for Vitamin D



Anywhere from 3% to 10% (depending on the paper) of the active human genome is directly or indirectly regulated by vitamin D

The Case for Vitamin D

- Ill-effects of vitamin D deficiency
  - When the body is deficient in vitamin D, you're not giving the 36 tissues the building blocks it needs to produce and regulate 1,25(OH)2D inside cells.
  - When the body doesn't have enough building blocks (vitamin D) for 1,25(OH)2D, you have difficulty signaling your genes.
  - When 25 (OH)D levels are low, the body "triages" vitamin D to the immediate life saving need of maintaining blood calcium, and pays less attention to the long term needs of the 36 tissues.

The Case for Vitamin D

- Ill-effects of vitamin D deficiency
  - Without proper autocrine function, we're discovering vitamin D deficiency may be part of the etiology of…
    - Autoimmune diseases
    - Cancers
    - Cardiovascular diseases
    - Mental health disorders
    - Infectious diseases
    - Respiratory health…

The Case for Vitamin D

- Everyone who takes a vitamin D supplement will die.
- Everyone who does not take a vitamin D supplant will die.
- So the question is when?

The Case for Vitamin D

- Sun avoidance is like one big unplanned experiment:
  - What happens to Americans when they avoid the sun or use sunblock and then don’t do anything to make up for the vitamin D that the skin is not making?
  - This experiment started in the mid 1980s.
  - You are a participant in this experiment.

- Again, what happens when we’re deficient in vitamin D?

The Case for Vitamin D

- Research is slow to find out.
- For specific diseases, research usually unfolds something like this:
  - Researchers notice higher prevalence of disease the further you move from equator
  - Then they do some cross-sectional studies
  - Look at cohorts prospectively
  - Finally get to some clinical trials (RCT).

The Case for Vitamin D

- Example: Multiple sclerosis
  - Suggested in 1974 and 1992 that vitamin D is implicated in MS.
    - Was supported by looking at incidence of MS around the world. Further away from equator, the higher the incidence of MS. Further away from equator, equals less sun exposure, less vitamin D.
  - Furthermore, when immigrants moved away from higher latitudes to lower latitudes, incidence of MS decreased to lower than expected rates in those immigrants

Hayes CE et al. Vitamin D and Multiple Sclerosis. Vitamin D: Third Edition. Feldman, Pike & Adams. Elsevier Press, 2011

The Case for Vitamin D

- Example: Multiple sclerosis
  - Then looked at incidence in Nurses' Health Study II, a cohort of over 95,000 women
    - Those who took over 400 IU of vitamin D/day had a 40% reduced risk of developing MS than those who did not.
  - Prospective nested case-control study among 7 million US military personnel
    - 41% decreased risk of developing MS for every 20 ng/ml increase in vitamin D levels

Hayes CE et al. Vitamin D and Multiple Sclerosis. Vitamin D: Third Edition. Feldman, Pike & Adams. Elsevier Press, 2011

The Case for Vitamin D

- Example: Multiple sclerosis
  - Finally, a small RCT this past year showed that 20,000 IU/week reduced disease activity in patients with MS.
  - Another small RCT later last year showed that 50,000 IU/week reduced or delayed onset of MS for patients with Clinically Isolated Syndrome.

Soilu-Hänninen M et al. A randomised, double blind, placebo controlled trial with vitamin D3 as an add on treatment to interferon β-1b in patients with multiple sclerosis. J Neurol Neurosurg Psychiatry, 2012.

Derakhshandi H et al. Preventive effect of vitamin D3 supplementation on conversion of optic neuritis to clinically definite multiple sclerosis: a double blind, randomized, placebo-controlled pilot clinical trial. Acta Nerol Belg, 2012.

The Case for Vitamin D

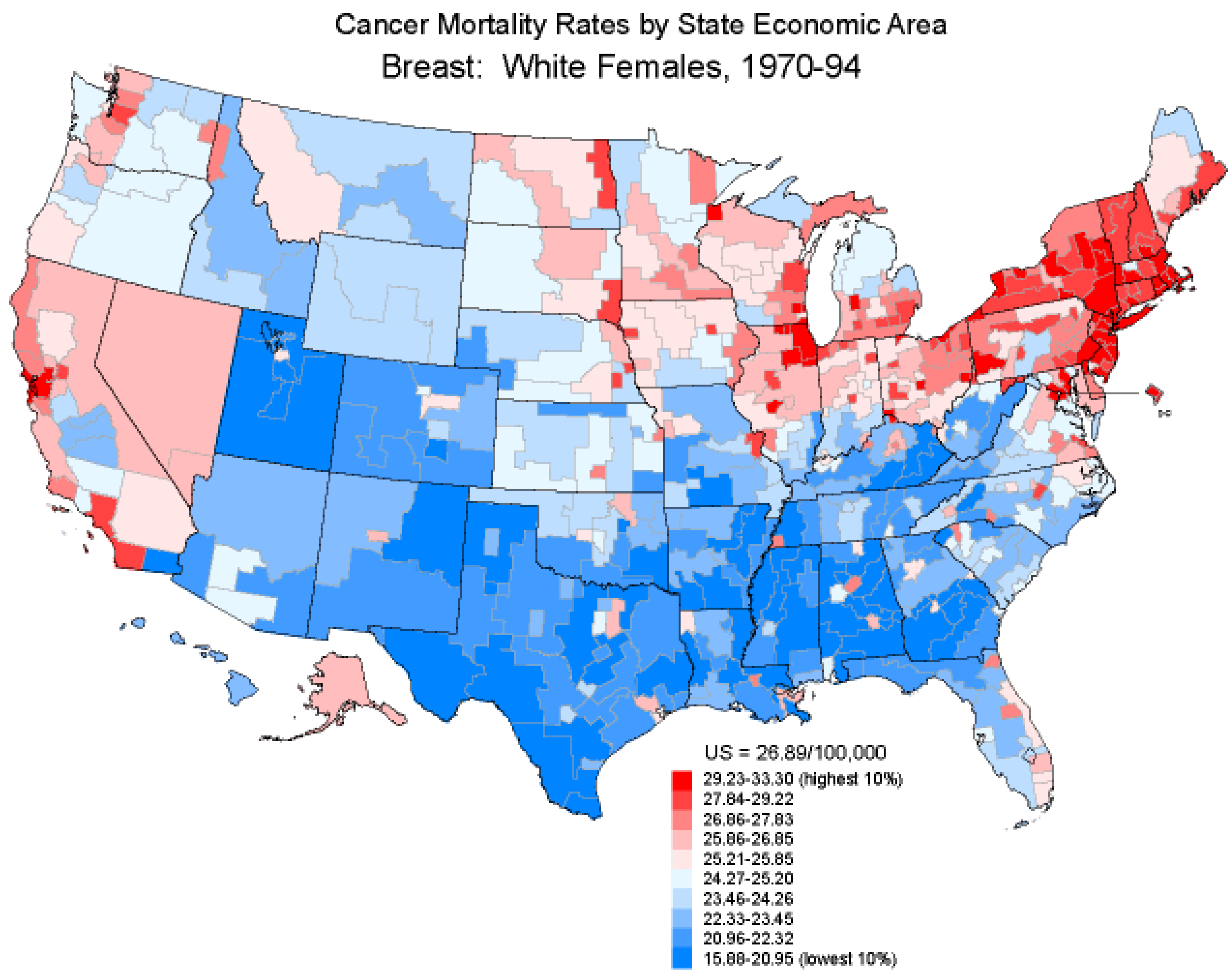
- Recent debate in the journal, *Multiple Sclerosis*. Would you take 10,000 IU/day if you had CIS or early MS?
  - Papeix C, Lubetzki C. If I had clinically isolated syndrome with MRI diagnostic of MS I would take vitamin D 10,000 IU daily; no. MSJ. 2013.
    - No, I would not.
  - Correale J. If I had clinically isolated syndrome with magnetic resonance imaging diagnostic of multiple sclerosis, I would take vitamin D 10,000 IU daily; yes. MS Journal. 2013.
    - Yes, I would and I would advise my MS patients to do so.
  - Hutchinson M. If I had CIS with MRI diagnostic of MS, I would take vitamin D 10,000 IU daily; commentary. MS Journal. 2013.
    - Yes, I would but I would not advise my MS patients to do so.

The Case for Vitamin D

- Another example: Cancer
  - Suggested in 1930s and 40s that sunlight reduced (but not eliminated) the risk of internal cancers
  - Garland brothers reintroduced the idea in the early 1980s, noticing that incidence of colon cancer, breast cancer and ovarian cancer were highest in regions in the USA that got least amount of sun exposure.

Giovannucci E. The Epidemiology of Vitamin D and Cancer Risk. Vitamin D: Third Edition. Feldman, Pike & Adams. Elsevier Press, 2011

The Case for Vitamin D



Map obtained from National Cancer Institute's Cancer Mortality Maps & Graphs

The Case for Vitamin D

- Example: On colon cancer
  - Cohort study of Health Professionals Follow-up Study
    - Found those in the highest quintile of 25(OH)D had a 54% reduced risk of getting colon cancer (RR=.46, p trend=.005)
  - When pooled with Nurses' Health Study
    - Found those with higher 25(OH)D had 46% reduced risk (RR=.54, p trend=.002)

Giovannucci E. The Epidemiology of Vitamin D and Cancer Risk. Vitamin D: Third Edition. Feldman, Pike & Adams. Elsevier Press, 2011

The Case for Vitamin D

- Example: Cancer
  - RCT in 2007: 1,179 women over 55, randomized to take either 1500 mg calcium and 1100 IU vitamin D, just calcium or placebos.
    - RR incident of all-type cancer was .40 (p=.01) for Ca+D compared to placebo. Just .53 for Ca only.
    - In a sub-analysis of cancers diagnosed after first year, RR was .23 (p<.005) for Ca+D group. No significant reduced risk for Ca only group.
  - More RCTs on the way for cancer/vitamin D
  - Does not cure or 100% of the time prevent cancer!

Giovannucci E. The Epidemiology of Vitamin D and Cancer Risk. Vitamin D: Third Edition. Feldman, Pike & Adams. Elsevier Press, 2011

The Case for Vitamin D

- Other randomized controlled trials confirming ill-effects of vitamin D deficiency:
  - COPD common in WV.
    - RCT of 182 patients with moderate to severe COPD with recent exacerbations who were currently undergoing treatment
    - Patients were assigned to placebo or vitamin D group (100,000 IU/month)
    - Seriously D deficient participants(<10 ng/mL), reduced their rate of flare-ups/year by 43% with D

Lehouck A et al. High Doses of Vitamin D to Reduce Exacerbations in Chronic Obstructive Pulmonary Disease (COPD): A Randomized Trial, Annals of Internal Medicine, 2012 Jan 17

The Case for Vitamin D

- Other randomized controlled trials confirming ill-effects of vitamin D deficiency:
  - Depression:
    - A RCT: 42 patients with major depression, half of them receive 20 mg/day of Prozac and the other half 20 mg/day of Prozac plus 1,500 IU/day of vitamin D.
    - Prozac often takes 8 weeks to begin working, but here, after 4 weeks, they saw that the Prozac and vitamin D group had improved more than the Prozac only group ($p<.001$).
    - This improvement continued throughout the study (6 and 8 weeks).

Khoraminya N, Tehrani-Doost M, Jazayeri S, Hosseini A, Djazayery A. Therapeutic effects of vitamin D as adjunctive therapy to fluoxetine in patients with major depressive disorder. Aust N Z J Psychiatry, 2012

The Case for Vitamin D

- Other randomized controlled trials confirming ill-effects of vitamin D deficiency:
  - Systemic lupus erythematosis.
    - RCT: 267 SLE patients were randomized to receive 2,000 IU/day (n=178) vitamin D3 or a placebo (n=89) for 1 year.
    - Over the course of the year, only 10% of patients in the vitamin D group experienced a flare-up, compared to 24% experiencing flare-ups in the placebo group over the course of the year ($p<0.05$).
    - The authors noticed a significant reduction in SLE-related auto-antibodies in the vitamin D group compared with the placebo group ($p=0.05$).

Abou-Raya A, Abou-Raya S, Helmii M. The effect of vitamin D supplementation on inflammatory and hemostatic markers and disease activity in patients with systemic lupus erythematosis: A randomized placebo-controlled trail. The Journal of Rheumatology. Dec 2012.

The Case for Vitamin D

- Other randomized controlled trials confirming ill-effects of vitamin D deficiency:
  - Respiratory infections:
    - RCT: 4,000 IU/day of vitamin D3 or placebo for one year in 140 patients with immune deficiency (60%) or a history of frequent infections (40%).
    - Vitamin D group had a reduced total infectious score, about a 25% reduction in self reported infections.
    - Antibiotic use was reduced by 64% in the treatment group.
    - Recent negative *JAMA* study had controls with levels of almost 30 ng/ml.

Bergman P et al. Vitamin D3 supplementation in patients with frequent respiratory tract infections: a randomised and double-blind intervention study. BMJ Open, 2012.

The Case for Vitamin D

- Other randomized controlled trials confirming ill-effects of vitamin D deficiency:
  - Type 2 Diabetes (T2D):
    - RCT: 81 T2D patients randomized to either take 4,000 IU/day or placebo
    - Improvements were seen in insulin sensitivity and insulin resistance ($p=0.003$ and 0.02, respectively).
    - Fasting insulin decreased in vitamin D group ($p=0.02$).
    - Insulin resistance improved best when vitamin D levels were over 80 nmol/L or 32 ng/ml.

von Hurst PR, Stonehouse W, Coad J. Vitamin D supplementation reduces insulin resistance in South Asian women living in New Zealand who are insulin resistant and vitamin D deficient - a randomised, placebo-controlled trial. Br J Nutr. 2010 Feb;103(4):549-552012.

The Case for Vitamin D

- Autism
  - No RCT or cohort studies.
  - However a 2012 cross-sectional analysis of 50 autistic children:
  - 25(OH)D levels in autistic children (15 ng/ml) were half of controls (30 ng/ml), despite parents reporting the same amount of sun exposure (when 25(OH)D levels are low, 25 (OH)D is 70% heritable).
  - Autism severity as measured on the Autism Rating scale was inversely related to 25(OH)D with an incredible R value of .86.
  - An anti-neural antibody was also related to 25(OH)D with another incredible R value of .84.

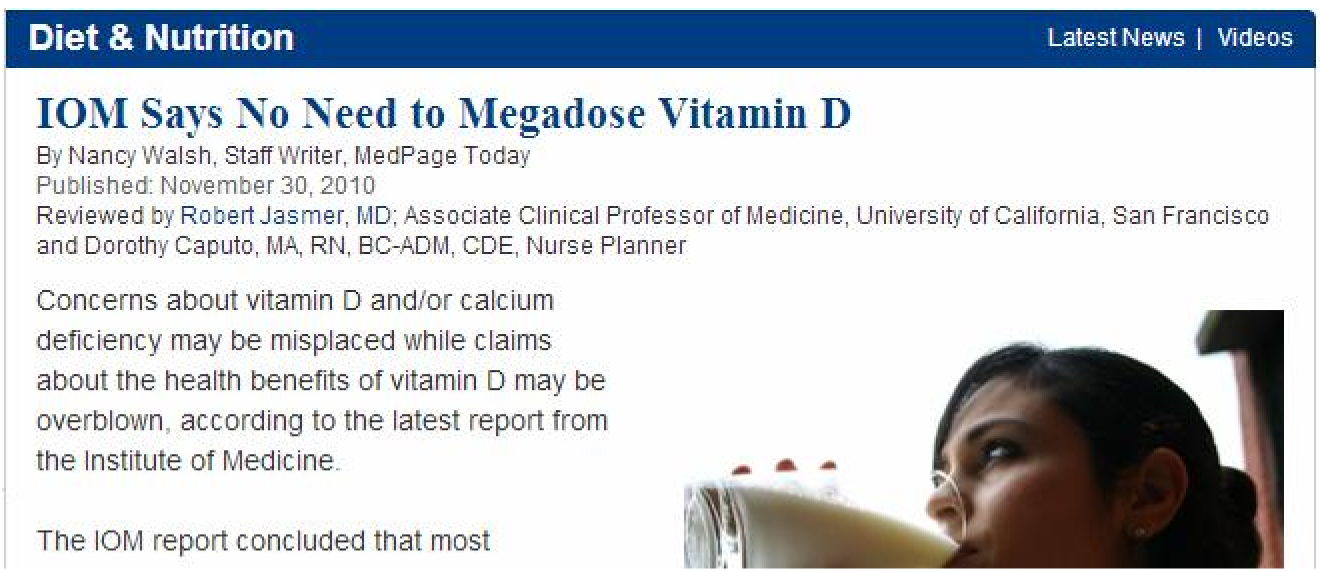
Mostafa GA, Al-Ayadhi LY. Reduced serum concentrations of 25-hydroxy vitamin D in children with autism: relation to autoimmunity. J Neuroinflammation. 2012 Aug 17;9:201.

The Case for Vitamin D

- There are many more diseases that follow this research pattern.
- For me, evidence-based medicine is too slow to find out if natural vitamin D levels are important, when we clearly aren’t getting as much as our ancestors.
- These examples demonstrate that we should not wait for more research to recommend higher vitamin D levels and/or sun exposure.
- We definitely need more research.
- However, physicians have always been ethically and legally required to act on what is known now, not on what may or may not be discovered in the future.

The Case for Vitamin D

- Institute of Medicine's 2010 Food and Nutrition Board (FNB) recommendations:
  - Adults take 600 IU/day
  - Need only a 25(OH)D level of only 20 ng/ml
  - However the FNB's N.O.A.E.L. is 10,000 IU/day
  - They made clear this does not apply to physicians treating patients.



Diet & Nutrition Latest News | Videos

IOM Says No Need to Megadose Vitamin D

By Nancy Walsh, Staff Writer, MedPage Today
Published: November 30, 2010
Reviewed by Robert Jasmer, MD; Associate Clinical Professor of Medicine, University of California, San Francisco and Dorothy Caputo, MA, RN, BC-ADM, CDE, Nurse Planner

Concerns about vitamin D and/or calcium deficiency may be misplaced while claims about the health benefits of vitamin D may be overblown, according to the latest report from the Institute of Medicine.

The IOM report concluded that most

The Case for Vitamin D

- The FNB knew several trials are underway assessing higher doses for general population.
  – They wanted to wait, get these done.
- They were not very good about stating:
  – There’s little evidence suggesting natural levels and higher dosage are by any means harmful.

The Case for Vitamin D

- Professor Robert Heaney (On the last FNB) responds best,

  > "I believe that the presumption of adequacy should rest with vitamin D intakes needed to achieve the serum 25(OH)D values (i.e., 40–60 ng/mL) that prevailed during the evolution of human physiology. Correspondingly, the burden of proof should fall on those maintaining that there is no preventable disease or dysfunction at lower levels. The IOM has not met that standard."

The Case for Vitamin D

- U.S. Preventative Service Task Force (USPSTF) sends out confusing reports, mixed messages to public. First, about a year ago, they said to take vitamin D to prevent falls:

Annals of Internal Medicine

ESTABLISHED IN 1927 BY THE AMERICAN COLLEGE OF PHYSICIANS

Home | Current Issue | All Issues | Online First | Collections | In the Clinic | Journal Club | CME

Clinical Guidelines | 7 August 2012

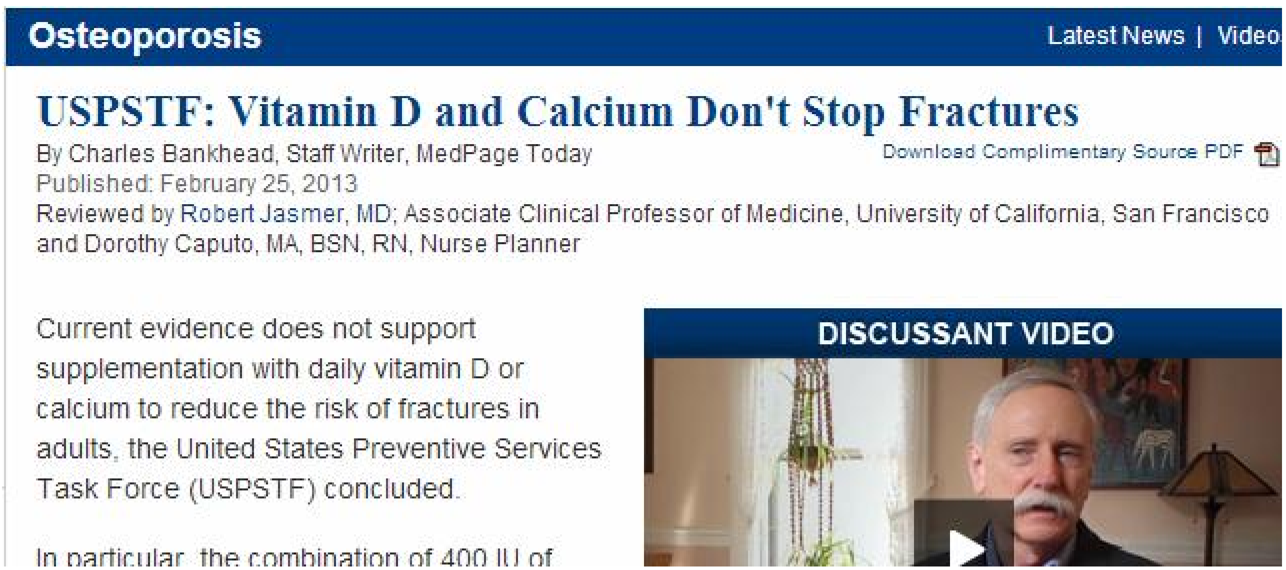
Prevention of Falls in Community-Dwelling Older Adults: U.S. Preventive Services Task Force Recommendation Statement FREE

Virginia A. Moyer, MD, MPH; and on behalf of the U.S. Preventive Services Task Force*

Recommendations: The USPSTF recommends exercise or physical therapy and vitamin D supplementation to prevent falls in community-dwelling adults aged 65 years or older who are at increased risk for falls. (Grade B recommendation)

The Case for Vitamin D

- Then, USPSTF says don't take low dose vitamin D to prevent fractures. They said there was insufficient fracture evidence to say anything one way or the other about higher doses preventing fractures.



Osteoporosis

Latest News | Video

USPSTF: Vitamin D and Calcium Don't Stop Fractures

By Charles Bankhead, Staff Writer, MedPage Today

Download Complimentary Source PDF

Published: February 25, 2013

Reviewed by Robert Jasmer, MD; Associate Clinical Professor of Medicine, University of California, San Francisco and Dorothy Caputo, MA, BSN, RN, Nurse Planner

Current evidence does not support supplementation with daily vitamin D or calcium to reduce the risk of fractures in adults, the United States Preventive Services Task Force (USPSTF) concluded.

DISCUSSANT VIDEO

In particular, the combination of 400 IU of

The Case for Vitamin D

- Confusing, not helpful, doesn’t add guidance or insight for public.
- In their meta-analysis on fractures, pooled 19 RCTs, most of which used 400 IU/day.
  - Their findings: 400 IU/day is of no benefit for fractures.
  - I agree. 400 IU/day in an adult is almost a meaningless dose.

Chung M et al. Vitamin D with or without calcium supplementation for prevention of cancer and fractures: an updated meta-analysis for the U.S. Preventive Services Task Force. Ann Intern Med, 2011

The Case for Vitamin D

- However, a recent meta-analysis of 11 RCTS published in the *New England Journal of Medicine* shows:
  - Doses of 800 IU/day or more reduce fractures.
  - 30% reduction in the risk of hip fracture (hazard ratio, 0.70; 95% CI, 0.58 to 0.86) and a 14% reduction in the risk of any non-vertebral fracture (hazard ratio, 0.86; 95% CI, 0.76 to 0.96).
  - Lower doses do not reduce fractures.

Bischoff-Ferrari HA et al. A pooled analysis of vitamin D dose requirements for fracture prevention. N Eng J Med, 2012.

The Case for Vitamin D

- Also, some perspective: one health outcome should not determine whether or not to take a supplement. Example:
  - A Cochrane meta-analysis pooled 50 RCTs and found that even low dose vitamin D3 reduced mortality in elderly adults by 6%.
  - However, most were low dose and mortality was a secondary outcome in all of these RCTs.

Bjelakovic G et al. Vitamin D supplementation for prevention of mortality in adults. Cochrane Database Syst Rev., 2011 Jul 6;(7):CD007470.

The Case for Vitamin D

- Looking at other recommendations
  - Vitamin D's active form is a hormone, so what does The Endocrine Society say?
    - In general, recommend 1,500-2,000 IU/day
    - 25(OH)D levels between > 30 and <100 ng/ml.
    - "10,000 IU/day for children and adults 19 years and older may be needed to correct vitamin D deficiency."
    - "Several recent studies have suggested that the recommended dietary allowances (RDA) of the FNB may be inadequate."

Holick MF et al. Evaluation, Treatment, and Prevention of Vitamin D Deficiency. J Clin Endo Metab, 2011.

The Case for Vitamin D

- Looking at other recommendations
  - What does the Vitamin D Council recommend?
    - For adults, 5,000 IU/day
    - Simple rationale: This dose most closely allows average adults to obtain a level of 40 - 60 ng/ml, a natural vitamin D level.
    - Observational studies say, health is better at 40 ng/ml.
    - For what we know about vitamin D, I would rather RCTs show me that natural levels are unacceptable, rather than wait for RCTs to show me that it is acceptable.

The Case for Vitamin D

- Looking at other recommendations
  - What does the Vitamin D Council recommend?
    - We recommend sun exposure.
      - Sun exposure is part of our evolution
      - Brief full body (June 21st) sun exposure, avoiding burning.
      - Can only make vitamin D when the sun is high in the sky, so that your shadow is shorter than you.
      - In the winter, with the angle the sun strikes the Earth, it’s hard to make much of any vitamin D in the winter. So you need to supplement during the winter.
      - Huntington is at latitude 48 degrees N (Vitamin D winter)
      - When you get full body sun exposure, you do not need to supplement on that day.

The Case for Vitamin D

- What kind of evidence are others waiting for?
  - VITAL study out of Harvard:
    - 20,000 men and women over age of 50
    - 2x2 RCT, administering:
      - 2,000 IU/day + omega 3s,
      - 2,000 IU/day + placebo,
      - Placebo + omega 3s,
      - Placebo + placebo.
      - Outcomes: cancer, cardiovascular disease among other things.
    - Results excepted in 2017

The Case for Vitamin D

- What kind of evidence are others waiting for?
  - FIND study out of Finland:
    - 18,000 men and women over age of 60
    - RCT administering:
      - 3,200 IU vitamin D/day
      - 1,600 IU vitamin D/day
      - placebo
    - Outcomes: cancer, cardiovascular disease, diabetes among other things.
    - Results excepted in 2020

The Case for Vitamin D

- What kind of evidence are others waiting for?
  - VIDAL in the UK:
    - 20,000 men and women, ages 65-84
    - RCT unfortunately administering 60,000 IU monthly
    - Outcomes: Longevity among other things
    - Results excepted in 2020
  - VIDA in New Zealand:
    - 5,100 men and women over age 50
    - Unfortunately administering 100,000 IU monthly
    - Outcomes: Cardiovascular disease, respiratory disease, fractures among other things
    - Results expected 2017-2020

The Case for Vitamin D

- It's up to you. You have to ask yourself:
  - "Do I the doctor or I the patient, want to wait for more research before I maintain natural levels of vitamin D or do I act on what is known now?"
- For me, the answer is easy: act on what is known now:
  - Maintain vitamin D levels of evolving humans, take 5,000 IU/day

Thank you. Questions?

John J Cannell, MD

Executive Director, Vitamin D Council