



Supplements

What to know when your patients ask

Objectives



Learn how to analyze who may need a supplement



How to critique a supplement: dose, type, duration, risk,



Develop a systems biology mindset to help patients recognized Food as Medicine instead of relying on supplements

Conflict of Interest



Brain Treatment Center Michigan



Speaker for Michigan Osteopathic Association



Staff Cleveland Clinic Center for Functional Medicine



80% of chronic disease in the United States could be prevented with lifestyle changes

Katz DL, Frates EP, Bonnet JP, Gupta SK, Vartiainen E, Carmona RH. Lifestyle as Medicine: The Case for a True Health Initiative. *Am J Health Promot.* 2018;32(6):1452-1458.

doi:10.1177/0890117117705949

Approximately 80% of chronic disease and premature death could be prevented by not smoking, being physically active, and adhering to a healthful dietary pattern. Cardiovascular disease, diabetes, stroke, dementia, and cancer are all influenced by lifestyle choices

What would you do
to not get heart
disease, cancer,
psychiatric illness,
or chronic disease?

Hadza Hunters

Sayre MK, Pontzer H, Alexander GE, et al. Ageing and physical function in East African foragers and pastoralists. *Philos Trans R Soc Lond B Biol Sci.* 2020;375(1811):20190608. doi:10.1098/rstb.2019.0608

Aspect	Hadza Lifestyle	Western Lifestyle	Supporting Studies (PMID)
Diet	Foraging-based: tubers, berries, honey, occasional meat; high fiber, seasonally variable	Processed, high-calorie foods; low fiber, uniform diet	
Physical Activity	Highly active, constant foraging and movement	Sedentary, minimal physical activity	
Heart Disease Rates	Very low, near-absent due to active lifestyle and diet	High, epidemic levels linked to inflammation and inactivity	
Cancer Rates	Extremely low, attributed to anti-inflammatory diet	High, linked to processed foods and lifestyle factors	
Chronic Disease Rates	Rare, minimal obesity, diabetes, or hypertension	Widespread, driven by diet and sedentary behavior	
Parasite Prevalence	High (e.g., 34-44% for helminths/protozoa in similar groups)	Low due to sanitation and medical interventions	
Autism Rates	Variable, ~4.9% in children aged 5-10 (potentially higher than Western)	~1-2%, though diagnostic criteria vary	
Overall Psychiatric Disorders	Low, ~3.6% in children	Higher, ~11.8% in children (e.g., UK)	

What do you recommend?

- Case of the 67-year-old very healthy woman who did not feel well despite her attempts at optimization.
- She is a triathlete
- Eats all organic, plant-based diet with fish as a protein source





How much does she really need?

- Mrs L is a sixty –seven- year -old triathlete, She was referred to me because her transaminases were three times normal. She felt okay and her work up with the Gastroenterologist was unremarkable.
- She had 28 bottles of supplements
- She was taking 99,000IU of vit D , about 33,000mcg of vitamin A. (>3000mcg = unsafe)
- 150mcg of B12, recommended is 10mcg for older adults
- 16 of the bottles had the same high dose multivitamin and minerals.
- “Proprietary Blends”

How much training do we get on supplements?

published in 2024 documents that 75% of U.S. medical schools have no required clinical nutrition classes, and only 14% of residency programs have a required nutrition curriculum. HHS is calling for increased nutrition education thresholds across the medical education continuum. The nation's medical schools must fundamentally address this critical gap in health care training and ensure that future and current doctors possess the essential knowledge to provide evidence-based nutritional guidance to their patients.



“U.S. medical education has not kept up with the overwhelming research on the role of nutrition in preventing and treating chronic diseases,” **said U.S. Secretary of Education Linda McMahon.**



<https://www.hhs.gov/press-room/hhs-education-nutrition-medical-training-reforms.html>

Why is this important?

- An estimated 23,000 emergency department visits in the United States every year are attributed to adverse events related to dietary supplements. Published October 15, 2015 N Engl J Med 2015;373:1531-1540
- DOI: 10.1056/NEJMsa1504267 VOL. 373 NO. 16 Copyright © 2015
- A 2023 survey by the [Council for Responsible Nutrition \(CRN\)](#) found that 74% of U.S. adults take supplements
- North America dietary supplements market size was calculated at USD 53.87 billion in 2024 and is expected to hit around USD 118.15 billion by 2034. Globe Newswire
- 95% of Family Medicine residencies have less than 1 hour a month for nutrition education
- 94% of Family Medicine Residencies do not have nutrition education competencies

Patients and supplements

- On the bottle it states:
- The warning to "check with your provider" on a supplement bottle is there because
- the [Dietary Supplement Health and Education Act of 1994 \(DSHEA\)](#) requires it. Since the FDA does not approve supplements for safety before they are sold, manufacturers are responsible for ensuring their products are safe and correctly labeled. This means a doctor's advice is crucial to ensure the supplement is appropriate for a person's individual health needs and won't cause harm.
- It created a new regulatory framework that treated supplements as a category **between food and drugs**, placing more responsibility on manufacturers to prove safety and limiting FDA's pre-market approval authority.





Here are a few steps when considering supplements

1. **Sources,**
2. **Dosing,**
3. **Interactions,**
4. **Health Implications**
5. **Safety,**
6. **Testing,**
7. **Bioavailability.**

When do we need supplements? Long term or short term



1. To support a medical condition: malabsorption issues, genetically predisposed to deficiencies, dietary patterns that predisposes to risk of deficiencies



2. To support a deficiency: Short term use of supplements until a normal dietary pattern can be resumed

What to consider when discussing supplements

- Can food be the main source
- Are they deficient
- What are the confounding risks/medical conditions
- What is their age
- What medications are they on
- Is there a genetic reason to take a supplement
- How much and how long
- What is the goal



Reasons NOT to take a supplement without investigation into symptoms



improving energy levels,



Sleep issues



Poor concentration,



Poor skin health,



digestive issues,



prevent age-related diseases.



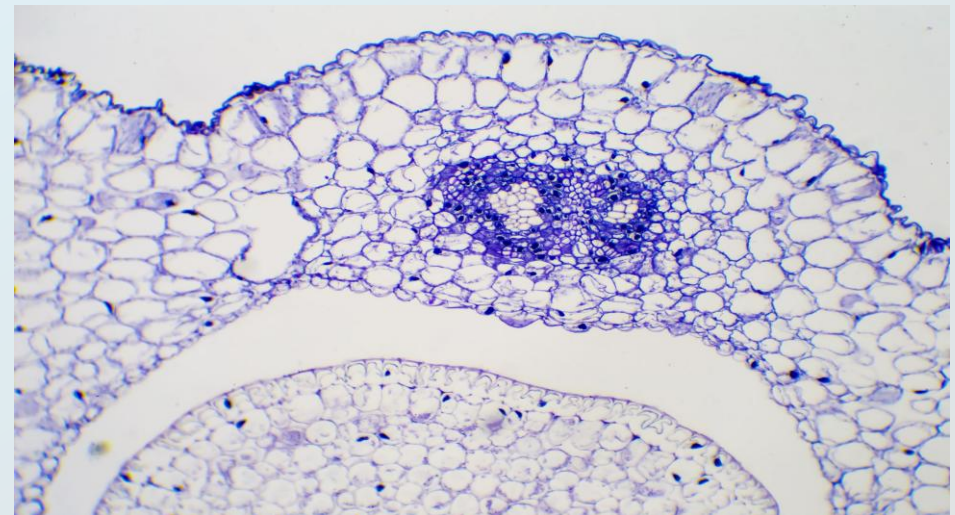
Boost immune systems



This is when it is important to see a doctor to find out why these issues are occurring

Find the
dysfunction in the
biologic system

- Poor energy is from?
- Sleep issues are from?
- Poor concentration from?
- Skin issues are from?
- Digestive issues from what?
- Why is your immune system not working?
- Why do you feel “old”?



Case study

- Brian is a 38-year –old resident, His BMI is 26. He used to work out a lot before he started medical school and is interested in what supplements he should be on for his overall wellness and to optimize is workout routine during his internship. He lives above the 40th parallel, frequently eats at the hospital cafeteria to save time. He can't afford a lot of supplements. He just wants to know the basics. His medical history is relatively unremarkable except he gets “low energy” in the winter months.
- What would recommend?



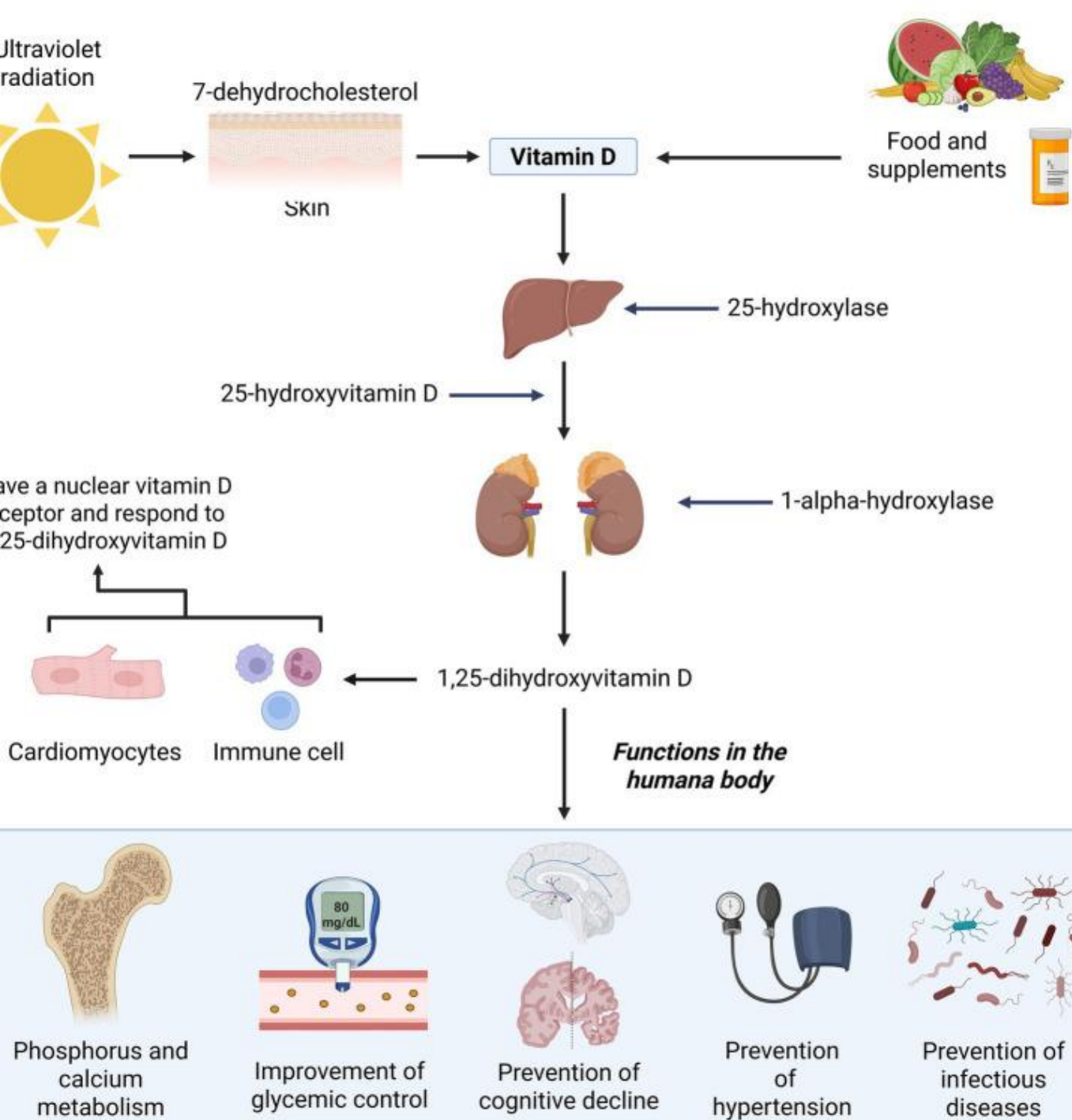
Vitamin D

1. Vitamin D Levels in Medical Residents: The authors present findings about medical and surgical residents having lower vitamin D levels compared with healthy controls
Mendoza, V. · Villanueva, M.T. · Vargas, G. **Vitamin D deficiency among medical residents and its relationship with metabolic indices** *Endocr Pract.* 2013; **19**:59-63
2. Good place to start just because of the risks



Vitamin D an overview

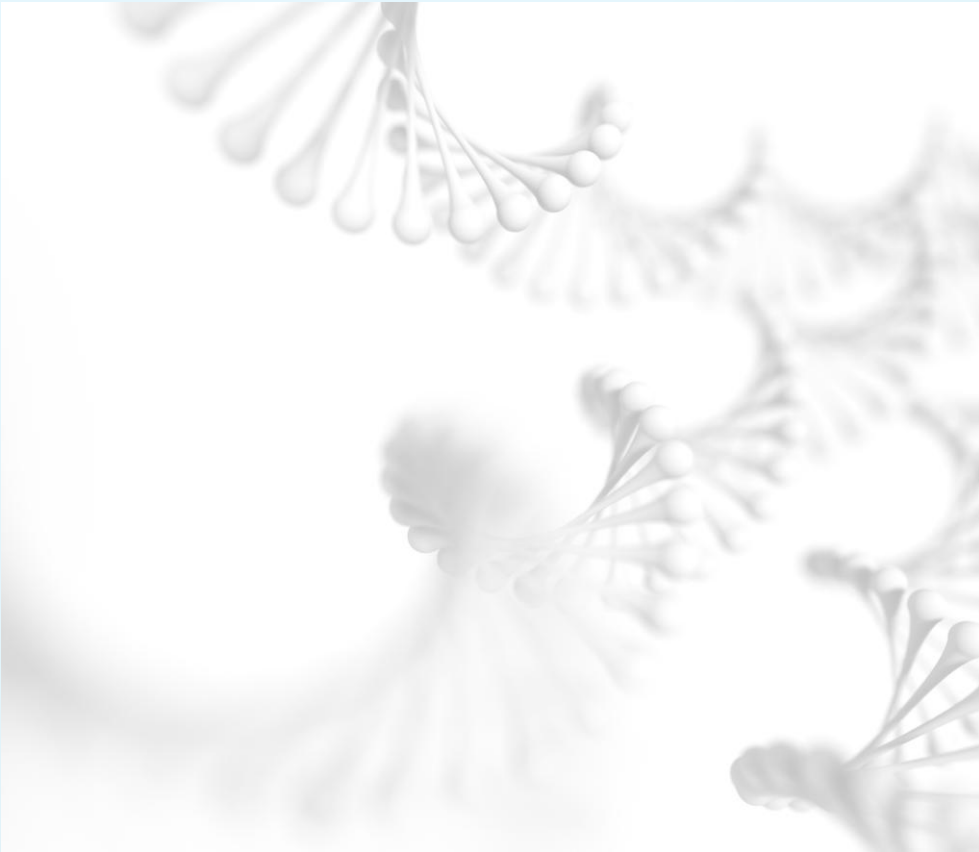
1. Vitamin D Hormone, **Sources, Dosing, Interactions**, and **Health Implications**
2. Synthesis of Key Insights on **Safety, Testing, Bioavailability**.



Synthesis of Vitamin D

- Ortiz-Prado E, Vasconez-Gonzalez J, Izquierdo-Condoy JS, et al. Cholecalciferol (vitamin D3): efficacy, safety, and implications in public health. *Front Nutr.* 2025;12:1579957. Published 2025 Jun 9. doi:10.3389/fnut.2025.1579957

Vitamin D Receptor (VDR) Activity



- **Function:** Nuclear receptor; Binds calcitriol → Regulates genes for calcium homeostasis, immunity, cell growth.
- **Impact on Intake:** Polymorphisms (e.g., BsmI) may require higher doses (1,000–4,000 IU) for efficacy.
- **Impact on Light Exposure:** Inefficient VDR needs more sun (20–30 min vs. 10–15) for synthesis.
- **Recommendations:** Test 25(OH)D; Genetic screening for variants; RDA 600–800 IU, adjust for risks.

Why Vitamin D Is a Hormone, Not a Vitamin

- **Definition:** Traditionally a vitamin (prevents deficiency like rickets), but biochemically a prohormone due to endogenous synthesis and signaling
 - **Endogenous Production:** Synthesized in skin from UVB light (7-dehydrocholesterol → cholecalciferol/D3).
 - **Metabolism:** Liver → 25(OH)D; Kidneys → Active 1,25(OH)₂D (calcitriol).
 - **Hormonal Actions:** Binds VDR to regulate ~1,000 genes (3% of genome); Controls calcium/phosphate, immunity, cell growth
 - **Historical Note:** Named a vitamin in 1920s; Still called one for public health simplicity.
-
- Schlereth F, Badenhop K. Vitamin D : Mehr als ein Knochenhormon [Vitamin D : More than just a bone hormone]. *Internist (Berl)*. 2016;57(7):646-655. doi:10.1007/s00108-016-0082-2
 - Abboud M, Rybchyn MS, Rizk R, Fraser DR, Mason RS. Sunlight exposure is just one of the factors which influence vitamin D status. *Photochem Photobiol Sci*. 2017;16(3):302-313. doi:10.1039/c6pp00329j

Recommended Dosing and Maximum Limits

RDA (Adults): 600–800 IU (15–20 mcg) daily for bone/immune health.

Tolerable Upper Limit (UL): 4,000 IU (100 mcg) daily to avoid toxicity.

High-Dose Regimens: 50,000 IU weekly (for 6–12 weeks) for deficiency correction; Safe short-term with monitoring.

Personalization: Higher needs (1,000–4,000 IU) for obesity, darker skin, malabsorption.

Toxicity Risks: Hypercalcemia (>10.5 mg/dL) at >10,000 IU/day long-term; Symptoms: Nausea, kidney stones.

Lab Markers: Elevated PTH, low calcium/phosphate in deficiency; No routine screening for asymptomatic.

<https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/>

Sources of Vitamin D



- **Sunlight (UVB Exposure):** Primary natural source; 10–30 min midday (arms/legs/face) 2–3x/week produces 10,000–20,000 IU.
- **Dietary:** Fatty fish (salmon: ~600 IU/3 oz), fortified foods (milk: 100–400 IU/serving), eggs
- **Supplements:** Synthetic D3 (cholecalciferol from lanolin/yeast) or D2 (ergocalciferol from yeast/plants); Forms: Capsules, liquids, liposomal
- **No Sunlight Scenario:** Supplements maintain levels, but miss circadian/mood benefits; Risk sleep disruption, low serotonin
- Sunlight is the free source of vitamin D
- Bleizgys A. Vitamin D Dosing: Basic Principles and a Brief Algorithm (2021 Update). *Nutrients*. 2021;13(12):4415. Published 2021 Dec 10. doi:10.3390/nu13124415
- Webb AR, Alghamdi R, Kift R, Rhodes LE. 100 YEARS OF VITAMIN D: Dose-response for change in 25-hydroxyvitamin D after UV exposure: outcome of a systematic review. *Endocr Connect*. 2021;10(10):R248-R266. Published 2021 Oct 15. doi:10.1530/EC-21-0308

Factors Affecting Vitamin D Levels



Skin Pigmentation: Darker skin (high melanin) reduces synthesis (50–90% less efficient); Needs 1,000–2,000 IU/day vs. 600–1,000 for lighter skin



Conditions: Obesity (sequesters in fat), malabsorption (IBD, celiac), liver/kidney disease, hyperparathyroidism.



Medications: Anticonvulsants (accelerate breakdown), corticosteroids (impair metabolism), orlistat (reduce absorption).



Lifestyle: Low sun exposure, sunscreen/clothing, northern latitudes.



Mazahery H, von Hurst PR. Factors Affecting 25-Hydroxyvitamin D Concentration in Response to Vitamin D Supplementation. *Nutrients*. 2015;7(7):5111-5142. Published 2015 Jun 25. doi:10.3390/nu7075111

Testing for Vitamin D deficiency

- **Primary Test:** Serum 25(OH)D; Accurate via immunoassays or LC-MS/MS (gold standard but may overestimate by 11%).
 - **Levels and Symptoms:**
 - Deficiency: <20 ng/mL (<50 nmol/L); Symptoms start here (fatigue, bone pain).
 - Insufficiency: 21–29 ng/mL; Mild symptoms possible.
 - Sufficiency: ≥30 ng/mL; Optimal: 30–50 ng/mL
 - **Symptom Timeline:** Weeks–months for mild (fatigue); 6–12 months+ for severe (osteomalacia).
 - **Lab Markers:** Elevated PTH, low calcium/phosphate in deficiency; No routine screening for asymptomatic
 - \$16/test

US Preventative Services Task Force

- **Population** Community-dwelling, nonpregnant adults who have no signs or symptoms of vitamin D deficiency or conditions for which vitamin D treatment is recommended.
- **Evidence Assessment** The USPSTF concludes that the overall evidence on the benefits of screening for vitamin D deficiency is lacking. Therefore, the balance of benefits and harms of screening for vitamin D deficiency in asymptomatic adults cannot be determined.
- **Recommendation** The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for vitamin D deficiency in asymptomatic adults. (I statement)

<https://jamanetwork.com/journals/jama/fullarticle/2778487>

Patient Population Under Consideration

Assessment of Risk

- This recommendation applies to community-dwelling, nonpregnant adults who have **no signs or symptoms of vitamin D deficiency**, such as bone pain or muscle weakness, or conditions for which vitamin D treatment is recommended.
- This **recommendation focuses on screening** (ie, testing for vitamin D deficiency in **asymptomatic adults** and treating those found to have a deficiency), which differs from USPSTF recommendation statements on supplementation for those at risk
- **Assessment of Risk:**
- Although there is insufficient evidence to recommend for or against screening for vitamin D deficiency, several factors are associated with lower vitamin D levels.
- Low dietary vitamin D intake may be associated with lower 25(OH)D levels.⁷ **Little or no UV B exposure** (eg, because of winter season, high latitude, or sun avoidance) and **older age** are also associated with an increased risk for low vitamin D levels.⁸⁻¹²
- **Obesity** is associated with lower 25(OH)D levels,¹³ and people who are obese have a 1.3- to 2-fold increased risk of being vitamin D–deficient, depending on the threshold used to define deficiency.^{8,9,13,14}
- Depending on the serum threshold used to define deficiency, the prevalence of vitamin D deficiency is 2 to 10 times higher in **non-Hispanic Black persons** than in non-Hispanic White persons, likely related to differences in skin pigmentation.^{7-9,14}
- <https://jamanetwork.com/journals/jama/fullarticle/2778487>



Interactions with Medications

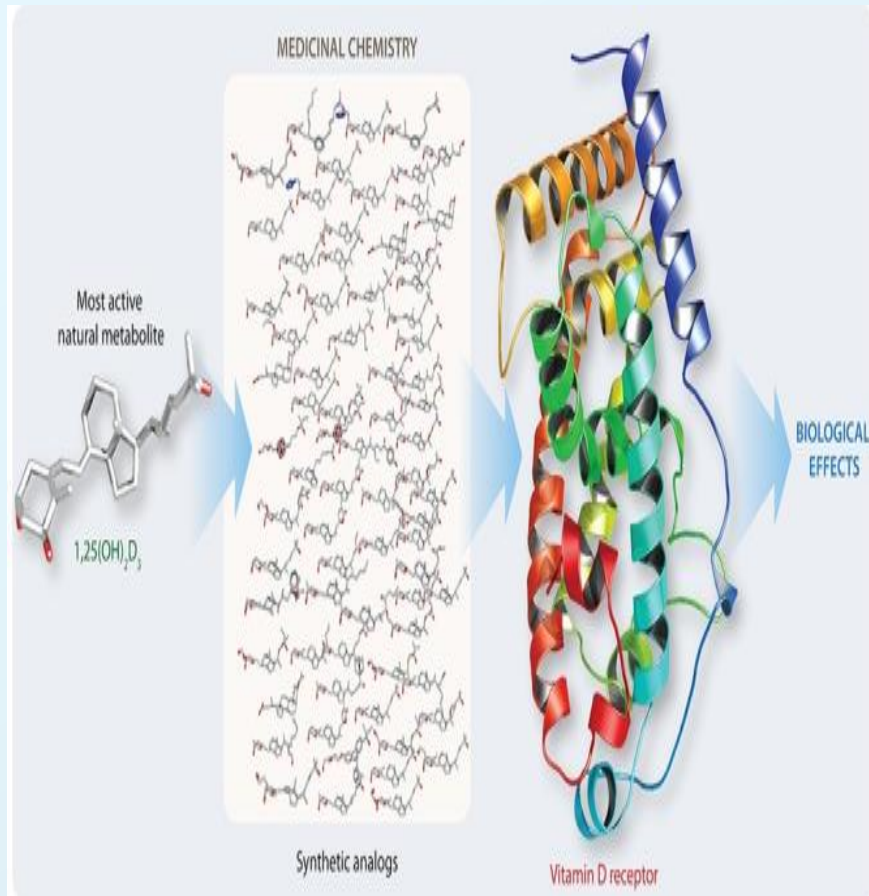
- **Thiazide Diuretics:** Increase hypercalcemia risk.
- **Digoxin:** Enhances arrhythmia potential.
- **Anticonvulsants:** Reduce vitamin D efficacy (need higher doses).
- **Corticosteroids/Orlistat:** Impair absorption/metabolism.
- **Statins/Antiretrovirals:** Mixed; May require adjustments.
- **[https://naturalmedicines.therapeuticresearch.com/](https://naturalmedicines.therapeuticresearch.com/Home/ND)**

Concerns with Synthetic Vitamin D

What is on Social Media?

- The People's Chemists view: How do we interpret social media????
- **The People's Chemist" Perspective(POV):** Synthetic D is a "lab-created hormone disruptor," not a true vitamin; Causes toxicity (hypercalcemia, kidney/heart failure).
- **Key Worries:** Industry manipulation (rigged tests, profit-driven); Overloads parathyroid; No natural safeguards like sunlight
- **Alternatives:** Sun exposure (15–30 min midday), unfortified cod liver oil, fatty fish; Avoid pills for dependency.
- https://www.thepeopleschemist.com/collections/all-products?srsId=AfmBOodobyO3cTtPYw3qylap50oRK5t1y8ry8_0ySRm5mijRBql3Mte

Bioavailability and Degradation of Synthetic Vitamin D



- **Weekly Loss:** 0.3–4% under typical storage (cool/dark/dry); Accelerates with heat/light/moisture (5–10% in poor conditions).
- **Manufacturer Variations:** 5–201% of label claims; Better with antioxidants/encapsulation
- **Form Differences:**
 - Liposomal: <1% weekly loss; High bioaccessibility (1.0 index).
 - Capsule: 1–3% loss; Moderate bioaccessibility (0.47 index).
 - Liquid: <2% loss; High bioaccessibility (0.71 index).
 - **Food (Fortified): <0.5% loss; Superior bioaccessibility (1.0+ index).**
- Maestro MA, Molnár F, Carlberg C. Vitamin D and Its Synthetic Analogs. *J Med Chem.* 2019;62(15):6854-6875. doi:10.1021/acs.jmedchem.9b00208

Vitamin D from Food and Sunshine is Free

- Vitamin D₃ is more bioaccessible from foods than supplements,
- its bioaccessibility is susceptible to changes in gastric pH. Fasting conditions (i.e., gastric pH = 1) enhance the vitamin's bioaccessibility
- Pasidi E, Vareltzis P. Vitamin D₃ Bioaccessibility from Supplements and Foods-Gastric pH Effect Using a Static In Vitro Gastrointestinal Model. *Molecules*. 2024;29(5):1153. Published 2024 Mar 5. doi:10.3390/molecules29051153

Conclusion and Practical Recommendations

- **Key Takeaways:** Vitamin D as hormone: Balance intake/sunlight; Monitor for deficiency; Personalize based on factors/VDR
- **General Advice:** Aim 30–50 ng/mL; 600–800 IU RDA; 10–30 min sun exposure
- **For Special Groups:** Higher needs for darker skin/obesity; Genetic testing for polymorphisms
- **Caution:** Avoid unmonitored high doses; Prioritize natural sources where possible
- Most bioavailable: **microencapsulated form of vitaminD**
- Šimoliūnas E, Rinkūnaitė I, Bukelskienė Ž, Bukelskienė V. Bioavailability of Different Vitamin D Oral Supplements in Laboratory Animal Model. *Medicina (Kaunas)*. 2019;55(6):265. Published 2019 Jun 10. doi:10.3390/medicina55060265

References

- NIH Office of Dietary Supplements
(2025):<https://ods.od.nih.gov/About/StrategicPlan2025-2029.aspx>
- IOM Guidelines
https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf
- <https://academic.oup.com/jcem/article-abstract/97/4/1153/2833218?redirectedFrom=fulltext>
- <https://www.fda.gov/media/187161/download>
- Ellison's Views: thepeopleschemist.com articles
- <https://lpi.oregonstate.edu>

Vitamin B12:

Case:
72-Year-Old
Woman who is
vegan

What are the risks?

- **Dosing, Risks, Symptoms, Personalization**
- Why Vitamin B12 Is Essential?
- Definition: Water-soluble vitamin crucial for red blood cell formation, neurological function, and DNA synthesis.
- For a 72-Year-Old Vegan: High deficiency risk due to no animal sources in diet + age-related reduced absorption (e.g., lower intrinsic factor/stomach acid).
- Untreated deficiency can cause anemia, neuropathy, fatigue, cognitive decline, or irreversible nerve damage—more severe in elderly.
- Evidence: NIH notes 40–80% deficiency risk in vegans; prevalence rises to 20–40% in those >60.
- Niklewicz A, Smith AD, Smith A, et al. The importance of vitamin B₁₂ for individuals choosing plant-based diets. *Eur J Nutr*. 2023;62(3):1551-1559. doi:10.1007/s00394-022-03025-4



- Vitamin B12 is bound to protein in food and must be released before it is absorbed.
- The process starts in the mouth when food is mixed with saliva.
- The freed vitamin B12 then binds with haptocorrin, a cobalamin-binding protein in the saliva.
- More vitamin B12 is released from its food matrix by the activity of hydrochloric acid and gastric protease in the stomach, where it then binds to haptocorrin
- In the duodenum, digestive enzymes free the vitamin B12 from haptocorrin, and this freed vitamin B12 combines with intrinsic factor, a transport and delivery binding protein secreted by the stomach's parietal cells.
- The resulting complex is absorbed in the distal ileum by receptor-mediated endocytosis

Sources of Vitamin B12

- Natural: Animal-derived (methylcobalamin, etc.) in meat, fish, eggs, dairy—unavailable for vegans
- Fortified/Synthetic: Cyanocobalamin in cereals, plant milks, nutritional yeast (e.g., 6 mcg/serving cereal).
- For a 72-Year-Old Vegan: Rely on fortified foods + supplements; no plant-based active B12 without fortification. Example: 1 cup fortified soy milk (~1–3 mcg)
- Tip: Check labels; absorption from food is 50–60%, lower in elderly due to gastric atrophy
- Allen LH. How common is vitamin B-12 deficiency?. *Am J Clin Nutr*. 2009;89(2):693S-6S. doi:10.3945/ajcn.2008.26947A

Other Factors Affecting B12 Levels

- Age: Reduced Intrinsic Factor and acid in elderly (e.g., 20–40% lower absorption at 72).
- Diet: Veganism = 40–80% deficiency risk without supplements.
- Conditions: Pernicious anemia, atrophic gastritis (common in elderly), IBD, obesity.
- Medications: PPIs (e.g., omeprazole for reflux), metformin (diabetes).

B12 Deficiency Symptoms

- Early/Mild: Fatigue, weakness, constipation, loss of appetite, weight loss.
- Neurological: Numbness/tingling in hands/feet, balance problems, difficulty walking, memory loss, depression, irritability
- Severe/Anemia-Related: Megaloblastic anemia (pale skin, shortness of breath), glossitis (inflamed tongue), vision changes.
- For Elderly Vegans: Symptoms often mistaken for aging (e.g., dementia, falls); irreversible neuropathy if untreated >6–12 months
- Evidence: NIH; symptoms emerge at serum B12 <200 pg/mL, worsened by age/veganism.
- Adequate levels of recommended daily allowance values range from 2.4 to 2.8 mcg for adults and from 0.4 to 2.8 mcg for infants, children, and adolescents,
- <https://www.ncbi.nlm.nih.gov/books/NBK441923/>

Testing for Vitamin B12

For our 72-Year-Old Vegan:

- Primary Test: Serum B12 (optimal: 300–900 pg/mL; deficiency: <200). CBC and pair with MMA/homocysteine for function.
- Accuracy: Immunoassays (good precision, but 10–20% overestimation); LC-MS/MS gold standard.
- Annual screening recommended; deficiency may be asymptomatic until advanced (e.g., falls, dementia mimic).
- Symptom Timeline: Months for fatigue; years for neuropathy.
- <https://www.ncbi.nlm.nih.gov/books/NBK441923>

Interactions with Medications

- For our 72-Year-Old Vegan: Common meds (e.g., for heartburn, diabetes) compound risks;
- PPIs/H2 Blockers: Reduce acid, impair food B12 release (10–30% drop; supplement 500 mcg/day).
- Metformin: 20% higher deficiency risk
- Antibiotics/Colchicine: Temporary absorption issues
- <https://www.ncbi.nlm.nih.gov/books/NBK441923>

Concerns with Synthetic B12

- Synthetic (Cyanocobalamin): Safe, but some prefer natural methylcobalamin for better conversion in elderly
- Worries: Rare cyanide buildup (negligible); potential for masking folate deficiency
- For our 72-Year-Old Vegan: Essential—no natural vegan sources; choose third-party tested to avoid contaminants.
- <https://www.healthline.com/nutrition/methylcobalamin-vs-cyanocobalamin#bioavailability>

Genetic Factors and B12

- Variations: FUT2/TCN2 polymorphisms reduce absorption (10–20%; higher in some ethnic groups).
- Impact: May need higher doses (500–1,000 mcg/day).
- For a 72-Year-Old Vegan: Genetic testing maybe useful if persistent deficiency; age amplifies effects.
- Velkova A, Diaz JEL, Pangilinan F, et al. The FUT2 secretor variant p.Trp154Ter influences serum vitamin B12 concentration via holo-haptocorrin, but not holo-transcobalamin, and is associated with haptocorrin glycosylation. *Hum Mol Genet.* 2017;26(24):4975-4988. doi:10.1093/hmg/ddx369

Special Considerations for Elderly Vegans

- Higher Needs: Absorption <1% without IF; aim for injections if oral fails
- Symptoms: Fatigue, balance issues, mood changes—mistaken for aging
- Lifestyle: Fortified foods + B12-fortified yeast; monitor B6/folate balance.
- Evidence: NHANES shows 20–40% deficiency in elderly vegans

Recommended Dosing and Maximum Limits

- RDA (Adults >50): 2.4 mcg/day (same as younger, but needs often higher due to absorption issues).
- No UL: Safe up to 2,000–5,000 mcg/day; excess excreted.
- For a 72-Year-Old Vegan: Supplement 250–1,000 mcg/day oral (cyanocobalamin/methylcobalamin) or 1,000 mcg injections monthly to correct/prevent deficiency. High doses needed as absorption drops to <1% in elderly without IF.
- Toxicity: Rare; possible acne/rash from injections.
- For a 72-Year-Old Vegan: Combined risks amplify; monitor for symptoms like tingling, memory issues..

Bioavailability and Degradation

- Absorption: 50% from food; 1–2% passive from high-dose supplements (key for elderly/vegans).
- Degradation: Stable in cool/dark storage; <5% weekly loss; heat/light accelerates (10–20%).
- For a 72-Year-Old Vegan: Sublingual/injections bypass gut issues; pair with B-complex for synergy.

Back to the intern who wants to be tough!



https://media.istockphoto.com/id/455682851/photo/strong-angry-viking-on-his-ship.jpg?s=612x612&w=0&k=20&c=jTIM_mh66xuVoOKbtoTP10DdkZeQUJ66aybv_3jySc=

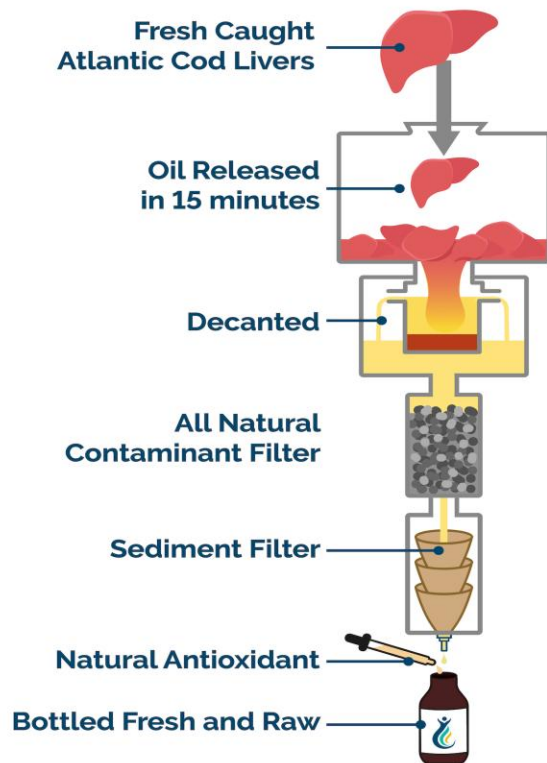
The Vikings' Secret Superfood: Cod Liver Oil

How a Fishy Tonic Fueled the Fiercest Warriors

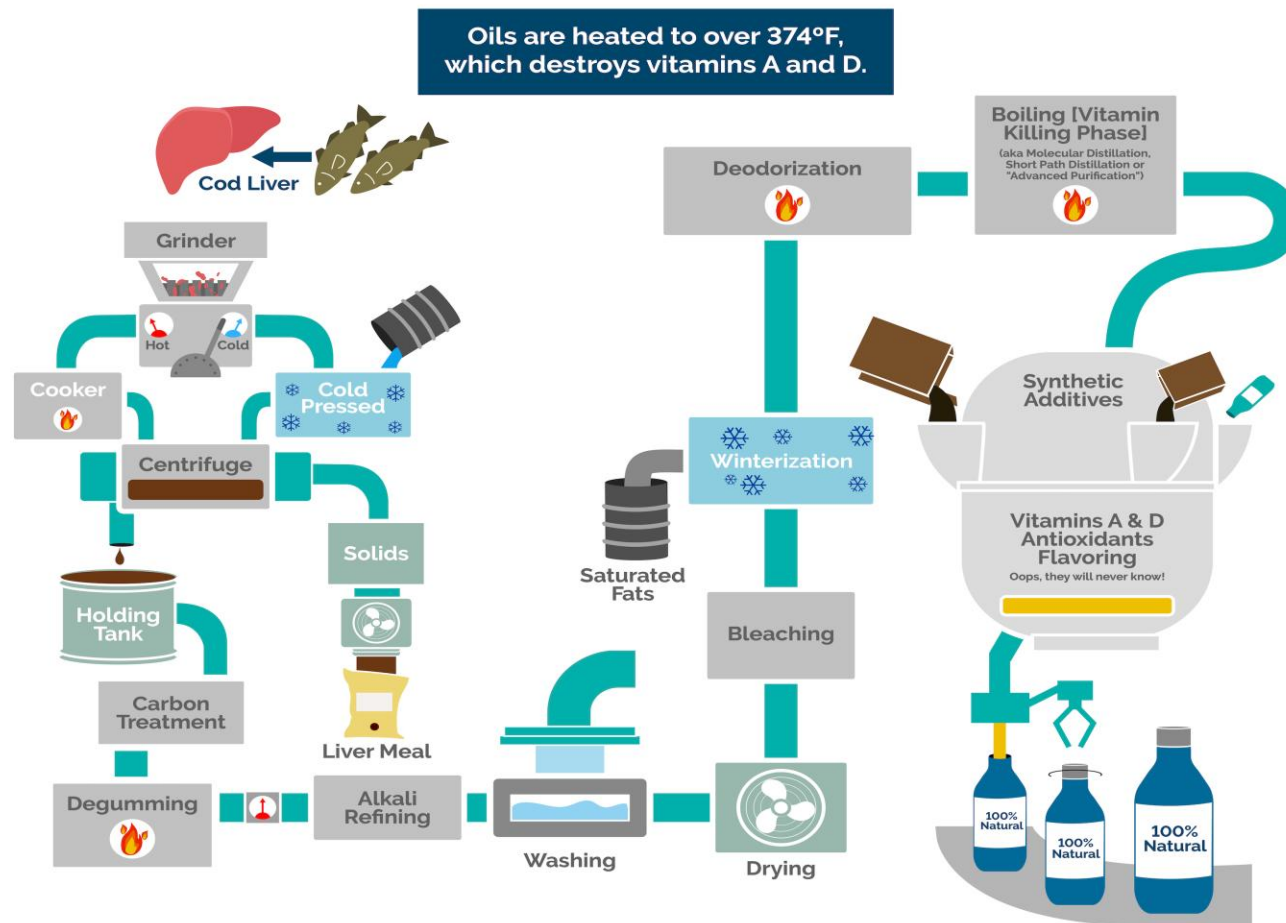
- " (*Dramatic Viking ship sailing through icy fjords; overlay of a glowing cod liver dripping golden oil; timeline from 800 AD to today.*)
- Imagine the year 900 AD. Brutal Nordic winters, endless nights, no sunlight for months. Vikings—raiders, explorers, settlers—faced rickets, weak bones, and scurvy. But they had a secret weapon: cod liver oil.
- From abundant North Atlantic cod, they extracted this golden elixir using steam from boiling kettles or fermenting barrels. A daily teaspoon wasn't just food—it was medicine. Rubbed on sore joints after battles, sipped for strength, it prevented deformities that plagued sunnier but fish-poor Europe.
- Anthropological Proof:
- Bones Tell the Tale: Viking skeletons show fewer rickets signs than medieval city-dwellers—**thanks to vitamin D-rich oil (1,360 IU/teaspoon).**
- Folklore & Sagas: Norse tales praise it for "warrior vitality"; isotope analysis reveals 50–80% marine diet.
- Trade Empire: Cod was Viking "currency"—dried stockfish exported, livers oiled their health machine.
- This wasn't science; it was survival smarts. In sun-scarce latitudes, cod liver oil was their supplement superpower—boosting immunity, mood, and might.
- Modern Twist: Today, we know it's packed with omega-3s, vitamins A & D. Vikings didn't need labs; they had observation. Lesson: Sometimes, ancient wisdom outshines supplements. Raise a spoon to the Vikings—who conquered with cod!
- Try unrefined cod liver oil—third-party tested—and feel the Viking vigor!
- (*Sources: NIH, Viking archaeology, Icelandic Sagas*)



Temperature never exceeds 50°F during the entire process.



Standard “Natural” Production of Cod Liver Oil



Each and every batch of Rosita® fish liver oil is third-party tested in a microbiological lab and certified to meet strict European regulations for potency and purity

Take home points

- **Purpose of the Supplement**
- **Why is the patient considering supplements?**
ask the patient why they are interested in taking a particular supplement. Is it for general wellness, specific health concerns (e.g., joint pain, fatigue, immune support), or a specific medical condition (e.g., vitamin D for deficiency)?
- **Evidence supporting the supplement:**
discuss whether the supplement has scientifically proven benefits for the condition the patient is concerned about, and if the evidence is strong or inconclusive.
- **Dosage and Proper Use**
- **Correct dosage:**
Discussing the appropriate dosage of a supplement is crucial, as overdosing on certain supplements (like fat-soluble vitamins or minerals) can cause toxicity. Explain how much to take and how often.
- **Timing and form:**
Some supplements are more effective when taken with food, at certain times of the day, or in specific forms (e.g., capsule, powder, liquid). Clarifying these details can help maximize the benefit of the supplement.



Take home points

Safety

•Side effects:

It's essential to discuss potential side effects or adverse reactions associated with the supplement, even if they are rare. Some supplements may cause digestive issues, allergic reactions, or other health concerns.

•Interactions with medications:

Many supplements interact with prescription or over-the-counter medications, either reducing their effectiveness or causing dangerous side effects. Go over any known interactions with the patient's current medications.

•Quality control and regulation:

Supplements are not regulated by the FDA as rigorously as prescription medications, so it's important to talk about the potential variability in supplement quality. Some products might contain contaminants, improper dosages, or ineffective ingredients.

How products are made plays a role: a warning

- **FDA update: These supplements contain toxic yellow oleander:**
<https://www.cspi.org/cspi-news/fda-update-these-supplements-contain-toxic-yellow-oleander>
- In September 2023, the US Food and Drug Administration issued a [warning to consumers](#) about tejocote root (*Crataegus mexicana*) supplements, particularly those purchased online through third-party retailers like Amazon and Etsy. An analysis conducted at that time revealed that all nine products sampled were labeled as tejocote but were actually toxic yellow oleander (*Cascabela thevetia*), a potentially fatal poison that can cause “neurologic, gastrointestinal, and cardiovascular adverse health effects,” including convulsions and lethargy, diarrhea, hypertension, and in severe cases,



Quality and Brand Recommendations

- **Choosing a reputable brand:**
Provide guidance on choosing reputable supplement brands that adhere to good manufacturing practices. Some may even recommend third-party testing
- **Avoiding unverified claims:**
Discussing the importance of being cautious with supplements that make unverified, miraculous claims, which could be a red flag for poor quality or false marketing
- Environmental Working Group: [EWG.org](https://www.ewg.org)
- [NSF.org](https://www.nsf.org)
- [Consumerlab.com](https://www.consumerlab.com)

Monitoring and Follow-Up

- Ongoing monitoring:**

If a supplement is being used for a specific health condition, it's essential to plan for regular follow-up to assess whether the supplement is effective or causing any side effects.

- Lab work:**

For certain supplements, such as vitamin D, iron, or calcium, lab tests can help monitor levels and ensure the supplement is having the desired effect

- Affordability and necessity:**

Sometimes, patients take supplements that may not be necessary or are overly expensive. Help the patient weigh the cost of the supplement against its potential benefits.

Cost vs. Benefit

Cultural and Personal Beliefs

- Respect for beliefs:**

Some patients may prefer natural or alternative therapies due to cultural or personal reasons. Listen to these preferences and engage in respectful discussions to ensure the patient is making well-informed choices while still considering medical advice

How to choose the right supplement if one is needed



First consider the person:
can the nutrient be provided
from a food



NatMed Pro.

<https://naturalmedicines.therapeuticresearch.com/Home/ND>. a database to evaluate the
supplement and possible interactions with
medication

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