

## Dietary Supplements for the Dental Team



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Chair: US Pharmacopeia Dietary Supplement Admissions, Evaluation and Labeling Expert Committee

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National Geographic's  
*Life Is Your Best Medicine*  
*Healthy At Home*  
*Fortify Your Life*  
*Guide to Medicinal Herbs*

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1

## Micronutrient Status of Americans

- 31% population at risk of at least one vitamin deficiency or anemia.
- Deficiency risk most **common in women** (37% overall): 19–50 years (41%), and pregnant or breastfeeding women (47%).
- Those who **did NOT** take dietary supplements had **highest risk** of any deficiency (40%), compared to users of full-spectrum MVI-mineral supplements (14%).
- Individuals consuming an **adequate diet** based on EAR had a **lower risk** of any deficiency (16%), compared to those with **inadequate diet** (57%).

Bird JK, et al. *Nutrients* 2017 Jun 24;9(7):655.

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2

## Real State of Our Nutrition

- **90 million** Americans are **vitamin D deficient** (using the Endocrine Society guidelines < 20ng/mL)
- **30 million** are **deficient in vitamin B6**
- **18 million** people have **B12 deficiency**
- **16 million** have **vitamin C deficiency**
- 13% of Latinas and 16% of African American women (ages 12–49) are **iron deficient**
- **Women 25–39** overall have borderline **iodine insufficiency**



CDC. 2<sup>nd</sup> National Report on the Biochemical Indicators of Diet and Nutrition in the U.S. population

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3

## Why YOU Need to Know This Information

- Examination of oral cavity particularly **useful for identifying early nutrient deficiencies** with accuracy as tissues in oral mucosa have rapid turnover. **Dorsal tongue** (highest degree of epithelial cell turnover in mouth) typically first to manifest signs.
- Deficiencies of vitamins **A, B2, B3, B6, B12, C, D, and folate**, as well as **iron and zinc** can be detected within oral cavity.
- Aging population, chronic disease, highly processed and refined diet, restrictive diets, polypharmacy, increase likelihood of deficiencies.

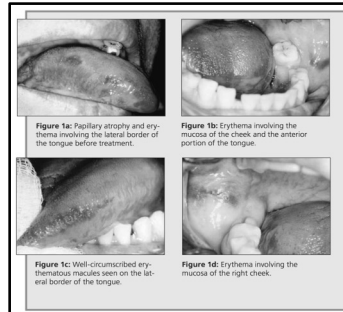
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4

### Case: 41-year-old Female

**Disturbance of taste** (unable to sense flavor of variety of fruits and vegetables), fatigue after simple daily activities, **paresthesia of the anatomic structures innervated by the mandibular division** of the trigeminal nerve on her left side, disturbance of memory and slowing mental faculty. **No meds. Vegan for 2.5 years.** No significant medical or dental history.

Pontes HA, et al. *J Can Dent Assoc* 2009; 75(7):533-7.



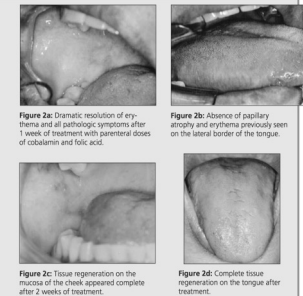
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5

### Laboratory Tests & Post-Treatment

Test	Normal range (female)	Patient's values
RBC count (cells/ $\mu$ L)	3.90–5.03	1.63
Hemoglobin (g/dL)	12.0–15.5	7.2
MCV (fL)	80–100	144
Hematocrit (%)	36–45	23.4
RDW (%)	13 $\pm$ 1.5	25
Serum folate (ng/mL)	3–16	7.73
Serum cobalamin (pmol/L)	118–716	71.8

MCV = mean corpuscular volume; RBC = red blood cell; RDW = red cell distribution width.



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6

- **Early diagnosis** may prevent development of neurological symptoms
- **Glossitis, angular cheilitis**, recurrent **aphthous ulcers**, diffuse erythematous mucositis, mucosal pallor, candidiasis
- **Sensory alterations** including **prodrome of burning and soreness**
- Patients may complain of diminished **taste sensation**, likely secondary to the **atrophy of circumvallate papillae**



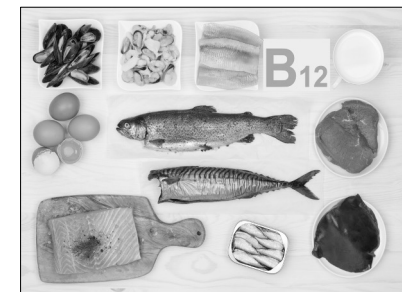
Pontes HA, Neto NC, Ferreira KB, Fonseca FP, Vallinoto GM, Pontes FS, et al. Oral manifestations of vitamin B12 deficiency: a case report. *J Can Dent Assoc*. 2009;75(7):533-7.

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7

### Vitamin B12

- Risk for deficiency:
  - Inadequate intake
  - Veganism
  - Malabsorption
  - Medications (PPI, metformin)
  - Obesity
  - Aging
- **18 million Americans** deficient
- In **geriatric population** prevalence **21%**
- **25–250 mcg** per day if at risk



Singh NN, et al. Vitamin B-12 Associated Neurological Disease. 2018; Oct 22 <https://emedicine.medscape.com/article/1152670-overview#a6>

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8

## Metformin & PPI Increase Risk for Low B12

- 2015 meta-analysis: **80% increased risk B12 deficiency after 10 months of regular proton pump inhibitor use.**
- Meta analysis 29 studies: **245% increased risk B12 deficiency with metformin use. Low B12 increases progression of diabetic neuropathy.**
- B12 deficiency can lead to **difficulty walking, tingling/numbness** in hands and feet, **fatigue**, shortness of breath, **loss of appetite**, joint pain, depression, loss of taste and smell, **cognitive impairment**, and dementia.
- **B12 should be monitored every 1–2 years if taking these medications.**

Jung SB, et al. Association between vitamin B12 deficiency and long-term use of acid-lowering agents: a systematic review and meta-analysis. *Intern Med J* 2015; 45(4):409-16.

Out M, et al. Long-term treatment with metformin in type 2 diabetes and methylmalonic acid: Post hoc analysis of a randomized controlled 4.3-year trial. *J Diabetes Complications* 2018; 32(2):171-178.

Niafar M, et al. *Intern Emerg Med* 2015; 10(1):93-1026.

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9

## Proton Pump Inhibitors & Fracture



- FDA concluded patients taking **high doses of PPIs and/or taking one year or more are at highest risk.** Warning label mandated.
- Recent study of adverse event reporting at FDA showed that PPI also increases fracture of ribs and other sites.
- **American Geriatrics Society recommends against use of PPIs for longer than eight weeks in older adults, except in high-risk patients, due to the potential risk of bone loss, fractures and *C. difficile* infection**

<http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm213206.htm>

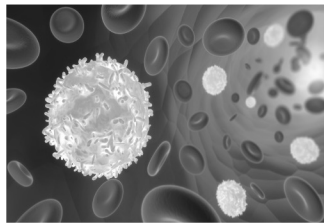
Wang L, et al. Proton Pump Inhibitors and the Risk for Fracture at Specific Sites: Data Mining of the FDA Adverse Event Reporting System. *Sci Rep* 2017 Jul 17;7(1):5527.

American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. *J Am Geriatr Soc*, 63(11):2227-46.

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10

## Vitamins B6



Cheng CH, et al. Vitamin B6 supplementation increases immune responses in critically ill patients. *Eur J Clin Nutr* 2006;60:1207–1213.

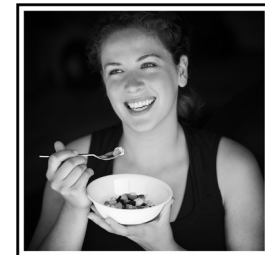
- Folate and vitamins B6 and B12 all necessary for **production of white blood cells, crucial for immune health.**
- **Low vitamin B6** significantly associated with **impaired humoral and cell-mediated immunity**; and increased inflammation.
- **Supplementing critically ill patients with B6 increases immune response.**
- **30 million Americans deficient in vitamin B6.**

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11

## Oral Contraceptives & Vitamin B6

- Majority of women on OCPs have **low serum B6 levels**, even when meeting dietary RDA.<sup>1</sup>
- **Oral contraceptive use in US 2017–2019:**<sup>2</sup>
  - 19.5% of women aged 15–19
  - 21.6% aged 20–29
  - 10.9% aged 30–39
  - 6.5% of women aged 40–49
- Low B6: microcytic anemia, depression, poor concentration, fatigue, etc.
- Women who discontinue OCs and become **pregnant may be at increased risk for preterm birth and early pregnancy loss.**<sup>3</sup>



1. Morris MS, et al. *Am J Clin Nutr* 2008; 87(5):1446-54  
2. [www.cdc.gov/nchs/products/databriefs/db388.htm](http://www.cdc.gov/nchs/products/databriefs/db388.htm)  
3. Wilson SMC. *Nutr Rev* 2011 Oct; 69(10):572-83

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12

**65-year-old man** complains of persistent **tingling and numbness in his legs (bilateral)** and **chronic sore throat** during a routine oral care visit. Dentist notes **beefy red and deeply fissured tongue**. Other than **cataract** in his right eye, no known medical problems. **Vegetarian and lactose intolerant**.

Which of the following nutrient deficiencies would best explain his symptoms?

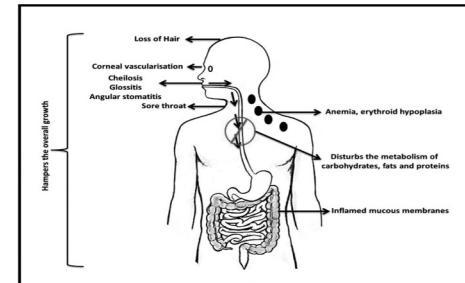
- A. Vitamin B2
- B. Vitamin B6
- C. Vitamin C
- D. Vitamin B12



From McLaren DS: *A color atlas and text of diet-related disorders*, ed 2, London, 1992, Mosby-Year Book.

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13



Riboflavin (B2) deficiency causes ariboflavinosis, which manifests as cracked lips, inflammation of tongue, dryness/burning of oral cavity, and sore throat.

*Basic multivitamin can provide adequate amounts of riboflavin (~1.5 mg/d).*

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14

### *Riboflavin Deficiency: At Risk Groups*

- **Alcoholics**
- Those with **chronic infection or liver disease** (increased demand)
- **Inflammatory bowel disease** (decreased absorption)
- **Diabetics** (increased excretion)
- **Elders** (decreased absorption, dietary intake)
- **Vegans** (insufficient dietary intake)
- **Pregnant and breastfeeding women** (increased demand—low riboflavin increases risk for pre-eclampsia)
- **Adolescents, particularly girls** (increased demand)
- **Athletes** (increased demand)
- **Hyperthyroidism** (increased demand)

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15

A **26-year-old African American woman** comes in for her routine dental exam. She mentions that **she craves ice all the time**, even in the winter. Dentist notes **generalized oral mucosal atrophy and pallor**.

*What nutrient deficiency is most likely?*

- A. Folate
- B. Iron
- C. Calcium
- D. Selenium

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16

## Iron

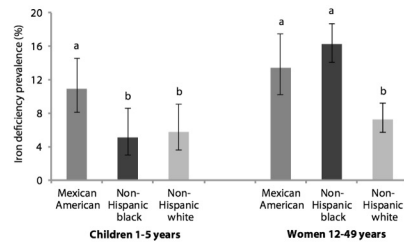


Image: <https://www.cdc.gov/nutrition/essort/pdf/Trace.pdf> Accessed May 7, 2021

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17

- Low iron *most common cause of anemia* in young women; detrimental to **mood, cognition; physical well-being.**
- **Prenatal** and early childhood iron deficiency associated with **long-term neurobehavioral damage**, may not be reversible, even with treatment.
- **RDA for females:**
  - 14–18 yrs.: 15 mg/d
  - 19–50 yrs.: 18 mg/d
  - Pregnant: 27 mg/d
  - Breastfeeding: 9 mg/d
  - 51 and older (*and men*): 8 mg/d

## To Get 18mg of Iron in Food

- 4 cups of raisins OR
- 3-5 cups instant oatmeal OR
- 3 cups fortified Special K cereal\*\* OR
- 3 cups cooked lentils OR
- 2.2 cups canned white beans OR
- 10-ounces beef liver OR
- 45-ounces chicken breasts OR
- 15 cups broccoli OR
- 3 cups cooked spinach



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18

## Vitamin C

- Plays crucial role in **innate and adaptive immune responses.**
- Maintains **epithelial barrier** function, increases alveolar fluid clearance, and attenuates pro-inflammatory response.
- Deficiency leads to **impaired immunity** and greater risk of infection.<sup>1</sup>
- **Only 1 in 10** Americans get recommended daily intake for **fruits and vegetables.**<sup>2</sup>
- **~15.7 million** Americans have serious vitamin C deficiency; **~60 million** have marginal status.

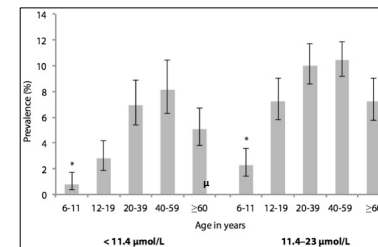


1. Vonlison P, et al. *Eur J Clin Pharmacol* 2019; 75(3):303-311.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6456116/pdf/ajph.aph.180006.pdf>  
 Accessed November 24, 2021  
 2. [https://www.cdc.gov/nutrition/essort/pdf/Nutrition\\_Book\\_complete2008\\_final.pdf](https://www.cdc.gov/nutrition/essort/pdf/Nutrition_Book_complete2008_final.pdf)

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19

## Prevalence of Vitamin C Deficiency and Low Vitamin C Concentration in US Population



**Figure H.1.f.** Prevalence estimates of vitamin C deficiency (serum concentrations less than 11.4 μmol/L) and low vitamin C concentrations (11.4-23 μmol/L) in the U.S. population aged 6 years and older by age group, National Health & Nutrition Examination Survey, 2003-2006.

Error bars represent 95% of confidence intervals. \*Prevalence in children is significantly lower than prevalence in persons 20 years and older ( $p < 0.05$ ).

**Scurvy induced** when dietary vitamin C intake < 10 mg/d and/or plasma vitamin C levels **below 11 μmol/L**.

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20

## Vitamin C: Acute Infection



- **Infection depletes levels** due to increased inflammation and metabolism.
  - 35% Scottish elders hospitalized for respiratory inf: levels < 11  $\mu\text{mol/L}$ .<sup>1</sup>
  - Canadian hospital: 19% patients had levels < 11  $\mu\text{mol/L}$ <sup>1</sup>
  - Paris hospital: 44% patients had levels < 6  $\mu\text{mol/L}$ .<sup>1</sup>
- Maintain adequate vitamin C levels, especially during periods of stress.

1. Hemila H, et al. Vitamin C Can Shorten the Length of Stay in the ICU: A Meta-Analysis. *Nutrients* 2019 Apr; 11(4): 708.

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21

## “Picky” Eater?

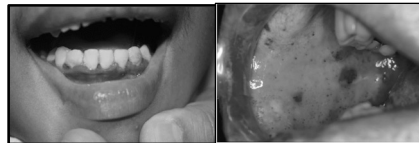
- **Healthy 4-year-old boy** seen by ortho/rheumatology with **right-leg pain** and **progressively worse limping**, became **unable to weight bear**.
- Intermittent **non-blanching rash arms and legs** past 2 years, topical emollients not effective. **Bleeding when brushing teeth, gingivitis.**
- Diet primarily **waffles, yogurt, pasta with butter, goldfish crackers, peanut butter, chicken nuggets, and water.**
- Workup negative **except for iron, vitamins C and D deficiencies.**
- **100 mg ascorbic acid q 8 hours x 7 days**, then 1 x daily with **iron and vitamin D.**
- **Limp and rash completely disappeared within weeks.**

Nastro A, et al. Scurvy Due to Selective Diet in a Seemingly Healthy 4-Year-Old Boy. *Pediatrics* September 2019; 144 (3) e20182824.

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22

## Vitamin C



- Skin changes, **easy bruising**, **slow healing wounds**, **dry mouth**, **dry eyes**. **Emotionally labile. Weakened capillaries.** Hemorrhage is hallmark of scurvy and hair follicles are common site of cutaneous bleeding.
- **Inflammation of gingiva** followed by **bleeding, ulceration, and bad breath.**
- **Swelling of periodontal membranes** occur, followed by **loss of bone**, and **loosening of the teeth.**
- Low ascorbic acid levels found in **healthy subjects with gingivitis** and in **diabetics with periodontitis.** 250 mg BID improved symptoms.<sup>1</sup>

1. Gokhale NH et al. *J Diet Suppl.* 2013;10:93–104.

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23

### MAIN FUNCTIONS

- Antioxidant defense
- Enhances immune function
- Needed to make collagen, carnitine, and the neurotransmitters serotonin and norepinephrine

### DAILY RECOMMENDATION

**400**  
mg

All Adults

### GOOD SOURCES

#### Fruit

- Kiwifruit, 1 medium-sized, 90 mg



mg = milligrams

- Strawberries (whole), 1 cup, 85 mg



#### Vegetables

- broccoli • kale • tomatoes
- Sweet Red Pepper, ½ cup chopped, 95 mg



### SPECIAL NOTES

- Heat destroys vitamin C. Try to eat fresh foods and cook by steaming, microwaving, or stir-frying.
- Vitamin C in food is identical to vitamin C in supplements.
- The Daily Recommendation listed is specific to the LPI based on extensive review of the scientific evidence. The Institute of Medicine's Recommended Dietary Allowance (RDA) is 90 mg/day for men and 75 mg/day for women.

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24

Which of the following nutrients would be most beneficial for someone with idiopathic taste disorders?

- A. Magnesium
- B. Vitamin C
- C. Zinc
- D. Biotin

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25

## Zinc & Oral Health

- Zinc critical for **sense of smell & taste**.
- Review clinical trials: *moderate quality evidence zinc supplements improve overall taste in patients with zinc deficiency/idiopathic taste disorders.*
- Zinc can protect taste in those **undergoing chemotherapy or radiation**.
- RDA for men is 11 mg/d and 8 mg/d women. (Nursing: 12 mg/d)
  - 40 mg/d considered safe long term.



Nagraj SK, et al. *Cochrane Database Syst Rev* 2014; 2014 Nov 26;11:CD010470.  
Ozler GS. *J Laryngol Otol* 2014; 128(6):531-3  
Najafizade N, et al. *J Res Med Sci* 2013; 18(2):123-6

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26

## Zinc & Immune Health

- Improves **mucociliary clearance**, strengthens **epithelial integrity**, regulating **tight junctions**, antibacterial effects against *S. pneumoniae*<sup>1</sup> preserves antiviral immunity.
- Zinc deficiency affects **30%** of global population; responsible for **~800,000 deaths**.<sup>2</sup>
- ~ **4% children** (<10 y), **8.6% males** (≥10 y), **8.2% females** (≥10 y) **below** zinc cutoff.<sup>3</sup>
- **35–45% US adults > 60 years** daily intake below estimated average requirement.
- Study 420 nursing home patients: **29% zinc deficient** even after one year taking MVI with 7 mg zinc.<sup>4</sup>



1. Ejthakump B-A, et al. *PLoS Pathogens*, 2019; 15 (6): e1007  
2. Wu D, et al. *Front Immunol* 2019; doi: 10.3389/fimmu.2018.03160  
3. Heminger SK, et al. *The Journal of Nutrition* 2018; 148(5): 1341-51  
4. Meydani SN, et al. Serum zinc and pneumonia in nursing home elderly. *Am J Clin Nutr* 2007; 86, 1167–1173

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27

## Zinc & COVID

- Prospective study of fasting zinc levels in **COVID-19 patients** at time of **hospitalization** found significantly **lower serum zinc levels** than controls ( $p < 0.001$ ), with **57.4% being zinc deficient**.
- Odds of severe complications **five-fold greater** in those who were zinc deficient.
- **Higher rates complications** ( $p = 0.009$ ), acute respiratory distress syndrome (18.5% vs 0%,  $p = 0.06$ ), **prolonged hospital stays** ( $p = 0.05$ ), and **increased mortality** (18.5% vs 0%,  $p = 0.06$ ).



Jothimani D, et al. COVID-19: Poor outcomes in patients with zinc deficiency. *Int J Infect Dis* 2020 Nov;100:343-349.

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28

## Zinc Deficiency



- Increased risk: vegans, alcoholics, those with HIV, cystic fibrosis and inflammatory bowel disease; those taking statins/blood pressure meds.
- **Perioral and periorificial eczematous to pustular dermatitis** in horseshoe-shaped configuration due to sparing of the upper lip.
- **Angular cheilitis** with **oral ulcerations** may be present.
- Intraoral findings may include **flattening of the filiform papillae**, **impaired healing**, and sensations of **hypogeusia** and **xerostomia**.

Perioral dermatitis associated with zinc deficiency. Photo by Dr. Mark Pittelkow, Mayo Clinic Department of Dermatology as published in: DiBaise M, et al. *Nutrition in Clinical Practice* 2019; 34(4): 490-503

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29



30

## Vitamin D

- Deficiency common globally, more **severe in elders** due to environmental/biological factors.
- **75% elders** in nursing homes **severely** vitamin D deficient (25(OH)D < 10 ng/mL).
- **Obesity, dark skin, living northern latitudes, use of sunscreen**, all increase **deficiency risk**.
- Vitamin D increases **innate immunity** via secretion of **antiviral peptides**, strengthening **mucosal defenses** and **reducing risk of respiratory infections**.



Lips P, et al. *Eur J Endocrinol*. 2019;180:23-54.  
Ali N. *J Injct Public Health* 2020; Oct; 13(10): 1373-1380.

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31

## Vitamin D & Respiratory Infection



Martineau AR, et al. Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. *BMJ* 2017; 356: i6883.

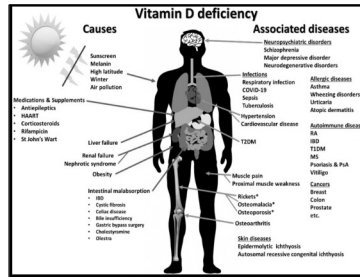
- Acute respiratory infection kills **~2.65 million people/year**.
- Vitamin D releases antimicrobial peptides in the lungs, helps to mount immune response.
- **25 eligible randomized controlled trials (n=10,933, aged 0-95 years)**.
- Supplementation **reduced risk of acute respiratory infection** among all participants (NNT=33) and **those who were vitamin D deficient experienced the most benefit (NNT=4)**.

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32



## Vitamin D & Microbiome



• Vitamin D ensures appropriate level of antimicrobial peptides in mucus; maintains intestinal barrier function.

• If bacteria penetrate epithelial layer and enter interstitium, immune cells trigger adaptive immune response by activating Th1/Th17 cells. **Vitamin D/VDR signaling in these cells ensures clearance of the bacteria.**

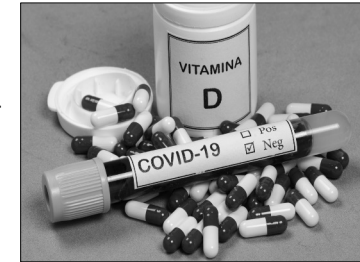
Fakhoury HMA, et al. *J Steroid Biochem Mol Biol* 2020

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33

## Vitamin D & COVID

- 212 cases COVID-19: **vitamin D deficient patients had 19.6-fold higher risk of critical outcome** compared to those with sufficient levels ( $p < 0.001$ ).<sup>1</sup>
- Retrospective study: **780 confirmed cases SARS-CoV-2 infection** found those vitamin D deficient **~13 times more likely to die**.<sup>2</sup>
- Israeli data: **26% of COVID patients died** if vitamin D deficient soon before hospitalization, compared to **3% who had normal levels of vitamin D**.
- Hospitalized patients **who were vitamin D deficient 14 times more likely to end up in severe or critical condition** than others.<sup>3</sup>



1. Alipia, M. Vitamin D Supplementation Could Possibly Improve Clinical Outcomes of Patients Infected with Coronavirus-2019 (COVID-2019). *ISRN Endocrinol*. 2020; doi:10.2139/ssrn.3571484;  
2. Raharison P, et al. Patterns of COVID-19 Mortality and Vitamin D: An Indonesian Study. *ISRN Endocrinol*. 2021; doi:10.2139/ssrn.396561  
3. <https://www.timesofisrael.com/1-in-4-hospitalized-covid-patients-who-lack-vitamin-d-died-in-study/>

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34

## Vitamin D Deficiency

- Serum 25(OH)D level is used to determine vitamin D status. According to the American Endocrine Society:
  - Preferable level **40–60 ng/mL** (100–150 nmol/L)
  - Sufficiency is **30 ng/mL** (75 nmol/L) and above
  - Insufficiency defined as **20–29 ng/mL**
  - Deficiency defined as **<20 ng/mL** (<50 nmol/L)
  - Severe deficiency **<12 ng/mL** (<30 nmol/L)
- **66.8 million Americans** 1 year and older levels between **12–20 ng/ml**
- **23 million Americans** 1 year and older: levels **less than 12 ng/ml**
  - Most at risk were **women and non-Hispanic blacks**
- **2000–4000 IU per day** appears necessary to maintain sufficient levels

CDC 2nd National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population. All rights reserved.  
Holick MF, et al. *J Clin Endocrinol Metab* 2011; 96(7):1911-30

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35

Table 2. IOM and Endocrine Society Recommendations for Vitamin D Intake<sup>6,11</sup>

Life-stage Group <sup>a</sup>	IOM Recommendations, IU/d		Endocrine Society Recommendations, IU/d <sup>b</sup>	
	Intake	Upper Limit <sup>c</sup>	Intake	Upper Limit <sup>c</sup>
0-6 months	400 <sup>d</sup>	1,000	400-1,000	2,000
6-12 months	400 <sup>d</sup>	1,500	400-1,000	2,000
1-3 years	600	2,500	600-1,000	4,000
4-8 years	600	3,000	600-1,000	4,000
9-18 years	600	4,000	600-1,000	4,000
19-30 years	600	4,000	1,500-2,000	10,000
31-50 years	600	4,000	1,500-2,000	10,000
51-70 years	600	4,000	1,500-2,000	10,000
71+ years	800	4,000	1,500-2,000	10,000
Pregnant or lactating women (14-18 years)	600	4,000	600-1,000	4,000
Pregnant or lactating women (19-50 years)	600	4,000	1,500-2,000	10,000

<sup>a</sup> Includes normal healthy individuals of both genders unless otherwise specified.

<sup>b</sup> Estimated intake needed to maintain blood 25(OH)D levels above 30 ng/mL.

<sup>c</sup> Maximum level that is expected to have no risk of adverse effects to healthy individuals. 1 µg of vitamin D is equivalent to 400 IU.

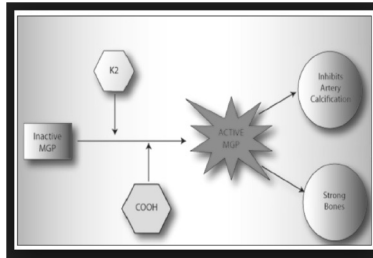
<sup>d</sup> Refers to adequate intake (intake estimated to maintain protective 25(OH)D levels in a group of healthy individuals with limited sun exposure and vitamin D stores) instead of recommended intake, which could not be established because of insufficient evidence.

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36

## Don't Forget the Vitamin K

- Calcium, vitamins D and K, and magnesium contribute independently and collectively to bones.
- Beneficial role of vitamin K, particularly **vitamin K2**, in bone and cardiovascular health reasonably well supported scientifically, with several preclinical, epidemiological, and clinical studies published over the last decade.
- Vitamin K2 (MK-7) 100–200 mcg per day.



Karpinski M, et al. Roles of Vitamins D and K, Nutrition, and Lifestyle in Low-Energy Bone Fractures in Children and Young Adults. *J Am Coll Nutr* 2017 Jul;36(5):399-412.

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37

## Magnesium is Crucial

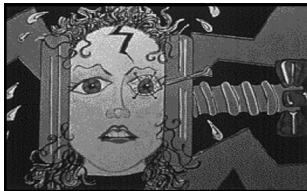
- Regulates fundamental functions: **muscle contraction, neuromuscular conduction, glycemic control, myocardial contraction, and blood pressure.**
- Type 2 diabetes, metabolic syndrome, inflammation, HTN, atherosclerosis, sudden cardiac death, osteoporosis, migraines, asthma, and colon cancer.
- Serum level should be **>2.07 ng/mL**
- Many benefit from 300–400 mg/d



Bertrando J, et al. *Nutrients* 2017 Mar; 9(3): 296  
 Al Alwan AM, et al. *Int J Endocrinol* 2018; 9(4):694  
 Razaque MS. *Nutrients* 2018; 10(12):1863

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38



## Magnesium for Migraines

- Migraine disproportionately affects women. Impacts 1 in 4 households. Studies show migraineurs have low brain magnesium during migraine attacks.
- Canadian Headache Society: **strong recommendation for magnesium for prophylaxis of migraine (also for riboflavin).**
- Dose generally 400–600 mg/d.
- Diarrhea most common side effect (glycinate, malate and citrate less GI complaints than oxide). **Caution** with supplementation in those with *poor kidney function*.

Rajapakse T, et al. Nutraceuticals in Migraine: A Summary of Existing Guidelines for Use. *Headache* 2016; 56(4):808-16.

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39

## Choline in Pregnancy



- ACOG, AMA, AAP, EFSA, WHO: choline is **crucially important** during pregnancy.<sup>1</sup>
- **Pregnant women: 450 mg/d Lactating women: 550 mg/d.**
- ~90–95% pregnant women consume less than recommended amounts of choline.
- Review 38 animal & 16 human studies: supplementing mother/child's diet first 1,000 days of life:
  - **Supports normal brain development** (animal and human evidence).
  - Protects against **neural/metabolic insults**, particularly when **fetus exposed to alcohol**.<sup>2</sup>
  - Improves **neural and cognitive functioning** (animal evidence).<sup>3</sup>


1. Schwarzenberg SJ. *Pediatrics*. 2018;141. doi: 10.1542/peds.2017-3716. 2. Derbyshire E, et al. *Nutrients* 2020 Jun 10;12(6):1731. 3. Brunst KJ, et al. *BMJ* 2010 May 20;340:c2181.

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40

Food	Choline Content Per Serving	Milligrams (mg) per serving	Percent DV*
Beef liver, pan fried, 3 ounces		356	65
Egg, hard boiled, 1 large egg		147	27
Beef top round, separable lean only, braised, 3 ounces		117	21
Soybeans, roasted, ½ cup		107	19
Chicken breast, roasted, 3 ounces		72	13
Beef, ground, 93% lean meat, broiled, 3 ounces		72	13
Fish, cod, Atlantic, cooked, dry heat, 3 ounces		71	13
Potatoes, red, baked, flesh and skin, 1 large potato		57	10
Wheat germ, toasted, 1 ounce		51	9
Beans, kidney, canned, ½ cup		45	8
Quinoa, cooked, 1 cup		43	8
Milk, 1% fat, 1 cup		43	8
Yogurt, vanilla, nonfat, 1 cup		38	7
Brussels sprouts, boiled, ½ cup		32	6
Broccoli, chopped, boiled, drained, ½ cup		31	6
Mushrooms, shiitake, cooked, ½ cup pieces		27	5
Cottage cheese, nonfat, 1 cup		26	5

<https://ods.od.nih.gov/factsheets/Choline-HealthProfessional/#en16> Accessed July 17, 2021




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41

## Iodine Crucial for Brain Health

- **Crucial nutrient**, especially during **pregnancy, infancy, and childhood** when thyroid hormones regulate growth in developing brain.
- **Mild deficiency** associated with **autistic spectrum disorder, ADHD, learning disabilities, and dyslexia.**<sup>1</sup>
- **American Thyroid Association:** women planning on becoming pregnant, are pregnant or lactating **take supplement containing 150 mcg/d potassium iodide.**<sup>2</sup>



1. Hay I, et al. *Nutrients* 2019 Aug 22;11(9):1974  
2. Stagnaro-Green A, et al. *Thyroid*. 2011;21(10):1081-1125

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42

## Iodine Intake Pregnancy & Breastfeeding

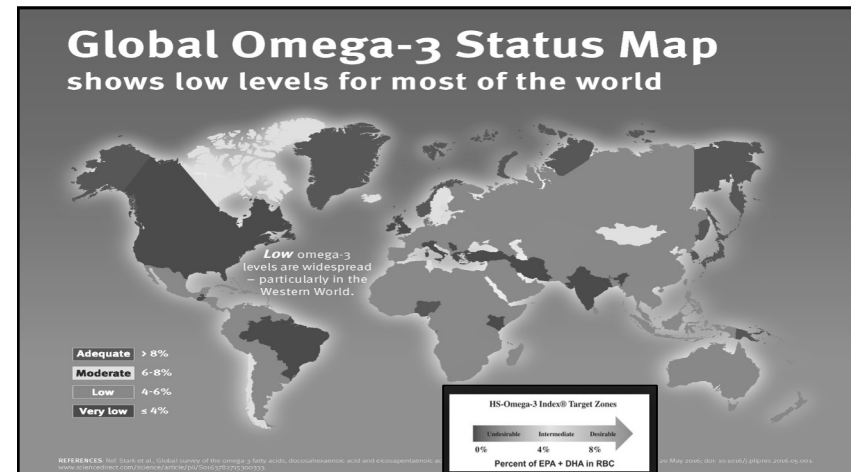
Data from National Health and Nutrition Examination Survey found **use of iodine containing dietary supplements among pregnant and lactating women remains low** in contrast with current recommendations.

- Among **pregnant** women, 72.2% used any dietary supplement; however, **only 17.8% used a dietary supplement with iodine.**
- Among **lactating** women, 75.0% used a dietary supplement; however, **only 19.0% used a dietary supplement with iodine.**



Gupta PM, et al. Use of Iodine-Containing Dietary Supplements Remains Low among Women of Reproductive Age in the United States: NHANES 2011-2014. *Nutrients* 2018 Mar 29;10(4): pii: E422

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43




44

Greater Longevity with a Higher Omega-3 Index	Recovering from a Heart Attack with Omega-3s: The OMEGA-REMODEL Study
	
<p>Postmenopausal women with an Omega-3 Index over 8% were 30% less likely to die than those with an Index under 4% over 15 years.</p>	<p>Patients who had recently had a heart attack and were then treated with omega-3 fatty acids for 6 months had healthier hearts if their Omega-3 Index reached 11% compared to those with lower levels.</p>

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45

The Omega-3 Index and Risk for Fatal CHD	Total Mortality and the Omega-3 Index: Heart and Soul
	
<p>Data from 10 prospective cohort studies including &gt;24,000 subjects showed that an Omega-3 Index of 8% or greater was associated with the lowest risk for fatal CHD.</p>	<p>People with the highest Omega-3 Index levels lived longer than those with the lowest levels.</p>

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46

## Where Can You Get Tested?

- Talk to your health care practitioner about potential concerns around micronutrient deficiencies.
- Most lab tests are readily available through LabCorp or Quest.
- If you order your own tests, I recommend [www.requestatest.com](http://www.requestatest.com).
- Vibrant America, EveryWell, and SpectraCell are also commonly used.

Request Online Lab Testing or a Drug Test Near You

• Affordable and expedient test results  
• Convenient ordering and results  
• No doctor's order necessary - we'll handle it

Request A Test Now

Affordable, Rapid, Confidential

Order Your Test | Get Your Results | Get Your Results | Get Started Now

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47



48



49



50

## *Aloe Vera Gel*

- Antiseptic/anti-inflammatory gingivitis and periodontitis
- Mouth rinse: reduction in gingivitis and plaque accumulation after use
- Anti-viral: herpes simplex
- Reduce oral ulcer pain
- Inhibits oral candida

Scientific name (Family name)	Subjects	Outcomes	Reference
<i>Aloe vera</i> (L.) Burm.f. (Asphodelaceae)	120 volunteers with gingivitis aged 18-25 years old	Inhibition of gingivitis and plaque accumulation after oral rinse	Chandrasekhar et al. (2012)
	45 patients with plaque-induced gingivitis aged 18-65 years old	Reduction of gingival inflammation	Ajmera et al. (2013)
	345 healthy subjects	Reduction of gingival bleeding and plaque indices	Karim et al. (2014)
	76 intubated patients in intensive care unit aged 18-64 years old	Reduction of gingival index compared with chlorhexidine	Rezaei et al. (2016)
	390 healthy subjects	Reduction of gingival index compared with chlorhexidine	Vangipuram et al. (2016)

Sujatha G, et al. Aloe vera in dentistry. *J Clin Diagn Res* 2014; 8(10): Z101-Z102.

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51

## Elder berry *Sambucus nigra*

- Long history across disparate cultures as a treatment for respiratory infections.
- Numerous compounds thought active for antiviral and immune priming effects.
- Possesses antimicrobial activity against Gram-positive bacteria *Streptococcus pyogenes* and group C and G Streptococci, and the Gram-negative bacterium *Branhamella catarrhalis*.



Porter RS, et al. A Review of the Antiviral Properties of Black Elder (*Sambucus nigra* L.) Products. *Phytother Res* 2017 Apr;31(4):533-554.

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52

**Table 3. Human clinical studies on the effects of various *Sambucus nigra* treatments against influenza**

Study	Treatment	dosage	n	Results	p
Zakay-Rones <i>et al.</i> , 1995	Sambucol®	4 tsp (all adults) once daily for 2 days	25	Absence of side-effects in healthy adults	
		4 tsp (adults) or 2 tsp (children) once daily for 2 days	27	Recovery from fever in 4 days instead of 6 or more days Symptomatic improvement in 2 days instead of 5 or more days Complete recovery in 2-3 days instead of 5 or more days	<0.01 <0.001 <0.001
				Lessened duration of illness	
Korlee, 1998 Zakay-Rones <i>et al.</i> , 2004	Sambucol®	15 mL four times daily for 5 days	60	All individual symptoms relieved in 2-4 days instead of 7-8 days Global assessment showed pronounced improvement after 3 days instead of 7 days Less use of rescue medication than control	<0.001 <0.001 <0.001
				Absence of side-effects in patients	
Kong, 2009	Elderberry extract lozenge from HerbalScience Singapore Pte. Ltd.	4 lozenges daily for 2 days	64	24 h: significant improvement in all symptoms except coughing and mucus discharge 48 h: significant improvement in all symptoms 48 h: complete eradication of all symptoms in 28% of treatment group and 0% of control group	<0.0001 <0.0001
				Absence of side effects in patients Lessened symptom severity Lessened illness duration No significant difference in use of rescue medications Less occurrence of illness in treatment group (not significant)	0.06 0.02 0.9 0.2
Tratnig <i>et al.</i> , 2016	Rubini capsules	2 capsules/day priming (9 days), then 3 capsules/day (6 days)	29		
All studies were randomized, double-blinded, and placebo-controlled, with acceptable patient compliance.					
Copyright © 2017 John Wiley & Sons, Ltd. <i>Phytother. Res.</i> 31: 533-554 (2017)					

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53

## *Echinacea and Elderberry*

- 473 patients with flu symptoms less than 48 hours randomized to **240 mg echinacea herb/root extract + elderberry fruit** (Vogel Bioforce) or **tamiflu**.
- **No difference between recovery rates**, antibiotic use, intermediate doctor visits, use of over-the-counter medications for symptoms, “ability to return to normal daily activities,” or physician- and patient-reported efficacy of the treatments.
- Safety positive.



Raus K, et al. *Curr Ther Res.* 2015 Dec; 77: 66-72.

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54

### Are there safety concerns?

Elderberry fruit extract is **POSSIBLY SAFE** when taken by mouth for up to 12 weeks. It's not known if taking elderberry fruit extract is safe when used for longer periods of time.

Elderberry is **POSSIBLY UNSAFE** when the leaves, stems, unripe fruit, or uncooked fruit is eaten. The cooked elderberry fruit seems to be safe, but raw and unripe fruit might cause nausea, vomiting, or severe diarrhea.

#### • Children

##### Oral:

**Influenza:** An elderberry fruit extract (Sambucol, Nature's Way) 15 mL (1 tablespoon) twice daily for 3 days, starting within 48 hours of initial symptoms, has been used (5260). A specific product containing echinacea and elderberry (Echinaforce Hot Drink, A. Vogel Bioforce AG) 5 mL mixed with 150 mL of hot water five times daily for 3 days, then three times daily for 7 days, has been used in children 12 years and older (95650).

<https://naturalmedicines-therapeuticresearch-com.ezproxy4.library.arizona.edu/databases/food,-herbs-supplements/professional.aspx?productid=434#dosing> Accessed January 17, 2019

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55

## *Rhodiola rosea* L.

- Plant: perennial with thick leaves and stem; yellow, fragrant flowers. Crassulaceae.
- Part used: **root and rhizomes**
- Used in traditional medicine of Russia, Scandinavia, and other northern latitude countries for centuries
- Used to increase **physical endurance, work productivity, longevity, and nervous disorders**
- “**Anti-fatigue agent**” in Sweden, commonly used psychostimulant in officially registered herbal medicinal products



Khana K, et al. Golden root: A wholesome treat of immunity. *Biomed Pharmacother* 2017; Mar;87:496-502.

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56

**Table 1**  
Randomized and non-randomized clinical trials of Rhodiola in mental fatigue, stress-induced fatigue, fatigue syndrome and asthenia.

Adaptogen (active principle)	Indication for use and/or pharmacological activity	Number of trials	Number of subjects	Grade of recommendation	
				EMA <sup>a</sup>	NSR <sup>b</sup>
<i>Rhodiola rosea</i>	<b>Mental fatigue:</b> Rhodiola can improve attention in cognitive function in fatigue after single and repeated administration.	3	257	A	A
	<b>Fatigue syndrome:</b> Rhodiola has anti-fatigue effect in physical, emotional, and mental exhaustion.	1	60	A	B
	<b>Mild depression:</b> Rhodiola has an anti-depressive effect	1	89	A	B
	<b>Stimulating effect:</b> Rhodiola can improve mental performance after single dose administration	3	419	B	B
	<b>Stimulating effect:</b> Rhodiolside can improve mental performance after single dose administration	1	46	B	

<sup>a</sup> Grade of recommendation based on the European Medicines Agency Assessment Scale [EMA/HMPC/104613/2005]:  
Grade A. Evidence levels quality Ia, Ib - Requires at least one randomized controlled trial as part of the body of literature of overall good consistency addressing the specific recommendation;  
Grade B. Evidence levels Ia, Ib, III - Requires availability of well-conducted clinical studies but no randomized clinical trials on the topic of recommendation;  
Grade C. Evidence level IV - Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities but indicates absence of directly applicable studies of good quality.

<sup>b</sup> Grade of recommendation according to Natural Standards Evidence-Based Validated Grading Rationale (Basch and Ullblight, 2005):  
Grade A. Strong scientific evidence - Statistically significant evidence derived from: (i) more than two properly conducted randomized controlled trials (RCT), or (ii) one properly conducted randomized controlled trial, and one properly conducted meta-analysis, or (iii) multiple RCTs with a clear majority of the properly conducted trials and with supporting evidence in basic science, animal studies or theory;  
Grade B. Good scientific evidence - Statistically significant evidence derived from: (i) one or two properly conducted randomized trials, or (ii) one or more properly conducted meta-analysis, or (iii) more than one cohort/case control/non-randomized trials and with supporting evidence in basic science, animal studies or theory.

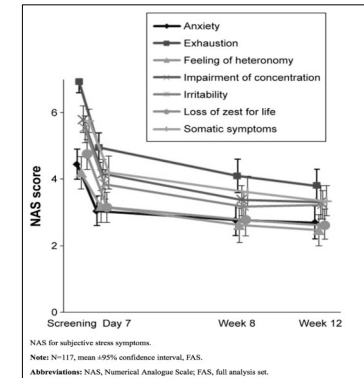
Panossian AG. Rosenroot (*Rhodiola rosea*): Traditional use, chemical composition, pharmacology and clinical efficacy. *Phytotherapy* 2010; 17(7): 481-93

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57

## Open Label Study

Multicenter trial 118 outpatients with **burnout syndrome** (multiple validated scales) found 400 mg/d *R. rosea* extract (1.5–5:1, WS<sup>®</sup> 1375, Rosalin) over 12 weeks **had significant beneficial effect on symptoms.**



Kaspar S, et al. *Neuropsychiatr Dis Treat* 2017; 13: 889–898

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58



EUROPEAN MEDICINES AGENCY  
SCIENCE MEDICINES HEALTH

27 March 2012 EMA/HMPC/232100/2011  
Committee on Herbal Medicinal Products (HMPC)  
**Assessment report on *Rhodiola rosea* L. rhizoma et radix**

- “The traditional use as an adaptogen **for temporary relief of symptoms of stress such as fatigue and sensation of ‘weakness’ is appropriate for traditional herbal medicinal products.**”
- “The long-standing use as well as the outcome of the clinical trials support the plausibility of the use of the mentioned herbal preparation in the proposed indication.”

[https://www.ema.europa.eu/documents/herbal-report/final-assessment-report-rhodiola-rosea\\_en.pdf](https://www.ema.europa.eu/documents/herbal-report/final-assessment-report-rhodiola-rosea_en.pdf) Accessed November 1, 2018

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59

## Turmeric (*Curcuma longa*)

- Family: Zingiberaceae (ginger family)
- More than 130 species worldwide
- Part Used: Rhizome
- Perennial plant grown in tropical areas, most grown in India, they consume 80% of crop. Used in meat, fish and vegetable curries.
- Long history of medicinal use ~4,000 years.
- In ancient Ayurvedic literature, called Jayanti, meaning “one who is victorious over disease.”



[www.ncbi.nlm.nih.gov/books/NBK92752/](http://www.ncbi.nlm.nih.gov/books/NBK92752/) Accessed September 2, 2018

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60

## Tuft's Review 11 RCTs: *Turmeric, Boswellia, and Osteoarthritis*

- Curcumin and boswellia **significantly more effective than placebo for pain relief/functional improvement.**
- No significant differences between curcumin, boswellia and placebo in **safety outcomes.**
- **Curcuminoids** similar efficacy to **NSAIDs; significantly less likely** to experience gastrointestinal adverse events.
- “Curcumin and boswellia formulations could be valuable addition to **knee OA treatment regimens** by **relieving symptoms while reducing safety risks.**”



Bannuru RR, et al. Efficacy of curcumin and Boswellia for knee osteoarthritis: Systematic review and meta-analysis. *Semin Arthritis Rheum* 2018 Mar 10; pii: S0049-0172(18)30002-7

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61

## *Turmeric Mouthwash*

- 21-day clinical study 60 patients: both 0.2% chlorhexidine and 0.1% turmeric mouthwash effectively used as adjunct to mechanical plaque control in prevention of plaque and gingivitis.
- Both mouthwashes had comparable anti-plaque, anti-inflammatory and anti-microbial properties.



Mali AM, et al. *J Indian Soc Periodontol* 2012 Jul-Sep; 16(3): 386–391.

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62

## *Turmeric for Depression?*

- Meta-analysis 6 studies: curcumin reduced depression symptoms, particularly in middle-aged patients when given at higher doses for longer periods of time.
- Authors concluded, “there is supporting evidence that curcumin administration reduces depressive symptoms in patients with major depression.”
- Is this an impact on microbiome? Is it due to systemic reduction in inflammation?



Al-Kawari D, et al. *Phytother. Res* 2016; 30(2):175-83

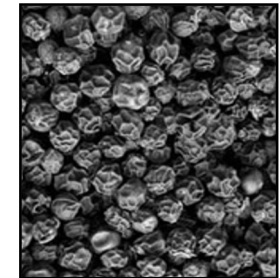
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63

## Absorption & Bioavailability

- **<1% curcumin reaches peripheral blood after oral ingestion even at high doses (12 grams).** Only organ exposed to high concentration is **gastrointestinal tract.**
- To enhance absorption: piperine from black pepper or use phytosome (Meriva) product.
- Piperine, black pepper alkaloid. **Increases bioavailability 2000%. <20 mg/d piperine to avoid drug interactions.**
- **Dose generally: 1000–1500 mg per day (95% curcuminoids)**



Metzler M, Pfeiffer F, Sculz SI, et al. Curcumin uptake and metabolism. *Biofactors* 2013; 39(1): 14-20  
Howlings SJ, et al. Curcumin: A Review of Its Effects on Human Health. *Food* 2017 Oct 22;6(10), pii: E32.

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64



Essential Oil	Potential Use in Dentistry
Lavender	As an anxiolytic in dental office
	Reduces pain of needle insertion, herpes
Eucalyptus	Anti-cariogenic agent
Peppermint	Antimicrobial activity, halitosis
	Use in oral hygiene products
Cinnamon	In treating oral candidiasis
Lemon	In treating candidiasis
Clove	Antimicrobial against oral pathogens, toothache
Myrrh	Gingivitis, aphthous ulcers, periodontal disease
Tea Tree	Oral candidiasis, aphthous ulcers
	Prophylactic oral hygiene products
Dagli N, et al. Essential oils, their therapeutic properties, and implication in dentistry, a review. <i>J Int Soc Prev Community Dent</i> 2015; 5(5): 335-340.	

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65

## Quality

- **Domestically produced products** *generally* better quality than those imported from China or India.
- **3<sup>rd</sup> party testing** (e.g., USP, NSF, CL, NNEA) **quality indicator.**
- Be cautious with products in **weight loss, sexual enhancing or bodybuilding** categories.
- **Consumer Labs** can be a useful website for assessing quality.

03/04/2022	Wonderful Honey	n/a	n/a	Examination of imported goods	Undeclared salmonella	Public Notification	Drugs
07/10/2022	Raw Up Red Edition Capsules	Positive Health	n/a	amazon.com	Undeclared tadalafil	Recall	Drugs
02/09/2022	Red Mammoth capsules	Celebrate Today	n/a	amazon.com	Undeclared tadalafil and sildenafil	Recall	Drugs
02/08/2022	The Red Pill	Your Favorite Shop	n/a	amazon.com	Undeclared tadalafil	Recall	Drugs
02/08/2022	MAC DADDY PURPLE capsules	ABC SALES 1 INC	n/a	amazon.com	Undeclared tadalafil	Recall	Drugs
02/08/2022	MAC DADDY RED capsules	ABC SALES 1 INC	n/a	amazon.com	Undeclared tadalafil and sildenafil	Recall	Drugs
02/04/2022	Magma Performance Booster capsules	Jump LLC	n/a	amazon.com	Undeclared tadalafil	Recall	Drugs
01/08/2022	Hard Down Box and Shine capsules	Ensupplementations, LLC	n/a	amazon.com	Undeclared tadalafil	Recall	Drugs
01/07/2022	Tasewen Liar	Various Distributors	n/a	etsy.com	Undeclared metoclopramide	Public Notification	Drugs
01/05/2022	Anti Age King	Various Distributors	n/a	amazon.com	Undeclared sildenafil	Public Notification	Drugs

[https://www.accessdata.fda.gov/scripts/sda/sdNavigation.cfm?filter=&sortColumn=1d&sd=tainted\\_supplements\\_cder&page=1](https://www.accessdata.fda.gov/scripts/sda/sdNavigation.cfm?filter=&sortColumn=1d&sd=tainted_supplements_cder&page=1)  
Accessed March 8, 2022

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66

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Our Mission: To identify the best quality health and nutritional products through independent testing.

Product Tests | Select a Review | CL Answers | Warnings | Encyclopedia | Where to Buy | News

**BRANDS REVIEWED AND TESTED:**

Since 1999, ConsumerLab.com has tested and provided ratings for vitamins and supplements for a wide range of brands, including those sold in health food stores, vitamin stores, pharmacies, supermarkets, mass merchandisers, discount clubs, catalogs, health care practitioner offices, through distributors in multi-level marketing companies, and on the Internet.

The brands below have been tested and rated in Product Reviews conducted by ConsumerLab.com, providing quality ratings and comparisons of hundreds of vitamins, supplements and other health products. Please note that the full product line for each brand below has not been tested. ConsumerLab.com rotates through brands in selected products to be evaluated in its Product Reviews. In addition to the products that it selects to be tested, ConsumerLab.com allows manufacturers/distributors to request the testing of their own products for a fee through the Voluntary Testing Program. All such products are purchased on the market by ConsumerLab.com and are not supplied by the manufacturer/distributor. These products undergo the same testing and evaluation as other products.

**Brands tested:**  
Click on a brand name below or use the Search box (top right of this page) to find products by brand.

[https://www.consumerlab.com/results/brands\\_vitamins\\_supplements\\_list.asp#M](https://www.consumerlab.com/results/brands_vitamins_supplements_list.asp#M)

**USP Verified Dietary Supplements**

Over 100 different dietary supplement formulas have received the USP Verified Mark, representing several different brands and retailers. Here are three different ways you can find a quality supplement.

Supplement Types	Brands	Retailers
Minerals	Nature Made	COSTCO WHOLESALE
	KIRKLAND	
Multivitamin	TRU NATURE®	Grocery, Drug, Mass Merchandisers


<https://www.quality-supplements.org/verified-products>

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67

## Herb-Drug Interactions

- Safety concerns: **potential** for dietary supplements to **interact with the absorption, transport, and/or metabolism** of pharmaceutical drugs.
- While *preclinical data* suggests many herbs may interact with drugs, clinical studies of most botanicals predicted to interact with drugs **have shown no clinically significant effects.**
- More **crucial** drug for medical purposes and/or **narrower** therapeutic window—**need closer watch for interactions.**
- **Pharmacists** can be great allies for monitoring potential interactions.
- There are numerous drug-supplement checkers on the Internet.



Sprouse AA, van Breemen RB. *Drug Metab Dispos* 2016;44:162-171

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68

Home > Tools > Interaction Checker  
Back

chamomile

#A#B#C#D#E#F#G#H#I#J#K#L#M#N#O#P#Q#R#S#T#U#V#W#X#Y#Z

**Search Matches** (Click to Add)

- Chamomile
- Chamomile
- Chamomile
- Chamomile & Cramp Bark 450 mg by TerraVita
- Chamomile & Cramp Bark Powder by TerraVita
- Chamomile & Cramp Bark 160 mg by TerraVita
- Chamomile & Yang-Ming Body Lotion 8oz by derma

**Selected Agents** (Click to Remove)

- Melatonin
- Concerta (Methylphenidate)
- Siberberry Drug
- Chamomile

**Results Summary** (Click to Detail)

Interactions found!

Click on any interaction below for more information.

**Concerta <<interacts with>> MELATONIN** contained in "Melatonin"  
Interaction Rating = **Moderate** Be cautious with this combination.

**Disclaimer:** Currently this does not check for drug-drug or supplement-supplement interactions. This is not an all-inclusive comprehensive list of potential interactions and is for informational purposes only. Not all interactions are known or well reported in the scientific literature, and new interactions are continually being reported. Input is needed from a qualified healthcare provider including a pharmacist before starting any therapy. Application of clinical judgement is necessary.

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Check for supplement-  
drug interactions.

<https://naturalmedicines-therapeuticresearch-com.ezproxy4.library.arizona.edu/tools/interaction-checker.aspx#E>

Accessed Jan 17, 2019

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69

You can go deeper into interactions.

**Concerta <<interacts with>> MELATONIN** contained in "Melatonin"

Interaction Rating = **Moderate** Be cautious with this combination.

**SEIZURE THRESHOLD LOWERING DRUGS**

Interaction Rating = **Moderate** Be cautious with this combination.  
Severity = **High** • Occurrence = **Possible** • Level of Evidence = **D**

Some clinical evidence suggests that melatonin may increase the frequency of seizures in certain patients, particularly children who are neurologically disabled (8248,9744). Theoretically, taking melatonin with drugs that also lower the seizure threshold might increase the risk of seizure activity. Some drugs that lower the seizure threshold include anesthetics (propofol, others), antiarrhythmics (mexiletine), antibiotics (amphotericin, penicillin, cephalosporins, imipenem), antidepressants (bupropion, others), antihistamines (cyproheptadine, others), immunosuppressants (cyclosporine), narcotics (fentanyl, others), stimulants (methylphenidate), theophylline, and others.

<https://naturalmedicines-therapeuticresearch-com.ezproxy4.library.arizona.edu/tools/interaction-checker.aspx#E>

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70

## Resources

- *Fortify Your Life* and *Guide to Medicinal Herbs* with National Geographic
- Dietary Supplement Label Database: [dslid.nlm.nih.gov](https://dslid.nlm.nih.gov)
- NIH National Center for Complementary and Integrative Health (NCCIH): [nccih.nih.gov](https://nccih.nih.gov)
- Office of Dietary Supplements: [ods.od.nih.gov](https://ods.od.nih.gov)
- Linus Pauling Institute: [lpi.oregonstate.edu](https://lpi.oregonstate.edu)
- Consumer Labs: [www.ConsumerLabs.com](https://www.ConsumerLabs.com)
- Natural Medicines Research Collaboration  
<https://naturalmedicines.therapeuticresearch.com>

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71