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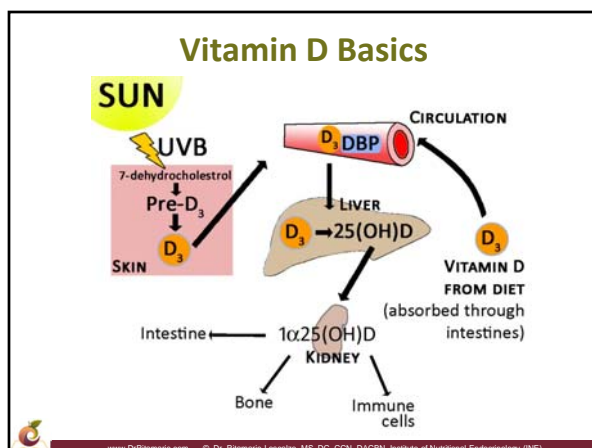
Micronutrients: Vitamin D

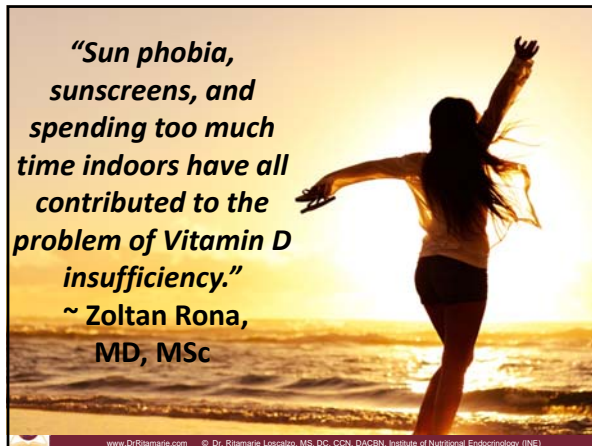
Dr. Ritamarie Loscalzo

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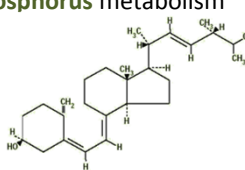
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Functions of Vitamin D - Part 1


- ✓ Helps **gut absorb calcium** and phosphorus
- ✓ Regulate **calcium and phosphorus** metabolism
- ✓ **Adrenal** gland health
- ✓ **Blood sugar** control
- ✓ **Bone** metabolism
- ✓ **Brain** and nervous system development and function
- ✓ **Digestion** and nutrient absorption
- ✓ **Blood brain barrier** permeability
- ✓ **Gut** membrane permeability



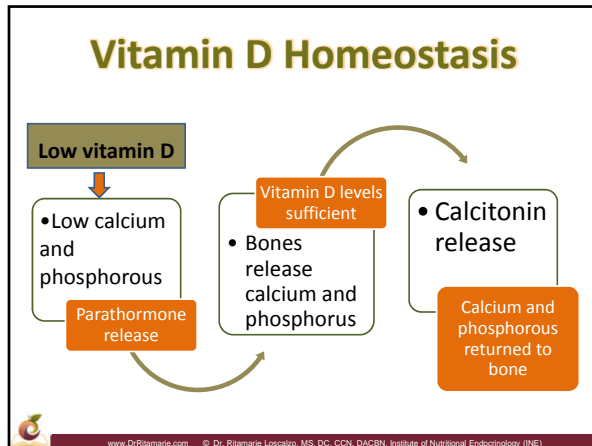
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Functions of Vitamin D - Part 2

- ✓ **Immune system** health
- ✓ **Mood**, mind, memory and behavior
- ✓ **Muscle, nerve** and athletic performance
- ✓ Normal **blood pressure**
- ✓ **Pancreatic** health
- ✓ **Skin** health
- ✓ **Sleep**
- ✓ **Vision**
- ✓ **Weight** control
- carbohydrate and fat metabolism



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Forms of Vitamin D

- ✓ **Vitamin D3:** found exclusively in animal sources
- ✓ **Vitamin D2:** found in plant sources in small amounts
- ✓ **Synthetic Vitamin D2:** fortified products and some supplements

The image shows the chemical structures of Vitamin D2 (calciferol) and Vitamin D3. Vitamin D2 has a side chain with a double bond and two methyl groups. Vitamin D3 has a side chain with three methyl groups.

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Why We Become Vitamin D Deficient

- ✓ **Sun phobia**
- ✓ **Sunscreens**
- ✓ Too much **time indoors**
- ✓ Poor liver function
- ✓ Poor **kidney** function
- ✓ Poor bile production
- ✓ **Food allergies** (prevent absorption)
- ✓ Northern climates / cold climates
- ✓ **Genetics**
- ✓ Showering and scrubbing with soap
- ✓ **Statin drugs**

An aerial photograph of a sandy beach with several people walking along the shoreline.

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INE: Micronutrients - Vitamins: Vitamin D

MAYO CLINIC
Mayo Medical Laboratories

Vitamin D Deficiency

Consequences:

- Psychiatric:**
 - Schizophrenia
 - Depression
- Infections:**
 - Urinary
 - Tuberculosis
- Circulatory:**
 - High blood pressure
 - Coronary heart disease
- Cancer:**
 - Breast
 - Colon
 - Prostate
 - Other
- Other:**
 - Diabetes
 - Syndrome X
 - Obesity
- Pulmonary:**
 - Wheezing
 - FEV1
- Bone & Muscle:**
 - Osteoporosis
 - Osteomalacia
 - Osteoarthritis
 - Rickets
 - Muscle aches & weakness

Medications & Supplements:

- Antiepileptic
- Glucocorticoids
- Rifampin
- HAART
- St. John's Wort
- Malabsorption
- Crohn
- Whipple
- Cystic fibrosis
- Celiac
- Organ failure
- Liver disease
- Renal failure
- Nephrotic syndrome

Vitamin D Testing

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Vitamin D Deficiency Can Result In

- ✓ Over-weight
- ✓ High blood pressure
- ✓ Osteoporosis and osteopenia
- ✓ Autism
- ✓ Autoimmune conditions
- ✓ Cancer
- ✓ Depression
- ✓ Asthma
- ✓ Migraines
- ✓ Cystic fibrosis
- ✓ Diabetes (types: 1 and 2)
- ✓ Multiple sclerosis
- ✓ Schizophrenia
- ✓ Epilepsy
- ✓ Osteoarthritis PCOS (Polycystic Ovarian Syndrome)
- ✓ Musculoskeletal pain, including joint pain and low back pain
- ✓ Muscle weakness
- ✓ Poor balance
- ✓ Systemic inflammation
- ✓ Fibromyalgia

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Blood Levels of Vitamin D (US Measurements)

- >100 ng/mL Excessive vitamin D
- 50–70 ng/mL Proposed optimal range
- 30–50 ng/mL Suboptimal
- <30 ng/mL Deficient
- <20 ng/mL Overt vitamin D deficiency
- <10 ng/mL Seriously deficient

**** To convert to Standard International units, multiply by 2.496**

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Vitamin D Deficiency Statistics

- ✓ 41% of people studied had vit. D level below 20
- ✓ 82.1% of African Americans had vit. D level below 20
- ✓ 69.2% of Hispanics had vit. D level below 20

Nutr Res. 2011 Jan;31(1):48-54. doi: 10.1016/j.nutres.2010.12.001. Prevalence and correlates of vitamin D deficiency in US adults. Forrest KY, Stuhldreher WL.

- ✓ 1988-1994, 45% of people studied had vit. D level greater than 30
- ✓ 2001-2004, 23% of people studied had vit. D level greater than 30


Demographic Differences and Trends of Vitamin D Insufficiency in the US Population, 1988-2004. Adit A. Ginde, MD, MPH, Mark C. Liu, MD, Carlos A. Camargo Jr, MD, DrPH. Arch Intern Med. 2009;169(6):626-632.



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Cancer and Sun Exposure

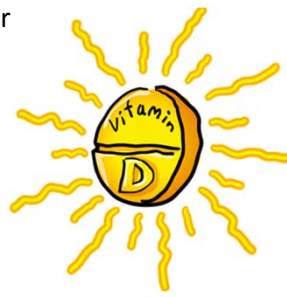
- **Melanoma:** Most dangerous cancer of skin is not related to sun exposure; recent studies suggest it can be caused by vitamin D and omega-3 deficiency
- **Basal cell carcinoma** is benign
- **Sunscreens** are carcinogenic
- Get out of the sun when your skin starts to turn a little pink
- **Natural sunblocks** if necessary: zinc oxide, titanium dioxide



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Those at Highest Risk of Vitamin D Deficiency

- ☐ **Overweight:** greater need – stored in fat
- ☐ **Pregnant women**
- ☐ **Elderly:** skin loses ability to produce
- ☐ **Dark skinned:** melanin blocks UVB rays



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Vitamin D Testing



- ✓ Get a baseline test
- ✓ Supplement if indicated
- ✓ Retest every 3 months until stable, for at least a year
- ✓ Be sure to test in winter and summer

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Vitamin D Supplementation How Much is Safe?




- ✓ University of Toronto study:
No measurable shifts in levels until > 4000 IU
- ✓ 20,000 IU made each hour of summertime sun exposure
- ✓ Skin reserves
- ✓ 10,000 IU considered optimal dose by Dr. Zoltan Rona, author of *Vitamin D: The Sunshine Vitamin*

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Conditions That Benefit From Large Doses of Vitamin D

- ✓ Cancer
- ✓ ALS
- ✓ Depression
- ✓ Hashimotos
- ✓ Multiple sclerosis
- ✓ Allergies
- ✓ Flu
- ✓ Rheumatoid arthritis
- ✓ Heart disease
- ✓ Lung disease
- ✓ Osteoporosis



Dr. Joe Prendergast, endocrinologist, - 50,000 iu per day

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Subset of Conditions That Respond To Vitamin D Supplementation - 1

- ✓ **The flu:** *Cambridge Journals* showed that vitamin D reduces the incidence of respiratory infections in children
- ✓ **Muscle weakness:** Michael F. Holick: Muscle weakness is usually caused by vitamin D deficiency because for skeletal muscles to function properly, their vitamin D receptors must be sustained by vitamin D
- ✓ **Psoriasis:** In a study published by the UK PubMed central, it was discovered that synthetic vitamin D analogues were found useful in the treatment of psoriasis



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Subset of Conditions That Respond To Vitamin D Supplementation - 2

- ✓ **Chronic kidney disease:** Patients with advanced chronic kidney diseases unable to make the active form of vitamin D
- ✓ **Diabetes:** 10,366 children were given 2,000 international units (IU)/day of vitamin D3 per day during their first day of life then monitored for 31 years; risk of type 1 diabetes was reduced by 80 percent (Lancet.com)
- ✓ **Asthma:** Asthma attacks in school children in Japan were significantly lowered in those subjects taking a daily vitamin D supplement of 1,200 IU a day



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Subset of Conditions That Respond To Vitamin D Supplementation - 3

- ✓ **Periodontal disease:** Raising their vitamin D levels increases defensins and cathelicidin and lower the number of bacteria in the mouth
- ✓ **Cardiovascular disease:** *Harvard University* - nurses study - women with low vitamin D levels had a 67% increased risk of hypertension
- ✓ **Schizophrenia and depression:** Vitamin D prenatal and during childhood - vitamin D receptor in the brain integral for brain development and mental function maintenance in later life



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Subset of Conditions That Respond To Vitamin D Supplementation - 4

Cancer: Georgetown University Medical Center presented at the American Association for Cancer Research - increased doses of vitamin D linked to a **75 percent reduction in overall cancer growth** and **50 percent reduction in tumor** among those already having the disease, especially estrogen-sensitive breast cancer



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High Dose Vitamin D Supplementation

- ✓ John Cannelli, head of vitamin D council, recommends **50,000 – 100,000 iu daily** for cold or flu
- ✓ Dr. Mercola recommended **90% of body weight during swine flu outbreak**
- ✓ Norm Shealy, MD takes **50,000 iu daily** – has for 18 months
- ✓ **Do not take calcium with such high doses**
- ✓ In 1930s and 1940s doctors at Johns Hopkins prescribed **600,000 iu to treat arthritis** and only 10 patients developed toxicity symptoms after 2 – 18 months



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Vitamin D Toxicity Symptoms

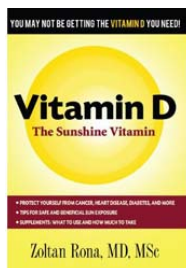
- ✓ Weight loss and fatigue – first
- ✓ Anorexia
- ✓ Nausea
- ✓ Vomiting
- ✓ High blood calcium
- ✓ Kidney damage
- ✓ Only deaths reported were when steroids prescribed with the Vitamin D



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Treatment for Vitamin D Toxicity

- ✓ Discontinue supplements
- ✓ Stay out of sun
- ✓ Drink at least **4 liters of water per day**
- ✓ **Symptoms resolve in several weeks**, calcium level normalizes in several months



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Vitamin D in Foods

Food	Serving Size	Calories	Amount of Vitamin D
Cod Liver Oil	1Tbs	120	1360
Salmon	4 oz	158	511
Sardines	3.2 oz	189	175
Tuna	4 oz	147	93
Egg	1	77	43
Shiitake Mushrooms	½ cup	41	20



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Supplementation Guidelines

- ✓ Vitamin K2
- ✓ Vitamin A
- ✓ Research drug interactions
- ✓ Limit or avoid calcium supplements with high dose vitamin D



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Resources/References - 1

- ✓ <http://www.drRitamarie.com/go/TrendsVitDInsufficiency>
- ✓ <http://www.drRitamarie.com/go/VHFoodsVitD>
- ✓ *Vitamin D the Sunshine Vitamin*, Zoltan Rona, MD
<http://www.drRitamarie.com/go/VitDSunshineVitaminRona>
- ✓ <http://www.drRitamarie.com/go/DrRitamarieVitaminDVideo>
- ✓ <http://www.drRitamarie.com/go/DrRitamarieSunlightDFense>
- ✓ <http://www.drRitamarie.com/go/10SymptomsVitDdeficiency>
- ✓ Mercola.com "Daily Sunlight Can Keep Cancer Away"
<http://www.drRitamarie.com/go/DailySunlightCancer>
- ✓ Mercola.com "Lack of Sunshine Causes One Million Deaths a Year"
<http://www.drRitamarie.com/go/LackOfSunshineDeaths>
- ✓ Mercola.com "How Much Vitamin Do You Need?"
<http://www.drRitamarie.com/go/HowMuchVitD>



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Resources/References - 2

- ✓ Video by Dr. Joe Mercola: 1 hour video with lots of details about vitamin D
- ✓ *Annals of Epidemiology*, April 14, 2009, Dr. Cedric Garland
- ✓ *Annals of Epidemiology*, July 2009, Volume 19, Issue 7, Pages 468-483
- ✓ *Science Daily*, "New Model of Cancer Development: Low Vitamin D Levels May Have Role" May 26, 2009
- ✓ *The Journal of Steroid Biochemistry and Molecular Biology*, March 2007; 103(3-5):708-11
- ✓ *American Journal of Clinical Nutrition*, June 2007; 85(6):1586-91.
- ✓ *American Journal of Epidemiology*, October 12, 2007



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