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Nutritional Update: The Role of Vitamin D

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Disclosure


- I have no financial or materially beneficial relationships with any commercial organizations.



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Objectives

- Review food sources for Vitamin D
- Discuss guidelines for Vitamin D as a dietary supplement
- Identify the role of Vitamin D in heart health

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Nutritional Issues

- "Let food be thy medicine and medicine be thy food"
- Hippocrates
460 B.C. – 377 B.C.
- Overweight/Obesity
- Hypertension
- Heart and vascular diseases
- Lipid disorders
- Endocrine dysfunction
- Gout
- Some forms of cancer
- Vitamin deficiencies



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Vitamin D Basics

Two main forms:

1. Ergocalciferol or D₂
2. Cholecalciferol or D₃

Principal sources:

1. Environmental source is ultraviolet radiation of the skin
2. Dietary sources, including fortified milk, egg yolks, liver, and fish liver oils

Functions to:

1. Promote calcium and phosphate absorption
2. Mineralization and maturation of bone
3. Tubular reabsorption of calcium
4. Chemical messenger in many organs (vascular smooth muscle, endothelium, and cardiomyocytes)

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Generating Questions

- "Adults with decreased serum 25(OH)D levels have significantly higher risk of death from HF and premature death, and this may beget additional justification for the study of vitamin D supplementation.."

Howard J. Eisen MD, chief of cardiology division at Drexel University

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Vitamin D is for "Debate"

1. How much Vitamin D does a human need each day?
 - A. 200 iu
 - B. 600 iu
 - C. 400 iu
 - D. 2000 iu

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Food Sources of Vitamin D

2. The food source with the highest level of Vitamin D is
 - A. Fortified milk
 - B. Canned Tuna (water)
 - C. Egg
 - D. Sockeye salmon
 - E. Breast milk

Vitamin D Deficiency and Insufficiency

3. Vitamin D deficiency and insufficiency is defined as a serum 25(OH)D level of
 - A. < 40 ng/ml and 41-49 ng/ml
 - B. < 30 ng/ml and 31-39 ng/ml
 - C. < 20 ng/ml and 21-29 ng/ml


**Serum 25-Hydroxyvitamin D [25(OH)D]
Concentrations and Health**

- **Nanograms per milliliter**
- **<12 ng/ml** Associated with vitamin D deficiency, leading to rickets in infants and children and osteomalacia in adults
- **12–20 ng/ml** Generally considered inadequate for bone and overall health in healthy individuals
- **> 20 ng/ml** Generally considered adequate for bone and overall health in healthy individuals
- **>50 ng/ml** Emerging evidence links potential adverse effects to such high levels, particularly levels >60 ng/mL
- <http://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional>

Recommended Dietary Allowances (RDAs)


- RDAs values are considered the average daily level of intake sufficient to meet the nutrient requirements of 97-98% of people (normal bone health and calcium metabolism in healthy people)
- Intake reference values are provided in the Dietary References Intake by Food and Nutrition Board at the Institute of Medicine of the National Academies (formerly Nat'l Academy of Sciences) and reported by NIH

<ul style="list-style-type: none"> ■ Males and Females 	<p>Ages</p> <table border="0"> <tr><td>0-12 months</td><td>400 IU</td></tr> <tr><td>1- 70 years</td><td>600 IU</td></tr> <tr><td>> 70 years</td><td>800 IU</td></tr> </table> <p>Pregnant & lactating females, ages 14-50 years of age 600 IU</p>	0-12 months	400 IU	1- 70 years	600 IU	> 70 years	800 IU
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Vitamin D Deficiency

- Low serum Vitamin D in US adolescents (age 12-19) is strongly associated with hypertension, hyperglycemia, and metabolic syndrome, independent of adiposity.
- Reis, J et al. Vitamin D Status and Cardiometabolic Risk Factors in the US Adolescent Population, Pediatrics, 2009

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Role of Vitamin D in Diabetes

June 2010

- Results from a study reported at the Endocrine Society annual meeting noted 91% of its diabetic participants were deficient in D and as the deficiency worsened, so did the diabetes control (retrospective study from OP setting in 2003-2008 of 124 people with diabetes)

As reported by Dr. Esther Krug, an endocrinologist at Sinai Hospital of Baltimore and Assistant Professor at Johns Hopkins USOM



Vitamin D Deficiency & Risk of CV Disease

- Hypertension and CV risk have been correlated to a deficiency of Vitamin D.
- Scientists monitored 1739 people for 5 years, average age 59, 55% women, all white, without prior CVD
- Those with low levels of Vit D (<15ng/ml) had a 62 % increased chance of a CV event.

■ Framingham Offspring Study
Wang, T.J et al, Vitamin D Deficiency & Risk of CV Disease. Circulation, 2008; 117:503-511



Clinical Decision Making

- Serum levels vary widely & are influenced by:
 1. Exposure to sunlight, time spent out of doors, and latitude
 2. Genetic background
 3. Dietary influences
 4. Body habitus
 5. Developmental stage
 6. State of health



Vitamin D Winter: Very little if any vitamin D can be synthesized in the skin from November through February at latitudes north of 37 degrees.



Conclusions from the Institute of Medicine

1. Uncertainties regarding RDI values
2. Randomized trials evidence is sparse on skeletal and nonskeletal (CV) outcomes
3. Further study on the biology of diverse effects of Vitamin D, as well as sun exposure, adiposity, body composition, race, and genetic factors is needed
4. Higher levels of Vitamin D have not been shown consistently to confer greater benefits (above 30ng/ml)
5. Urgent clinical and public health need for consensus on Vitamin D to prevent over or under treatment

■ 2011 Report on Dietary Reference Intakes for Calcium and Vitamin D from the IOM: What Clinicians Need to Know



Thank you