

Is Vitamin D the New Silver Bullet for Preventing and Managing Chronic Disease???

**Many Faces of Community Health
Conference**

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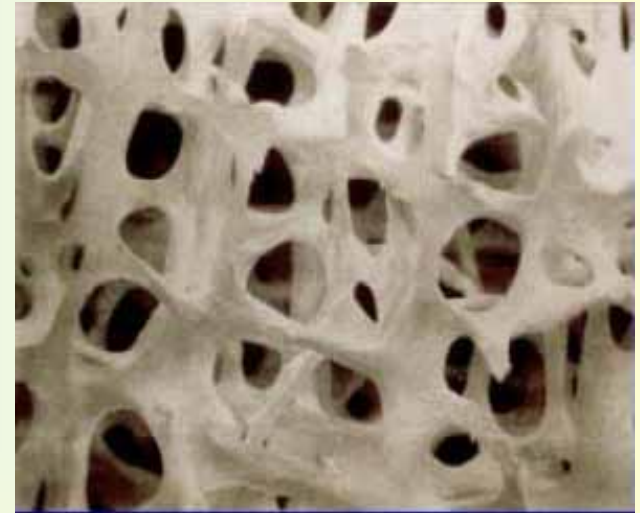
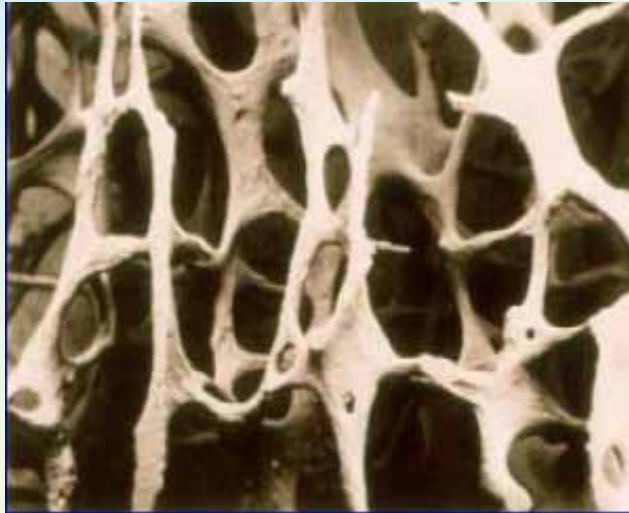
Division of Health Promotion and Chronic Disease

Concerns about Osteoporosis and Low Bone Mass

- ★ Osteoporosis is a silent disease
- ★ Osteoporosis can be prevented and can be diagnosed and treated before any fracture occurs
- ★ Fractures may lead to chronic pain, disability, and death
- ★ Costs estimated at \$17 billion (2001)

Osteoporotic Bone

Normal Bone



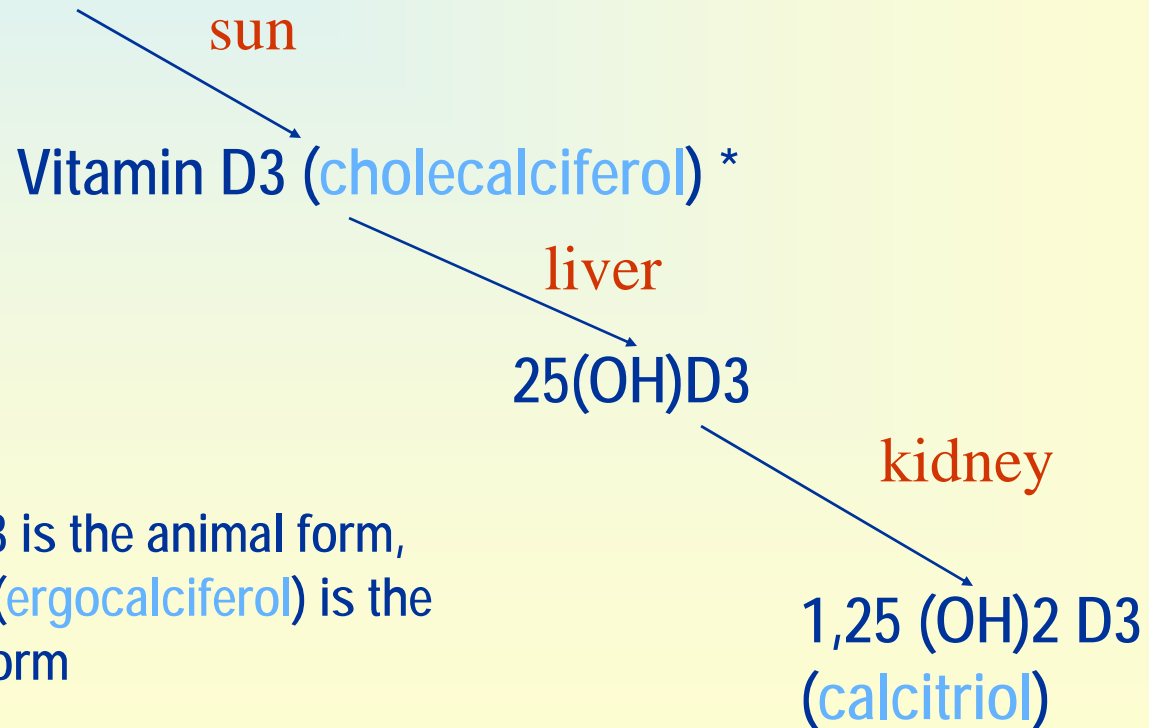
- ★ The bones in our skeleton are made of a thick outer shell and a strong inner mesh filled with collagen (protein), calcium salts and other minerals.
- ★ The inside looks like honeycomb, with blood vessels and bone marrow in the spaces between bone.

Falls – the evidence

- ★ Falls are the leading cause of injury death among older adults
- ★ Hip fractures are among the most serious fall-related injuries
 - Half never regain their previous level of functioning
 - Many are unable to live independently after their injury
 - 20% die within the first year post-fracture

Vitamin D: Nutrient or Hormone ?

Cholesterol
in the skin



* Vit D3 is the animal form,
Vit D2 (ergocalciferol) is the
plant form

Vitamin D: Nutrient or Hormone ?

Cholesterol
in the skin

sun

Vitamin D3 (cholecalciferol) *

liver

25(OH)D3

Colon	skin
Dendritic cells	brain
Endothelial cells	breast
Pancreatic islets	prostate
Parathyroid gland	
Placenta	

kidney

1,25 (OH)₂ D₃
(calcitriol)

* Vit D3 is the animal form, Vit D2 (ergocalciferol) is the plant form

Vitamin D receptor sites

- ★ Adipose
- ★ Adrenal
- ★ Bone
- ★ Bone marrow
- ★ Brain breast
- ★ Cancer cells
- ★ Cartilage
- ★ Colon
- ★ Epididymis
- ★ Hair follicle
- ★ Intestine
- ★ Kidney
- ★ Lung
- ★ Lymphocytes
- ★ Cardiac muscle
- ★ Smooth muscle
- ★ Osteoblast
- ★ Ovary
- ★ Pancreas b-cell
- ★ Parathyroid
- ★ Parotid
- ★ Pituitary
- ★ Placenta
- ★ Prostate
- ★ Retina
- ★ Skin
- ★ Stomach
- ★ Testis
- ★ Thymus
- ★ Thyroid
- ★ Uterus

Conditions that have reported associations with Vitamin D

- ★ Osteoporosis
- ★ Falls
- ★ Rheumatoid Arthritis
- ★ Osteoarthritis
- ★ Diabetes type 1
- ★ Diabetes type 2
- ★ Heart failure
- ★ Heart disease
- ★ Hypertension
- ★ Polycystic ovary disease
- ★ Rickets
- ★ Multiple Sclerosis
- ★ Parkinson's disease
- ★ Depression
- ★ Dental problems
- ★ Cancer, especially breast, colon, prostate, skin, non-Hodgkin's lymphoma, ovarian

Functions of Vitamin D

- ★ Calcium homeostasis and skeletal metabolism
- ★ Role in regulation of prostaglandin metabolism
- ★ Functions and mechanisms of action need to be identified to evaluate epidemiological relationships with diseases
- ★ Role of Calcium in Vitamin D functions needs to be clarified

Vitamin D Requirements

Age	Adequate Intake (IU/day)	Upper Limit (IU/day)
31 – 50 years	200	2000
51 – 70 years	400	2000
> 70 years	600	2000

Vitamin D Requirements – Newer Recommendations

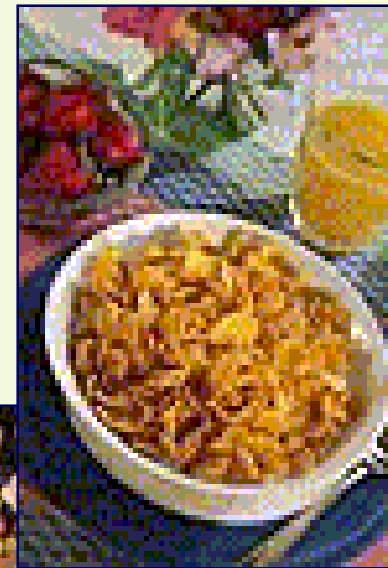
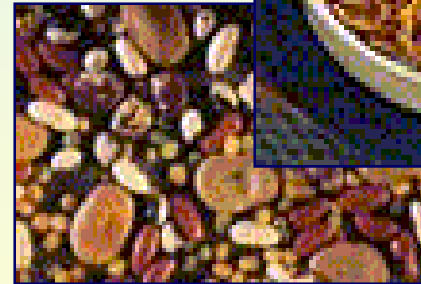
- ★ 800- 1000 IU for adults proposed by consensus group (AJCN, 2007)
- ★ Upper limit 2000 IU
- ★ 400 IU proposed for children (AAP, 2008)
- ★ Sufficient intake to achieve serum concentrations of 75-220 nmol/L for 25(OH)D
- ★ Recommended intake 3800 IU to 5000 IU
- ★ Upper limit 10,000 IU

Issues in assessing Vitamin D status and evaluating Vitamin D content in food

- ★ Need standardized laboratory procedures
- ★ Need reference standards for laboratory assays of Vitamin D
- ★ Need concensus on appropriate endpoints for adequacy and insufficiency that are related to function
- ★ Need understanding of role and influence of biological and environmental modifiers (latitude, season, ethnicity, skin color, body mass index)

Meeting Needs for Vitamin D

- ★ Food vs Supplements
- ★ Sun vs Supplements



What about sun???



- ★ Time estimates are variable
 - 15-20 minutes at noon
 - % body exposed?
 - Effect of age, skin thickness
 - Effect of skin color
 - Latitude
 - Season
- ★ Risk of skin cancer is real

Vitamin D= magic bullet?

★ Epidemiological data is strongest for

– Heart disease

- Low Vit D associated with increased events
- DASH diet effects?

– Cancer – particularly breast cancer and colon cancer

★ Biologic mechanisms have not been defined

Vitamin D= magic bullet?

★ Implications for practice

- Relationships between deficiency, naturally occurring levels of D and therapeutic levels of D are not clear
- Variability in response to sun and supplements and difficulties in measurement complicate our ability to make recommendations for intake
- Evidence base exists for prevention and management of rickets and osteoporosis
- Evidence for causal relationships for other chronic conditions is not yet available

★ An impressive array of observational data suggests that low vitamin D concentrations are associated with a wide variety of diseases, including diabetes, cardiovascular disease, and cancer. This does not necessarily mean that intervention with vitamin D supplementation will improve health outcomes—witness the problems of hormone replacement therapy despite encouraging observational data, not to mention the lack of effect and possible harms surrounding vitamins A, E, and β carotene supplementation.

Biased media coverage of research results— at all levels of reporting

- ★ Predisposition to publish positive results over negative results
- ★ Lack of attention to strength/weakness or limitations of the experimental design
- ★ Failure to recognize that science is advanced by a body of research not a single study

Proceed with caution

★ What do we need to know

- Mechanisms of action in health, disease and disease prevention
- Kinetics of depletion and repletion with sun, food and supplements
- Good measures of sufficiency and deficiency
- Population variability and determinants of variability
- Gold standards for assessment tests for biomarkers and supplements
- Quality of supplements

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*Questions
and*

Comments ?