

## To D or Not To D

### *Unraveling the Vitamin D Puzzle*

Vitamin D is one of the hottest topics in the nutrition field. It has been the subject of countless articles in the popular press. Investigators at Creighton's Osteoporosis Research Center have been among the world leaders in unraveling the vitamin D puzzle, and so "Partners in Research" is in a good position to bring you the very latest insights from this still rapidly developing field.

Vitamin D is not actually a "vitamin" at all – at least for humans. We don't normally get very much from our food (as is the case with all other vitamins); rather we make it for ourselves. Sunlight converts a chemical compound in our skin to the compound we call vitamin D<sub>3</sub>.

Medical science has known for about 100 years that vitamin D was necessary to prevent a childhood disease known as rickets, which resulted in bowing of the legs and deformities of the pelvis, among other skeletal abnormalities. This disease comes about because of a deficiency of calcium and phosphorus in the blood of vitamin D-deficient individuals. The result is that there is not enough mineral to support the formation and growth of bone. To prevent this disorder it has been common, for at least the last 80 years, to give vitamin D sources to infants and children, such as cod liver oil or vitamin D drops – thus ensuring that they get sufficient vitamin D to support bone growth and development. Once children became old enough to play outdoors, and if they lived in a climate that allowed them to expose skin, then they made all the vitamin D they needed and the drops and cod liver oil were no longer necessary.

But several things have happened that have made it harder for all of us – children and adults alike – to get the vitamin D we need. And at the same time there is a new awareness about the importance of vitamin D, not

just for bones, but for all the other tissues and organs of our bodies as well.

First, both children and adults spend more time indoors or protected from the sun. As a result they no longer make as much vitamin D as in the past. Partly this is because of a fear of skin cancer. While the risk is real, it is probably greatly exaggerated. Bear in mind that the human race somehow survived prior to the development of high SPF skin lotions. Short sun exposures are all that is required. But remember that daylight is not the same as sunlight. Sun exposure remains absolutely necessary for the bulk of the human race.

But perhaps most important is the belated realization that 1) vitamin D affects extremely important body functions that have nothing to do with calcium or bones at all; and 2) in order to optimize those functions, we need a lot more vitamin D than the amount required simply to prevent rickets. When vitamin D status is deficient – though not so severe as to cause rickets – all of these functions in all of the other body tissues are hobbled. It is as if we had asked our tissues to run a race with their feet tied together. They can still do it, but not so well, and they often fail.

There is good evidence to suggest that vitamin D deficiency plays a role in the development of autoimmune diseases such as multiple sclerosis and Type I diabetes, in the resistance to infections, such as influenza and tuberculosis, and in control of cell division that goes awry in the development of many cancers. There is also some evidence that vitamin D deficiency may contribute in some way to chronic fatigue syndrome and fibromyalgia. Because vitamin D deficiency is extremely common in the general population, many experts believe that we

won't truly know the actual burden of age-related chronic disease until we eradicate vitamin D deficiency. Many of the diseases associated with vitamin D are multifactorial, and what vitamin D does is to help the body cope with them, either to prevent their appearance in the first place, or to lessen their severity.

## How much vitamin D do I need? And what is the best way to get it?

For about 10 years there has been agreement in the scientific community that the best way to assess vitamin D status is with a blood test measuring the concentration of the principal vitamin D compound in the body, a substance called 25-hydroxyvitamin D. Researchers in the Osteoporosis Center here at Creighton try to keep their patients at a blood level of 30 ng/mL or higher, and some experts would argue for a value as high as 40 or even 50 ng/mL.

Since vitamin D isn't found naturally in most foods, we have to rely on either fortified foods or supplements. (The dose of vitamin D is measured in IUs, international units, and not milligrams). Currently milk, a few yogurt brands, and some orange juice brands are vitamin D-fortified, but the level is relatively low, about 100 IU per serving. That amount is enough to raise the blood concentration of vitamin D only slightly. It is clear that we are not likely to meet our needs from even fortified foods. That's why supplements come into the picture: they *supplement* what we can get from an already good diet. Most of us need at least 1000 IU per day in addition to all other sources of vitamin D (including multivitamins, calcium supplements that contain vitamin D, milk, and the various fortified foods that may be available). Many people will actually require 2000 IU per day. (And in some rare circumstances a person may need up to as much

as 4000 IU per day, but that would be fairly unusual.) There used to be a hole in the alphabet in the vitamin supplement sections of most drugstores and supermarkets, with plenty of sources of vitamins A, B, C, and E – but no D. That has changed in the last two years, and now there are several good preparations of vitamin D available in convenient dosage sizes (ranging from 700 to 2000 IU per tablet or capsule). Be sure to check the label to make sure that it says vitamin D or D3. Anyone taking vitamin D can rest assured, both of its safety in the recommended intake range, and of its potency.

We see four barriers to widespread acceptance of improved vitamin D status in the general public. First, it is old; second, it is cheap; and third, it is not patentable. Those three mean that we are not likely to see the commercial push that would usually accompany the development and marketing of a new drug. So the public has to take added responsibility for its own health. Ask your doctor to measure your blood vitamin D (25-hydroxyvitamin D) concentration.

The fourth barrier is the result of a peculiar quirk in human nature. In a sense vitamin D suffers from what Dr. Robert P. Heaney, one of the professional staff members of the ORC, calls the Naaman syndrome. If you recall your Bible history, Naaman, a Syrian general who had leprosy, came to Israel to get a cure from the prophet Elisha. The prophet told him to wash seven times in the waters of the river Jordan, but Naaman sulked saying that they had better rivers in Syria than the Jordan. However, a wise servant told him “My father, if the prophet had asked you to do something difficult you would have done it.”

There is the problem: vitamin D seems too simple. To D or not to D? Do D, definitely.

## What You Should Know About Vitamin D

*Jennifer Meyer, RD, Director of Nutrition Education American Dairy Association and Dairy Council of Nebraska*

Since the 1920's, when it was discovered that vitamin D deficiency caused the bone softening disease, rickets, this vitamin has been well recognized for its role in bone health. Vitamin D plays a key role in aiding the body in absorbing and depositing calcium. Dairy's dynamic duo of calcium and vitamin D may help prevent falls and fractures in older women.

The bone building benefits of calcium and vitamin D may help older women improve their balance, therefore

preventing subsequent falls and fractures. Beyond its important role in bone health, emerging research has sparked a renewed interest and appreciation for vitamin D and its possible health benefits. Vitamin D deficiency is described as an unrecognized epidemic affecting all age groups. Because of the recent identification of widespread poor vitamin D status and numerous potential health benefits associated with optimal vitamin D status, assessment of vitamin D status as part of annual physical examinations is encouraged.

So how much vitamin D do we need? According to the Institute of Medicine (IOM), current dietary recommendations for vitamin D are 200 IU/day for those up to age 50, 400 IU/day for adults ages 51 through 70 years, and 600 IU/day for adults over age 70 years. As research continues to indicate that vitamin D has benefits beyond bone health, many health experts argue that these recommendations should be increased to achieve the optimal effects. (See **portions of newsletter titled To D or Not to D and Research Studies Conducted in the ORC related to Vitamin D**)

Vitamin D is unique because not only is it found in foods, but our body can synthesize it when our skin is exposed to sunlight. Sometimes referred to as the “sunshine vitamin”, by exposing our skin (without sunscreen) to sunlight for approximately 5 to 15 minutes, two to three times a week, we can meet most or all of the requirement for vitamin D. Because sun exposure may be limited or inconsistent, it is also important to consume vitamin D from dietary sources. Food sources of vitamin D include, cod liver oil and fatty fish such as mackerel, salmon, tuna and herring. In addition, dairy foods such as milk and some yogurts and cheeses are fortified with vitamin D. There are also some juices, breads and breakfast cereals that are fortified with vitamin D. Note that any of these food sources contain relatively small amounts of vitamin D. See the two recipes in this issue as

an example. For this reason, it is important to not depend entirely on food sources to meet vitamin D requirements.

In addition to adequate sunlight exposure, follow these tips to ensure your diet is rich in vitamin D:

- Dairy Delivers D- Aim for 3 servings per day of vitamin D fortified dairy foods.
- Look at the Label- Pay attention to food labels and select breads and cereals that are fortified with vitamin D.
- Feast on fish- Incorporate fatty fish into your diet. Not only are fish such as salmon and herring naturally rich in vitamin D, they are also a good source of “heart healthy” Omega 3 fatty-acids.
- Don't be “D” ficient- Milk's impact on vitamin D levels is especially significant during the winter and spring months in northern climates when decreased exposure to sunlight slows the body's ability to produce vitamin D. The number one source of vitamin D in the American diet is fortified milk.

*(According to our physicians at the ORC all references made to sunlight in the above article refer to “summer sunlight”. In the northern climates winter sunlight exposure produces little or no vitamin D and does not ensure the body's ability to produce vitamin D.)*

#### POPULAR WEBSITES

[www.nebmilk.org](http://www.nebmilk.org) and [www.nof.org](http://www.nof.org)

## Research Studies Conducted in the ORC related to Vitamin D

- 1) Numerous observational studies have found supplemental calcium and vitamin D to be associated with reduced risk of common cancers. However, research studies that actually test this connection have been lacking. The purpose of this analysis was to determine the effectiveness of calcium alone and calcium plus vitamin D in reducing new cancer risk of all types. This analysis demonstrated very clearly that improving calcium and vitamin D nutritional status substantially reduced all-cancer risk in post menopausal women.
- 2) It is well known that exposure to sunlight increases vitamin D levels, but the effect of skin pigmentation is not well known. This study demonstrated that the body's ability to make vitamin D from sun exposure is dependent on the skin pigmentation; darker skin tones require longer exposure to the sun in order to manufacture vitamin D.
- 3) This study examined vitamin D levels in healthy, indoor workers who were then exposed to varying amounts of light in a specially-designed light booth (not a tanning booth) over a period of several months. Vitamin D levels were measured before starting and at periodic intervals. This study concluded that vitamin D levels in the blood increase in response to sunlight but the body needs constant vitamin D input in order to maintain vitamin D blood levels. Vitamin D levels in the blood are depleted quickly.
- 4) There is much interest in dosing vitamin D intermittently for patient convenience and long-term adherence. A group of 30 subjects was given a single oral dose of 100,000IU of cholecalciferol (D3). Participants were healthy with limited sun exposure and milk consumption. The results of this study showed that this dose is a safe, effective, and simple way to increase blood levels of vitamin D. Dosing interval should be no longer than 2 months to ensure continuous vitamin D levels above baseline.



Osteoporosis Research Center

Creighton University Medical Center  
Suite 4820  
2500 California Plaza  
Omaha, Nebraska 68178

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Phone: 402-280-4470 Fax: 402-280-5173 Website: [osteoporosis.creighton.edu](http://osteoporosis.creighton.edu) e-mail address: [orc@creighton.edu](mailto:orc@creighton.edu)

# Bone Appétit

## Heartfelt Tuna Melt

Prep Time: 5 min • Cook Time: 5 min

6 ounces solid white water-packed tuna, drained  
1/3 cup chopped celery  
1/4 cup chopped onion  
1/4 cup low-fat Russian or Thousand Island salad dressing  
2 whole wheat English muffins, split  
3 ounces Cabot 50% Light Cheddar cheese, grated  
Salt and black pepper to taste

Preheat broiler. Combine tuna, celery, onion and salad dressing. Season with salt and pepper. Toast English muffin halves. Place split-side-up on baking sheet and top each with 1/4 tuna mixture. Broil 2-3 minutes or until heated through. Top with cheese and return to broiler until cheese is melted, or about one minute longer. Makes 4 servings.

*Recipe courtesy of Cabot Creamery*

Nutritional facts per serving: approximate

Calories: 210 • Fat: 6 g • Saturated fat: 3 g • Cholesterol: 30 mg  
Sodium: 417 mg • Calcium: 250 mg • Vitamin D: 70 IU

## Smoked Salmon Seashell Chowder

Prep Time: 5 min • Cook Time: 20 min

1 1/2 cups (4 ounces) medium pasta shells (1 1/2 c. dry = 3 c. cooked)  
2 1/2 cups 1% low-fat milk  
3 tablespoons all-purpose flour  
1 teaspoon onion powder  
3/4 teaspoon dried dill  
1 1/2 cups frozen peas, thawed  
1 pouch (7 ounces) skinless, boneless pink salmon, flaked  
Salt and pepper

Cook the pasta according to package directions, drain and set aside. In a saucepan, combine the milk, flour, onion powder, and dill and whisk until well blended. Add the peas and salmon; place over heat. Bring the mixture to a simmer, stirring constantly.

Reduce heat and continue to simmer and stir gently until the soup thickens slightly, about two minutes. Stir in pasta and season with salt and pepper to taste. Heat through and serve.  
*Recipe courtesy of "The Mom's Guide to Meal Makeovers."*

Nutritional Facts per serving: approximate

Calories: 310 • Total Fat: 7 • Saturated Fat: 2 • Cholesterol: 40g • Sodium: 340g  
Calcium: 350 mg • Protein: 22 g • Carbohydrates: 41 g • Dietary Fiber: 4 g  
Vitamin D: 175 IU

# Opportunities to Participate

**The Creighton University Osteoporosis Research Center is conducting the following studies. If you have any questions, please call 402-280-BONE (280-2663) or Toll-free 1-800-368-5097.**

## INTERESTED IN JOINING A NUTRITIONAL SUPPLEMENT STUDY?

This is a 6 month study evaluating the potential effectiveness of a nutritional supplement on bone density. Eligible participants will receive at no cost to them a pre-study health screening which includes a bone density scan.

Requirements:

- Caucasian Females, age 45-55
- Post-menopausal for 1 to 3 years and no hysterectomy
- Not currently taking any hormones
- Not currently taking osteoporosis medication
- Not currently taking long term steroid therapy
- No cancer, except for basal or squamous cell skin cancer

## THE MILK MINERAL STUDY

*Milk, Vitamin D and bone density scans provided at no cost. Stipend available. Only 5 visits in 7 months for those who qualify.*

- Women over age 50
- Past menopause for more than 5 years but less than 10 years
- Dairy intake of 1 serving or less a day
- Must be willing to drink 3 servings of milk a day or chocolate chews for the duration of the study.
- Not currently taking steroids, calcium supplements, hormone replacement or prescription osteoporosis medication

## HOW'S YOUR BONE HEALTH?

You may qualify for a bone density scan at no cost to you.

We are looking for:

- Women ages 20 to 48 who are having regular menstrual cycles.
- Women who either have not had a previous density scan or it has been greater than 2 years since your previous scan.

A nurse will meet with you after the scan and provide you with the results. Information about our current research studies provided but there is no obligation to join a research study.

## ARE YOU HIP AT 50?

The Osteoporosis Research Center is looking for women who are age 50 or older who have had a hip fracture to participate in a genetic study.

To qualify:

- ◆ You must be a Caucasian post-menopausal woman
- ◆ Within the last year you can not have taken:
  - Hormones
  - Osteoporosis Medications ( Calcium & Vitamin D are okay)
  - Steroid Medications
  - Seizure Medications

## GENETIC DETERMINATIONS

The Osteoporosis Research Center. Purpose: To identify genes and proteins that may increase the risk of osteoporosis

- Seeking Caucasian women age 50-55
- Free bone density scan (DXA) with interpretation of results for eligible participants
- Stipend available, just 2 visits

## BE BONE SMART

Seeking volunteers for a 2 year study. Eligible Participants will receive: Free Bone Density Scan, Individual Bone Health Counseling with an Osteoporosis Nurse Educator, Active study medication (NO placebo group), Physical exam, including blood work and EKG. Monetary Stipend available.

- Women age 50 and older and 5 years post menopause

## MUSCLE STRENGTH STUDY

Seeking women 65 years of age and older for a 6 month study

Eligible participants will receive:

- FREE bone density scan (DXA) with interpretation of results
- Investigational Study Medication and or placebo
- Protein and vitamin D supplements
- Physical exam, including blood work and EKG
- Physical agility testing
- Monetary Stipend available

November 01, 2007

To our Patients, Research Participants and Donors:

This note is to thank you for giving us the privilege of caring for you, and for volunteering to participate in research studies that we have conducted at the Osteoporosis Research Center. Without the help of our research participants and their generous contributions of time and effort, we could not advance the cause of osteoporosis prevention and treatment. We regard you as our partners in this scientific endeavor and have the greatest respect and admiration for your enthusiastic support. I also wish to thank those donors who have contributed memorials to the Osteoporosis Research Center, and have supported its endowment. This is a great help to us in sustaining our efforts to conquer osteoporosis and its resulting fractures.

Sincerely,



Robert R. Recker, M.D., M.A.C.P., F.A.C.E.  
Professor of Medicine  
Director  
Osteoporosis Research Center

## Most Recent Donors

*In Memory of Robert Evers  
by Don and Helen Brittan*

*In Memory of Agnes Herbst  
by Dr. and Mrs. Robert Recker*

*In Memory of Helen Schlautman  
by Helen's Family and Friends*

*In Honor of Dr. Robert Recker  
by Don and Helen Brittan*

## THE GIFT OF GIVING

*Consider a donation in honor of a loved one to the  
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Just mail this form to: Osteoporosis Research Center  
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A Contribution is enclosed to the Recker/Pappajohn  
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