

# Nutrition SPOTLight

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## Strengthen Your Bone Knowledge

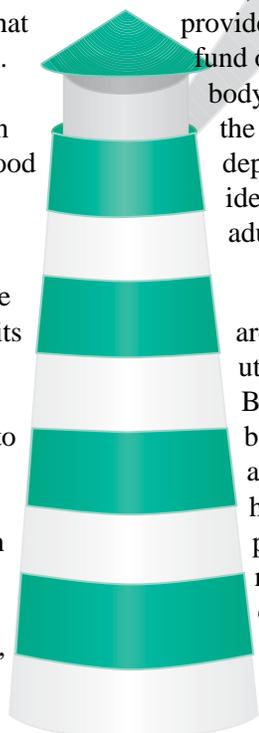
Anyone who knows even the basics of nutrition realizes that our bones need our attention. This issue of *Nutrition Spotlight* hopes to strengthen the understanding of what good nutrition can do for our skeletons!

Calcium, the number one mineral in bones, must find its way into our diets or our bodies will pay a price. The price we pay for neglecting to obtain enough calcium throughout early and middle life is extensive degeneration of the skeleton in old age—adult bone loss, which can lead to crippling deformities, irreparable fractures and even death.

The urgency of obtaining enough calcium has to be learned through education, because the body sends no signals saying it is deficient. A developing calcium deficiency is utterly silent; it becomes apparent only when a hip or pelvic bone suddenly fractures into fragments that cannot be reassembled. Depletion of bone calcium shows up on an x-ray only when it is so far advanced that it is virtually irreversible.

Bones represent the deposits in the body's calcium bank, drawn on whenever the supply from the day's diet runs short. Invested in savings during the milk-drinking years of

childhood, these calcium deposits provide a nearly inexhaustible fund of calcium; 99 % of the body's calcium is stored in the bones. We form these deposits as children, and ideally, we tend them as adults.



Deposits of calcium are best made, and best utilized, as daily deposits. Because of the adult body's limited ability to absorb calcium, it cannot handle massive doses periodically. Instead, it needs frequent opportunities to take in small amounts - as it would naturally get from a varied, adequate diet.

Milk products are rightly famous for their calcium content. Many other foods, of both plant and animal origin, are meaningful contributors to the calcium account. As research continues, more attention is being focused on calcium in nonfood supplements. What is the best source of calcium? Who needs a calcium supplement? What role does exercise play in bone-building? The answers are brought to light in this issue of *Nutrition Spotlight*.

*Source: Whitney, EN, and Hamilton, EM. Understanding Nutrition, 4th ed. West Publishing. 1987.*

**Ninety-nine percent of the body's calcium is stored in the bones.**

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# Who Needs a Calcium Supplement?

People at various ages need differing amounts of calcium. Teens need 1300 mg and people over the age of 50 years need 1200 mg calcium each day, which is the equivalent of approximately 4 cups milk. Eating foods that are high in calcium or are fortified with calcium, such as orange juice or cereals, is best. A second-best strategy is to take calcium supplements. When added to dietary calcium intake from food sources, calcium supplements can help fulfill needed daily requirements. (Multivitamin/mineral supplements contain only small amounts of calcium.)

The FDA authorizes health claims linking calcium intake with reduced risk later in life for osteoporosis. Supplement labeling laws require calcium supplement packages to show mg calcium in each serving. No more than 2500 mg calcium a day should be taken; too much calcium can interfere with iron and zinc absorption.

People who don't drink milk, eat vitamin D fortified foods, or get out in the sunshine regularly should use a calcium supplement with vitamin D. Vitamin D helps the body absorb and store calcium. Older adults need more vitamin D than do people age 50 years or less. Too much vitamin D can be toxic; dosage levels should not be more than 2000 I.U. vitamin D a day from foods and supplements.

Non-chewable calcium pills should dissolve in 6 ounces vinegar

in 30 minutes or less. (Some calcium pills do not dissolve, so they cannot get absorbed during the time they are in the digestive system.) Supplement manufacturers do not have to prove anything before marketing their products. The term "USP" on the label indicates that the supplement meets voluntary U.S. Pharmacopeia standards for quality, purity, disintegration, and dissolution.

Calcium supplements are absorbed best if taken with food. If not taken with meals, absorption may be about 10% lower. If more than 500 mg calcium is needed from supplements each day, the supplements should be taken several times during the day in doses of 500 mg or less. It also may be beneficial to take one at bedtime to improve overnight bone health activity.

There are many types of calcium supplements, some better than others. The cost of supplements per mg calcium varies greatly. The cost of supplements is not necessarily a good indicator of their quality.

Better choices for calcium supplements since they are well absorbed include:

- Calcium glycinate-very well absorbed.
- Calcium citrate malate-very well absorbed.
- Calcium citrate- the best calcium supplement to take if you don't want to take one with meals. Requires less stomach acid to be

absorbed, so it is good for older adults whose acid secretion is slowed down from the aging process.

- Calcium lactate- has little calcium in each pill; requires taking more pills to get much calcium.
- Calcium gluconate- has little calcium in each pill; requires taking more pills to get much calcium.
- Calcium carbonate- may cause intestinal gas/constipation. This is an antacid. Its use by older adults is a potential concern, because acid secretion is also slowed down during the aging process. If used, it is best taken right after meals/snacks. It is usually the cheapest form of calcium supplement. Has 40% calcium per pill.

Worse choices; better to avoid these calcium supplements:

- Calcium phosphate-contributes too much phosphorus.
- Antacids with aluminum or magnesium hydroxides-can accelerate bone loss.
- Chelated calcium and magnesium- not absorbed well.
- Dolomite (bone meal)- not well absorbed; may be contaminated with toxic materials, such as lead, mercury and arsenic.
- Calcium hydroxyapatite- interferes with iron absorption.
- Oyster shell- not well absorbed; may be contaminated with toxic materials, such as lead, mercury and arsenic.

New on the market are chewable chocolate- and coffee-flavored calcium supplements. Keep them away from young children;kids may think they are candy.

## Recommended Daily Calcium Amounts

Age Group	Calcium needed (mg)	Number of daily servings † needed
Children 1-3 yr.	500 mg	3**
Children 4-8 yr.	800 mg	3
Teens 9-18 yr.	1,300 mg	4
Adults 19-50 yr.	1,000 mg	3
Adults 51 + yr.	1,200 mg	4

Source: *Dietary Reference Intakes, National Academy of Sciences, 1997*

† A serving is equal to 1-8 oz. glass of milk, 1 1/2 oz. of cheese or an 8 oz. serving of yogurt.

# Bone Health is a Key Nutrition Issue for Kids

Older persons are not the only ones who need to be concerned about bone health. One of the most important **child** nutrition issues in the U.S. is the prevention of osteoporosis. Calcium is seen as a major deficiency in the diets of children and adolescents, and bones need calcium for growth and strength.

Most children need more calcium than they get, but how much is recommended? Toddlers and preschoolers should consume approximately two to three cups of milk or the equivalent each day. The serving size for toddlers is four ounces of milk or yogurt and one ounce of cheese. Combination foods, such as pizza or macaroni and cheese, provide calcium from cheese and milk. School-age children need the equivalent of three cups of milk a day, and teens need the calcium contained in four cups of milk each day.

Calcium is essential for the bone growth that we identify as normal throughout childhood. As a rule, boys need more calcium than girls, because boys are typically taller than girls and form more bone to support that height. Ninety-nine percent of the body's calcium is found in its bones and teeth, and **40-45 percent** of the adult's skeleton is built in the adolescent years.

The need for calcium sources in the childhood years is obvious, and the solution seems straightforward—include milk and milk products liberally in a child's diet. The solution, however, is not easy. Since about 1980, consumption of dairy products, including milk, has decreased. Children and young teens are drinking more soda than milk, and the trend concerns health officials. Milk consumption has decreased 16%, while soda consumption has increased 16% since the late 1970's.

Another fact that strengthens the “weak bones” issue is exercise. What is the role of physical activity in the prevention of osteoporosis by influencing peak bone mass? Much research is being conducted in this area, and the answers are not yet conclusive. It seems, however, that physical activity of a reasonable amount for the majority of children, adolescent, and young adults increases peak bone mass about 7 to 8% on average, as compared with sedentary subjects. Scientists believe that physical activity is an essential stimulus for bone structure, and exercise has the potential to increase bone formation within limits set by heredity, nutrition, and other factors.

In summary, it is apparent that the time to set the stage for healthy strong bones is early in life. When good nutrition coupled with physical activity is emphasized early and maintained throughout the life cycle, a person's bone growth and strength will benefit, as will his or her overall health.

## Bone Health in Vegetarians

Some vegetarians drink milk and others follow a strict plant-based diet. Either can provide all the nutrients needed for healthy bones. Calcium is an important nutrient for everyone, vegetarian and non-vegetarian alike. According to the American Dietetic Association strict vegetarians, or vegans, have lower total calcium needs than non-vegetarians who are meat eaters. This is because their diets are lower in protein. Protein, particularly from animal sources, tends to decrease calcium absorption. This is not true of protein in peas and beans that are staples of many vegetarian diets. Calcium from some plant sources such as kale, broccoli, and turnip greens are actually absorbed better than from milk. However, there are some compounds in plant foods that can interfere with calcium absorption. An example is oxalates which are found in foods like spinach and rhubarb. This shouldn't be a concern with a varied diet. So go ahead and have that piece of rhubarb pie!

Vitamin D plays a crucial role in protecting our bones by facilitating the absorption of calcium and phosphorus. Vegetarians who drink vitamin D-fortified milk probably don't need to worry. However, vegans who live in northern climates and/or are housebound may want to consume cereals and/or soy beverages that are fortified with vitamin D. As the need for vitamin D goes up after the age of 50, older adults may be well-advised to talk with their physicians about taking a vitamin supplement.

*Source: The Vegetarian Way. Messina, V and Messina, M. Crown Publications. 1996*

# Osteoporosis: Late-Breaking News of the Weak

Osteoporosis is a preventable, treatable condition of weak, hollow, brittle bones that break easily. In its advanced stages, it is a painful condition affecting approximately 30 million Americans, causing fractures, typically of the hip, wrist, and spine. Osteoporosis greatly reduces independence and the quality of life of its victims; many die from complications of osteoporosis. In the U.S., one out of every two women, and one out of eight men, develop osteoporosis.

It is never too early or too late to improve bone health. Bones are living tissues. Throughout life, old bone is removed and replaced by new bone. Many factors affect the rate of bone addition and loss. Our bodies need calcium for proper heart, muscle and nerve function, to maintain blood pressure, and for blood clotting. If the diet doesn't provide enough calcium, we take it from our "calcium reservoir" (otherwise known as our bones). If old bone is removed at a rate that is too fast, or if the rate of new bone replacement occurs too slowly, then gradually bones become porous and fragile. For example, 40% of the bone's density can be lost during advanced osteoporosis.

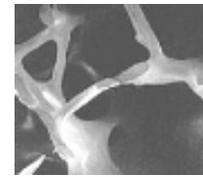
A lifelong adequate intake of calcium and vitamin D, as well as phosphorus, zinc, vitamins K and C, copper and manganese, helps bone health by increasing (as much as is genetically possible) the amount of bone formed during youth and early adulthood. Adequate diet and hormone levels also slow down the rate of overall bone loss that occurs later in life. When recommended amounts of calcium are consumed during the bone-building years, maximum bone mass "reserves" with a consequent reduction in

osteoporosis, and 50% fewer hip fractures later in life.

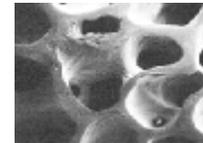
Many factors increase one's chance of developing osteoporosis. People at greatest risk for osteoporosis are older adults, especially women, who:

- have a family history of osteoporosis or of an adult family member breaking a bone (heredity influences peak bone mass in part because of vitamin D receptor- gene levels);
- are non-Hispanic white or Asian;
- are post-menopausal women not on hormone (estrogen) replacement therapy;
- have had low calcium intake after age 35;
- have had consistently low vitamin D intake or low sunlight exposure;
- do little weight-bearing exercise;
- smoke cigarettes;
- have a small, thin frame (adult body weight less than 125#);
- have never been pregnant;
- have a history of estrogen deficiency as a result of amenorrhea, late menarche, or an early menopause, either naturally or surgically;
- have or had excessive dieting;
- have a history of taking thyroid medication, cortisone-like medications, anti-seizure drugs, or certain other medications.

To find out more about preventing your risk for osteoporosis and bone fractures, or for treatment options, ask your health care provider. Having a bone mineral density scan is a painless test for osteoporosis especially important for women age 50 and over.

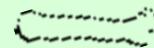


Osteoporotic bone



Normal bone

## Dietary Factors Affecting Bone Health

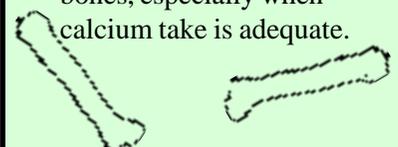


- High sodium or salt intake increases calcium excretion. Each 500 mg sodium increases calcium loss by a small amount, about 10 mg a day. This can contribute to poor calcium balance if calcium intake is not adequate.

- Meals that contain large amounts of phytates, in wheat bran and dried beans, or oxalates, in spinach and rhubarb, interact with calcium eaten during that meal resulting in a reduced amount of calcium being absorbed.

- Drinking too many soft drinks (over 5 a day) can disrupt calcium and phosphorus balance and reduce bone minerals over time especially if the diet is not adequate in essential minerals.

- Caffeine intake has only a minimal negative effect on bones, especially when calcium take is adequate.



# Exercise and Bone Health

Regular physical weight-bearing activity improves the efficiency of calcium use and strengthens both bones and muscles. When bones are not used at all, as with people who are confined to bed or who have a plaster cast on, they slowly decrease in strength and thickness. Bone formation increases when pressure is applied to the bone. Physical weight-bearing activity over one's lifetime increases peak bone mass in the years up to age 30, and decreases bone loss later in life.

Recommendations are for at least 30 minutes of weight-bearing exercise 3 times a week or more. This includes walking, playing court games, and doing any activity that involves gravity and an impact on bones. Activities of daily living, including normal walking, standing, stair climbing and household chores, count too. It does not include non-weight-bearing exercise, such as swimming. In addition, strength training, such as lifting weights, is recommended at least twice a week. It is best to include a variety of physical activities, so that all the bones in the body are used. Be active; think fun.

An additional benefit of exercise is that it improves overall flexibility, stability, and balance, and therefore can help prevent falls and help people recover from injury more quickly.

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## Minerals and More for Bone Health

The advertisements are true. *Calcium* is important for bone health, but it is not the only vital nutrient needed—bones need phosphorus, magnesium, vitamins D and K, potassium and protein, too. That is why it is important for us to eat a variety of foods and not rely just on calcium supplements.

The solid part of a bone is a dynamic, complex network composed of strong protein fibers, water, and minerals such as calcium, phosphorus, and magnesium. It is a reservoir from which calcium is withdrawn to perform functions in other parts of the body (such as muscle contraction and blood clotting), and then is replaced primarily by calcium from the foods we eat. Good sources of dietary calcium can be found in many plant foods such as broccoli, dark leafy vegetables, cooked dried beans, soy products and figs as well as the more commonly recognized dairy foods.

Vitamin D is important to bone health because it facilitates the absorption by the intestines and reabsorption from the kidneys of phosphorus and calcium, both vital bone-forming minerals. Vitamin D fortified milk is the best dietary source of the vitamin, with the added benefit being an excellent source of calcium and phosphorus as well.

Although dietary protein is important for strong bones, excessive amounts can result in loss of calcium in the urine, underscoring the need to eat protein foods in moderation. Potassium may help prevent the withdrawal of calcium and phosphorus from the bone. It does this by neutralizing the acid environment that a diet of excessive protein can create. Potassium is found in generous amounts in fruits, vegetables, and milk.

Magnesium, found in milk and whole grains, plays an important role in bone metabolism. It interacts with calcium and phosphorus, facilitating formation of calcium phosphate a compound that gives structure to bone.

Vitamin K is important in formation of bone protein. The Nurses Health Study found that those who consumed moderate or high amounts of vitamin K-rich foods had a 30% lower risk of hip fractures than those consuming minimal amounts. Vitamin K is fairly easy to obtain, as good bacteria produce it in our intestines. It is worth noting, however, that it is still important to consume a good dietary source of vitamin K especially after a round of antibiotics as it can deplete the intestine not only of harmful bacteria, but vitamin K producing bacteria as well. It's easy to get enough from a couple of servings a day of green vegetables such as leaf lettuce, spinach and broccoli.

Again, bone health depends on adequate intake of many different vitamins and minerals. The best insurance policy for bone health is a varied diet coupled with physical activity.

*Source: The ADA Complete Food and Nutrition Guide. Duyff, RL. Chronimed Publishing. 1998.*

## Blueberry Smoothie

- 2 cups fresh or slightly thawed frozen blueberries
- 1 container (8 ounces) lowfat vanilla or blueberry yogurt
- 1 cup lowfat milk
- 6 ounces unsweetened pineapple juice
- 2 tablespoons honey
- 1 1/2 cups ice cubes
- 1 teaspoon vanilla

In a blender container, place blueberries, yogurt, milk, pineapple juice and honey; cover and blend at medium speed until smooth. Increase speed to high; add ice cubes, a few at a time, until finely crushed. Serve immediately.

Nutrition Facts		
Serving Size 254g		
Servings Per Container 4		
Amount Per Serving 1 cup		
<b>Calories</b> 170	Calories from Fat 15	
% Daily Value *		
<b>Total Fat</b> 2g	3%	
Saturated Fat 1g	5%	
<b>Cholesterol</b> 5mg	2%	
<b>Sodium</b> 80mg	3%	
<b>Total Carbohydrate</b> 33g	11%	
Dietary Fiber 2g	8%	
Sugars 30g		
<b>Protein</b> 6g		
Vitamin A 4%	Vitamin C 25%	
Calcium 20%	Iron 2%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs. If your calorie needs are much different, you adjust the amounts recommended for calories, fats, carbohydrate, and fiber.		
Calories		
	2,000	2,500
Total Fat	Less than 65g	80g
Sat Fat	Less than 20g	25g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2,400 mg	2,400mg
Potassium	3,500mg	3,500mg
Total Carbohydrate	300g	375g
Dietary Fiber	25g	30g
Calories per gram:		
Fat 9	Carbohydrate 4	Protein 4

## Homemade Ice Cream

- 2 cups 2% milk
- 1/2 teaspoon salt
- 1 3/4 cup sugar
- 2 cups half and half
- 4 cups whipping cream
- 1 tablespoon vanilla

Scald milk and remove from heat. Add salt and sugar and stir until dissolved. Cool in refrigerator 30 minutes. Add remaining creams and vanilla and freeze. (Enjoy occasionally!)

Nutrition Facts		
Serving Size 143g		
Servings Per Container 16		
Amount Per Serving 5 oz.		
<b>Calories</b> 350	Calories from Fat 230	
% Daily Value *		
<b>Total Fat</b> 26g	39%	
Saturated Fat 16g	80%	
<b>Cholesterol</b> 100mg	33%	
<b>Sodium</b> 125mg	5%	
<b>Total Carbohydrate</b> 26g	9%	
Dietary Fiber 2g	8%	
Sugars 26g		
<b>Protein</b> 3g		
Vitamin A 20%	Vitamin C 2%	
Calcium 10%	Iron 0%	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs. If your calorie needs are much different, you adjust the amounts recommended for calories, fats, carbohydrate, and fiber.		
Calories		
	2,000	2,500
Total Fat	Less than 65g	80g
Sat Fat	Less than 20g	25g
Cholesterol	Less than 300mg	300mg
Sodium	Less than 2,400 mg	2,400mg
Potassium	3,500mg	3,500mg
Total Carbohydrate	300g	375g
Dietary Fiber	25g	30g
Calories per gram:		
Fat 9	Carbohydrate 4	Protein 4

**This recipe can replace the homemade ice cream recipes from the past that contain raw eggs.**

**Homemade ice cream recipes that contain raw eggs can be substituted with pasteurized liquid eggs to meet food safety guidelines.**

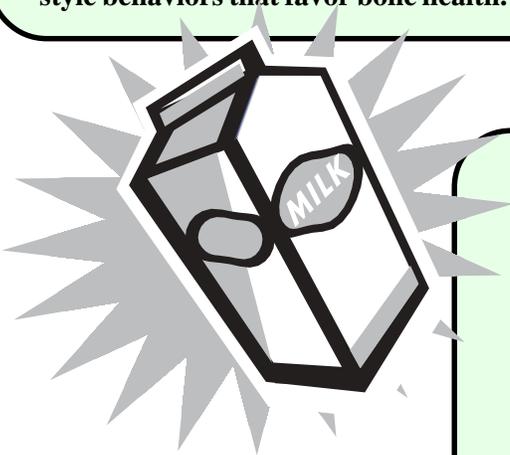
## Freezing Cheese

Did you know that most natural cheeses (Cheddar, Swiss, Edam, Gouda, Brick, Muenster, Provolone, Mozzarella, and Parmesan) can be successfully frozen for six weeks or more under proper conditions?

- Just cut cheese in small pieces not more than a half pound and one inch thick. Shredding the cheese works well too.
- Wrap tightly in an airtight package and freeze.
- Thaw cheese in refrigerator and use as soon as possible.

## Did You Know?

Multiple studies have concluded that bone mineral density is reduced in people with type 1 diabetes mellitus. The cause for this is not clear, but it would be prudent for this group of people to talk with their health care provider about getting a bone scan test to pinpoint their risk for osteoporosis, and to practice life-style behaviors that favor bone health.



## Quick Ways to Increase Calcium in the Diet

- Drink milk with meals and snacks
- Enjoy chocolate or other flavored milks
- Add cheese to sandwiches and burgers
- Eat a carton of yogurt for breakfast, lunch or a quick snack
- Top a baked potato with cheese, yogurt or cottage cheese
- Sprinkle popcorn with grated Parmesan cheese
- Use milk in place of water when cooking and baking