

Calcium, Vitamin D and Your Health

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Calcium and Vitamin D are nutrients that have received much attention in recent years because they work together to prevent several chronic diseases. One of the best sources of calcium and Vitamin D is milk, but there are other sources. This pamphlet can help you understand why adequate amounts of these nutrients are needed for overall health and prevention of disease. You will also learn ways to meet the recommended intakes of each nutrient.

Where Is Calcium Found In The Body?

About 99% of the calcium in the body is in the bones and teeth and 1% is in the blood, muscles, and other soft tissues (such as the nerves, organs, etc.) This 1% plays a major role in our health.

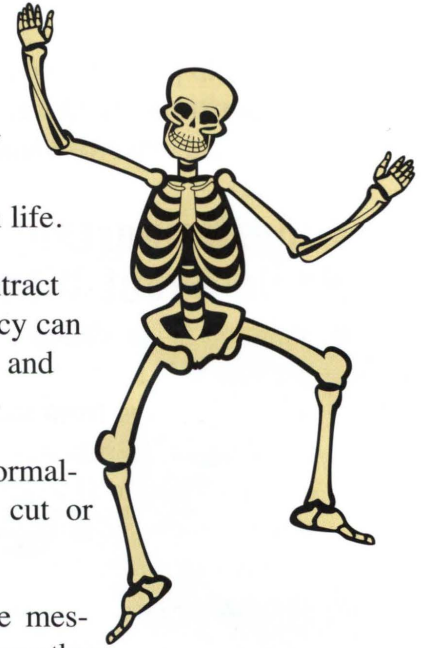


Calcium is a very important mineral because it ...

- Combines with phosphorus to form bones and teeth, making them hard and resistant to breaks and decay. Children need to get enough calcium

for their bones and teeth to develop normally. Getting enough calcium early in life helps bones remain strong later in life.

- Helps muscles to contract normally. A deficiency can cause muscle spasms and cramps.
- Helps blood to clot normally, when you get a cut or wound.
- Is essential for nerve messages to be passed along the nervous system from the brain to other parts of the body and vice versa.
- Helps regulate blood pressure. Low calcium intake has been associated with high blood pressure. People with high blood pressure should make sure they consume the recommended amount of calcium (1000 to 1500 mg per day). African-Americans have a higher rate of high blood pressure than other groups and tend to have low calcium intakes.
- Calcium may help prevent colon cancer, one of the most common forms of cancer. Calcium may reduce cancer risk in two ways: (a) by binding fat and bile acids in the large intestine, keeping them from causing harm and (b) by preventing the excessive growth of cells in the intestines, which could otherwise lead to cancer.



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Vitamin D is a fat soluble vitamin that ...

- Must be present for calcium to be absorbed and used. For this reason, milk that is rich in calcium and fortified with Vitamin D is a good choice.
- Is essential for calcium to be used for building bones and teeth and for other roles in the body.
- May help prevent colon cancer by working with calcium to slow the growth of intestinal cells that could otherwise lead to cancer.

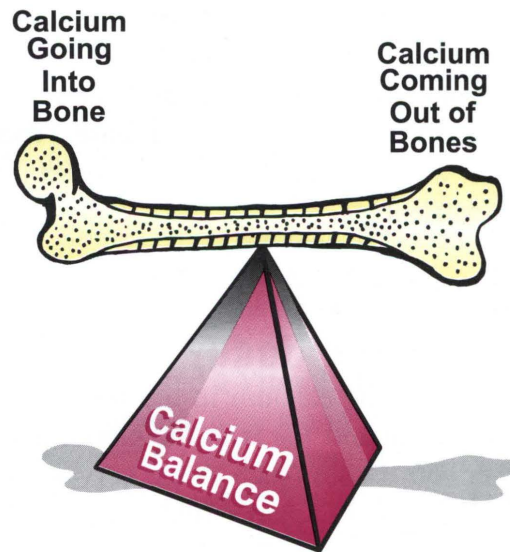
Other Important Facts About Vitamin D:

- Vitamin D is called the “sunshine vitamin” because it is formed in the skin by the action of ultraviolet rays from the sun. For fair skinned individuals, 15 minutes of sunlight will produce enough Vitamin D to last for several days, even when wearing light clothing. However, it takes 3 hours or more for this to happen with dark-skinned people.
- Clouds, smoke, and window glass also prevent penetration of ultraviolet rays
- Use of a sunscreen lotion of 8 SPF or higher will prevent the formation of Vitamin D in the skin. When sunbathing, just wait 15 minutes before applying sunscreen lotion (i.e. if you are fair skinned).
- Vitamin D is also present in fish oil and some types of saltwater fish and shellfish (salmon, halibut, herring, tuna, oysters, and shrimp).
- Other Vitamin D sources are fortified milk (400 IU per quart) and some cereals. Check nutrition labels of cereals to see which ones contain Vitamin D.

What Is Good Bone Health?

- Throughout life, calcium continuously moves in and out of the bones. During childhood and the teen years, bones grow in size and density. Calcium goes into the bones faster than it comes out.

- Between ages 20 and 30 years, the bones do not grow anymore in size, but they become more dense and hard if you are taking in enough calcium and Vitamin D. Therefore, the first 30 years (first third of life) is called the “**bone building stage.**”
- After age 40, calcium begins to move out of the bones faster than it goes back in. This is called the “**bone losing stage.**” It is very important to reach this age with the strongest, most dense bones possible to minimize the effects of calcium loss.



- “Good bone health” means reaching adulthood with the most dense, strong bones possible, and then keeping the bones strong by doing the things discussed in this pamphlet.
- On the other hand, if too little calcium is stored in the bones before age 30, or calcium is drawn out too fast in later life, you will be at risk for getting a disease called **osteoporosis**.

What Is Osteoporosis?

- Osteoporosis (OSS-tee-oh-pore-OH-sis) is a disease, occurring mostly in older adults, due to a loss of bone density and a break down of bone structure. The bones become porous, thin, and brittle. Osteoporosis is a major health problem in the U.S.
- One cause of this disease is getting too little calcium in early life and reaching age 30 with too little calcium in the bones. It can also result from calcium being drawn out of the bones too

fast due to several conditions (risk factors) discussed below.

- As the bones in the spine lose calcium, they become more thin and soft and can no longer support the body, causing the person to stoop forward. Eventually, this becomes very serious because the lungs and organs may not have enough room to work properly.
- Bones also break easily, especially those in the hips, legs, and arms. Falls may cause a bone to break, or a bone might give way causing the person to fall.

Risk Factors for Osteoporosis

- **Being female:** 80% of people with osteoporosis are women.

Females have smaller bones and tend to take in less calcium than males. On average, U.S. adult females consume only 450 - 550 mg of calcium per day, which is only half the recommended amount of 1,000 mg.



- **Race:** Whites and Asians are at greatest risk for osteoporosis, but African-Americans and Hispanics also have some risk.
- **Having thin bones and a small frame:** If you start out with smaller bones, then lose calcium and bone due to other risk factors, the effect will be more serious.
- **Family history of osteoporosis:** There is a tendency for osteoporosis to run in families.
- **Being underweight or constantly dieting to lose weight:** Heavier people tend to have more dense bones. This is one advantage of being overweight. People who constantly stay on a diet to lose weight often do not take in enough calcium.
- **Post-menopause:** After menopause (i.e. menstrual periods have stopped) women have much lower levels of estrogen, which causes a loss of calcium from the bones.

- **Inadequate physical activity:** Getting too little physical activity leads to a loss of calcium from the bones.
- **Low calcium/Vitamin D intakes:** If you do not get enough calcium and Vitamin D early in life, your bones will be less dense and smaller. When you start losing calcium after age 40, the bones will rapidly show the effects of calcium loss.
- **Excessive intakes of sodium and protein:** Eating excessive amounts of sodium (in salt) and protein (in meat), while not taking in enough calcium, causes the kidneys to excrete more calcium from the body.
- **Smoking:** Smokers tend to have a lower bone density, partly because smoking decreases calcium absorption.
- **Alcohol intake:** Excessive intake of alcohol causes a loss of calcium from the body.
- **Certain medications:** Long-term use of corticosteroids, anticonvulsants, and antacids, as well as excessive levels of thyroid hormones, may either reduce calcium absorption or cause increased loss of calcium from the bones. If you take any of these medications, talk with your doctor about your possible need of a calcium supplement.

A major health concern is that many children and teenagers are not taking in enough calcium. One culprit may be the increased drinking of soft drinks. Health experts fear that many children will develop osteoporosis later in life, due to low calcium intakes during childhood and the teen years.

Ways to Prevent Osteoporosis

If you have any of the above risk factors, you should take the following actions to protect your bones. This is even more important if you have several risk factors.

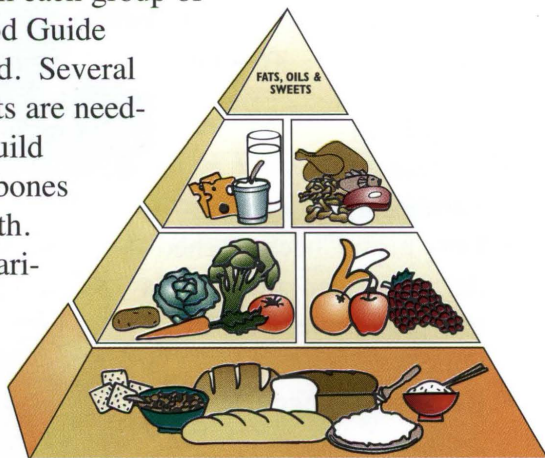
1. Avoid fad or very restrictive diets to lose weight. If you are trying to lose weight, follow a balanced eating



plan with at least a minimum of two cups of low-fat milk or other low-fat milk products. It is best not to go below 1500 calories. If you cannot lose weight at this level, you may need to increase your physical activity.

- If you have gone through menopause or think you are near menopause, talk with your doctor about hormone replacement therapy (HRT) or estrogen replacement therapy (ERT).
- Participate in regular physical activity, including at least 30 minutes of activity on most days of the week. Stretching and weight-bearing activities, such as walking, can increase bone density and help bones remain strong throughout life. Weight lifting exercises are also beneficial to bones, balance, and overall health. Be sure to check with your doctor before starting any new physical activity or greatly increasing your level.
- Don't smoke. If you already smoke, try to stop, or at least cut down.

- Eat a wide range of foods by selecting a variety from each group of the Food Guide Pyramid. Several nutrients are needed to build strong bones and teeth. Eat a variety of foods to get all of them.



- Eat more calcium-rich foods. Milk and foods made with milk are the best sources of calcium. Fluid milk also contains Vitamin D. Cheese and other foods made from milk may not contain the same level of Vitamin D as fluid milk.
- Limit salt and meat intake to moderate levels. Recommended intakes are 2400 mg sodium (1 teaspoon or less of salt) and 2 servings (total of 6 ounces) of meat per day.

- Eat low-fat milk products. When trying to lose weight, or to reduce blood cholesterol, don't cut out milk. Instead, drink skim milk, 1% milk, or buttermilk, or eat low-fat cottage cheese (with added calcium) and yogurt.

- If you drink alcoholic beverages, limit the amount to no more than one per day for women and two per day for men (one drink = 12 ounces beer, or 5 ounces wine, or 1 1/2 ounces liquor).



- Have a bone density test, especially at age 65 and every 2 years thereafter. If you have 2 or more risk factors for osteoporosis, ask your doctor about having a bone density test at a younger age. The machine that measures bones in the entire body is referred to as a DEXA (dex-za) machine

Meeting Your Calcium Needs

The National Research Council has set up recommendations for the amount of calcium people need at different ages. These are called *Dietary Reference Intakes* or *DRIs*.

DRIs for Calcium At Different Ages and Amount of Milk Needed

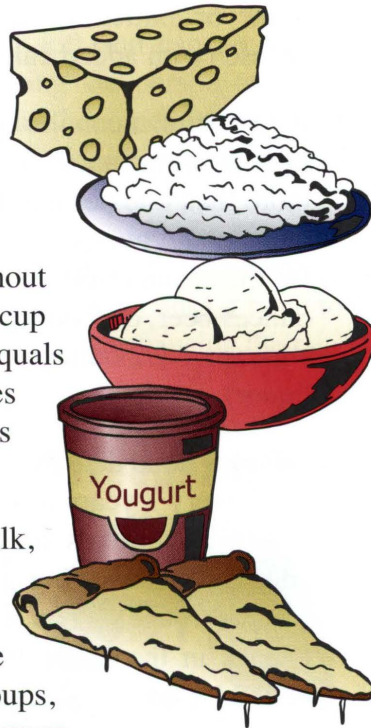
Age Group	Calcium Needs	Milk to Provide Most of Calcium*
1 – 8 years	500 – 800 mg	2 to 3 cups
9 – 18 years	1300 mg	4 cups
19 – 50 years	1000 mg	3 cups or more
Women, 51+ (with **HRT) and Men, 51+	1200 mg	3 to 4 cups
Women, 51+ (without **HRT)	1500 mg	4 cups or more
Pregnant or Breastfeeding	1200 mg	3 to 4 cups

*1 cup (8 ounces) of Milk contains about 300 mg of Calcium. The above amounts of milk will not provide all the calcium needed, but there are other foods that can help meet calcium needs.

**HRT = Hormone Replacement Therapy

What Are the Best Sources of Calcium and Vitamin D?

- The Milk, Yogurt, & Cheese Group of the Food Guide Pyramid is the best source of calcium and Vitamin D. It is very difficult to get enough calcium without drinking milk. One cup (8 ounces) of milk equals one serving and gives about 300 milligrams (mg) of calcium.



- Foods made with milk, such as cheese, yogurt, pudding, custard, ice milk, ice cream, and cream soups, are included in this group.
- Foods that are the lowest in calories, but contain the highest amount of calcium, are skimmed and low-fat fluid milk, buttermilk, and low-fat yogurt. Low-fat cottage cheese with added calcium is also an excellent choice. Plain, low-fat yogurt is especially high in calcium with 415 mg per cup.
- Cheeses contain varying amounts of calcium. The more firm the cheese, the more calcium it contains. For example, Swiss and Parmesan cheese are excellent sources of calcium, whereas softer cheeses (American, Farmers, Mozzarella, and Provolone) have lower amounts of calcium. Cream cheese is not a good source of calcium.
- Some cheeses are made with low-fat or skim milk and are lower in fat, cholesterol, and calories than regular cheese. Check "Nutrition Facts" labels to see how much fat and calcium you are getting in a serving. On the label, calcium is shown as a percent of the daily need of 1000 mg. To determine the milligrams of calcium in a serving, remove the % sign and add one 0. A food that provides 20% of calcium need in one serving will contain 200 mg of calcium.

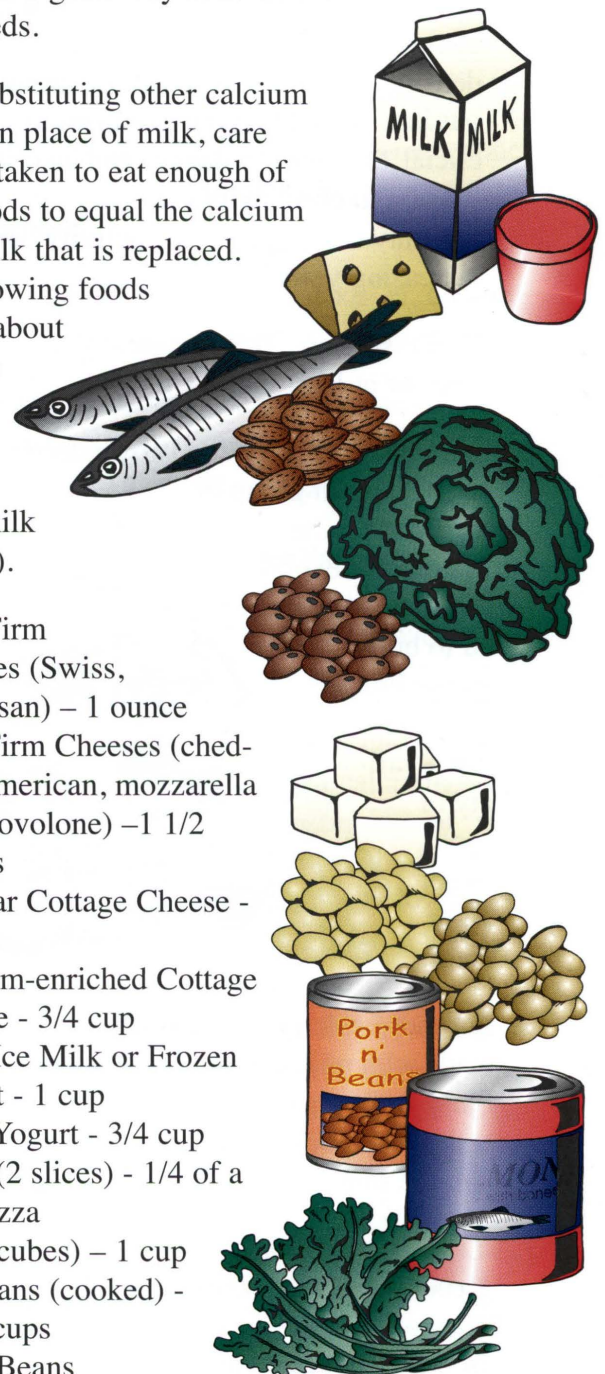
- Canned fish, such as sardines and salmon, are good sources of calcium, if the bones are eaten.
- Tofu and soymilk are good sources of calcium if made with calcium.
- Almonds, dried beans and peas, and dark green leafy vegetables are fair sources of calcium.
- Due to their acid and Vitamin C content, some fruit juices increase the absorption of calcium.

Drinking orange or grapefruit juice with added calcium is a good way to meet calcium needs.

When substituting other calcium sources in place of milk, care must be taken to eat enough of these foods to equal the calcium in the milk that is replaced.

The following foods provide about the same amount of calcium as 1 cup of milk (300 mg).

- Very Firm Cheeses (Swiss, Parmesan) – 1 ounce
- Less Firm Cheeses (cheddar, American, mozzarella and provolone) – 1 1/2 ounces
- Regular Cottage Cheese - 2 cups
- Calcium-enriched Cottage Cheese - 3/4 cup
- Plain Ice Milk or Frozen Yogurt - 1 cup
- Plain Yogurt - 3/4 cup
- Pizza (2 slices) - 1/4 of a 12" pizza
- Tofu (cubes) – 1 cup
- Soybeans (cooked) - 2 1/3 cups
- Navy Beans (cooked) – 1 1/4 cups



- Pork N' Beans - 1 3/4 cups
- Salmon (canned with bones) - 5 1/3 ounces
- Turnip Greens - 1 1/2 cups

Contrary to previous belief, calcium from plant sources is well absorbed. One exception is the calcium in spinach, which is not well absorbed due to compounds called oxalates.

Lactose Intolerance

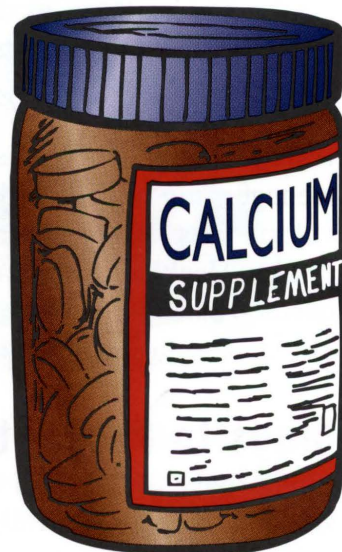
If you have a problem called "lactose intolerance," you may have trouble drinking regular milk. This is because some of the milk sugar "lactose" may not be digested due to a deficiency of the enzyme, lactase. This may result in excess gas, diarrhea, and nausea after drinking milk.

Cheese, yogurt, and buttermilk may not cause this problem since much of the "lactose" has already been broken down. Also, you may be able to drink smaller amounts of milk at one time (1 cup or less) without symptoms. Lactaid tablets (from a drug store) can be added to milk to reduce the lactose.

Do you need to take a calcium supplement?

If you do not get enough calcium from food, because you don't like milk or have lactose intolerance, you may need to take a calcium supplement.

Postmenopausal women, if not on hormone replacement, may need a calcium supplement. The recommended intake of calcium is 1500 mg per day, which is difficult to meet without a calcium supplement.



Here are some things to consider, if you take a calcium supplement:

- Not all calcium supplements are equally well absorbed in the body. Calcium Carbonate and

Calcium Citrate are fairly well absorbed. These are available in most drug stores without a prescription.

- Calcium Citrate is well absorbed under most conditions, but is best taken on an empty stomach. Calcium Carbonate needs acid to be absorbed, so it is best taken with a meal or soon thereafter when stomach acid is highest. Stomach acid may be low in older adults (called achlorhydria), causing reduced calcium absorption. Thus, Calcium Citrate might be the best choice for older adults.
- **How much calcium should you take at one time?** No matter what type of calcium supplement you take, limit the amount to no more than 500 mg at a time (calcium in food + supplement). This is all that the body can absorb at once. Some cereals provide 1000 mg calcium in a serving, which overloads the body's ability to absorb all of it.
- **Do you also need a Vitamin D supplement?** If you have dark skin, or are in the sun very little, you may need a calcium supplement that contains Vitamin D. Only 5 to 10 micrograms (200 to 400 IU) of Vitamin D are needed each day, but be sure to keep your intake below 50 micrograms (2,000 IU) per day. A daily intake higher than this can be very harmful.

References:

1. National Resource Center, National Institute of Health Osteoporosis and Related Bone Diseases. *Fact Sheets*. Available at: <http://www.osteoporosis.org>
2. *Calcium: A Summary of Current Research for the Health Professional* (1987). Rosemont, IL: National Dairy Council.
- 3.Sizer, F and Whitney, E (2000). *Nutrition Concepts and Controversies*, 8th Edition, Belmont, CA: Wadsworth/Thompson Learning. From: <http://www.wadsworth.com>.
4. Many good osteoporosis prevention materials are available on the National Osteoporosis Foundation website at: <http://www.nof.org>.