

## Calcium: What is it?

Calcium, the most abundant mineral in the human body, has several important functions. More than 99% of total body calcium is stored in the bones and teeth where it functions to support their structure [1]. The remaining 1% is found throughout the body in blood, muscle, and the fluid between cells. Calcium is needed for muscle contraction, blood vessel contraction and expansion, the secretion of hormones and enzymes, and sending messages through the nervous system [2]. A constant level of calcium is maintained in body fluid and tissues so that these vital body processes function efficiently.

Bone undergoes continuous remodeling, with constant resorption (breakdown of bone) and deposition of calcium into newly deposited bone (bone formation) [2]. The balance between bone resorption and deposition changes as people age. During childhood there is a higher amount of bone formation and less breakdown. In early and middle adulthood, these processes are relatively equal. In aging adults, particularly among postmenopausal women, bone breakdown exceeds its formation, resulting in bone loss, which increases the risk for osteoporosis (a disorder characterized by porous, weak bones) [2].

## What is the recommended intake for calcium?

Recommendations for calcium are provided in the Dietary Reference Intakes (DRIs) developed by the Institute of Medicine (IOM) of the National Academy of Sciences. *Dietary Reference Intake* (DRI) is the general term for a set of reference values used for planning and assessing nutrient intakes of healthy people. Three important types of reference values included in the DRIs are *Recommended Dietary Allowances* (RDA), *Adequate Intakes* (AI), and *Tolerable Upper Intake Levels* (UL). The RDA recommends the average daily intake that is sufficient to meet the nutrient requirements of nearly all (97-98%) healthy individuals in each age and gender group. An AI is set when there is insufficient scientific data available to establish a RDA. AIs meet or exceed the amount needed to maintain a nutritional state of adequacy in nearly all members of a specific age and gender group. The UL, on the other hand, is the maximum daily intake unlikely to result in adverse effects. It is listed in the section "*Is there health risk of too much calcium?*" of this fact sheet.

For calcium, the recommended intake is listed as an Adequate Intake (AI), which is a recommended average intake level based on observed or experimentally determined levels. Table 1 contains the current recommendations for calcium for infants, children and adults.

## What foods provide calcium?

In the United States (U.S.), milk, yogurt and cheese are the major contributors of calcium in the typical diet [4]. The inadequate intake of dairy foods may explain why some Americans are deficient in calcium since dairy foods are the major source of calcium in the diet [4]. The U.S. Department of Agriculture's Food Guide Pyramid recommends that individuals two years and older eat 2-3 servings of dairy products per day. A serving is equal to:

- 1 cup (8 fl oz) of milk
- 8 oz of yogurt
- 1.5 oz of natural cheese (such as Cheddar)
- 2.0 oz of processed cheese (such as American)

A variety of non-fat and reduced fat dairy products that contain the same amount of calcium as regular dairy products are available in the U.S. today for individuals concerned about saturated fat content from regular dairy products.

Although dairy products are the main source of calcium in the U.S. diet, other foods also contribute to overall calcium intake. Individuals with lactose intolerance (those who experience symptoms such as bloating and diarrhea because they cannot completely digest the milk sugar lactose) and those who are vegan (people who consume no animal products) tend to avoid or completely eliminate dairy products from their diets [2]. Thus, it is important for these individuals to meet their calcium needs with alternative calcium sources if they choose to avoid or eliminate dairy products from their diet. Foods such as Chinese cabbage, kale and broccoli are other alternative calcium sources [2]. Although most grains are not high in calcium (unless fortified), they do contribute calcium to the diet because they are consumed frequently [2]. One 8 ounce glass of milk is equal to 1 cup of yogurt, 1 ½ ounces of cheddar cheese, 2 ¼ cups of cooked broccoli or 8 cups of cooked spinach. Additionally, there are

several calcium-fortified food sources presently available, including fruit juices, fruit drinks, tofu and cereals. Certain plant-based foods such as some vegetables contain substances which can reduce calcium absorption. Thus, you may have to eat several servings of certain foods such as spinach to obtain the same amount of calcium in one cup of milk, which is not only calcium-rich but also contains calcium in an easily absorbable form. Table 2 contains additional listings of food sources of calcium.

Daily Values (DV) were developed to help consumers determine if a typical serving of a food contains a lot or a little of a specific nutrient. The DV for calcium is based on 1000 mg. The percent DV (% DV) listed on the Nutrition Facts panel of food labels tells you what percentages of the DV are provided in one serving. For instance, if you consumed a food that contained 300 mg of calcium, the DV would be 30% for calcium on the food label.

A food providing 5% of the DV or less is a low source while a food that provides 10-19% of the DV is a good source and a food that provides 20% of the DV or more is an excellent source for a nutrient. For foods not listed in this table, please refer to the U.S. Department of Agriculture's Nutrient Database Web site: [http://www.nal.usda.gov/fnic/cgi-bin/nut\\_search.pl](http://www.nal.usda.gov/fnic/cgi-bin/nut_search.pl).

### Helping hints for meeting your calcium needs

As the 2000 *Dietary Guidelines for Americans* states, "Different foods contain different nutrients and other healthful substances. No single food can supply all the nutrients in the amounts you need" [9]. For more information about building a healthful diet, refer to the *Dietary Guidelines for Americans* <http://www.usda.gov/cnpp/DietGd.pdf> and the US Department of Agriculture's *Food Guide Pyramid* <http://www.nal.usda.gov/fnic/Fpyr/pyramid.html> [9,10].

The following are strategies and tips to help you meet your calcium needs each day:

- Use low fat or fat free milk instead of water in recipes such as pancakes, mashed potatoes, pudding and instant, hot breakfast cereals.
- Blend a fruit smoothie made with low fat or fat free yogurt for a great breakfast.
- Sprinkle grated low fat or fat free cheese on salad, soup or pasta.
- Choose low fat or fat free milk instead of carbonated soft drinks.
- Serve raw fruits and vegetables with a low fat or fat free yogurt based dip.
- Create a vegetable stir-fry and toss in diced calcium-set tofu.
- Enjoy a parfait with fruit and low fat or fat free yogurt.
- Complement your diet with calcium-fortified foods such as certain cereals, orange juice and soy beverages.

Table 1: Recommended Adequate Intake by the IOM for Calcium

Male and Female Age	Calcium (mg/day)	Pregnancy & Lactation
0 to 6 months	210	N/A
7 to 12 months	270	N/A
1 to 3 years	500	N/A
4 to 8 years	800	N/A
9 to 13 years	1300	N/A
14 to 18 years	1300	1300
19 to 50 years	1000	1000
51+ years	1200	N/A

Table 2: Selected Food Sources of Calcium [6-8]

Food	Calcium (mg)	% DV*
Yogurt, plain, low fat, 8 oz.	415	42%
Yogurt, fruit, low fat, 8 oz.	245-384	25%-38%
Sardines, canned in oil, with bones, 3 oz.	324	32%
Cheddar cheese, 1 ½ oz shredded	306	31%
Milk, non-fat, 8 fl oz.	302	30%
Milk, reduced fat (2% milk fat), no solids, 8 fl oz.	297	30%
Milk, whole (3.25% milk fat), 8 fl oz	291	29%
Milk, buttermilk, 8 fl oz.	285	29%
Milk, lactose reduced, 8 fl oz.**	285-302	29-30%
Mozzarella, part skim 1 ½ oz.	275	28%
Tofu, firm, made w/calcium sulfate, ½ cup***	204	20%
Orange juice, calcium fortified, 6 fl oz.	200-260	20-26%
Salmon, pink, canned, solids with bone, 3 oz.	181	18%
Pudding, chocolate, instant, made w/ 2% milk, ½ cup	153	15%
Cottage cheese, 1% milk fat, 1 cup unpacked	138	14%
Tofu, soft, made w/calcium sulfate, ½ cup***	138	14%
Spinach, cooked, ½ cup	120	12%
Instant breakfast drink, various flavors and brands, powder prepared with water, 8 fl oz.	105-250	10-25%
Frozen yogurt, vanilla, soft serve, ½ cup	103	10%
Ready to eat cereal, calcium fortified, 1 cup	100-1000	10%-100%
Turnip greens, boiled, ½ cup	99	10%
Kale, cooked, 1 cup	94	9%
Kale, raw, 1 cup	90	9%
Ice cream, vanilla, ½ cup	85	8.5%
Soy beverage, calcium fortified, 8 fl oz.	80-500	8-50%
Chinese cabbage, raw, 1 cup	74	7%
Tortilla, corn, ready to bake/fry, 1 medium	42	4%
Tortilla, flour, ready to bake/fry, one 6" diameter	37	4%
Sour cream, reduced fat, cultured, 2 Tbsp	32	3%
Bread, white, 1 oz	31	3%
Broccoli, raw, ½ cup	21	2%
Bread, whole wheat, 1 slice	20	2%
Cheese, cream, regular, 1 Tbsp	12	1%

\*DV=Daily Value

\*\*Content varies slightly according to fat content; average =300 mg calcium

\*\*\* Calcium values are only for tofu processed with a calcium salt. Tofu processed with a non-calcium salt will not contain significant amounts of calcium.