

California Food Guide

Milk and Milk Products

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What's New?

- MyPyramid recommends that for adults and children over the age of two, most milk group choices be fat-free or low-fat.¹
- Based on food intake data, 78 percent of children ages 9-18 and 85 percent of adults 51 years of age and older do not meet their daily calcium requirements.²
- Americans two years of age and older consume, on average, one and a half cups a day of milk and milk products vs. the two to three cups recommended in the Dietary Guidelines for Americans 2005 (Dietary Guidelines).^{3, 4} Nonfat and low-fat milks are not recommended for use during the first two years of life.⁵
- Many African Americans and Asian Americans do not get enough calcium from their daily diets.^{6, 7}

Public Health Implications

At least three cups of milk and milk products, or other non-dairy sources of calcium, are needed for those nine years of age or older to meet their calcium requirements.⁴ Adequate consumption during adolescence is particularly important because peak bone mass is largely achieved during this life stage and continues until the mid 20's.

Healthy People 2010 Objective 2-9: Reduce the overall number of cases of osteoporosis. Target: eight percent of adults. Baseline: ten percent of adults aged 50 years and older.⁸ In California approximately 15 percent of women 50 years and older have been told that they have bone loss, osteopenia, or osteoporosis.⁹

Healthy People 2010 Objective 19-11: Increase the proportion of persons aged two years and older who meet the dietary recommendations for calcium. Target: 75 percent. National baseline: 46 percent.⁸

Definition

Milk and Milk Products

Milk Group: The United States Department of Agriculture (USDA) released its MyPyramid recommendations in 2005. The Milk Group is also known as the milk, yogurt and cheese group and includes all fluid milk products and many foods made from milk that retain their calcium content. Foods made from milk that have little or no calcium, such as cream cheese, cream, and butter are not considered part of the milk group.¹ See Table 1 for the calcium content of milk and milk products.

One cup equivalent for the milk group is defined in the Dietary Guidelines for Americans⁴ as:

- One cup low-fat/fat-free milk, yogurt
- One and a half ounces of low-fat or fat-free natural cheese
- Two ounces of low-fat or fat-free processed cheese

Dairy Products: Dairy products, currently not defined in the Dietary Guidelines, include a broader range of milk products including all ranges of fluid milk (fat-free to whole milk, buttermilk, acidophilus milk, and flavored milks), cheeses, cottage cheese, yogurt and yogurt drinks, butter, cream, sour cream, and ice cream. Of these, milk, natural and aged cheeses, and yogurt products are excellent calcium sources (see Table 1). In contrast, butter, cream, and cream cheese contain no or minimal calcium.

Note that for the purposes of this chapter, we will be referencing primarily to cow's milk. While some individuals do consume goat and sheep's milk and cheeses, such products are not part of this discussion. There is a section in this chapter on non-dairy calcium containing alternatives.

The calcium content of fluid milk has to meet California standards, which exceed federal standards. This has been accomplished through the fortification of milk with non-fat milk solids. These offer improved taste in addition to nutritional benefits. The additional calcium content is most pronounced in the one percent fat version of milk. For example, one cup of federal standard one percent milk contains 311 mg calcium, while one cup of California standard one percent milk contains 380 mg calcium. Furthermore milk produced under California standards contains up to 33 percent more protein than milk produced under federal standards. Other nutrients are affected minimally by the fortification of fluid milks.¹⁰

Table 1: Calcium Content of Milk and Milk Products^{10, 11}

High calcium sources (about 300 mg/serving)	Serving Size	Mg Calcium
Fluid milk (fat-free or one percent preferred)	1 cup	311* 380 †
Evaporated milk (fat-free preferred)	½ cup	320
Sweetened condensed milk (fat-free preferred)	½ cup	292
Yogurt, fat-free or low fat preferred	1 cup	355
Natural or processed hard cheeses, low fat preferred (Cheddar, Monterey Jack-types)	1 ½ oz natural; 2 oz processed	287
Ricotta cheese	½ cup	335
Parmesan cheese	¼ cup	276
Pudding	1 cup	306
Custard or flan	¾ cup	296
Frozen yogurt	1 cup	304
Cream soup	1 ½ cup	320
Medium calcium sources (about 100 mg/serving)		
Cottage cheese	1 cup	138
Ice cream	½ cup	85

* 311 mg calcium for fat free milk using the Federal Standards for milk.

† 380 mg calcium for one percent milk using the California Standards for milk.

Milk Nutrient Profile

Milk and dairy products provide about 63 percent of the calcium available in the United States food supply.¹² Milk and dairy products are also good sources of phosphorous, riboflavin, vitamin B-12, protein, potassium, zinc, magnesium, and vitamin A (32 percent, 26 percent, 21 percent, 19 percent, 19 percent, 16 percent, 16 percent, and 15 percent of food supply of these nutrients, respectively). Vitamin D fortified milk and breakfast cereals are the primary sources of dietary intake of vitamin D in the United States.¹³

This unique package of nutrients speaks to the benefits of including milk and dairy products in the diet for reasons other than their calcium content.¹⁴ Numerous studies have reported that consumption of milk and dairy products improves the overall nutrient density and quality of the diet in women, older adults, children, and adolescents.¹⁵

Health Benefits of Milk and Milk Products

Milk and milk products are an easy and economical way to meet calcium requirements. Recent research supports the beneficial role of milk and milk products in the diet beyond bone health. Specifically, several studies suggest that adequate milk or calcium

intake may reduce the risk of several chronic diseases besides osteoporosis, including mild hypertension, kidney stone formation, and some cancers.^{16, 17, 18, 19, 20} Cultured fat free and low-fat dairy foods such as yogurt may offer health benefits including improved lactose digestion, control of intestinal infections, and enhanced immune function.²¹

Milk and milk products have traditionally been associated with bone health in western societies. To be sure, dietary calcium has been demonstrated to enhance bone health throughout life, with high intakes being associated with formation of greater bone mass in childhood and adolescence, and reduced bone loss and fracture risk in the elderly. Children and adolescents especially require adequate calcium, vitamin D, protein and other dairy nutrients for proper bone growth. Bone mass later in life is determined primarily by peak bone mass, of which more than 90 percent is attained by age 20 years.²²

Vitamin D is necessary for proper bone growth from infancy through puberty and for bone maintenance in adulthood. Vitamin D is found in fortified milk, cheese, whole eggs, liver, salmon, and fortified margarine. The skin also has the ability to synthesize vitamin D if exposed to sunlight on a regular basis.²³ It is estimated that 30 percent of adolescents nationwide may be vitamin D deficient, putting them at risk for fractures, stunted growth and debilitating osteoporosis later in life.²⁴ Recently, cases of rickets or vitamin D deficiency have resurfaced in the United States, making the adequate consumption of vitamin D-fortified fluid milk even more important.²⁵ In addition, increased use of sunscreens in the United States has further contributed to vitamin D deficiencies.^{26, 27}

Considerable scientific evidence indicates that calcium or calcium-rich, low-fat dairy foods have a beneficial effect on blood pressure regulation.^{16, 18} Among those studies is the landmark controlled-feeding intervention trial Dietary Approaches to Stop Hypertension (DASH). This study demonstrated that a low-fat dietary pattern high in fruits and vegetables (eight to nine servings a day) coupled with low-fat dairy products (three servings a day) produced greater reductions in systolic and diastolic blood pressure than a control diet or a diet high only in fruits and vegetables.

A role for milk and dairy products in weight management for children and adults is beginning to emerge.^{28, 29} Recent studies showed that people on a reduced-calorie diet who consumed three servings of milk, cheese or yogurt each day lost significantly more weight and more body fat than those who just cut calories while consuming little or no dairy.²⁸ Consumption of dairy foods resulted in greater weight loss benefits than when a calcium supplement was taken; indicating that other factors in dairy foods may work synergistically to exert this effect. A recent study concluded that dairy calcium, age, and physical activity were significantly associated with lower body fat in 9-14 year old girls.²⁹ However research results are not completely consistent and health professionals are encouraged to monitor ongoing findings documented in this area.

Dietary Recommendations

The Dietary Guidelines recommend daily consumption of two to three cups of fat-free or low-fat milk or equivalent milk products (however this does not apply to children under two years of age⁵).⁴ This recommendation is made to ensure that the majority of the population meets its needs for calcium. The dietary recommendation for calcium, defined by the “Adequate Intake” (AI), varies with age to meet the body’s varying needs for calcium at different life stages – increased needs during childhood and adolescence when bone is being accrued, and in old age when bone losses naturally occur. See Table 2 for age-specific calcium recommendations.²⁸

Table 2: Dietary Recommendations for Calcium in North America²⁸

Population	Age (yrs)	Calcium recommendation* (mg)
Infants	0 - 0.5	210
Infants	0.5 – 1	270
Children	1 – 3	500
Children	4 – 8	800
Teenagers	9 – 18	1,300
Adults	19 – 50	1,000
Adults	51 – 70	1,200
Adults	70+	1,200
Pregnant or nursing teenagers		1,300
Pregnant or nursing women		1,000

*Adequate Intake as defined by the Dietary Reference Intakes (Institute of Medicine, 1997).

Burden

Milk and milk products are the primary sources of calcium in the United States.²⁹ As described above, calcium plays a critical role in bone health and, hence, in reducing osteoporosis risk.

About ten million Americans have osteoporosis and another 18 million have low bone mass (osteopenia) and are at risk of developing osteoporosis.³⁰ In California, data from the California Health Interview Survey show that nearly 15 percent of women aged 50 years and older have been told by a doctor that they have bone loss, osteopenia or osteoporosis.⁹

Osteoporosis-related medical expenditures were estimated nationally at \$14 billion in 1996 and \$2 billion in California in 1998.^{31, 32} Women, Whites, and Asians are more likely to develop osteoporosis than men, and Blacks, respectively. Lower socioeconomic status is also associated with increased osteoporosis risk in White and Black women.³³

As indicated earlier, calcium and other nutrients in milk and dairy products not only play a role in bone health, but also in other chronic health conditions. Using data from

prospective and randomized controlled trials, McCarron and Heaney (2004) have suggested that eating three to four servings of dairy foods each day, as part of a healthy diet, could result in cost savings of \$26 billion in the first year, and more than \$200 billion over five years.³⁴ These savings would be realized by reducing the disease burden of several common medical conditions: obesity, hypertension, type 2 diabetes, osteoporosis, kidney stones, certain outcomes of pregnancy, and some cancers.

Consumption Patterns

Nationally, representative data (1999-02) show that Americans two years of age and older consume an average of only 1.7 cups of milk a day.³⁵ This is half of the recommendation of the current Dietary Guidelines.⁴

When looking at a breakdown of population by age segments, we see that certain groups are at higher risk for calcium deficiency because of inadequate consumption of milk and dairy products. According to the 1999-00 National Health and Nutrition Examination Survey, only 30 percent of Americans aged two years and older met the recommendation for milk and dairy consumption. Mean calcium intake fell short of dietary recommendations especially for adolescent girls, older women, and older males.³⁶

Calcium intake varies by ethnic background. African Americans and Asian Americans tend to have lower calcium intakes than Whites.⁶ Eighty-six percent of African Americans do not get the daily recommended amount of calcium in their diet and only about half of all African Americans consume one or more servings of dairy products a day.³⁷

In California, only about half of all California adults report drinking milk on any given day. Milk tends to be consumed most often by the youngest and oldest age groups, and the least by African Americans. About one in ten report eating yogurt and about half report eating cheese at least once in a given day. One in four California adults report consuming no milk or milk products on a given day.³⁸ In summary, fewer than one in three adults is likely to meet the recommendation of three servings a day.

Trends/Contributing Factors

Milk, and consequently calcium intake has been declining in children and adolescents over the past few decades. Between 1970 and 2000, mean daily calcium decreased for children and adolescents aged 3-15 years by as much as 20 percent depending on age group. In contrast, mean calcium intake increased for adult women, and remained stable for men aged 20–39 years.³⁶ The decline in calcium intake in children and adolescents is a public health concern; it is during adolescence (puberty) that bone mass is acquired rapidly so that by the end of puberty, about 90 percent of peak bone mass has been acquired.

In immigrant groups, more acculturated individuals tend to have lower intakes of calcium.³⁹ Interventions developed to improve bone health in immigrant groups should consider cultural preferences and food ways when promoting the use of milk and dairy products.

Barriers to Implementation/Myths

Common Concerns About Milk and Milk Products

“Lactose intolerance means I can’t drink milk.”

Lactose intolerance or lactose maldigestion is the inability to fully digest lactose, the sugar in milk, due to a deficiency of the enzyme lactase. Symptoms include bloating, abdominal discomfort and flatulence. Many people with lactose intolerance are under the impression that they need to omit all dairy products from their diet. However, there is evidence to show that the majority of people with lactose intolerance can tolerate milk products,⁴⁰ and that gradual exposure to dairy foods can improve tolerance to lactose in some individuals.³⁷ Suarez and associates have observed that some lactose-intolerant individuals can tolerate milk products if they are consumed in smaller amounts and spaced throughout the day.⁴¹ Cultured milk products such as yogurt and cheeses, are often better tolerated. Finally, lactose-reduced milks are available.

“My child has a milk allergy.”

Milk allergies are often due to allergic reactions to the protein components of milk, casein or whey. True milk allergies are uncommon. Only about one to three percent of children experience cow’s milk allergy and they usually outgrow this by age three.⁴² In adults the incidence is even lower. Individuals with true milk allergies would need to consume a milk substitute, such as a soy or rice beverage. Keep in mind that these alternatives are not a substitute for many of the nutrients in milk. In particular, calcium-fortified beverages should be selected.

“Flavored milks are too high in sugar to be part of a healthful diet.”

Both unflavored and flavored 100 percent milks can be nutritious beverage choices in the context of an overall healthy diet. Flavored milks provide calcium, vitamin D and a package of nutrients comparable to unflavored milks. Children like the taste of flavored milks, and often accept them more readily. However they should be consumed in moderation as part of a healthy, balanced diet.⁴³ Fat-free and low-fat (1 percent) flavored 100 percent milks are generally considered acceptable beverages on K-12 campuses.⁴⁴

“Milk is fattening; I can’t drink it because I’m trying to lose weight.”

There is no clear scientific evidence to indicate that consuming recommended daily servings of reduced fat milk increases risk of overweight. In fact, there is some evidence to suggest that consuming at least three servings of milk, yogurt or cheese as part of a reduced calorie diet, may help people burn more fat and lose more weight than just cutting calories alone.²⁸ This observation needs to be confirmed in further studies.

Alternative Sources of Calcium

While milk and dairy foods are important sources of calcium in the United States, when they are not tolerated, or consumed due to personal or religious decisions, there are other foods that provide adequate calcium. Some individuals choose to avoid animal milk because they are following a vegan or total vegetarian diet; or are lactose intolerant; have allergies; wish to avoid cholesterol, or dislike dairy products. Furthermore, the emergence of animal rights and ethics college courses and the proliferation of information on vegetarian diets has led to increased interest in plant sources for calcium.⁴⁵

Sources of well absorbed calcium include calcium fortified soy milk and juice; calcium set tofu; soy beans and soy nuts; bok choy, broccoli, collard greens, Chinese cabbage, kale, mustard greens, and okra.⁴⁶ Other grains, beans, fruits, and vegetables can also contribute to calcium intake but cannot replace key calcium rich foods. Moreover, fortified foods such as soy milks, meat analogs, juices and breakfast cereals can add substantially to intakes of calcium, iron, zinc, vitamin B-12, vitamin D, and riboflavin.⁴⁵ However, alternative non-dairy food sources of calcium do not completely replace the nutrient package of fortified cow's milk. "Milk type" beverages such as soy, rice, or almond-based drinks are available in most California stores. Table 3, derived from the Dietary Guidelines, shows the amount of calcium in some non-dairy food sources of calcium. See Table 3 for non-dairy food sources of calcium.

While taking supplements increases one's nutrient intake and may be necessary for some individuals, it should not preclude the consumption of healthy foods rich in micronutrients. Many nutrients present in whole foods work in concert with each other, an effect not found when individual supplements are taken. Most calcium supplements do not contain the full package of nutrients found in foods like milk and dairy products.

Table 3: Alternate Food Sources of Calcium⁴

Non-Dairy Food Sources of Calcium ranked by milligrams of calcium per standard amount; also calories in the standard amount. The bioavailability may vary. (The AI for adults is 1,000 mg/day.)^a

Food, Standard Amount	Calcium (mg)	Calories
Fortified ready-to-eat cereals (various), one ounce	236-1043	88-106
Soy beverage, calcium fortified, one cup	368	98
Sardines, Atlantic, in oil, drained, three ounces	325	177

(Cont'd) Food, Standard Amount	Calcium (mg)	Calories
Tofu, firm, prepared with nigari ^b , a half cup	253	88
Pink salmon, canned, with bone, three ounces	181	118
Collards, cooked from frozen, a half cup	178	31
Molasses, blackstrap, one tablespoon	172	47
Spinach, cooked from frozen, a half cup	146	30
Soybeans, green, cooked, a half cup	130	127
Turnip greens, cooked from frozen, a half cup	124	24
Ocean perch, Atlantic, cooked, three ounces	116	103
Oatmeal, plain and flavored, instant, fortified, one packet prepared	99-110	97-157
Cowpeas, cooked, a half cup	106	80
Food Standard Amount	Calcium (mg)	Calories
White beans, canned, a half cup	96	153
Kale, cooked from frozen, a half cup	90	20
Okra, cooked from frozen, a half cup	88	26
Soy beans, mature, cooked, a half cup	88	149
Blue crab, canned, three ounces	86	84
Beet greens, cooked from fresh, a half cup	82	19

(Cont'd) Food Standard Amount	Calcium (mg)	Calories
Pak-choi, Chinese cabbage, cooked from fresh, a half cup	79	10
Clams, canned, three ounces	78	126
Dandelion greens, cooked from fresh, a half cup	74	17
Rainbow trout, farmed, cooked, three ounces	73	144

^a Both calcium content and bioavailability should be considered when selecting dietary sources of calcium. Some plant foods have calcium that is well absorbed, but the large quantity of plant foods that would be needed to provide as much calcium as in a glass of milk may be unachievable for many. Many other calcium-fortified foods are available, but the percentage of calcium that can be absorbed is unavailable for many of them.

^b Calcium sulfate and magnesium chloride.

Source: Nutrient values from Agricultural Research Service (ARS) Nutrient Database for Standard Reference, Release 17. Foods are from ARS single nutrient reports, sorted in descending order by nutrient content in terms of common household measures. Food items and weights in the single nutrient reports are adapted from those in 2002 revision of USDA Home and Garden Bulletin 72, Nutritive Value of Foods. Mixed dishes and multiple preparations of the same food item have been omitted from this table.

It should be noted that calcium absorption in green vegetables varies. Oxalic acid, which is found in spinach, rhubarb, chard, and beet greens binds with the calcium in those foods and reduces its absorption. These foods should not be considered good sources of calcium. However, calcium in other green vegetables, like kale, collard greens, Chinese mustard greens and Chinese cabbage flower leaves is well absorbed.^{46, 47} Also, fiber appears to have little effect on calcium absorption except the fiber in wheat bran, although somewhat variable effect.⁴⁸

Opportunities for Improvement

The USDA MyPyramid food guidance system currently recommends two to three cups of milk and milk products each day for individuals two years of age or older. Numerous research studies, as well as recommendations from the Dietary Reference Intakes suggest that a minimum of three cups of milk or milk equivalents should be consumed daily to ensure not only adequate intake of calcium, but other key nutrients such as magnesium, phosphorus and vitamin D.²⁸

Moreover, the Dietary Guidelines for Americans recommend that those who cannot tolerate or prefer not to consume milk and milk products should make sure they meet their calcium requirements by consuming non-dairy sources rich in calcium.⁴

The final report released in January 2005 by the committee preparing the Dietary Guidelines for Americans indicates the important role of low-fat dairy products in the diet, which is emphasized much more strongly than in previous releases of the guidelines.⁴ Given the high nutritional quality of dairy foods, particularly low-fat dairy products, emphasis should be placed on ensuring their adequate consumption in adults and children over two years of age. Children under the age of two years should not be given nonfat or low-fat milk as they need the nutrients in breast milk or infant formula during the first 12 months of life, or in whole milk, or its equivalent during the second year of life, for growth and development. Fat intake should then be subsequently decreased during the toddler years so that fat intake, averaged across several days, should provide approximately 30 percent of total energy.⁵

The following recommendations have been made by the American Dietetics Association in their position paper on vegetarianism.⁴⁵

- Offer both dairy and non-dairy calcium foods in child nutrition programs. In the United States National School Lunch Program (NSLP), few public schools regularly feature vegetarian menu items. School lunches are usually not adequate for vegans even when some vegan options are available because soymilk is typically only served as part of a school lunch in cases of lactose intolerance.
- Offer both dairy and non-dairy calcium foods to families enrolled in the Women, Infants and Children (WIC) Supplemental Nutrition Program. Provide WIC vouchers, coupons, or groceries to those who meet the income and nutritional risk criteria for the WIC program. Vouchers can be used for some foods acceptable to vegetarians, including fortified soy milk, as well as milk, calcium- fortified juices and cheese.
- Offer alternative food sources of calcium in other institutions and quantity food service organizations. As interest in non-dairy calcium food sources grows and because of the nutritional and health benefits of choosing a vegetarian diet; increased provision of recommended alternative food sources of calcium on a daily basis should be encouraged in other institutions, including colleges, universities, hospitals, restaurants, and publicly funded museums and parks.

Clinical Implications

- Milk and milk products can be part of a low-calorie diet as there are a wide variety of reduced fat, low-fat, and fat-free milk and milk products to choose from.
- One should not assume that all African Americans, Hispanics or Asian are lactose intolerant. If someone is lactose intolerant, milk and milk products do not always have to be eliminated from the diet.
- Individuals do not outgrow their need for the nutrients found in milk and milk products. Children, adults and seniors can benefit from the unique nutrient package and accompanying health benefits that milk and milk products provide. There are also viable alternatives if milk and milk products cannot be consumed as part of an overall healthy diet plan.
- The majority of adolescent and adult females do not meet recommended levels of calcium intake, in part because of their lower consumption of milk products relative to soft drinks and this may be a contributing factor to their increased risk for osteoporosis.⁸

Resources/Web Sites

Dairy Council of California – www.dairycouncilofca.org
Online Calcium Quiz – www.dairycouncilofca.org/activities/quiz/acti_calc_main.htm
Meals Matter – www.mealsmatter.org
California Milk Advisory Board – www.realcaliforniacheese.com
National Dairy Council – www.nationaldairycouncil.org
Foundation for Osteoporosis Research and Education – www.fore.org/index.html
California Department of Food and Agriculture – www.cdfa.ca.gov
National Osteoporosis Foundation – <http://www.nof.org/prevention/index.htm>
USDA Food Guide Pyramid – <http://mypyramid.gov>
The National Bone Health Campaign – www.cdc.gov/powerfulbones
California Project LEAN *Huesos Fuertes, Familia Saludable (Strong Bones, Healthy Family)* – www.californiaprojectlean.org
University of California Cooperative Extension – FSNEP Bone Health Curriculum (available Fall, 2006)

References

- ¹ MyPyramid, USDA. Inside the Pyramid. Available at <http://www.mypyramid.gov/pyramid/milk.html>. Accessed September 1, 2006.
- ² US Department of Agriculture, Agricultural Research Service. Data tables: Results From USDA's 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals and 1994-96 Diet and Health Knowledge Survey. 2000. [Online]. Available: www.barc.usda.gov/bhnrc/foodsurvey/home.htm. Accessed March 8, 2006.
- ³ US Department of Agriculture and US Department of Health and Human Services. *Nutrition and Your Health: Dietary Guidelines for Americans*. 5th ed. Home and garden bulletin 232. Washington, DC: US Government Printing Office, 2000.
- ⁴ US Department of Health and Human Services. *Dietary Guidelines for Americans*. 2005. [Online]. Available: <http://www.healthierus.gov/dietaryguidelines/>. Accessed March 8, 2006.
- ⁵ *Pediatric Nutrition Handbook*. Fifth Edition. American Academy of Pediatrics; 2004. 126.
- ⁶ Looker AC, Loria CM, Carroll MD, et al. Calcium intakes of Mexican Americans, Cubans, Puerto Ricans, non-Hispanic whites, and non-Hispanic blacks in the United States. *J Am Diet Assoc*. 1993;93:1274-9.
- ⁷ Novotny R, Boushey C, Bock MA, et al. Calcium intake of Asian, Hispanic and White youth. *J Am Coll Nutr*. 2003;22:64-70.
- ⁸ US Department of Health and Human Services. *Healthy People 2010* (Conference edition, in two volumes). Washington, DC: January 2000.
- ⁹ Lund LE & Ford-Keach P. *Osteoporosis Risk in California Counties*, 2001. County Health Facts # 04-07, Center for Health Statistics, California Department of Health Services.
- ¹⁰ Dairy Council of California. California Milk Standards: Nutrient Contribution of Fortified Fluid Milk. 2005. [Online]. Available: http://www.dairycouncilofca.org/dairy/dair_cal_main.htm. Accessed March 10, 2006.
- ¹¹ US Department of Agriculture National Nutrient Database for Standard Reference. Available at <http://www.nal.usda.gov/fnic/foodcomp/search>. Accessed July 21, 2006.

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- ¹² Cook AJ, Friday JE. Food mixture or ingredient sources for dietary calcium: Shifts in food group contributions using four grouping protocols. *J Am Diet Assoc.* 2003;103(11):1513-9.
- ¹³ Calvo MS, Whiting SJ, Barton CN. Vitamin D fortification in the United States and Canada: Current status and data needs. *Am J Clin Nutr.* 2004;80(6 Suppl):1710S-6S.
- ¹⁴ Berner LA. Defining the role of milk fat in balanced diets. *Adv. Food Nutr. Res.* 1993;37:131-257.
- ¹⁵ Murphy SP, Allen LH. Nutritional importance of animal source foods. *J Nutr.* 2003; 133(11 Suppl 2):3932S-35S.
- ¹⁶ Appel LJ, Moore TH, Obarzanek E, et al. The DASH collaborative research group: A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med.* 1997; 336:1117-24.
- ¹⁷ Curhan GC. Dietary calcium, dietary protein and kidney stone formation. *Miner Electrolyte Metab.* 1997;23:261-4.
- ¹⁸ Svetkey LP, Simmons-Morton D, Vollmer WM, et al. Effects of dietary patterns on blood pressure: Subgroup analysis of the dietary approaches to stop hypertension (DASH) randomized clinical trial. *Arch Intern Med.* 1999;159:285-93.
- ¹⁹ Shin MH et al. Intake of dairy products, calcium, and vitamin D and risk of breast cancer. *Journal of the National Cancer Institute.* 2002;94(17):1301-11.
- ²⁰ Wu K, Willett WC, Fuchs CS, et al. Calcium intake and the risk of colon cancer in women and men. *J Natl Cancer Inst.* 2002;94:437-46.
- ²¹ Miller G, Jarvis J, McBean L. *Handbook of Dairy Foods and Nutrition.* Boca Raton, FL: CRC press; 2000.
- ²² Abrams SA. Normal acquisition and loss of bone mass. *Horm Res.* 2003 60 Suppl 3:71-6.
- ²³ Norman AW. Sunlight season, skin pigmentation, vitamin D, and 25-hydroxyvitaminD: Integral components of vitamin D endocrine system. *Am J Clin Nutr.* 1998;67:1108-10.
- ²⁴ Tylavsky FA, Ryder KA, Lyytikainen A, et al. Vitamin D, parathyroid hormone, and bone mass in adolescents. *J Nutr.* 2005;135:2735S-8S.
- ²⁵ Holick MF. The vitamin D epidemic and its health consequences. *J Nutr.* 2005; 135:2739S-48S.

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- ²⁶ Wharton B, Bishop N. Rickets. *The Lancet*. 2003;362:1389-1400.
- ²⁷ Dietary Supplement Fact Sheet: National Institutes of Health. Office of Dietary Supplements. NIH Clinical Center. Available at: <http://dietary-supplements.info.nih.gov/factsheets/vitamind.asp#4>. Accessed September 21, 2006.
- ²⁸ Institute of Medicine. Dietary reference intakes for calcium, phosphorus, magnesium, Vitamin D, and fluoride. National Academies Press;1997.
- ²⁹ Fleming KH, Heimbach JT. Consumption of calcium in the United States: Food sources and intake levels. *J Nutr*. 1994;(suppl):1426S-30S.
- ³⁰ Osteoporosis Prevention, Diagnosis and Therapy. NIH Consensus Statement online. Mar 27-29, 2000;17(1): 1-36.
- ³¹ Ray NF, Chan JK, Thamer M, et al. Medical expenditures for the treatment of osteoporotic fractures in the United States in 1995: Report from the National Osteoporosis Foundation. *J Bone Miner Res*. 1997;12:24-35.
- ³² Max W, Sinnot P, Kao C, et al. The burden of osteoporosis in California, 1998. *Osteoporos Int*. 2002;13:493-500.
- ³³ Wang MC, Dixon LB. (2005) Socioeconomic Influences on bone health in postmenopausal women: Findings from NHANES III, 1988-94. *Osteoporosis International*. 2006;17:91-98.
- ³⁴ McCarron DA, Heaney RP. Estimated healthcare savings associated with adequate dairy food intake. *American Journal of Hypertension*. 2004;17:88-97.
- ³⁵ Cook AJ & Friday JE. Pyramid servings intakes in the United States 1999-02, 1 Day. CNRG Table Set 3.0;2005. Available at www.ba.ars.usda.gov/cnrg. Accessed October 20, 2006.
- ³⁶ Briefel RR, Johnson CL. Secular trends in dietary intake in the United States. *Annu Rev Nutr*. 2004;24:401-31.
- ³⁷ Wooten WJ, Price W. The role of dairy and dairy nutrients in the diet of African Americans. *J National Med Assoc*. 2004;Suppl 96(12):1S-31S.
- ³⁸ Foerster S, et al. California diet practices survey: Overall Trends in Healthy Eating Among Adults, 1989-97. A Call to Action, Part 2, California Department of Health Services, Public Health Institute, 1999.

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- ³⁹ Dixon LB, Sundquist J, Winkleby M. Differences in energy, nutrient, and food intakes in a United States sample of Mexican-American women and men: Findings from the Third National Health and Nutrition Examination Survey, 1988-94. *Am J Epidemiol.* 2000;152:548-57.
- ⁴⁰ Pribila BA, Hertzler SR, Martin BR, et al. Improved lactose digestion and intolerance among African-American adolescent girls fed a dairy-rich diet. *J Am Diet Assoc.* 2000; 100:524-28.
- ⁴¹ Suarez FL, Savaiano D, Arbisi P, et al. Tolerance to the daily ingestion of two cups of milk by individuals claiming lactose intolerance. *Am J Clin Nutr.* 1997;65: 15026.
- ⁴² Host A. Frequency of cow's milk allergy in childhood. *Ann Allergy Asthma Immunol.* 2002;89(6 Suppl 1):33-7.
- ⁴³ Frary CD, Johnson RK, Wang MQ. Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food groups. *Journal of Adolescent Health.* 2004;34:56-63.
- ⁴⁴ LAUSD. Nutritional assessment of foods sold in Los Angeles Unified School District (LAUSD) Schools. 2004. [Online]. Available at http://www.farmtoschool.org/ca/nutrit_assmnt_laUSD.pdf. Accessed March 8, 2006.
- ⁴⁵ Position of the American Dietetic Association and Dieticians of Canada: Vegetarian diets. *JADA.* 2003;103(6):748-65.
- ⁴⁶ Weaver CM, Plawecki KL. Dietary Calcium: Adequacy of a vegetarian diet. *Am J Clin Nutr.* 1994; 59(suppl):1238S-41S.
- ⁴⁷ Weaver CM, Heaney RP, Nickel KP, et al. Calcium bioavailability from high oxalate vegetables: Chinese vegetables, sweet potatoes, and rhubarb. *J Food Sci.* 1997;62:524-5.
- ⁴⁸ Weaver CM, Heaney RP, Martin BR, et al. Human calcium absorption from whole wheat products. *J Nutr.* 199;121:1769-75.