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Calcium & Vitamin D

Calcium is necessary for your child's bones to grow strong. Low calcium intakes may be an important risk factor for fractures in children. Dietary calcium spares, or protects, the calcium in your bones. If you don't get enough calcium from the proper diet, your body pulls the calcium you need from your bones. If this process continues, your bones become weak and break easily. This leads to the crippling bone disease in later life called "osteoporosis."

Milk provides important amounts of protein and it is many children's main source of calcium and vitamin D. Children need about 24 ounces of milk every day to provide adequate calcium.

To help your child get enough calcium, use more dairy products or calcium-rich foods in your cooking. The most available source of calcium in our food supply comes from milk and foods made with milk.

Calcium-fortified orange juice provides the same amount of calcium as milk. However, OJ does not contain vitamin D, or provide the protein that milk provides.

Ways To Include Calcium In The Diet

1. You can make milk and/or orange juice the only mealtime beverage except for water.
2. You must not insist, "You have to drink your milk or OJ." And you must not use leverage: "You have to drink your milk/OJ before you can have more spaghetti." Also, you shouldn't play games: "I bet I can drink my milk/OJ faster than you can." These tactics give children the clear message that they should not like milk/OJ. Children reason, "If it's so good, how come they have to do all that to get me to drink it?"
3. Most children go through a stage when they do not drink milk. For many, it is when they first are weaned from the bottle. Don't panic and put your child back on the bottle. Just wait. They will start to drink milk again.

Calcium Requirements

<u>Age</u>	<u>Mg of Calcium</u>
0-6 months	400
6 months to 1 year	600
1 through 3 years	800
4 through 5 years	800
6 through 10 years	800-1200
11 through 18 years	1200-1500

Calcium Supplements

For children who do not receive enough calcium from their diet, calcium supplements should be used. Supplements (500-600 mg) are available as tablets (Tums & Viativ Soft Chews), liquid and chewables (over the counter)).

The body absorbs some forms better than others. Supplements in the form of calcium lactate or calcium carbonate are reasonably well absorbed. Avoid bone meal and dolomite (these contain lead and other trace elements that are not good for your child).

Calcium supplements come with or without vitamin D. The recommended daily allowance for vitamin D is 400 IU per day. Eight ounces of milk will supply 400 IU of Vitamin D.

Different Ways To Use Dairy Products

- **Make fortified milk:** Combine 2 cups of liquid milk and 1/3 cup of powdered milk. Cool in refrigerator before using. Substitute for regular milk. One cup of fortified milk contains the calcium and other nutrients of 1 and 1/2 cups of regular milk.
- **Add flavorings to milk:** strawberry, chocolate, soft drink powders. Make eggnog, cocoa, and milkshakes.
- **Make a "smoothie":** Blend milk with fruit to make a beverage much like a milkshake.
- **Use milk in some cooking instead of water:** for example, in cooked cereal, soups, and gravies.
- **Use powdered milk when you bake:** Add 2 tablespoons of powdered milk to each cup of flour.
- Store and use for all baking.
- **Add powdered milk to other cooking**
- **Ground beef:** Add 1/2 cup powdered milk for each pound of beef. Add water.
- **Casseroles:** Add 2 tablespoons of powdered milk for each cup of casserole.
- **Vegetables:** Make a cream sauce using powdered milk.
- **Make desserts with fortified milk:** for example, custard, pudding, rice pudding, pumpkin custard, and cheesecake.
- **Use cheese in cooking:** for example, macaroni and cheese, lasagna, tacos, grilled cheese
- Use vegetables high in calcium (see previous page)
- **Use beans and peas:** for example, bean or split pea soup, chili, three-bean salad, pea-pickle-cheese salad, and kidney beans with cheese.
- **Use leafy, green vegetables** in salads, soups, and casseroles.

What If My Child Is Lactose Intolerant?

Children with lactose intolerance can drink small amounts of milk without discomfort. Other alternatives include the use of other dairy products, such as solid cheeses and yogurt, which may be better tolerated than milk. Lactose-free skim milk (Lactaid) is available. Lactrase capsules can be given with milk products to help digest lactose. One to 2 capsules can be given with milk or dairy products or the capsule contents can be sprinkled on dairy products before eating. Increasing the intake of nondairy products, such as vegetables, may be helpful, as may the use of calcium-supplemented foods.

Common Foods Containing Calcium

Calcium contents vary. Check nutrition labels. Calcium intakes on food labels are indicated as a percentage of the "daily value" in each serving. This daily value is currently set as 1000 mg/day. Good sources of calcium are those foods, which provide 20-30% of the daily value for calcium.

Milk (skim), orange juice with calcium, and low fat yogurt contain 300 mg of calcium per cup (8 ounces). Vegetables have a low calcium content. Therefore, relatively large servings are needed to equal the total intake achieved with typical servings of dairy products.

FOODS	SERVING SIZE	CALCIUM CONTENT (MG)	FOODS	SERVING SIZE	CALCIUM CONTENT (MG)
BREADS			FATS		
Hamburger/hot dog roll	1 roll	54	Margarine, regular, hard, unsalted	1 tsp	0.8
English muffin, plain	1 muffin	45	Mayonnaise, soy, commercial	1 tsp	0.6
White bread	1 slice	32	Shortening, vegetable, soybean/cottonseed	1 tsp	0
Whole wheat bread	1 slice	20			
Hard roll	1 roll	12	Olive oil	1 tsp	0
Vanilla wafer cookies	5 cookies	8	Vegetable oil, corn	1 tsp	0
Italian bread	1 slice	5			
Graham crackers	1 cracker	3	FRUITS		
Saltine crackers	1 cracker	0.5	Oranges, raw, all varieties	1 orange	53
Noodles (macaroni)	1/2 cup	15	Cherries,* sweet	1/2 cup	18
CEREALS			Pears, raw, Bartlett, unpeeled	1 pear	18
Nabisco Cream of Wheat®, instant	1 cup	59	Pineapple,* w/juice	1/2 cup	18
Oatmeal, cooked	1 cup	19	Apricots	1/2 cup	14
Kellogg's Raisin Bran®	1/2 cup	10	Grapefruit	1/2 cup	14
Nabisco Shredded Wheat®, biscuit	1 cup	10	Apples, raw, unpeeled	1 apple	10
Nabisco Cream of Rice®	1 cup	7	Strawberries, raw, whole	1/2 cup	10
Farina Mills Farina®	1 cup	5	Bananas, raw, peeled	1 banana	7
Kellogg's Rice Krispies®	1/2 cup	2	Apples, raw, peeled	1 apple	5
Puffed Wheat	1/2 cup	2	Peaches,* lite syrup	1/2 cup	5
Kellogg's Corn Flakes®	1/2 cup	0.3	Applesauce	1/2 cup	4
			Blueberries, raw	1/2 cup	4
DAIRY			Peaches, raw	1 peach	4
Skim milk	1 cup	302	JUICES		
Whole milk	1 cup	291	Pineapple*	3.5 ozs	19
Buttermilk	1 cup	285	Prune, canned or bottled	3.5 ozs	13
Egg, whole, raw, large	1 egg	25	Lemon, canned or bottled	3.5 ozs	12
Sour cream, cultured	1 tbsp	17	Tomato*	3.5 ozs	10
Cream, light	1 tbsp	14	Orange (with calcium)	8 ozs	300
Cottage cheese, uncreamed	1 oz	9	Apple, canned or bottled	3.5 ozs	8
Butter, regular	1 tbsp	3	Apricot nectar*	3.5 ozs	8
Yogurt (low fat)	1 cup	300	Grapefruit,* unsweetened	3.5 ozs	8
Cheese (natural or processed)	1 oz	200	Pear nectar*	3.5 ozs	5
			Grape*	3.5 ozs	4
			Cranberry, bottled	3.5 ozs	3

* indicates food is canned

Vitamin D

Recent studies show that most children are not getting enough of this essential vitamin. We're seeing evidence of vitamin D deficiency in infants and children of all ages as well as adolescents and adults. There is evidence that vitamin D not only makes for strong bones, but may play a role in preventing some chronic diseases later in life, including those involving the immune and cardiovascular systems.

The body needs vitamin D to absorb calcium. Calcium is needed to build and maintain strong bones and teeth. Without enough vitamin D, your body can't form enough of the active vitamin D hormone. This in turn leads to insufficient calcium absorption from the diet. In this situation, the body must take calcium from its stores in the skeleton, which weakens existing bone and prevents the formation of strong, new bone. Vitamin D prevents rickets in children and osteomalacia in adults, which are skeletal diseases that result in defects that weaken bones.

You can get vitamin D in three ways: through the skin, from the diet, and from supplements.

Exposure to sunlight

Exposure to sunlight (ultraviolet rays) stimulates Vitamin D production in the skin. Season, latitude, time of day, cloud cover, smog, and sunscreens affect the amount of sunlight your skin receives. For example, in Boston the average amount of sunlight is insufficient to produce significant vitamin D synthesis in the skin from November through February. Sunscreens with a sun protection factor of 8 or greater will block UV rays that produce vitamin D, but it is still important to routinely use sunscreen whenever sun exposure is longer than 10 to 15 minutes. It is especially important for individuals with limited sun exposure to include good sources of vitamin D in their diet.

If children can make Vitamin D when being exposed to the sun, what is wrong with just letting them play outside each day?

Direct exposure to sunlight is known to increase a child's risk of getting skin cancer, so sun exposure without sunscreen is discouraged. Infants under 6 months of age should have no direct sun exposure.

How Much Vitamin D is Recommended?

The American Academy of Pediatrics now recommends that all children, beginning in the first two months of life, receive **at least** 400 IU of Vitamin D each day.

32 ounces each day of infant formula, cow's milk and soy milk fortified with Vitamin D will provide the required amount of vitamin D.

Children who are exclusively breastfeeding or toddlers who aren't drinking much milk will also need Vitamin D supplements (available as Vitamins A,D,C or Vitamin D drops).

Adolescents should receive at least 800 IU of Vitamin D (food source, multivitamin, Vitamin D supplement)

Is There a Danger to Too Much Vitamin D?

Consuming too much vitamin D through diet alone is not likely unless you routinely consume large amounts of cod liver oil. It is much more likely to occur from high intakes of vitamin D in supplements. The Food and Nutrition Board of the Institute of Medicine considers an intake of 1,000 IU for infants up to 12 months of age and 2,000 IU for children, adults, pregnant, and lactating women to be the **tolerable upper intake level**.

There is a high health risk associated with consuming too much vitamin D. Vitamin D toxicity can cause nausea, vomiting, poor appetite, constipation, weakness, and weight loss. It can also raise blood levels of calcium causing mental status changes such as confusion. High blood levels of calcium also can cause heart rhythm abnormalities. Calcinosi, the deposition of calcium and phosphate in soft tissues like the kidney can be caused by vitamin D toxicity.

What Blood Test is Used to Measure Vitamin D Levels

1. **Lab test-** 25 Hydroxy-Vitamin D
2. 25 Hydroxy-Vitamin D is the major circulating form that is used to determine Vitamin D status. Can be drawn at any time of day as serum levels stay fairly stable.
 - Normal Vitamin D level: > 30 ng/ml
 - Vitamin D insufficiency: 20 to 29 ng/ml.
 - Vitamin D deficiency: < 20 ng/ml

Selected Food Sources of Vitamin D

The following table suggests dietary sources of vitamin D. As the table indicates, fortified foods are a major source of vitamin D. Breakfast cereals, pastries, breads, crackers, cereal grain bars and other foods may be fortified with 10% to 15% of the requirement for vitamin D. It is important to read the nutrition facts panel of the food label to determine whether a food provides vitamin D.

One cup of vitamin D fortified milk supplies about one-fourth of the estimated daily need for this vitamin for adults. Although milk is fortified with vitamin D, dairy products made from milk such as cheese, yogurt, and ice cream are not fortified with vitamin D. Only a few foods naturally contain significant amounts of vitamin D, including fatty fish and fish oils.

<u>Food sources of Vitamin D</u>	
<u>Food</u>	<u>Vitamin D* IU</u>
Cod liver oil, 1 tablespoon	1360
Liver, beef, cooked, 3 1/2 oz	30
<u>Fish & Shellfish</u>	
Pacific oysters, 3.5 oz	640
Salmon, pink, canned, 3 oz	530
Salmon, Atlantic, farmed, cooked, 3.5 oz	360
Mackerel, cooked, 3 1/2 oz	345
Sardines, canned in oil, drained, 3 1/2 oz	270
Tuna, light, canned, 3 1/2 oz	236
Eel, cooked, 3 1/2 oz	200
Milk, Vit D fortified (skim,1%,2%) 8 oz	98
Margarine, vitamin D fortified, 1 tablespoon	60
Cereal fortified with Vit D, 1 cup	40
Egg yolk, cooked, 1 large	25
Human milk, 30 ounces	20-60
Yogurt, 1 cup	4
Cheese - Swiss, 1 oz	22
Cheese- Cheddar, 1 oz	3.5
* Recommended intake 400-800 IU per day	

Forms of Vitamin D Supplements

There are 2 forms of vitamin D that have been used as supplements: vitamin D₂ (ergocalciferol, which is plant derived) and vitamin D₃ (cholecalciferol, which is fish derived). Either form can be used.

Treatment of Low Vitamin D Levels

- 50,000 IU /cap of Vit D --1 capsule once a week for 8 weeks or
- 8,000 IU/cc of Vit D: 6 cc once a week for 8 weeks

**Continue above dose until Vit D level is repeated (even if > 8 weeks later)
Check Vit D level after 8 weeks -- if level still low, repeat 8 week course**

Maintenance of patients once Vit D level > 30 ng/ml

1. 50,000 IU of Vit D₂ once a month (prescription)
2. 8,000 IU/cc of Vit D: 6 cc once a month
3. 1000-2000 IU per day (OTC)