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FCS8145

Prevent Osteoporosis: Catch the Silent Thief[1]

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Why the Concern?

Osteoporosis has been called the "silent thief." It robs bone from women (and some men) with no outward signs. Eventually, even a minor stumble might cause a wrist or hip fracture. Spine fractures can result in the stooped posture known as "dowager's hump."

Osteoporosis means porous bones—bones that have so many openings (pores) that they can easily crush or break. In the United States, more than 40 million people either have osteoporosis or are at high risk because they have low bone mass. By 2020, one in two Americans over age 50 is expected to have osteoporosis of the hip or be at high risk for the condition.

About half of women and one quarter of men over age 50 will have bone fractures caused by osteoporosis in their lifetimes. Many of these fractures, especially in the spine and hip, cause pain, disability, and loss of independence. Of patients who fracture their hips, fewer than 50 percent ever recover "normal" function and about one quarter of people age 50 and over who have a hip fracture will die in the following year.

In the United States, osteoporosis causes approximately 1½ million fractures each year, mostly in the hip, spine, and wrist. Medical costs of fractures, including nursing home care, were estimated at $22 billion in 2008, and are expected to rise to $25 billion by the year 2025. Other impacts of osteoporosis include the following:

- Loss of income
- Temporary loss of independence
- Loss of productivity
- Stress on family/caregivers

Osteoporosis is similar to high blood pressure in that it displays no symptoms until a complication occurs. There is no cure, so prevention is essential to combat this disease.

Bone—A Mineral Warehouse

Often bone is thought of as static and unchanging. Actually, it constantly turns over, with new bone formed and existing bone broken down. When bone formation and breakdown are balanced, the amount of bone mass stays about the same.

During growth, more bone is formed than is lost. When people reach their mid-thirties, breakdown tends to exceed formation, and there is a slow, gradual loss of bone from then on. In women, the rate of bone loss speeds up during menopause. After about age 65, the rate of loss slows down. Women who stop menstruating because of excessive exercise or eating disorders also lose bone.

Since bone loss is certain, the more people have to begin with, the more they will have as they get older. Everyone can make choices early in life to help build bone mass before the loss begins. As we get older, we can slow down bone loss with positive lifestyle choices. Throughout life, diet and exercise are two things we all can control to reduce risk of osteoporosis.

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Who Will Get Osteoporosis?

Osteoporosis is known as a "multifactorial" disease, which means that many factors contribute to a person's risk of getting the disease. Some osteoporosis risk factors are "innate," or beyond a person's control. Others are lifestyle-related and can be controlled. People make decisions every day that can reduce their risk for developing osteoporosis.

Risk factors that cannot be controlled are gender, ethnicity, family history, menstrual status, body build, and certain medical conditions.

Although women are much more likely to get osteoporosis than men, men account for about 25% of cases. Black and Hispanic individuals are less likely to develop osteoporosis than whites or Asians. Those with a family history of the disease and people with a thin body build have a higher risk. Higher body weight seems to protect individuals against osteoporosis, although the mechanism is unclear. Because of the increased risk for other conditions such as diabetes and heart disease, weight gain is not recommended to protect against osteoporosis.

Several medical conditions increase the risk of osteoporosis. Persons with diabetes and thyroid disease and those taking certain medications are at high risk for this bone-robbing disease (see Table 1).

Table 1. Risk Factors for Osteoporosis.

Innate	Lifestyle-related
Older age	Too little vitamin D (from the diet or sun exposure)
Female	Too little calcium in diet
Caucasian or Asian	Too little exercise
Family history	Nicotine use
Menopause	Excessive alcohol use
Hysterectomy	Medications (steroids, anti-convulsants, antacids with aluminum, thyroid extract)
Amenorrhea*	
Petite body build (weight under 127 pounds)	
Hormone or chemical imbalance (such as diabetes or thyroid disease)	
* Absence of menstrual period	

Even people who have many risk factors can decrease their risk of osteoporosis with positive lifestyle choices. These include getting enough calcium, vitamin D, and weight-bearing exercise, not smoking, and avoiding excess alcohol.

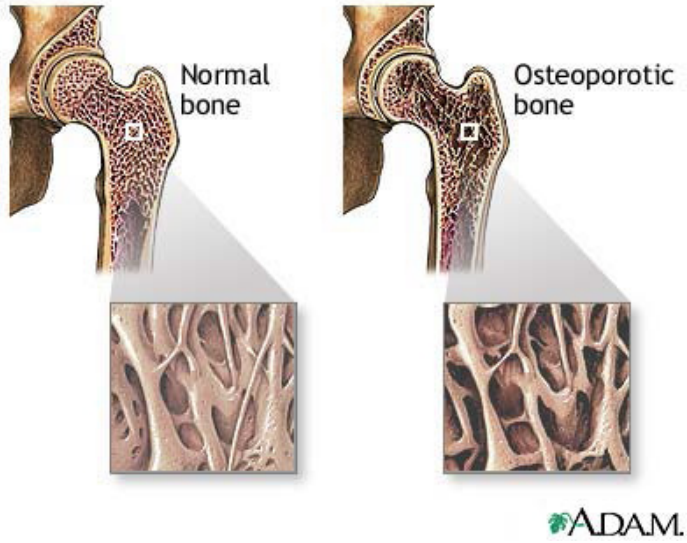

Figure 1. Osteoporosis means porous bones—bones that have so many openings (pores) that they can easily crush or break.

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Calcium for Building Bones

Because bone is constantly breaking down and rebuilding, we need to get enough calcium and other minerals in our diets for rebuilding our bones. A diet that provides adequate calcium, magnesium, and vitamin D is critical for bone health.

Bones and teeth contain 99 percent of the calcium in the body. The other one percent is found in the blood and other body fluids where calcium helps in blood clotting and nerve transmission. Calcium is stored in the bones and drawn upon when the daily intake is too low to meet the body's needs.

The current daily recommendation for calcium intake is 1,300 milligrams for children ages nine to 18 years, 1,000 milligrams for women age 19 to 50 and men age 19 to 70, and 1,200 mg for women 51 and older and men over 70 years.

Getting Calcium from Foods

The best way to get enough calcium is to eat a variety of foods that are good sources of calcium. Including them in meals and snacks can help meet calcium needs. Table 2 shows the calcium content of some common foods.

Dairy foods are excellent sources of calcium. To keep intake of fat, saturated fat, and cholesterol low, choose low-fat (1%) or fat-free milk, yogurt, and cheese.

Table 2. Calcium in Selected Foods.

Food	Calcium (mg)	Food	Calcium (mg)
Collard greens (cooked and drained), 1 cup	350	Mozzarella cheese, part skim, 1 ounce	220
Sardines with bones (drained), 3 ounces	325	Yogurt (low-fat), 1 cup fruit-flavored	200
Parmesan cheese, grated, 1 ounce	310	Cheddar cheese, 50% less fat, 1 ounce	200
Low-fat milk (1%), 1 cup	300	Pink salmon, canned with bones, 3 ounces	180
Fat-free milk, 1 cup	300	American cheese, (processed), 1 ounce	160
Yogurt (low-fat), 1 cup plain	300	Orange juice, fortified, ¾ cup	150
Chocolate milk (1%), 1 cup	290	Creamed cottage cheese (1%), 1 cup	140
Whole milk, 1 cup	275	Tofu, firm (calcium fortified), 2 ounces	110
Buttermilk (1%), 1 cup	250	Ice cream, low-fat, vanilla, ½ cup	100
Yogurt (low-fat), 1 cup vanilla-flavored	250	Kale (cooked and drained), 1 cup	95
Swiss cheese, 25% less fat, 1 ounce	250	Nonfat dry milk, 1 Tbsp.	60
Turnip greens (cooked and drained), 1 cup	250	Broccoli (cooked and drained), 1 cup	60
Source: Food Processor SQL, Version 10.7. ESHA Research, Inc., 2010			

Other foods, such as leafy green vegetables, also are good sources of calcium. Choose broccoli, collards, turnip greens, mustard greens, cabbage, and kale. Canned salmon (including the mashed bones) and sardines are high in calcium too.

Oxalic acid in some green vegetables and phytic acid in whole-grain foods interfere with calcium absorption. Therefore, the calcium in whole grains and spinach, chard, and beet greens is less available than calcium from other food sources.

Table 3 provides examples of how to include calcium-rich foods in meals and snacks. People who have high calcium needs and those who avoid dairy foods may need to take a calcium supplement.

Table 3. Calcium-Rich Foods in Meals and Snacks.

Meal	Food	Calcium (mg)
DAY 1		
Breakfast	1% milk , ¾ cup, for cereal	225
Lunch	Whole milk, 3 Tbsp (added to coffee) Canned salmon, 2 ounces	50 120
Snack	Vanilla low-fat yogurt, 1 cup	250
Dinner	Cooked turnip greens, ¾ cup Fat-free milk, ¾ cup	190 225
TOTAL		**1060**
DAY 2		
Breakfast	Waffles, fortified, 2 Orange juice, fortified, ¾ cup	225 150
Lunch	Swiss cheese, 1 ounce (on sandwich)	250
Dinner	Broccoli spears, 1 cup Fat-free milk, ¾ cup	60 225
TOTAL		**910**

Figure 2. Dairy foods, such as milk, yogurt, and cheese are good sources of calcium. Choose low-fat or fat-free dairy products to limit the intake of fat in your diet.

Credits: Greschoj, http://bit.ly/AqiqsZ

What about Supplements?

Calcium supplements are available for those who do not get enough calcium from foods. The two main forms of calcium supplements are citrate and carbonate. The absorption is similar between the two. However, calcium citrate is better absorbed by people who have decreased stomach acid, such as older adults or people taking antacids.

It is a good idea to check with your doctor or pharmacist before taking any supplements. There are risks for some

people who take high levels of calcium. Your doctor or pharmacist can also help you decide what type of calcium supplement is right for you.

For best absorption, take calcium supplements with food. It is also a good idea to consume calcium from food or supplements throughout the day rather than all at one time. The body can only absorb about 500 mg of calcium at a time.

To be absorbed, calcium tablets must dissolve in the stomach. It is best to purchase your supplements from a reliable manufacturer to ensure you are getting a quality supplement. A USP (United States Pharmacopeia) symbol on the bottle means the supplement will dissolve and also will be free from lead.

Some foods naturally low in calcium, like orange juice, are available with added calcium. These fortified foods are an alternative for people who limit other calcium sources. See examples in Tables 2, 3, and 4.

Nutrition labels list the calcium content of food. Note that the percent Daily Value on the label is based on a Daily Value of 1000 milligrams (see Table 4).

Table 4. Foods Supplemented with Calcium.

	% Daily Value	Calcium (mg)
Cereal, calcium-fortified, 1 cup	10–100%	100–1000
Orange juice, calcium-fortified, ¾ cup	26–45%	260–450
Soy beverage, calcium-fortified, 1 cup	8–50%	80–500

Vitamin D

Vitamin D promotes calcium absorption and is important for bone growth and maintenance. This vitamin is made in the skin after exposure to sunlight and is added to fortified milk, cereals, and several other foods.

The recommended daily intake for vitamin D is 15 micrograms (µg) (600 IU) for children one year and older and for all adults up to 70 years. Men and women over 70 should get 20 µg (800 IU) a day. For persons with light skin and those living in warm climates, spending 10–15 minutes in the sun each day (without sunscreen) can help meet vitamin D needs.

Although some people may have less than optimal levels of vitamin D in their bodies, blood levels that indicate vitamin D sufficiency or deficiency are not yet well defined. The dietary recommendations provided here were recently

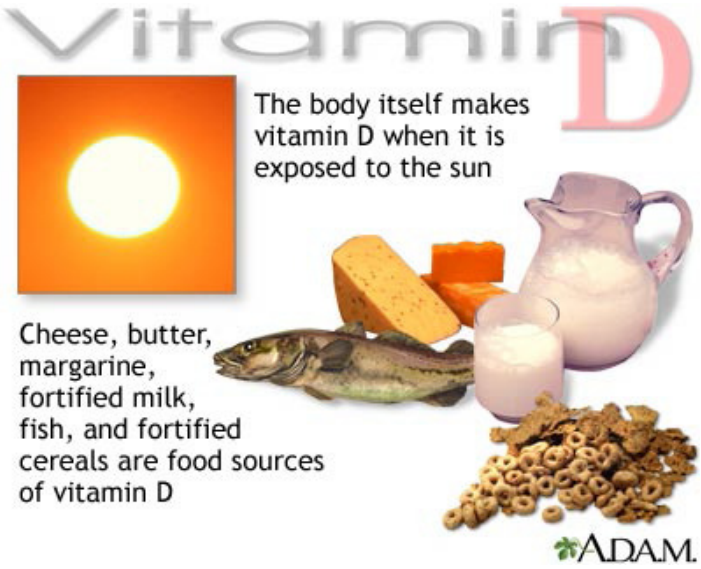

Figure 3. Vitamin D promotes calcium absorption and is important for bone growth and maintenance.

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updated by the Institute of Medicine. Those older adults who are less efficient at making vitamin D from sun exposure, those living in institutions, or those who have dark skin pigmentation may have a greater risk for getting inadequate vitamin D and need to be sure to get the recommended intake from their diets.

Getting enough calcium and vitamin D helps build bone and decrease risk for osteoporosis. Eating a wide variety of foods from all food groups in recommended amounts will also ensure consumption of other minerals, including magnesium, that promote bone health. More information about nutrition and diet recommendations can be found at http://ChooseMyPlate.gov.

Physical activity, including weight-bearing exercise, is the next lifestyle factor that promotes bone health.

Move It or Lose It

Exercise is important in preventing osteoporosis. The expression "Move it or lose it" can apply to bones.

During body movement, muscles pull against bones. The resulting stress on the bone causes minerals (chiefly calcium) to be deposited in the bone. This makes the bone denser and stronger.

The best type of exercise for building bones is weight-bearing exercise. The exercise most often recommended is brisk walking. Strength training with free weights or resistance machines also helps to build bones.

Figure 4. Following a healthy diet and getting regular exercise are two keys to building strong bones to prevent osteoporosis.

Credits: Cris Watk, http://bit.ly/pe7Dle

Sticking to an exercise program for the long term can be a challenge for some people. Choosing an enjoyable exercise plan is important. Walking with a friend in a pleasant park or joining a gym, for example, may help encourage an active lifestyle. Make exercise a priority, maybe even mark it on a calendar.

Some ideas for incorporating physical activity into the day include the following:

- Walk during lunch and other breaks at work.
- Park the car at the far end of parking lots at work and when shopping.
- Take the stairs instead of elevators or escalators when possible.
- Do some errands on foot.
- Walk to a co-worker's office instead of using e-mail or texting to communicate.
- Relax with a favorite workout or sport instead of in front of the television.
- When watching television, walk, jog, dance, or do stretches during commercials. Keep a light free-weight or a filled water bottle next to the chair/sofa and do some weight lifting while watching TV.

It's important to choose activities that will not increase the risk of fracture from a fall or other injury. People who have not been active for awhile should start slowly; check with a doctor before beginning a new exercise program.

Advice for Teens and Preteens

Age is another significant factor in bone formation. Bone mass increases during growing periods, and peaks at about age 30. It is especially important for teen and preteen girls to live a lifestyle that promotes bone health to help build bones for the predictable postmenopausal bone loss.

Because bone building requires calcium "building blocks," teens and preteens need to have an adequate calcium intake. This age group is likely to be diet conscious and may avoid dairy foods thinking that they are "fattening." Teen and preteen girls should be encouraged to consume a variety of low-fat or fat-free calcium and vitamin D dietary sources. Eating a variety of fruits and vegetables will provide other needed minerals, such as magnesium, that also support bone health.

Teens and preteens also should have opportunities for vigorous exercise every day, whether at school or in after-school and weekend activities. Weight-bearing exercise will help build strong bones.

Hormone Therapy

During the childbearing years, a woman's body produces the hormones estrogen and progesterone. At menopause, production of these hormones drops. The drop in estrogen contributes to bone loss as well as the hot flashes and other symptoms associated with menopause. Hormone therapy provides relief for some women who have severe symptoms when going through menopause.

Hormone therapy can involve use of estrogen alone or in combination with progesterone or the synthetic progestin. Estrogen therapy alone may increase the risk of endometrial cancer. Estrogen combined with progestin lowers the risk of endometrial cancer, but when the two hormones are used together, menstrual bleeding resumes.

Estrogen/progestin therapy causes other side effects, including swelling, cramping, nausea, and breast tenderness. Long-term health risks include increased risk of breast cancer, stroke, blood clots, and heart disease.

When considering estrogen or estrogen/progestin therapy, it's important to discuss the risks and benefits with a doctor.

Debating a Dietary Dilemma

As we learn more about osteoporosis, there are more questions that need to be answered. Scientists still don't agree on appropriate treatments for osteoporosis. Prevention seems to be the best approach.

A healthful diet that includes getting enough calcium, vitamin D, and other nutrients, exercising regularly, limiting alcohol intake, and not smoking are wise practices for

general health and can help prevent osteoporosis. Hormone therapy for menopausal women is still controversial because the risks may outweigh the benefits for some women.

Another aspect of the dilemma is that dairy foods, the main sources of calcium in the American diet, are not consumed by many ethnic groups. This may be because of cultural preferences and/or lactose intolerance. Nutrition education that is sensitive to cultural differences can help people make food selections that meet nutritional needs.

Summary

Osteoporosis is a serious and common disease that has many causes. Enjoying a healthy lifestyle that includes healthful food choices and physical activity can help people build and keep strong bones for a lifetime.

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Calcium-Rich Recipes

Morning Shake

1 cup 1% milk (or fat-free)
1 cup sliced frozen banana
3 tablespoons frozen orange juice concentrate, fortified with calcium
½ teaspoon pure vanilla extract

Preparation:
Place milk, banana, orange juice, and vanilla into the container of an electric blender. Cover and blend until smooth. Serve at once. Makes two servings.

Each serving provides approximately:

Calories: 150
Fat: 1.4 grams
Calcium: 200 milligrams

Corn Chowder

1 tablespoon vegetable oil
2 tablespoons finely diced celery
2 tablespoons finely diced onion
2 tablespoons finely diced green pepper
1 package (10 ounces) frozen whole kernel corn
1 cup raw diced potatoes, peeled
1 cup water
¼ teaspoon salt
Black pepper to taste
¼ teaspoon paprika
2 cups milk, fat-free, divided
2 tablespoons flour
2 tablespoons chopped fresh parsley

Preparation:
In a medium saucepan, heat oil over medium-high heat. Add celery, onion, and green pepper; sauté for 2 minutes.

Add corn, potatoes, water, salt, pepper, and paprika. Bring to a boil. Reduce heat to medium, and cook, covered, about 10 minutes or until potatoes are tender.

Pour ½ cup milk into a jar with a tight-fitting lid. Add flour and shake vigorously. Add gradually to cooked vegetables; stir well. Add remaining milk.

Cook, stirring constantly, until mixture comes to a boil and thickens. Serve garnished with chopped fresh parsley. Makes 4 servings.

Each serving provides approximately:

Calories: 200
Fat: 4.5 grams
Calcium: 160 milligrams
Source: "A Healthier You." U.S. Department of Health and Human Services.

Italian Rice Bake*

2/3 cup uncooked rice (or 2 cups cooked rice)
1-1/3 cups water (if using uncooked rice)
1 onion, chopped
1 tablespoon margarine
1 6-ounce can tomato paste (no salt added) and 1 can water
½ teaspoon garlic powder
1 teaspoon sugar
Dash pepper
½ teaspoon whole thyme
½ teaspoon dried oregano, crushed
1 teaspoon parsley flakes
1½ cups low-fat cottage cheese
½ cup grated part-skim mozzarella cheese

Preparation:

Cook rice in water. In a skillet, sauté onion in the margarine. Add tomato paste, water, garlic powder, sugar, pepper, thyme, oregano, and parsley.

Combine cottage cheese and rice.

Put 1/3 of rice mixture in non-stick sprayed casserole dish. Top with 1/3 of tomato sauce. Continue to alternate layers, ending with tomato sauce. Top with grated cheese. Bake at 325°F for 30 minutes, until hot and bubbly. Makes six servings.

Each serving provides approximately:

Calories: 200
Fat: 5 grams
Calcium: 130 milligrams

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Cauliflower Walnut Casserole*

Because of the cheese and nuts, this is more a vegetable entrée than a side dish. Serve with a salad, French bread, and a fruit dessert. For variety, substitute broccoli or cabbage for the cauliflower.

1 medium head cauliflower, broken into florets
1 cup plain low-fat yogurt
1 cup shredded reduced-fat Cheddar cheese
1 tablespoon flour
2 teaspoons low-sodium, chicken-flavored bouillon granules
1 teaspoon dry mustard
1/3 cup chopped walnuts
1/3 cup fine dry bread crumbs
1 tablespoon margarine
1 teaspoon dried marjoram, crushed

Preparation:

In a medium saucepan bring water to a boil. Add cauliflower, reduce heat, and simmer 15 minutes. Drain.

Mix yogurt, cheese, flour, bouillon granules, and mustard. Place cauliflower in 10 x 6-inch or 8-inch square baking dish and spoon yogurt mixture over cauliflower.

Mix together walnuts, bread crumbs, margarine, and marjoram; sprinkle over cauliflower and sauce. Bake at 400°F about 20 minutes, until casserole is bubbly. Makes four entrée servings.

Each serving provides approximately:

Calories: 240
Fat: 12 grams
Calcium: 300 milligrams

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Tomato Raita

1 medium cucumber, peeled
½ teaspoon salt (optional)
2 medium tomatoes, cored, cut into ½-inch cubes and drained
1 tablespoon onion, finely chopped
1 cup low-fat plain yogurt
¼ cup fresh parsley, chopped
2 tablespoons fresh cilantro (coriander), chopped
1 teaspoon cumin (or to taste)

Preparation:

Cut cucumber in half lengthwise and remove seeds. Cut into thin crosswise slices and place in a bowl. Sprinkle with salt. Let stand for 40 minutes. Rinse and drain, squeezing cucumber slightly to remove excess moisture. Add tomatoes and onion. In a bowl combine yogurt, parsley, cilantro, and cumin; mix well. Pour over vegetables; mix well. Cover. Chill until serving time.

Makes four servings.

Each serving provides approximately:

Calories: 60
Fat: 1 gram
Calcium: 130 milligrams

Fresh Fruits with Orange Custard Sauce

1½ cups 1% milk (or fat-free)
2 tablespoons sugar
1 tablespoon cornstarch
1½ teaspoons grated orange peel
1 egg yolk
2 cups mixed fresh fruit cut into bite-sized pieces (e.g., pears, peaches, apples, grapes, pineapple, etc.)

Preparation:

In a small saucepan combine milk, sugar, cornstarch, orange peel, and egg yolk. Cook and stir over medium heat until mixture comes to a boil. Boil for one minute, stirring constantly. Serve warm or cold over cut fruits. Makes two servings.

Each serving provides approximately:

Calories: 270
Fat: 5 grams
Calcium: 250 milligrams

Yogurt Popsicles (great for kids!)

1 cup plain low-fat or fat-free yogurt
1 banana, sliced
1 teaspoon vanilla
1 cup fruit juice or fruit chunks

Preparation:

Blend ingredients together and pour into small paper cups. Freeze. Place a plastic spoon or popsicle stick in each cup when yogurt mixture is half frozen. To serve, turn cup upside-down and run hot water over it until the popsicle slips out. Keep the cups to use as a holder. Makes four small popsicles.

Each popsicle provides approximately:

Calories: 90
Fat: 1 gram
Calcium: 75 milligrams

Old-Fashioned Baked Rice Pudding*

1 quart fat-free milk
1/3 cup uncooked rice (not converted)
¼ cup sugar
½ teaspoon salt
¼ cup raisins (softened in hot water if needed)
Ground nutmeg

Preparation:

Preheat oven to 300°F. Combine milk, rice, sugar, and salt in a lightly buttered two-quart casserole. Bake uncovered for two hours, stirring every 30 minutes. Add raisins during the last 30 minutes of baking, and stir.

Figure 5. Getting enough calcium in your diet can help to build strong bones and prevent osteoporosis. A fun and healthy way for your children to get the calcium they need is to eat yogurt popsicles. Credits: Julie Magro CC 2.0 http://bit.ly/xO2RUv

Upon standing the rice will absorb the rest of the milk. Sprinkle with nutmeg. Serve warm or chilled with additional milk, if desired. Makes four servings.

Each serving provides approximately:

Calories: 200
Fat: Less than 1 gram
Calcium: 300 milligrams

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Banana Mousse

2 tablespoons low-fat (1%) milk
4 teaspoons sugar
1 teaspoon vanilla
1 medium banana, cut in quarters
1 cup plain, low-fat yogurt
8 ¼-inch banana slices

Preparation:

Place milk, sugar, vanilla, and banana in blender and process 15 seconds at high speed until smooth. Pour mixture into a small bowl; fold in yogurt. Chill. Spoon into four dessert dishes; garnish each with two banana slices just before serving. Makes four servings.

Each serving provides approximately:

Calories: 95
Fat: 1 gram
Calcium: 125 milligrams