



Jr. Chef Club Sippin' on Smoothies Lesson 3

Educator Information Preparing to Teach the Lesson

Calcium Needs and Sources

The 2005 U.S. Dietary Guidelines recommend that everyone age 9 years and older consume three cups of nonfat or low-fat milk, or the equivalent, each day to meet their calcium needs. Children ages 2–8 need just 2 cups. Children's calcium needs are:

- kids ages 4 to 8 years – 800 milligrams
- older children 9 to 18 years – 1,300 milligrams
- adults 19 to 30 years – 1,000 milligrams

When children get enough calcium and physical activity during childhood and the teen years, they can start out their adult lives with the strongest bones possible. Bones are like a savings account for calcium. The body makes it easy to deposit calcium into the bone bank while you're young. Children and teens have the greatest bone-building ability. After about the age of 25–30, only withdrawals can be made from bone bank, you can't really add calcium after that time.

Young people need to have plenty of calcium and physical activity every day to help the body pack calcium into the bones to achieve "peak bone mass," or the most calcium that a bone can hold. To maintain that bone mass adults also need to continue to consume calcium in their diet each day so that the body does not rob the "calcium savings account" in the bones to help meet the needs to do other bodily functions.

Calcium Functions

Calcium is one of the most abundant minerals in the body—99 percent is found in our bones and teeth. The remaining 1 percent of calcium is used for things such as muscle contraction and relaxation, blood clotting and keeping the heart beating. If you don't eat enough calcium everyday to meet these critical needs, then the body must rob the bone bank to get enough calcium for these other functions. Bones are depleted of calcium when this happens day-after-day. This then, increases the risk to develop osteoporosis later in life.

Research indicates that calcium also plays a role in heart health (normalizing blood pressure), may help prevent colon cancer, and may help with weight loss efforts.

Dietary Sources of Calcium

The best sources of calcium are dairy products, but the mineral is also found in dark green, leafy vegetables (broccoli, kale, cabbage, collard, and mustard greens) and tofu that's been made with calcium sulfate. If tofu has been made with nigari, it will be low in calcium so be sure to check labels. Some nuts, seeds and dry beans contain good amounts of calcium. Some foods are fortified with calcium, such as certain 100 percent juices, cereals and soymilk. Note the amount of calcium in one cup of low- or non-fat milk and how that compares to the daily recommended intake and other calcium-containing foods.

Serving Size	Food or Beverage	Calcium
8 ounces (237 milliliters)	milk	300 milligrams
8 ounces (237 milliliters)	calcium-fortified orange juice	300 milligrams
2 ounces (57 grams)	American cheese	300 milligrams
1½ ounces (43 grams)	cheddar cheese	300 milligrams
4 ounces (113 grams)	tofu made with calcium	260 milligrams
6 ounces (177 milliliters)	yogurt	225 milligrams
½ cup (118 milliliters)	collard greens (cooked from frozen)	178 milligrams
4 ounces (113 grams)	ice cream, soft serve	120 milligrams
½ cup (118 milliliters)	white beans	110 milligrams
1 ounce (28 grams)	almonds	80 milligrams
½ cup (118 milliliters)	bok choy	80 milligrams
½ cup (118 milliliters)	rhubarb, cooked	75 milligrams
4 ounces (113 grams)	cottage cheese	70 milligrams
½ cup (118 milliliters)	red beans	40 milligrams
½ cup (118 milliliters)	broccoli, cooked	35 milligrams

Choose Low-Fat or Non-Fat Dairy Products

Dairy products, although rich in calcium, can be loaded with fat—especially saturated fat. It's important to choose 1 percent or non-fat milk, low or nonfat yogurts and ice cream, and reduced-fat cheeses. Choosing low fat dairy products are an easy way to cut out a significant amount of fat (especially saturated fat) from one's daily fare. If you drink three cups of milk per day and switch from whole milk to 1 percent, it saves about 15 grams of fat—11 of these are saturated fat. Making the switch gradually is a good idea. There are milk products on the market that are nonfat but imitate the mouth-feel of 2 Percent milk. Different manufacturers have different names for this product. Natural gums/thickeners are used to give the milk more "body".

Lactose Intolerance or Milk Allergies

Lactose intolerance occurs when a person lacks, or has a reduced amount of, the digestive enzyme needed to break down lactose, the sugar found naturally in milk. Many people with this condition need to choose non-dairy sources of calcium or dairy products with the naturally occurring enzyme added to it; or the enzyme supplement. Some people with lactose intolerance are able to eat cheese and yogurt because these contain less lactose. Others may find that they can tolerate very small amounts of dairy products at a given time without symptoms. Symptoms of lactose intolerance include cramping, gas, bloating and diarrhea after drinking milk or eating other dairy products.

A milk allergy is much less common and is the result of the body mounting an immune system reaction to one or more of the proteins in milk. People who are allergic to milk need to remove or eliminate all milk and other dairy (cheese, yogurt, etc) products from their diet.

Children with either of these conditions should see their health care provider for guidance in meeting their calcium recommendations. Check to make sure that students in your classes do not have lactose intolerance or an allergy to any of the foods in the smoothie before serving it.

More on Bone Building

Weight-bearing physical activity is also important for strong bone development. Activities that work the body against gravity are considered weight bearing. Examples include walking, running, jumping and any activity, game or sport that includes those actions. Non-weight bearing activities, such as swimming, are still good to do, they just don't promote bone development as much as weight-bearing actions do. Weight-bearing activities cause muscles and tendons to tug on bones, which stimulates them to store more calcium.

Soft drinks contain a form of phosphorus that was once thought to interfere with calcium absorption and pull calcium from the bones. Research in the early

2000's indicates this may not be the case. However, drinking soft drinks instead of milk robs the bone of calcium. High protein diets can also pull calcium out of the bones.

Amount of Calcium in Bones at Different Life Stages (Visual Aid)

This visual aid increases the children's knowledge of the importance of calcium in building strong bones. Make these points when using the visual aid:

- The human skeleton is composed of 206 bones.
- 99 percent of the body's calcium is in the bones.
- Childhood is an important bone-building time.
- If you don't eat enough calcium for daily physiological needs, your body will remove calcium from your bones.
- Insufficient calcium may cause stress fractures or bones to become brittle and break.
- Insufficient calcium may stunt growth.
- Calcium deposited into bones during childhood serves as a calcium bank to use during adulthood. Make sure to keep the bone reserves for later years by consuming the recommended Milk Group servings or equivalents every day!

At different ages, our bodies have varying amounts of calcium stored in our skeletal system. Use bags of white cornmeal to illustrate the amount of calcium in our bodies at different ages.

- A newborn baby has only 1 ounce of calcium in its body (show the ¼ cup bag)
- At age 10, the amount of calcium would look like this: (show 3½ cup bag)
- By age 15, your body has grown and will grow more. Your bones become longer and wider. Your body has twice as much calcium as at age 10 (show 7 cup bag)
- By adulthood, your bones will grow even more (show 11 cup bag)

Inadequate calcium intake as adults has devastating long term consequences. Osteoporosis is the name of a bone loss disease occurring late in life. It causes bones to become brittle and break easily. It's a "silent" disease. Significant bone loss often occurs before osteoporosis is diagnosed. Sometimes a fracture is the first sign of the disease. A person with osteoporosis may have lost quite a bit of bone calcium. (If desired, show 7 cup bag and compare to the normal adult 11 cup bag). To maintain strong bones, have at least three cups or the equivalent of calcium every day. Good sources of calcium are: milk, yogurt, cheese, canned salmon with bones, sardines, tofu, broccoli and kale. A tablespoon or two of powdered milk can also be added into foods and beverages (such as smoothies, soups, casseroles, etc.) to boost calcium content.

Bone Bank Relay

This game helps kids use weight bearing activity (bone building) while applying their new knowledge about exercise and bone health. This game requires two teams for a relay. The goal is for each team to get as much calcium as possible into their bone bank as quickly as possible. The “bone banks” are two empty, clear plastic gallon jars. Make a sign for them, indicating they are a bone bank. Ahead of time find food pictures that have varying amounts of calcium (low, medium, high) and pictures of activities that are weight bearing and non-weight bearing. On the back of the pictures, write the numbers 1, 2 or 3. The numbers represent how well this food or activity builds strong bones (foods low in calcium have a “1” and swimming has a “1”, foods that have moderate levels of calcium have a “2” and an activity like bicycling would have a “2”; foods high in calcium have a “3” as do weight bearing activities (like walking, climbing, jumping, and running).

Use white corn meal for calcium. If this is not available, use white flour or powdered milk.

Instructions for playing the relay are in the lesson plan.

Blender Safety

Blenders have powerful motors, so it's important to be extra cautious when using a blender to avoid getting hurt.

- Put liquids in first, so the blades can whirl freely and gradually pull down other foods.
- Always keep the lid on the blender when the motor is running.
- Make sure the motor has completely stopped before using any utensil to scrape the sides of the blender container or remove the container. Otherwise, you could damage the utensil, the blender or even hurt yourself.
- Blenders work quickly so stop often to check and see how your foods are doing. You don't want to over blend.
- Avoid leaving a blender running when no one is watching it.
- Blender blades are as sharp as knives-use caution when cleaning them.
- Always read the instruction book first when using a blender or other kitchen appliance for the first time.

Don't be a blender bender: use crushed ice and make sure there is a least one cup of liquid before adding ice. To make crushed ice, put ice into a plastic baggie and strike on a hard surface or double the baggies and tap the ice with a hammer on the concrete outside.

If students don't have a blender at home, a food processor will also work. If students don't have that, they could try using an electric mixer. Chill ingredients first so that ice does not have to be used. If an electric mixer is not available

either, mash the fruit in a bowl, put into a jar with a tight fitting lid. Add the other ingredients, cover tightly and shake well.

Where are the Foods from? (Optional discussion, if time)

Today's Tropical Smoothie uses fruits from far-away places. It takes much energy (many people, trucks, ships or airplanes and fuel to run those vehicles) to get those foods to our table. To save energy, we should try to use local, in-season foods first. Consider foods from far away as a special treat. Foods from far away typically cost more too, because of the energy (labor and transportation and fuel) it took to get them to our country.

Use a world map to show that bananas, vanilla beans and sugar cane come from tropical places.

- **Bananas** originated in India and today are grown in Africa, Asia, Central and South America.
- **Vanilla** comes from large pods that grow on vines, originally in Central America.
- **Sugar** comes from sugar cane, a 20 foot tall member of the grass family, which may have originated in the South Pacific; its exact origins are unknown.
- **Oranges and strawberries** come from warm areas with long growing seasons-such as Florida, California and Mexico. Oranges originated in Southeast Asia and were first grown in India, China and Japan. Strawberries are native to North and South America.
- **If you are using different fruits** for the smoothies, point out their places of origin on the map.