

# Lesson 3

## How Should We Care for Our Bones?

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### Objectives

Students will

- identify calcium as the mineral that strengthens bones
- identify exercise and a diet rich in calcium as factors that support good bone health

### Vocabulary

*calcium* (KAL-see-uhm)—the mineral from which bones are made

*fracture* (FRAK-cher)—a break in a bone

### Structuring the Curriculum

Have students set up **Let's Find Out: What Happens to Bone When It Is Placed in Vinegar?** at least two weeks ahead of time.

### Preparation/Materials

#### Demonstration: Bone Properties

- ✓ clean bone (such as a chicken or turkey drumstick or a ham bone)

#### Let's Find Out: What Happens to Bone When the Calcium is Removed?

- ✓ clean chicken bones, one per team
- ✓ protective gloves, one pair per student
- ✓ glass jars with lids, one per team
- ✓ vinegar, enough to cover each bone

#### Demonstration: Fracture

- ✓ clean chicken or turkey drumstick bone, broken to demonstrate a fracture

#### Discussion: Calcium

- ✓ milk container
- ✓ samples of sesame seeds, almonds, fresh broccoli, salmon, and/or molasses

#### Activity: Bone Mobile

- ✓ craft sticks, two per student
- ✓ glue
- ✓ construction paper cut into eighths, at least four eighths per student
- ✓ crayons or markers
- ✓ scissors, one per student
- ✓ yarn

## Background

Bones are composed of minerals and protein. The inner bone is a protein matrix on which the mineral layer (primarily calcium phosphate) is deposited to form a strong bone. Collagen, a protein, is the main component in cartilage. As children grow, the cartilage ossifies (becomes bone) as more mineral is incorporated into the cartilage.

Diet and exercise are the main factors that determine skeletal health. A diet rich in calcium especially favors strong bone development. Vitamin D is essential for calcium to be absorbed from food. The body produces vitamin D when sun shines on the skin, and most fluid milk has been fortified with vitamin D. Foods high in calcium include not only dairy products but also sesame seeds, almonds, salmon, sardines, oysters, and many dark green leafy vegetables such as kale. Soft drinks aren't advisable for growing children's diets—not only do they often substitute for milk, but phosphoric acid also competes directly with dietary calcium and inhibits strong bone mineral development.

Maximum skeletal strength is reached during adolescence. Thereafter, a person can maintain skeletal strength, but it's generally not possible to exceed the strength that has been gained at that point. Therefore, it's important for children to have well-balanced diets and a lifestyle that incorporates regular weight-bearing exercise.

Bones become more brittle with age. Older peoples' bones break more easily. Osteoporosis is a condition that develops in older people, especially post-menopausal women. The spongy bone tissue becomes less dense and more brittle. Weight-bearing exercise, in which skeletal muscle pulls against the bone, strengthens and increases bone density.



## Bone Care

Your bones are very important. They are part of God's plan for your body. You can take care of your bones by eating the right foods and exercising.



Minerals in the bone make the bones strong. The mineral from which bones are made is called **calcium** (KAL-see-uhm). Milk and foods made from milk have lots of calcium.



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You can also get calcium by eating some kinds of fish. Broccoli has a lot of calcium. So do sesame seeds and almonds.



Exercise also makes bones strong. When you walk, run, and jump, your bones get stronger.



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## Discover

1. **Demonstration: Bone Properties.** Hold up a clean bone, such as a turkey or chicken drumstick bone or a ham bone. Brainstorm a list of properties that God gives bones that make them functional in our bodies. (Answers will vary but may include their hardness, length, how they fit together, the fact that they contain marrow to make blood cells, and so on.)
2. Hold up one of the jars with a vinegar-covered bone from **Let's Find Out: What Happens to Bone When the Calcium Is Removed?** Have students predict how the bone will be changed. (Make sure that students wear gloves during this activity.) Discuss the properties of the bone that they put in there (hard, white, etc.). Have students finish the activity. Discuss how the hardness has changed. Explain that the vinegar is a mild acid that dissolved the hard layer of calcium.
  8. *What does it feel like? (It's soft and rubbery.)*
  10. *What would happen if all the bones in your body were like the bones in the vinegar? (We couldn't stand up straight, we couldn't lift heavy things, and we couldn't support ourselves.)*Have students wash their hands thoroughly after this activity.
3. Have students demonstrate (mime) what their movements would be like if their bones were rubbery. Discuss what would be harder (walking, sitting, chewing food, etc.), and what would be easier or more advantageous (fewer bone breaks, curling into smaller spaces) if their bones weren't hard.



## Let's find out

### What Happens to Bone When the Calcium is Removed?

#### You will need

- ✓ clean chicken bone
- ✓ protective gloves, one pair per student
- ✓ glass jar with a lid
- ✓ vinegar



#### Do this

1. Put on the gloves.
2. Feel the bone. What does it feel like?
3. Try to bend it.
4. Write down what the bone is like.
5. Put the bone in the jar. Pour vinegar over it. Put the lid on the jar.
6. Guess what the bone will be like in two weeks.
7. Write your ideas down in your science journal.
8. After two weeks, take the bone out of the jar.
9. What does it feel like? Try to bend it.
10. Write your observations in your science journal.
11. What would happen if all the bones in your body were like the bone in the vinegar?

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Exercise that puts weight on your bones makes them stronger, too.



Old people's bones can get weak. Weak bones break more easily. Even bones that aren't weak can break, though. A break in a bone is called a **fracture** (FRAK-cher).




Do you know someone who has had a fracture?

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## Develop

1. **Demonstration: Fracture.** Hold up a broken chicken or turkey bone. Discuss what happens when a bone breaks. Introduce the word *fracture* to mean a break in a bone. Have students share their experiences with broken bones.
2. Discuss the difference between a compound fracture and a simple fracture. (In a simple fracture a break in the bone doesn't break the skin; in a compound fracture the broken bone breaks through the skin.) Discuss the importance of keeping the break area still and seeing a doctor promptly. Ask what might happen if bone isn't set by a doctor. (Although the bone will heal and grow back together, it might not grow back together as it should. It might stay crooked.) Marvel together that God gives bones the ability to mend together.
3. Students' experiences with broken bones may be limited to situations caused by falls or accidents. Discuss that while the impact of a fall can break even the strongest of bones, not all bones have the same strength; weaker bones break more easily.
4. Ask the following questions.
  - What could make some bones stronger or weaker than others? (Answers will vary but may include bone size, bone age, and how thick the "hard" bone layer is.)
  - Hold up and bend a rubbery bone from the Let's Find Out activity. Do you think that it's important to have a solid layer of mineral in your bones? (Yes.)




## Intersection with

### Fracture

MEDICINE

A bone with a fracture can heal itself. But it must stay still a long time.

To make sure it heals right, a doctor sets the bone in position. Then you get a cast or splint on it.



In simple fractures the broken bone stays inside the skin. In compound fractures the broken bone pokes through the skin.

### Think Back

1. What mineral makes bones strong and hard?
2. What can you do to keep your bones strong?
3. Why are strong bones important?

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5. **Discussion: Calcium.** Ask the following questions.
  - Where do you think your body gets the minerals to make your bones hard? (We get these minerals from food.) Tell students that most of the hard layer of the bone is a mineral called calcium. Eating foods with lots of calcium helps your body make strong bones.
  - Which foods do you think have lots of calcium? (Milk and foods made from milk have lots of calcium.) Hold up a milk container.
  - What foods are made from milk? (Yogurt, cheese, and ice cream are made from milk.)
  - Do you think other foods have calcium, too? (Answers will vary.) Hold up samples of sesame seeds, almonds, broccoli, salmon, and/or molasses as examples of foods that have calcium.
6. To establish the importance of exercise in developing and maintaining strong bones, lead students through these instructions.
  - There's something else you can do to make and keep your bones strong. Think about what that might be.
  - Stand up and do ten jumping jacks.
  - That's exercise! Exercise helps your bones stay strong and healthy.

## Reinforce/Assess

1. As a class, read **Bone Care** (page 42) in the student text, and answer the **Think Back** questions (page 46).
  1. *What mineral makes bones strong and hard? (Calcium makes bones strong and hard.)*
  2. *What can you do to keep your bones strong? (We can exercise and eat foods high in calcium.)*
  3. *Why are strong bones important? (Strong bones don't fracture easily.)*
2. Ask students why we keep our bones healthy. Students should understand the importance of bones to daily activities. They should also understand that bones are a gift from God that we have a responsibility to care for.
3. **Activity: Bone Mobile.** Have students glue two craft sticks together in the shape of an X. Have them draw or write on construction paper pieces ways to keep bones healthy. Have them use yarn to hang these pieces from the sticks. (Save the mobiles for students to add to during Lesson 7.)

## Extend

- ▶ Have students research the use of seat belts in preventing broken bones. Start a class scrapbook of newspaper clippings about car accidents, noting whether the victims were wearing seat belts. Assign one student to be the “accident clerk.” That student should keep the scrapbook and report additions to the class.
- ▶ Have interested students find out about x-rays. How do x-rays work? What do they show? How are they helpful? Can they be harmful?
- ▶ Have students make a meal plan for a day that includes foods high in calcium.
- ▶ Have students develop an exercise program for themselves. Even moderate exercise can benefit bones. Have them plan to walk, run, jump rope, or do some other weight-bearing activity two or three times a week.
- ▶ Have students list safety rules for exercising. Discuss these rules and the importance of exercise safety.
- ▶ Demonstrate the need for wearing bicycle helmets. Drop a very ripe melon on a floor covered with protective plastic or newspaper. The melon will shatter like an unprotected skull. Repeat the activity with another melon protected inside a bicycle helmet.



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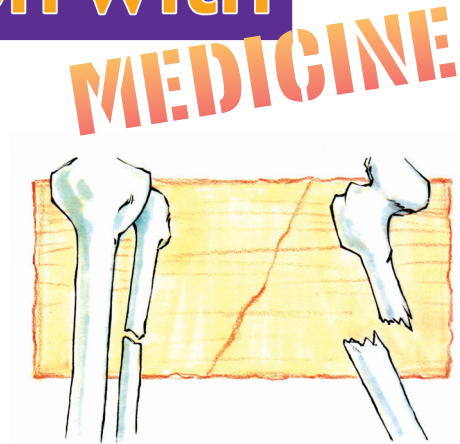
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