

Rubber Bones

Subject Area: Science

Unit Title: Nutrition and Your Bones

Grade Level: 4th & 5th grade

Objectives: Each student will gain an understanding of the role of calcium in bone strength.

Colorado Content Standards to be covered:

SCIENCE:

Standard I - Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Standard III - Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

Anticipatory Set: Read the questions and answers from the Bone Up On Basics handout to your students (last page).

Materials:

- Two small jars, one with a lid
- White vinegar
- Paper towels
- 2 small clean chicken bones

Input:

Why is milk important?

Your students need the calcium and other nutrients from milk to help their bones grow both in length and density.

The calcium recommendations for 9- to 18-year-olds is 1300 milligrams of calcium a day. Unfortunately, a majority of 9- to 13-year olds is not meeting the recommendation. That's unnecessary, because it's so easy to get calcium. All your students need is 4 a day— 4 servings of milk, cheese, or yogurt to get the calcium they need for strong bones and teeth.

During the pre-teen and teen years, nearly half of all bone is formed and about 15% of their adult height. These years are a critical time for consuming calcium-rich foods, and by far the most common and abundant source for calcium is milk and other dairy products.

Because flavored milk tastes so good, many children (and adults) don't realize that it's good for them too. Compare white milk and chocolate milk. They're both excellent sources of calcium, vitamin D and protein (so are strawberry, banana, and other flavored milks.) Active children can easily use the 60 or so extra calories that a cup of flavored milk supplies.

A recent study at the University of Vermont which included 3000 children suggested that children who drink flavored milk were more likely to meet their daily calcium requirements com-

pared to their peers. Another recent study found that flavored milk drinkers not only consumed more calcium; but their overall nutrient intakes were higher than their peers, all without increasing their total added sugar and fat. There's a milk for every taste—whole, reduced fat, lowfat, and fat free. Each is rich in calcium, protein and vitamin D, so it doesn't really matter what type of milk your students drink—as long as they drink it!

Checking for Understanding: At the end of this section choose one of the following for a quick check: ask the students to partner share and think, pair and share, do a quick 3 word write up as an exit slip, do a quick sketch or give each other a quick thumbs up or down to check for understanding. Determine the level of mastery for each student and provide individual remediation as needed.

Procedures/Activities:

Rubber Bones

1. Let each student handle a chicken bone, and describe how it feels.
2. Put one bone in a jar of vinegar and place the lid on the jar.
3. Place the other bone in a clean, empty jar. Do not put a lid on the top.
4. After one week, remove the bone from the vinegar. Ask the students to describe the changes.
5. Compare the air-dried bone to the bone soaked in vinegar.

Discuss

When your diet does not provide enough calcium for everyday life functions (such as bloodclotting and regulating your heart beat), your body takes what it needs from your bones. Over time, this can weaken bones to the point where they break easily. Calcium, along with other nutrients, provides the raw materials the body needs to make bones strong. Fragile bones have less calcium, which weakens the structure.

Vinegar is an acid. In this demonstration, the acid leached calcium out of the chicken bone, making it soft and rubbery. Calcium is the building material bones need to help them stay strong and hard. What would it be like to live with soft and rubbery bones in your body? Along with physical activity and overall good nutrition, eating calcium-rich foods can help keep your bones strong.

Closure:

Ask each student what they are going to eat or drink to ensure that they get enough calcium in their diet.

Handout:

Bone up on Basics: True or False

Questions	Answers
Bones are dry and dead.	False. Bones are alive. They start to grow even before you are born. As you grow your bones grow. Foods such as milk and yogurt have calcium. Calcium helps bones to grow strong and healthy.
Bones have blood inside.	True. Bigger, longer bones, such as the leg bone, have space inside. The spaces are filled with bone marrow. Red bone marrow makes red blood cells.
Bones give your body shape, support and protection.	True. Without bones you would flop around like a wet noodle. Bones hold up your body and protect internal organs such as your heart.
A baby has about 350 bones, but an adult has only 206.	True. Wiggle the tip of your nose. It feels rubbery because it is made of cartilage. Babies' bones are soft and are made mostly of cartilage. As a baby grows, the bones fuse together and harden. For example, a baby's skull has many bone parts that fuse together later.
Bones that break cannot heal.	False. If you cut your skin, a scab forms and the skin begins to heal. If you break a bone, an inside scab or clot forms to stop the bone from bleeding. Then the body works to rebuild the bone and help it to heal.
A giraffe has more bones in its neck than a human being has in his or her neck.	False. Both giraffes and human beings have seven bones in their necks. However, each giraffe neck bone is ten inches long!
The pinkie finger is the smallest bone.	False. The smallest bone is found inside the ear. This bone is so small (3mm) that it can fit on the fingernail of your pinkie!