



**Building Better Bones Program**  
**Class Number 1**  
**“Bone Up on Calcium”**  
**50 Minutes**

**Lesson at a glance:**

Osteoporosis has been described as a pediatric disease with geriatric outcomes. Students will learn that osteoporosis means “porous bones” or “bones full of holes”. Porous bones are brittle bones that can easily fracture. The critical time in which to build bone density (bone mass) is before age 18. Students will learn that their goal for calcium consumption is 130% of the Daily Value (1300 mg) and identify foods with calcium from each of the groups in the food guide pyramid. Students will also recognize that they need four servings from the milk group to meet their calcium needs.

**Objectives:**

Upon completion of the class, students will be able to:

1. Define osteoporosis.
2. Recognize 130% Daily Value as a goal for calcium intake. (1300 mg)
3. Identify % Daily Value for calcium on the Nutrition Facts Label.
4. Identify the most important time for building denser, stronger bones (Birth to age 18).
5. Identify foods with calcium from all the food groups on the food guide pyramid.
6. Identify the number of servings needed from the milk group each day.
7. Plan a meal that provides at least 40% Daily Value for calcium.

**Materials:**

1. *Food Guide Pyramid Poster* - Dairy Council
2. Snoopy Food Guide Pyramid core board
3. Dairy Council food models with Velcro strips attached to the back – 4 packets: one breakfast and 3 lunch/dinner packets (See page 9 for suggested food models)
4. Piece of Styrofoam shaped like a bone
5. Two clear containers, the same size, with lids that have holes in them to allow beans to pass through
6. Small white beans to fill one container completely and the second container half way
7. Clear plastic shoe box or other container to catch the beans as they are poured

8. *Healthy and Unhealthy Bone* poster – from ADHS
9. Death of a Bone model - HE79143 from Health Edco
  
10. Mini skeleton model
11. “4 servings of milk” core board
12. 4 Target boards
13. Eight magnetic clips to attach posters to the board
14. “Got Milk” cups – Dairy Council
15. Fat Tubes

### **Handouts:**

#### In-Class Handouts:

1. Pre Tests (Optional: mail to school in advance)
2. *Reading a Food Label* – Adapted from FDA, 1994
3. Meal planning worksheet
4. *Food Guide Pyramid* sheets – Dairy Council
5. Teacher evaluation

#### Leave with Teacher Handouts:

1. Nutrition Education Resources Handout
2. *Wheel of Calcium Choices* – Dairy Council (Optional)
3. *Es Usted Intolerante a la Lactosa?* or *Are You Lactose Intolerant?* or *Lactose Intolerance and Your Child* - Dairy Council (Optional)
4. Building Better Bones Puzzles Handout – (Optional)

### **Introduction**

Hi. My name is \_\_\_\_\_. Before we get started today I need your help in filling out a survey. (*Only administer survey if it was not mailed to the teacher prior to class*) (*After completion of the survey*): Everyone knows their ABC’s right, well today we are going to learn the BBB’s, Building Better Bones. Even though you can’t see them, your bones need to be strong in order to last a lifetime. In order to do this you need to eat or drink calcium and do daily physical activity. In this Building Better Bones program I will be presenting two classes on calcium and nutrition and one class on physical activity.

(*Hold up mini skeleton*) Did you know that you have 206 bones in our body? Did you know that your bones are alive? They are living tissue, not permanent, hard rods. Just like our hair, skin and blood, our bones are constantly breaking down and rebuilding. Today, we are going to learn how to build stronger, denser bones and prevent a serious bone disease.

(*Write Aosteoporosis@ on the board or on a sheet of newsprint. First underline Aoste@*) Who knows what Aoste@ means? AOste@ is Latin for Abone@. (*Underline Aporosis@*) How about

Aporosis≡? APorosis≡ means Aporous≡ or Afull of holes. So, putting these two words together we have Aosteoporosis≡ which means Aporous bones or bones full of holes≡. Porous bones are brittle and can break easily. Osteoporosis is a painful disease, which can deform the body. How many of you have seen an older person that is stooped over and has a hump on their back? Who knows someone who has fallen and broken his or her hip, wrist or back bone? If you have, you know someone whose bones are porous or full of holes. (*Holding a piece of Styrofoam shaped like a bone in your hands, explain that Styrofoam is a porous, brittle material like weakened bones with osteoporosis. Snap the piece in half, showing the students how little effort it takes to crack porous bones.*)

(*Hold up Death of a Bone model*) This first bone on the left is normal bone, which has plenty of calcium to make it strong and dense. It is solid, not porous. The bone in the middle is very porous or full of holes and very brittle. This person didn't get enough calcium in their diet when she (he) was young, like you. And this bone on the right is fractured because the bone was porous or full of holes, weakened from osteoporosis. People with osteoporosis often break their hip, spine or wrist. (*Hold up the Healthy and Unhealthy Bone poster.*) Here is a real picture of a bone with osteoporosis. You can see how porous or full of holes the bone looks. There are large holes here where calcium should be, but isn't. When the bone was full of calcium it was dense, but now it is porous and brittle, like the Styrofoam I just broke.

So, why am I talking to you about this disease now when you are only 10, 11 or 12 years old? Because by the time you are 18 or graduating from high school you will have 90% of all the bone density or bone mass you will ever have. By the time you are age 30 your bone density or bone mass will not increase anymore.

### **Demonstration**

(*Place two empty containers on a desk. One container should be marked with colored tape at a level, which should represent 90% of its total volume. The second container should be marked with colored tape at a level, which represents 50% of its volume.*)

*Make up a name of a student who likes milk, "Davey". (Use this student's name throughout the demonstration in reference to building bone to 90% of total bone mass.) Next, make up a name for a student who doesn't like milk, "Mary". (Use this student's name in reference to the 50% taped line container.)*

Here is a container that we are going to pretend is "Davey". The beans I am pouring into the container represents calcium that "Davey" gets from food and milk. Calcium is needed by the 206 bones in your body to help them grow denser, stronger, and more solid. As "Davey" grew up "Davey" ate the right amount of calcium his body needed. (*Pour in beans to the 90% taped level*) So at age 18 "Davey's" bones have the capacity to be at 90% of total bone mass and they are.

Now, let's look at this second container. (*Pour in beans to the 50% taped level*) It is only half full of calcium because "Mary" only ate or drank about half of the calcium she needed to make her bones dense. Her bones did not get enough calcium as she was growing up and are only at 50%, or ½, of total

bone mass.

Then by the age of 30 everyone's bones are going to have as much calcium as they ever will. (*Fill the container of the student who likes milk to the top with beans.*) From age 30 and older, you can't increase the amount of calcium of your bones. They are as dense, or solid, or as full of calcium as they will get. (*Put the lid on the container.*) After age 30 everyone gradually starts losing calcium from the bones. Which container do you think is going to empty first? Right, the container that had the least amount of calcium to begin with. And this is similar to what happens with osteoporosis. (*Now tip the containers and allow the beans to begin to run out into a clear plastic shoe box or other clear container*)

So now, right now, is the time to build your bones denser, stronger and more solid. Weak, brittle, porous bones don't have to happen. Osteoporosis is largely preventable if you have a healthy lifestyle. If you build calcium dense bones from birth and through your teenage years, you can keep osteoporosis from happening. Remember 90% of all the bone density or bone mass you are ever going to have you will have by the time you are eighteen. Fill your bones with calcium today and everyday after today.

### **Activity - Number of students who consume enough calcium**

Raise your hand if you think you get enough calcium to build your bones. Studies tell us that many children, preteens and teenagers do not get the right amount. Let's look at the numbers.

(*Make 10 X's on the board.*) Raise your hands if you think you know how many boys, your age, out of 10 are getting adequate amounts of calcium. (*Allow time for responses then erase all but 4 of the X's*) Out of 10 boys your age, only 4 of them get the recommended amount of calcium. Only 40% of boys your age get enough calcium.

(*Make 10 more X's on the board*) Raise your hands if you think you know how many girls, your age, out of 10 are getting adequate amounts of calcium. (*Allow time for responses then erase all but 2 of the X's.*) Out of 10 girls your age, only 2 of them get all the calcium they need. That means 20% of girls are getting adequate calcium. Why do you think girls get less calcium than boys do? Yes, girls often do not eat as much as boys usually because they may be worried about gaining weight or of getting fat.

## Activity - Learning % Daily Value for Calcium

Now that we know why we need calcium let's learn how much is needed and which foods give us calcium.

How do you know how much calcium is in a food? The easiest way is to look at the food label. (*Pass out "Reading a Food Label" - Massachusetts Department of Public Health handout*) Now we are going to take some time looking at the Nutrition Facts label. There are over 40 different pieces of information we can learn about from the label, but today we are going to focus on 3 things: serving size, something called % daily value for calcium and fat grams. Each packaged food comes with a nutrition label which is titled "Nutrition Facts". At the top, the food label will tell you what size a serving is (1 cup, ½ cup, 2 tablespoons, 1 ounce, etc.). In the middle you can find the word total fat, in grams. And near the bottom you can find the word calcium, a number and a percentage sign.

On your Reading a Food Label handout what is the serving size? (Answer 1 cup) Now, look under the first bolded line and find the words "Total Fat". How many total grams of fat in this food? (Answer 13g) This tells you how much fat is in the food. The larger the number the more fat the food has and the smaller the number the less fat the food has. Why is the amount of fat in foods important? Too much fat in the diet can lead to many diseases such as obesity, diabetes, high blood pressure and heart disease. Remember that the lower the number of fat grams the better the food is for you in most cases. We will talk more about this in our last BBB class. Next, look at the label just under the second heavy black line and you will see where the calcium is listed with a percentage. What is the percentage number? (Answer 15% of the Daily Value) At your age you need to eat foods throughout the day that will give you a total of 130% Daily Value for calcium. (1300 mg.) The larger the percentage number the more calcium that food has and the smaller the percentage the less calcium it has. A serving of food that provides 20% or more of the daily value for calcium is considered to be an excellent source of calcium. It is important to remember that fat and calcium numbers are opposites. You want low fat numbers and high calcium numbers.

If you don't have food labels to look at remember that you need at least 4 servings from the milk group every day to meet your calcium needs. (*Show the core board labeled "4 servings of milk"*) Each serving of milk provides 30% of the DV for calcium. If you have 4 servings from the milk group  $4 \times 30 = 120$ . Now you only have to obtain how much more from other foods? (10%). Milk has different amounts of fat. Whole milk is packed with fat and is good for children younger than 2 years of age. Reduced fat milk has a little less fat than whole milk but it still has a lot of fat in it. 1% or fat free milk would be best to drink. Low-fat milk has a small amount of fat and would be okay to drink. Fat free milk has no fat in it and would be our best bet if we wanted to watch the amount of fat that we were eating. Fat free milk has high calcium numbers and low fat numbers; they are opposites and this is what we want when looking at the different foods that we eat. (*Show the varying degrees of fat in milk using the fat tubes*)

## **Activity - Learning % Daily Value for Calcium**

Now that we know how to read food labels we are going to do an activity to practice what we just learned. We are going to divide the class into 4 groups. Each group is going to get a packet of food models: breakfast, lunch, dinner or snack. Each food model has a food label on the back. Read the food label and place the food on the target board according to the %DV for calcium. For example, milk has 30% DV for calcium so what ring would milk be placed? Correct, on the red circle, 20+. If you cannot find the word calcium on your food label look at the bottom of the food label and in small print it may say “this food is not a significant source of calcium”, etc. This means the food would go in the outer, yellow ring. This activity will allow you to see that the foods in the middle rings provide the most calcium and the foods on the outer rings provide little to no calcium. (*Break the class into 4 groups*) You have about 5 minutes to place all your foods on the target board in the appropriate circle.

(*After all groups have completed this task explain the next part of the activity.*) Next, as a group (*emphasis as a group*) create a meal using the following criteria: <sup>1</sup>. Choose no more than 4 foods <sup>2</sup>. The total of the meal must be greater than or equal to 40% DV for calcium <sup>3</sup>. One of the foods must be a fruit or a vegetable. (*Pass out the worksheet with the instructions and write the instructions on the board*) Use this worksheet to write down your meal and total it at the bottom of the page. Once you have agreed on a meal as a group decide which food group each food in your meal belongs on the Food Guide Pyramid. (*Pass out the FGP handout*) (*Allow approximately 5 minutes to create meals*)

Now that you have created a meal choose a spokesperson from your group to come up to the front of the classroom and place your meal in the appropriate food groups on the Snoopy FGP. (*Have each group say what foods they chose for their meal and how much calcium is in each food. As the spokesperson verbalizes this information have another student volunteer add the percent DV for calcium on the board. Complete each meal and snack and total the meals for the day. Did they get greater than 130% for the day as a group?*)

(*Discuss what was discovered and what are the best sources of calcium. If time permits place other items on the board that may not have been discussed: salmon, dark green etc.*)

### **Summary:**

1. What is the name of the disease meaning porous, brittle bones or bones full of holes? (Osteoporosis)
2. What percentage Daily Value for calcium do you need? (130%)
3. 90% of your bone density is going to be formed by what age? (18 years, graduation from high school)
4. Name at least one food from each food group that provides calcium.
5. How do you find out the percent daily value for calcium in a food? (Look at the bottom of the nutrition label)

6. How many servings do students your age need from the milk group? (4)
7. What is the name of this program? (Building Better Bones Program)

**Ideas for Going Further:**

1. Provide a master copy of a blank food record with the teacher. Encourage the teacher to have students keep track of their food intake for a full week to evaluate calcium consumption.
2. Explore different nutrition educational materials using the provided resource list.  
Dairy Council of Arizona  
2008 S. Hardy  
Tempe, AZ 86282  
(480) 966-7211  
  
Arizona Prevention Resource Center  
641 E. Van Buren, Suite B2  
Phoenix, AZ 85004-2208  
(602) 727-2772  
  
Arizona Beef Council  
1401 N. 24<sup>th</sup> Street  
Phoenix, Arizona 85008  
(602) 273-7163  
FAX (602) 220-9833
3. Provide the teacher with information about lactose intolerance for those students who may avoid dairy foods because of lactase deficiency. (Handout *Lactose Intolerant? Or Es Usted Intolerante a la Lactosa?* Or *Lactose Intolerance and Your Child* from the National Dairy Council)
4. Provide teacher with handout master of the activity anagram and calcium cryptogram (US Food and Drug Administration, Center for Food Safety and Applied Nutrition, November 1996). Explain that these can be done with the students as a follow-up activity.
5. Provide the teacher with the handouts, *Wheel of Calcium Choices* – Dairy Council and *Power-Up* Dairy Council.
6. Have the students make a display for the school cafeteria wall about Building Better Bones.

## **Arizona Standards – Comprehensive Health Education Standards**

CH1-E1 Explain the relationship between positive health behaviors and health care and the prevention of injury, illness, disease, and disability and premature death

PO1 Illustrate how positive health behaviors can prevent common injuries, diseases and conditions

CH1-E6 Describe ways to reduce risks related to adolescent health problems

PO1 Determine personal health behaviors that reduce health problems

CH1 E8 Explain how basic nutrients are utilized by the body and the relationship of a balanced diet and essential nutrients to appropriate weight, appearance and wellness

PO2 Describe how a balanced and nutritious diet is related to weight, appearance and wellness

CH1-P1 Analyze how behavior impacts health maintenance and disease prevention

PO1 Determine the positive and negative choices for a balanced, healthy lifestyle (e.g. poor eating habits versus good eating habits)

### **Curriculum Committee:**

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## Suggested Food Models for Target Activity

### Breakfast

Egg  
Bacon  
Sausage  
Corn Flakes  
Waffle  
Pancake  
Bagel  
English Muffin  
Hash Browns  
Cantaloupe  
Orange Juice  
Banana  
Skim Milk  
1% Milk  
2% Milk  
Sweet Roll  
Donut  
Maple Syrup  
Cream Cheese  
Butter

### Lunch

Turkey Sandwich  
Pizza  
Hamburger  
Fish Sandwich  
Macaroni and Cheese  
Chef Salad  
Submarine Sandwich  
Tomato Soup  
Ice Cream  
Yogurt  
1% Milk  
2% Milk  
Chocolate Milk  
Skim Milk  
Milkshake  
Chocolate Pudding  
Peach  
Pear  
Watermelon  
Salad Dressing

### Dinner

Taco  
Burrito  
Refried Beans  
Rice  
Spaghetti  
French Bread  
Tossed Salad  
Roast Beef  
Baked Potato  
Mashed Potatoes  
Spinach  
Corn  
Pie  
Ice Cream  
Skim Milk  
1% Milk  
2% Milk  
Parmesan Cheese  
Sour Cream  
Butter

### Snacks

Carrots  
Broccoli  
Celery  
Peanut Butter  
Cheddar Cheese  
American Cheese  
Mozzarella Cheese  
Cottage Cheese  
Brownie  
1% Milk

Frozen Yogurt  
Flavored Yogurt  
Raisins  
Strawberries  
Orange  
Peaches  
Saltines  
Graham Crackers  
Orange Juice  
2% Milk

Popcorn  
Ritz Crackers  
Corn Chips  
Potato Chips  
Pretzels  
Sunflower Seeds  
Granola Bar  
Chocolate Bar  
Milkshake  
Chocolate Milk