

Calcium, Bones, and Osteoporosis

Lisa Mitchell, WVU Extension Agent, Mercer County

Terrill Smith, WVU Extension Agent, Raleigh and Summers Counties

Educational Objectives

1. Become more aware of the relationship of what we eat and physical activity to bone health.
2. Learn how to evaluate calcium intake from food.
3. Make lifestyle changes to build strong, dense bones if a person is young and to prevent or slow down bone loss if a person is older.

Have you ever noticed that many elderly women break their hips? Often, osteoporosis causes these problems.

Osteoporosis means “porous bones.” In this disease, the bones are weakened by the loss of minerals, especially calcium, from their structure. The bones generally stay the same size, but the inside of some of them become full of holes like brittle pieces of coral or a hard, dry sponge. This happens slowly over many years.

When 30 percent or more of the mineral is lost, the bones may break under the slightest pressure – the kind of stress that would not hurt normal bones. For example, a woman may break a rib from trying not to sneeze. In later stages of osteoporosis, doing just about anything can cause a broken bone in back, wrist, hip, or ribs. The National Osteoporosis Foundation (NOF) estimates that half of all women and one in eight men in this country will have an osteoporosis-related fracture at some time.



Osteoporosis is a crippling disease, which is growing in numbers each year among older Americans, particularly women. It is often referred to as the “silent disease” because there may be no symptoms until a fracture occurs; the diagnosis is made at that time. More than 25 million Americans have osteoporosis, and at least 1.5 million broken bones happen because of this disease each year.

Facts to remember:

Every day, 685 women fracture their hips, 1,918 women fracture their spines, and 685 women fracture their wrists. Most breaks occur in the hip, spine, and wrist. Broken hips are the most serious. Twenty

– continued –

percent of those with a broken hip die from complications such as pneumonia or blood clots.

Experts estimate the cost for treating osteoporosis to be from \$10 billion to \$20 billion per year. As the number of older Americans grows, the cost will increase.

The risk of a woman receiving a hip fracture due to osteoporosis is the same as her combined chances of developing breast, uterine, and ovarian cancer. With proper prevention, there is definite hope that these statistics will improve over the next few years. Treatments are now aimed at slowing down bone loss, starting at menopause.

Women can take preventive measures before menopause to lower their risk of developing osteoporosis. Two important steps to maintain healthy bones are doing weight-bearing exercises and getting the proper amount of calcium each day.

Who is at risk for osteoporosis?

- Though men can develop osteoporosis, women are most at risk.
- Underweight white women who have stopped menstruating, especially those who have undergone early menopause.

Here are some risk factors over which you have no control:



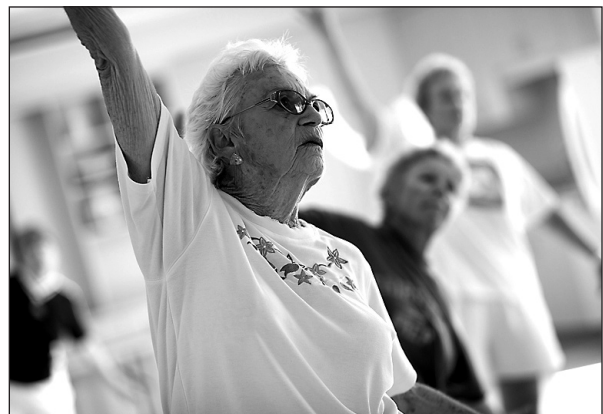
- Female gender
- Age
- Fair skin (Caucasian or Asian)
- Small bone structure
- Low body weight
- Early menopause, either natural or due to an operation
- Positive family history of osteoporosis

Although most studies have been done on Caucasian and Asian women, there are now indications that osteoporosis may be more

prevalent than thought in Hispanic and Native American women. Almost one-third of African American women, a group once thought to be unaffected by osteoporosis, may also be affected.

Factors you can control

- Low calcium intake.
- Smoking (studies show that smoking lowers the hormone called estrogen in a woman's bloodstream, thus weakening the bones. Smoking is even more dangerous for women with other risk factors for osteoporosis.
- Alcohol intake of more than three standard glasses per week.
- Certain medications for long-term use such as cortisone, thyroid, heparin (a blood thinner), and anticonvulsants also decrease the strength of bones. If you are taking any of these medications, do not discontinue their use. Instead, discuss this with your healthcare professional. He or she may want to adjust your dosage or monitor you more closely.
- Alcohol abuse or excessive amounts of caffeine.



- Lack of weight-bearing exercises: It is lack of physical activity and not aging that is one of the major contributors to osteoporosis. Aerobic exercise such as walking, tennis, basketball, or weightlifting is very important in building stronger bones.
- Many over-the-counter drugs can cause bone loss. For example, excessive use of laxatives and antacids can contribute to bone loss.



Other factors that may contribute to osteoporosis include:

- Removal of ovaries
- Breastfeeding, particularly if children are very close in age
- Stressful lifestyle

Though menopause is the single-most important cause of osteoporosis, osteoporosis is not an inevitable part of menopause or aging.

Calcium in your diet

One of the reasons calcium is removed from the bones is that other parts of your body need calcium for other uses. It helps to make your muscles work. It is also essential for digestion. When the level of calcium in your blood is not high enough, the body takes calcium from the skeleton. Problems will develop when the calcium is not returned to the bones.

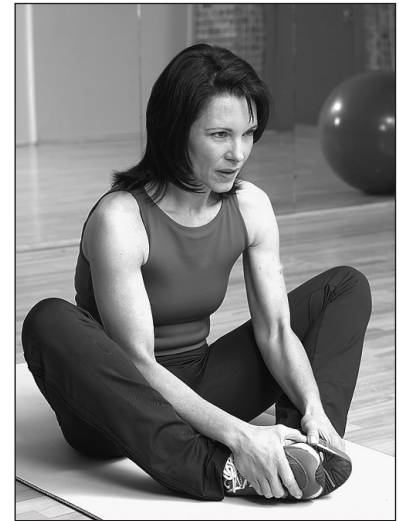
Our bodies contain more calcium than any other mineral. Ninety-nine percent of this calcium is found in the bones and teeth. The other 1 percent, equally vital to our health, circulates in the blood. It helps with blood clotting, regulating heart beat, and contracting muscles.



The calcium in tooth enamel is fairly stable. Once a tooth is formed, it doesn't lose calcium (except when decay sets in). This isn't true for calcium in the bones. Though the basic outside structure of bones may seem the same, they are constantly changing or remodeling. The bones act as "storage banks" in which calcium can be deposited or withdrawn as needed to keep balance between the mineral in the blood and that in the bones.

Other nutrients – proteins, phosphorus, vitamin D, fluoride, and magnesium – and a number of hormones are involved along with calcium in bone-building.

Building and keeping strong bones is a lifelong commitment. Too many women think they do not have to worry about osteoporosis until they reach menopause. This is simply not true.



Research shows that the best way to prevent this disease is to develop lifelong healthy habits that build bone strength.

During childhood and adolescence, bones grow wider, longer, and stronger. Bones continue to grow in mass, strength, and hardness until around age 35. Sex, race, nutrition, exercise, and overall health influence bone mass. Though bone mass (denseness) will vary among individuals, men have about 30 percent more than women, and blacks have about 10 percent more than whites. The years between ages 11 to 16, particularly the first two years after the onset of menstruation, are critical for the buildup of bone mass. Almost half (45%) of bone mass develops during the teen years. Good health habits to prevent osteoporosis should begin at that early age.

It is never too late to do something to help your bones. The daily recommendations for calcium are:

Adults 19-50 years old	1,000 mg/day
Adults 51 and older	1,200 mg/day
Postmenopausal women (not taking estrogen)	1,500 mg/day

Daily intake of calcium should not exceed 2,500 mg, and ideally no more than 500 mg at any one time.

Exercise tips:

L	Load- or weight-bearing: Start small; don't try to do too much or for too long.
I	Intensity: Increase resistance, or weights, rather than repetitions.
V	Variety: Combine several weight-bearing exercises.
E	Enjoyment: Find exercises you like; do them with friends or family.

- Warm up before starting and cool down at the end of each exercise session.
- Drink plenty of water.
- Check with your healthcare provider before you start.

Suggested activities

1. Demonstrate the amount of calcium in the human body at the various life stages. The flour represents the amount of calcium by weight in the body at different life stages. Calcium from food becomes part of the bones' framework. The more calcium bones contain, the stronger and denser they are.

Vitamin D is a bone-builder, too. It helps the body absorb calcium from food and deposit minerals into bones. Phosphorous and magnesium are also major mineral components of bones.

Childhood and teenage years are critical times to build bone mass. Nearly half of all adult bone mass is formed during adolescence.

Assemble:

- 10 pounds of white flour
- Measuring cups
- Clear plastic re-sealable bags (gallon and quart sizes)

Amount of flour	Stage of life
¼ cup	Newborn
3 ½ cups	10-year-old
7 cups	15-year-old
11 cups	Adult
6 ½ cups	Adult with Osteoporosis of 30 to 40% bone loss

2. Using the chart in the handout (WL 479), have members evaluate their previous day's calcium intake and note one improvement they can make.

Selected resources

National Osteoporosis Foundation

National Institutes of Health: Osteoporosis and Related Bone Diseases

The North American Menopause Society

The West Virginia Bureau for Public Health: Osteoporosis Prevention Education Program

FDA Office of Women's Health

Cent\$ible Nutrition Program, University of Wyoming Family and Consumer Science

Riggs B.L. and Melton, L.J.: The worldwide problem of osteoporosis: Insight afforded by epidemiology, *Bone* 17 (5): 505S-51S, November 1995).

Institute of Medicine National Academy of Science

California Department of Public Health (www2.cdph.ca.gov/HealthInfo/healthyliving/childfamily/Documents/MO-NUPA-03calcium.pdf)

