



**National Institutes of Health
Osteoporosis and Related
Bone Diseases ~
National Resource Center**

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What Is Bone?

In order to understand osteoporosis, it is important to learn about bone. Made mostly of collagen, bone is living, growing tissue. Collagen is a protein that provides a soft framework, and calcium phosphate is a mineral that adds strength and hardens the framework. This combination of collagen and calcium makes bone strong and flexible enough to withstand stress. More than 99 percent of the body's calcium is contained in the bones and teeth. The remaining 1 percent is found in the blood.

There are two types of bone found in the body – cortical and trabecular. Cortical bone is dense and compact. It forms the outer layer of the bone. Trabecular bone makes up the inner layer of the bone and has a spongy, honeycomb-like structure.

Bone Remodeling

Throughout life, bone is constantly renewed through a two-part process called remodeling. This process consists of resorption and formation. During resorption, old bone tissue is broken down and removed by special cells called osteoclasts. During bone formation, new bone tissue is laid down to replace the old. This task is performed by special cells called osteoblasts. Osteoclast and osteoblast function is regulated by several hormones including calcitonin, parathyroid hormone, vitamin D, estrogen (in women) and testosterone (in men), among others.

The Bone Bank Account

Think of bone as a bank account where you “deposit” and “withdraw” bone tissue. During childhood and the teenage years, new bone is added to the skeleton faster than old bone is removed. As a result, bones become larger, heavier, and denser. For most people, bone formation continues at a faster pace than removal until bone mass peaks during the third decade of life.

Remember, in order to be able to make “deposits” of bone tissue and reach the greatest possible peak bone mass, you need to get enough calcium, vitamin D, and exercise – important factors in building bone.

After age 20, bone “withdrawals” can begin to exceed “deposits.” For many people, this bone loss can be prevented by continuing to get calcium, vitamin D, and exercise and by avoiding tobacco and excessive alcohol use. Osteoporosis develops when bone removal occurs too quickly or replacement occurs too slowly or both. You are more likely to develop osteoporosis if you did not reach your maximum peak bone mass during your bone building years.

Women, Men, and Osteoporosis

Women are more likely than men to develop osteoporosis. This is because women generally have smaller, thinner bones, and because they can lose bone tissue rapidly in the first 4 to 8 years after menopause due to the sharp decline in production of the hormone estrogen. Produced by the ovaries, estrogen has been shown to have a protective effect on bone. Women usually go through menopause between ages 45 and 55. After menopause, bone loss in women greatly exceeds that in men. However, by age 65, women and men tend to lose bone tissue at the same rate. While men do not undergo the equivalent of menopause, production of the male hormone testosterone may decrease, and this can lead to increased bone loss and a greater risk of developing osteoporosis.

Osteoporosis Prevention

Osteoporosis is preventable for many people. Prevention is important because while there are treatments for osteoporosis, a cure has not yet been found. A comprehensive program that can help prevent osteoporosis includes:

- a balanced diet rich in calcium and vitamin D
- weight-bearing exercise
- a healthy lifestyle with no smoking or excessive alcohol intake
- bone density testing and, when appropriate, medication.

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For Your Information

For updates and for any questions about any medications you are taking, please contact the U.S. Food and Drug Administration at 1-888-INFO-FDA (1-888-463-6332, a toll-free call) or visit their Web site at www.fda.gov.