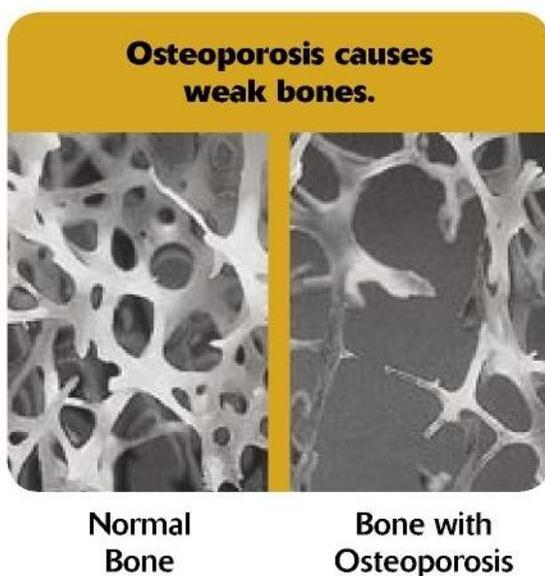




Osteoporosis, or porous bone (see figure), is a disease characterized by low bone mass and structural deterioration of bone tissue, leading to bone fragility and an increased risk of fractures of the hip, spine, and wrist. It is often called a “silent” disease because it has no discernible symptoms until there is a bone fracture. Like other tissues in the body, bone tissue is in a state of constant flux – remodeling and rebuilding. There are many influences on bone mass and strength, such as genetics, hormones, physical exercise and diet (especially intake of calcium, phosphate, vitamin D, and other nutrients). Osteoporosis occurs when there are problems with these factors, resulting in more bone loss than bone rebuilding. Osteoporosis can strike at any age and affects both men and women. In the United States today, more than 40 million people either already have osteoporosis or are at high risk for fractures due to low bone mass.

**Figure from U.S. Department of Health and Human Services. The 2004 Surgeon General’s Report on Bone Health and Osteoporosis: What It Means To You. U.S. Department of Health and Human Services, Office of the Surgeon General, 2004.**

## Yesterday



- Relatively little was known or could be done about osteoporosis; both the disease and the fractures that go along with it were thought of as an inevitable part of old age. Few risk factors other than the menopause had been identified.
- A limited number of effective diagnostic tools were available to assist health care providers in identifying and treating individuals at risk for osteoporosis.
- Osteoporosis was viewed solely as a “woman’s disease.” Men did not recognize the disease as a significant threat to their mobility and independence.

## Today

- The devastating consequences of low bone mass—that is, broken bones—can often be prevented. For example, simple changes to a person's home (e.g., adding more lights, removing clutter) can prevent falls. A balanced diet and modest exercise enhance bone strength. And, medications can slow disease progression.
- Enhancing bone health is important at any age. NIH, in partnership with other Federal agencies and non-governmental organizations, are implementing programs to help young people adopt bone-healthy behaviors that will last a lifetime. Furthermore, NIH-supported clinical studies in nutrition and physical activity interventions provide strong evidence that fractures can be prevented and bone loss reduced even in older individuals, providing evidence that osteoporosis does not need to be a natural consequence of aging.
- Identification of risk factors for osteoporosis is providing clinicians with important information about who is at most risk for this debilitating disease and who would benefit from treatment. Major contributions from the Study of Osteoporotic Fractures (SOF), which began over 20 years ago, and its counterpart for men (Mr. OS), revealed that bone mineral density of the hip is one of the best predictors of fracture. These studies, and others, also showed

that body weight, diet, physical activity, family history, and medication use are important risk factors.

- Researchers have dispelled the myth that some fractures in older people are “earned” and, therefore, do not necessarily signal osteoporosis. SOF, Mr. OS, and other studies have shown that older people who have a fracture should be tested for osteoporosis—even if the fracture occurred because of a fall.
- Dual energy x-ray absorptiometry (DXA) has become one of the most commonly used methods of assessing bone mineral density. Mr. OS is generating data that the U.S. Preventive Services Task Force can incorporate into guidance on using bone mineral density to assess fracture risk. Mr. OS data also will be useful when developing guidelines for diagnosing osteoporosis in men.
- New classes of drugs have been developed that significantly reduce the risk of fractures in individuals with bone disease. Federal support for unique clinical intervention studies of combination therapies for osteoporosis has played an important role in determining the best therapeutic practices associated with these drugs, potentially minimizing drug use and cost.
- These advances—along with other efforts to improve osteoporosis prevention, diagnosis, and treatment—are having a positive effect on bone health. Between 1995 and 2005, the age-adjusted hospitalization rate for hip fractures among older Americans decreased. For women aged 65 years or more, the rate decreased 24.5 percent. For men in the same age range, the rate decreased 19.2 percent.

## Tomorrow

- Advances in scientific knowledge have ushered in a new era in bone health, one in which bone fractures can be prevented in the vast majority of individuals, and identified early and treated effectively in those who do get them.
- Although bone mineral density is one of the best measures for assessing osteoporosis and fracture risk, there are some limitations to using bone mineral density as a single predictive measure of fracture risk. Cutting edge imaging, identification of clinical risk factors, as well as biomarker research, will continue to

provide insight into the other characteristics of bone that may inform studies of skeletal health.

- Results from additional long-term studies in the elderly, minority populations, and women and men will assist researchers and clinicians in designing and prescribing targeted therapies and prevention strategies based on the individual characteristics of patients.
- Genetics can account for up to 75 percent of a person’s bone mineral density. Now, researchers are determining which genes and bone formation pathways are involved in bone remodeling, in hopes that their discoveries will lead to the development of better strategies to treat or prevent osteoporosis.

**Contact: NIH Osteoporosis and Related Bone Diseases National Resource Center toll free: 800-624-BONE (2663); email: [NIHBoneInfo@mail.nih.gov](mailto:NIHBoneInfo@mail.nih.gov).**

[www.bones.nih.gov](http://www.bones.nih.gov)

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