

Bone Introduction

Taken from NIH Osteoporosis Fact Sheet
<http://www.osteoporosis.org/newfile.asp?doc=osteoporosis+Overview&doctype=HTML+Fact+Sheet>

Bone -- definition

- Bone is a living, growing tissue.
- Made mostly of collagen, a protein that provides a soft framework, and calcium phosphate, a mineral that adds strength and hardens the framework.
- This combination of collagen and calcium makes bone strong yet flexible to withstand stress. More than 99% of the body's calcium is contained in the bones and teeth. The remaining 1% is found in the blood.

Clinical problem – Osteoporosis

- Osteoporosis (porous bone)
 - a disease characterized by low bone mass and structural deterioration of bone tissue, leading to bone fragility and an increased susceptibility to fractures of the hip, spine, and wrist. Men as well as women suffer from osteoporosis, a disease that can be prevented and treated.

Facts & Figures

- Major public health threat for 44 million Americans, 68% of whom are women.
- In the U.S. today, 10 million individuals already have osteoporosis and 34 million more have low bone mass, placing them at increased risk for this disease.
- One out of every two women and one in four men over 50 will have an osteoporosis-related fracture in their lifetime.
- More than 2 million American men suffer from osteoporosis, and millions more are at risk. Each year, 80,000 men suffer a hip fracture and one-third of these men die within a year.
- Osteoporosis can strike at any age.
- Osteoporosis is responsible for more than 1.5 million fractures annually, including 300,000 hip fractures, and approximately 700,000 vertebral fractures, 250,000 wrist fractures, and more than 300,000 fractures at other sites.
- Estimated national direct expenditures (hospitals and nursing homes) for osteoporosis and related fractures is \$14 billion each year.

Bone Remodeling

- Throughout your lifetime
 - old bone is removed (resorption)
 - new bone is added to the skeleton (formation).
- Resorption and formation
 - During childhood and teenage years, new bone is added faster than old bone is removed. Bones become larger, heavier, and denser.
 - Peak bone mass (maximum bone density and strength) is reached around age 30.
 - After age 30, bone resorption slowly begins to exceed bone formation.
 - Bone loss is most rapid in the first few years after menopause but persists into the postmenopausal years.
 - Osteoporosis develops when bone resorption occurs too quickly or if replacement occurs too slowly.
 - Osteoporosis is more likely to develop if you did not reach optimal bone mass during your bone building years.

Risk Factors you cannot change

- Gender - Your chances of developing osteoporosis are greater if you are a woman. Women have less bone tissue and lose bone more rapidly than men because of the changes involved in menopause.
- Age - the older you are, the greater your risk of osteoporosis. Your bones become less dense and weaker as you age.
- Body size - Small, thin-boned women are at greater risk.
- Ethnicity - Caucasian and Asian women are at highest risk. African-American and Latino women have a lower but significant risk.
- Family history - Susceptibility to fracture may be, in part, hereditary. People whose parents have a history of fractures also seem to have reduced bone mass and may be at risk for fractures.

Risk Factors you can change

- Sex hormones: abnormal absence of menstrual periods (amenorrhea), low estrogen level (menopause), and low testosterone level in men.
- Anorexia
- A lifetime diet low in calcium and vitamin D.
- Use of certain medications, such as glucocorticoids or some anticonvulsants
- An inactive lifestyle or extended bed rest
- Cigarette smoking
- Excessive use of alcohol

