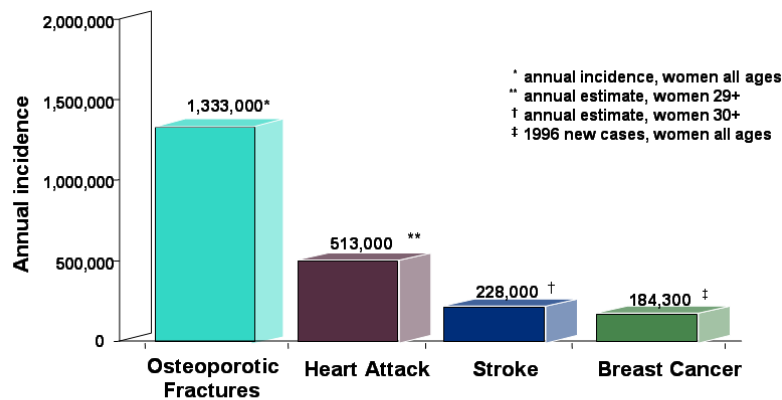


Osteoporosis, Characteristics, risk factors prevention and detection

Characteristics

Osteoporosis, or porous bones, is a disease characterized by low bone mass and structural deterioration of tissue leading to bone fragility and an increased susceptibility to fractures of the hip, spine and wrist. While there is increased global awareness of osteoporosis, the disease is under-diagnosed and under-treated.

According to the International Osteoporosis Foundation¹ (IOF), osteoporosis affects over 200 million people worldwide, 80% of which are women. Osteoporosis is a major public health threat for 44 million Americans, and the disease costs the U.S. healthcare system in excess of \$17 billion (\$47 million per day) annually compared to breast cancer at \$6 billion. In fact, more people die of osteoporosis-related fractures each year than die of breast cancer.



Derived from Riggs, BL *Bone* 17(5)(Suppl):505S-511S, 1996, assuming women represent 88.9% of all fractures.
Heart & Stroke Facts: 1996 Statistical Supplement, American Heart Assoc
Cancer Facts & Figures - 1996, American Cancer Society

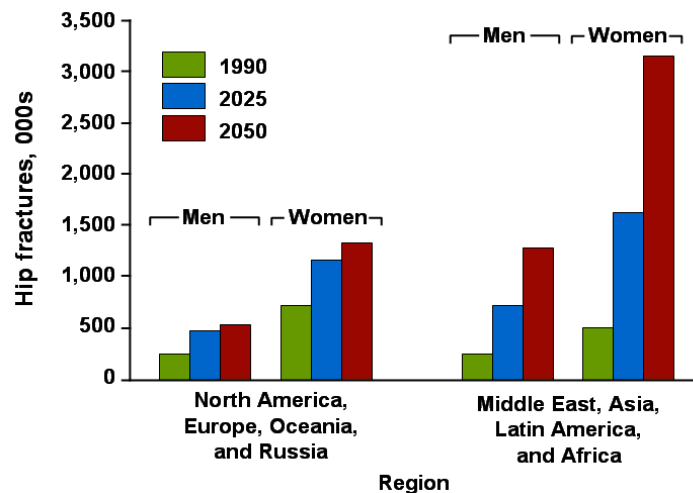
Osteoporosis compared to other diseases in women

The majority of people with osteoporosis are neither diagnosed nor treated. In a Gallup survey of women with osteoporosis ages 55-60 86% had never spoken with their doctors about osteoporosis prevention prior to their diagnosis, and

¹ Web site of the International Osteoporosis Foundation, July 2002.

there exists 2-3 undiagnosed patients for every one that is found². Less than 10% of distal forearm fractures or hip fractures are diagnosed or treated for osteoporosis, as symptomatic treatment prevails; however, osteoporosis is responsible for more than 1.5 million fractures annually³:

- 300,000 hip fractures;
- 700,000 vertebral fractures;
- 200,000 wrist fractures; and
- 300,000 fractures at other sites.



The burden of hip fracture will increase worldwide

Osteoporosis can be prevented and treated, which results in considerable savings to health care systems worldwide. In addition to these savings, hospitals are missing a major source of revenue, since they usually treat fractures symptomatically, rarely looking for the underlying cause of the problem.

Risk factors

Certain people are more likely to develop osteoporosis than others. Factors that increase the likelihood of developing osteoporosis are called "risk factors." The following risk factors have been identified:

- Female;
- Thin and/or small frame;
- Advanced age;
- A family history of osteoporosis;
- Postmenopausal status;
- Abnormal absence of menstrual periods (amenorrhea);
- Anorexia nervosa;

² National Osteoporosis Foundation, May 2000.

³ NIH Osteoporosis & Related Bone Diseases- National Resource Center, Aug 2002.

- A diet low in calcium;
- Steroid or anticonvulsant use;
- Low testosterone levels in men;
- Inactive lifestyle;
- Smoking;
- Excessive use of alcohol; and
- Caucasian or Asian.

Prevention

By about age 20, the average woman has acquired 98 % of her skeletal mass. Building strong bones during childhood and adolescence can be the best defense against developing osteoporosis later in life; however, women can lose up to 20% of their bone mass in the five to seven years following menopause, making them more susceptible to osteoporosis. There are four steps that work together to help prevent osteoporosis:

- A balanced diet rich in calcium and vitamin D;
- Weight-bearing exercise;
- A healthy lifestyle with no smoking or excessive alcohol intake; and
- Bone density testing and medication, when appropriate.

Detection

Typically there are no obvious symptoms of early stage osteoporosis, and the first symptom is often a debilitating fracture. Osteoporosis is primarily diagnosed by testing the density of the bones. A bone mineral density (BMD) test measures bone mineral content. The higher the bone mineral content, the stronger (or denser) the bone. Studies have shown that bone mineral density correlates highly with bone strength. The bone density test is sometimes used to show the rate of bone mineral loss in patients not receiving therapy.

There are a number of instruments that measure bone density. Central machines, such as DXA and QCT, measure density in the hip and spine. Peripheral machines utilize ultrasound or X-ray technology to measure density in the finger, wrist, kneecap, shinbone and heel. Controversy exists regarding the correlation between machines measuring at different sites; however, some methods are highly correlated.