

Osteoporosis

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What is osteoporosis?

Osteoporosis is a common bone disease that affects 35% of women older than 65. Osteoporosis is a disease characterized by decreased bone mass, microscopic deterioration of the bone architecture, and resulting fragility fractures.

What can occur if you get osteoporosis?

One of every two Caucasian women will experience an osteoporotic fracture in their lifetime. Of Caucasian women aged 80 and over, 25% will experience a vertebral (spine) fracture. The economic impact is significant, with more than 400,000 hospital admissions and 2.5 million physician visits per year.

The impact of osteoporotic vertebral fractures is significant. Vertebral fractures (or compression fractures) can result in significant functional impairment, including chronic pain, difficulty bending, lifting, walking down stairs, and cooking. Vertebral fractures also result in loss of height of an individual and multiple fractures can give the back a hump-like appearance (“dowager hump”), called kyphosis. If severe, this can result in compression of abdominal contents and an abdominal bulge, sometimes causing the individual to complain of “getting fat” but not gaining any weight. Kyphosis can also result in chronic neck pain.

Even better known than osteoporotic fracture of the vertebra is osteoporotic fractures of the hip. Hip fractures lead to 15% mortality (death of the patient) within the first year and most individuals have a significant decline in function. Men have less than half the risk of women for hip fractures but twice the mortality rate. The risk of a hip fracture increases with the age of the individual, falls (especially falls to the side), low body weight, and a poor initial bone mass density.

What are the risk factors for osteoporosis:

Osteoporosis is associated with numerous risk factors, some of which can be modified. The risk factors that can be modified include smoking, low body weight (<127 lbs), estrogen deficiency, low calcium intake, alcoholism, impaired eyesight, recurrent falls, inadequate physical activity, and poor health and frailty. Risk factors that cannot be modified include personal history of fracture (as an adult), fracture in first degree relative (parents, siblings, children), Caucasian race, advanced age, female gender, dementia, and poor health and frailty. There does seem to be a genetic predisposition to osteoporosis.

How is osteoporosis diagnosed?

The diagnosis of osteoporosis can be made most easily by a bone scan, also called DEXA scan (dual energy xray absorptiometry). A scan, using minimal radiation exposure, is taken of the spine and/or hip. This is then compared with young, healthy adults with peak bone mass and also with an age corrected peer group. Osteoporosis is defined by the World Health Organization (WHO) as a bone mass that is 2.5 standard deviations below peak bone mass. If the patient has already had a fragility fracture, then the individual is said to have severe

osteoporosis. Osteopenia, a mild form of osteoporosis, is defined as a bone mass that is 1-2.5 standard deviations below peak bone mass.

Bone is living tissue. There is constant remodeling and repair. Before age 25, there is a net build-up of bone. Peak bone mass is not reached until age 25. After age 25, bone is lost a slow steady rate for men and women, but women have a precipitous drop around time of menopause. In fact, for every year a woman is without normal menstrual cycles, there is an average of 2% decline in bone mass. However, after age 60, a woman's rate of bone loss is approximately the same as in men, a slow steady rate of loss. Then again, around age 80, a significant decrease in bone mass occurs, both in men and women.

How can you prevent osteoporosis?

Fortunately, there are actions that can be taken to prevent osteoporosis and actions that can be taken even after one has been diagnosed with osteoporosis or osteopenia. Because cigarette smoking is a major risk factor for poor bone mass, smoking cessation is strongly encouraged. As an adolescent and young adult (before age 25), peak bone mass can be best achieved with an adequate supply of calcium, adequate nutrition, and adequate exercise. Calcium requirement for children aged 10 and younger is 700 mg (a dairy portion of milk, cheese, ice cream, or yogurt contains approximately 250mg) whereas for adolescents aged 10-25 (when peak bone mass is achieved), the calcium requirement is 1300mg. Adults require 800mg whereas postmenopausal women and those recovering from a fracture require 1500mg. While children have efficient absorption of calcium from their diet, adults have less efficient absorption. Therefore, calcium citrate and vitamin D supplements are encouraged. Caffeine can decrease the absorption of calcium.

Can exercise help in the prevention of osteoporosis?

Bone can be built up with the help of exercise and mechanical load. With no load, there will be a net loss of bone. However, moderate or high loads will remodel bone to withstand the new load. Moderate loads can be achieved from impact activities like dancing and walking, as well as other activities. Tai Chi has been shown in one study to be the best intervention for fall prevention, with a 47% reported decrease in falls. Exercise, when accompanied by an adequate calcium intake, has been shown to maintain or increase the bone mass of elderly individuals.

What about medications for osteoporosis?

There are a number of prescription medications that can prevent the first fracture or subsequent fractures from osteoporosis. Estrogen has been shown to prevent osteoporosis and to actually increase bone mass by 2% per year. After a woman stops taking estrogen, a loss of bone mass of 2% per year will occur. Studies have shown that seven years after stopping estrogen, bone mass will return to baseline status, unless another medication is used. Estrogen does not come without its risks, however, as it increases the risks of blood clots and breast and uterine cancer. If interested in estrogen, the individual should talk with their physician to weigh the risks and benefits.

Other medications used to treat osteoporosis include raloxifene, calcitonin, and the bisphosphonates. Raloxifene (Evista) is a selective estrogen receptor modulator and can decrease the risk of vertebral fracture by approximately 40-50% (there is no reported protection for the hip). Raloxifene, like estrogen, can actually increase bone mass. In comparison to

estrogen, the increase in bone mass is 60% of the increase seen with estrogen. Calcitonin is a non-sex, non-steroid hormone that can be taken as a nasal spray to increase bone mass in the spine at a rate comparable to that of estrogen. It has been shown to decrease vertebral fractures by 37% (no reported protection for the hip). The bisphosphonates include alendronate (Fosamax) and risedronate (Actonel). They function by blocking the breakdown of bone. Alendronate has been shown to increase bone mass in both hip and spine, comparable to that of estrogen. There is a decrease in the risk of fractures by 50% after one year of treatment.

Summary:

Osteoporosis is a disease of low bone mass, microarchitectural deterioration, and an increased number of fractures, mostly of vertebra and hips. Osteoporosis has a significant impact on the health and welfare of our nation's elderly. Osteoporosis can be prevented to a large degree with adequate calcium and nutrition, exercise, and smoking cessation. Osteoporosis, once diagnosed, can and should be treated with an estrogen or another medication shown to increase bone mass. Individuals must be as concerned with taking care of their bones as with fall prevention.

References:

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