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A number of risk factors are associated with the onset of osteoporosis and excessive age-related bone loss. Nonnutritional risk factors include age, gender, race, small body size, lack of physical activity, and smoking. Diet-related factors include low peak adult bone mass, anorexia nervosa, and lack of body fat. Habitual levels of calcium and vitamin D intake have been found to be related to bone mass in some studies but not in others. More convincing is evidence that there are impairments in calcium absorption with aging that are more pronounced in women with osteoporosis. In some persons this is related to poor synthesis of 1,25-(OH)<sub>2</sub>-vitamin D. Current treatments for osteoporosis include estrogen therapy to reduce the rate of bone resorption and supplementation with calcium and/or vitamin D or its metabolites. (CUN NUTR 1986;5:14752)

Osteoporosis is the most common disease associated with the bone loss of aging. For several reasons, it has aroused a great deal of scientific and medical interest in the last decade. These include the increasing proportion of elderly persons in the population, improved methods of detection of the disease, and progress in the prevention and treatment of the condition. This article will review what is known about the role of calcium and its metabolism in the etiology, prevention, and treatment of osteoporosis.

There are three different periods of change in bone mass in human subjects. Between conception and the time of epiphyseal closure there is a gradual increase in both trabecular and cortical bone. When bone growth ceases, there is a period of about 15 years of adulthood when the porosity of cortical bone declines, and there is a slight increase in cortical thickness. Peak adult bone mass occurs at approximately 35 years of age. A few years after this, age related bone loss commences to some degree in almost all persons. In women the most rapid rate of loss occurs for about 5 years after menopause when a negative balance of 40 to 120 mg of calcium per day indicates that this quantity of the mineral is being lost from both cortical and trabecular bone. After this the rate of bone loss is about 1% per year. In men the onset of bone loss is somewhat later and averages 0.3% per year.

The loss of bone during aging is associated with an increase in the incidence of fractures of the distal radius, vertebrae, proximal humerus; -pelvis, and proximal femur. The occurrence or high probability of risk of these fractures is associated with the presence of "osteoporosis." This term includes different clinical entities. Type 1 is postmenopausal osteoporosis; it occurs between 5 and 15 years after menopause and is characterized by vertebral fractures, a greater proportion of trabecular bone loss than cortical loss, and defects in bone remodeling. Type 2 is senile osteoporosis, which reaches a peak incidence between 70 and 90 years of age in both men and women. An excessive amount of loss occurs equally in trabecular and cortical bone, fractures of the wrist and hip are more common, and inadequate vitamin D synthesis and/or intake may be indicated by low plasma levels of vitamin D metabolites and elevated parathyroid hormone (PTH) concentrations.

Histologically, osteoporosis is characterized by the loss of both bone mineral and bone matrix, with relatively normally mineralized remaining bone. Table I provides a summary of the histologic and metabolic changes that have been reported to occur in osteoporosis. It is difficult to detect the onset of this disease unless the individual is being followed longitudinally and changes in calcium balance are being monitored. Onset is gradual, and initially there are no symptoms.

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