

Osteoporosis

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INTRODUCTION

Osteoporosis, the most common disorder of bone and mineral metabolism, affects about 50% of women and 25% of men older than 50 years. The National Institutes of Health Consensus Development Panel on Osteoporosis Prevention defines osteoporosis as a skeletal disorder characterized by compromised bone strength, predisposing a person to an increased risk of fracture. Bone strength has two main components: bone density and bone quality. Bone density reflects the peak adult bone mass and the amount of bone lost in adulthood. Bone quality is determined by bone architecture, bone geometry, bone turnover, mineralization, and damage accumulation (i.e., microfractures) (Fig. 75-1).

DEFINITION AND EPIDEMIOLOGY

In the United States, 2 million osteoporotic fractures occur each year. There are almost 300,000 hip fractures each year, which are associated with a mortality rate of more than 20% during the first

year. More than 50% of patients with hip fracture are unable to return to their previous ambulatory state, and about 20% of them are placed in long-term care facilities. When defined by bone mineral densitometry, 48 million Americans have low bone mass, and 9 million have osteoporosis. Although morbidity is less with vertebral fractures, the 5-year mortality rate is similar to that for hip fractures. Only one third of radiologically diagnosed vertebral fractures receive medical attention.

PATHOLOGY AND RISK FACTORS

Peak bone mass is determined primarily by genetic factors. Men have a higher bone mass than women, and African Americans and Hispanics have a higher bone mass than whites. Other factors that contribute to the development of peak bone mass are the use of gonadal steroids, timing of puberty, calcium intake, exercise, and growth hormone.

The causes of bone loss in adults are multifactorial. The pattern of bone loss is different in women than in men, and bone

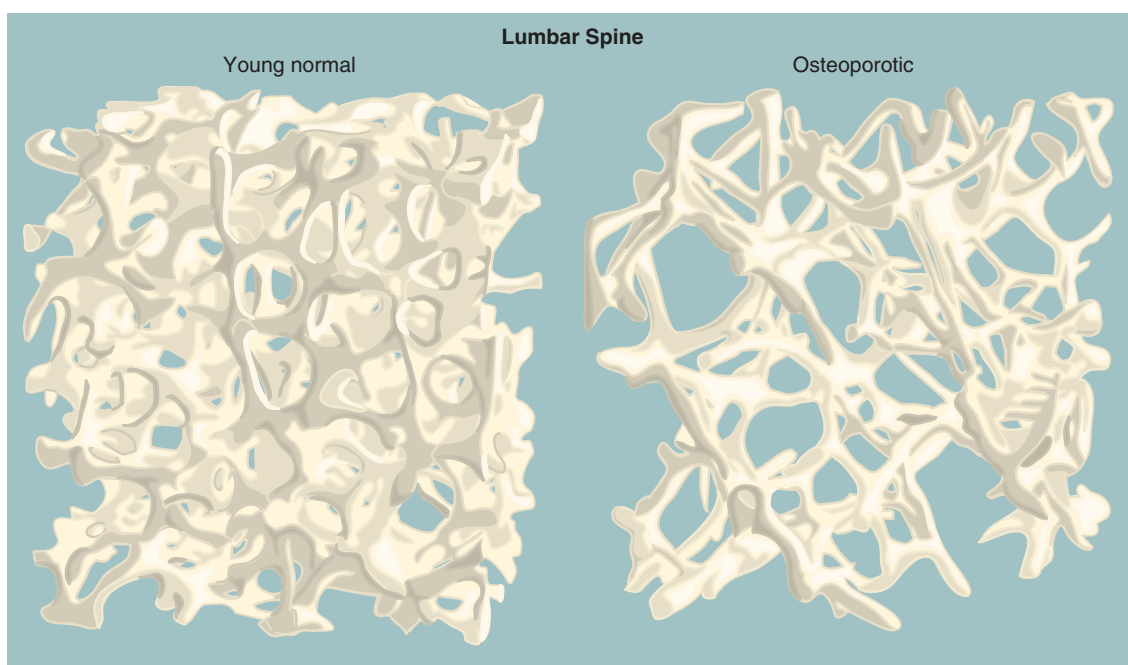


FIGURE 75-1 Three-dimensional reconstruction by microcomputed tomography of a lumbar spine sample from a young adult normal woman and from a woman with postmenopausal osteoporosis. In the osteoporotic woman, bone mass is reduced and microarchitectural bone structure is deteriorated. Whereas the platelike structure in the normal case is very isotropic, the structure in the osteoporotic case shows preferential loss of horizontal struts; the plates have become rods that are thin and farther apart, and there is a concomitant loss of trabecular connectivity. These changes lead to a reduction in bone strength that is more than would be predicted by the decrease in bone mineral density. (From Riggs BL, Khosla S, Melton LJ 3rd: Sex steroids and the construction and conservation of the adult skeleton, *Endocr Rev* 23:279–302, 2002; Courtesy Ralph Mueller, PhD, Swiss Federal Institute of Technology [ETH] and University of Zurich, Switzerland.)