



# Osteoporosis in the Oncology Setting

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As an advanced practice nurse, you care for patients who have a variety of chronic conditions, and you are expected to handle them all. How do you keep up with all the advances in cardiology, endocrinology, gastroenterology, and infectious disease? You read this column, dedicated to managing a variety of primary care disorders in conjunction with cancer treatment. If you have developed expertise in management of one or more chronic diseases, consider writing for this column. Contact Associate Editor Joyce Marrs, MS, APRN-BC, OCN®, AOCNP, via e-mail at joycemrn@sbcglobal.net.

## Case Presentation

Betty is a 67-year-old woman originally diagnosed in 1992 with a tumor 1C, node 0, metastasis 0 infiltrating ductal carcinoma that was estrogen and progesterone receptor positive. She was treated with a right modified radical mastectomy followed by five years of tamoxifen. In October 2001, she had a local recurrence that required an excision of a 0.5 cm diameter lesion followed by radiation, chemotherapy with cyclophosphamide and doxorubicin, and hormonal therapy with letrozole (Femara®, Novartis Pharmaceuticals, East Hanover, NJ).

Betty's personal medical history includes two pregnancies, menopause at the age of 55, and hormone replacement therapy with estrogen for one year following menopause. Betty also has a history of hyperlipidemia and nephrolithiasis. She denies any alcohol, tobacco, or illicit drug use. Significant family history includes her mother having an unidentified gynecologic cancer.

Betty had a routine screening bone densitometry test done in November 2004. At that point, she had been on letrozole for 37 months. The left hip T score was -2.47 with a corresponding -0.39 Z score. She was diagnosed with severe osteopenia of the left hip, which has a medium risk for fracture. The lumbar spine scores were normal. Betty was placed on alendronate (Fosamax®, Merck & Co., Inc., Whitehouse Station, NJ) 35 mg by mouth weekly in ad-

dition to calcium 1,500 mg and vitamin D 800 IU daily.

## Case Discussion

Betty was 55 years old when originally diagnosed with breast cancer. Menopause occurred with the administration of adjuvant chemotherapy. With the care she has received, Betty has survived her cancer for 12 years with a good quality of life. However, like many other women surviving breast cancer today, treatment options can produce other long-term disorders, such as osteoporosis (Twiss et al., 2001).

Osteoporosis is a disease that occurs with aging as a result of estrogen loss. Approximately 28 million Americans have osteoporosis or osteopenia (Malabanan, 2003; Slovik, 2002). Although the disease primarily affects women, men also are affected. Osteoporosis is responsible for approximately 1.5 million fractures a year in the United States (Bennett, 2003). The total estimated cost for the care of osteoporotic fractures is approximately \$14 billion a year.

Osteoporosis is a common metabolic bone disease. The characteristic finding in osteoporosis is a low bone mass and a degeneration of the microarchitecture of bone tissue (Slovik, 2002). These changes result in an increased risk for fractures resulting from bone fragility. Common sites for fractures are the vertebrae, hips, wrists, forearms, feet, and toes (Bennett, 2003).

Osteopenia can lead to osteoporosis. Osteopenia is defined as a decreased bone density mass when compared to a healthy, 30-year-old adult (Slovik, 2002).

## Pathophysiology

Bone mass is laid down by age 20. However, throughout life, the bone continually completes a remodeling cycle. The cycle occurs in two phases: bone resorption and bone formation (Malabanan, 2003; Mourad, 1998). The process of remodeling for one cycle takes four months in a healthy adult, whereas the process may take up to two years in a person with osteoporosis (Mourad). The rate of bone resorption and bone formation is generally in constant equilibrium in healthy individuals. Osteoporosis occurs when the remodeling cycle is out of balance.

In osteoporosis, bone replacement is slower than bone resorption, causing a net loss of bone (Malabanan, 2003). Bone resorption occurs when osteoclasts, cells that originate from monocytes and macrophages, remove old or damaged bone. Bone formation occurs when osteoblasts set down the organic matrix by depositing calcium and phosphorus into the osteoid.

## Risk Factors

The imbalance in bone remodeling can begin slowly at age 40 with an acceleration at the time of menopause (Twiss et al., 2001). Premenopausal female cancer survivors treated with chemotherapy may experience chemotherapy-induced menopause. Earlier

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