DURING AND AFTER TREATMENT

Osteoporosis: Common Side Effect

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For osteoporosis, standards of care are based on emerging evidence-based practice.

Definitions

- Osteopenia, bone density that is lower than normal, is a less severe form of bone loss than osteoporosis (National Cancer Institute, n.d.).
- Osteoporosis is the most common metabolic bone disease, characterized by low mineral bone mass and microdeterioration of bone tissue (International Osteoporosis Foundation, 2021). Secondary osteopenia and osteoporosis can result from cancer treatment, which can then accelerate bone mineral density loss. Bone loss from cancer treatment is faster and more severe than that associated with usual aging (Shapiro et al., 2019).
- Using dual-energy x-ray absorptiometry (DEXA), osteopenia and osteoporosis can be distinguished as follows:
  - ☐ Osteopenia: T score between –1 and –2.5
  - ☐ Osteoporosis: T score of –2.5 or lower

Incidence

- In the general population, one in two postmenopausal women will have an osteoporotic fracture in their lifetime; for men, the risk is one in four (National Osteoporosis Foundation, 2021). As such, given the effects of cancer and its treatment, particularly in hormone-dependent cancers (e.g., antiestrogen or androgen-deprivation therapy [ADT]), as well as chemotherapy-induced ovarian failure, secondary osteoporosis can occur as a comorbidity in patients with cancer (Shapiro et al., 2019).
- High prevalence is found among men with prostate cancer, because the use of ADT leads to 53% diagnosed with osteoporosis (Lassemillante et al., 2017).
- Women with breast cancer receiving therapy with an aromatase inhibitor (AI) have a two- to fourfold increase in bone loss compared to physiologic menopausal bone loss (Shapiro et al., 2019).
- Hematopoietic stem cell transplantation (HSCT) recipients may have an eightfold increased risk of fracture for female survivors and a seven- to ninefold increased risk for men aged 45–64 years (Pundole et al., 2015).

PROVIDER RESOURCES

American Association of Clinical Endocrinologists and American College of Endocrinology Clinical Practice Guidelines
- www.sciencedirect.com/science/article/pii/S1530891X20428277

American Society of Clinical Oncology
- www.asco.org

International Osteoporosis Foundation
- www.osteoporosis.foundation/health-professionals/treatment

National Comprehensive Cancer Network
- www.nccn.org

National Osteoporosis Foundation
- www.nof.org

Pathophysiology

- Osteoporosis is characterized by a loss of normal bone remodeling, with increased bone resorption (osteoclasts) and decreased deposition (osteoblasts) of new bone.
- The resultant weakening of bone, including fragility and fracture, causes increased morbidity and mortality.
- Hormones, particularly sex steroids, are crucial to the bone microenvironment. Estrogen plays a significant role in bone health for both sexes.
- Cancer therapies that affect sex hormones (e.g., AIs, ADT, chemotherapy-induced ovarian failure, surgical or radiation ablation of ovaries or testes) accelerate bone loss.
- Nutritional status, malabsorption (chronic graft-versus-host disease [GVHD]), and chronic kidney disease can affect absorption of calcium and vitamin D.

General Risk Factors

- Advanced age
- Female gender
- Current cigarette smoker
- Excessive alcohol consumption (10 or more drinks per week)
- Hypogonadism
- Impaired mobility
- Increased risk of falls
- Long-term glucocorticoid use
- Low body weight
- History of parental hip fracture
- Postmenopausal status

Cancer Treatment–Related Risk Factors

- Treatment with AIs, antiandrogens, or gonadotropin-releasing hormone agonists