



## **Medications to Prevent and Treat Osteoporosis**

The bisphosphonates, calcitonin, estrogens and raloxifene affect the bone remodeling cycle and are classified as anti-resorptive medications. Bone remodeling consists of two distinct stages: bone resorption and bone formation. During resorption, special cells on the bone's surface dissolve bone tissue and create small cavities. During formation, other cells fill the cavities with new bone tissue. Usually, bone resorption and bone formation are linked so that they occur in close sequence and remain balanced. An imbalance in the bone remodeling cycle causes bone loss that eventually leads to osteoporosis and fracture risk. Anti-resorptive medications slow or stop the bone-resorbing portion of the bone-remodeling cycle but do not slow the bone-forming portion of the cycle. As a result, new formation continues at a great

### **Fosamax, Actonel, and Boniva**

Fosamax, Actonel and Boniva are bisphosphonates that work by decreasing the rate of bone loss. They work to reduce the risk of both spine and hip fractures. The side effects include esophageal irritation (heartburn or indigestion). Fosamax and Actonel are taken weekly. Actonel and Boniva are taken monthly. For patients with esophageal irritation, Boniva can be given four times a year by injection. The medications are taken with a full glass of water in the morning. It is important not to recline or eat anything for the first hour after taking the medication to prevent possible heartburn.

Fosamax - Controlled clinical trials indicate that over a 3 to 4 year period alendronate increases bone mass and reduces the incidence of vertebral, hip and all non-vertebral fractures by 50%

Actonel - Controlled clinical trials indicate that over a 3 to 4 year period alendronate increases bone mass and reduces the incidence of vertebral, hip and all non-vertebral fractures by 50%

Boniva - helps prevent bone loss and reduces the risk of spine fractures.

### **Evista (Raloxifene)**

Selective estrogen receptor modulators (SERMS) are compounds that bind with estrogen receptors and exhibit estrogen action in some tissues and anti-estrogen action in other tissues. Today SERMS are used for the menopausal woman as an alternative to estrogen. For menopausal women, the ideal SERM would deliver all the benefits of estrogen without the adverse effects. Although SERMS may not be closely related chemically to the estrogen produced in a woman's body, people sometimes use the term "designer estrogen" to describe them. Raloxifene is approved by the FDA for both prevention and treatment of osteoporosis in postmenopausal women. Raloxifene increases vertebral bone mass modestly and reduces the risk of vertebral fracture by 40 %. Currently, there is no evidence that it significantly reduces risk of non-vertebral fractures. Raloxifene increases the risk of deep vein thrombosis to a degree similar to that observed with estrogen. It also increases hot flashes (~6% over placebo). Raloxifene appears to decrease the risk of estrogen-dependent breast cancer. Its effect on coronary heart disease is under investigation.

### **Calcitonin (Miacalcin®)**

Salmon calcitonin is FDA-approved for the treatment of osteoporosis in women who are at least 5 years postmenopausal. It is delivered as a single daily intranasal spray that provides 200 international units (IU) of the drug. Subcutaneous administration by injection also is available. Controlled clinical trials indicate that calcitonin decreases the vertebral fracture rate by 54%. In the single large trial, however, it lowered vertebral fracture risk by 21%. It did not alter the non-vertebral fracture rate in any of the studies. Calcitonin is generally safe and well tolerated, although some patients experience rhinitis and, rarely, epistaxis.

### **Estrogen/Hormone Therapy (HRT)**

HRT is approved by the FDA for the prevention of osteoporosis, relief of vasomotor symptoms and vulvovaginal atrophy associated with menopause. Women who have not had a hysterectomy require progesterone added to the estrogen to protect the uterine lining. The Woman's Health Initiative (WHI) found that 5 years of Prempro® reduced the risk of clinical vertebral fractures and hip fractures by 34%. However, the FDA recommends that when their use is considered solely for prevention of osteoporosis, approved non-estrogen treatments should first be carefully considered. HRT should not be used for the prevention of cardiovascular disease. The WHI reported increased risks of myocardial infarction, stroke, invasive breast cancer, pulmonary emboli and deep vein phlebitis during 5 years of treatment with Prempro®. Other doses and combinations of estrogen and progestins were not studied and, in the absence of comparable data, their risks should be assumed to be comparable. Because of the risks, HRT should be used in the lowest possible doses for the shortest duration to meet treatment goals.

### **Parathyroid hormone (Forteo®)**

PTH (1-34) is approved by the FDA for the treatment of osteoporosis in postmenopausal women. PTH (1-34) is an anabolic (bone-building) agent when administered by daily subcutaneous injection. PTH (1-34) was recently shown to decrease the risk of vertebral fractures by 65% and non-vertebral fractures by 54% after an average of 18 months of therapy. PTH (1-34) is well tolerated although some patients experience leg cramps and dizziness. Because PTH (1-34) caused an increase in the incidence of osteosarcoma in rats, patients with an increased risk of osteosarcoma (e.g., patients with Paget's disease of bone, prior radiation therapy of the skeleton, bone metastases, hypercalcemia, or a history of skeletal malignancy) should not receive PTH (1-34) therapy. The safety and efficacy of PTH (1-34) has not been demonstrated beyond 2 years of treatment.

### **Phytoestrogens**

Phytoestrogens are plant-derived compounds with estrogen-like activity. These are over-the-counter medications. Phytoestrogens are found in foods such as soy beans, tofu, miso, and soy milk. Commercial soy products have been processed to appeal to the American consumer and are sold as protein powder extracts, cereals, energy bars, and tablets. These supplements are not standardized or regulated by the FDA, and no information regarding phytoestrogen content is required on product labels. Since scientific studies using commercially available products are limited, it is difficult to make definitive recommendations. Phytoestrogens have not been found to reduce fractures. There is no evidence of favorable or unfavorable effects on the breast.

Venous Thrombosis effects are unknown. They may reduce vasomotor flushes but do not relieve vaginal dryness

Combination therapy (usually a bisphosphonate with a non-bisphosphonate) can provide additional small increases in BMD when compared with monotherapy; however, the impact of combination therapy on fracture rates is unknown. The added cost and potential side effects should be weighed against potential gains.

For more information:

[National Osteoporosis Foundation](#)

[International Osteoporosis Foundation](#)

[Foundation for Osteoporosis Research and Education \(FORE\)](#)