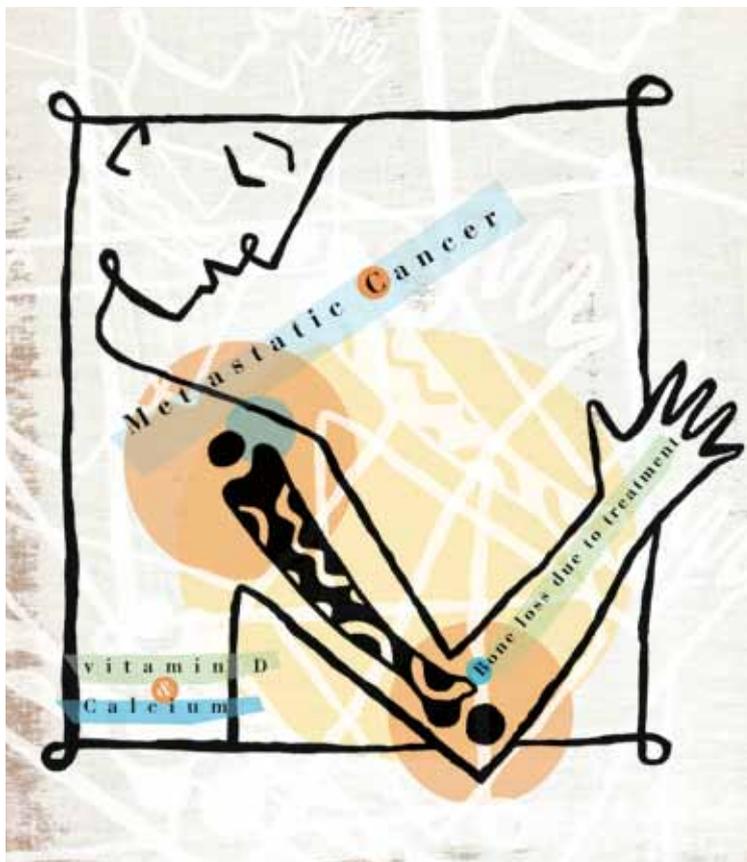


A Patient's Guide to **Bone Health**



How Cancer Can Be Bad to the Bones ■ Ways to Increase Bone Mass
■ Symptoms and Risk Factors ■ **Resources**

cure

CANCER UPDATES, RESEARCH & EDUCATION

Based on science, but filled with humanity,
CURE makes cancer understandable.



A Patient's Guide to Taking Care of Your Bones

GOOD BONE HEALTH is important for all individuals, but for many cancer patients and survivors, it's become a process of managing a long-term side effect of cancer. A loss of bone mineral density is common as people age. Known as osteopenia—or osteoporosis when it is more pronounced—this loss of bone density can increase the risk of fracture. Loss of bone mineral density is also common for cancer patients. As better therapies improve patients' longevity, physicians have realized that early diagnosis and prevention of osteoporosis are critical. The loss of bone mineral density can lead to fractures, which can diminish quality of life and even lead to death.

BONE TISSUE constantly undergoes a natural process called remodeling. In this process, old bone is removed and new bone is built. A delicate balance occurs between cells that eat away at the bone, called osteoclasts, and cells that build bone up, known as osteoblasts. Early-stage patients who receive cancer therapies that disrupt this process may develop weak bones that are vulnerable to fracture.

Protecting the bones of patients who have advanced disease is also important. Bones weakened by metastatic tumors can eventually become more vulnerable to breaking. Long bones in the arms and legs are frequently the sites of such fractures. Vertebrae also are vulnerable, breaking and collapsing onto themselves and causing back pain. Bone fractures can

occur not only during a fall but also during everyday activities. Tumors that may have metastasized along the spine can press on the spinal cord, leading to painful nerve damage or causing numbness or paralysis. Treating metastatic cancer and its symptoms, along with managing bone health, can help patients reduce pain and live a better quality of life.

Because poor bone health can result in poor quality of life, permanent disability, and an increased risk of complications, it is important to take measures to mitigate the damage of bone loss associated with cancer treatment. This guide will help you learn about the importance of good bone health, what promotes it, and how you and your doctor can manage and treat your cancer-related bone loss.



Why Bone Loss Occurs

CANCER-RELATED BONE LOSS can occur for many reasons, including issues due to cancer therapies, such as surgery and certain medications, and metastatic disease to the bone. In addition, certain types of cancer, such as multiple myeloma and sarcoma, can also directly affect the bone tissue.

CANCER TREATMENT

Certain cancer treatments and surgeries that slow cancer growth can also lower levels of sex hormones, such as estrogen and testosterone, that bones need to grow. This can dramatically accelerate bone loss and can cause bones to weaken and be more prone to fracture.

Here are some ways cancer treatment can contribute to bone loss:

- **Surgery:** Because the ovaries are the body's primary site for estrogen production, women who have their ovaries surgically removed (called an oophorectomy) experience a substantial drop in estrogen production. Oophorectomies are performed to prevent breast cancer or to treat or prevent ovarian cancer in women. Some men undergo surgical removal of the testicles (called an orchiectomy) to shrink or slow the growth of prostate cancers. More than 90 percent of male sex hormones, including testosterone, are produced in the testicles. These sex hormones, called androgens, can fuel prostate cancer growth.

- **Radiation:** Radiation therapy to treat cancers of the pelvic area is known to make bones more fragile. Hip fractures in particular are more common after pelvic radiation. They

can occur even a few years after treatment is completed. One study found that compared with their healthy peers, women 65 and older who had received radiation therapy for anal, cervical, or rectal cancers had a substantially higher risk of hip fracture. Radiation therapy for head and neck cancers, meanwhile, may cause the death of bone tissue in the jaw, putting the patient at risk for fractures.

- **Hormonal therapy:** Estrogen-sensitive tumors are commonly treated with medicines known as aromatase inhibitors. These drugs can cause a loss of bone density and increase risk for fractures because they suppress the production of estrogen. Suppressing estrogen is important work for the drugs to do, because estrogen helps fuel the growth of about two-thirds of breast tumors. But bones need estrogen. In postmenopausal women whose ovaries have stopped producing estrogen, the hormone may come from various other sources, including fat tissue that converts androgens to estrogen. Arimidex (anastrozole), Aromasin (exemestane), and Femara (letrozole) are all aromatase inhibitors. The medicines' suppression of estrogen can be particularly dangerous in women already at risk for osteoporosis, such as postmenopausal women.

In men, a type of prostate cancer treatment called androgen-deprivation therapy suppresses male sex hormones, including testosterone. Lowering levels of these bone-friendly hormones can shrink or slow the growth of prostate tumors. Types of androgen-deprivation therapy include drugs that suppress testosterone production such as Lupron (leuprolide) and Zoladex (goserelin), known as LHRH (luteinizing-hormone-releasing hormone) or GnRH (gonadotropin-releasing hormone) agonists, and the drug Firmagon (degarelix), an LHRH antagonist. Medicines called anti-androgens, such as Eulexin (flutamide) and Casodex (bicalutamide), interfere with the body's use of androgens.

Prolonged treatment with hormones known as glucocorticoids or corticosteroids, which are used to treat certain cancers, cancer-related pain, and side effects of chemotherapy, can also weaken the bones.

■ **Chemotherapy:** In women with breast cancer, chemotherapy with drugs such as cyclophosphamide and methotrexate can cause the ovaries to stop functioning. This reduces the body's level of estrogen—along with the bone protection estrogen provides. One study comparing premenopausal women who lost ovary function with those who retained it after adjuvant chemotherapy for breast cancer found a marked difference in bone mineral density between the two groups. Patients in the first group continued to experience bone loss even more than six months after beginning chemotherapy.

METASTATIC CANCER

Although different cancers are predisposed to spread to different sites, the bones are among the most frequent sites of metastases. The spine is the most common site of bone metastases.

Bone remodeling releases growth factors that can attract tumor cells from elsewhere in the body and help them multiply. The tumor cells, in turn, release their own growth factors that can promote bone breakdown, and that breakdown further releases growth factors that promote the cancer at the new site. This breakdown process can leave bone brittle, weak, and vulnerable to fracture.

Besides promoting bone breakdown, tumor cells can cause bone to build up abnormally. This can create metastatic lesions that make bone weak and prone to pain, collapse, and fracture, as well as infrequently causing high blood calcium levels. Tumors that cause bone buildup are called osteoblastic; those that cause bone breakdown are called osteolytic and are more prone to damage the bone tissue.



Risk Factors & Symptoms

CERTAIN FACTORS are linked to potentially dangerous levels of bone loss, even in healthy people. For instance, women are more likely to develop osteoporosis than men because they have less bone tissue and lose it at a faster rate after menopause. Small, thin-boned women face a higher risk. Also, bones naturally thin and weaken with age.

Women of Caucasian and Asian ancestry are at higher risk of osteoporosis, but African-American and Hispanic women also can develop it. In addition, a person's family background—specifically whether their parents had a history of bone fractures—can indicate higher risk of dangerous bone loss.

Certain behaviors also cause bone weakness. For instance, high alcohol consumption, cigarette smoking, and inactivity all can weaken bones. Certain conditions, like an abnormal absence of menstrual periods, low estrogen or testosterone levels, the eating disorder anorexia nervosa, and lifetime deficiencies of calcium and vitamin D are also osteoporosis risk factors.

Some factors are linked specifically to a higher risk of bone fractures. Besides low bone mass, those factors include: being 65 or older; a bone fracture after age 45; a family history of early fracture or osteoporosis; and a weight of less than 127 pounds. Circumstances that can contribute to falls may also place someone at risk for fractures. Medical conditions, including hyperthyroidism, hyperparathyroidism, chronic lung disease, endometriosis, and Cushing's disease, are also risk factors, as well as a general sense of "fair" or "poor" health. Weakness, poor balance, vision problems,

and use of medications such as tranquilizers may place someone at risk for fractures.

In its early stages, bone loss often causes few symptoms. Later, it can lead to fractures, including debilitating hip fractures as well as spinal or vertebral ones that can cause severe back pain, shortened stature, stooped posture, disability, or even death.

One symptom is hypercalcemia, or excessive calcium in the blood. Hypercalcemia, which affects up to 20 percent of all cancer patients, can cause muscle weakness, fatigue, depression, confusion, restlessness, high blood pressure, and heart problems. It can also cause gastrointestinal symptoms, including nausea, abdominal pain, constipation, or bloating.

Certain side effects of cancer treatment can contribute to hypercalcemia. A lack of activity, common in patients with severe fatigue, can contribute to bone breakdown and release of calcium into the bloodstream. Nausea and vomiting, other common side effects, can cause dehydration, which can interfere with the kidneys' ability to remove calcium from the blood. Metastatic cancer can also cause hypercalcemia. In causing bone to break down, metastases can prompt the release of calcium into the blood.

Because calcium influences a host of bodily processes, untreated hypercalcemia can quickly become life-threatening. Yet its symptoms, which include fatigue, confusion, vomiting, dry mouth, and stomach pain, can be misattributed to the cancer or its treatment. Ganite (gallium nitrate) can be used to treat cancer-related hypercalcemia, as can bisphosphonates, such as Aredia (pamidronate) and Zometa (zoledronic acid).



Measuring Bone Health

COMPREHENSIVE BONE MONITORING requires not only bone mineral density testing but also consideration of factors that can increase risk of severe bone loss. During regular physical exams, doctors and patients should discuss any recent bone fractures or back pain and overall health. Posture, balance, and any height change should be noted.

Smoking status, alcohol intake, and amounts of weight-bearing exercise are also important to discuss, as well as disease history, personal and family history of frail bones, medication use, and whether patients are taking vitamin D and calcium supplements.

If you experience height changes or back pain, your doctor might order an X-ray to look for spinal fractures. Also, blood and urine tests can reveal factors that may contribute to loss of bone mass, such as low calcium, vitamin D, or phosphorus levels; high levels of parathyroid hormone; and abnormal levels of thyroid-stimulating hormone. (One study of women with breast cancer found almost 70 percent had low vitamin D levels.)

Various tests can be performed to assess bone health.

A common test for bone mineral density is dual-energy X-ray absorptiometry. It is a key predictor of future bone fractures. The test, also known as DEXA (or DXA), can measure bone density at places including the hip and spine, as well as the thigh and wrist. The measurement is compared with the peak or ideal bone density of a healthy 30-year-old adult. That result is called a “T” score. A “T” score between +1 and -1 is considered in the normal range. The farther the score

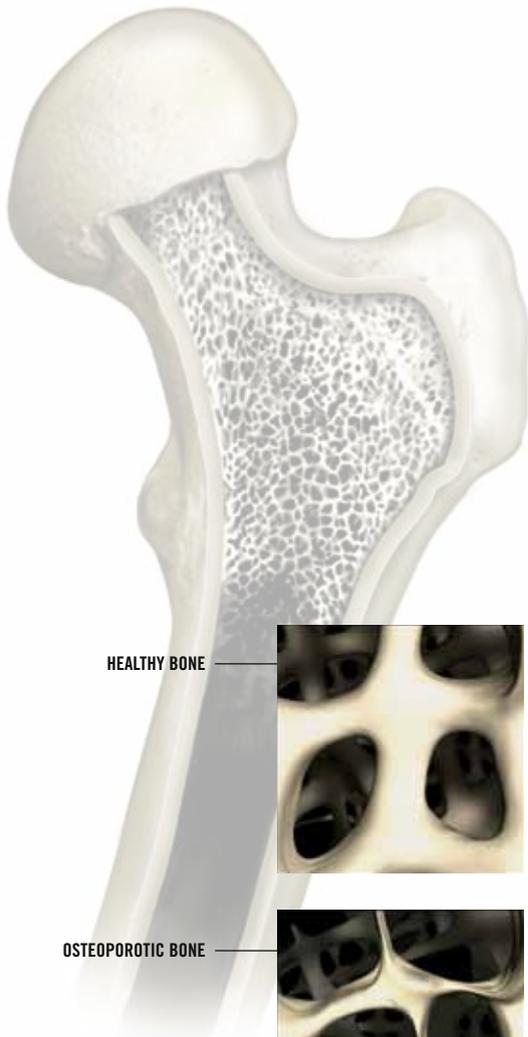
is below zero, the greater the bone loss; a score of -2.5 or lower indicates osteoporosis. Sometimes a result called a Z score—based on a comparison of bone mass with a typical individual of the same age, sex, and race as the patient—is also calculated, which can help signal an underlying disease or condition that might contribute to bone loss.

Bone mineral density testing is advised for all women over 65 and for others who have one or more risk factors for bone loss. Subsequent testing is usually at least a year apart so changes in bone mass can be detected. The U.S. Preventive Services Task Force recommends intervals of at least two years.

The American Society of Clinical Oncology urges bone density testing for premenopausal women who have cancer treatment-induced menopause, postmenopausal women receiving aromatase inhibitors, women over 65, and younger women with other bone loss risk factors. In addition, the National Comprehensive Cancer Network recommends bone mineral density testing for men with prostate cancer who undergo surgery or receive androgen-deprivation therapy to suppress sex hormones.

A valuable online tool to evaluate bone health is the World Health Organization’s FRAX, or Fracture Risk Assessment Tool (www.sheffield.ac.uk/FRAX/). The tool considers factors including home country, age, ethnicity, weight, height, fracture history, rheumatoid arthritis history, DEXA score, as well as alcohol, tobacco, and glucocorticoid use.

Simple X-rays can reveal fractures and show the sites on the skeleton where any



HEALTHY BONE



OSTEOPOROTIC BONE



.....
BONE OUT OF BALANCE

IN OSTEOPOROTIC bone, more bone tissue is destroyed than produced.

This upsets a delicate balance in the bone and results in bone loss that can be damaging to your health.

ILLUSTRATION BY ERIN MOORE

tumors have spread, as well as their size and shape. Osteolytic tumors appear as darker “holes” in the bone, while osteoblastic tumors are whiter than the bone on the X-ray.

Radionuclide bone scans can detect metastases earlier than X-rays. In this test, the patient is injected with a mildly radioactive marker that is attracted to diseased bone throughout the body. However, sometimes this scanning technique fails to pick up areas of bone already destroyed by cancer. The scan might also detect other bone or joint problems, and additional tests might be needed to determine the exact nature of any highlighted trouble spots.

Another imaging technique, called magnetic resonance imaging (MRI), involves magnets and radio waves but doesn't require ionizing radiation. MRI can reveal details inside the body and is frequently used to scan the spine for compression.

Positron emission tomography (PET) scanning is sometimes used to detect tumors that are hard to see. This technology exploits the fact that cancer cells consume glucose, a form of sugar, at a higher rate than normal cells. For the scan, glucose that is radioactive (so the scanner can track and photograph it) is injected into a vein. As cancer cells take in the glucose, deposits of radioactivity accumulate at the site.



Treating & Managing Treatment-Related Bone Loss

A NUMBER OF TREATMENTS widely used to prevent or treat osteoporosis in the general population might help counteract bone loss related to cancer treatment. Other treatments, specifically for lowering the risk of fracture, include anti-resorptive therapies and are recommended for patients with osteoporosis or those with osteopenia and additional fracture risk factors.

Calcium and vitamin D supplements.

Calcium and vitamin D are crucial for strong bones. Research has shown that low calcium intake over the course of a lifetime is linked to low bone mass and high fracture rates. How much calcium supplementation is recommended will depend on an individual's dietary calcium intake and personal risk factors related to bone health. Vitamin D is essential to the body's absorption of calcium. A lack of vitamin D forces the body to extract needed calcium from the skeleton, which can cause weakened bones.

Bisphosphonates. These anti-resorptive drugs—used to treat osteoporosis, hypercalcemia, and bone pain due to some types of cancer—can slow bone loss in patients receiving cancer therapy. For instance, a clinical trial of the bisphosphonate Zometa (zoledronic acid), administered intravenously every six months for three years, found it can prevent treatment-induced bone loss in premenopausal women undergoing estrogen suppression after breast cancer surgery. Research has even suggested breast cancer patients on Zometa plus estrogen

suppression were less likely to have the cancer spread.

Other bisphosphonates that patients might receive for breast cancer and osteoporosis include oral Actonel (risedronate), Fosamax (alendronate), and Boniva (ibandronate). Fosamax is approved for steroid-related osteoporosis. However, use of bisphosphonates, especially intravenously in cancer patients, has been linked to a serious condition called osteonecrosis of the jaw, in which jaw tissue dies.

Meanwhile, in a study of prostate cancer patients who underwent surgery or androgen-deprivation therapy to lower hormone levels, weekly Fosamax helped increase bone density compared to a decrease among subjects on placebo. Other drugs that might be used in prostate cancer patients are Zometa, Actonel, or the intravenous agent Aredia (pamidronate).

Denosumab. Approved in June to treat osteoporosis in postmenopausal women with a high risk for fractures, the drug is a biologic medicine called a monoclonal antibody that works by inhibiting a protein called RANK ligand, which plays a role in bone loss.

Research shows denosumab can increase bone density in postmenopausal women taking aromatase inhibitors (estrogen-suppressing drugs) after completing breast cancer treatment. Study subjects received either injections of a placebo or of denosumab every six months for two years, plus instructions to take calcium and vitamin D supplements. Patients on denosumab saw a 5.5 percent increase in lumbar spine

bone density compared with patients on the placebo. The Food and Drug Administration is reviewing whether to approve the drug for the treatment and prevention of bone loss in patients with hormone-sensitive prostate or breast cancer. Rare incidences of osteonecrosis of the jaw have also been seen with denosumab.

Forteo (teriparatide). Forteo, a form of parathyroid hormone that increases bone formation, is approved to treat osteoporosis and bone weakening associated with long-term use of drugs, such as glucocorticoids. Forteo, typically given by self-injection daily, is not recommended for patients who have had metastatic skeletal disease or a history of skeletal radiation. And since long-term safety and effectiveness data are unclear, the maximum recommended treatment period of parathyroid hormone therapy is about two years.

Miacalcin (calcitonin). Miacalcin is a hormone that increases calcium deposits in the bone. While untested as a therapy for bone loss related to cancer treatment, Miacalcin—administered as a nasal spray, usually daily—is approved for postmenopausal osteoporosis.

Strontium ranelate. This drug, not yet available in the United States, slows bone loss and may foster bone growth. A European study comparing strontium ranelate to a placebo found the drug reduces risk of hip and non-vertebral fractures in postmenopausal women with osteoporosis.

Cathepsin K inhibitors. These experimental

osteoporosis drugs, including balicatib and odanacatib, act on an enzyme involved in bone breakdown. Balicatib may not only reduce bone loss but increase bone formation.

Gallium-containing compounds. Gallium, a chemical element that does not occur in nature, slows bone loss by interfering with resorption of calcium. Compounds such as gallium nitrate may represent a new way to fight osteoporosis. Gallium might also help treat bone metastases.

METASTATIC CANCER

Therapies for bone metastases can be aimed at shrinking or minimizing the tumors using standard anti-cancer therapies, or preventing or repairing damage the tumors can cause.

Bisphosphonates. Systemic therapy with drugs called bisphosphonates can reduce bone pain and prevent or delay damage caused by metastatic tumors. Research has shown some bisphosphonates can help patients with bone metastasis from cancers including breast, prostate, and lung.

For breast cancer patients with bone metastases and clear signs of bone damage, the American Society of Clinical Oncology recommends administration of the intravenous bisphosphonates Aredia (pamidronate) or Zometa (zoledronic acid) every three or four weeks. Both drugs are approved to treat bone metastases from breast cancer. Aredia is given in a dose of 90 milligrams over at least two hours, and Zometa is administered 4 milligrams over at least 15 minutes. Blood levels of creatinine,

a marker of kidney function, should also be monitored.

Zometa is also approved to treat bone tumors caused by prostate and lung cancers. It is considered the standard of care for bone metastases from prostate cancers that resist therapies—such as surgical castration or androgen-deprivation therapy—that are aimed at quelling the impact of male hormones.

Bisphosphonates, especially when administered intravenously to cancer patients, have in some cases been linked to serious damage to the jaw in a condition known as osteonecrosis.

Denosumab. Studies have shown that denosumab could be a viable option for delaying complications of bone metastases. In a head-to-head comparison with Zometa, denosumab proved better at alleviating pain from breast cancer that had spread to the bone. Denosumab was also superior in preventing serious complications from bone metastases, the research found.

In a large phase 3 study in patients with metastatic prostate cancer, the drug was found to delay a negative bone event—such as a fracture or spinal cord compression—by 3.6 months compared with Zometa.

Radiopharmaceuticals. This systemic therapy, involving radioactive drugs delivered intravenously, aims to alleviate pain caused by multiple bone metastases. The medicines—Metastron (containing the radioactive substance strontium-89) and Quadramet (samarium-153)—are attracted to cancerous areas of the bone.

Radiofrequency ablation. Research has

indicated that radiofrequency ablation—a minimally invasive treatment using heat to destroy tumor cells—can help ease bone pain in patients with a single bone metastasis. **Radiation or surgery.** To treat a single problem area, radiation treatment or surgery are sometimes used. The goals of local radiation treatment are to prevent fractures and alleviate pain caused by a metastasis at a particular site. A course of radiation therapy might be daily doses for 10 days over a two-week period; the total dose and duration varies.

Surgery could be used to reinforce a particularly frail bone with a metal support or a glue that can stabilize it. A spinal procedure known as kyphoplasty, designed to treat painful vertebral fractures and correct related deformities, restores the shape of a substantial part of the damaged vertebra and then uses a bone cement to strengthen it. A related procedure, involving only the injection of cement, is called vertebroplasty.



Exercise & Nutrition

PEOPLE WITH bone loss or other medical conditions should ask their doctor before beginning an exercise program. However, regular physical activity can help build and maintain bone density, while also improving strength and balance, which could reduce the risk of fracture due to falls.

Patients with weak bones are advised to avoid high-impact activities that are hard on the bones, such as running and high-impact aerobics. Exercises that can twist or bend the spine, such as golf or certain poses in yoga, also are not recommended. Exercises that are beneficial include those that are weight-bearing, including walking, hiking, and weight training, and exercises that can help with balance, such as certain forms of yoga and tai chi. Meeting with a physical therapist who has a specialty in cancer or bone issues can be particularly helpful in deciding the best exercise regimen.

In addition, the American College of Sports Medicine and American Cancer Society launched the Certified Cancer Exercise Trainer program for health and fitness professionals interested in becoming qualified to work with cancer patients and survivors. A certified trainer may be available at your local fitness facility to help create an exercise plan that is safe for you and your bones.

A diet adequate in calcium and vitamin D can also help. Calcium-rich foods include sardines, cheddar cheese, and milk, as well as fortified foods such as orange juice. High intake of protein or salt, however, is counterproductive, increasing calcium elimination from the body. Also, lactose intolerance can prevent the body from

benefiting from calcium in dairy foods.

Women and men over age 50 are advised to take in 1,200 milligrams of calcium daily, and doctors often recommend calcium supplements to achieve this. Supplements rarely result in excess calcium in the blood. However, calcium taken at the same time as an oral bisphosphonate can decrease the drug's absorption in the body, so these should be taken at least two hours apart.

Vitamin D, which aids absorption of calcium, can be obtained through foods like egg yolks and fortified milk, by production in the body in response to sunlight, or with supplements. The National Osteoporosis Foundation recommends adults under age 50 get 400-800 International Units (IU) of vitamin D3 or D2, and that older adults get 800-1,000 IU daily. The Institute of Medicine advises intake of no more than 2,000 IU daily. Excess vitamin D can cause hypercalcemia as well as kidney problems.

Research has linked vitamin D deficiency to poor breast cancer outcomes, although it's unclear whether inadequate vitamin D actually caused the outcomes. Scientists measured vitamin D levels in more than 500 women diagnosed with breast cancer and followed them for more than 11 years. Women with low levels of vitamin D were almost twice as likely to have a distance recurrence of their cancer and had a higher risk of death during the study period.

Supplementation guidelines for cancer patients have not been developed because vitamin D levels in individuals' blood do not necessarily reflect the dose of the supplement taken.



Glossary

Arthritis > The chronic stiffness and swelling surrounding joints. Types of arthritis include osteoarthritis, rheumatoid arthritis, and juvenile arthritis.

Bisphosphonates > Drugs that slow or stop the resorption of bone tissue, improving bone density and strength. Fosamax (alendronate) and Aredia (pamidronate) are bisphosphonates.

Bone Remodeling > The renewal of bone tissue by the process of osteoclasts removing old bone tissue and osteoblasts building new bone on the skeleton.

Calcium > A mineral found in dairy products and some dark green vegetables that is required for many bodily processes and is stored in the skeleton.

Collagen > Fibrous proteins found in the bone that provides structure and strength to the skeleton.

Corticosteroids > Steroids released from the cortex of the adrenal gland. Corticosteroids include glucocorticoids.

Dual-energy X-ray absorptiometry (DEXA) > A test to measure bone density and to predict the likelihood of future bone fractures. The result is called a “T” score. A “T” score between +1 and -1 is considered in the normal range. A score of -2.5 or lower indicates osteoporosis, and between -1.0 and -2.5 is considered osteopenia.

Glucocorticoids > Steroid hormones made in the cortex of the adrenal gland that predominantly affect the metabolism of carbohydrates. Cortisol is the main glucocorticoid.

Hypercalcemia > An excess of calcium in the blood. This condition affects up to 20 percent of all cancer patients and can lead to osteoporosis and kidney problems.

Osteoblasts > Cells that form bone tissue by synthesizing collagen and then controlling its mineralization.

Osteoclasts > Large, multinucleate cells that eat away at the bone to help it remodel. Also involved in processes such as the formation of cavities and canals.

Osteonecrosis > A disease caused by a lack of blood supply to the bones. Without blood, bone tissue dies, possibly causing the bone to collapse.

Osteopenia > A loss of bone mineral density that could lead to osteoporosis if it becomes more pronounced. There are no symptoms, though the chance of bone breakage is increased.

Osteoporosis > A bone disease affecting 10 million Americans, characterized by low bone density and the thinning of bone tissue.

Vitamin D > A fat-soluble nutrient found in fish that is necessary for the absorption of calcium.

Weight-bearing exercise > Physical activity that best strengthens bone tissue by working against gravity. Examples include walking, lifting weights, and yoga.

SOURCES: NIH National Osteoporosis and Related Bone Diseases National Resource Center; The Arthritis Foundation



Resources

BONE HEALTH RESOURCES

The American Academy of Orthopaedic

Surgeons covers all things bones for all ages, but focuses on orthopaedic surgery. The website offers informed patient tutorials and tips for bone safety. <http://orthoinfo.aaos.org/main.cfm>

American Bone Health provides education, resources, and tools to help you understand bone disease and bone health. It features a blog and a “Question and Answer” section as well as a calcium-rich recipe section. <http://www.americanbonehealth.org/>

The Arthritis Foundation offers information for those living with arthritis. The website features a section on osteoarthritis, as well as a list of events and updates on research and drugs in the pipeline. <http://www.arthritis.org/>

Best Bones Forever! was launched by the Department of Health and Human Services as a campaign to increase awareness about bone health in young women. <http://www.bestbonesforever.gov/>

The Bone and Cancer Foundation provides information and resources for patients, families, and physicians on cancer related bone disease. <http://www.boneandcancerfoundation.org/>

Bone Health and Osteoporosis: A Report of the Surgeon General is a 13-chapter outlook on the status of bone health in America. It offers lifestyle approaches, risk factor assessments, and a note on the future of bone health. <http://www.surgeongeneral.gov/library/bonehealth/content.html>

Cancer Bone Health is a microsite launched by *CURE* magazine with support from Amgen that provides cancer patients with information specific to cancer-related bone issues. First-person stories, videos, blogs, and a message board are featured on the microsite. <http://www.cancerbonehealth.com/>

Centers for Disease Control Calcium and Bone Health page shows a detailed image of a bone with osteoporosis and provides recommended calcium intake levels for different age ranges. <http://www.cdc.gov/nutrition/everyone/basics/vitamins/calcium.html>

The National Dairy Council offers an information page full of fact sheets and quizzes on the importance of the calcium provided in dairy foods and bone health, including additional information on vitamin D and protein. <http://www.nationaldairycouncil.org/HealthandWellness/DairysHealthBenefits/Pages/BoneHealth.aspx>

National Osteoporosis Foundation offers advice, a list of health care professionals, and events geared towards those with osteoporosis. The NOF also offers featured webinars by health care professionals on bone health. <http://www.nof.org/>

NIH National Osteoporosis and Related Bone Diseases National Resource Center is an easy-to-use basic guide to understanding the bones and diseases that may affect them. The site includes government research updates, sections on bone health in men, women, and kids, and a glossary. <http://bones.nih.gov>

American College of Sports Medicine and American Cancer Society launched the

Certified Cancer Exercise Trainer program which licenses trainers who are skilled in creating exercise programs and fitness assessments for cancer patients, from the newly diagnosed to survivors.

- > **To become a trainer:** <http://www.pearsonvue.com/acsm/cet/>
- > **To find a trainer:** http://forms.acsm.org/_frm/crt/online_locator.asp
- > **ACSM Certification Department** (317) 637-9200, ext. 115, certification@acsm.org

OTHER CANCER INFORMATION SOURCES

The American Association for Cancer Research has collected a host of resources for patients and family members, including fact sheets on cancer, a dictionary of cancer terms, links to cancer centers, information about support groups, and more at www.aacr.org/home/public-media/patients-family.aspx.

The American Cancer Society offers detailed guides to many types of cancer and many patient resources at www.cancer.org. The society can also provide help and information by phone, at 800-227-2345. Help also is available in Spanish.

CancerCare provides free, professional support services for anyone affected by cancer at 800-813-4673. Counseling, education, financial assistance, and practical help are provided by trained oncology social workers.

A variety of information about cancer can be found on the **National Cancer Institute's** website at www.cancer.gov. Information about cancer types, clinical trials, treatment and survivorship is available, as well as a wealth of other information. You can also talk to a real person and get answers to your cancer questions by calling the NCI's Cancer Information Service. You also can receive NCI booklets and fact sheets through the Cancer Information Service. Trained help is available at 800-4-CANCER (800-422-6237).

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