National Osteoporosis Foundation

BONING UP *on* OSTEOPOROSIS

CONTENTS

INTRODUCTION

When you think about staying healthy, you probably think about making lifestyle changes to prevent conditions like cancer and heart disease. Keeping your bones healthy to prevent osteoporosis may not be at the top of your wellness list. But it should be.

HERE'S WHY:

OSTEOPOROSIS IS COMMON. Osteoporosis is a condition in which the bones become weak and can break from a minor fall or, in serious cases, from a simple action such as a sneeze. Approximately 10 million Americans already have the disease. Another 44 million are at high risk for it. Being at risk for osteoporosis means you are more likely to get this disease. The U.S. Surgeon General reports that nearly half of all women older than 50 will break a bone because of osteoporosis. An estimated one in four men will too.

OSTEOPOROSIS IS SERIOUS. Breaking a bone is serious, especially when you're older. Broken bones due to osteoporosis are most likely in the hip, spine, and wrist, but any bone can be affected. It can cause severe pain that may not go away. For some people, it causes height loss and posture that is stooped or hunched. This happens when the bones of the spine, called vertebrae, begin to break or collapse. Osteoporosis may even keep you from getting around easily and doing the things you enjoy. This can make you feel isolated and depressed. It can also lead to other health problems. Twenty-five percent of seniors who break a hip die within one year from problems related to the fracture itself or surgery done to repair it. Many of those who survive need long-term nursing home care.

OSTEOPOROSIS IS COSTLY. In 2005, osteoporosis was responsible for an estimated two million fractures and $19 billion in costs. By 2025, experts predict that osteoporosis will be responsible for three million fractures and $25.3 billion in costs.

OSTEOPOROSIS CAN SNEAK UP ON YOU. You can't feel your bones growing weaker. You could have osteoporosis now or be at risk for it and not know it. Often, breaking a bone is the first clue that you have osteoporosis. Or maybe you notice that you are getting shorter or your upper spine is curving forward. At this point the disease is advanced. Fortunately, there are tests, called bone mineral density (BMD) tests, which can tell if you have osteoporosis before you break a bone, making it possible to treat the disease early and prevent further damage.

Boning Up on Osteoporosis **will help you find out whether you are at risk for osteoporosis. It will also guide you in working with your healthcare providers to prevent or treat it. If you don't have osteoporosis, you can take steps now to prevent it. If you already have it, you should seek treatment. Treatment can prevent further bone loss and decrease your chances of breaking a bone. It can also help you stay more active and improve the quality of your life.**

CHAPTER 1

OSTEOPOROSIS: WHAT IT IS AND WHO IS AT RISK

Osteoporosis means "porous bone." Although bones seem solid, if you looked inside them under a microscope, you would see a sponge-like honeycomb of connected branches. Calcium and other minerals give this honeycomb its strength. If you have osteoporosis, the branches are thinner, broken, or missing altogether. You see holes and empty spaces that would be full of branches in healthy bone. That's because when you have osteoporosis, your bones have lost the minerals that kept them strong. Weakened bones break very easily. In fact, people with osteoporosis can break a bone just by sneezing, picking up a bag of groceries, or tripping on uneven pavement.

BONE BASICS

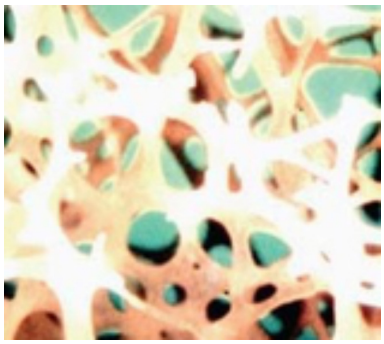
Because osteoporosis is a disease of the skeleton, it is important to know some basics about your bones.

Your bones contain three major components that make them both flexible and strong:

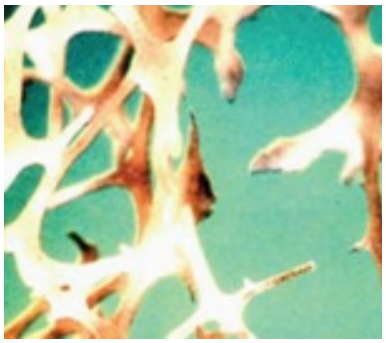
- Collagen, a protein that gives bones a flexible framework
- Calcium-phosphate mineral complexes that make bones hard and strong
- Living bone cells that remove and replace weakened sections of bone

HOW BONES CHANGE AND GROW

Throughout life, your skeleton loses old bone and forms new bone. Children and teenagers form new bone faster than they lose the old bone. In fact, even after they stop growing taller, young people continue to make more bone than they lose. This means their bones get denser and denser until they reach what experts call peak bone mass. This is the point when you have the greatest amount of bone you will ever have. It usually happens between the ages of 18 and 25.



After you reach peak bone mass, the balance between bone loss and bone formation might start to change. In other words, you may slowly start to lose more bone than you form. In midlife, bone loss usually speeds up in both men and women. For most women, bone loss increases after menopause, when estrogen levels drop sharply. In fact, in the five to seven years after menopause, women can lose up to 20% or more of their bone density.



BONE TISSUE:
NORMAL VS.
OSTEOPOROTIC BONE

Osteoporosis happens when you lose too much bone, make too little bone, or both. The more bone you have at the time of peak bone mass, the better you will be protected against weak bones once bone loss begins.

WHO GETS OSTEOPOROSIS: FACTORS THAT PUT YOU AT RISK

Osteoporosis can affect people of all ages, but it is far more common in older people than younger people. All of us lose some bone as we age, but some of us lose more bone or lose it faster than others. It is not true that every older person gets osteoporosis, but it does become more common with age. About half of women in their 80s have it.

Age and Sex. Osteoporosis is also more common in women than men. Eighty percent, or four out of five, of the 10 million Americans who have it are women. There are several reasons for this. Women have lighter, thinner bones to begin with. They also lose bone rapidly after menopause. In addition, women live longer than men, which gives them more years to develop the disease. This puts women at serious risk for breaking bones later in life. A woman's risk of breaking a hip due to osteoporosis is

RISK FACTORS FOR OSTEOPOROSIS

- Female gender
- Older age
- Family history of osteoporosis or broken bones
- Being small and thin
- Race/ethnicity (Caucasian, Asian or Latino)
- History of breaking a bone in adulthood
- Menopause
- Low sex hormones
- Diet—especially one low in calcium and vitamin D
- Inactive lifestyle
- Smoking
- Alcohol abuse
- Certain medications such as glucocorticoid medications
- Certain diseases and conditions such as rheumatoid arthritis

These risk factors can help identify people who are more likely to get the disease. You can find out if you have osteoporosis by getting a bone mineral density (BMD) test *(see Chapter 3).* Ask your healthcare provider if you should have a BMD test.

equal to her combined risk of breast, ovarian and uterine cancer. But this doesn't mean osteoporosis is just a woman's disease. When you think about it—if four out of five people with the disease are women—one out of five (two million) are men. A man older than 50 is more likely to break a bone due to osteoporosis than he is to get prostate cancer.

Older age and female gender are just two factors that increase your risk of osteoporosis. While you have no control over these risk factors, there are others you can change. Many of the choices you make each day can affect your bones. By making healthier choices you can help to reduce your risk of osteoporosis as well as the painful fractures it can cause.

Family History. Research suggests that heredity and genetics play a major role in osteoporosis. If either of your parents had osteoporosis or a history of broken bones, you are more likely to get it too. Also, if one of your parents had noticeable height loss or a spine that curved forward, they may have had osteoporosis.

Low Body Weight/Being Small and Thin. Women and men with small bones are more likely than larger people to have osteoporosis. But that doesn't mean heavier or larger people can't get it.

Race and Ethnicity. While osteoporosis affects all races and ethnicities, people in the U.S. who are Caucasian or of Asian or Latino descent are more likely to develop osteoporosis than those of African heritage.

History of Broken Bones. People who have broken one or more bones during their adult years are at greater risk for osteoporosis. This includes all fractures from all causes except those of fingers, toes, skull, and facial bones.

Menopause. For most women, bone loss increases after menopause, when estrogen levels drop sharply *(for more information, see Chapter 2).*

LOW SEX HORMONE

Estrogen Levels. In women, the sex hormone estrogen protects bones. If you are a woman and go through menopause early, your risk of osteoporosis increases. The same is true if you have your ovaries removed. That's because your ovaries produce most of your body's estrogen. In either of these cases, it's important to speak with your healthcare provider about steps to improve bone health. *(See Chapter 4 to learn the latest about hormone therapy.)*

Missing Periods. If you are a young woman and don't have regular periods, this could mean low estrogen levels. There could be many reasons for this, such as exercising too much or eating so little that you become too thin. Other possible causes include disorders of the ovaries or the pituitary, which is the gland in the brain that makes hormones. Regardless of the cause, loss of estrogen can harm bone health. It can also affect other vital body systems. For these reasons, young women who don't have regular periods should speak to their healthcare provider.

Testosterone Levels. In men, testosterone protects bone, as does estrogen, although to a lesser degree. Low levels of these hormones can lead to bone loss. A number of factors can cause levels to be low, including eating too little or drinking too much alcohol. A simple blood test can tell you if your hormone levels are normal.

DIET: HOW THE FOODS YOU EAT CAN AFFECT YOUR BONES

Calcium. Calcium is the most important mineral for healthy bones. That's because it is a building block of bone. *(For good sources of calcium, see Chapter 2.)*

Vitamin D. Vitamin D is important because it helps your body absorb calcium. If you don't get enough vitamin D, or if your body does not absorb it well, you are at much greater risk for bone loss and osteoporosis. *(For more information on vitamin D, see Chapter 2.)*

Phosphorus. Like calcium, phosphorus is a component of bone. Because this mineral is naturally present in many foods, most people get enough phosphorus. It is sometimes added to processed foods and soft drinks in the form of phosphate or phosphoric acid. While some experts say that Americans may be getting too much phosphorus, many experts believe that phosphorus intake is not a problem as long as people get enough calcium.

Other Minerals and Vitamins. Magnesium, vitamin K, vitamin B6 and vitamin B12 are some of the many

minerals and vitamins that are important for bone health. If you eat a well-balanced diet, you should be getting enough of these nutrients. Most experts recommend multivitamins or supplements for people who do not get what they need from foods.

Protein. Eating foods that supply protein is important for your health. But a diet very high in protein, particularly animal protein, causes a loss of calcium through the kidneys. You can make up for this calcium loss by getting enough calcium to meet your body's needs.

Caffeine. Found naturally in coffee and tea, caffeine is often added to soft drinks. Caffeine appears to decrease calcium absorption. One study suggests that drinking 330 mg of caffeine, or about four cups of coffee, daily increases the risk of fractures. You can also make up for calcium loss due to caffeine by getting enough calcium to meet your body's needs.

Soft Drinks. Some in the medical community are concerned that the phosphorus and/or caffeine in certain soft drinks may harm bone health. Other experts suggest the harm to bone is caused by people substituting soft drinks for milk and calcium-fortified juices. It's a good idea to limit your intake.

Sodium (salt). Eating foods that have a lot of sodium may reduce your body's ability to retain calcium. Eating too much sodium is bad for your bones and can cause bone loss. Try cooking without adding extra salt, and limit the salty snacks and processed foods that you eat.

Spinach. Spinach contains high levels of a compound called oxalate. Oxalate prevents the body from absorbing the calcium found naturally in spinach. In contrast, the body can absorb calcium found in most other green vegetables such as broccoli and kale.

Wheat Bran. 100% wheat bran is the only food that appears to reduce the absorption of calcium in other foods that are eaten at the same time. If you are taking calcium supplements, you may want to take your supplement two or more hours before or after eating any foods with 100% wheat bran. *(For good sources of calcium, see Chapter 2.)*

OTHER FACTORS THAT AFFECT BONE HEALTH

Inactive Lifestyle. People who are bedridden, are inactive or do not exercise are at high risk of osteoporosis. Certain kinds of regular exercise can help keep your bones strong. *(To learn more about exercise, see Chapter 6.)*

Smoking. Smoking is bad for your bones in many ways. The chemicals in cigarettes damage bone cells. Smoking also might make it harder to absorb calcium. For women, smoking can prevent estrogen from protecting the bones.

Alcohol Abuse. Drinking heavily can reduce bone formation. In many cases, people who drink too much do not get enough calcium. Drinking may also affect your body's calcium supply. In addition, drinking too much is bad for your overall health and can make you more likely to fall. This is how many people break bones. Alcohol in smaller amounts, however, does not harm bone health. This usually means no more than 2 drinks a day for women and 3 for men.

Medications. Some medications can be harmful to your bones, especially if taken at high doses or for a long time. The riskiest types of medications for bones are glucocorticoids. Many people take these medications to ease inflammation in conditions like rheumatoid arthritis or asthma. It's important to talk with your healthcare provider about the risks and benefits of any medications you take and about how they may affect your bones. Do not stop any treatment or change the dose of your medications unless your healthcare provider says it's safe to do so.

DISEASES AND CONDITIONS THAT CAUSE BONE LOSS

There are many health problems that can harm your bones and increase your risk of osteoporosis. These include:

Anorexia Nervosa and Other Eating Disorders. Anorexia nervosa is a major risk factor for osteoporosis. In women with anorexia nervosa, estrogen levels drop so much that menstrual periods either become irregular or stop. This decline in estrogen causes bone loss. A number of other complex changes occur in the body, and these are also harmful to the bones. Although more common in teenage girls and young women, men can also have eating disorders, and they too are at great risk for broken bones from osteoporosis.

Depression. Research suggests a link between depression and low bone density or osteoporosis. More studies will help us to better understand any relationship between these two conditions.

Hyperparathyroidism. This is a condition in which the parathyroid glands (two pairs of small glands located near the thyroid in the neck) produce too much parathyroid hormone (PTH). Having too much PTH causes bone loss. This condition is more common in women after menopause. A simple blood test can tell your healthcare provider if this is a problem.

Hyperthyroidism. In people with this condition, the thyroid gland produces too much thyroid hormone. This can lead to weak muscles and fragile bones. The same

MEDICATIONS THAT CAN CAUSE BONE LOSS*

- Aluminum-containing antacids
- Antiseizure medications *(only some)* such as Dilantin® or Phenobarbital
- Aromatase inhibitors such as Arimidex®, Aromasin® and Femara
- Cancer chemotherapy drugs
- Cyclosporine A and FK506 *(Tacrolimus)*
- Glucocorticoids such as cortisone and prednisone
- Gonadotropin releasing hormone (GnRH) agonists such as Lupron® and Zoladex®
- Heparin *(long-term)*
- Lithium
- Medroxyprogesterone acetate for contraception *(Depo-Provera®)*
- Methotrexate
- Proton pump inhibitors *(PPIs)* such as Nexium®, Prevacid® and Prilosec®
- Selective serotonin reuptake inhibitors *(SSRIs)* such as Lexapro®, Prozac® and Zoloft®
- Tamoxifen® *(premenopausal use)*
- Thiazolidenediones such as Actos® and Avandia®
- Thyroid hormones in excess

**This list may not include all medications that cause bone loss.*

OSTEOPOROSIS AND GLUCOCORTICOIDS MEDICATIONS

Glucocorticoids (also known as corticosteroids or steroids) are powerful medications that relieve inflammation. Although they are often referred to simply as steroids, these medications should not be confused with anabolic steroids. Anabolic steroids are male sex hormones that some athletes use illegally to build muscle.

Glucocorticoids are much like certain hormones made by your own body. Healthcare providers prescribe them for many conditions, including arthritis, asthma, Crohn's disease, allergies and lupus. Glucocorticoids are also used along with other medications to treat cancer and support organ transplants. Common glucocorticoid medications are cortisone, prednisone, and methylprednisolone.

People of all ages can lose bone and develop fractures if they take large doses of glucocorticoids. People whose adrenal glands make too much of the hormone cortisol (a condition called Cushing's syndrome) may also develop osteoporosis.

While glucocorticoid medicines increase your risk for breaking a bone, they can be life-saving treatments for serious conditions. If you must take glucocorticoid medications to treat an illness for more than a few weeks, you should take steps to prevent bone loss. Taking glucocorticoids in a dose of 5 mg or more per day for more than three months increases your risk of bone loss and can lead to osteoporosis and fractures.

Talk with your healthcare provider about prescribing the smallest dose for the shortest period of time. While taking glucocorticoids, it is especially important to get enough calcium and vitamin D. It is also important to exercise and not smoke. You may also want to ask your healthcare provider if you need a bone density test.

thing can happen if you take too much thyroid hormone medication to treat an underactive thyroid.

Multiple Myeloma. This is a cancer of the bone marrow. Its first symptoms may be back pain and fractures of the spinal bones called vertebrae. Blood and urine tests can detect the problem. Other forms of cancer that affect bones or bone marrow can also cause fractures.

Rheumatoid Arthritis (RA). People with rheumatoid arthritis are at increased risk for osteoporosis. In addition, RA is often treated with corticosteroids which further increases the risk.

Inflammatory Bowel Disease (IBD). There are different types of IBD including Crohn's disease and ulcerative colitis. Glucocorticoid are commonly used to treat these conditions. People with IBD may also have trouble absorbing calcium, vitamin D, and other nutrients further weakening their bones.

Celiac Disease. People with celiac disease have trouble digesting foods with gluten. Gluten is found in grains such as wheat, rye, and barley. People with celiac disease also have problems absorbing nutrients, including calcium and vitamin D.

Organ Transplants. People who have organ transplants must take medications to prevent their bodies from rejecting their new organs. Some of these drugs can weaken bones. Solid organ transplantation itself may also increase the risk of osteoporosis.

Rapid or Excessive Weight Loss. Obesity contributes to poor health. Losing excess

ARE OSTEOPOROSIS AND OSTEOARTHRITIS CONNECTED?

Many people confuse osteoporosis and osteoarthritis. That's because the two words sound so much alike. It's true that they both involve bone ("osteo") and they both are more common as we age; nevertheless, osteoarthritis and osteoporosis are distinctly different disorders. Osteoarthritis is a disease of thinning joint cartilage; whereas osteoporosis is a thinning of the bone itself. Osteoarthritis occurs when the cartilage cushioning joints wears away with time or injury. Unlike osteoporosis, osteoarthritis does not make bones weaker or more likely to break.

There are many types of arthritis, all of which affect the joints and surrounding tissue. After osteoarthritis, the next most common type is rheumatoid arthritis (RA). Rheumatoid arthritis is an autoimmune disease treated with glucocorticoid medications. These medications, in addition to direct effects of RA, damage bone and increase risk for osteoporosis and fractures.

weight improves health and reduces risk for diabetes, stroke, and other serious conditions. However, losing too much weight too quickly can also cause bone loss. Fortunately, you can protect your bones while losing weight by exercising regularly and eating a healthy diet that provides enough calcium and vitamin D.

Other Diseases and Conditions. Many other health problems can affect the bones. Some of these include genetic disorders and diseases of the kidneys, lungs, or digestive system. With proper treatment, most people can live well with these diseases. They just need to take extra care to protect their bones.

MEDICAL CONDITIONS THAT COULD LEAD TO OSTEOPOROSIS*

- AIDS/HIV
- Ankylosing spondylitis
- Blood and bone marrow disorders
- Breast cancer
- Cushing's syndrome
- Eating disorders
- Emphysema
- Female athlete triad
- Gastrectomy
- Gastrointestinal bypass procedures
- Hyperparathyroidism
- Hyperthyroidism
- Idiopathic scoliosis
- Inflammatory bowel disease *(e.g. crohn's disease or ulcerative colitis)*
- Diabetes mellitus *(Types I and II)*
- Kidney disease
- Lupus
- Lymphoma and leukemia
- Malabsorption syndromes *(e.g. celiac disease)*
- Multiple myeloma
- Multiple sclerosis
- Organ transplants
- Paralysis
- Parkinson's disease
- Poor diet
- Post-polio syndrome
- Premature menopause
- Prostate cancer
- Rheumatoid arthritis
- Severe liver disease *(including biliary cirrhosis)*
- Spinal cord injuries
- Stroke (CVA)
- Thalassemia
- Thyrotoxicosis
- Weight loss

**This list may not include all conditions that cause bone loss.*

CHAPTER 2

PREVENTING BONE LOSS AT ANY AGE

You're never too young or too old to improve the health of your bones. Osteoporosis prevention should begin in childhood. But it shouldn't stop there. Whatever your age, the habits you adopt now can affect your bone health for the rest of your life.

THE RECIPE FOR HEALTHY BONES

No matter your age, the recipe for bone health is simple for both men and women:

- Get enough calcium and vitamin D
- Exercise regularly
- Make healthy lifestyle choices
- Talk to your healthcare provider about your bone health

In this chapter, we'll discuss each of these four ingredients. Then we'll offer some guidance for building and keeping healthy bones at every stage of life.

EAT HEALTHY FOODS

Most foods contain vitamins, minerals, and other nutrients that keep you healthy. Your body needs these nutrients to work properly. Eating plenty of fruits and vegetables benefits every organ, including your skeleton. Two nutrients that are of special importance to your bones are calcium and vitamin D.

CALCIUM

Calcium is an essential nutrient because it provides the material for building new bone. It's important throughout your life, particularly when you are growing. For women, it is especially important when pregnant or breastfeeding. Dairy products (low-fat or non-fat milk, yogurt and cheese) are good sources of calcium. So are products that have calcium added, such as certain breakfast cereals, soy milk, and juices. You can get calcium in smaller amounts from broccoli, certain leafy green vegetables, and soybeans. If you drink soy milk that is fortified with calcium, be sure to shake the container thoroughly as calcium can settle to the bottom.

If you are lactose intolerant (which means that you have trouble digesting milk due to a shortage of a protein called lactase), you might be able to eat lactose-free dairy products or those with added lactase. Another option is to eat other calcium-rich foods and ones that have added calcium.

If you don't get enough calcium from food (check calcium calculator, in this chapter, to find out) consider taking a calcium supplement. The amount of supplement you need depends on how much calcium you get each day from the foods you eat. It's important to meet the recommended daily intake of calcium, but generally not to exceed it.

In food, calcium never exists on its own. It is always combined with one or more other elements, in what is called a compound. Several different calcium compounds are used in supplements, including calcium carbonate, calcium citrate, calcium lactate and calcium phosphate. These compounds contain different amounts of elemental calcium, which is the actual amount of calcium in the supplement. It is important to read the product label carefully to determine how much elemental calcium is in the supplement and how many doses or pills to take. When reading the label, pay close attention to the "amount per serving" and "serving size."

Calcium supplements are available without a prescription in a wide range of preparations (including chewable and liquid) and in various strengths. Many people ask which calcium supplement they

should take. The best supplement is the one that meets your needs based on tolerance, convenience, cost, and availability.

CALCIUM AND VITAMIN D* RECOMMENDATIONS

Children and Adolescents	Calcium (Daily)	Vitamin D (Daily)
1 through 3 years	500 mg	200 IU**
4 through 8 years	800 mg	200 IU**
9 through 18 years	1,300 mg	200 IU**
Adult Women	**Calcium (Daily)**	**Vitamin D_3 (Daily)***
19 through 49 years	1,000 mg	400-800 IU
50 years and over	1,200 mg	800-1,000 IU
Adult Men	**Calcium (Daily)**	**Vitamin D_3 (Daily)***
19 through 49 years	1,000 mg	400-800 IU
50 years through 70 years	1,000 mg	800-1,000 IU
71 years and older	1,200 mg	800-1,000 IU

Vitamin D3 is also called cholecalciferol; vitamin D2 is also called ergocalciferol.

**When available, a supplement of vitamin D3 is preferred over vitamin D2 to protect bone health.*

***The National Osteoporosis Foundation does not have specific vitamin D recommendations for these age groups. These are the recommendations of the Institute of Medicine of the National Academies and National Institutes of Health, Office of Dietary Supplements.*

CALCULATE YOUR CALCIUM

Are you getting enough calcium in your diet? Calcium needs vary at different times in your life. Here's a general guide. Try keeping a diary of all the foods you eat for a week or two. Then use the results of a typical day to fill out this calcium calculator and compare your results to "Calcium and Vitamin D Recommendations" *(see above)*. If you find that you fall short, select a calcium supplement to make up the difference.

Product	Servings/day		Estimated calcium/ serving, in mg		Calcium in mg
Milk (8 oz.)	_____	x	300	=	_____
Yogurt (8 oz.)	_____	x	415	=	_____
Cheese (1 oz.)	_____	x	200	=	_____
Fortified foods or juices	_____	x	80 to 1000*	=	_____
Estimated total from other foods with smaller amounts of calcium					+250 mg
TOTAL DAILY CALCIUM INTAKE				=	_____

**Calcium content of fortified food varies. Check package label.*

DOS AND DON'TS FOR CHOOSING A CALCIUM SUPPLEMENT

The following DOs and DON'Ts can help you in choosing and using a calcium supplement. If you still have concerns about the right supplement or amount, speak with your healthcare provider.

DO

- ✓ **DO** ask your pharmacist to recommend a calcium supplement. Pay close attention to the serving size and amount of calcium per serving.
- ✓ **DO** read the package label. It will tell you the amount of elemental calcium—how much calcium the supplement provides—and how many you must take to get that amount.
- ✓ **DO** ask your pharmacist about possible interactions between calcium supplements and any medications you take.
- ✓ **DO** take supplements with food whenever possible. Except for calcium citrate, calcium supplements are better absorbed by your body when taken with food. You can take your supplement during or right after a meal or snack.
- ✓ **DO** consider foods that have calcium added instead of supplements. Some brands of breakfast cereal and fruit juice have calcium added.
- ✓ **DO** check with your healthcare provider or pharmacist if you take proton pump inhibitors (PPIs) daily. Examples of PPIs include Nexium®, Prevacid® and Prilosec®. Because these medications block stomach acid, your body may better absorb calcium citrate supplements. Calcium citrate, unlike other calcium supplements, doesn't need stomach acid for absorption.

DON'T

- ✗ **DON'T** buy a supplement made from unrefined oyster shell, bone meal or dolomite unless the label states "purified" or has the USP (United States Pharmacopeia) symbol. These may contain lead and other toxic metals.
- ✗ **DON'T** take all of your calcium at once. If possible, spread it out over two or three doses throughout the day. Your body absorbs calcium best in amounts of 600 mg or less.
- ✗ **DON'T** take more calcium than you need. Estimate the amount of calcium you get from your diet. Extra calcium from supplements won't help, and it might cause problems such as kidney stones in certain individuals.
- ✗ **DON'T** take an iron supplement at the same time as your calcium supplement. Calcium may prevent your body from properly using the iron.
- ✗ **DON'T** use antacids containing aluminum as a calcium supplement. Large doses of aluminum can harm bone. Using an antacid with calcium carbonate, as long as it doesn't contain aluminum, is fine.

CALCIUM CONTENT OF FOODS

Food item	Serving size	Estimated calcium content in milligrams (mg)
MILK		
Whole, low-fat or skim	8 oz. (1 cup)	300
YOGURT AND ICE-CREAM		
Plain yogurt, fat-free or low-fat	8 oz. (1 cup)	415
Fruit yogurt, low-fat	8 oz. (1 cup)	345
Frozen yogurt, vanilla, soft-serve	8 oz. (1 cup)	205
Ice-cream, low-fat or high-fat	8 oz. (1 cup)	140-210
CHEESE		
American	1 oz.	175
Cheddar, shredded	1 oz.	205
Cottage cheese, 1% milk fat	1 cup	140
Mozzarella, part skim	1 oz.	205
Parmesan, grated	1 tbsp.	70
Ricotta, part skim	4 oz.(1/2 cup)	335
Swiss 1 oz.	1 oz.	220-270
FISH AND SHELLFISH (CANNED)		
Sardines, canned in oil with bones	3 oz.	325
Salmon, pink, canned with bones	3 oz.	180
Shrimp, canned	3 oz.	125
VEGETABLES		
Bok choy (Chinese cabbage), raw	8 oz. (1 cup)	75
Broccoli, cooked & drained	8 oz. (1 cup)	60
Kale, cooked 8 oz. (1 cup)	8 oz. (1 cup)	95
Soybeans, mature, cooked & drained	8 oz. (1 cup)	175
Turnip greens, fresh, cooked & drained	8 oz. ((1 cup)	200
FRUITS		
Oranges	1 whole	50
Dried figs	2 figs	55
FORTIFIED FOODS		
Fruit juice with added calcium	6 oz.	200-345
Cereal with added calcium (without milk)	1 cup	100-1,000
Tofu prepared with calcium	4 oz. (1/2 cup)	205
Soy milk with added calcium	8 oz. (1 cup)	80-500

VITAMIN D

The body needs vitamin D to absorb calcium. Your skin makes vitamin D when it is exposed to the sun. In fact, sunlight is the main source of vitamin D for people all over the world. However, we know that getting sun is a risk factor for skin cancers and premature skin aging. In some people, vitamin D levels can remain low despite sun exposure. In some places, the sun is so weak during winter months, people are unable to produce vitamin D.

Vitamin D is usually added to the milk you buy at the grocery store (but not to other milk-based products, like cheese, yogurt and butter). Liver, fatty fish, and egg yolks also contain small amounts of vitamin D. It is very difficult to get enough of this nutrient from food, so many people need to take a multivitamin or a vitamin D supplement. Many calcium supplements also contain vitamin D.

Your healthcare provider can run a simple blood test that can tell if you're getting enough vitamin D to keep your bones healthy. If you aren't, you may be prescribed extra doses of vitamin D until your blood levels increase. Your healthcare provider may need to repeat the test a few times until your blood levels of vitamin D are normal.

HOW MUCH VITAMIN D DO I NEED?

The National Osteoporosis Foundation recommends between 800 and 1,000 units (IU) of vitamin D3 daily for most people age 50 and older. Some people may need more. Adults under age 50 should get between 400 and 800 IU of vitamin D3 daily. Supplements of vitamin D are available as either vitamin D2 or D3. Vitamin D3 is the better choice to protect your bones. It is also called cholecalciferol.

EXERCISE REGULARLY

Your muscles get bigger and stronger when you use them. Bones are similar; they get stronger and denser when you make them work. And "work" for bones means handling impact, the weight of your body, or more resistance.

Currently, we know the most about two types of exercises that are important for building and maintaining bone density. These are:

Weight-bearing/impact exercises. These exercises include activities that make you move against gravity while being upright, such as fast walking, running, stair climbing and playing soccer. Biking and swimming are not weight-bearing exercises so they don't help your bones as much. If you like these activities, try to add in other activities that work your bones.

Resistance/strengthening exercises. Resistance or strengthening exercise is when you move your body, a weight, or some other resistance against gravity. This can include functional movements, such as standing and rising up on your toes, or resistance/strengthening exercises such as lifting weights, using elastic exercise bands, weight machines or lifting your own body weight.

Your program may also include the following types of exercises:

Balance exercises. Exercises that strengthen your legs and challenge your balance, such as Tai Chi, can decrease your risk of falls and the fractures that falls can cause.

Posture exercises. Exercises that improve your posture and reduce rounded or "sloping" shoulders can help you decrease the risk of fractures, especially in the spine.

Functional exercises. Exercises that improve how well you move can help you in everyday activities and decrease your risk of falls and fractures. For example, if you have trouble getting up from a chair or climbing stairs, functional exercises can help.

Refer to Chapter 6 for specific exercises that can help you strengthen your hips and spine, improve your balance and posture and how you move in your everyday life.

If you can't do high-impact weight-bearing activities, try lower-impact ones. For example, try walking or stair-climbing instead of jogging. If you haven't exercised regularly for a while, check with your healthcare provider before beginning a new exercise program—particularly if you have health problems such as heart disease, diabetes, or high blood pressure. Once you have your healthcare provider's approval, start slowly.

If you have already had spine fractures from osteoporosis, be very careful to avoid activities that require reaching down, bending forward, rapid twisting motions, heavy lifting, and anything that increases your chance of a fall.

HOW MUCH EXERCISE SHOULD I DO?

Weight-bearing, impact exercises should be done for 30 total minutes on most days of the week. You can do 30 minutes at one time or break it up during the day. For example, 3 sessions for 10 minutes each will provide the same bone benefit as one 30-minute session. If you can't fit 10 minutes in, spread your impact exercises through your day by taking the stairs or by parking farther from the store or work.

Resistance/strengthening exercises should be done 2 to 3 days a week. You should aim for one exercise for each major muscle group for a total of 8 to 12 exercises. You should do one or two sets of 8 to 10 repetitions for each exercise. If you lift a weight 10 times in a row and then stop, you have completed one set of 10 repetitions. If you can't do 8 in a row, the weight is too heavy or resistance is too much. If you can do more than 10 in a row, increase the weight or resistance. If you have osteoporosis or are frail, you may be able to do 10 to 15 repetitions of a lighter weight. If you're at high risk of having a fracture, you should work with a physical therapist to develop a safe strength training program.

If you don't have much time for strengthening/resistance training, do small amounts at a time. You can do just one body part each day. For example, do arms one day, legs the next and trunk the next. You can also spread these exercises out during your normal day.

Balance, posture and functional exercises can be done every day. You may want to focus on one

WHEN A SERVING OF MILK SAYS IT CONTAINS 30% CALCIUM, HOW DO I KNOW HOW MUCH CALCIUM IS IN THAT SERVING?

The percent Daily Values (DV) on the food label can help you determine whether a food is high or low in a nutrient. In general, 5% DV or less is low in a nutrient, while 20% DV or more is high. Daily Values are available on the "Nutrition Facts" panel on food labels, which should be read carefully because the percent DV is based on one serving of food.

The DV for calcium is based on 1,000 mg daily. Therefore, a serving of milk with a DV of 30% calcium means that it contains 300 mg of calcium. A serving of food with a DV of 20% calcium means it contains 200 mg of calcium and 10% means it contains 100 mg of calcium.

In the case of vitamin D, the DV is based on 400 IU daily. Therefore a serving of food with 50% vitamin D has 200 IU of vitamin D. A serving of food with 25% vitamin D has 100 IU of vitamin D. There are few food sources for vitamin D, so unless an item has been fortified with vitamin D, most food labels do not list the percent of the DV of vitamin D.

START HERE

CHECK CALORIES

LIMIT THESE NUTRIENTS

GET ENOUGH OF THESE NUTRIENTS

FOOTNOTE

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250 Calories from Fat 110

	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Potassium 700mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

QUICK GUIDE TO % DV

5% or less is low

20% or more is high

area more than the others. If you have fallen or tend to lose your balance, spend time doing the balance exercises. If you are getting rounded shoulders, work more on the posture exercises. If you have trouble climbing stairs or getting up from the couch, do more functional exercises. You can also perform these exercises at one time or spread them throughout your day.

As you get started, your muscles may feel sore for a day or two after you exercise. If soreness lasts longer, you may be working too hard and need to ease up. Exercises should be done in a pain-free range of motion.

HEALTHY BONES EXERCISE SCHEDULE

Your healthy bones exercise week may look like one of the following two examples. Adjust your schedule to fit your specific needs and your lifestyle.

Exercise	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Weight-bearing, impact exercise	30 min.	30 min.		30 min.		30 min.	30 min.
Resistance/ strengthening exercise			8-12 types		8-12 types		
Balance, posture, and functional (Chap. 6)	✓	✓	✓	✓	✓	✓	✓

Exercise	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Weight-bearing, impact exercise	30 min.		30 min.	30 min.	30 min.		30 min.
Resistance/ strengthening exercise	4 arm*	4 leg	3 trunk	4 arm*	4 leg	3 trunk	
Balance, posture, and functional (Chap. 6)	✓	✓	✓	✓	✓	✓	✓

If you've had a fracture or have osteoporosis or low bone density, work with a physical therapist to choose the best exercise and learn the correct exercise form.

All individuals should check with their healthcare provider before beginning an exercise program. If you have any chest pain, stop exercising and see your healthcare provider before exercising again.

**Even though arm exercises are not included in this booklet, they are part of a complete resistance/strengthening program.*

WHICH EXERCISE IS BEST?

The activities in Group 1 are the most effective for building bone. If you already have low bone mass, osteoporosis or are frail, choose safer options from Groups 2, 3 and 4.

GROUP 1: WEIGHT-BEARING HIGH-IMPACT/ RESISTANCE ACTIVITIES

- Aerobics
- Basketball
- Dancing
- Field hockey
- Gymnastics
- Hiking, jogging or running
- Jumping rope
- Lacrosse
- Racquet sports
- Soccer
- Stair climbing
- Tennis
- Volleyball
- Weight lifting or resistance training

GROUP 2: WEIGHT-BEARING LOW-IMPACT ACTIVITIES

- Cross-country ski machines (not for people with poor balance, weak lower legs, or high risk of falls)
- Cross-country skiing (not for people with poor balance, weak lower legs, or high risk of falls)
- Elliptical training machines
- Low impact aerobics
- Stair-step machines
- Treadmill walking
- Walking

GROUP 3: WEIGHT-BEARING HIGH-IMPACT/ RESISTANCE ACTIVITIES

- Balance training exercises
- Functional exercises
- Pilates (with no forward-bending)
- Posture exercises
- Tai chi
- Yoga (with no forward-bending)

GROUP 3: NON-IMPACT/BALANCE/POSTURE/ FUNCTIONAL EXERCISES

- Bicycling and indoor cycling
- Deep-water walking
- Stretching and flexibility exercises (with no forward-bending)
- Swimming
- Water aerobics

HEALTHY LIFESTYLE CHOICES

Habits like smoking and drinking alcohol can damage your bones. If you drink, do so in moderation. Heavy drinking reduces bone formation. It might also affect your body's calcium supply. Drinking alcohol can also make you more likely to fall, which is how many people break bones. Moderate drinking, however, does not appear to harm bones. But if you drink more than two alcoholic drinks a day you need to be concerned.

If you smoke, stop. If you don't smoke, don't start. Smoking is bad for your bones for many reasons. The nicotine and other chemicals in cigarettes are toxic to bone cells. Smoking might also make it harder for you to absorb calcium. In addition, smoking decreases the ability of estrogen to protect bones in women. Finally, smoking can make exercise harder because it stresses the heart and lungs. It's no surprise, then, that researchers say smokers are more likely than nonsmokers to break bones.

PROTECTING YOUR BONES AT EVERY STAGE OF LIFE

While the same basic recipe for bone health will serve you well throughout life, there are some specific things you can do at each stage of life. Whatever your age, get started now.

CHILDHOOD THROUGH ADULTHOOD: BUILDING STRONG BONES

Building strong bones when you are young can help you avoid osteoporosis later in life. Children and teenagers form new bone as they grow taller. Their bones get longer and stronger until they reach what experts call peak bone mass. This is the point when you have the strongest bones you will ever have. It usually occurs between the ages of 18 and 25.

To help build strong bones, it is important to be physically active throughout childhood, the teen years, and young adulthood. Children and teens should get at least one hour of physical activity every day. Adults should get at least 30 minutes of moderate physical activity daily. Activities such as jumping rope, running, and playing sports are fun and make bones stronger. Lifting weights, using

TALK WITH YOUR HEALTHCARE PROVIDER

If your healthcare provider hasn't talked to you about your bone health, it is time for you to bring it up. The two of you can develop a plan for protecting your bones.

Depending on your age and other risk factors, your healthcare provider may recommend a bone mineral density (BMD) test. *(We'll discuss this more in Chapter 3.)* The test will tell if you have osteoporosis or are at risk for developing it. If the BMD test shows you are losing bone density, your healthcare provider may prescribe medication to prevent fractures.

These drugs fall into two main categories: antiresorptives and anabolics.

- **Antiresorptives slow bone loss.**
- **Anabolics build bones.**

You can learn more about both types of medication in Chapter 4 Treating Osteoporosis.

weight machines or taking cross-fit exercise classes builds both muscles and bones.

Eating well and getting enough calcium are also important at these stages of your life. Avoid drinking sodas in place of milk or calcium-fortified juices. If you are a teen or young adult, avoid excessive dieting.

Becoming too thin as a teen can negatively affect your bones for the rest of your life. Smoking and drinking too much alcohol can also harm your bones now and in the future.

WHEN KIDS GET OSTEOPOROSIS

There is no generally accepted definition of osteoporosis in children. Low bone density in children is most commonly due to other medical conditions or medications used to treat disease. Sometimes there is no known cause for low bone density in children. In some cases, children who suffer multiple fractures have an underlying problem with their bones called osteogenesis imperfecta. This disease is different from osteoporosis and can be diagnosed with a blood test.

A rare form of osteoporosis, called idiopathic juvenile osteoporosis, affects children between the ages of 1 and 13. Its cause is unknown. Children with this condition tend to have lots of broken bones, particularly of the legs and spine. Treatment includes calcium and vitamin D and, in some cases, medication. Fortunately, this type of osteoporosis usually goes away at adolescence. Experts are not certain how this condition affects bone health later in life.

Glucocorticoid medications can also put children at risk of losing bone density. Glucocorticoids are strong medicines used to treat diseases such as rheumatoid arthritis, asthma, and Crohn's disease. *(See Chapter 2.)* If your child must take one of these drugs, speak with his or her healthcare provider about bone protection. The Food and Drug Administration (FDA) has not approved the use of osteoporosis medications for children.

YOUNG ADULTHOOD TO MIDDLE AGE: MAINTAINING PEAK BONE MASS

Once you reach the age of 25, your bones are probably as strong as they will ever be. If you have a healthy lifestyle and if you are a woman with regular periods, you probably won't lose much bone over the next 20 years. But if you are inactive or don't get enough calcium and vitamin D, you can start losing bone in early adulthood. Bone loss can also happen if sex hormone levels are low or if you have a disease that causes bone loss. *(See Medical Conditions That Can Lead to Osteoporosis, in Chapter 2.)* In these cases, it is especially important to start a program to prevent bone loss.

Teenagers who use Depo-Provera® for birth control may be at risk for bone loss and osteoporosis later in life. The Food and Drug Administration (FDA) advises women that Depo-Provera® should not be used longer than two years if other birth control options are available and appropriate.

WHAT WOMEN NEED TO KNOW MENOPAUSE: A TIME FOR ACTION

At some point, all women go through menopause. At first, monthly periods become less regular. This is called perimenopause. A woman reaches menopause when her periods stop completely. This transition happens naturally over time. In some women, it takes less than a year. In others, it can take two or more years. During this time, you may feel many physical and emotional changes. Or you may feel no symptoms at all.

Menopause happens when the ovaries stop producing estrogen. If you have your ovaries removed, menopause happens abruptly. Either way it happens, the result is the same: low estrogen levels, which can lead to bone loss. In some women, bone loss is rapid and severe.

The amount of bone you have at menopause and how fast you lose it afterwards are the two most important factors in determining if you will develop osteoporosis. When you reach menopause, you may want to ask your healthcare provider about whether you should have a BMD test at this time *(see Chapter 3.)* With BMD tests, it is possible to tell if you are at risk for osteoporosis. Knowing this can help you begin treatment before you lose too much bone.

Other forms of long-term birth control have not been reported to damage bone growth in adolescents or raise risk for broken bones later in adulthood.

If you are pregnant or breastfeeding, it is especially important to get the calcium and vitamin D you need. The need is greatest for teenagers who become pregnant, because they must provide for their own growing bones and those of their baby. So, for teenage pregnancies, the effects on future bone health are not certain. Women who have one or more pregnancies and/or miscarriages as adults appear to experience no lasting harm to their bones.

Healthy lifestyle choices continue to be important for protecting bones during adulthood. Drinking too much alcohol or smoking can lead to bone loss. Exercise and a proper diet help keep bones strong. If you have young children or grandchildren, now is the time to help them develop healthy habits to build and maintain healthy bones throughout their lives.

MIDDLE AGE AND BEYOND: PREVENTING BONE LOSS LATER IN LIFE

In your 30s and 40s you may begin to lose bone, especially if you have certain illnesses, take medicines that cause bone loss, or have other risk factors. *(For information on risk factors, see Chapter 1.)* A broken bone in your 30s or 40s could very well be the first indication that your bones are not as strong as they should be. A woman with strong bones does not break her wrist simply by falling while walking the dog. However, wrist fractures are common in women beginning in their 40s, much more common than in men.

For most women, bone loss is most rapid

during the first few years after menopause. But it continues throughout life. Bone loss at the hip often speeds up in your 70s or 80s. This may be due to less physical activity and changes in the way your body breaks down and builds bone. Most men do not begin to lose bone until their 50s, and their rate of bone loss is slower than women's. However, men can lose a lot of bone later in life and are also at risk for fractures.

It's important for older women and men to get enough calcium (1,200 mg/day) and vitamin D (800-1,000 units/day). Staying active is essential for keeping toned muscles, flexible joints, strong bones, and good balance.

If you already have osteoporosis, work with your healthcare provider to find the best way to treat it and prevent further bone loss and fractures. *(For more on treatment, see Chapter 4.)* You should also take steps to reduce your risk of falls, the leading cause of broken bones in older adults.

If you have risk factors, or aren't sure, it's important to speak with your healthcare provider about the best ways to protect your bones. Bone mineral density tests can tell if you have low bone density and if you need medical attention.

WHAT MEN NEED TO KNOW

MEN GET OSTEOPOROSIS TOO

If you think you can't get osteoporosis because you are a man, think again. Although women are at greater risk, osteoporosis can cause broken bones in older men. As the population ages, more and more men are affected. Here are some facts and statistics:

- **In American men over age 50, two million already have osteoporosis. Another 12 million are at risk.**
- **As many as one in every four men over age 50 is at risk for an osteoporosis-related fracture.**
- **Each year, approximately 80,000 men will break a hip.**
- **Men are also more likely than women to die within a year from problems related to a hip fracture.**
- **Men can develop painful spinal fractures, but usually at a later age than women.**

Factors such as using glucocorticoid medications, not exercising, smoking, drinking too much alcohol, or having low testosterone levels put men at risk. So does having other medical problems such as chronic kidney, lung or gastrointestinal disease, prostate cancer and certain inflammatory disorders such as rheumatoid arthritis. If you have risk factors, or aren't sure, it's important to speak with your healthcare provider. Bone density tests can tell if you have low bone density and if you need medical treatment. Anyone who has experienced a fracture from an injury that seems minor should be evaluated for osteoporosis.

CHAPTER 3

DETECTING OSTEOPOROSIS: THE IMPORTANCE OF TESTING

Your bones won't tell you if they are getting weak. They won't creak. They won't ache. In fact, you may have osteoporosis and never know it. For many people, breaking a bone is the first clue that anything is wrong. Others can have fractures of the spine and not realize it until they lose height or their spine begins to curve forward. At this point the disease is advanced. In any case, these broken bones can be very painful and lead to long-term problems. More broken bones are likely to follow. That's why it's important to know about the health of your bones—before you break one.

LEARNING ABOUT YOUR BONE HEALTH

It's important to work with your healthcare provider to find out if you are at risk for osteoporosis.

Diagnosing osteoporosis may involve several steps, including:

Medical history. Your healthcare provider will ask you questions to better understand your risk. These questions may concern:

- Medicines you currently take or took in the past
- Health problems you have currently or had in the past
- Bones you've broken
- How much you exercise
- How much calcium and vitamin D you get
- How much alcohol you drink
- Whether or not you smoke
- Family history of osteoporosis; family or personal history of broken bones in adulthood

If you are a woman,

- History of your menstrual cycle
- If and when you went through menopause.

Physical exam. Your healthcare provider will measure you to see if you have lost any height and check your spine to see if it is curving forward. Either of these could mean that you have broken one or more bones in your spine.

Tests. Your healthcare provider may order one or more tests, which we will discuss later in this chapter. These include:

- Bone mineral density (BMD) tests, which can measure the amount of bone in different parts of the skeleton
- X-rays or bone scans, which can show other bone problems
- Lab tests, which can give clues about bone loss and new bone formation

BONE MINERAL DENSITY (BMD) TESTS

While many tests are used to evaluate bones, the bone mineral density (BMD) test is the only one that can diagnose osteoporosis. A BMD test uses a special machine to measure bone density. In other words, this test lets you know the amount of bone mineral you have in a certain area of bone. A BMD test can tell if you have low bone density before you break a bone. When you repeat the test, it can tell you if your bones are losing density or staying the same. Your BMD, along with personal risk factors, can predict your chance of having a fracture in the future and can help you and your healthcare provider decide if you need treatment. If you are being treated for osteoporosis, your healthcare provider may repeat the test every year or two and compare the results to see how well treatment is working.

TYPES OF BMD TESTS

The methods for measuring bone density include the following:

- DXA (dual-energy x-ray absorptiometry)
- pDxA (peripheral dual-energy x-ray absorptiometry)
- QUS (quantitative ultrasound)
- QCT (quantitative computed tomography)
- pQCT (peripheral quantitative computed tomography)

BMD TESTS

WHAT THE NUMBERS MEAN

Your BMD test result is a number called a T-score. It tells you how your bones compare to those of healthy young adults. The difference between your BMD and that of a healthy young adult is described as a standard deviation (SD). Usually 1 SD decrease in BMD equals a 10% to 15% drop in bone density. Greater than two and a half SDs below normal means you have significant risk for fractures; you have osteoporosis.

HERE'S WHAT YOUR T-SCORE MEANS

IF YOUR T-SCORE IS	YOU HAVE
-1.0 or higher	normal bones
Between - 1.0 and -2.5	low bone mass (osteopenia)
-2.5 or lower	Osteoporosis

There are many types of BMD tests. *(See left)* Often, the type of test you have will depend on the equipment available in your community.

Experts recommend a type of BMD test using a central DXA (which stands for dual-energy x-ray absorptiometry). It is the preferred method to diagnose osteoporosis. Most healthcare providers measure BMD in the hip and/or spine. Breaks in the hip or spine can be the most serious fractures. Sometimes healthcare providers do BMD tests of the wrist, finger, or heel. These tests are called peripheral screenings and are not used to diagnose osteoporosis. They can, however, help your healthcare provider decide if a central DXA or other test is needed.

Most BMD tests, including DXA, use radiation to measure bone density. But for most, the amount of radiation is very small. You would be exposed to 10 to 15 times more radiation flying in a plane round-trip between New York and San Francisco.

With most of these tests you will remain fully dressed. The test usually takes about 15 minutes. If you need to have the test again, it is best to have it done on the same machine in the same facility. That allows your healthcare provider to better compare results.

When you have a BMD test, your bone density is compared to a healthy young adult who has reached peak bone density. Test results are

WHAT IS OSTEOPENIA?

Osteopenia is the medical term for bone density that is lower than normal, but not low enough to be osteoporosis. If you are told that you have osteopenia, you may simply have lower than average bone density naturally. It does not always mean you are losing bone or that you will break bones in the future. Osteopenia is one of many risk factors for osteoporosis and fractures. If you have been diagnosed with osteopenia, now is a good time to make sure you are taking steps to protect your bones. This includes eating a healthy diet, getting regular exercise, and talking to your healthcare provider about your bone health.

expressed in a number called a T-score. The T-score shows how much your bone density is above or below normal when compared to the young normal average person. Your T-score will tell your healthcare provider if you have normal bone density, low bone mass (osteopenia) or osteoporosis.

The value of a T-score is that it predicts fracture risk. This predictive power is based on a history of how many older men and women with that T-score broke a bone. T-scores mean different things in different groups. For example, a T-score that signifies high likelihood for fracture in an 80-year-old woman would be very unlikely to cause a young child to break a bone, even though it is the very same score. This is why T-scores are not used to diagnose osteoporosis in younger men, premenopausal women, and children.

For younger people, most experts suggest using Z-scores, rather than T-scores. A Z-score compares a person's BMD to what is expected in another person of the same age, gender, and body size. A low Z-score can tell a healthcare provider if a patient should be evaluated for a condition that may be causing bone loss. (See the section titled Do I Need a BMD Test?)

X-RAYS, SCANS, AND LAB TESTS

Healthcare providers do not routinely use standard x-rays for BMD testing. While x-rays can identify broken bones, they are not sensitive enough to detect osteoporosis until 25% to 40% of bone density has been lost, and by this time the disease is well advanced.

Your healthcare provider may order an x-ray for suspected fractures of the spine or other bones. An x-ray is the most common way to tell if you have a broken bone. People with low BMD can have fractures of the spine that do not cause noticeable pain. It is very important to find these fractures early so that future fractures can be prevented. Over time, these fractures can cause much pain and

DO YOU NEED A BMD TEST?

YOUR HEALTHCARE PROVIDER MAY RECOMMEND A BMD TEST IF YOU ARE:

- A postmenopausal woman under age 65 with one or more risk factors for osteoporosis
- A man age 50-69 with one or more risk factors for osteoporosis
- A woman age 65 or older, even without any risk factors
- A man age 70 or older, even without any risk factors
- A woman or man age 50 or older who has broken a bone
- A postmenopausal woman who has stopped taking estrogen therapy (ET) or hormone therapy (HT)
- A man or woman who is being treated for osteoporosis

SOME OTHER REASONS YOUR HEALTHCARE PROVIDER MAY RECOMMEND A BMD TEST INCLUDE:

- Long-term use of certain medications, including glucocorticoids (prednisone and cortisone), some anti-seizure medications, Depo-Provera® and aromatase inhibitors
- In men, receiving certain treatments for prostate cancer
- Overactive thyroid gland (hyperthyroidism) or taking high doses of thyroid hormone medication
- Overactive parathyroid gland (hyperparathyroidism)
- An x-ray of the spine showing a fracture or bone loss
- Back pain with a possible fracture
- Significant loss of height
- Loss of sex hormones at an early age, including early menopause
- Having a disease that causes bone loss
- Women going through menopause with certain risk factors for breaking a bone

disability. In addition to x-rays, DXA tests, specifically a vertebral fracture assessment (VFA), can be used to look for fractures of the spinal bones, called vertebrae.

BONE SCANS

Sometimes healthcare providers order nuclear bone scans. A bone scan can tell your healthcare provider if there are changes that may indicate cancer, bone lesions, inflammation, or new fractures. These are not the same as bone density tests.

LAB TESTS

Lab tests use samples of blood or urine to tell your healthcare provider what is happening in your body. Many people need lab tests to check vitamin D levels or to identify conditions that contribute to bone loss. Tests that measure products of bone breakdown and formation called biochemical, or bone turnover, markers can provide information about what is going on inside your bones. This shows if you are losing bone at a faster rate than normal. These biomarkers can also help your healthcare provider tell if your bones are responding to treatment. Because bone turnover markers do not detect low bone density or diagnose osteoporosis, they cannot take the place of BMD testing.

FRAX

Some DXA machines are able to provide a report that gives information on a person's "Absolute Fracture Risk." This report incorporates a person's bone mineral density results, age and some of the important risk factors for osteoporosis and fractures. The information in this report will be used to help determine a person's risk of having a fracture in the next 10 years. This prediction of absolute fracture risk helps both healthcare providers and patients decide whether treatment is needed with an osteoporosis medication.

HOW TO FIND A HEALTHCARE PROVIDER

If you are at risk for osteoporosis or already have it, it's important that you have a healthcare provider who knows about the disease. There is no one type of medical specialty dedicated to osteoporosis; many types of healthcare providers are qualified to diagnose and treat it. Before you make an appointment, ask if anyone in the practice treats patients with osteoporosis or has a background or specialty in "metabolic bone diseases." Here are some examples of healthcare providers who may have experience in osteoporosis prevention, diagnosis, and treatment:

- Endocrinologists specialize in disorders related to the glands and hormones.
- Family physicians and general practitioners treat a variety of medical problems in patients of all ages.
- Geriatricians evaluate and treat common conditions and multiple diseases that typically occur in the elderly.
- Gynecologists specialize in the healthcare of women.
- Internists treat a variety of medical problems in adults,
- Orthopedists specialize in the treatment of injuries and disorders of the bones.
- Physiatrists specialize in physical medicine and rehabilitation.
- Rheumatologists specialize in conditions that affect the bones and joints.

IN ADDITION TO PHYSICIANS, ALLIED HEALTH PROFESSIONALS CONTRIBUTE TO THE CARE OF PEOPLE WITH OSTEOPOROSIS

Nurse practitioners are registered nurses with advanced education and training who are licensed to treat patients in collaboration with physicians.

Physical therapists with experience in osteoporosis are a resource for patients seeking guidance on bone-safe exercise and activities. Physical therapists can perform balance assessment and training that is important in preventing falls and can also help with posture, body mechanics, pain relief, and safe movement. A written prescription is usually required to see a physical therapist.

Physician assistants are licensed to treat patients under the supervision of a physician.

Registered dietitians are a resource for nutrition information and special dietary needs. Many hospitals have dietitians on staff.

If you have a primary care physician, ask him or her about osteoporosis. A healthcare provider who already knows your overall health may be able to treat you. If you need to see a specialist, your healthcare provider may be able to suggest one.

If you don't have a healthcare provider or yours can't help you, call your nearest university hospital or community hospital and ask for the department that cares for osteoporosis patients. This varies from hospital to hospital. For example, in some facilities, the department of endocrinology or metabolic bone disease treats osteoporosis patients, and in others it may be the department of rheumatology, orthopedics or gynecology. Some hospitals have a separate osteoporosis program or women's health clinic that treats osteoporosis patients. Not all hospitals, however, have departments or programs that focus on osteoporosis.

To help you locate a healthcare provider to diagnose or treat your osteoporosis, the National Osteoporosis Foundation (NOF) has developed a Professional Partner's Network (PPN) directory. Any healthcare provider can become a PPN. NOF, therefore, is not able to endorse any of the healthcare providers or healthcare organizations in the PPN directory. For a listing of PPN healthcare providers in your state, visit our NOF Web site at www.nof.org.

Many hospitals now have physician referral services, which may be another way for you to find a healthcare provider who is knowledgeable about osteoporosis. Also check the Web sites of your local hospitals. They usually list the healthcare providers on staff, including their sub-specialties and clinical interests. These may include osteoporosis or metabolic bone disease, which includes osteoporosis.

DOING YOUR OWN RESEARCH

For assistance in doing more research on osteoporosis, we recommend checking with a librarian at your public library or a medical librarian at your community hospital. Below are websites for information that may be helpful to you.

For information on clinical trials
WWW.CENTERWATCH.COM | WWW.CLINICALTRIALS.GOV | WWW.CISCRP.ORG
For information on clinical study results or to research information from studies
WWW.PUBMED.GOV | WWW.CLINICALSTUDYRESULTS.ORG
To track new medications in development
WWW.PHRMA.ORG
For drug and supplement information
WWW.FDA.ORG | WWW.USP.ORG | WWW.PDRHEALTH.COM WWW.ODS.OD.NIH.GOV | WWW.DRUGDIGEST.ORG WWW.NLM.NIH.GOV/MEDLINEPLUS/DRUGINFORMATION.HTML
For information on laboratory tests
WWW.LABTESTSONLINE.ORG
For information on complementary and alternative medicine
HTTP://NCCAM.NIH.GOV

NOTE: NOF cannot assume responsibility for the quality or trustworthiness of the information found on these Web sites. The content is not necessarily recommended or reviewed by NOF.

CHAPTER 4

TREATING OSTEOPOROSIS

Osteoporosis is a lifelong condition. Progression of the disease varies from person to person and affects some bones more than others. While osteoporosis is not curable, it can be treated and managed. You can help keep bones strong and prevent osteoporosis by exercising, not smoking and making sure you get enough calcium and vitamin D. But this is not always enough. If you have osteoporosis or low bone density, or if you have broken a bone as an adult, you should talk to your healthcare provider about whether an osteoporosis medication is right for you.

THE ROLE OF MEDICATIONS

Many osteoporosis medications are available. If, like many people, you learned you had osteoporosis after breaking a bone, the goal of your treatment will be to heal your fracture, prevent future fractures, and stop bone loss. If you have low bone density and have been fortunate enough to avoid broken bones so far, your treatment goal will be to prevent further bone loss and prevent fractures going forward. Many treatments today can help you meet these goals.

CHOOSING A TREATMENT

For most people, treatment for osteoporosis includes taking prescription medication. A number of medications have been approved by the U.S. Food and Drug Administration (FDA) to both prevent and treat osteoporosis. These drugs fall into two main categories: antiresorptives and anabolics. We'll discuss both types below.

ANTIRESORPTIVES

Antiresorptive medications slow the breakdown of bone. When you first start taking these medications, you stop losing bone mineral as quickly as you did before, but you still make new bone. Therefore, your bone density may increase slightly. Antiresorptive treatments can prevent further losses in bone density and lower your risk of breaking bones.

The antiresorptives available today are:

Bisphosphonates. This is a class of medications that includes alendronate (Fosamax® and Binosto®), ibandronate (Boniva®), risedronate (Actonel® and Atelvia®) and zoledronic acid (Reclast®). The FDA has approved these medications for use in women and in men (except ibandronate, which is only approved for women).

Alendronate, risedronate, and zoledronic acid are approved to prevent and treat osteoporosis in postmenopausal women, to treat osteoporosis in men, and to treat glucocorticoid-induced osteoporosis in both men and women. Risedronate and zoledronic acid are also approved to prevent glucocorticoid-induced osteoporosis.

Alendronate and risedronate are both available in pill form, and alendronate is also available as a liquid. Zoledronic acid is given intravenously once a year. Alendronate, risedronate, and zoledronic acid increase BMD and reduce the risk of fractures in the spine, hip, and other bones.

Ibandronate is a bisphosphonate approved only for women. Ibandronate may be given as a monthly pill, but it may also be given by intravenous (IV) infusion every three months. Ibandronate increases bone density and reduces the risk of spine fractures.

Common side effects of bisphosphonates taken by pill include problems with the digestive system such as "heartburn" or trouble swallowing. These effects can be lessened by taking the medicine exactly as prescribed (with plain water, on an empty stomach, 30-60 minutes before lying down). Side effects that can occur after receiving an IV bisphosphonate include flu-like symptoms, fever, pain in muscles or joints and headaches. Flu-like symptoms go away on their own after a few hours

or a few days. Taking an over-the-counter pain reliever and staying well hydrated before and after treatment usually reduces the likelihood and severity of symptoms. Side effects of bisphosphonates taken by pill or IV may include abdominal, bone, joint, and muscle pain.

There have been rare reports of eye inflammation and very rare reports of death of bone tissue (called osteonecrosis) of the jaw in people who take bisphosphonates either by pill or IV. If you are prescribed or are taking a bisphosphonate, you should let your dentist know before having any dental work. Some invasive dental procedures such as tooth extractions and dental implants can trigger this extremely rare side effect. Good dental hygiene, including regular brushing and flossing can help prevent complications and improve overall health.

There have also been rare reports of so-called "atypical femoral fractures"—breaks through the shaft of the thigh bone. Most of these unusual fractures have occurred after longer-term use (5 to 7 years) of bisphosphonate therapy and with little or no trauma. The majority of patients at risk for an atypical femoral fracture have had a warning sign—new thigh or groin pain unexplained by other medical problems. If such pain develops, notify your physician. Evaluation can be done to check for a possible underlying fracture. If there are signs of a potential or partial fracture, there are measures that can be taken to reduce the chance of a complete fracture occurring.

Estrogen therapy (ET) or hormone therapy (HT). These terms refer to estrogen therapy (ET) alone and estrogen with progesterone hormone therapy (HT). These medications are approved for the prevention of osteoporosis in postmenopausal women. They are available under many brand names. Estrogen can increase BMD and prevent fractures of the spine, hip, and other bones. Healthcare providers prescribe estrogen with progesterone (HT). In a woman with a uterus, taking estrogen by

itself may increase risk for cancer of the uterine lining (endometrial cancer). Estrogen therapy (ET) is often prescribed for women who have had hysterectomies. Hormone therapy effectively prevents postmenopausal osteoporosis and fractures. Some formulations of ET/HT alone or in combination with a drug called bazedoxifene are FDA-approved for this purpose.

Although ET and HT are good for bones, large studies have found that they slightly increase the risk of stroke, blood clots, and other problems *(see Chapter 4).* Unless contraindicated (by a history of breast cancer or blood clots, for example,) women with premature menopause who require prevention of bone loss are best served with HT or oral contraceptives (which are less effective than HT) rather than other bone-specific treatments until the average age of menopause, when treatment may be reassessed.

If you decide to take ET or HT, talk with your healthcare provider about the most appropriate type, dose, formulation, route of administration, and duration of therapy so as to maximize benefits and minimize risks.

Estrogen agonists/antagonists, also known as selective estrogen receptor modulators (SERMs). These drugs are for women only. They were developed to provide the benefits of estrogen therapy without many of the risks. The only estrogen agonist/antagonist approved so far for osteoporosis is raloxifene (Evista®). Raloxifene increases bone density and reduces the risk of spine fractures. It also reduces the risk of breast cancer in postmenopausal women. Possible side effects include blood clots, swelling, leg cramps, and hot flashes.

Tissue-selective estrogen complex. Conjugated estrogens/bazedoxifene combination (Duavee®) is approved to treat moderate to severe hot flashes due to menopause and to help reduce the chances of developing osteoporosis. If you use this medication only to prevent osteoporosis due to menopause, talk with your healthcare provider about whether a different treatment or medicine without estrogens might be better for you. This medication should be taken for the shortest time possible and only for as long as treatment is needed. You and your healthcare provider should talk regularly about whether you still need continued treatment with this or another medication to prevent fractures. Medicine should only be used by postmenopausal women who have not had a hysterectomy. If you have a medical history of blood clots, certain cancers, unusual vaginal bleeding, liver problems, or are pregnant or breastfeeding, you should not take this medicine. Women should take this for the shortest time needed to control hot flash symptoms. Side effects include muscle spasms, nausea, diarrhea, upset stomach, abdominal pain, throat pain, dizziness, and neck pain. If you use DUAVEE only to prevent osteoporosis due to menopause, talk with your healthcare provider about whether a different treatment or medicine without estrogens might be better for you.

Denosumab. Denosumab (Prolia®), a monoclonal antibody to RANKL, works by preventing the development of osteoclasts, which are the cells that break down bone. Denosumab is indicated for treatment of osteoporosis in postmenopausal women and men at high risk for fracture (defined as a history of osteoporotic fracture, or multiple risk factors for fracture) or patients who have failed or are intolerant to other available osteoporosis therapy.

Denosumab is indicated for treatment of glucocorticoid-induced osteoporosis in men and women at high risk of fracture who are either initiating or continuing systemic glucocorticoids in a daily dosage equivalent to 7.5 mg or greater of prednisone and expected to remain on glucocorticoids for at least 6 months.

Denosumab is also approved for men and women at high fracture risk caused by hormone-blocking therapy: men on androgen deprivation therapy for nonmetastatic prostate cancer and women receiving adjuvant aromatase inhibitor therapy for breast cancer.

Denosumab is given by subcutaneous injection (under the skin) by your health care professional every 6 months. It has been shown to reduce the risk of spine, hip, and other fractures. Denosumab should not be used if the calcium level in the blood is low, so blood tests may be needed before your medical appointment.

Low levels of blood calcium must be corrected before getting denosumab. The most common side effects are joint and muscle pain. Denosumab has also been linked to very rare cases of osteonecrosis of the jaw and atypical femoral fracture, as noted above for the bisphosphonates. When denosumab is stopped, bone density declines, potentially increasing risk for fracture, including multiple spine fractures. Therefore, after denosumab treatment ends, ongoing treatment with another medicine is recommended. Denosumab is also approved for the treatment of glucocorticoid-induced osteoporosis (GIOP) in men and women at high risk of fracture, defined as a history of fracture, multiple risk factors for fracture, or patients who have failed or are intolerant to other available osteoporosis therapy.

Calcitonin. Calcitonin is a synthetic hormone that can slow bone loss and help BMD in the spine. The FDA has approved it only for women who are at least five years past menopause. Calcitonin is available as a nasal spray or injection. The possible side effects of nasal calcitonin include nasal irritation, backache, bloody nose and headaches. Possible side effects of injectable calcitonin include nausea, vomiting and flushing. Calcitonin, like any medication, can cause an allergic reaction. This medicine is no longer considered a first-line treatment for osteoporosis. Other more effective medicines should be considered.

ANABOLICS

Anabolic medications speed up bone formation. At this time, there are two medicines available in this group: abaloparatide and teriparatide. Neither drug should be taken by people with a condition called hyperparathyroidism.

There are two anabolic drugs approved for treatment of osteoporosis: abaloparatide (Tymlos®) and teriparatide (Forteo®). Both abaloparatide and teriparatide are parathyroid hormone-related protein analogs approved for people at high risk for fracture — abaloparatide for men only and teriparatide for both men and women.

High risk for fracture is defined as a history of osteoporotic fracture, multiple risk factors for fracture, or having failed or been unable to tolerate other available osteoporosis therapy. Many people take an anabolic because they have had a fracture while taking another type of osteoporosis medication.

MEDICATIONS APPROVED TO PREVENT AND/OR TREAT OSTEOPOROSIS

Class and Drug	Brand Name	Form	Frequency
BISPHOSPHONATES			
Alendronate	Fosamax®	Oral (tablet)	Daily/Weekly
Alendronate	Fosamax Plus D™ (2,800 or 5,600 I.U. of vitamin D3)	Oral (tablet)	Weekly
Alendronate	Fosamax®	Oral (liquid Weekly solution)	Weekly
Alendronate	Binosto®	Effervescent Tablet	Weekly
Ibandronate	Boniva®	Oral (tablet)	Monthly
Ibandronate	Boniva®	Intravenous (IV)	Four Times per Year
Risedronate	Actonel®	Oral (tablet)	Daily/Weekly/ Monthly
Risedronate	Atelvia®	Oral (tablet)	Weekly
Zoledronic Acid	Reclast®	Intravenous (IV)	One Time per Year (treatment) Once every two years (prevention)
CALCITONIN			
Calcitonin	Generic	Nasal spray	Daily
Calcitonin	Generic	Injection	Varies
ESTROGEN THERAPY (ET)/HORMONE THERAPY (HT)			
Estrogen*	Multiple Brands	Oral (tablet)	Daily
Estrogen*	Multiple Brands	Transdermal (skin) patch	Twice Weekly/ Weekly
ESTROGEN AGONISTS/ANTAGONISTS (ALSO CALLED SERMS)			
Raloxifene	Evista®	Oral (tablet)	Daily
RANKL INHIBITOR (MONOCLONAL ANTIBODY)			
Denosumab	Prolia®	Injection	Every 6 months
TISSUE-SELECTIVE ESTROGEN COMPLEX			
Conjugated Estrogens/ Bazedoxifene	Duavee®	Oral (tablet)	Daily
PARATHYROID HORMONE			
Abaloparatide**	Tymlos®	Injection	Daily up to 24 months
Teriparatide**	Forteo®	Injection	Daily up to 24 months

**Estrogen is also available in various vaginal preparations, in a vaginal ring, as a cream, by injection and as an oral tablet taken sublingually (under the tongue).*

*** Drugs are given by daily injection using a pen-like device that patients are taught to use at home.*

THE HORMONE DEBATE

Almost two decades ago, estrogen therapy (ET) and estrogen with progesterone hormone therapy (HT) were the only FDA-approved medications to prevent or treat osteoporosis. While estrogen is effective against bone loss in postmenopausal women, it is not appropriate for premenopausal women or for men. The Women's Health Initiative (WHI) study showed that HT was associated with a modest increase in the risk of breast cancer, strokes, heart attacks, blood clots, and cognitive (mental) decline.

The risks of HT differ depending on type, dose, duration of use, route of administration, timing of initiation, and whether a progestogen is used. Treatment should be individualized to identify the most appropriate HT type, dose, formulation, route of administration, and duration of use, using the best available evidence to maximize benefits and minimize risks, with periodic reevaluation of the benefits and risks of continuing or discontinuing HT. For women aged younger than 60 years or who are within 10 years of menopause onset and have no contraindications, the benefit-risk ratio is most favorable for treatment of VMS hot flashes and other bothersome menopausal symptoms as well as for those at elevated risk for bone loss or fracture. For women who initiate HT more than 10 or 20 years from menopause onset or are aged 60 years or older, the benefit-risk ratio appears less favorable because ofthe greater absolute risks of coronary heart disease, stroke, venous thromboembolism, and dementia. Longer durations of therapy should be for documented indications such as persistent menopausal symptoms or bone loss, with shared decision making and periodic reevaluation. For symptoms not relieved with over-the-counter therapies and without indications for use of systemic HT, low-dose vaginal estrogen therapy or other therapies are recommended.

If you are considering ET or HT, you should discuss your choices with your healthcare provider to better understand both the possible risks and benefits.

Both abaloparatide and teriparatide are given daily as a subcutaneous injection (under the skin). Patients are taught how to administer it themselves using a special pen-type injector.

The most common side effects of abaloparatide and teriparatide are increased calcium in the urine, dizziness, nausea, headache, palpitations, fatigue, and upper abdominal pain.

In animal research studies of teriparatide and abaloparatide given in very high doses for most of the lifespan, bone cancer has developed in rats. For this reason, use of these medications, alone or in combination, beyond two years is not recommended.

When a person stops taking teraparitide or abaloparatide, bone-building halts and bone loss gradually resumes. To preserve gains in bone mineral, switching to an antiresorptive medication at that time is recommended.

Cautions. People with certain medical conditions should not take these anabolic drugs. This includes people who have hyperparathyroidism, bone or bone marrow cancers, Paget's disease of bone,

and any other cancers that have spread to the bones. Also, people who have certain abnormal blood test results, including increased calcium levels, should not take these medications.

Sometimes healthcare providers prescribe two different osteoporosis drugs at the same time. This may improve bone density more effectively than one drug alone, but experts do not agree on the benefits of combining medications. In fact, there may be some risks of taking two osteoporosis medications, including increased side effects. If your healthcare provider mentions this, you will need to weigh the added cost and consider both the risks and benefits.

Once a medication is approved by the FDA, a healthcare provider can prescribe it. When a healthcare provider prescribes a medication for a different reason than the FDA approved it, this is called prescribing "off label." Because the National Osteoporosis Foundation (NOF) takes its guidance from the FDA, NOF does not provide information on non-FDA-approved treatments for osteoporosis. Information on the safety and effectiveness of alternative therapies to prevent and treat osteoporosis is not currently available.

WEIGHING RISKS AND BENEFITS

Any medication can cause side effects, or effects from the drug that you don't want. When you are making a decision about taking a medication, the NOF urges you to discuss your treatment options with your healthcare provider. Together, you can look at both the benefits and risks of taking

MONITORING TREATMENT

To find out how your treatment is working, your healthcare provider will likely repeat the BMD test every one to two years. In some cases, healthcare providers will also use lab tests to see if patients are breaking down bone.

As noted, your healthcare provider will likely repeat the BMD test whether you are taking an antiresorptive medication or an anabolic medication. It is important to realize, however, that the BMD test may not always change much in response to that treatment, even at a time when bone is getting stronger and the risk of fracture is going down significantly. That is because osteoporosis medications improve not only BMD, but also what is termed "bone quality." While there is no easy way to measure that improvement in bone quality, much research is currently underway. As a result of these considerations, the goal of repeat BMD testing is largely to make sure that the BMD isn't going down while you are on treatment. Don't be disappointed if your BMD doesn't change very much on medication, because that repeat BMD test doesn't measure the improvement in bone quality. The best measure of treatment success is whether you have been free of fractures.

REPORTING ADVERSE EVENTS

No matter how carefully you take your medicines, sometimes they can cause problems. If you have a serious problem with a medication, it's important that you or your healthcare provider notify the FDA. You can contact the FDA by calling (800) 332-1088 or by visiting www.fda.gov/medwatch. You may also want to contact the company that made the drug.

a medication. In recent years, there has been extensive publicity about possible side effects from osteoporosis medications. Although any side effect is undesirable, it is critical that you discuss with your healthcare provider not only your risk of having a side effect, but also your risk for fractures if you go untreated.

FACTORS TO CONSIDER WHEN CHOOSING A TREATMENT

There are many factors to consider when choosing the right osteoporosis treatment for you. A few factors you and your healthcare provider may want to consider are:

Your sex. Calcitonin, estrogen and estrogen agonists/antagonists are approved only for women. Some bisphosphonates, denosumab, and teriparatide are approved for both men and women.

Your age. Some medications may be more appropriate for younger postmenopausal women while some are more appropriate for older women.

If you have not reached menopause. In general, premenopausal women should not take osteoporosis medications. Certain osteoporosis medications are approved for the prevention and treatment of osteoporosis in premenopausal women as a result of the long-term use of steroid medications. In very rare cases, healthcare providers may recommend that some premenopausal women consider taking an osteoporosis medication if they've had a fracture caused by low bone density or have experienced bone loss from a rare medical condition.

The severity of your osteoporosis. Osteoporosis medications work in different ways. A person with more severe bone loss or a broken bone may take a different medication than a person with less severe bone loss.

Other health problems you may have. Your healthcare provider will consider other health problems you have when recommending a medication. If you have had breast cancer or blood clots, for example, you should not take ET or HT. Also, if your bones have been exposed to radiation treatment, you should not take teriparatide or abaloparatide.

Personal preference. Do you prefer a pill, liquid, IV medication, or an injection? Does it work better for you to take your medication daily, weekly, monthly, several times a year or even once a year? Do you have negative feelings about a particular drug? Any of these factors could influence your treatment decision. It's also important to keep in mind that no two people are the same. How well a medication works or what side effects it will have can vary from one person to the next.

GET THE MOST FROM YOUR TREATMENT

Many people have trouble taking their medications. People with osteoporosis often take multiple medications for other conditions as well. Risks and side effects can be worrying and medication schedules can be hard to follow. When you have questions about your medications, or trouble staying on track, be sure to speak with your healthcare provider or pharmacist. They can help.

Like any medication, osteoporosis drugs can only work if they are taken exactly as prescribed. With many health conditions, it is easy to remember to take your medicine because, when you don't, you feel bad. Your blood pressure goes up or some other obvious problem results. That doesn't happen with osteoporosis. Without bone density testing, you can't even tell you have osteoporosis until you break a bone. By the same token, when you take osteoporosis medicine, you can't feel your bones getting stronger. You might notice that you haven't broken a bone…but, if you are like most people, you won't notice something that doesn't happen.

The important thing is to take your medicine and take it consistently. Get enough calcium and vitamin D and exercise regularly. If you have any trouble following your treatment plan or if you have concerns about side effects, talk to your doctor. Don't suffer in silence. It happens to a lot of people. Your doctor can help you find something that works for you. There are lots of different options, one is sure to fit your needs.

With antiresorptive medications, the goal of treatment is to prevent further bone loss and to reduce the risk of breaking bones in the future. Your response to treatment is considered good if your bone density either stays the same or improves and if you have had no additional broken bones. Your healthcare provider may also perform other tests to see if you are responding well to treatment.

With anabolic medication, the goal of treatment is to build new bone, increase bone mass, repair tiny defects in bone, and reduce the risk of fractures. Your response to this medicine is considered good if both the amount and quality of bone improves and you have had no broken bones.

HOW LONG TO TREAT

At this time, healthcare providers don't know for sure how long it is safe and effective to take most osteoporosis drugs. The exception is for abaloparatide (Tymlos®) and teriparatide (Forteo®).

Several osteoporosis medications quit working as soon as you stop taking them. Denosumab and HT/ET are in this category. When discontinuing one of these drugs, a follow-on therapy is usually prescribed to hold onto BMD gains. In contrast, research suggests that the benefits of bisphosphonate medications may continue several years or longer after you stop taking them. Bisphosphonates stay in the bones for a long time. However, once discontinued, their beneficial effects gradually wear off. After stopping an osteoporosis medication, sometimes a different medication is given in order to get the most benefit.

If you are taking a bisphosphonate medicine and if you have a good response to treatment, your healthcare provider may consider giving you a so-called "drug holiday." That means you may be able to stop taking the medicine for a period of time, while your healthcare provider will continue to monitor your health, bone density, and in some cases, blood tests that measure bone breakdown. The FDA suggests that the decision about continued bisphosphonate therapy be based on individual assessment of risks, benefits, and preferences. Generally speaking, people at low risk of fracture might consider a drug holiday after 3 to 5 years of treatment, but people at high risk of fracture might benefit from continued therapy. Keep in mind that drug holidays only apply to people treated with bisphosphonates. Also, as osteoporosis is a chronic disease, treatment will likely need to resume

at some point, just like we all eventually have to return from a vacation or holiday.

RECOVERING FROM FRACTURES

Even the best efforts to protect your bones can't prevent all fractures. Most often these fractures occur at the spine, hip, or wrist. But some people break bones in other parts of the body such as the ribs, upper arms, pelvis, collarbone, ankles, and feet. Regardless of the bone(s) affected, recovery involves more than just healing the bone. Regaining strength and returning to daily activities is an ongoing process. Your recovery period can be a good time to get started on a healthy bone plan to prevent future bone loss and fractures.

Specialized health professionals can help you recover from a fracture. An orthopedic doctor can help repair your broken bone. Physiatrists (doctors who specialize in rehabilitation), physical therapists (PTs) and occupational therapists (OTs) use a variety of methods to help people with osteoporosis regain full function after a fracture. Physiatrists often oversee a team of health professionals that may include PTs, OTs and other healthcare professionals to provide well-rounded rehabilitation for the patient.

Physical therapists treat pain and discomfort in many ways: exercises to keep the joint moving as well as application of ice and heat. Such treatments are especially important in relieving the muscle spasms and pain that often come with fractures of the spine. In addition, a supervised program of exercises to strengthen the back can help decrease pain and improve function. An OT can teach you techniques that will help you move safely during your daily activities and to reduce pain and prevent falls.

Here's what you should know about each of the most common fractures:

HIP FRACTURE

Hip fractures tend to cause more problems than other broken bones. Most people who break a hip will need surgery to repair it. Some people have complications from the surgery and do not fully recover. Even after surgery, many people have trouble walking again and have to use a wheelchair

SURGERY FOR VERTEBRAL FRACTURES

If you have severe ongoing pain from vertebral fractures, one of these minimally invasive, outpatient surgeries may help.

VERTEBROPLASTY

This surgery involves injecting bone cement into the fractured vertebral area of the spine. Vertebroplasty can reduce pain and make it possible for you to be more active.

KYPHOPLASTY

This surgery is similar to vertebroplasty. However, in kyphoplasty a balloon device is inserted into the fractured vertebral area and inflated to partially restore the height of the vertebra. The space is then filled with bone cement. This can help pain and deformity of the spine due to vertebral fractures.

Spinal surgery is not right for everyone. If you think you might be interested in one of these procedures, you should discuss the risks and benefits with your healthcare provider.

or walker. Many lose the ability to care for themselves and must move into nursing homes and other supported facilities.

If you break a hip, a physiatrist, physical therapist (PT), or occupational therapist (OT) can teach you exercises to help you get better and learn safe ways to move.

Recovery from a hip fracture can take many months. In the early weeks of recovery, your activities will be limited. You may need to rely on others for shopping, cooking, cleaning, bathing and even dressing yourself. Depending on others can be upsetting, especially if you are used to being independent. Remember you will get stronger, especially if you are able to walk and do your rehabilitation exercises daily.

The best treatment for hip fractures is to avoid them in the first place. Once you've had one, it's important to take steps to prevent another. Since many hip fractures result from tripping, slipping, or losing balance, you may wish to fall-proof your home, participate in balance training and learn exercises to increase your muscle strength *(see Chapter 6)*. The exercises at the end of this book can help you. Check with your healthcare provider about medications you are taking that may cause dizziness, drowsiness, or otherwise increase the risk of falling. Also, once you are up and around, have your vision and hearing checked.

VERTEBRAL FRACTURE

A vertebral fracture is a fracture of one or more bones (vertebrae) of the spine. It can result from a fall, a twisting motion of the torso, or from carrying a load that is too heavy for a fragile spine. In a person with very fragile bones, a movement as simple as rolling over in bed or coughing can cause a vertebral fracture. When this happens, you may feel sharp pain that doesn't get better or you may not feel any pain at all. When you break more than one vertebra, you may even get shorter.

Vertebral fractures can cause your spine to curve forward. This is called kyphosis. It can cause pain as the muscles and other tissues of the back are strained and stretched. The nerves may also become pinched which can cause pain.

If you have a vertebral fracture, it will take several weeks to heal. You most likely won't need to have surgery, but you will need to exercise and get rest. During the first week after a fracture, you will need more rest and less activity in order to heal. Soon you will be able to rest less and become more active. This

will help you regain strength and mobility. In fact, it's important to increase your activity because too much rest can itself cause bone loss. Sometimes vertebral fractures cause side effects that may need medical treatment. These can include constipation and muscle spasms in the back. No two people recover the same, so listen to your body. Pain and fatigue are signs that you may be pushing yourself too hard.

In some cases, vertebral fractures occur without any noticeable pain. People may learn about these fractures from chest or back x-rays done for other reasons. Even when they are painless, vertebral fractures should be taken seriously. Having one vertebral fracture increases the likelihood many times over that you will break another bone.

This is why the National Bone Health Alliance and others, including the NOF, have endorsed expanding the definition of osteoporosis to include the presence of one or more vertebral compression fractures, regardless of BMD. You may require an osteoporosis medication to prevent future fractures.

Physiatrists, physical therapists (PTs), and occupational therapists (OTs) can help you learn safe ways to move. They can teach you exercises to help limit the curvature of your spine. They can also help you learn ways to manage your pain. *To learn some safe exercises to help your spine, see Chapter 6. For methods to manage pain, see this chapter.*

Sometimes your healthcare professional may recommend a temporary back brace, jacket or corset to support your spine as you heal from a vertebral fracture. At first you may need to wear it daily while you exercise, when your back is tired, or when you have a lot of pain. The support can relieve pain by decreasing movement in the affected area while it heals. It will also allow you to return to normal activities sooner and keep kyphosis from getting worse. As your back muscles become stronger, you will use the support less often. It is important to use it for the shortest time possible because using it for too long will keep your bones and muscles from getting stronger.

To reduce your risk of vertebral fractures, you may need to avoid some activities and change the ways you do others. For example, you may not be able to pick up your grandchildren or do heavy housework. When carrying groceries, you may need to make several trips with small bags rather than carrying one or two heavy bags *(see Chapter 6 for more suggestions).*

WRIST FRACTURE

Women suffer more wrist fractures around the time of menopause than at any other time. This is probably because of the bone loss that occurs during menopause.

If you are between the ages of 40 and 60, a wrist fracture can be an early warning sign of osteoporosis. When you have a wrist fracture, ask your healthcare provider about getting a BMD test to find out if you have osteoporosis.

While a simple wrist fracture usually heals with a cast or splint, a more complex wrist fracture often requires surgery. If your healthcare provider puts you in a cast or splint, you'll need to wear it for 6 to 8 weeks. During this time, a physiatrist or physical therapist can teach you exercises for your hand,

wrist, forearm, elbow, and shoulder. Doing these daily will help restore strength and movement of the wrist, fingers, and arm.

After a wrist fracture, you will need help with your daily routine. If the break is in your dominant arm (your right wrist if you are right-handed), you may need help with tasks such as getting dressed, making meals, and combing your hair. At the very least, this is frustrating.

For people who are frail or have other physical problems, a wrist fracture can be quite disabling.

BEYOND PHYSICAL HEALING

Aside from physical healing, recovery from any broken bone involves learning to cope emotionally, mentally, and spiritually with the changes the fracture may bring. In many cases, a fracture marks the first time you learn you have osteoporosis. In addition to coping with pain from the fracture and rehabilitation, you also must educate yourself about osteoporosis. There may be necessary, but beneficial, changes in lifestyle and activities that can protect your current bone health.

After a fracture, you may feel that you tire more easily. You may feel depressed, especially when your body image has changed and you fear having more fractures. These challenges can be overwhelming at first. With time and support, however, you can learn to manage them. (*For more information on dealing with the emotional challenges of osteoporosis, see Chapter 5.)*

To become more active and reduce the effects of osteoporosis on your body and your life, you'll need to find safer ways to do everyday activities. You'll also need to keep up a regular program of exercises to improve your strength, movement and flexibility. The exercises and suggestions at the back of this book can help. Always check in with your healthcare provider before you begin any exercise program.

CHAPTER 5

LIVING WITH OSTEOPOROSIS

Osteoporosis can affect your life in many ways. Building bones and repairing fractures may not be your only concerns. You may find yourself feeling sad, discouraged, or lonely. You may have ongoing pain. If osteoporosis has affected your spine, you may have trouble wearing the clothing styles you prefer. You may be hesitant about doing your favorite activities. You may even be afraid to walk around your own house for fear of falling and breaking a bone. You may want to learn more about your disease but not know where to look for information you can trust. In this chapter, we'll address some of these common concerns.

FINDING SUPPORT: BUILDING STRENGTH TOGETHER®

To help you connect with others who have osteoporosis, the National Osteoporosis Foundation has a program called Building Strength Together®

It provides an opportunity for people to share their concerns, find support, and learn more about their disease. You can participate by joining

- Support groups
- Online community

SUPPORT GROUPS

Some people with osteoporosis find support groups help them deal with the demands and feelings of living with this disease. Also called self-help groups, support groups bring together people who share common experiences. An osteoporosis support group gives you an opportunity to express feelings and fears. It also allows you to share ideas for coping and learn more about the disease. Understanding that you are not alone can be an important step in coping with osteoporosis. Even if you have family or friends who care for you, sometimes it feels good to talk with someone who also has osteoporosis.

Support group meetings are often held at a local library, hospital, doctor's office, community center or church. Some are organized by people with osteoporosis. Some are sponsored by a hospital or a private medical practice and led by a nurse or other healthcare professional.

To find a support group in your area, you can ask your healthcare provider, local hospital or the National Osteoporosis Foundation (NOF). For general information about NOF support groups or to learn how you or your provider can start a support group, visit www.nof.org.

INSPIRE™ ONLINE COMMUNITY

NOF's online community, hosted by Inspire™ brings people together through the Internet to communicate, support each other, and learn more about living well with osteoporosis.

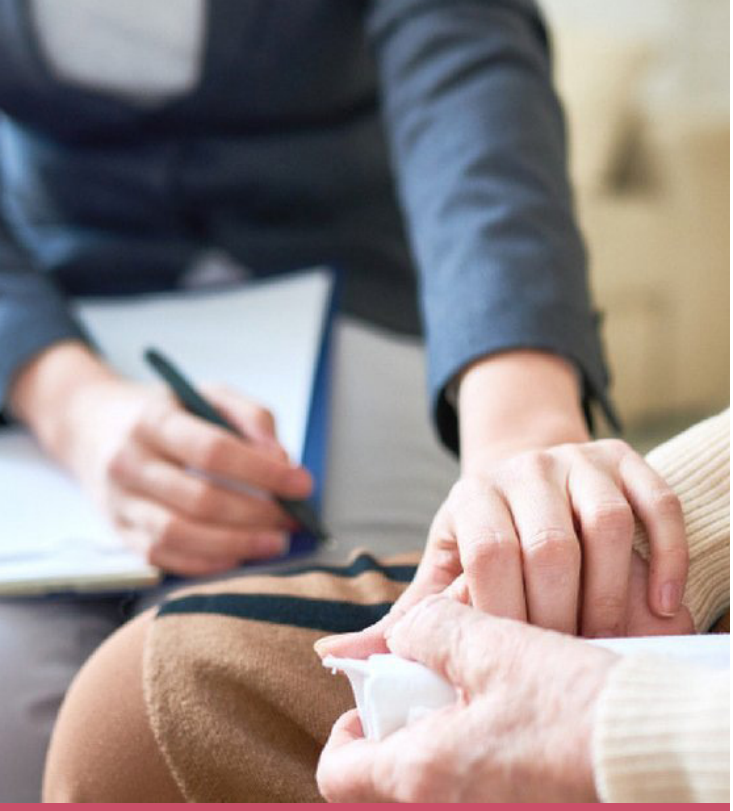
The online community has rules and structure with moderators to welcome new members, answer questions, and enforce rules when necessary. The online community provides privacy by allowing you to control your own personal information.

There are many benefits to joining an online health community: emotional support, practical information, sense of community, feeling good about helping others, and inspiration. People with osteoporosis, osteopenia, or fractures can participate as well as their family members, caregivers, friends, and even healthcare providers.

For more information about NOF's online community, visit http://nof.inspire.com.

GETTING YOUR PAIN UNDER CONTROL

For some people, recovery from a broken bone can be a long and painful process. Sometimes the pain continues even after the fracture heals. Ongoing chronic pain can make it hard to sleep. It



COPING WITH OSTEOPOROSIS

If your problems seem too big for you to cope with or if you feel depressed for more than two weeks, you should let your healthcare provider know. He or she can help you find a health professional who can help you. This may be a psychologist, psychiatrist, or social worker.

Making an effort to be active can also help your mood. Even gentle exercise, with your healthcare provider's permission, can give you a boost. A change of scenery can help, too. If you can, get out to shop or meet a friend from time to time. Many people also find it helpful to join a spiritual or religious community, such as a church, synagogue, mosque, or temple.

can make you depressed or irritable. This, in turn, can make the pain feel worse. Some examples of over-the-counter (OTC) medications that may help with pain relief are aspirin, acetaminophen (Tylenol®), ibuprofen (Advil®, Motrin®) or naproxen (Aleve®). But it is important to remember that these medications can have side effects, especially if you take them at high doses for a long time. Let your healthcare provider and pharmacist know if you take OTC medications. Keep a list of the pain medicines you take and how well they are working.

Medications aren't the only way to manage pain. Many people find it helps to apply cold to a recent fracture or heat to sore muscles. You can use cold in the form of a store-bought cold pack or a bag of frozen peas. As it thaws, the bag of peas will mold to fit the area where you use it. Warm towels and heating pads can also provide relief. Since too much heat or cold can burn or damage the skin, you should not use either one for more than 15 or 20 minutes at a time.

Other ways to help pain include:

Transcutaneous electric nerve stimulation (TENS). This is a method to reduce pain with electrical impulses. A TENS unit is a small box connected by wires to a pair of electrodes. The electrodes are placed on your skin near the site of pain. When the box is switched on, a weak current passes through the electrodes and into your body. You may feel tingling or warmth. A treatment lasts from 5 to 15 minutes. You can ask your healthcare provider about getting a prescription for TENS.

Acupuncture. This involves inserting special needles at specific places in the skin. According to ancient Chinese belief, this alters the body's flow of energy into healthier patterns. Acupuncture is gaining acceptance in this country as a way to control pain. Your healthcare provider or health insurance company may be able to tell you

about acupuncturists in your area. Some health insurance companies offer coverage or discounts for acupuncture.

Biofeedback. Biofeedback therapy uses electronic instruments to measure body functions and then feed that information back to you. A biofeedback specialist uses this information to teach you to control involuntary body responses, such as blood pressure or heart rate. It can also be helpful for managing pain. Your healthcare provider may be able to help you find a biofeedback specialist.

Behavior modification. This is a technique to change habits, behaviors, and feelings that can result from ongoing pain. It may include rewards for increasing your physical activity, improving your diet or making other changes in your life.

Physical activity. Being active is a natural way to reduce pain. When you exercise, your body releases substances called endorphins that can relieve pain and boost your mood. Exercise also has many other health benefits. If you have osteoporosis, you should speak with your healthcare provider before you start a new exercise program.

Relaxation techniques. There are several different relaxation techniques that can help you release muscle tension and shift your attention away from the pain. Some examples include deep breathing, progressive muscle relaxation, and guided imagery. You can learn and practice these and other relaxation techniques from CDs, DVDs/videos, books, and classes, as well as trained professionals.

HAVING SEX – SAFELY

If you have broken a bone or discover you're at high risk of breaking one, you may be afraid to try certain activities...even sex. That's understandable. But it's possible to have a satisfying sex life with osteoporosis – if you are careful. It's best to avoid positions that cause twisting or forward bending of the spine. Your partner should avoid putting his or her full weight on you. Placing pillows or folded towels under your knees can help keep your spine positioned safely.

The most important thing you can do to have a satisfying relationship is to communicate with your partner. Don't be afraid to try different positions until you find one that is comfortable for both of you. You may also want to speak to a physical therapist (PT) for guidance.

THE MAGIC OF SCARVES

A simple piece of fabric can become your most useful fashion accessory. By learning a few tricks of folding, twisting, or tying, you can add more style to any outfit. Two common shapes for scarves are the square and rectangle, also known as the oblong. The modified ascot is one way you can tie a square scarf. It works best with very soft scarves and looks good with collars and scooped or v-necklines.

FINDING CLOTHES THAT FIT AND LOOK GOOD

Osteoporosis of the spine can lead to changes in the shape of your body. You may get shorter. Your upper back may curve forward and your tummy may protrude. All of these changes can make it hard to find clothes that fit and look good on you. Blouses may be too tight over your back. Collars may gape. Skirts and slacks may ride up under your bust. Skirts and dresses may become too short in the back and too long in the front.

Looking good is closely tied to feeling good about yourself. That's why it is important to find nice-looking clothes that fit well when you have osteoporosis. If you sew your own clothes, you can adapt clothing patterns or alter store-bought clothes. But if you rely on buying clothes off-the-rack, the following tips will help you find clothing that fits better:

- Overall, wear clothing that is loose, straight or just slightly fitted.
- Look for slight cowl/v-necks or rounded/jewel necklines.
- Choose tops and dresses with dolman or raglan sleeves.
- Add shoulder pads to jackets and blouses to reduce the appearance of sloping shoulders.
- Try dresses with dropped or empire waistlines to hide your tummy.
- Look for jackets and blouses with back yokes or a box pleat in the back. Or try wearing a cape instead of a jacket or coat.
- Use scarves to draw attention to your face and shoulders and away from your back and tummy.
- If you alter your hemlines yourself, look for skirts and dresses with simple straight hems. Avoid difficult pleats or wrapped skirt styles.
- Try different types of bras—long line, front closure, sports-type, or criss-cross straps—to find one that fits well and is comfortable.

REDUCING YOUR RISK OF FALLS

Each year about a third of all persons over age 65 will fall. Many of these falls result in a broken bone, often the hip or wrist. Many factors can lead to a fall: poor balance, weak muscles, vision problems, certain diseases, alcohol use, certain medications, and hazards in the home. Fortunately, there are things you can do to prevent falls. Follow these tips to keep yourself safe.

FALL-PROOFING YOUR HOME

Floors

- Remove all loose wires, cords and throw rugs.
- Keep floors free of clutter.
- Be sure all carpets and area rugs have skid-proof backing or are tacked to the floor.
- Do not use slippery wax on bare floors.
- Keep furniture in its accustomed place.

Bathrooms

- Install grab bars on the bathroom walls beside the tub, shower and toilet.
- Use a non-skid rubber mat in the shower or tub.
- If you are unsteady on your feet, you may want to use a plastic chair with a back and non-skid legs in the shower or tub and use a hand-held shower head to bathe.

Kitchen

- Use non-skid mats or rugs on the floor near the stove and sink.
- Clean up spills as soon as they happen (in the kitchen and anywhere in the home).

Bedroom

- Place light switches within reach of your bed and a night light between the bedroom and bathroom.
- Get up slowly from sitting or lying since this may cause dizziness.
- Keep a flashlight with fresh batteries beside your bed.

Stairs

- Keep stairwells well lit, with light switches at the top and the bottom.
- Install sturdy handrails on both sides.
- Mark the top and bottom steps with bright tape.
- Make sure carpeting is securely attached.

Outdoors

- Cover porch steps with gritty, weatherproof paint.
- Install handrails on both sides of porch steps.

Around the House

- Place items you use most often within easy reach. This keeps you from having to do a lot of bending and stooping.
- Use assistive devices to help avoid strain or injury. For example, use a long-handled grasping device to pick up items without bending or reaching.
- Use a pushcart to move heavy or hot items from the stove or countertop to the table.
- If you must use a stepstool, use a sturdy one with a handrail and wide steps.
- If you live alone, consider wearing a personal emergency response system (PERS). Also consider buying a portable telephone to take from room to room so you can call for help immediately if you fall.

Anywhere You Go

- If you are unsteady on your feet, use a cane or walker, even if you are going only a short distance.
- Be careful when you walk on floors that are slippery or that have confusing patterns (like you often see in the lobby of a hotel or bank).
- When walking on uneven ground, ask for assistance or use a cane or walker.
- Slow down. You are more likely to fall if you are in a hurry.
- Be extra careful when it is wet or icy. During the winter, carry a small bag of sand or kitty litter in your pocket or in your car glove box. If the ground is icy where you park, sprinkle the sand or kitty litter by your car door before getting out.
- Have your vision and hearing checked regularly. Keep your eye glass prescription up to date.
- Talk to your healthcare professional or pharmacist about the side effects of drugs you take. Some can make you feel dizzy.

- Limit your alcohol intake. Ask your doctor if you are prescribed any medications that should not be taken with alcohol.
- Get up slowly after eating, sitting, or lying flat to avoid light-headedness.
- Wear shoes with backs that fasten securely (no mules or open-backed slippers).
- Hem pants and skirts to ankle or knee/mid-calf length.
- Wear snug-fitting shoes with non-slip soles (but not crepe soles, which are sticky and can trip you up)
- Wear shoes that are flat or have low or medium-height wedge or block heels.

LEARNING MORE ABOUT YOUR DISEASE

You can learn more about osteoporosis by visiting the National Osteoporosis Foundation's Website, www.nof.org. You can also call NOF toll free at: (800) 223-9994 to request educational materials. NOF has many brochures and publications that can help you learn more about osteoporosis. Your healthcare provider can direct you to other good sources of information about osteoporosis.

CHAPTER 6

BONE SAFE MOVEMENT AND EXERCISES FOR DAILY LIVING

The first part of this chapter will teach you how to move safely throughout the day. The second part of this chapter contains a series of exercises, including posture exercises, hip and back (spine) strengthening exercises, balance exercises, and functional exercises.

BONE SAFE BODY DYNAMICS

Good posture and healthy body dynamics protect your bones and allow you to stay active and independent.

It starts with alignment. When you stand, align your head and shoulders over your hips, knees, and ankles. This puts less stress on your spine and improves balance by centering your body weight over your legs. When you sit, align your head, shoulders, and spine. Keep a straight back and feet flat on the floor.

How you stand and move determines how well your skeleton can distribute body weight and absorb the impacts of daily living. Overloading any one bone can exceed the strength of that bone. When this happens the bone breaks. Sudden overloading of a bone, by falling for example, is obvious when it occurs. Less obvious is the slow and steady overloading caused by poor posture and back-straining activities like tennis.

UNSAFE

MOVEMENT NO'S:

To maintain proper alignment, avoid the following positions or movements:

- No slouching (i.e. forward head jutting, collapsed trunk, and forward-tilted hips).
- No bending forward from the waist.
- No twisting at the spine (when you turn at waist, shoulders rotate, but hips don't).
- No leaning and reaching past your safe balanced position.

Learning spine-protective methods for performing everyday tasks can help you avoid injury. Applying bone-safe principles to daily life and recreational activities can be harder than it sounds. It sometimes requires rethinking and relearning habitual behaviors and everyday activities, from climbing stairs to getting out of bed. In the following sections, we walk you through bone-safe strategies for everyday living.

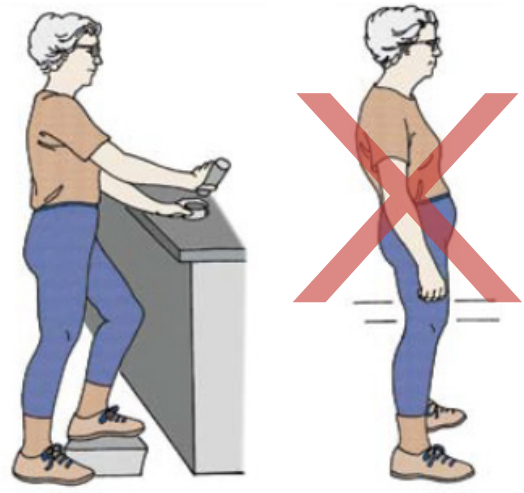
YOU WILL NOTICE THAT WE REPEAT A FEW BASICS:

- **Align your body—head, nose, knees, and toes should point in the same direction.**
- **Bend your knees and hip joints, not your back.**
- **Rotate your whole body, don't turn from your shoulders or twist your back.**
- **Move objects closer to you, instead of leaning in to them.**

A physical therapist can work with you to build your skills and trouble-shoot individual issues.

STANDING

- Hold your head high, chin in, and shoulder blades back and slightly pinched together.
- Maintain the natural arch of your lower back. Tighten your tummy muscles.
- Point your feet straight ahead with your knees facing forward. While standing in one place for more than a few minutes, put one foot up on a stool or in an open cabinet *(if you are in the kitchen.)* Switch to the other foot every so often. You'll find this much less tiring for your back and legs.

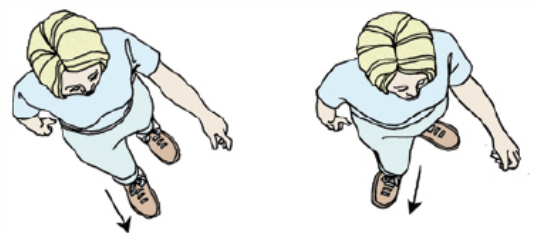


SITTING

- When sitting in a chair, try to keep your hips and knees at the same level. Place your feet flat on the floor. Keep a comfortable posture. You should have a natural inward curve to your lower back and a tall, upright upper back.
- When sitting in a bucket seat or soft couch/chair, use a rolled-up towel or pillow to support your lower back.
- When standing up from a chair, move your hips forward to the front of the chair, and use your leg muscles to lift yourself up.
- When driving, use the head rest and lumbar support for comfort.
- Use a footstool or footrest when seated for long periods of time.
- When tying your shoes or drying your feet, sit in a chair. Place one foot on a footstool, box, or on your other leg. Lean forward at the hips to tie or dry. Do not bend over or slouch through your upper back. Keep the natural curve of your lower back and a straight upper back.
- When reading, set your reading material on a desk, table, or pillows on your lap.
- When sitting at a desk, position your work materials so you can work without slouching. One strategy is to prop up a clipboard so that it slants toward you, like a drafting table.

WALKING

- Hold your head high, chin in, and shoulder blades slightly pinched together.
- Keep your feet and knees aligned and facing forward.
- Keep your weight balanced over your feet.
- Keep your knees slightly bent. Avoid locking your knees.
- Wear rubber or other non-slip soles that fit snuggly. Avoid slip-on shoes or slippers.



STAIR CLIMBING

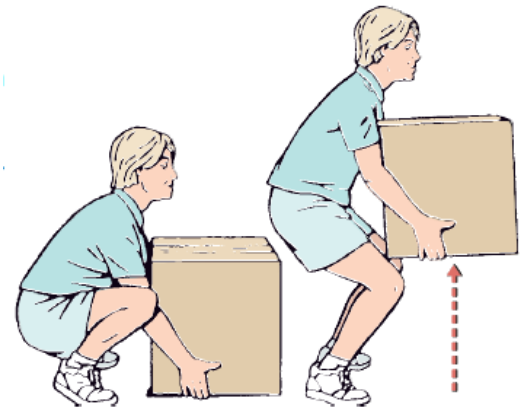
- Use the stairs for exercise and to help with your bone density, but only if your healthcare provider says it's safe for you. Build up gradually with this exercise.
- Keep your head high, chin in, shoulder blades slightly pinched together, and abdomen pulled in.
- Keep your feet pointed straight ahead, not to one side. Your knees should face forward. Keep your knees slightly bent.
- Keep your feet a few inches apart, lined up under your hip on that side. Extend your foot straight forward from this lined-up position *(instead of putting one foot directly in front of the other).*
- ALWAYS hold the rail while going up and down. Try not to pull yourself up by the railing.
- Take extra care on stairs. A fall down the stairs could cause severe injuries.

BENDING AND TURNING

- Keep your feet flat and about shoulder-width apart.
- Let both upper arms fall so they are touching your sides *(or one arm, if you're using one hand for support).*
- Stand with your back straight and your shoulder blades pinched together.
- Bend only your knees and hips. Keep your back straight. Bending forward with a rounded back puts so much stress on your spine it can easily break a bone.
- Keep your back straight when standing to brush your teeth or to wash dishes. If you need to reach something, hinge at the hips with back straight.
- When changing direction, move your feet in alignment with your body. Pivot on your heels or toes with your knees slightly bent. Keep your nose, knees, and toes pointed in the same direction.

LIFTING AND CARRYING

- Lift and carry lightweight things only: Nothing weighing more than 10 pounds. If you are unsure about how much you can lift, check with your healthcare provider or physical therapist.
- When you pick up an object, bend your knees not your back. Keep your weight balanced over your hips with your back straight to avoid excessive stress on your spine.
- When lifting an object off the floor, first kneel on one knee. Next, place one hand on a table or stable chair for support if you need it.
- Next, lift and draw the object close to your body at waist level. Gently pull in your abdomen to support your back. Breathe out slowly.
- Hold the object close to your body and keep your back straight. Use your leg muscles to stand up.



- When buying groceries, ask to have your bags packed lightly. Divide heavy items into separate bags. When you carry them, hold the bags close to your body. Try to balance the load by carrying the same amount in each arm.
- When unpacking, place bags on a chair or table rather than on a high counter or on the floor. This prevents unnecessary lifting and twisting.
- Carry a light-weight cross-body bag, backpack, or fanny pack rather than a heavy shoulder bag or handbag.

PUSHING AND PULLING

- When you vacuum, rake, sweep, or mop, stand with feet a few inches apart with one foot in front of the other.
- Face your work directly. This avoids twisting your back.
- As you work, hold the tool close to your body. “Push” and “pull” by shifting your weight with your back straight. Leaning over to push or pull curves your back and strains your spine.
- Shift your weight from one foot to the other in a rocking movement. With knees bent and shoulder blades pinched, shift your weight forward and back, or side to side rhythmically.

COUGHING AND SNEEZING

- Pay attention to when and how you sneeze or cough.
- When you feel a sneeze coming, straighten your back and brace yourself. Stand or sit straight up and put one bent arm behind your back, or bend your knees slightly and place one hand on your thigh. This protects your spine from a sudden jerk forward.

GETTING INTO BED

- First, sit down on the edge of the bed.
- Place your hands on the bed at your sides.
- Putting your weight on your hands, lean toward the head of the bed, bend your weight-bearing arm to support yourself with your elbow. Use your other hand in front of your body to keep you balanced.
- Lie down on your side, bringing both feet up onto the bed at the same time.
- Pull in your abdomen to support your back and avoid twisting.
- Keep your nose, knees, and toes pointing in the same direction.
- With your knees bent and arms in front of you, roll onto your back in one motion.
- Use your bent legs and arms to shift your position in bed.
  (Lifting your head and upper back can overstress your back and cause spinal fractures.)

LYING DOWN AND GETTING OUT OF BED

- When lying on your side in bed, use one pillow between your knees and one under your head to keep your spine aligned and increase your comfort.
- When lying on your back in bed, use one or two pillows under your knees and one under your head. Try to avoid using extra pillows to prop your head and upper back since this will put you into a rounded upper back position. But, if you already have a rounded upper-back posture with a forward head, you may need two pillows to support your neck comfortably.
- When getting out of bed, reverse the steps you used to get into bed *(above)*:
  1. Keep both arms in front of you.
  2. Pull in your abdomen in and breathe as you roll onto your side toward the edge of the bed.
  3. With your abdomen tight, push yourself upright using your lower hand. As you do this, lower your feet to the floor in one smooth motion. You should now be in a seated position.
  4. Sit on the edge of the bed for a moment or two before you stand up. Always use your arms to help you sit up. This protects your back.

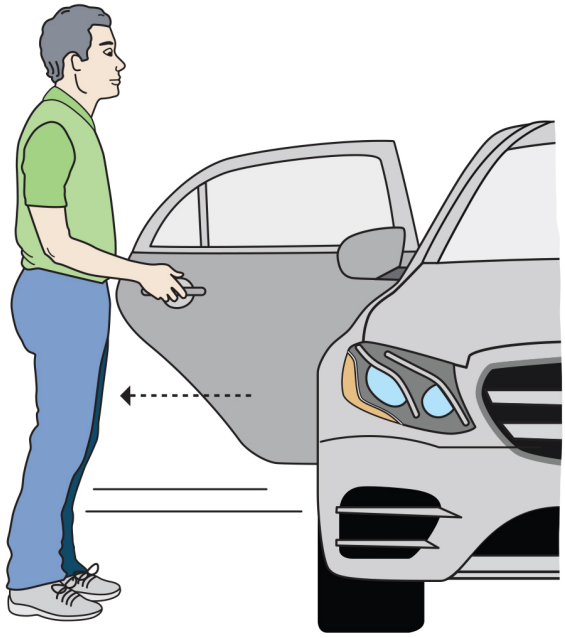
GETTING INTO AND OUT OF MOTOR VEHICLES

(A swivel cushion can make getting into and out of cars easier and safer by allowing you to turn safely without twisting your spine.)

As with all activities, start with a tight tummy, upright posture, feet hip width apart, and knees slightly bent. Empty your pockets of any wallets or other items that will misalign your spine when you sit down.

Getting into a car:

- Open the car door: with your back straight, knees, nose, and shoulders facing the same direction pull the door towards you.
- Without twisting your spine, shift your feet to turn body until you are facing away from the car with one hand on the door frame or hand grip for stability if you need it.
- Keeping your back straight, "hinge" at the hips, bend your knees, and lower yourself into the seat of the car.
- Swing one leg into the car, plant your foot.
- Swing the other leg into car.
- Adjust the seat so that your back is straight, hips are raised, and lumbar spine is supported *(if lumbar adjustment is not available, you can use a rolled hand towel).*



Getting out of a car:

- Keeping your back straight, use your arm to push the door open. Avoid bending or twisting when you do this.
- Holding onto steering wheel, in unison ,turn your shoulders, hips, and knees toward the open door.
- Using your "inside" foot for stability, push yourself to a seated position facing outside the car as you move one leg at a time outside the car and place both feet flat on the ground.
- Lean forward from the hips.
- Shift weight onto your feet and legs.
- Push legs into the ground and stand (use hand hold or door frame if needed)

SAFE EXERCISE FOR FRAGILE BONES

Exercise keeps you strong and healthy. We all need regular heart-pumping activity to build and preserve muscles and bones. However, some exercises can do more harm than good in people with osteoporosis. Weight-bearing exercises can be dangerous for easily broken bones; and so can forward bending and twisting; jerky, rapid movements; and impacts of any kind.

Exercises to Avoid:

- Sit-ups and abdominal crunches
- Bench presses
- Standing or seated hamstring stretches
- Curls (weight lifting)
- Using elliptical trainers
- Jumping rope
- Running/jogging
- Golf *(may be able to modify swing to make safer)*
- Tennis/racquet ball
- Bowling
- Yoga/Pilates postures that require twisting at waist and/or forward bending

Better Options for People with Fragile Bones

- Controlled dance
- Back-safe yoga
- Tai Chi
- Swimming

Although beneficial to overall health, aerobic exercise, such as walking, is not enough to prevent falls and fractures if you have osteoporosis. You also need balance and strength training. Exercises that strengthen the muscles in your legs reduce your chances of falling and breaking a bone. Gentle balance and posture exercises strengthen the muscles supporting your spine. This improves balance and protects your bones from injury during normal daily activities.

Some of these exercises include:

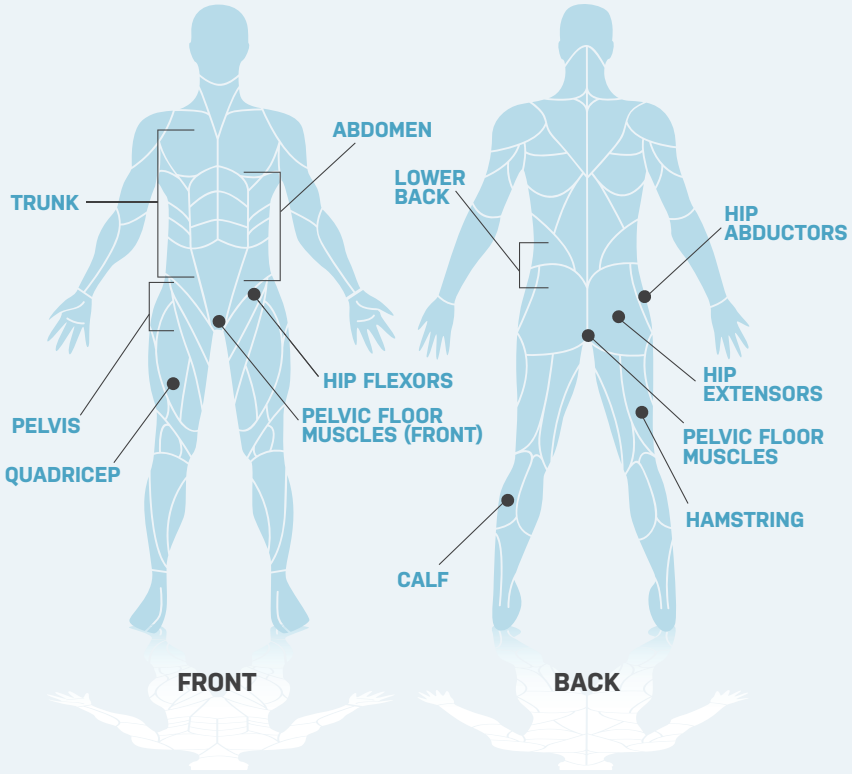
- Muscle-building, weight-bearing, and resistance exercises including:
  - Lifting weights using back-safe position and technique
  - Pulling elastic exercise bands
  - Using weight machines
  - Lifting your own body weight, such as one-foot stands and toe rises
  - Balance exercises that strengthen legs and challenge balance, such as Tai Chi or slow/controlled dancing
- Posture exercises that strengthen back extensor muscles
- Functional exercises based on safe methods for everyday activities, such as getting up from a chair or climbing stairs

Disclaimer: The exercises illustrated in this booklet are intended to aid individuals with low bone density or osteoporosis. You should use this booklet and follow its directions and suggestions only after discussing them with your PT or other healthcare provider.

A little bit of muscle soreness lasting for one to two days after exercise is normal, but none of these exercises should ever hurt in any way while you are doing them or cause soreness for more than one or two days afterwards. If you have pain with any of these exercises or you are not sure if a certain exercise is for you, NOF recommends that you first discuss your concerns with a PT.

HOW MUCH TO EXERCISE

How often and how long you exercise and which exercises to do depends on your physical ability and therapy goals. Even if you only have 10 minutes a day, these exercises can help you. While all of these exercises are important, you may do some more often than others. For example, if you have good posture but lose your balance or have falls, you may want to do each posture exercise one or two times per week, but spend several minutes each day on the balance exercises. If you struggle to stand up from a chair or climb stairs, you may want to do each of the key functional exercises every day.



These exercises are designed to be done along with a weight-bearing activity *(see Chapter 2 for information on weight-bearing exercises).*

The exercises in this chapter are divided into four sections:

- Posture exercises
- Hip and back (spine) strengthening exercises
- Balance exercises
- Functional exercises

Each section begins with a list of the key exercises for your program. After this list are additional exercises that are also important. Some exercises fit into more than one section. For example, some of the hip strengthening exercises are very helpful for good balance. For the greatest benefit, include all of the exercises listed in the section you are working on.

A COUPLE THINGS BEFORE YOU BEGIN:

- Show your doctor the exercises you want to do and ask if they are safe for you.
- Read through the entire instructions for an exercise before you try it.
- For exercises where you lie on the floor, you may want to use a blanket or thick mat.
- If you are unable to get up and down from the floor, do the exercises on a firm bed.
- These exercises should not hurt while you do them or make your muscles sore for more than two days.
- If it hurts or if you feel like you might fall, STOP and SIT DOWN.

POSTURE EXERCISES

KEY EXERCISES

RELATED

Good posture starts with your ears over your shoulders, your shoulders over your hips, your hips over your knees, and your knees over your ankles. Posture exercises can help you reduce rounded upper back or "sloping" shoulders. These exercises can also help prevent broken bones in your spine. Doing a variety of posture exercises can stretch and strengthen the muscles in your upper body, abdomen, back, and lower body.

To protect your spine and prevent injury, you need a strong trunk. Start with "pelvic floor" and abdominal "pull-in" exercises to create a solid core (see below). All other exercises will start with your abdomen tight (pull in your tummy) and your pelvis slightly tilted forward (tuck your "tail").

1 - PELVIC FLOOR EXERCISE

The pelvic floor muscles are the muscles that control the flow of urine *(refer to the illustration on previous page to see where the pelvic floor muscles are located).*

1. Start by performing this exercise lying down, then progress to sitting, and to standing.*
2. While lying down, sitting or standing, think of pulling your pelvic floor muscles up as if to prevent urine flow.
3. Hold for a count of five to ten seconds.
4. Let go gradually.
5. Repeat 5 to 10 times, 2 to 4 times a day.

To control leakage of urine during coughing, sneezing and strenuous movements, perform exercise by pulling up and releasing 10 times quickly. Do this 2-4 times per day.

Benefit: Helps prevent incontinence (being unable to control leakage of urine) and prolapsed (dropped or fallen) uterus or bladder. Provides support for lower back and trunk.

2 - BASIC ABDOMINAL EXERCISE

1. Lie on your back with knees bent and feet flat on the floor with a small pillow under your head.
2. You will have a little space between the floor and the arch of your low back.
3. Tighten your abdominal muscles by pulling in your abdomen *(tummy).*
4. Think about pulling your navel in toward your spine.
5. Maintain the space between the floor and the arch of your low back.
6. Hold for 2 seconds.
7. Relax. Repeat 10 times, every day. When you can do this without much effort, replace it with exercises #3 and #4 below

Benefit: Strengthens and flattens abdominal muscles.

3 - BASIC ABDOMINAL EXERCISE WITH LEG SLIDE

1. Perform the abdominal pull-in exercise.
2. Slide one leg out as far as you can, keeping your abdomen pulled in.
3. Return to the original position while keeping your abdomen pulled in.
4. Relax. Repeat 5 times with each leg, every day.

Benefit: Strengthens and flattens abdominal muscles and stretches the muscles on the front of the hip.

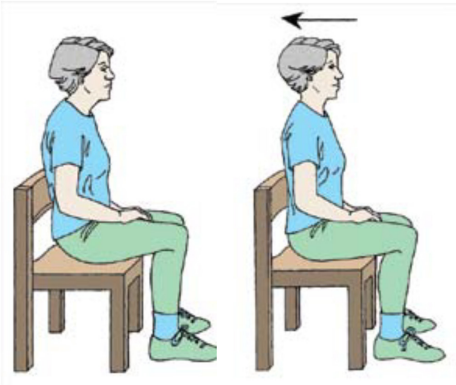
4 - BASIC ABDOMINAL EXERCISE WITH ARM RAISE

1. Perform the abdominal pull-in exercise.
2. Keeping your abdominal muscles pulled in, bring one arm up over your head with your elbow straight, while squeezing your shoulder blades in, and then return it to your side.
3. Be sure to keep your abdomen tight and your back in the starting position without letting it rise off of the floor as you move your arm.
4. Relax.
5. Repeat 5 times with each arm, every day.
6. Once you can do this without your back lifting off the floor, you can do both arms at the same time.

Benefit: Strengthens and flattens abdominal muscles and stretches chest muscles.

5 - CHIN PULLS/NECK LENGTHENING

1. In a seated position, pull your chin in, as if you could move it to the back of your neck.
2. Look straight forward, not up or down.
3. Keep your head high, lengthening the back of your neck.
4. You will feel a stretch in the back of your neck and a flattening of your upper back.
5. Push your hands down on your thighs to help your back become as straight as possible.
6. Hold 2 seconds.
7. Repeat 10 times, every day.



Benefit: Corrects posture (head jutting forward).

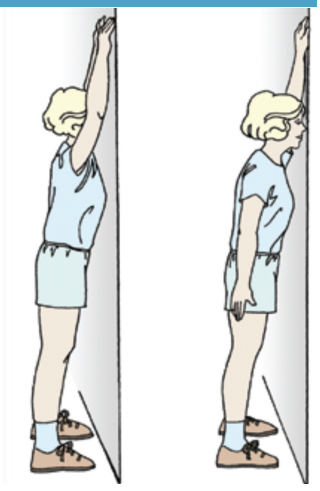
6 - UPPER BACK STRENGTHENING

1. Sit or stand as tall as you can with your chin in *(as in Chin Pulls exercise).*
2. Keep abdomen pulled in, chest gently lifted and both feet flat on the floor.
3. Place arms in a "W" position with your shoulders relaxed, not hunched.
4. Bring your elbows back, pinching shoulder blades together.
5. Hold for a slow count of 1-2-3.
6. Relax for a slow count of 1-2-3.
7. Repeat 10 times, every day.

Benefit: Decreases forward tilt of the head and rounded shoulders. Flattens and strengthens upper back and abdomen.

7 - WALL ARCH STRETCH

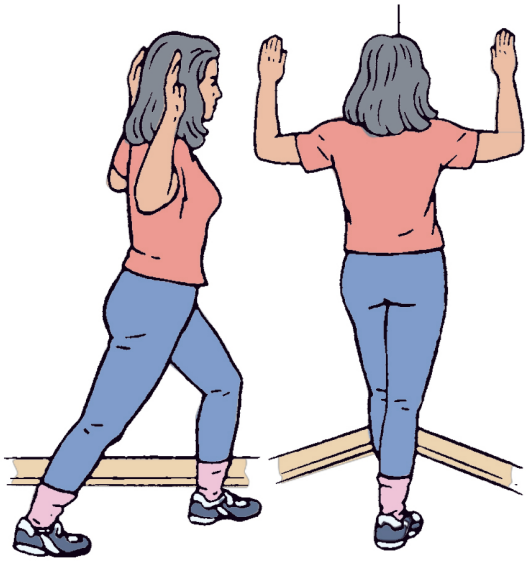
1. Face a wall with your feet six inches from the wall and six inches apart from each other.
2. Take a deep breath and stretch your arms up to touch the wall.
3. Try to keep your abdomen pulled in.
4. Hold 10 seconds, lower your arms.
5. If this strains your shoulders, you may need to start by lifting one arm at a time.
6. Repeat 3-5 times, 3 times a week.



Benefit: Flattens upper back. Strengthens abdomen and stretches shoulders.

8 - CORNER STRETCH

1. Stand in the corner of a room with your arms bent at a 90° angle at shoulder level and hands touching the walls *(see picture for proper position of head, arms and legs).*
2. Step one foot forward, letting that knee bend.
3. Shift your weight onto your front leg, while pressing your head and chest toward the corner. You should feel a light stretch in your shoulders. Look at the corner of the wall at chest level to avoid overextending the neck.
4. Hold for 20-30 seconds.
5. Stand up straight and switch feet.
6. Repeat the exercise on the other side.
7. Do this exercise twice on each side 3 times a week.



Benefit: Stretches shoulders, flattens upper back. Improves rounded shoulders.

9 - STANDING BACK BEND

Perform this exercise standing, with your abdominal muscles pulled in. If you have balance problems, stand with your back next to a counter or in front of a wall.

Level 1

- Make two fists and place them on your lower back below your waist.
- Arch backwards slowly, while taking a deep breath.
- Relax and repeat 5-10 times.
- Do once a day.

Level 2

- When you can do Level 1 comfortably, progress to placing your fists on your middle back at waist level.
- Relax and repeat 5-10 times.
- Do once a day.

Level 3

- When you can do Level 2 comfortably, progress to placing your fists higher up on your back above waist level, if possible.
- Repeat 10 times
- Do once a day.

Benefit: Restores healthy lower back curve. Decreases rounded upper back.

10 - STANDING CALF STRETCH

Starting position for both leg stretching exercises:

- Hold onto a counter or the back of a chair with one hand.
- Stand with your feet pointing ahead and hip width apart.
- Keep your knees relaxed and lined up over your second toe.
- Hold your abdomen flat, back straight, and shoulder blades gently pinched together.

From starting position *(above),* step one foot forward, keeping your back foot flat on the floor with your leg straight.

1. Keep your toes and knees facing forward.
2. Keep your body straight and abdomen gently pulled in.
3. Shift your weight forward as you bend the front knee to stretch the calf of the back leg.
4. Hold for 30-60 seconds.
5. Repeat with the other leg.
6. Do this exercise twice for each leg, 3 times a week.

11 - QUADRICEPS & HIP STRETCH

1. Start in the calf stretch position.
2. Lift up your heel and bend the knee of the leg behind you.
3. Shift your weight forward on bent front knee and push back knee down as if reaching it to the floor for the stretch.
4. Hold 20-30 seconds.
5. Repeat with the other leg.
6. Do this exercise twice for each leg, 3 times a week.

Benefit: Stretches calf and thigh muscles and front of hip. Increases weight-bearing through the hip. Improves balance and standing posture.

12 - SITTING HAMSTRING & CALF STRETCHES

1. Sit with your back straight, abdomen pulled in and arms resting at your sides or on your thighs.
2. Slowly straighten your knee, keeping your back very straight *(don't slump and let your back round out).*
3. After your knee is as straight as possible, bend your ankle so that your foot points upward toward the ceiling or back toward your knee *(stretches your calf).*
4. Hold 10 seconds.
5. Relax and lower your leg to the starting position.
6. Repeat the sequence with the other leg.
7. Do this exercise 3 to 5 times on each leg, 3 times a week.

Benefit: Stretches calf muscles (back of lower leg) and hamstrings (back of thigh). Improves posture.

HIP AND BACK (SPINE) STRENGTHENING EXERCISES

KEY EXERCISES

RELATED

The following exercises strengthen the muscles around the hip and along the spine to help decrease the risk of a fracture in these areas. They can also help your balance so that you are less likely to fall.

When doing these exercises, tighten your abdomen and slightly tilt your pelvis forward. Hold this position during the entire exercise. When you can do the exercise without your muscles getting tired, add weight to make it more difficult. Once the weight becomes easy, increase it.

13 - HIP FLEXOR STRENGTHENING

1. Stand beside a chair, standing as tall as possible.
2. Lift your knee up as if marching.
3. Do not lift it higher than your hip.
4. Lower and repeat 10 times.
5. Repeat with the other leg.
6. Do this exercise 2 or 3 times a week.
7. When you are able, add an ankle weight that is heavy enough that you cannot lift it more than 10 times.

Benefit: Strengthens the hips. Improves balance.

14 - HIP ABDUCTOR STRENGTHENING

1. Stand straight and hold onto the back of a chair, without bending at the waist or knee.
2. Place other hand on the top of your pelvis and raise this leg straight out to the side.
3. Make sure that the toes point forward and your pelvis *(and hand)* don't rise up.
4. Lower the leg and repeat 10 times.
5. Change sides and repeat the exercise with the other leg.
6. Do this exercise 2 or 3 times a week.
7. When you are able, add an ankle weight that is heavy enough that you cannot lift it more than 10 times.

Benefit: Strengthens the hips. Improves balance.

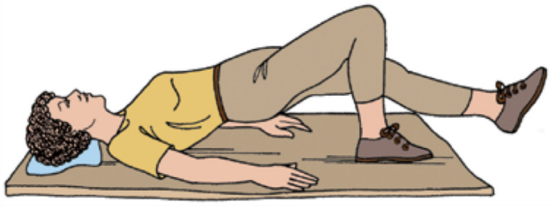
15 - HIP EXTENSOR STRENGTHENING

1. Stand straight and hold onto the back of a chair.
2. Bend forward about 45 degrees at the hips.
3. Lift one leg straight out behind you as high as possible without bending your knee or moving your upper body.
4. Lower leg and repeat 10 times.
5. Change sides and repeat the exercise with the other leg.
6. Do this exercise 2 or 3 times a week.
7. When you are able, add an ankle weight that is heavy enough that you cannot lift it more than 10 times.

Benefit: Strengthens the hips. Improves balance.

16 - THE BRIDGE

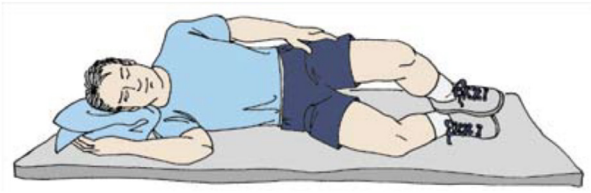
1. Lie on your back with knees bent and feet flat.
2. Keep your arms at your sides.
3. Press your head and shoulders down.
4. Lift your buttocks up so your body rises from the floor.
5. Lower yourself to the floor, relax, and repeat 10 times.
6. When you can do 10 repetitions without difficulty, try it with one leg out flat, lifting body with the other leg.
7. Do 10 on one side and then 10 on the other.
8. Do this exercise 10 times, 2 or 3 times a week.



Benefit: Strengthens hips. Improves balance.

17 - SIDE-LYING KNEE LIFTS

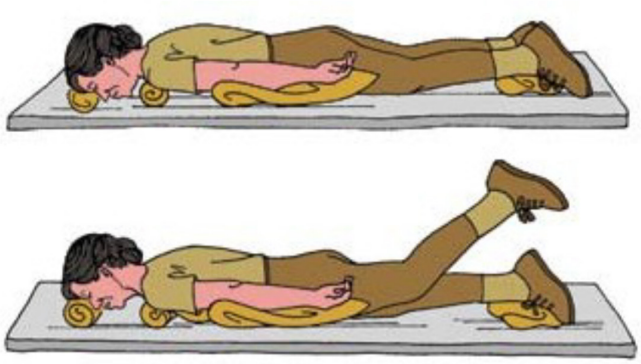
1. Lie on your side with knees bent, pelvis forward and abdomen gently pulled in.
2. Lift the top knee, keeping feet together.
3. Do 10 on one side and then 10 on the other.
4. Do this exercise 2 or 3 times a week.



Benefit: Strengthens hip and abdominal muscles.

18 - PRONE LEG LIFTS

1. Lie on your abdomen with hands at your sides.
2. Place a towel under your forehead and your shoulders and towel or pillow under your abdomen for comfort *(see illustration).*
3. Bend your right leg slightly and lift your thigh off the floor.
4. Keep your foot relaxed.
5. Lower and repeat 10 times.
6. Then do 10 on the other side.
7. Do this exercise 2 or 3 times a week.
8. When you are able, add an ankle weight that is heavy enough that you cannot lift it more than 10 times.

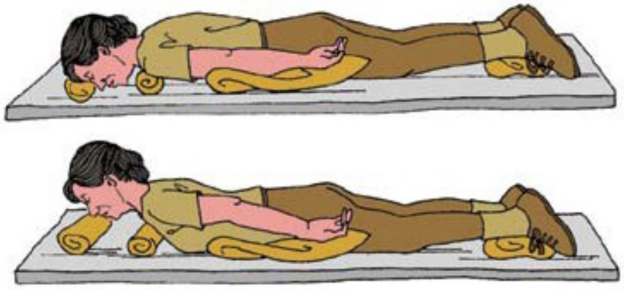


If this causes back pain, try adding another pillow under your abdomen or replace this exercise with the hip extensor strengthening exercise.

Benefit: Strengthens lower back and buttocks. Stretches hip flexors and the front of the thighs.

19 - PRONE TRUNK LIFTS

1. Lie on your stomach as described in Prone Leg Lifts exercise above.
2. Place a towel under your forehead and a pillow under your abdomen for comfort *(see illustration).*
3. Keep your abdomen pulled in, feet down, and head in a normal position.
4. With hands at your sides, lift your upper back while pinching shoulder blades together.
5. Hold for 1 to 3 seconds.
6. Relax and repeat.
7. Inhale going up and exhale going down.
8. Do not arch your neck up.
9. Do this exercise 10 times, once a day.



Benefit: Strengthens back.

BALANCE EXERCISES

KEY EXERCISES

20 - Balance Training Progression

21 - Toe Raises/Heel Raises

RELATED

10 - Standing Calf Stretch
13 - Hip Flexor Strengthening
14 - Hip Abductor Strengthening
15 - Hip Extensor Strengthening
16 - The Bridge
17 - Sidelying Knee Lifts
18 - Prone Leg Lifts
19 - Prone Trunk Lift
22 - Wall Slide
23 - Wall Sit
24 - Chair Rises

Balance exercises can be done at home or in a group setting. Many fitness clubs, community centers, and other organizations offer balance exercise programs, such as Tai Chi classes. Balance exercises can also be done at home. Balance exercises are especially important if you have fallen during the past year or if you lose your balance while doing regular daily activities.

Do your balance exercises every day. You can do them all in one session or spread them out through the day. In addition to these, leg-strengthening and hip-strengthening exercises improve balance and should be part of your balance training program.

The first couple times you do these exercises, hold onto a stable chair or table with both hands. When you no longer wobble, hold on with one hand only. Then progress to touching the chair or table with one fingertip only. As you become steadier, hold both hands two inches above the chair or table. When you can do this without any trouble, keep your hands two inches above the chair or table and do the exercise with your eyes closed.

20 - BALANCE TRAINING PROGRESSION

Level 1

- **Feet together:** Stand with feet next to each other, legs tight together.

Level 2

- **Semi-tandem:** Stand with one foot in front but slightly to the side of the other and the inside edge of your front heel touching the inside edge of the big toe of your back foot.

Level 3

- **Tandem:** Stand with one foot directly in front of the other like you are standing on a tight rope.

Level 4

- **Single leg stance:** Stand on one leg.

Hold each level for 20-30 seconds:

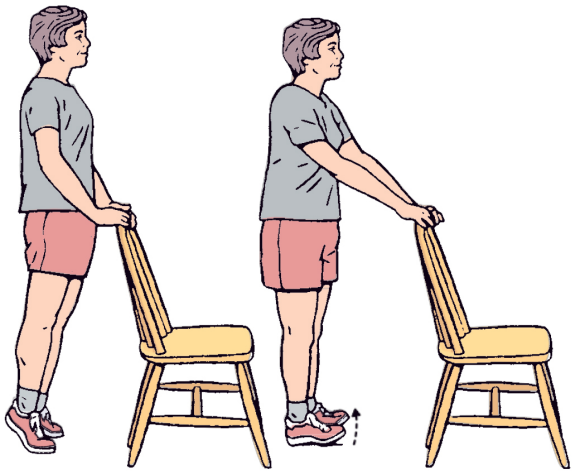
- The first time you do this exercise, hold onto a stable chair or table with both hands.
- When you can go all the way through without wobbling, hold on with only one hand.
- When you are steady with that, progress to touching the chair or table with only your fingertips and then only one fingertip.
- When you don't wobble with only one fingertip, do it with your eyes closed or with both hands two inches above the chair or table.
- When you are solid all the way through, you can graduate to eyes closed AND both hands above the chair or table.
- Do this exercise once every day.

These exercises should not hurt while you do them or make your muscles sore for more than two days. If it hurts or if you feel like you might fall, STOP and SIT DOWN.

21 - TOE RISES/HEEL RISES

1. Stand straight and hold onto the back of a chair, without bending at the waist or knees.
2. Rise up on your toes and then back onto your heels—imagine you are moving your head up to the ceiling.
3. Repeat 10 times.
4. Hold on to the chair as little as possible to challenge your balance.
5. Do this exercise once every day.

Benefit: Strengthens lower legs. Improves balance, helps prevent falls.



FUNCTIONAL EXERCISES

KEY EXERCISES

22 - Wall Slide
23 - Wall Sit
24 - Chair Raises

RELATED

1 - Pelvic Lift Exercise
2 - Basic Abdominal Exercise
7 - Wall Arch Stretch
10 - Standing Calf Stretch
13 - Hip Flexor Strengthening
21 - Toe Raises/Heel Raises

Functional exercises are based on activities you do every day, such as climbing stairs. If you struggle to do everyday activities, such as standing up from a chair or climbing stairs, you should do functional exercises. Also, if you have recently been inactive due to a broken bone, surgery, an illness, or other reason, you may also benefit from these exercises.

You can do functional exercises every day, in one session or spread throughout the day. Doing exercises that are similar to everyday activities will keep you strong in these activities. Some of these exercises can also improve your balance to decrease you risk for falling.

22 - WALL SLIDE

Starting position for wall sit/wall slide

- Stand with your heels one shoe-length from the wall.
- Keep your feet straight ahead and shoulder width apart.
- Place your buttocks, palms of your hands and shoulders against the wall.
- Tuck your chin in so that the back of your head is as close to the wall as possible. Pull in your abdomen the entire time.

Begin with starting position for wall slide.

1. To increase thigh strength and place positive stress on the hip, place your feet 1 to 1 1/2 shoe lengths from the wall and slide down the wall. Hold the “wall sit” for up to 30 seconds.
2. Keep your knees lined up over your second toe.
3. Repeat 2 times, 2 or 3 times per week.

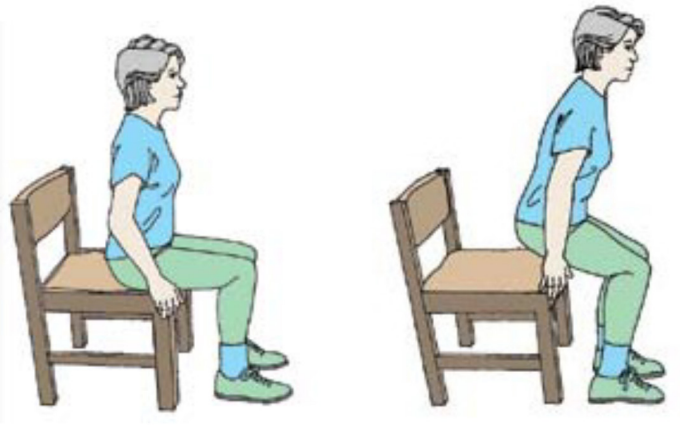
Benefit: Strengthens thighs, abdomen, and back. Decreases rounded upper back and forward head posture. Improves leg alignment.

23- WALL SIT

1. To increase thigh strength and place positive stress on the hip, place your feet 1 to 1 1/2 shoe lengths from the wall and slide down the wall. Hold the "wall sit" for up to 30 seconds.
2. Keep your knees lined up over your second toe.
3. Repeat 2 times, 2 or 3 times per week.

Benefit: Strengthens thighs, abdomen, and back. Decreases rounded upper back and forward head posture. Improves leg alignment.

23 - CHAIR RISES



1. Sit on the front edge of a chair and rise to a standing position and gently sit back down without using your arms. It may be helpful to cross your arms on your chest to prevent using them.
2. Keep your knees and feet hip width apart at all times.
3. Use the strength of your legs to stand and sit.
4. If you are not able to do this without using your arms, place a pillow on the chair.
5. The goal is to stand and sit 10 times in a row. Once you can complete the set of 10, move the exercise to a lower chair to make it harder.
6. Do this exercise once each day.

Benefit: Strengthens legs. Helps with safety when getting up from a chair to stand.

GLOSSARY
OF COMMONLY USED TERMS

Abaloparatide—An anabolic medication used for people at high risk for fracture and to treat postmenopausal osteoporosis. Abaloparatide is taken once a day as a subcutaneous injection. The brand name is Tymlos®

Actonel®—See risedronate.

Alendronate—A medication that can prevent and treat osteoporosis in women and men. It is in a class of medications called bisphosphonates. Alendronate is taken as an oral tablet daily or weekly or as an effervescent tablet once a week. The brand name is Fosamax® or Binosto®.

Anabolic medications—A category of medications that help build bone. Teriparatide and abaloparatide are anabolic medications.

Antiresorptive medications—A category of medications that slow the breakdown of bone. These medications protect bone mineral density and reduce the risk of fractures. Most osteoporosis medications are antiresorptive medications. These medications include bisphosphonates, calcitonin, estrogen therapy/hormone therapy, the monoclonal antibody denosumab, and an estrogen agonist/antagonist which is also called a selective estrogen receptor modulator (SERM).

Balance exercises—Exercises that strengthen your legs and challenge your balance, such as Tai Chi. Balance exercises can decrease your risk of falls.

Binosto®— See alendronate.

Bisphosphonate medications—A class of antiresorptive medications that slow the breakdown of bone. They include alendronate, ibandronate, risedronate and zoledronic acid.

Bone density—See bone mineral density (BMD).

Bone mass—The amount of mineral content in your bones. Bone mass is not corrected for bone size.

Bone mineral density (BMD)—Average concentration of minerals in your bones. BMD is corrected for bone size and is also called bone density.

Bone mineral density (BMD) test—A test that uses a special machine to measure bone density. Some people also call it a bone mass measurement test or bone density test. It helps doctors find out if your bones are becoming weak and if you are likely to have a fracture.

Boniva®—See ibandronate.

Calcitonin—A medication to treat osteoporosis in women at least five years past menopause. It is a hormone that helps regulate how your body uses calcium. Calcitonin is available as a nasal spray or injection to treat osteoporosis.

Calcium—A mineral needed to build strong bones. For bone health, it is important to eat foods rich in calcium, such as milk, dairy products, fortified foods and other calcium rich foods. If you do not get enough calcium through your diet, it is important to take a calcium supplement.

Calcium citrate—A type of calcium supplement. Calcium supplements from calcium citrate do not need to be taken with food for absorption.

Calcium carbonate—A type of calcium supplement. Calcium carbonate should be taken with food for best absorption.

Collagen—A major component of bone. Collagen is a protein that gives bones a flexible framework.

Conjugated estrogen complex—An antifracture drug composed of a mixture of man-made and natural estrogens used as an external source and replacement for the natural female hormone.

Corticosteroids—See glucocorticoids.

Daily value (DV)—The Food and Drug Administration (FDA) lists daily values (DVs) on the "Nutrition Facts" panel of foods to help consumers determine the amount of nutrients in each product. DVs can help people decide if a food is a good source of certain nutrients, such as calcium and vitamin D.

Denosumab—A monoclonal antibody that blocks a pathway associated with bone resorption. Denosumab is given every 6 months by subcutaneous injection. The brand name is Prolia®.

Dual-energy x-ray absorptiometry (DXA)—A test to detect low bone density and diagnose osteoporosis. Most experts consider it the best method we currently have to diagnose osteoporosis. This test can be performed on the spine, hip, forearm, heel or total body.

Duavee®—See tissue-selective estrogen complex.

Endocrinologist—A physician who treats the endocrine system, which includes the glands and hormones that help control the body's metabolic activity. In addition to osteoporosis, conditions often treated by endocrinologists include diabetes, thyroid disorders and pituitary diseases.

Estrogen—A female hormone that controls sexual development and the menstrual cycle. It also plays an important role in maintaining healthy, strong bones in women. The body produces very little estrogen after menopause.

Estrogen agonist/antagonist—A type of medication that is also called a selective estrogen receptor modulator (SERM). It was developed to provide the benefits of estrogen therapy without some of the risks. This type of medication is for women only. The only estrogen agonist/antagonist that is currently approved for osteoporosis is raloxifene (Evista®).

Estrogen/hormone therapy (ET/HT)—These terms refer to estrogen therapy (ET) alone and estrogen with progesterone hormone therapy (HT). While these medications can prevent osteoporosis in postmenopausal women they also increase the risk of other health problems. A woman who still has her uterus can only take HT. Estrogen/hormone therapies are available under many brand names.

Evista®—See raloxifene.

Family physician—A physician with a broad range of training that includes surgery, internal medicine, obstetrics and gynecology and pediatrics. Family physicians place special emphasis on caring for an individual or family on a long-term, continuing basis.

Forteo®—See teriparatide.

Fosamax®—See alendronate.

Fracture—A broken bone. A fracture is often the first sign of osteoporosis. While the most common osteoporosis fractures occur in the hip, vertebrae (bones in the spine) and wrist, these fractures also occur in other bones.

Functional exercises—Exercises that improve how well you move and help you in everyday activities to decrease your risk of falls and fractures.

Geriatrician—A family healthcare provider or internist who specializes in treating patients age 65 and older. This type of physician receives additional training on the aging process and is able to evaluate and treat common conditions and multiple diseases that typically occur among older adults.

Glucocorticoids—Medications that relieve inflammation and are much like certain hormones made by your own body. If you take glucocorticoids for long periods or at high doses, these drugs can cause bone loss, osteoporosis, and fractures. Glucocorticoids are also known as steroids and corticosteroids. Glucocorticoid medications are used to treat many serious conditions, including autoimmune diseases such as rheumatoid arthritis and inflammatory disorders such as asthma.

Gynecologist—A physician who diagnoses and treats conditions of the female reproductive system and associated disorders. A gynecologist may serve as primary healthcare provider for women and follow a patient's reproductive health over time.

Healthcare provider—A person who is trained and licensed to provide healthcare services. Healthcare providers include medical doctors, nurse practitioners, physician assistants, physical therapists, and other health professionals.

Hormone therapy—See estrogen/hormone therapy (ET/HT).

Ibandronate—A medication that can prevent and treat osteoporosis in women. It is in a class of medications called bisphosphonates. Ibandronate can be taken as an oral tablet once monthly or given by intravenous (IV) infusion every three months. The brand name is Boniva®.

Idiopathic juvenile osteoporosis—This condition affects children between the ages of 1 and 13. Its cause is unknown. Children with this condition tend to have many broken bones, particularly of the legs and spine. Fortunately, this type of osteoporosis usually goes away at adolescence. Treatment involves protecting bones from fractures until the disease goes into remission to prevent deformity during growth.

Internist—A physician who is trained in the essentials of overall care of general internal medicine in adults. An internist diagnoses and nonsurgically treats many diseases of the body. An internist also provides long-term comprehensive care in the hospital and office.

Kyphoplasty—A treatment for severely painful fractures of the vertebrae (bones in the spine). It involves inserting a balloon device into a fractured vertebra and inflating it to restore the height of the vertebra. The space is then filled with bone cement. This can help pain and possibly deformity of the spine due to recent fractures of the vertebrae.

Kyphosis—Abnormal forward curving of the spine caused by fractures of the vertebrae ("dowagers hump").

Medications—Substances or combinations of substances that are primarily used or given to treat or prevent disease. Osteoporosis medications fall into two categories: 1) antiresorptive medications; and 2) anabolic medications. Medications are also called medicines or drugs.

Menopause—The time in a woman's life when she stops having menstrual periods and her estrogen levels drop. This can happen naturally or when the ovaries are removed surgically. For many women, bone density decreases quickly in the first few years after menopause.

Nurse practitioner—A registered nurse with advanced education and training who is licensed to treat patients in collaboration with physicians.

Occupational therapist (OT)—A healthcare professional who can help you regain skills of daily living following a fracture either unsupported or with the aid of adaptive devices. An OT can teach techniques that will help you move safely during your daily activities to reduce pain and prevent falls.

Orthopedist—A physician who treats injuries and disorders of the musculoskeletal system. This system includes bones, joints, muscles and tendons. An orthopedic surgeon operates to correct or replace joints and limbs. Alternate spelling for orthopedic is orthopaedic.

Osteoarthritis—The most common form of arthritis—sometimes called "wear and tear"—is a disease of joint cartilage. Cartilage is the tough tissue that covers the ends of the bones in joints. When joint cartilage breaks down, the bones can rub against each other. Bone spurs often form and the joints become stiff and painful. Aside from its name, osteoarthritis has little in common with osteoporosis.

Osteopenia—Low bone mass. This means bone mass or bone mineral density is lower than normal, but not low enough to be considered osteoporosis. A person in this category may benefit from taking an osteoporosis medication depending on his or her risk factors for osteoporosis and fractures.

Osteoporosis—A condition in which the bones become so porous and weak that they are likely to break from a minor injury. A person with osteoporosis can break a bone from a minor fall, picking up a bag of groceries, and in more serious cases, from a simple action such as a sneeze. While the most common osteoporosis fractures occur in the hip, vertebrae (bones in the spine) and wrist, these fractures also occur in many other bones

Ovaries—The two glands that produce eggs and sex hormones in women. When the ovaries stop producing estrogen at menopause or are removed surgically, bone loss can occur rapidly.

Parathyroid hormone—A hormone made by the four parathyroid glands that are close to the thyroid gland in the neck. Its main job is to control the amount of calcium in the blood.

Peripheral DXA (pDXA) —A test of bone density in bones other than the hip or spine. This type of test is often done on the wrist, finger and heel.

Peak bone mass—The point at which you have the most bone you will ever have. This usually is between the ages of 18 to 25.

Physiatrist—A doctor who specializes in rehabilitation. A physiatrist can help you recover from a fracture, regain function and reduce pain. Physiatrists often oversee a team of health professionals that may include PTs, OTs, and other healthcare professionals to provide well-rounded rehabilitation for the patient.

Physical therapist (PT)—A healthcare professional who can help you after a fracture. PTs treat pain and discomfort with exercises to keep the body moving. They also use ice, heat, and other treatments to help a person recover after a fracture. A PT can help you learn an exercise program to make you stronger and better able to perform your daily activities as well as to prevent fractures.

Physician assistant—A healthcare professional who is licensed to treat patients under the supervision of a physician.

Posture exercises—Exercises that improve your posture and reduce rounded or "sloping" shoulders. Posture exercises can help you decrease the risk of fractures, especially in the spine.

Prolia® —See denosumab.

Quantitative computed tomography (QCT)—A test that measures bone mineral density in the spine or other bones using a CT scan and computer software. This test is less commonly used than a DXA.

Radiographic absorptiometry (RA)—A test that uses a special hand x-ray to measure bone density of the hand.

Raloxifene—The first in a class of osteoporosis medications called estrogen agonists/antagonists, which are also known as selective estrogen receptor modulators (SERMs). It is approved for women only and is taken as an oral tablet daily. The brand name is Evista®.

Registered dietitian—A resource for nutrition information and special dietary needs. Most hospitals have registered dietitians on staff and many offer outpatient instruction.

Remodeling—The ongoing process of bone formation and bone breakdown (bone loss) that occurs throughout life.

Reclast®—See zoledronic acid.

Resistance or strengthening exercises—Exercises that help to build and maintain bone density. These exercises include lifting weights, using elastic exercise bands, weight machines or lifting your own body weight.

Resorption—The process of bone breakdown and loss.

Rheumatoid arthritis—An autoimmune disease in which the membrane surrounding the joints becomes inflamed. Steroid medications that are often used to reduce inflammation, as well as the condition on its own, can increase the risk of osteoporosis.

Risedronate—A medication that can prevent and treat osteoporosis in women and men. It is in a class of medications called bisphosphonates. It is taken as an oral tablet daily, weekly, twice monthly or monthly. The brand name is Actonel®.

Risk factor—Anything that is known to make you more likely to have a certain problem. For osteoporosis, risk factors include low bone mineral density, low body weight, family history of fractures, a previous fracture and smoking.

SERM—See estrogen agonist/antagonist.

Single energy x-ray absorptiometry (SXA)—A test used to assess bone density in the wrist or forearm.

Steroids—See glucocorticoids.

Support group—A group of people who come together to share common concerns. An osteoporosis support group can allow you to express feelings and fears and share ideas for coping with the disease.

Teriparatide—The first in a class of osteoporosis medications called anabolics. It is a type of parathyroid hormone. It works by helping to form new bone. Teriparatide is taken as a daily injection by the patient. The brand name is Forteo®.

T-score—A number that shows the amount of bone you have in comparison to a healthy young adult.

Testosterone—The main male sex hormone. In men, testosterone protects bone. Low levels of testosterone can lead to bone loss.

Tissue-selective estrogen complex—An antifracture medication made from a combination of conjugated estrogens and bazedoxifene used to reduce moderate to severe hot flashes due to menopause and to prevent osteoporosis. The brand name is Duavee®.

Tymlos®—See abaloparatide.

Ultrasound densitometry—A test that uses sound waves to assess bone density in the heel.

Vertebrae—The 33 bones that form the spinal column, or backbone.

Vertebroplasty—A procedure in which bone cement is injected into recently fractured vertebrae to relieve persistent or severe pain.

Vitamin D—A vitamin created in the skin when it is exposed to sunlight. Vitamin D helps the body absorb and use calcium to keep bones strong. It is available in a few foods such as fortified milk and cereal, egg, and fatty fish.

Weight-bearing, impact exercises—Exercises that help to build and maintain bone density. These exercises include activities that make you move against gravity while being upright, such as fast walking, running, stair climbing, and playing soccer.

Z-score—A number that shows the amount of bone you have in comparison to other people of your age, gender, and weight.

Zoledronic acid—A medication that can treat osteoporosis. It is in a class of medications called bisphosphonates. It is given once a year by intravenous (IV) infusion over at least 15 minutes. The brand name is Reclast®.

ACKNOWLEDGEMENTS

Established in 1984, the National Osteoporosis Foundation (NOF) is the nation's leading voluntary health organization solely dedicated to osteoporosis and bone health. National Osteoporosis Foundation's Vision: To make bone health a reality and a lifelong priority for all individuals.

NATIONAL OSTEOPOROSIS FOUNDATION'S MISSION: To prevent osteoporosis and related fractures, to promote lifelong bone health, to help improve the lives of those affected by osteoporosis and to find a cure through programs of awareness, advocacy, public and health professional educationand research.

DEDICATION

This edition of Boning Up is dedicated to the memory of Ms. Vivian Woods-Flowers. Vivian's gentle spirit and compassion for others inspired all who worked with her. She is missed.

STATEMENT OF EDITORIAL INDEPENDENCE. In order to accomplish our mission—to prevent osteoporosis and related fractures, to promote lifelong bone health, to help improve the lives of those affected by osteoporosis and to find a cure—NOF accepts support from diversified sources, including individual donors, memberships, sales of educational materials, investment income and grants from foundations, government sources and corporations.

While some of these funds may be restricted to specific projects, NOF maintains its independence and objectivity in accordance with the National Health Council's guiding principles. Grants accepted from corporations, which include companies involved in healthcare and consumer products and services, are accepted only on an unrestricted basis. This means that NOF alone determines the ideas and content published or promoted in the program created by grant support.

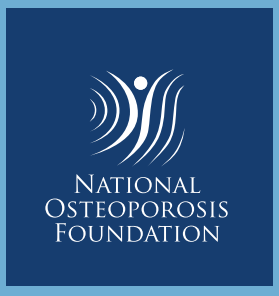
All of the educational resources produced by NOF are developed and/or reviewed by independent experts selected for their knowledge about a particular subject. Scientific members of NOF's Board of Trustees, as well as other leading experts in the field of osteoporosis, are routinely consulted to provide a fair and balanced perspective regarding written materials and educational programming. NOF policy ensures that its recommendations are consistent with positions of the National Institutes of Health, findings of the U.S. Food and Drug Administration, guidelines of relevant medical societies, and professional consensus statements or evidence-based research published in peer-reviewed journals. NOF does not endorse any particular product, service or point of view. NOF does, however, inform the public about all FDA-approved therapies, as well as the availability of other appropriate products and services, as part of its educational responsibility to the public and healthcare professionals.

NOF recommends that when using treatments for osteoporosis, as with all medications, individuals follow the instructions provided by their healthcare provider and presented in the package insert for that medication. It is important that patients tell their doctor about any other drugs they are taking, including non-prescription medicines and alcohol. If a serious side effect occurs, patients should immediately report the event to their healthcare provider and inquire about stopping the medication.

NOF is in full compliance with the Good Operating Practices and meets the Standards of Excellence of the National Health Council, meets the strong and comprehensive standards of the Better Business Bureau's Wise Giving Alliance, and has been awarded the Independent Charities Seal of Excellence.

ACKNOWLEDGEMENTS: This version of *Boning Up on Osteoporosis* is based upon prior versions printed in 1991, 2000, 2003, 2005, and 2008. The original handbook was prepared by the University of Connecticut Health Center, Farmington, Connecticut in collaboration with NOF.

The information included in this edition is current as of the publication date. For the most up-todate information on osteoporosis prevention, diagnosis, or treatment, consult with your healthcare provider or visit www.nof.org.



Revised March 2018

Developed by the National Osteoporosis Foundation.