

Osteoporosis Treatments That Help Prevent Broken Bones

A Guide for Women After Menopause



Agency for Healthcare Research and Quality
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fast facts



- ▶ Medicines for osteoporosis (OSS-tee-oh-puh-ROW-sis) can lower your chance of breaking a bone.
- ▶ All the medicines in this guide can prevent breaks in the small bones of the spine.
- ▶ Some of the medicines in this guide also can prevent breaks in the hip or wrist.
- ▶ There are three different kinds of medicines for osteoporosis. Each kind of medicine has different risks.
- ▶ Women need to make sure they get enough calcium and vitamin D for bone health, especially after menopause.
- ▶ Falling can cause broken bones. Exercise can help prevent falls. It is good for bone health, muscle strength, and balance.

What Does This Guide Cover?

Osteoporosis means that bones become less dense (or less solid). Bones that are less dense are weak and break easier. If your doctor has told you that you have osteoporosis, this guide is for you. It looks at ways to prevent broken bones caused by osteoporosis. It can help you talk to your doctor or nurse about ways to lower your risk of broken bones. It covers:

- ▶ Different kinds of treatments for preventing broken bones from osteoporosis.
- ▶ How well they work.
- ▶ Side effects of osteoporosis medicines.
- ▶ Price.

This guide is based on a government-funded review of research reports about osteoporosis treatments to prevent broken bones.

What Is Not Covered in This Guide?

This guide does not cover osteoporosis treatments for women before menopause or for men. It does not cover ways to prevent osteoporosis. But the medicines in this guide can help rebuild bone or slow the breakdown of old bone.



Learning About Osteoporosis



What is osteoporosis?

Osteoporosis means that bones become less dense (or less solid). When bone density is low, bones become weak and easier to break. Bone density that is low enough for bones to break easily is called osteoporosis.

Who gets osteoporosis?

Half of all women 50 and older will have a broken bone from osteoporosis at some time during their life.

Osteoporosis is more likely for:

- ▶ Women after menopause, mostly because the body has less estrogen.
- ▶ Smaller and thinner women.
- ▶ White or Asian women.
- ▶ Women who have family members who had osteoporosis and broke a bone.
- ▶ Women who smoke tobacco or drink too much alcohol.
- ▶ Women who take certain medicines, like thyroid medicine or steroids.

Both men and women can have osteoporosis, but most of the research is about women.

What causes osteoporosis?

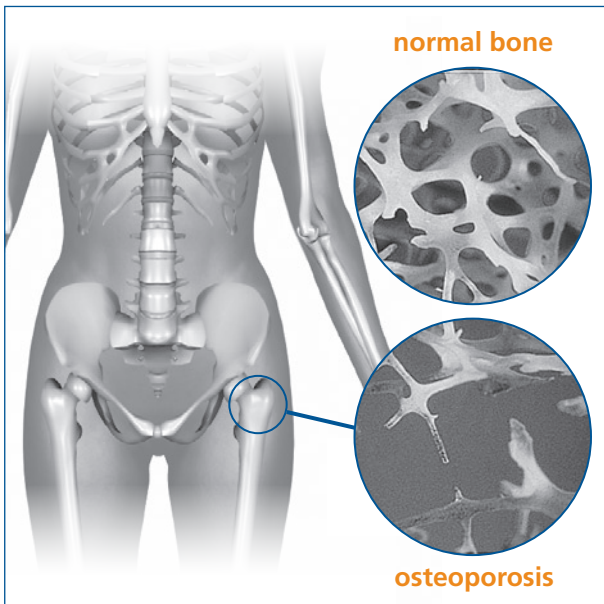
Bone is living tissue. Old and damaged bone is always being broken down and replaced with new bone. As you get older, your body loses minerals, like calcium. Calcium is needed to build new bone. If you have osteoporosis, it means your old bone is not being replaced fast enough by new bone.

Hormones in the body, like estrogen, help prevent bones from breaking down too fast. When you go through menopause, your body makes less estrogen. The loss of hormones is why women are more likely to have osteoporosis after menopause.

How do I know if I have osteoporosis?

To find out if you have osteoporosis, your doctor will do a bone density test. Often this is a special x-ray test called a DXA (dex-ah). It measures

the thickness of your bones. It can tell if your bones are getting weak. It does not say for sure if your bones will break. Your doctor or nurse can tell you if your bone density is low enough to mean that you have osteoporosis.



Bone images used with permission from the International Osteoporosis Foundation.

Which Bones Can Break?

Osteoporosis can cause any bone to break. The most likely bones to break are the spine, hip, or wrist. Bones can break from a fall or just a hard bump.

Spine

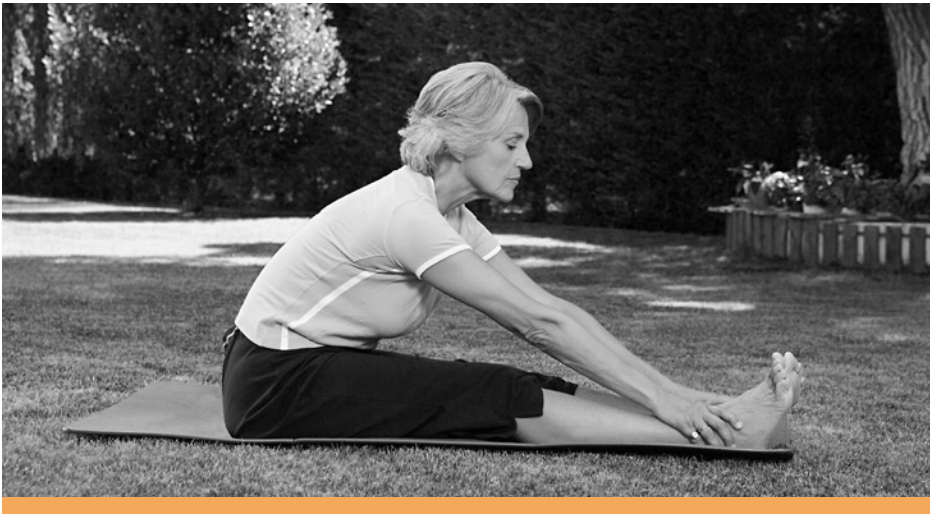
Cracks in the bones of the spine can cause these bones to crunch together (compression fracture). This can cause backaches and pain. In fact, loss of an inch or more of height may be the first sign of osteoporosis.

Hip

A broken hip almost always needs to be repaired with surgery. Recovery from the operation can take a long time. A broken hip can raise the risk of serious problems, even death.

Wrist

A broken wrist makes it hard to use the arm and hand. It can also require surgery.



Learning About Bone Health

The U.S. Surgeon General says that calcium, vitamin D, and exercise are important for healthy bones. The Surgeon General also warns that smoking and drinking too much alcohol raises the risk of broken bones.

Calcium and vitamin D

Many people do not get enough calcium and vitamin D. Calcium is the building block for bones. Vitamin D helps your bones use calcium. They work together to build bones.

Calcium

Women need more calcium after menopause. Each day you should get at least:

- ▶ 1,200 mg of calcium.

Calcium pills can help you meet this goal. Smaller doses of 500 mg or less taken with meals are best.

Vitamin D

Vitamin D needs vary by age. Each day you should get at least:

- ▶ 400 IU of vitamin D if you are 51 to 70.
- ▶ 600 IU of vitamin D if you are 71 and over.

Many calcium pills and multi-vitamins contain vitamin D. Check the label to be sure.

Exercise

Exercise is good for bone health, muscle strength, and balance. Exercise can help lower the chance of falling. For many people with osteoporosis, falling is what leads to a broken bone.

Learning About Medicines



There are three kinds of medicines for osteoporosis. Most come as pills. A few are given by a shot under the skin or directly into the vein using an IV. One is a nasal spray. Some are taken once a day. Others are taken once a week, once a month, or even less often.

Bisphosphonates

Bisphosphonate (biss-FOSS-fuh-nate) drugs include alendronate (Fosamax[®]), ibandronate (Boniva[®]), risedronate (Actonel[®]), and zoledronic acid (Reclast[®]). They stick to the surfaces of the bones and slow the breakdown of old bone.

SERMs

Selective estrogen receptor modulators (SERMs), like raloxifene (Evista[®]), slow the breakdown of old bone. They are not hormones but work on bone like the hormone estrogen.

Hormones

Estrogen (Premarin[®]) and estrogen plus progestin (Prempro[®], Premphase[®]) pills add to the body's natural hormones. They slow the breakdown of old bone.

Teriparatide (Forteo[®]) helps the body make new bone faster than old bone is broken down.

Calcitonin (Miacalcin[®], Fortical[®]) slows the breakdown of old bone.

Research About the Benefits of Medicines

In the chart below, a ✓ means there is research that shows the medicine can prevent fractures of certain bones. A ? means research can't tell us yet whether that medicine works for those bones. There is more research on some bones and less on others.

Where the Medicine Works To Prevent Broken Bones

Medicine	Brand Name	Spine	Hip and Other Bones
BISPHOSPHONATES			
Alendronate	Fosamax®	✓	✓
Ibandronate	Boniva®	✓	?
Risedronate	Actonel®	✓	✓
Zoledronic acid	Reclast®	✓	✓
SERMs			
Raloxifene	Evista®	✓	?
HORMONES			
Estrogen	Premarin®	✓	✓
Estrogen plus progestin	Prempro®, Premphase®	✓	✓
Teriparatide	Forteo®	✓	?
Calcitonin	Miacalcin®, Fortical®	✓	?



Side Effects of Bisphosphonates

Tips for taking bisphosphonate pills

Following these directions can lower the chance of esophagus and stomach problems.

- ▶ Take your pill on an empty stomach first thing in the morning.
 - ▶ Drink a full glass of water.
 - ▶ Wait 30 to 60 minutes before lying down or eating.
-

All the medicines in this guide can cause side effects. The chance of serious side effects with osteoporosis medicines can depend on a person's other health problems. Talk with your doctor or nurse about the risks for you.

Esophagus and stomach problems

The esophagus (eh-SAW-fuh-gus) is the tube that connects your mouth and stomach. Problems with the esophagus and stomach can happen with any of the bisphosphonate pills. Problems include heartburn, nausea, and trouble swallowing. More serious problems include ulcers or bleeding.

Pain

Bisphosphonate medicines can cause pain in your muscles, bones, or joints. If you have pain after starting a bisphosphonate, tell your doctor or nurse. This pain may be a reaction to your medicine. It can start right away or happen after you've been on the medicine for a long time.

Breakdown of the jaw bone

You may have heard that bisphosphonates can cause a breakdown of the jaw bone. This rare problem is called osteonecrosis (OSS-tee-oh-neh-KRO-sis). It's happened mostly with people who have cancer and were taking bisphosphonates. It's happened with only a few people taking bisphosphonates for osteoporosis.

Side Effects of SERMs and Hormones

Blood clots and stroke

Raloxifene (Evista®) and pills containing estrogen (Premarin®, Prempro®, Premphase®) raise the risk of blood clots.

Pills containing estrogen (Premarin®, Prempro®, Premphase®) raise the risk of stroke.

Breast and uterine problems

Estrogen plus progestin pills (Prempro®, Premphase®) raise the risk of breast cancer.

Pills containing estrogen (Premarin®, Prempro®, Premphase®) can cause problems with uterine bleeding and breast pain or tenderness.

Nasal irritation

Calcitonin (Miacalcin®, Fortical®) when taken by nasal spray can cause nasal irritation.



Using Information To Make a Decision About Medicine



Ask your doctor or nurse if medicine is a good choice for you. Medicines for osteoporosis work to prevent broken bones. The best choice may be different for each person. Here are a few things to think about.

Will the way the medicine is taken affect how well you stick with it?

The medicines in this guide are taken as a pill, nasal spray, a shot under the skin, or by IV. Some need to be taken once a day. Others are taken less often. Some come with special instructions.

Think about what will work best for you. You have a better chance of preventing fractures if you're able to stick with your plan.

Have you ever had an ulcer or stomach bleeding?

All bisphosphonates have some risk for serious esophagus and stomach problems. Your doctor or nurse may suggest a different kind of drug if you've had these problems in the past.

Have you ever had a blood clot or stroke? Are you at risk for either?

Ask your doctor about your risks of blood clots and stroke. Pills containing estrogen (Premarin®, Prempro®, Premphase®) and the drug raloxifene (Evista®) make problems like these more likely.

Is cost important to you?

Use the chart on pages 12 and 13 to compare the prices of drugs. If your health plan covers prescriptions, check with them about the cost. If you need help paying for your medicine, there may be a program for you. The Partnership for Prescription Assistance can tell you about these programs. Web site: www.pparx.org. Phone: (800) 477-2669.

What Is the Source of This Guide?

The information in this guide comes from a detailed review of 591 research reports. The review is called *Comparative Effectiveness of Treatments To Prevent Fractures in Men and Women With Low Bone Density or Osteoporosis* (2007) and was written by the Southern California Evidence-based Practice Center at RAND.

The Agency for Healthcare Research and Quality (AHRQ) created the Eisenberg Center at Oregon Health & Science University to make research helpful for consumers. This guide was prepared by Sandra Robinson, M.S.P.H., Martha Schechtel, R.N., Erin Davis, B.A., Bruin Rugge, M.D., Theresa Bianco, Pharm.D., Valerie King, M.D., and David Hickam, M.D., of the Eisenberg Center. Women with osteoporosis helped them write this guide.

Where Can I Get More Information?

For an electronic copy of this guide and materials about comparing treatments and medicines for other conditions, visit this Web site:
www.effectivehealthcare.ahrq.gov

For a free print copy, call:

The AHRQ Publications Clearinghouse
(800) 358-9295

Ask for AHRQ Publication Number
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For more information about osteoporosis, visit the Medline Plus Web site:
www.nlm.nih.gov/medlineplus/osteoporosis.html

For information about osteoporosis and seniors, visit the NIH Senior Web site:
www.nihseniorhealth.gov/osteoporosis/whatisosteoporosis/01.html

Dose and Price of Medicines for Osteoporosis

Generic Name ¹	Brand Name	Dose ² and How Often	How It Is Taken	Price Per Month ³	
				Generic	Brand
BISPHOSPHONATES					
Alendronate	Fosamax®	10 mg once a day	Pill	\$90	\$95
		70 mg once a week	Pill	\$80	\$85
Ibandronate	Boniva®	2.5 mg once a day	Pill		\$100
		150 mg once a month	Pill	NA	\$100
		3 mg once every 3 months	IV		\$485 ⁴
Risedronate	Actonel®	5 mg once a day	Pill		\$100
		35 mg once a week	Pill		\$90
		75 mg once a day for 2 days each month	Pill	NA	\$100
		150 mg once a month	Pill		\$100
Zoledronic acid	Reclast®	5 mg once a year	IV	NA	\$105 ⁵
SERMs					
Raloxifene	Evista®	60 mg once a day	Pill	NA	\$100
HORMONES					
Calcitonin	Miacalcin®, Fortical®	100 IU once every other day	Shot	NA	\$425
		200 IU once a day	Nasal spray		\$115
Estrogen	Premarin®	0.3 mg once a day	Pill		\$35
		0.45 mg once a day	Pill	NA	\$40
		0.625 mg once a day	Pill		\$35
Estrogen plus progestin	Prempro®	0.3 mg/1.5 mg once a day	Pill		\$40
		0.45 mg/1.5 mg once a day	Pill	NA	\$50
		0.625 mg/2.5 mg once a day	Pill		\$40
		0.625 mg/5 mg once a day	Pill		\$40
	Premphase®	0.625 mg/5 mg once a day	Pill	NA	\$55
Teriparatide	Forteo®	20 mcg once a day	Shot	NA	\$845

¹ These drugs were included in the research studies.

² Doses are approved by the Food and Drug Administration (FDA) for prevention or treatment of osteoporosis.

³ Average Wholesale Price from *Red Book*, 2007. Price does not include IV expenses.

⁴ Price (\$1,455) averaged over 3 months.

⁵ Price (\$1,250) averaged over 12 months.

IV = intravenous (given by shot into a vein).

NA = not available as generic.

SERMs = selective estrogen receptor modulators.

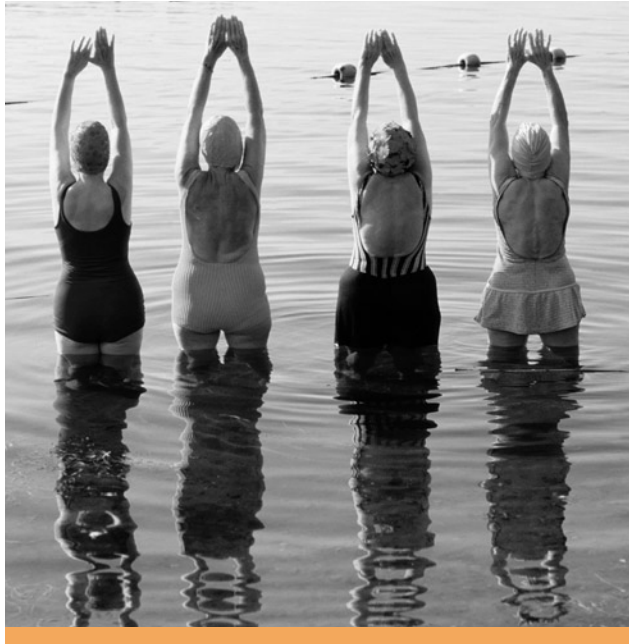
Dose and Price of Vitamins and Minerals

Generic Name ¹	Brand Name	Dose and How Often	How It Is Taken	Price Per Month ²	
				Generic	Brand
Calcium ³	Various brands	500 mg daily	Pill	\$3	Price varies
		1,000 mg daily	Pill	\$5	
		1,200 mg daily	Pill	\$6	
Vitamin D ³	Various brands	400 IU daily	Pill	\$1	Price varies
		800 IU daily	Pill	\$2	

¹ These drugs were included in the research studies.

² Average Wholesale Price from *Red Book*, 2007.

³ Not FDA-approved for osteoporosis. Doses are similar to those used in research studies.



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The photos in this guide are of models and are used for illustrative purposes only.