MEDICINES FOR PREVENTION AND TREATMENT

Although there is no cure for osteoporosis, the U.S. Food and Drug Administration (FDA) has approved medicines to prevent, slow or stop its progress. Taking a prescribed osteoporosis medicine, along with other healthy lifestyle behaviors such as getting enough calcium, vitamin D and regular exercise, can help reduce the risk of broken bones (also called fractures) due to osteoporosis.

WHAT CAUSES FRAGILE BONES?

The skeleton is an active, vital organ. It keeps the body healthy through a constant process of repair, renewal and mineral release. This process is called remodeling. The bone remodeling cycle consists of two distinct stages:

Bone resorption (breakdown or removal): cells on the bone's surface called osteoclasts dissolve bone tissue, releasing it into the bloodstream and leaving behind tiny pits or cavities.

Bone formation (generation of new bone): During bone formation, cells called osteoblasts fill these cavities with new bone tissue.

In normal bone, resorption and formation are in lockstep with one matching the other. Aging can cause the remodeling process to become unbalanced. More old bone gets removed than new bone gets created. Over time, this leaves bones weaker and more likely to break. A variety of circumstances, including hormonal changes, certain medications, prolonged inactivity as well as some diseases, can cause unbalanced bone remodeling.

Bone can also be resorbed to replace essential minerals missing in the bloodstream. This happens when there is not enough calcium in the diet. The result in all these scenarios is the same: slow but steady weakening of bones that can eventually lead to osteoporosis and fractures.

PREDICTING FRACTURE RISK

The best way to detect osteoporosis is with a bone density test by a DXA machine. DXA stands for dual energy x-ray absorptiometry. The T-score result on a bone density test falls into three categories: normal bone density, low bone density (osteopenia) and osteoporosis. If you have broken a bone at age 50 years or older, you may need to take an osteoporosis medicine. Some individuals have osteoporosis even when a bone density test indicates normal or low bone density.

Table 1: When to Consider Treatment with an Osteoporosis Medicine

Bone Density Category	When to Consider Osteoporosis Medicine Treatment in Postmenopausal Women and Men Age 50 Years and Older	T-scores	
		Range	Possible T-score*
Normal Bone Density	Most people with T-scores of -1.0 or higher do not need to consider a medicine.	-1.0 and above	+1.0 +0.5 0 -0.5 -1.0
Low Bone Density (Osteopenia)	People with T-scores between -1.0 and -2.5 should consider a medicine when there are certain risk factors suggesting an increased chance of breaking a bone in the next 10 years.	-1.0 to -2.5	-1.1 -1.5 -2.0 -2.4
Osteoporosis	All people with osteoporosis should consider a medicine to reduce the risk of broken bones.	-2.5 or below	-2.5 -3.0 -3.5 - 4.0 or lower

**BHOF has presented the T-scores differently than in its Clinician's Guide to help make this information more understandable.*

Some serious risk factors to consider when making a treatment decision include:

- Having parents who have/had osteoporosis or broken bones
- Being small and thin
- Taking certain medicines (such as steroids)
- History of broken bones or height loss of 1.5 inches or more from young adult height
- Smoking or drinking too much alcohol (e.g. more than two - three drinks per day)

Some DXA machines include a person's FRAX® score. A FRAX® score can also be computed using an online version (which can be found at www.sheffield.ac.uk/FRAX) of the FRAX® tool. This report incorporates a person's bone density results, age and some of the major risk factors for osteoporosis and broken bones to estimate the risk of breaking a bone in the next 10 years. A FRAX® score can help you and your healthcare provider decide when treatment with an osteoporosis medicine may be needed to reduce fracture risk.

FDA-APPROVED MEDICINES

The goal of treatment with osteoporosis medications is to strengthen bones and make them less likely to fracture. This is accomplished by altering the balance of resorption and formation. It can be done by slowing resorption through use of antiresorptive medication or by promoting bone formation using anabolic, or bone building, medication.

There are many medications available to treat osteoporosis and reduce the risk of fracture. They fall into two basic categories:

Antiresorptive drugs work by slowing the resorption or breakdown part of the remodeling cycle. Antiresorptive drugs include bisphosphonates (alendronate, ibandronate, risedronate, zoledronic acid), RANKL inhibitor (denosumab), estrogen/estrogen-progestin, estrogen agonist/antagonist (raloxifene) and a tissue specific estrogen complex (conjugated estrogens/bazedoxifene).

Anabolic drugs work by stimulating the formation part of the remodeling process. More bone is formed than is taken away. The result is stronger bone that is less likely to break. Teriparatide, a parathyroid hormone analog, abaloparatide, a parathyroid hormone-related protein analog and romosozumab-aqqg, a sclerostin inhibitor, are the FDA-approved anabolic medicines available at this time.

Special Note: Information provided here about FDA-approved osteoporosis medicines is intended solely for general information and should NOT be relied upon for any particular diagnosis or treatment. This information does not imply an endorsement by BHOF of any medicine or manufacturer. For more detailed information on the actions, administration and possible side effects for each of the medicines discussed here, please consult the package insert, available online and at pharmacies and/or speak with your health-care provider.

BONE BASICS | OSTEOPOROSIS MEDICINES

Class/Drug Name	Brand Name	Form	Frequency	Gender
ANTIRESORPTIVE AGENTS				
Bisphosphonates				
Alendronate	Fosamax®, Fosamax® Plus D	Oral (Tablet, Solution)	Daily/Weekly	Women & Men
Alendronate	Binosto®	Oral (Effervescent Tablet)	Weekly	Women & Men
Ibandronate	Boniva®	Oral (Tablet)	Monthly	Women
Ibandronate	Boniva®	Intravenous (IV) Injection	Every 3 Months	Women
Risedronate	Actonel®	Oral (Tablet)	Daily/Weekly/Twice Monthly/Monthly	Women & Men
Risedronate	Atelvia®	Oral (Tablet)	Weekly	Women
Zoledronic Acid	Reclast®	Intravenous (IV) Infusion	Once A Year/Once Every Two Years	Women & Men
RANK ligand (RANKL) inhibitor				
Denosumab	Prolia®	Injection	Every 6 months	Women & Men
Estrogen* (Hormone Therapy)				
Estrogen	Multiple Brands	Oral (Tablet)	Daily	Women
Estrogen	Multiple Brands	Transdermal (Skin Patch)	Twice Weekly/ Weekly	Women
Estrogen Agonist/Antagonist *also called selective estrogen receptor modulators (SERMs)*				
Raloxifene	Evista®	Oral (Tablet)	Daily	Women
Tissue Specific Estrogen Complex (TSEC)				
Conjugated Estrogens/ Bazodoxifene	Duavee®	Oral (Tablet)	Daily	Women
ANABOLIC AGENTS				
Parathyroid Hormone (PTH) Analog				
Teriparatide	Bonsity®	Injection	Daily	Women & Men
Teriparatide	Forteo®	Injection	Daily	Women & Men
Parathyroid Hormone-Related Protein (PTHrp) Analog				
Abaloparatide	Tymlos®	Injection	Daily	Women & Men
Sclerostin Inhibitor				
Romosozumab-aqqg	Evenity®	Injection	2 injections once monthly for 12 months	Women

**Estrogen is also available in other preparations including a vaginal ring, cream, by injection and as an oral tablet taken sublingually (under the tongue). The vaginal preparations do not provide significant bone protection.*

ANTIRESORPTIVE MEDICINES: BISPHOSPHONATES

Alendronate Sodium or Alendronate Sodium plus Vitamin D3 (Brand Name Fosamax®, Fosamax® Plus D, Binosto®)

Alendronate is approved for:

- Prevention and treatment of osteoporosis in postmenopausal women
- Treatment of osteoporosis in men
- Treatment of glucocorticoid-induced osteoporosis in men and women as a result of long-term use of steroid medicines (such as prednisone and cortisone)

Alendronate reduces bone loss, increases bone density and reduces the risk of spine and non-spine fractures including hip fractures.

For prevention, alendronate is taken daily as a 5 mg tablet or weekly as a 35 mg tablet. For treatment, it is taken daily as a 10 mg tablet, weekly as a 70 mg tablet (with or without vitamin D3) or weekly as a 70 mg effervescent tablet. The weekly dose with vitamin D3 contains either 2,800 IU or 5,600 IU of vitamin D3.

The alendronate tablet must be taken first thing in the morning after waking up and on an empty stomach. It is swallowed whole by itself (no other pills) with 6 to 8 ounces of plain water (no other liquid) at least 30 minutes before having anything to eat or drink. The Binosto® effervescent tablet must be dissolved in 4 ounces of plain water (no other liquid). You must remain upright (sitting, standing or walking) during this 30-minute period. This careful dosing is necessary to ensure that the alendronate is absorbed and to minimize the risk of irritation of the esophagus.

Alendronate with either 2,800 IU or 5,600 IU of vitamin D3 provides another option for a source of vitamin D. Weekly alendronate with 2,800 IU of vitamin D3 is the equivalent of taking 400 IU daily, while weekly alendronate with 5,600 IU of vitamin D3 is the equivalent of taking 800 IU daily. Vitamin D3 is also called cholecalciferol.

Ibandronate Sodium (Brand Name Boniva®)

Ibandronate is approved for the prevention and treatment of osteoporosis in postmenopausal women. Ibandronate reduces the incidence of spine fractures. For both prevention and treatment, ibandronate is taken once monthly as a 150 mg tablet. For treatment, it is also available as an intravenous (IV) injection of 3 mg given every three months. Although the FDA has approved a daily dose, it is not available in the U.S. Oral ibandronate should be taken once monthly, first thing in the morning after waking up and on an empty stomach. It needs to be swallowed whole with 6 to 8 ounces of plain water (no other liquid), at least 60 minutes before having anything to eat or drink. You must remain upright (sitting, standing or walking) during this 60-minute period.

A healthcare professional administers the IV dose in a doctor's office or other outpatient setting. You need to have blood tests before each dose including creatinine to confirm that kidney function is normal and calcium to confirm that the blood calcium level is normal.

Risedronate Sodium (Brand Name Actonel® and Atelvia®)

Risedronate is approved for:

- Prevention and treatment of osteoporosis in postmenopausal women
- Treatment of osteoporosis in men
- Prevention and treatment of glucocorticoid-induced osteoporosis in men and women as a result of long-term use of steroid medicines (such as prednisone and cortisone)

Risedronate slows bone loss, increases bone density and reduces the risk of spine and non-spine fractures, including hip fractures. For both prevention and treatment, risedronate is taken daily as a 5 mg tablet, weekly as a 35 mg tablet that is available with or without separate calcium carbonate tablets or monthly as a 150 mg tablet.

Risedronate (Actonel®) tablets needs to be taken first thing in the morning after waking up and on an empty stomach. It needs to be swallowed whole with 6 to 8 ounces of plain water (no other liquid), at least 30 minutes before having anything to eat or drink. You must remain upright (sitting, standing or walking) during this 30-minute period. For individuals taking risedronate with calcium, the calcium must be taken at a different time of day from the risedronate tablet and with a meal or snack.

The risedronate (Atelvia®) delayed-release tablet needs to be taken immediately after breakfast with at least 4 ounces of plain water (no other liquid). You must remain upright (sitting, standing or walking) for at least 30 minutes after taking Atelvia®.

Zoledronic Acid (Brand Name Reclast®)

Zoledronic acid is approved for:

- Treatment of osteoporosis in postmenopausal women
- Treatment to increase bone mass in men with osteoporosis
- Prevention and treatment of osteoporosis in men and women as a result of long-term use of steroid medications (such as prednisone and cortisone)

Zoledronic acid reduces bone loss, increases bone density and reduces fractures in the hip, spine and other bones. Studies show that zoledronic acid reduces the risk of new fractures in people who recently broke bones in the hip due to osteoporosis.

Zoledronic acid is given once a year as an intravenous (IV) infusion of 5 mg to treat osteoporosis or every two years as an IV infusion of 5 mg to prevent osteoporosis.

A healthcare professional gives zoledronic acid as an intravenous (IV) infusion in a doctor's office or other outpatient setting.

You need to have blood tests before each dose, including creatinine, to confirm that kidney function is normal and calcium to confirm that the blood calcium level is normal.

Possible Side Effects of Bisphosphonate Medicines

Side effects for all bisphosphonate medicines may include bone, joint or muscle pain. Side effects of oral tablets may include nausea, difficulty swallowing, heartburn, irritation of the esophagus and gastric ulcer. Shortly after receiving an IV bisphosphonate some patients have flu-like symptoms, fever, headache and pain in muscles or joints. These generally stop within two to three days and usually do not happen with future infusions.

In rare cases, inflammation of the eye (uveitis) may occur. There have also been reports of osteonecrosis (death of bone cells or tissue) of the jaw (ONJ) in patients taking bisphosphonates. The risk of ONJ in people taking bisphosphonates for osteoporosis appears to be very small for at least five years. ONJ is more common following high dose intravenous bisphosphonate treatments for cancer (such as Aredia® or Zometa®). You should practice good dental care and work closely with a doctor or dentist to reduce the risk of ONJ.

An unusual fracture of the upper femur (thigh bone) has been associated with bisphosphonates. Tell your healthcare provider if you have been taking bisphosphonates for several years or longer and have an unusual ache or pain in your thigh bone. Some people have a dull ache or pain in the thigh or groin area, sometimes for several weeks or longer, before having an unusual break in the thigh.

If you are taking oral bisphosphonate tablets, you should stop taking the drug and contact your healthcare provider immediately when experiencing chest pain, new or worsening heartburn or difficult or painful swallowing. It is important that you report these or other side effects to your healthcare provider. Bisphosphonates are not recommended for people with severe kidney disease or low blood calcium. People with certain problems of the esophagus may not be able to take the oral tablets.

ANTIRESORPTIVE MEDICINE: RANK LIGAND (RANKL) INHIBITOR/HUMAN MONOCLONAL ANTIBODY

Denosumab (Brand Name Prolia®)

Denosumab is approved for:

- Treatment of osteoporosis in postmenopausal women at high risk of breaking a bone. Being at high risk includes any of the following:
    - Women who have broken a bone due to osteoporosis or have multiple risk factors for breaking a bone
    - Women who cannot use other osteoporosis medicines or other osteoporosis medicines did not work well
- Treatment to increase bone mass in men at high risk of breaking a bone
- Treatment to increase bone mass in men taking androgen deprivation therapy to treat prostate cancer (such as Lupron® and Zoladex®)

- Treatment to increase bone mass in women taking aromatase inhibitors for breast cancer (such as Arimidex®, Aromasin® and Femara®) who are at high risk of breaking a bone
- Treatment of glucocorticoid-induced osteoporosis (GIOP) in men and women at high risk of fracture

Denosumab increases bone density and reduces the incidence of spine and non-spine fractures, including hip fractures. A healthcare professional gives denosumab by injection every six months.

Possible Side Effects of Denosumab Medicine

Denosumab may lower the calcium levels in the blood. If blood calcium levels are low before receiving denosumab, the low calcium level must be corrected before giving the medicine or it will get worse. You need to have a blood test after each dose to confirm that blood calcium level is not abnormally low. Signs of low calcium levels include spasms, twitches or cramps in the muscles or numbness and tingling in the fingers, toes or around the mouth. If any of these symptoms are seen while on this medicine, you should contact your healthcare provider. Most patients with low calcium levels, however, do not show these signs.

People who have weak immune systems or take other medicines that affect the immune system may have an increased chance of having serious infections with denosumab. Even patients who have no immune system problems may be at higher risk of certain infections such as those of the skin. You should contact your healthcare provider right away if signs of infection occur. These signs may include fever, chills, red and swollen skin, skin that is hot or sore to the touch, severe pains in the abdomen, pain or burning when passing urine or passing urine more frequently and in small amounts.

Denosumab may also cause skin rashes. Call your healthcare provider if you notice any abnormal skin-related symptoms. Any groin or thigh discomfort or pain should be reported to your healthcare provider as well as any unhealed dental lesions. You should practice good dental care during treatment and should have an examination of the mouth by a doctor or dentist before starting the medicine.

ONJ and unusual fractures of the upper femur (thigh bone) have been seen in patients taking denosumab (See “side effects of bisphosphonate medicines” above for additional details about ONJ and unusual femoral fractures).

ANTIRESORPTIVE MEDICINE: ESTROGEN (HORMONE THERAPY)

Menopausal hormone therapy (MHT) is approved for:

- Prevention of osteoporosis in postmenopausal women

MHT reduces bone loss, increases bone density in both the spine and hip and reduces the risk of hip, spine and other fractures in postmenopausal women. MHT also relieves menopausal symptoms.
MHT is commonly available as a tablet or skin (transdermal) patch and in other forms and in a wide variety of doses.

Possible Side Effects of Estrogen Medicines

When estrogen is taken alone, it can increase a woman's risk of developing cancer of the uterine lining (endometrial cancer). To reduce this risk, physicians prescribe the hormone progesterone in combination with estrogen (hormone therapy or HT) for those women who have a uterus. Estrogen therapy (ET) is prescribed for women who have had hysterectomies. Side effects may include vaginal bleeding in women with a uterus on HT, breast tenderness and gallbladder disease.

The Woman's Health Initiative (WHI) study confirmed that one type of HT, Prempro® (given to women who on average were more than ten years past menopause), reduced the risk of hip and other fractures, as well as colon cancer. However, it was associated with a slight increase in the risk of breast cancer, strokes, heart attacks, venous blood clots and cognitive (mental) decline. Although ET was associated with a similar increase in the risk of strokes, venous blood clots and cognitive decline, it did not increase the risk of breast cancer or heart attacks.

Women who have early menopause or their ovaries removed in their 30s or early 40s may benefit from low dose MHT. The results of the WHI study do not apply to women in this age group. Women who have had breast cancer or have a high risk for breast cancer should not consider MHT.

Important: According to the FDA, postmenopausal women should consider other osteoporosis medicines before taking MHT to prevent osteoporosis. Because estrogen use has risks, women should discuss with their healthcare providers whether the benefits outweigh the risks. Women who decide to take MHT should take the lowest possible dose for the shortest period of time to control menopausal symptoms and achieve desired goals. When MHT treatment is stopped, bone loss can be rapid and other medicines should be considered to maintain the increase in bone density.

ANTIRESORPTIVE MEDICINE: ESTROGEN AGONISTS/ANTAGONISTS (ALSO CALLED SELECTIVE ESTROGEN RECEPTOR MODULATORS OR SERMS)

Raloxifene (Brand name Evista®)

Raloxifene is approved for:

- Prevention and treatment of osteoporosis in postmenopausal women
- Reduction in risk of invasive breast cancer in postmenopausal women with osteoporosis
- Reduction in risk of invasive breast cancer in postmenopausal women at high risk for invasive breast cancer

Raloxifene reduces the risk of spine fractures. There are no data showing that raloxifene reduces the risk of hip and other non-spine fractures. It is in a class of drugs called estrogen agonists/antagonists that have been developed to provide the beneficial effects of estrogens without the potential disadvantages. It is neither an estrogen nor a hormone. For both prevention and treatment, raloxifene is taken daily as a 60 mg tablet with or without meals.

Possible Side Effects of Raloxifene Medicine

Side effects include hot flashes, leg cramps and an increased risk of deep vein thrombosis (blood clots). Other side effects include swelling and temporary flu-like symptoms. Raloxifene is not associated with diseases of the uterus or ovaries and does not affect cognitive (mental) function.

Raloxifene should not be taken by women at increased risk for stroke. This includes women who have had previous strokes, transient ischemic attacks (TIAs), atrial fibrillation (a type of serious irregular heart beat) or uncontrolled hypertension (high blood pressure).

ANTIRESORPTIVE MEDICINE: TISSUE SPECIFIC ESTROGEN COMPLEX (TSEC)

Conjugated Estrogens/Bazodoxifene (Brand name Duavee®)

Conjugated Estrogens/Bazodoxifene is approved for:

- Treatment for women who suffer from moderate-to-severe hot flashes associated with menopause
- Prevention of postmenopausal osteoporosis

The medicine combines conjugated estrogens with bazedoxifene, an estrogen agonist/antagonist. In women who were between 1- and 5-years post-menopause, use of this combination medicine increased the average spine bone mineral density at 12 months when compared to those who did not take the drug. Hip bone mineral density was also increased at 12 months when compared to those who did not take the drug.

Each daily tablet contains 0.45 mg of conjugated estrogens and 20 mg of bazedoxifene and can be taken without regard to meals.

Conjugated estrogens/bazedoxifene should be used only by postmenopausal women who still have a uterus. The bazedoxifene in this medicine reduces the risk of excessive growth of the lining of the uterus that can occur with the estrogen component. Because of this, women who take this drug do not need to take a progestin.

When used 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. Also, you should take this medicine for the shortest time possible and only for as long as treatment is needed.

Possible Side Effects of Conjugated Estrogens/Bazodoxifene Medicine

Because it contains estrogen, the same precautions and warnings for estrogen apply to conjugated estrogens/bazedoxifene. Women who cannot take estrogen or hormone therapy should not take conjugated estrogens/bazedoxifene. Side effects may include muscle spasms, nausea, pain and dizziness.

ANABOLIC MEDICINE: RECOMBINANT HUMAN PARATHYROID HORMONE ANALOG, RHPTH (1-34)

Teriparatide (Brand name Bonsity® and Forteo®)

Teriparatide is approved for:

- Treatment of osteoporosis in postmenopausal women and in men who are at high risk of breaking a bone
- Treatment of osteoporosis in men and women as a result of long-term use of steroid medications who are at high risk of breaking a bone

Teriparatide, a type of parathyroid hormone, rebuilds bone and significantly increases bone mineral density. Teriparatide reduces the risk of spine and non-spine fractures.

Teriparatide is self-administered as a daily injection under the skin from a pre-loaded pen that contains a four-week supply of medicine. It can be taken for a maximum of two years. After stopping teriparatide, bone loss can be rapid. To retain the benefits of treatment with teriparatide, most experts recommend that you start an antiresorptive medicine right after finishing the teriparatide therapy.

Possible Side Effects of Teriparatide Medicine

Side effects can include leg cramps, nausea and dizziness. Modest elevations in serum and urine calcium can occur, but there is no documented increase in the risk of kidney stones.

In animal studies performed in immature rats, very high doses of teriparatide that were given for a long period of time increased the incidence of osteosarcoma, a type of bone cancer. Although common in rats, this type of tumor is extremely rare in adult humans. In the experience with teriparatide in humans, there has been no evidence to date of an increased risk of osteosarcoma.

People with certain conditions should not take this medicine. This includes people with Paget's disease of the bone, children with growing bone, persons with unexplained alkaline phosphatase elevations (alkaline phosphatase is a specific blood test) and those who have had radiation treatment involving the skeleton. It also should not be given to people with metabolic bone diseases such as hyperparathyroidism and those with cancer that has spread to the bone. Also, people who have certain abnormal blood tests, including increased calcium levels, should not take this medicine.

ANABOLIC MEDICINE: HUMAN PARATHYROID HORMONE RELATED PROTEIN ANALOG, PTHRP (1-34)

Abaloparatide (Brand Name Tymlos®)

Abaloparatide is approved for:

- Treatment of osteoporosis
- Treatment of men and postmenopausal women with osteoporosis at high risk for fracture defined as:
    - History of osteoporotic fracture
    - Multiple risk factors for fracture
    - Patients who have failed or are intolerant to other available osteoporosis therapy

Abaloparatide is supplied as an injection for subcutaneous injection in a single-patient-use prefilled pen. Cumulative use of abaloparatide for more than 2 years during your lifetime is not recommended. You should receive supplemental calcium and vitamin D if dietary intake is inadequate.

Possible Side Effects of Abaloparatide Medicine

Adverse effects associated with the use of abaloparatide may include, but are not limited to, the following: hypercalciuria, dizziness, nausea, headache, palpitations, fatigue, upper abdominal pain, vertigo.

Abaloparatide caused a dose-dependent increase in the incidence of osteosarcoma, a malignant bone tumor, in male and female rats. It is unknown whether abaloparatide will cause osteosarcoma in humans. Use of abaloparatide is not recommended if you are at increased risk for osteosarcoma.

ANABOLIC MEDICINE: SCLEROSTIN INHIBITOR

Romosozumab-aqqg (Brand Name Evenity®)

Romosozumab-aqqg is approved for:

- Treatment of osteoporosis in postmenopausal women at high risk for fracture defined as:
    - History of osteoporotic fracture
    - Multiple risk factors for fracture
    - Patients who have failed or are intolerant to other available osteoporosis therapy

Romosozumab-aqqg is a humanized monoclonal antibody (IgG2) produced in a mammalian cell line by recombinant DNA technology that binds to and inhibits sclerostin.

Romosozumab-aqqg should be administered by a healthcare provider. Two separate subcutaneous injections, injected one after the other, are needed to administer the total dose of 210 mg. Injections should be administered once every month for 12 doses in the abdomen, thigh or upper arm.

The anabolic effect of Romosozumab-aqqg wanes after 12 monthly doses of therapy; therefore, you should limit use to 12 monthly doses. If osteoporosis therapy remains warranted, you should consider continued therapy with an anti-resorptive agent.

Possible Side Effects of Romosozumab-aqqg Medicine

Romosozumab-aqqg has a Boxed Warning in its product label, which advises that it may increase the risk of myocardial infarction (heart attack), stroke and cardiovascular death. Romosozumab-aqqg should not be initiated if you have had a heart attack or stroke within the preceding year. You and your healthcare provider should consider whether the benefits outweigh the risks if you have experienced other cardiovascular risk factors. If you experience a heart attack or stroke during therapy, it should be discontinued.

The most common adverse reactions reported with romosozumab-aqqg in clinical trials were arthralgia (joint pain) and headache. Hypersensitivity reactions (including angioedema, erythema multiforme, dermatitis, rash and urticaria) may also occur. Call your healthcare provider if you notice any abnormal skin-related symptoms.

ONJ and unusual fractures of the upper femur (thigh bone) may also occur while taking romosozumab-aqqg. Any groin or thigh discomfort or pain should be reported to your healthcare provider as well as any unhealed dental lesions. You should practice good dental care during treatment and should have an examination of the mouth by a doctor or dentist before starting the medicine.

RESPONSE TO TREATMENT WITH OSTEOPOROSIS MEDICINES

All these drugs reduce the likelihood of having fractures. They come in a range of formulations, from daily tablets to yearly intravenous infusions. There is no best medication for everyone. The one that works for you depends on many factors, including health history and preferences. Discuss the benefits and risks of these medicines with your healthcare provider.

Weighing Risks and Benefits of Anti-Fracture Medications

Rare side effects of antiresorptive drugs, namely bisphosphonates and denosumab, include atypical femur fracture (AFF) and osteonecrosis of the jaw (ONJ). AFF is a sudden thigh bone fracture, and ONJ is a nonhealing area in the jawbone. ONJ is seen almost always in people being treated for cancer with high

doses of these medications, frequently following oral surgery. Good dental care is a reasonable precaution for anyone taking antiresorptive medication for osteoporosis.

At the doses used for treatment of osteoporosis, AFF and ONJ are very rare. On the other hand, fragility fractures from untreated osteoporosis are very common. Out of 1,000 women, 500 will suffer a fracture during their lifetime unless they get treatment for osteoporosis. When treated appropriately, the benefits of osteoporosis medications outweigh the risks.

Monitoring Treatment and Length of Treatment

Bone density test should be repeated every two years to monitor the effectiveness of treatment with an osteoporosis medicine. You may need to repeat a bone density test after one year. Some healthcare providers may also perform lab tests called biochemical markers of bone turnover tests to learn more about your response to a medicine.

Teriparatide, abaloparatide and romosozumab-aqqg are the only drugs for osteoporosis that have a defined treatment length. The FDA recommends that treatment be limited to no more than two years for teriparatide and abaloparatide. Romosozumab-aqqg treatment should last 12 months. There is a great deal of variability in terms of ideal treatment duration for other medications.

Some drugs, like raloxifene and denosumab, leave the body quickly. Their effects generally disappear after you stop taking them. Some drugs, like bisphosphonates, stay in your bones after you stop taking them – some longer (alendronate, zoledronic acid) than others (risedronate, ibandronate). They may continue to work and offer protection even after you stop taking them. The most effective regimen and duration depends on the individual drug, the individual patient and the level of fracture risk.

What Is a Bisphosphonate Holiday?

There is no time limit for taking a bisphosphonate. However, when you respond well to bisphosphonate therapy, many healthcare providers will consider a “bisphosphonate holiday” during which you temporarily stop taking pills or extends the interval between injections of the bisphosphonate. The rationale for doing this is that the benefit of treatment may persist for a year or longer due to bisphosphonate that remains in the skeleton, and the risk of rare possible side effects, such as AFF, may be reduced. Many healthcare providers consider a bisphosphonate drug holiday after five years of treatment if bone density is stable and no fractures have occurred. The length of a bisphosphonate holiday varies, but it is commonly one to two years with a bisphosphonate pill and two or more years with IV zoledronic acid. Since the benefits of the bisphosphonate will eventually go away and the risk of fractures will rise, bisphosphonate holidays must be closely monitored so that treatment can be restarted when needed.

A “holiday” is not possible with non-bisphosphonate medications, because these medicines are not stored in the bones and the effects rapidly disappear when the drug is stopped. If you stop a non-bisphosphonate drug, then another drug should be started in its place.

Treatment Adherence

Like any medication, osteoporosis drugs only work if they are taken exactly as prescribed. With many health conditions, remembering to take your medicine is easy because when you do not, you feel bad or some other obvious problem results. This is not the case with osteoporosis. When you take osteoporosis medicine, you cannot feel your bones getting stronger.

Thus, it is important to take your medicine and take it consistently. If you have any trouble following your treatment plan or if you have concerns about side effects, talk to your healthcare provider who can help you find something that works for you.

ADVERSE EVENTS AND DRUG COMPANY INFORMATION

When you have a serious reaction or problem with a drug, either you or your healthcare provider should report the problem to the FDA. You can do this by calling (800) 332-1088 or completing an online report at www.fda.gov/medwatch. You can also notify the pharmaceutical manufacturer. The information below provides the phone numbers of the pharmaceutical manufacturers and the date each medicine was approved by the FDA as an osteoporosis medicine.

Companies that Make Osteoporosis Medicines**

Abaloparatide
(Tymlos®)
Radius Health, (855) 672-3487
FDA Approval: 2017

Alendronate
(Fosamax®, Fosamax® Plus D, Binosto®)
Merck, (800) 444-2080
FDA Approval: 1995
Generic versions available

Denosumab
(Prolia®)
Amgen, (800) 772-6436
FDA Approval: 2010

Estrogen (ET) and Hormone Therapy (HT)
Multiple brand names are available
FDA Approval: 1997
Generic versions available

Estrogen/Bazodoxifene
(Duavee®)
Pfizer, (800) 438-1985
FDA Approval: 2013

Ibandronate
(Boniva®)
Roche, (800) 526-6367
FDA Approval: 2005 for Monthly Oral Dose and 2006 for Quarterly IV Dose
Generic versions available (oral only)

Raloxifene
(Evista®)
Eli Lilly, (800) 545-5979
FDA Approval: 1997
Generic version available

Risedronate
(Actonel®, Atelvia®)
Allergan, (800) 678-1605 (Atelvia)
FDA Approval: 2000
Generic versions available

Romosozumab-aqqg
(Evenity®)
Amgen, (800) 772-6436
FDA Approval: 2019

Teriparatide
(Bonsity®, Forteo®)
Pfenex, (833) 266-7489 (Bonsity®)
Eli Lilly, (800) 545-5979 (Forteo®)
FDA Approval: 2002

Zoledronic Acid
(Reclast®)
Novartis, (888) 669-6682
FDA Approval: 2007
Generic versions available

***Accurate as of June 2023.*

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