No Bones About it – Osteoporosis –
The Pharmacist’s Role

Brooke Fidler, PharmD

Live Activity Handout

4 slides per page
No Bones About it – Osteoporosis – The Pharmacist’s Role

ACTIVITY DESCRIPTION
No bones about it – The National Osteoporosis Foundation (NOF) has estimated that eight million women already have osteoporosis, and another approximately 44 million may have low bone mass placing them at increased risk for osteoporosis. Moreover, an estimated two million osteoporotic fractures occur every year in the United States; by 2025 that number may reach three million. Osteoporosis sneaks up on most people. Often referred to as a “silent” disease, many patients never learn they have osteoporosis until they suffer a fracture. This knowledge-based activity will educate pharmacists on the diagnosis and treatment of osteoporosis, as well as the importance of counseling patients to adhere to lifestyle modifications and treatment.

TARGET AUDIENCE
The target audience for this activity is pharmacists, pharmacy technicians, and nurses in hospital, community, and retail pharmacy settings.

LEARNING OBJECTIVES
After completing this activity, the pharmacist will be able to:
• Outline the incidence, prevalence and burden of osteoporosis
• Describe the risk factors, screening methods, and current treatment options for patients with osteoporosis to include those at high risk for fracture
• Review the pharmacist’s role in treating osteoporosis patients to include non-pharmacological therapy, patient and care giver educations and improving patient adherence to treatment

After completing this activity, the pharmacy technician will be able to:
• Identify the risk factors for osteoporosis
• List the treatment options for patients with osteoporosis, including those at high risk of fracture
• Identify opportunities to refer patients to the pharmacist when patient education is needed including non-pharmacological therapy and medication adherence

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Radius Health, Inc

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ABOUT THE AUTHOR
Dr. Brooke Fidler joined the faculty in 2000 as assistant professor of pharmacy practice. In 1999 Dr. Fidler completed a Pharm.D. at the University of Rhode Island and went on to complete a PGY-1 residency at URI the following year. Currently Dr. Fidler’s practice site is Kings Specialty Pharmacy where she precepts APPE students completing their MTM elective experience. At Kings Pharmacy Dr. Fidler is also the residency director for the PGY-1 Community Residency. Dr. Fidler’s primary didactic responsibilities including teaching and coordinating the physical assessment course at the college. Dr. Fidler has published in Pharmacy and Therapeutics Journal and Journal of Nurse Practitioners. She has also presented numerous webinars for Drug Store News and FreeCE related to community practice and nonprescription medications.

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Learning Objectives

• Outline the incidence, prevalence, and burden of osteoporosis.
• Describe the risk factors, screening methods, and current treatment options for patients with osteoporosis to include those at high risk for fracture.
• Review the pharmacist’s role in treating osteoporosis patients to include non-pharmacological therapy, patient and care giver education and improving patient adherence to treatment.

Definition of Osteoporosis

• A systemic skeletal muscle disease characterized by decreased bone mass and deterioration of bone tissue increasing the risk for bone fragility and fracture - American College of Physicians
• A bone thinning disease that causes bone to become thin and weak and increases the risk of breaking a bone - NYS Osteoporosis Prevention and Education Program
• Porous bone in which the density and quality of bone are reduced increasing the risk of fracture - International Osteoporosis Foundation
• A bone disease that occurs when the body loses too much bone, makes too little bone, or both resulting in bones that are weak and may break - National Osteoporosis Foundation
Osteoporosis Statistics

• Osteoporosis is estimated to impact 200 million people worldwide
• 54 million Americans have osteoporosis and low bone mass
• Worldwide an estimated 8.9 million fractures annually
• Approximately 1 in 2 women and 1 in 4 men ≥50 years old will have a fracture due to osteoporosis
• By 2025 the economic impact of osteoporosis is expected to be $25.3 billion per year
• In women >45 years old osteoporosis accounts for more days spent in the hospital compared to other disease
• 20% of elderly who break a hip require long-term nursing care and have an increase in mortality within one year of injury

What is Osteoporosis?

• Cells of the bone
  • Bone forming cells called osteoblasts and osteocytes
  • Bone resorbing cells called osteoclasts
• Normal bone remodeling helps to maintain a healthy skeleton
• Removal of bone must be balanced by deposition of new bone to preserve bone strength
• Excessive resorption can lead to weaken bone (i.e., osteopenia) or brittle bones prone to fracture (i.e., osteoporosis)
• Primary or Type 1 (i.e., menopause, aging) vs secondary or Type II (i.e., medications, disease states)

Bone Mineral Density

• Bone mineral density (BMD) or bone mineral mass is a measurement of the amount of minerals (i.e., calcium and phosphorus) contained within a bone (grams of mineral per area or volume)
• Peak bone mass is reached at the age of 30 where there is a balance between bone remodeling and bone formation
• After the age of 30 the rate of bone loss increases and the rate of bone formation decreases

Excessive Bone Remodeling
Risk Factors for Osteoporosis

**Fixed Risk Factors**
- Advanced age
- Female gender
- Family history
- Ethnicity
- Genetics
- Menopause
- Disease states (i.e., RA)
- Medications (i.e., glucocorticoids)

**Modifiable Risk Factors**
- Alcohol
- Smoking
- Low BMI
- Poor nutrition
- Low calcium intake
- Vitamin D deficiency
- Physical inactivity

Risk Factors for Falls

- Age
- Environmental factors (i.e., throw rugs, lack of assistive devices)
- Medical conditions (i.e., cardiovascular, neurological)
- Medications causing sedation or orthostasis

Menopause and Primary Osteoporosis

- The rate of bone loss accelerates at 2-3 years before the last menses and accelerations ends 3-4 years after menopause
- Around the time of menopause women lose an average of 2% of bone annually
- Women who go through menopause ≤40 years of age are at greater risk for low BMD
- Direct link between increase bone resorption and decrease in estrogen production
- Estrogen works to stimulate osteoclasts and as estrogen production declines the rate of bone loss increases

Glucocorticoids and Secondary Osteoporosis

- Mechanism of glucocorticoid induced osteoporosis
  - Cell death of osteoblasts and interferes with bone mineralization
  - Stimulates enzymes involved in bone degradation
  - Less bone tissue being produced in the bone remodeling cycle
  - Stimulates production of RANKL which increases the activity of osteoclasts
- 10% bone loss in the first year and then 2-5% thereafter
- Doses as low as 2.5mg or as high as 10mg have also shown decrease BMD and increase fracture rates
- According to the WHO Fracture Risk Assessment Model long-term steroid use is defined as oral prednisone ≥5mg/day for > 3 months
Physical Exam

• Often referred to as the silent disease
• Signs of fracture, breaking of bones or joint pain
• Loss of height and kyphosis
• Balance issues
• Less physical activity
• Evaluate risk of falls and of secondary osteoporosis
• Examination, detailed history, BMD testing and FRAX score

Diagnosis

• BMD testing when there is an occurrence of hip or vertebral fractures in the absence of major trauma
• Lab testing to rule out secondary causes
• BMD measured by DXA or DEXA (dual energy X-ray absorptiometry)
• X-ray to measure the bone density in the hip, spine and wrist which are the most common areas of fracture
• DXA is considered the gold standard test for diagnosing patients without a fracture

BMD Testing Recommendations

• 2014 National Osteoporosis Foundation (NOF)
  • >65 years of age in women and >70 years of age in men regardless of risk factors; younger postmenopausal women and men 50-69 with risk factors; adults with a fracture at ≥50; adults with conditions or medications associated with bone loss (i.e., RA, steroids); loss of height; x-ray showing a break
• 2010 North American Menopause Society (NAMS)
  • ≥65 years of age regardless of risk factors; postmenopausal women regardless of age; postmenopausal women ≥50 years of age with risk factors*; postmenopausal women with a fracture
• Repeat BMD testing in treated women not necessary for 1-2 years and 2-5 years in untreated postmenopausal women

BMD Testing

• 2015 US Preventive Services Task Force (USPSTF)
  • ≥65 years of age for all women; <65 if risk is equal to or greater than a 65 year old with no risk factors; insufficient evidence to make recommendations for men
• 2017 American College of Rheumatology* (ACR)
  • Adults <40 years of age with a history of fracture or other risk factors and repeat testing every 2-3 years whether or not being treated for osteoporosis
  • Adults ≥40 years of age within 6 months of glucocorticoid treatment and every 2-3 years thereafter
  • Adults ≥40 years of age never treated for steroid induced osteoporosis should be tested every 1-3 years

*Fracture, <127lbs or BMI <21, family history of hip fracture, smoker, RA, more than 2 units of alcohol/day

*2017 ACR Guideline for the Prevention and Treatment of Glucocorticoid-Induced Osteoporosis
BMD Test Results

- Aids in the diagnosis of normal bone mass, low bone mass (i.e. osteopenia) and osteoporosis
- T-score
  - Compares your bone density to the average bone density of a healthy adult of your same gender
- Z-score
  - Compares your bone density to the average bone density of a healthy adult of your same gender and age
  - Helpful in diagnosing secondary osteoporosis and is used for children, women who are premenopausal and men under age 50
  - -2 or above is considered normal

WHO Criteria for Classification of Osteopenia and Osteoporosis

<table>
<thead>
<tr>
<th>Category</th>
<th>T-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>-1.0 or above</td>
</tr>
<tr>
<td>Low bone mass (osteopenia)</td>
<td>Between -1.0 and -2.5</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>-2.5 or below</td>
</tr>
</tbody>
</table>

Other Testing

- BMD testing should be done of the total hip, femoral neck and the lower spine
- Peripheral sites such as the finger, tibia or heel can identify those at risk but not useful for diagnosis
- Peripheral sites may be useful for prescreening for DXA scan
- Bone turnover markers from osteoclasts or osteoblasts may be found in urine or blood but not used for diagnostic purposes
- Various laboratory testing for secondary causes of osteoporosis
- FRAX® risk assessment tool

FRAX® Tool

- Current age (accepts ages 40-90)
- Gender
- Ethnicity (US models only: white, black, Hispanic and Asian)
- BMI
- Prior osteoporotic fracture
- Femoral neck BMD
- Oral glucocorticoids (>5 mg/d of prednisone > 3 months, current or past)
- Rheumatoid arthritis
- Secondary cause of osteoporosis
- Parental history of hip fracture
- Current smoker
- Alcohol intake (>3 drinks/day)
T-Score and Treatment Guideline for Postmenopausal Women and Men ≥50 Years of Age

<table>
<thead>
<tr>
<th>Category</th>
<th>T-Score</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Normal</td>
<td>-1.0 or above</td>
<td>Treatment not needed</td>
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<tr>
<td>Low bone mass (osteopenia)</td>
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<td>Treatment may be needed depending on 10-year risk based on FRAX tool**</td>
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<tr>
<td>Osteoporosis</td>
<td>-2.5 or below</td>
<td>Treatment recommended for spine, total hip or femoral neck (exclude secondary causes)</td>
</tr>
<tr>
<td>Documented hip or spinal fracture</td>
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<td>Treatment recommended</td>
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</tbody>
</table>

**10-year risk of ≥20% major osteoporotic fracture of the spine, hip, shoulder or wrist OR a hip fracture of at least ≥3%

Goals of Management

- Prevent fractures
- Improve bone strength
- Reduce the risk of falls
- Relieve symptoms of fractures and other skeletal deformities
- Maximize physical function
- Encourage lifestyle changes

Management

Nonpharmacological*
- Calcium/Vitamin D
- Nutrition
- Exercise
- Fall prevention
- Smoking cessation
- Decrease alcohol and caffeine

Pharmacological
- Bisphosphonates
- Calcitonin
- Estrogen
- Selective Estrogen Receptor Modulators (SERMs)
- Parathyroid agents
- RANK Ligand Inhibitor

*Patients with osteopenia should adhere to nonpharmacological management to avoid progression to osteoporosis

Calcium

- Important in developing peak bone mass and preventing bone loss
- Universal recommendation to all patients to reduce fracture risk

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<thead>
<tr>
<th>Age</th>
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<th>Female</th>
<th>Pregnant</th>
<th>Lactating</th>
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<tr>
<td>0-6 months*</td>
<td>200 mg</td>
<td>200 mg</td>
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<td>7-12 months*</td>
<td>260 mg</td>
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<td>1-3 years</td>
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<td>14-18 years</td>
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<td>19-50 years</td>
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<td>71+ years</td>
<td>1,200 mg</td>
<td>1,200 mg</td>
<td>1,200 mg</td>
<td>1,200 mg</td>
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</table>

NIH Calcium Recommendations
Calcium

- Take calcium with vitamin D to enhance absorption
- Calcium rich foods
  - Dairy products, dark green leafy vegetables, fish and calcium fortified foods and beverages
- Supplements
  - Calcium carbonate has 40% elemental calcium
  - Calcium citrate has 21% elemental calcium
- Counseling
  - No more than 500mg per dose for optimal absorption
  - Calcium carbonate should be taken with food
  - Calcium citrate preferred with elderly and those taking PPIs
  - Be aware of drug interactions

Vitamin D

- Vitamin D plays a major role in calcium absorption and bone health
- An estimated 40% of the US population is Vitamin D deficient
- Vitamin D sources include sunlight, foods and supplements
- Women and men <50 years of age 400-800 IU/day
- Women and men ≥50 years of age 800-1000 IU/day
- Upper limit of 4000 IU/day
- Nonprescription Vitamin D₃ and D₂ are available

Nutrition

- Encourage a balanced diet
- Avoid restrictive diets which could lead to low BMI and delay peak bone mass
- Adequate protein, magnesium and vitamin K
- Identify those at risk including chronic dieting, eating disorders and weight loss surgery

Exercise

- Increases bone mass and helps to develop and maintain bone
- Regular weight bearing exercise for 30-40 minutes most days of the week (3-4 days a week)
  - Light jogging, running, climbing stairs, walking
  - Light strength training
  - Yoga
  - Pilates
  - Avoid high impact activities
Fall Prevention

- Avoid throw rugs
- Use of nonskid mats or rugs
- Avoid clutter that can be tripped over
- Remove loose wires
- Use of assistive devices
- Well-lit hallways and rooms
- Sturdy shoes
- Handrails in halls or bathrooms
- Clear pathway throughout the home
- Hip protectors for those at high risk
- Minimize sedative medications (i.e., benzodiazepines, antidepressants, psychotropics)

Smoking, Alcohol and Caffeine

- **Smoking**
  - May impair calcium absorption, bone metabolism and lower estrogen levels
  - Studies show higher risk of smoker with osteoporotic fractures

- **Alcohol**
  - Increases fracture risk likely due to increase in falls or calcium deficiency
  - No more than 7 drinks/week with 1 drink equivalent to 4oz of wine, 1oz of liquor or 12oz of beer

- **Caffeine**
  - Increase in urinary excretion of calcium
  - Limit intake to 1-2 servings a day with 8-12oz in each serving

Bisphosphonates

- Work by inhibiting osteoclast activity and lifespan reducing overall bone resorption
- Currently 7 FDA approved brand name products for the management of osteoporosis with 4 active ingredients
- Dosing is based on specific indications
- Available as various formulations and dosing frequencies
- Percent reduction of spine and hip fractures with or without previous fracture varies among products
  - Entire class has shown evidence to reduce the risk of new vertebral fractures by 40-70%
  - Alendronate, risendronate and zoledronic acid have shown to reduce vertebral, nonvertebral and hip fractures
  - Majority of studies evaluated their use for 5 years but optimal duration is unknown

Bisphosphonates Approval Dates

- 1996: Fosamax® (alendronate)
- 1998: Actonel® (risendronate)
- 2005: Boniva® (ibandronate)
- 2011: Reclast® (zoledronic acid)
- 2012: Binosto® (alendronate sodium)
- 2008: Generic Fosamax® (alendronate)
- 2012: Generic Boniva® (ibandronate)
- 2013: Generic Reclast® (zoledronic acid)
- 2014: Generic Actonel® (risendronate)
### Ingredients

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<th>Form</th>
<th>Frequency</th>
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<tr>
<td>Alendronate</td>
<td>Fosamax®, Fosamax Plus D®</td>
<td>Oral tablet</td>
<td>Daily/Weekly</td>
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<td>Alendronate</td>
<td>Binosto®</td>
<td>Effervescent tablet</td>
<td>Weekly</td>
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<td>Ibandronate</td>
<td>Boniva®</td>
<td>Oral tablet</td>
<td>Monthly</td>
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<td>Actonel®</td>
<td>Oral tablet</td>
<td>Daily/Weekly/Monthly</td>
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<td>Risedronate</td>
<td>Atelvia™</td>
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<tr>
<td>Zoledronic Acid</td>
<td>Reclast®</td>
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<td>Once a year/Once every 2 years</td>
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<tr>
<td>Ibandronate</td>
<td>Boniva®</td>
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</tr>
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</table>

### Prevention

<table>
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<th>Brand Name</th>
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<th>Treatment</th>
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<th>Man</th>
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### Bisphosphonates

- When given orally must be taken first thing in the morning 30-60 minutes before any food/drink/medications (depending on bisphosphonate) with an 8oz full glass of water and must remain upright for 30-60 minutes
- Contraindicated in patients with esophageal abnormalities, patients who cannot sit upright for 30-60 minutes after ingestion or CrCl <30 ml/min
- Caution in hypocalcemia
- Known for upper GI adverse events (po) and headache, myalgia and fever (IV)

- Routine dental care is recommended due to rare risk of osteonecrosis of the jaw with long term therapy
- FDA Drug Safety Communication in March 2010 to make patients and health care professionals aware of the possible risk of atypical fractures in the bone just below the hip joint with oral formulation
  - Continue to follow label directions
  - New hip or thigh pain should be reported to providers
  - Report any adverse drug events to MedWatch
Calcitonin (Miacalcin®)

- Available since 1975
- Treatment of postmenopausal osteoporosis in women who are at least 5 years beyond menopause
- Administered as one spray (220IU) in one nostril daily
- Inhibitor of bone resorption by inhibiting osteoclasts; may increase osteoblasts and helps regulate calcium
- Shown to reduce the risk of new vertebral fractures in women with postmenopausal osteoporosis
- Does not increase BMD at sites other than the spine
- Use beyond 5 years is unknown with bone loss restarting 1-2 years after discontinuation
- Common side effects include rhinitis, nasal irritation and nose bleeds

Estrogen

- Exogenous estrogen inhibits bone resorption and induces osteoclast death
- Primary indication is for treatment of moderate to severe menopause symptoms but also indicated for the prevention of osteoporosis
- “When prescribing solely for the prevention of postmenopausal osteoporosis, therapy should only be considered for women at significant risk of osteoporosis and for whom non-estrogen medications are not considered to be appropriate”
- Women with an intact uterus must use a combination of estrogen plus progestin (EPT) to reduce risk of endometrial cancer
- Administered by oral or transdermal routes
- Studies have shown benefits for hip, vertebral and total fractures vs placebo
- Optimal dose for fracture benefits is unknown and bone loss appears to be rapid upon discontinuation

Estrogen

- In 2003 the Women’s Health Initiative found that EPT given to women 50-79 years of age was associated with increase risk of breast cancer, stroke and thromboembolic events
- Women without a uterus given estrogen alone had an increase risk of stroke and DVT
- Use at the lowest dosage for the shortest duration although these doses have not be studied in fracture efficacy
- According to the FDA approved nonestrogen therapies should be considered first line

Selective Estrogen-Receptor Modulator (SERMs)

- Selective estrogen-receptor modulators (SERMs) work as an estrogen agonist in the bone to decrease bone resorption and estrogen antagonist in the breast and uterine tissue
- Raloxifene (Evista®) and conjugated estrogen/bazedoxifene (Duavee®)
- Raloxifene (1997)
  - Approved for the prevention and treatment of postmenopausal osteoporosis as 60mg daily
  - Reduces the risk of vertebral fracture in patients with and without prior vertebral fracture
  - Reduction in the risk of nonvertebral fracture is unknown
  - Increases the risk of DVT, hot flashes and leg cramps
  - Baseline cardiovascular evaluation is recommended prior to choosing therapy
Selective Estrogen-Receptor Modulator (SERMs)

- Selective estrogen-receptor modulators (SERMs) work as an estrogen agonist in the bone to decrease bone resorption and estrogen antagonist in the breast and uterine tissue
  - Raloxifene (Evista®) and Conjugated estrogen/bazedoxifene (Duavee®)
  - Conjugated estrogen/bazedoxifene (2013)
  - 1 tablet (0.45mg/20mg) daily for the prevention of postmenopausal osteoporosis
  - Indicated only for postmenopausal women who still have a uterus
  - Studies showed an increase in lumbar spine and total hip BMD who were postmenopausal 1-5 years
  - Same warnings as with other estrogen products
  - Similar side effect profile to raloxifene

Parathyroid (PTH) Analogs

- Teriparatide (Forteo®) and Abaloparatide (Tymlos®) are both daily injectables
  - PTH regulated the amount of calcium absorbed from diet, how much calcium is released into the urine by the kidneys and how much calcium is stored in bones
    - Hyperparathyroidism can lead to increase release of bone calcium into the blood
  - PTH analogs work to stimulate bone formation by stimulating osteoblast activity
  - Abaloparatide is a synthetic analog of human PTH

Parathyroid (PTH) Analogs

- Teriparatide- Forteo® (2009)
  - 20mcg SQ daily for no more than 2 years
  - Shown to reduce spinal fractures only
  - Postmenopausal women with osteoporosis; men/women with steroid-induced osteoporosis; men with primary or hypogonadal osteoporosis
  - BBW for osteoscarcoma

- Abaloparatide- Tymlos® (2017)
  - 80mcg SQ daily for no more than 2 years
  - Reduces the risk of vertebral and nonvertebral fractures
  - Treatment of postmenopausal women with osteoporosis
  - BBW for osteoscarcoma
RANK Ligand Inhibitor [Denosumab (Prolia®)]

- Receptor activator of nuclear factor kappa-B ligand (RANKL) is a tumor necrosis factor expressed on the surface of osteoclasts
- RANKL inhibitors prevents RANKL from activating its receptor, RANK, on the surface of osteoclasts as well as their precursors
- Denosumab inhibits osteoclast formation, decreases bone resorption and increases bone mass and strength
- Indicated for the treatment of postmenopausal women with osteoporosis and in men with osteoporosis at high risk for fracture (2010)
- Also indicated to increase bone mass in men at high risk for fracture receiving androgen deprivation therapy for nonmetastatic prostate cancer and in women receiving adjuvant aromatase inhibitor therapy for breast cancer

RANK Ligand Inhibitor [Denosumab (Prolia®)]

- Studies have shown increased BMD of the spine, nonvertebral sites and hip during a 3 year time frame
- Efficacy and safety beyond 6 years is not established
- Administered by a healthcare professional as 60 mg every 6 months as a subcutaneous injection
- Patients are instructed to take calcium 1000 mg daily and at least 400 IU vitamin D daily with their therapy
- Contraindicated in hypocalcemia
- Adverse effects include musculoskeletal pain, back pain and skin reactions

Summary of Fracture Risk Reduction Evidence*

<table>
<thead>
<tr>
<th>Drug</th>
<th>Vertebral</th>
<th>Nonvertebral</th>
<th>Hip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alendronate</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Risedronate</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ibandronate</td>
<td>Yes</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Zoledronic acid</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Calcitonin</td>
<td>Yes</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Raloxifene</td>
<td>Yes</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>Teriparatide</td>
<td>Yes</td>
<td>Yes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Abaloparatide</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Denosumab</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Estrogen and Duavee* are only indicated if a patient is not a candidate for nonestrogen therapies

Treatment of Postmenopausal Osteoporosis*

- No prior fractures or moderate risk fracture
  - First line: Alendronate, denosumab, risedronate, zoledronic acid
  - Alternate: Ibandronate, raloxifene
  - Reassess yearly
  - Consider drug holiday after 5 years of oral bisphosphonate and 3 years of IV bisphosphonate therapy if stable BMD and no fractures
  - If progression to bone loss or fractures switch to injectable antiresorptive agent or teriparatide”

*2016 AACE/ACE Guidelines

**Abaloparatide is not noted in the guidelines as its approval was 2017 but is another PTH analog option
Treatment of Postmenopausal Osteoporosis*

- Prior fracture or higher risk fracture
  - First line: Denosumab, teriparatide**, zoledronic acid
  - Alternate: Alendronate, risedronate
  - Reassess yearly
  - If further progression or fractures
    - If on denosumab consider adding teriparatide or continuing therapy
    - If on teriparatide for up to 2 years start therapy with oral or IV antiresorptive agent
    - If on zoledronic acid and stable continue for 6 years and if progressive bone loss consider a switch to teriparatide

*Treatment of Postmenopausal Osteoporosis* is based on 2016 AACE/ACE Guidelines.

**Abaloparatide is not noted in the guidelines as its approval was 2017 but is another PTH analog option.

Treatment of Glucocorticoid-Induced Osteoporosis*

- All adults taking prednisone ≥2.5mg/day for ≥3 months should optimize calcium and vitamin D intake and lifestyle modifications
- Adults ≥40 at moderate-high risk of fracture treat with oral bisphosphonate
  - Other suggested therapies in order of preference include IV bisphosphonate, teriparatide, denosumab and raloxifene (for postmenopausal women only ≥40)
- Adults <40 at low-moderate-high risk of fracture should treat with oral bisphosphonate as first-line and teriparatide as second-line
  - Other suggested therapies in order of preference include IV bisphosphonate and denosumab

*Treatment of Glucocorticoid-Induced Osteoporosis* is based on 2017 ACR Recommendations.

Medication Adherence

- Poor adherence leads to reduced effectiveness, increased morbidity and mortality and increased medical costs
- “Silent” diseases may lead to medication nonadherence
- Determine cause of nonadherence (i.e., cost, side effects, complicated regimen)
- Provide a medication and regimen that works for the patient (i.e., generic, IV or monthly administration)
- Educate the patient that medication needs to be taken as prescribed in order to see a long term benefit

Treatment Decisions

- Decision to start therapy
  - T-score, FRAX score and other pertinent labs
- Which therapy to choose
  - Evaluation of patient adherence issues
  - Medication side effect profiles
  - Other medical conditions and medications
  - Age and menopausal status for women
- Decision to discontinue therapy
  - Drug holidays
  - Based on fracture risk and long-term study data
Take Home Points

- BMD testing indications
- Identify those patients at high risk
- Implement lifestyle changes when applicable and counsel on fall prevention
- Adequate intake of calcium and vitamin D and proper nutrition
- Therapy is based on history of fractures and overall fracture risk
- Counsel on appropriate medication administration
- Identify adherence issues
- Benefits of combination therapy is unknown (i.e., PTH plus bisphosphonate)

Additional References

- Camacho et al. AACE Medical Guidelines for Clinical Practice for the Diagnosis and Treatment of Postmenopausal Osteoporosis. Endocrine Practice Vol 22 No 9 September 2016.