

# Osteoporosis Management

Lisa Voss PA-C, CCD  
Laura Frontiero NP-C, CCD  
Kaiser Healthy Bones Program  
San Diego

---

---

---

---

---

---

---

---

Disclosures:

Nothing to disclose



LF

---

---

---

---

---

---

---

---

Can a bald person  
get a hairline  
fracture?

[www.zazzle.com](http://www.zazzle.com)

LF

---

---

---

---

---

---

---

---

## Overview

- How to diagnose Osteoporosis
- FRAX Interpretation- when to use
- Evaluation and Management of Osteoporosis and patients at high risk for fracture
- Drug Therapy Benefits and Side Effects
- Long term risks of bisphosphonates
- When to consider drug holiday

LV

---

---

---

---

---

---

---

---

## Case Study: Meet Helen



LF

---

---

---

---

---

---

---

---

## Case Study: Helen

### Question 1

74 y/o female with h/o distal radius fracture at 62, recently fell backwards on the sidewalk while walking and fractured T12. What is the next step?

- 1) Order a DXA and labs
- 2) Initiate treatment with medication
- 3) Start calcium and vitamin D
- 4) Educate about fall prevention, exercise and avoidance activities
- 5) All of above



LF

---

---

---

---

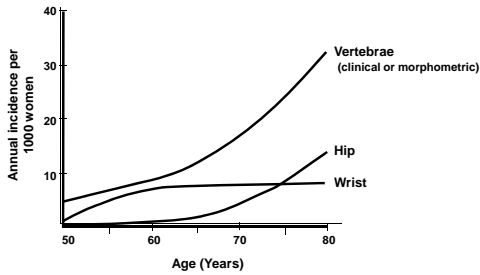
---

---

---

---

### Incidence Rates for Vertebral, Wrist & Hip Fractures in Women after Age 50



Wasnich RD, Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism. 4th edition, 1999 LV

---

---

---

---

---

---

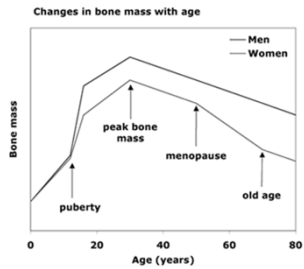
---

---

---

---

### Bone Mass Changes with Age



LV

---

---

---

---

---

---

---

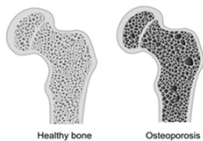
---

---

---

### Common Causes of Osteoporosis

- Genetics/Age/Gender
- Medications
  - Glucocorticoids, PPI, Chemotherapies, Aromatase inhibitor, SSRI, Lupron, Antiepileptics
- Hypogonadism
  - Low testosterone in men
  - Premature menopause
- Bone marrow malignancies
- Primary Hyperparathyroidism
- Malabsorption/undermineralized bone (osteomalacia)
  - Gastric bypass
  - Celiac disease
  - Hypercalciuria
- Excess alcohol intake/Smoking
- Poor calcium intake
- Low body weight
- Immobilization (paralysis)



LF

---

---

---

---

---

---

---

---

---

---

## Case Study: Helen

### Medical History

- 74 y/o female
- Menopause at 50
- BMI is 30
- Has been a jazzercise member for 20 years
- Takes care of 2 grandchildren 3 days a week
- Low trauma wrist fracture age 62
- Mother with osteoporosis but no parent history of hip fracture
- Drinks 1-2 glasses of wine with dinner nightly since her kids went to away to college
- T12 compression fracture s/p fall while walking one month ago



LF

---

---

---

---

---

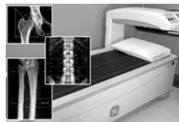
---

---

---

## Screening for Osteoporosis:

- BMD testing indications:
  - In women age 65 and older and men age 70 and older
  - In postmenopausal women and men age 50 and older who have had an adult age fracture (excluding fingers/toes and skull)
  - In postmenopausal women and men above age 50, based on risk factor profile
    - Oral glucocorticoids  $\geq 5$  mg/d of prednisone for  $>3$  months
    - Initiation of aromatase inhibitor and/or Lupron therapy
    - Type 1 DM, osteogenesis imperfecta, hypogonadism/premature menopause ( $<40$  years), malnutrition, chronic liver disease, rheumatoid arthritis
    - A prior osteoporotic fracture
    - Parental history of hip fracture
    - Current smoking
    - Low body mass index (BMI, kg/m<sup>2</sup>)
    - Alcohol intake (3 or more drinks/day)



Clinician's Guide to Prevention and Treatment of Osteoporosis  
Osteoporosis Int (2014) DOI 10.1007/s00198-014-2794-2

Image source: [ccradology.com](http://ccradology.com)

LF

---

---

---

---

---

---

---

---

## Case Study: Helen

### Question 2

When would have been the most appropriate time to screen this patient for osteoporosis by DXA?

- 1) At menopause/age 50
- 2) At age 65
- 3) After her wrist fracture at age 62
- 4) After her T12 fracture at age 72
- 5) Wait until she gets a hip fracture



LF

---

---

---

---

---

---

---

---

## Case Study: Helen

Question 3



DXA is performed:

composite spine T-score -2.4

lowest femoral neck T-score -2.1

FRAX Hip 6.3%, Major 23%

What is the diagnosis?

- 1) Osteoporosis
- 2) Osteopenia
- 3) Osteopenia with high risk for fracture

LV

---

---

---

---

---

---

---

---

## WHO Criteria for Osteoporosis

### WHO Definition of Osteoporosis Based on BMD

Classification	BMD	T-score
Normal	Within 1 SD of the mean level for a young-adult reference population	T-score at -1.0 and above
Low Bone Mass (Osteopenia)	Between 1.0 and 2.5 SD below that of the mean level for a young-adult reference population	T-score between -1.0 and -2.5
Osteoporosis	2.5 SD or more below that of the mean level for a young-adult reference population	T-score at or below -2.5
Severe or Established Osteoporosis	2.5 SD or more below that of the mean level for a young-adult reference population	T-score at or below -2.5 with one or more fractures

T-score compares the patient with young normal adult reference population

Z-score compares the patient's BMD with age, ethnicity & gender matched group

Z-scores  $\leq -2.0$  may be an indicator that a secondary cause of osteoporosis is present

Although these definitions are necessary to establish the presence of osteoporosis, they should not be used as the sole determinant of treatment decisions

Clinician's Guide to Prevention and Treatment of Osteoporosis Osteoporosis Int (2014) DOI 10.1007/s00198-014-2794-2

LF

---

---

---

---

---

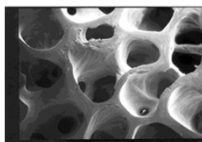
---

---

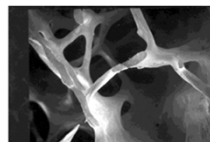
---

## Clinical Diagnosis of Osteoporosis

- Bone density vs bone quality
- 30% of people with osteoporosis can have BMD in normal or osteopenia range
- Fragility hip and/or spine fractures should be considered diagnostic of osteoporosis regardless of BMD.
- Fragility fracture is defined as a fracture that occurs due to fall from standing height or less
- Presence of single vertebral fracture increases the risk of subsequent fractures 5-fold and the risk of hip and other fractures 2-3 fold



Normal bone



Osteoporotic bone

LV

---

---

---

---

---

---

---

---

## Risk Factor Assessment

- |                                |   |                                |
|--------------------------------|---|--------------------------------|
| • <b>Myocardial Infarction</b> | ⇒ | • <b>Osteoporotic Fracture</b> |
| • Previous MI                  | ⇒ | • Prior Fragility Fracture     |
| • Age                          | ⇒ | • Age                          |
| • <b>LDL Cholesterol</b>       | ⇒ | • <b>T-Score (BMD)</b>         |
| • Smoking History              | ⇒ | • Smoking                      |
| • Family History               | ⇒ | • Family History               |
| • Diabetes                     | ⇒ | • Glucocorticoid Use           |
| • HTN                          | ⇒ | • Comorbid illness or meds     |

LF

---

---

---

---

---

---

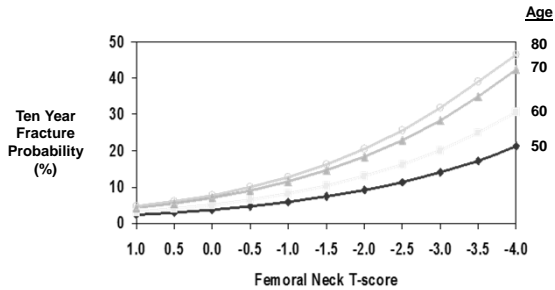
---

---

---

---

## Bone Density & Age vs. Fracture Risk



Probability of first fracture of hip, distal forearm, proximal humerus, and symptomatic vertebral fracture in women of Malmö, Sweden. Adapted from Kanis JA et al. *Osteoporosis Int.* 2001;12:989-995.

LF

---

---

---

---

---

---

---

---

---

---

## FRAX- Fracture Risk Assessment Tool

**Calculation Tool**

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: US (Caucasian) Name/DOB: Helen

**Questionnaire:**

- Age (between 40 and 90 years) or Date of Birth: 74 y, 1 m, 1 d
- Sex:  Male  Female
- Weight (kg): 61.7
- Height (cm): 165.1
- Previous Fracture:  No  Yes
- Parent Fractured Hip:  No  Yes
- Current Smoking:  No  Yes
- Glucocorticoids:  No  Yes
- Rheumatoid arthritis:  No  Yes
- Secondary osteoporosis:  No  Yes
- Alcohol 3 or more units/day:  No  Yes
- Femoral neck BMD (g/cm<sup>2</sup>): T-Score: -2.4

Buttons: Clear, Calculate

**Results:** BMD: 00.0, The ten year probability of fracture (%): 23.1 (Major osteoporotic), 6.3 (Hip Fracture)

The FRAX<sup>®</sup> algorithms give the 10-year probability of fracture. The output is a 10-year probability of hip fracture and the 10-year probability of a major osteoporotic fracture (clinical spine, forearm, hip or shoulder fracture).

LV

---

---

---

---

---

---

---

---

---

---



### Preventive Measures for All Adults

- **Calcium:** 1,200 mg/d, including diet and supplements, for postmenopausal women and men aged 50 and older
- **Vitamin D:** 1,000 IU/day, including diet, for pre- and postmenopausal women and men aged 50 and older
- **Exercise:** Regular weight-bearing and muscle-building
- **Smoking cessation**
- **Home safety proofing** for postmenopausal women and men at risk of falling (hip protectors not recommended)

Note: In some adults, adequate intake of calcium and vitamin D may require supplementation. Calcium carbonate contains the most elemental calcium per dose and should be taken with food to enhance absorption. Calcium citrate contains less elemental calcium than carbonate salt, but is better absorbed and may be preferred in patients with reduced gastric acid production or high gastric pH (e.g., those on long-term H<sub>2</sub>-antagonist or proton pump inhibitor therapy). It is more expensive and usually requires more tablets to be taken per day than calcium carbonate.

LF

---

---

---

---

---

---

---

---

---

---

### FDA-approved Medications

Drug	Postmenopausal Osteoporosis		Glucocorticoid-induced Osteoporosis		Men
	Prevention	Treatment	Prevention	Treatment	
Estrogen	✓				
Calcitonin*		✓			
Raloxifene (Evista®)	✓	✓			
Ibandronate (Boniva®)	✓	✓			
Alendronate (Fosamax®)	✓	✓		✓	✓
Risedronate (Actonel®)	✓	✓	✓	✓	✓
Zoledronate (Reclast®)	✓	✓	✓	✓	✓
Denosumab (Prolia™)		✓			✓
Teriparatide (Forteo®)		✓		✓	✓

\*FDA advisory board found that evidence did not support calcitonin salmon for the treatment of osteoporosis (March 5, 2013)

LV

---

---

---

---

---

---

---

---

---

---

### Evidence for Fracture Reduction

Drug	Vertebral Fracture	Nonvertebral Fracture	Hip Fracture
Calcitonin (Miacalcin®, Fortical®)	✓	No effect demonstrated	No effect demonstrated
Raloxifene (Evista®)	✓	No effect demonstrated	No effect demonstrated
Ibandronate (Boniva®)	✓	No effect demonstrated	No effect demonstrated
Alendronate (Fosamax®)	✓	✓	✓
Risedronate (Actonel®)	✓	✓	✓
Zoledronic acid (Reclast®)	✓	✓	✓
Denosumab (Prolia™)	✓	✓	✓
Teriparatide (Forteo®)	✓	✓	No effect demonstrated

Adapted from Murad MH, et al. *J Clin Endocrinol Metab.* 2012;97(6):1871-1880.

LV

---

---

---

---

---

---

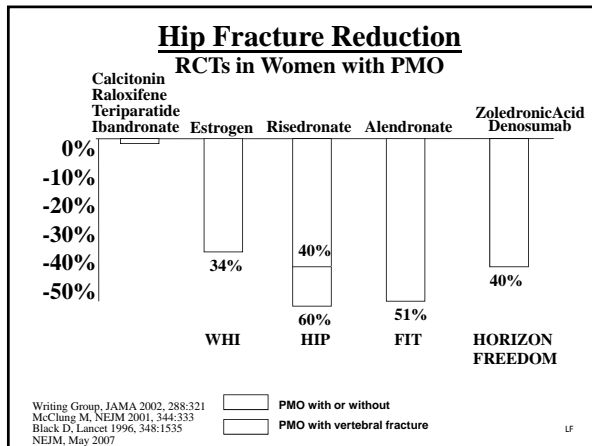
---

---

---

---






---

---

---

---

---

---

---

---

---

---

---

---

### Osteoporosis Therapies and Side Effects/Concerns

Therapy	Side Effects/Concerns
Raloxifene	Hot flashes/blood clot/DVT/PE, increased mortality from CVA
Residronate Alendronate Ibandronate	Esophagitis/erosion, bone pain, muscle pain, hypocalcemia, adynamic bone disease (CKD 4-5), ONJ, AFF, use with caution in barretts esophagus
Calcitonin	Nasal irritation, rash, cancer concerns
IV Bisphosphonates	Hypocalcemia, bone pain, fever, renal dysfunction, CrCl >35, ONJ, AFF
Teriparatide	Osteosarcoma in rats, cannot be used in people who have received XRT, paget's, high alk phos, limited to 2 years of therapy
Denosumab	Risk of infections: skin, blood, urine & eczema, endocarditis, hypocalcemia, back pain, ONJ, AFF

---

---

---

---

---

---

---

---

---

---

---

---

### Bisphosphonates... still first line treatment

**MEDICATION GUIDE**  
**FOSAMAX® (FOSS-ah-max)**  
*(alendronate sodium)*  
 Tablets


Read the Medication Guide that comes with FOSAMAX® before you start taking it and each time you get a refill. There may be new information. This Medication Guide does not take the place of talking with your doctor about your medical condition or treatment. Talk to your doctor if you have any questions about FOSAMAX.

**What is the most important information I should know about FOSAMAX?**

**FOSAMAX can cause serious side effects including:**

1. Esophagus problems
2. Low calcium levels in your blood (hypocalcemia)
3. Bone, joint, or muscle pain
4. Severe jaw bone problems (osteonecrosis)
5. Unusual thigh bone fractures

**1. Esophagus problems.**



---

---

---

---

---

---

---

---

---

---

---

---

## Medication Compliance

- Address everything up front
  - Side effects
  - Negative news media
  - Access to biased information (google)
  - The know-it-all neighbor
- Visual Aids
- Patient handouts



LV

---

---

---

---

---

---

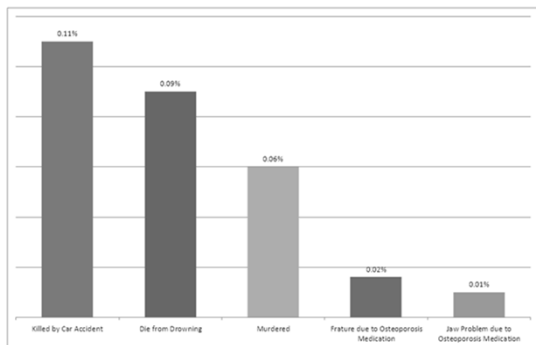
---

---

---

---

Your risk of Osteoporosis Medication Complications are very low when compared to Other Risks



Kaiser Permanente, Southern California, 1/13 Adapted: Leasli M. Binkley, N. 2012. "Talking With Your Patients About Risks vs. Benefits: Perception is Reality".

LF

---

---

---

---

---

---

---

---

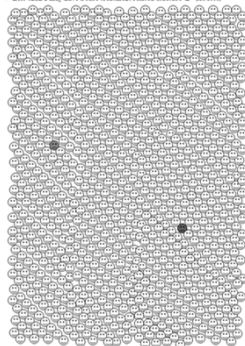
---

---

### THE RISK OF TAKING BONE STRENGTHENING MEDICATION

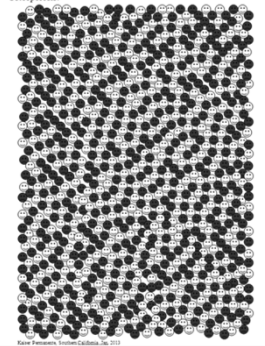
Out of 1,000 people on Osteoporosis medications for 5 years:

- Less than 1 may have a jaw problem (1/100)
- Less than 1 may have a non-treatment related fracture (1/100)



### YOUR RISK OF FRACTURE

Out of 1,000 women, 500 will suffer a fracture without treatment for Osteoporosis!



Kaiser Permanente, Southern California, 2013

LV

---

---

---

---

---

---

---

---

---

---

## Case Study: Helen

Question 4

What medication should we prescribe for Helen?

- 1) Alendronate
- 2) Raloxifene
- 3) Teriperatide (Forteo)
- 4) IV Zoledronic Acid (Reclast)
- 5) Denosumab (Prolia)



LF

---

---

---

---

---

---

---

---

## Helen Case Study

Question 5

Helen is started on Alendronate. How long should we treat this patient?

- 1) 3 years
- 2) 5 years
- 3) 10 years
- 4) > 10 years



LF

---

---

---

---

---

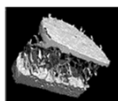
---

---

---

## Fracture Intervention Trial Long-Term Extension (FLEX)

- All women on alendronate for 5 yrs
- The FLEX trial compared placebo for the next 5 yrs vs. continuing on alendronate for a total of 10 yrs
- No change in morphometric vertebral fractures
- No change in non-vertebral fractures
- Lower incidence of clinical vertebral fractures in patients on treatment



JAMA. 2006 Dec 27;296(24):2927-38. Effects of continuing or stopping alendronate after 5 years of treatment: the Fracture Intervention Trial Long-term Extension (FLEX): a randomized trial. Black DM, et al.

LV

---

---

---

---

---

---

---

---

## Bisphosphonate Concerns

- Atypical Femur Fractures (subtrochanteric, femur shaft)
  - Increase in incidence based on duration of use 3+ yrs
  - Present with prodromal hip pain for weeks-months
  - Transverse fractures
  - Incidence 1/several thousand depending on duration of therapy
  - ASBMR published criteria for diagnosis
- Osteonecrosis of the Jaw
  - Incidence about 1/100,000
  - Reported with all therapies except forteo and raloxifene
  - Most cases reported with IV zoledronic acid
  - Risk factors: chemo, glucocorticoids, dental extractions, metastatic bone cancer

LV

---

---

---

---

---

---

---

---

## Typical vs. Atypical Fracture



ASBMR Task Force Report on Atypical Femoral Fractures Published in the JBMR, 9/14/10

LF

---

---

---

---

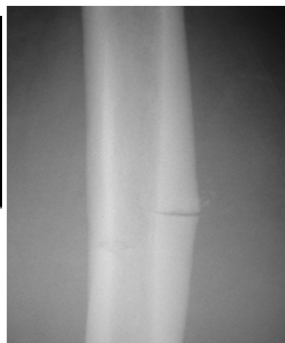
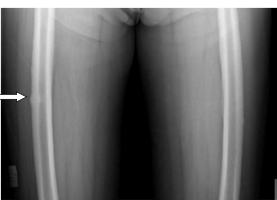
---

---

---

---

## Bone Features in Atypical Fractures



- Thick lateral cortices
- Bowing
- Periosteal callus
- Cortical beaking/flaring

ASBMR Task Force Report on Atypical Femoral Fractures Published in the JBMR, 9/14/10

LF

---

---

---

---

---

---

---

---

## Monitoring while on Treatment

- Monitoring with DXA
  - Don't re-test too soon
  - Do not "over-interpret" change
  - Be happy when BMD is stable OR increasing
- Improvement in BMD will vary. But, patients with less BMD improvement will still have fewer fractures than if they were not on therapy at all.
- Why do some patients lose BMD on treatment?
  - Poor adherence
  - Malabsorption
  - Underlying disorders that need to be addressed (secondary cause of osteoporosis)
  - Non-responder

LV

---

---

---

---

---

---

---

---

---

---

## Drug Holiday

Risk	Management
Low	Don't treat
Mild	Treat for 3–5 years, then stop. The 'drug holiday' can be continued until there is significant loss of BMD or the patient has a fracture
Moderate	Treat for 5–10 years, offer a 'drug holiday' of 3–5 years or until there is significant loss of BMD or the patient has a fracture, whichever comes first
High	Treat with bisphosphonate for 10 years, offer a 'drug holiday' of 1–2 years, until there is significant loss of BMD or the patient has a fracture, whichever comes first

Reassess after 1 year for risedronate, 1–2 years for alendronate, and 2–3 years for zoledronic acid

LF

Bisphosphonate drug holiday: who, when and how long? Dima L. Diab and Nelson B. Watts Ther Adv. Musculoskelet Dis June 2013

---

---

---

---

---

---

---

---

---

---

The collage features several informational panels:
 

- Prevent Falls: what you can do**: Includes the text "Prevent falls before they happen. Falls can be a serious health risk, especially for older people." and "Many falls can be prevented."
- Directions for Taking Fosamax**: A panel with a photo of a healthcare provider.
- CHECKLIST FOR Preventing Falls at Home**: Includes the text "Falls are often caused by hazards that are easy to overlook. But these hazards can also be easy to fix. This checklist helps you find hazards in each room of your home, and it gives tips on how to fix the problem."
- DXA FAQs**: "Frequently Asked Questions About The Dual-energy X-Ray".
- Calcium and Vitamin D: Are You Getting Enough to Keep Your Bones Healthy?**: Includes the text "What is a DXA test? A DXA test measures your bone mineral density, or thickness of the bones. It also checks for calcium in your blood."

LV

---

---

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

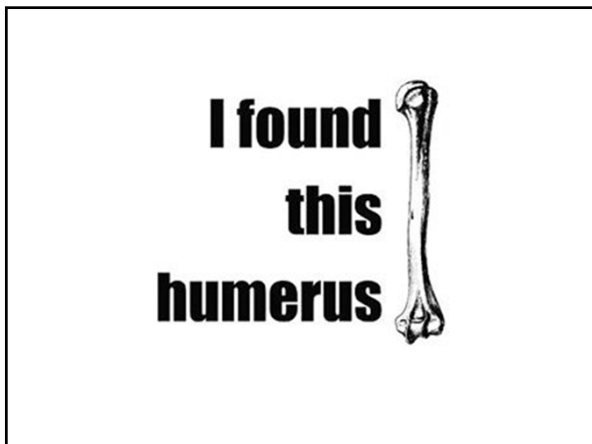
---

---

---

---

---



---

---

---

---

---

---

---

---

Contact Information

Lisa.ann.voss@kp.org

Laura.j.frontiero@kp.org



---

---

---

---

---

---

---

---