# Revolutionizing Osteoporosis Care: The Latest Advances in Goal-Directed Therapy

## Updates to the 2017 Guidelines

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# Disclosures

The following faculty speakers and/or planning committee members have disclosed the following:

| Faculty Name | Name of Ineligible Companies | Nature of Relationship |
|---|---|---|
| Megan Corrigan | WG Critical | Consultant, Relationship ended 12/31/25 |

The other planners and speaker have indicated that there are no relevant financial relationships with any ineligible companies to disclose. All of the relevant financial relationships listed for this individual have been mitigated.

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# Learning Objectives

At the end of this session, learners should be able to:

1. **Outline the pharmaceutical classes used in osteoporosis treatment**
2. **Describe treatment targets for treating osteoporosis**
3. **Identify potential opportunities for pharmacist intervention in osteoporosis management**
4. **Apply new goal-directed treatment strategies to a patient case**

# Outline

- Pathology
- Screening
- Pharmacotherapy
- Diagnosis
- Treatment Guidelines
- Role of pharmacists/future practice
- Patient Case

# Abbreviation Key

- AACE = American Association of Clinical Endocrinologists
- ACE = American College of Endocrinology
- AFF = Atypical femoral fracture
- ASBMR = American Society for Bone and Mineral Research
- BMD = Bone Mineral Density
- BTM = Bone Turnover Marker
- CI = Confidence interval
- DXA/DEXA = Dual-energy X-ray absorptiometry
- FN = Femoral Neck
- FRAX® = Fracture Risk Assessment Tool
- GIO= Glucocorticoid induced Osteoporosis
- IU = International units
- IV = Intravenous
- LS = Lumbar spine
- NOF = National Osteoporosis Foundation
- ONJ = Osteonecrosis of the jaw
- PTH = Parathyroid hormone
- PO = By mouth
- TBS = Trabecular Bone Scores
- TH= Total hip
- TSH = Thyroid Stimulating Hormone
- RANKL = Receptor Activator of Nuclear factor Kappa-B Ligand
- VFA = Vertebral fracture assessment
- VTE = Venous thromboembolism

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# Osteoporosis Statistics

| 50% | 10 million | 18% |
| --- | --- | --- |
| All adults age 50+ at risk of breaking a bone | Americans have osteoporosis | Increased risk of new fractures within 2 years of initial fracture |

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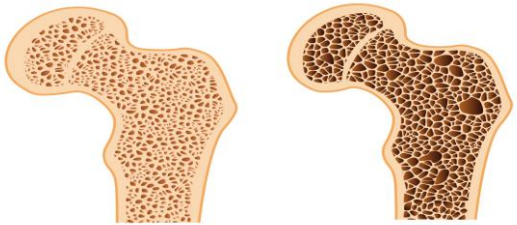
*Osteoporosis Fast Facts*, www.bonehealthandosteoporosis.org

# What is Osteoporosis?

Skeletal disorder characterized by deteriorated bone structure predisposing patients to an increased risk of fracture

- Primary osteoporosis:
  - Associated with age
  - Sex hormone deficiency
- Secondary osteoporosis:
  - Caused by several comorbidities & medications
  - Ex: glucocorticoid use




*Patel N and Ganti L. Orthopedic reviews. 2025;17:127772.*
MD, Andrew Minkley. *Sports Injury & Pain Relief Physicians.* 2025.

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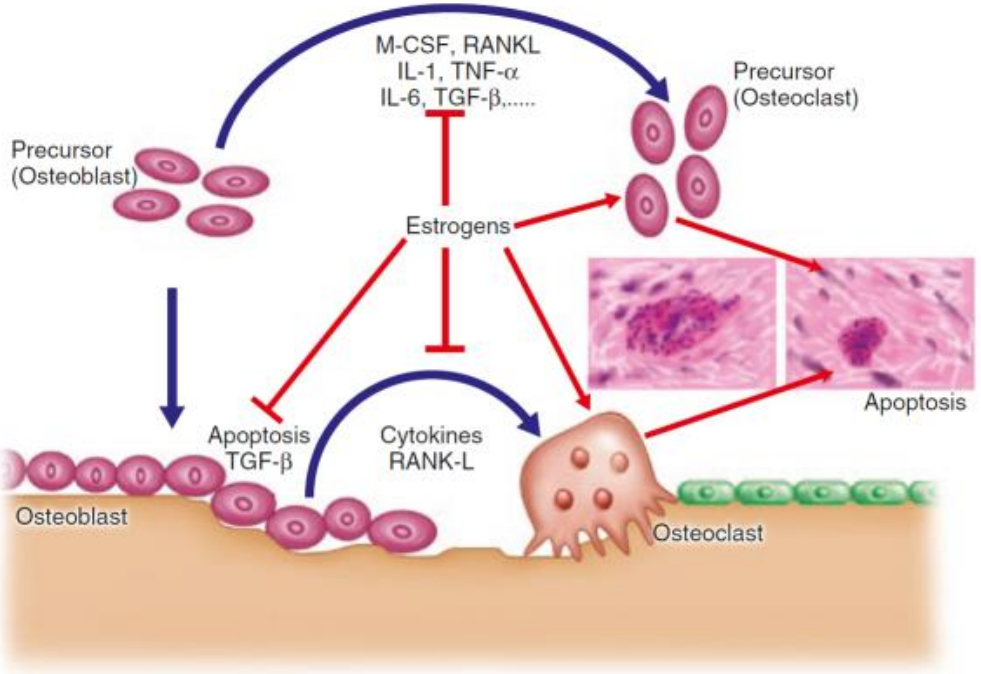
# Pathophysiology

Bone undergoing constant remodeling

Osteoblasts: bone builders

Osteoclasts: responsible for bone resorption




*Patel N and Ganti L. Orthopedic reviews. 2025;17:127772.*
*IOF International Osteoporosis Foundation website.*

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# Risk Factors

## Non-modifiable:

- Age
- Height loss
- Female gender
- Family history
- Previous fractures
- Ethnicity
- Estrogen deficiency and amenorrhea
- Menopause and hysterectomy

## Modifiable:

- Alcohol
- Smoking
- Low body mass index
- Inadequate calcium intake
- Vitamin D deficiency
- Eating disorders
- Insufficient exercise
- Frequent falls

*Patel N and Ganti L. Orthopedic reviews. 2025;17:127772*
*IOF International Osteoporosis Foundation website.*

# Assessment Question #1

KJ is a 59-year-old Caucasian female who lives in Chicago. She has a past medical history of hypertension, diabetes, and is a current smoker. Six months ago, she tripped over her rug in her kitchen and was seen in the Emergency Department. Imaging was performed a revealed a fracture to her pelvis.

**What are KJ's risk factors for osteoporosis?**

A. Smoking

B. Diabetes

C. Caucasian

D. Vitamin D deficiency

E. All of the above

# Fundamental Measures for Bone Health

| Ensure adequate: | Limit: | Consider: |
| --- | --- | --- |
| • Calcium intake<br>• Vitamin D intake<br>• Regular, weight-bearing or resistance exercise<br>• Protein intake | • Excessive vitamin A intake<br>• Alcohol intake<br>• Caffeine intake | • Smoking cessation<br>• Fall prevention<br>• Physical Therapy |

*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*

# Screening

Recommendations from ACP (2017) and AACE/ACE Guidelines (2020):

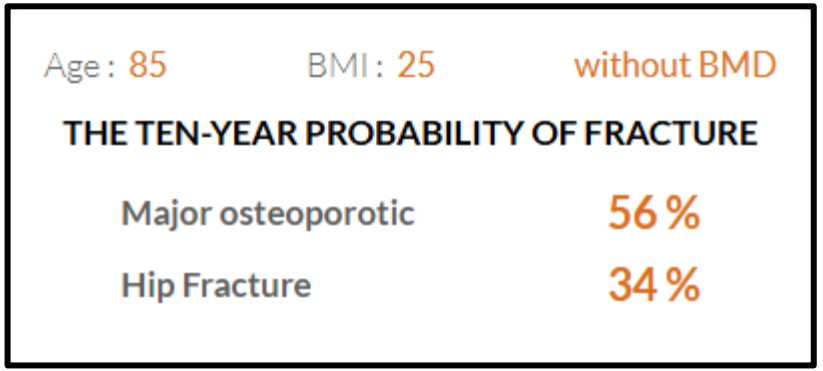
1. Men and women 50+ with fragility fractures
2. Postmenopausal women < 65 years with 1 or more risk factors for osteoporosis
3. Men 70+ and women 65+ with no additional risk factors

*US Preventive Services Task Force Recommendation Statement. JAMA.2025;333(6):498-508.*
*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*

# Clinical Fracture Risk Assessment

FRAX®: Fracture Risk Assessment Tool

- Estimates 10-year fracture risk
- Risk Factors included:
  - Country of residence
  - Ethnicity
  - Age
  - Sex
  - Height and weight
  - Personal or family history of fractures
  - Rheumatoid arthritis
  - Alcohol use
  - Secondary osteoporosis
- Considerations: can underestimate risk in certain patient populations, only reports hip fracture and major fracture risk




*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*
*FRAX® Fracture Risk Assessment Tool." University of Sheffield.*

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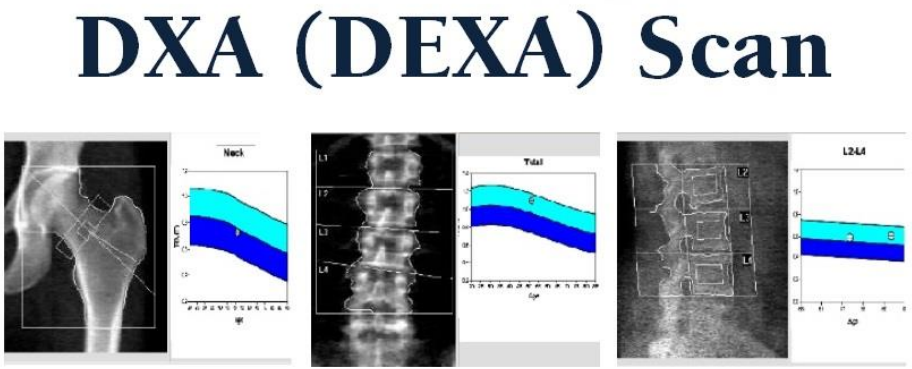
# Testing and Evaluation

## Calcaneal Ultrasonography

- more useful for ruling in osteoporosis than ruling out

## DXA scan: Dual Energy X-Ray Absorptiometry

- measures bone mineral density at lumbar spine, hip (femoral neck or total hip), and forearm
- reported as gram of mineral per $cm^2$ and converted to t- and z-scores
- used to calculate vertebral fracture assessment and trabecular bone score




*UC Davis Health, Department of Radiology.*
*Hashmi, Faiz R, and Khaled O Elfandi. Orthopedic reviews. 2016; 8(2):6357*

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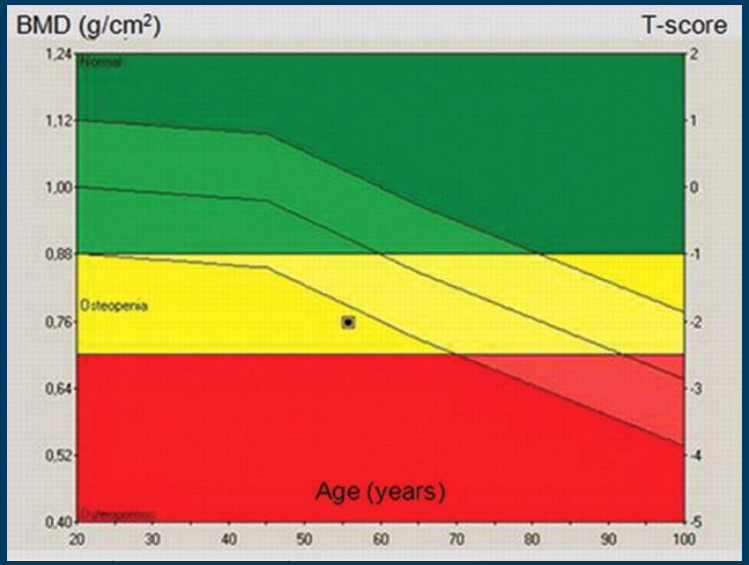
# Interpreting the DXA




**Z-score:** how many standard deviations from the population mean

(how does this patient compare to others their own age)

**T-score:** how many standard deviations from the mean

(how does this patient compare to the average 30-year-old)

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*Lorente-Ramos, Rosa et al. American journal of roentgenology. 2011;196(4):97-904.*

# Gaps in Care

- Early screening in at-risk individuals
- Prompt diagnosis
- Starting appropriate pharmacotherapy
- Specialist availability
- Patient adherence "silent disease"
- Osteoporosis care in men

# Pharmacotherapy Review

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# Overview of Pharmacotherapy

## Antiresorptive agents

- Bisphosphonates
- Denosumab
- Selective estrogen receptor modifiers
- Hormonal therapies
- Calcitonin

## Anabolic agents

- Parathyroid hormone
- Parathyroid hormone related protein analogue
- Sclerostin inhibitor

# Antiresorptive Agents

# Bisphosphonates

| Drugs: | alendronate (Fosamax®), risedronate (Atelvia®), ibandronate (Boniva®), zoledronic acid (Zolmigran®) | | |
|---|---|---|---|
| Mechanism | Bind with high affinity to mineral matrix of the bone to inhibit osteoclast resorption | | |
| Indications | First line for prevention/treatment of osteoporosis in postmenopausal women, men, and GIO patients (excluding ibandronate) | | |
| Dosing | **Bisphosphonate** | **Treatment dose** | **CrCl Recommendation** |
| | **Alendronate** | 10 mg PO daily or 70 mg PO weekly | ≥ 35 mL/min |
| | **Risedronate** | 5 mg PO daily, 35 mg PO weekly, or 150 mg once monthly | ≥ 30 mL/min |
| | **Zoledronic acid** | 5 mg IV yearly | ≥ 35 mL/min |
| | **Ibandronate** | 2.5 mg PO daily, 150 mg PO monthly, or 3 mg IV every 3 months | ≥ 30 mL/min |
| Administration | Take with glass of water in the morning prior to a meal and remain upright for at least 30 minutes | | |
| Length of therapy | Moderate to low fracture risk: drug holiday after 3-5 years<br>High fracture risk: drug holiday after 6-10 years | | |
| Contraindications | Hypocalcemia, CrCl < 30-35 mL/min, esophageal disorders, history of bariatric surgery | | |
| Monitoring | BMD at baseline and every 1-2 years on treatment | | |
| Adverse Effects | Upper gastrointestinal discomfort, osteonecrosis of the jaw, atypical femoral fractures | | |

GIO: Glucocorticoid induced osteoporosis

*Ganesan K, Goyal A, Roane D. Bisphosphonate. StatPearls [Internet] 2025.*
LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.

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# Denosumab

| Drugs: | denosumab (Prolia™) |
|---|---|
| Mechanism | Monoclonal antibody that inhibits RANKL to decrease bone resorption |
| Indications | • First line for patients at high risk of fracture or who are unable to take oral therapy<br>• Approved in men and women |
| Dosing | 60 mg subcutaneously every 6 months |
| Administration | • Do not administer intravenously or intramuscularly<br>• Injection sites include upper arm, upper thigh, or abdomen<br>• No premedications required<br>• Administer vitamin D and calcium as necessary to treat or prevent hypocalcemia |
| Contraindications | CKD Stage 5 or dialysis |
| Monitoring | Calcium levels |
| Adverse Effects | Serious infection, dermatological reactions, fatigue, peripheral edema, musculoskeletal pain, hypophosphatemia, hypercholesterolemia, ONJ, AFF |

*Hildebrand GK, Patel P, Kasi A. StatPearls [Internet]. 2025.*
Denosumab. [package insert]. Amgen Inc.; 2010
LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.

# Selective Estrogen Receptor Modifiers (SERMs)

| Drugs: | raloxifene (Evista®) |
|---|---|
| Mechanism | Agonistic estrogenic activity on bone, decreases bone resorption and bone turnover<br>Antagonistic estrogenic activity on breast and uterine tissue |
| Indications | • First-line therapy only in women requiring reduced risk of spine fracture<br>• Weaker antiresorptive therapy for higher risk patients during bisphosphonate drug holiday<br>• Not approved in men |
| Dosing | 60 mg PO daily |
| Contraindications | Women with history or active venous thromboembolism (VTE), premenopausal women, pregnant women |
| Monitoring | BMD at baseline and every 1-2 years on treatment |
| Adverse Effects | Vaginal bleeding, hot flashes, worsening of hypertriglyceridemia, VTE, death due to stroke, cardiovascular disease |

*EVISTA (raloxifene). [package insert]. Eli Lilly and Company; 1997.*
LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.

# Hormonal Therapies

| Drugs: | conjugated estrogens with bazedoxifene, estrogen therapy (Duavee®) |
|---|---|
| MOA | • Agonistic estrogenic activity on bone, decreases bone resorption and bone turnover<br>• Antagonistic estrogenic activity on breast and uterine tissue |
| Indications | Prevention of osteoporosis in women while treating vasomotor symptoms |
| Dosing | Conjugated estrogens 0.45 mg & bazedoxifene 20 mg PO once daily |
| Contraindications | Women with history or active VTE, premenopausal women, pregnant women |
| Monitoring | Baseline risk for breast cancer and cardiovascular disease, age-appropriate breast and pelvic exams, blood pressure, serum triglycerides, thyroid stimulating hormone (TSH), BMD |
| Adverse Effects | Vaginal bleeding, hot flashes, worsening of hypertriglyceridemia, venous thromboembolism, death due to stroke, cardiovascular disease |

*Duavee (conjugated estrogens/bazedoxifene) [package insert]. Wyeth Pharmaceuticals; 2013.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

# Calcitonin

| Drugs: | calcitonin-salmon (Miacalcin®) |
|---|---|
| Mechanism | Calcitonin receptors found on osteoclasts and osteoblasts |
| Indications | • Osteoporosis in women postmenopausal 5+ years when alternative therapies not feasible<br>• Paget's disease in men and women<br>• Short term for hypercalcemia in men and women |
| Dosing | 200 units daily intranasally or 100 units subcutaneously daily |
| Contraindications | Anaphylactic reaction to calcitonin |
| Monitoring | Calcium levels |
| Adverse Effects | Nausea, vomiting, rhinitis, nasal irritation, back pain, arthralgia, nosebleed, headache, hypocalcemic tetany |

*Miacalcin (Calcitonin Salmon) [package insert]. Novartis Pharmaceuticals Corp; 1975.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

# Anabolic Agents

# Parathyroid Hormone

| Drugs: | teriparatide (Forteo®, Bonsity®) |
|---|---|
| Mechanism | Synthetic fragment of human parathyroid hormone |
| Indications | • Treatment of osteoporosis in men and women at high risk for fracture<br>• Treatment of osteoporosis associated with sustained systemic glucocorticoid therapy |
| Dosing | 20 mcg subcutaneous injection daily |
| Contraindications | Increased risk for osteosarcoma: Paget's disease of the bone, prior radiation therapy involving the skeleton, open epiphyses, history of bone metastases or malignancies, unexplained elevated alkaline phosphatase |
| Monitoring | Calcium levels |
| Adverse Effects | Transient orthostatic hypotension, leg cramps, and nausea |
| Notes | • When discontinued, bone loss can be rapid<br>• Use cautiously in patients with active or recent kidney stones, hypercalcemia and hypercalcemic disorders |

*Forteo (teriparatide) [Package Insert]. Eli Lilly and Company; 1987.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

# Parathyroid Hormone-Related Protein Analogue

New Agent! 2017

| Drugs: | abaloparatide (Tymlos®) |
|---|---|
| Mechanism | Synthetic peptide analogue of human parathyroid related protein |
| Indications | • Osteoporosis in women and men at high risk for fracture<br>• Patients who have failed or are intolerant to other available therapies |
| Dosing | 80 mcg subcutaneously daily |
| Administration | • Administer into periumbilical region of abdomen<br>• Duration of therapy limited to 2 years |
| Contraindications | Pre-existing hypercalcemia, underlying hypercalcemic disorder |
| Monitoring | Urine calcium if pre-existing hypercalciuria or active urolithiasis, blood pressure |
| Adverse Effects | Dizziness, nausea, headache, palpitations, fatigue, upper abdominal pain, vertigo risk of orthostatic hypotension, hypercalcemia, urolithiasis |

*Tymlos (Abaloparatide) [package insert]. Radius Health Inc.; 2017.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

# Sclerostin Inhibitor

New Agent! 2019

| Drugs: | romosozumab (Evenity®) |
|---|---|
| Mechanism | Monoclonal antibody directed against sclerostin |
| Indications | • Osteoporosis in postmenopausal women at high risk for fracture<br>• Not yet approved in men |
| Dosing | Two 105 mg subcutaneous injections give one after another monthly for 12 months |
| Contraindications | Women with history or active VTE, premenopausal women, pregnant women |
| Monitoring | Calcium levels |
| Adverse Effects | • **Boxed Warning: myocardial infarction, stroke, and cardiovascular (CV) death**<br>• Rhinitis, nasal irritation, back pain, arthralgia, nosebleed, headache<br>• Few cases of AFF and ONJ |
| Notes | Use limited to 1 year |

*Evenity (romosozumab-aqqg) [package insert]. Amgen/UCB; 2019.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

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# Treatment Targets

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# Diagnosis

## BMD Diagnosis

| Classification | BMD | T-score |
|---|---|---|
| Normal | Within 1 standard deviation of mean level for young, healthy adult | ≥ 1 |
| Osteopenia | Between 1.0 and 2.5 standard deviations of mean level for young, healthy adult | Between –2.5 to –1.0 |
| Osteoporosis | 2.5 standard deviations or more from the mean level for young, healthy adult | ≤ -2.5 |

## Clinical Diagnosis:

1. Incidence Fractures: presence of fragility fractures in the absence of other metabolic bone disorders
2. T- score between –1.0 and –2.5 at femoral neck or total hip with FRAX® risk score ≥3% for hip fracture and ≥20% major fracture

*BMD: Bone mIneral density*

*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*
*LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.*

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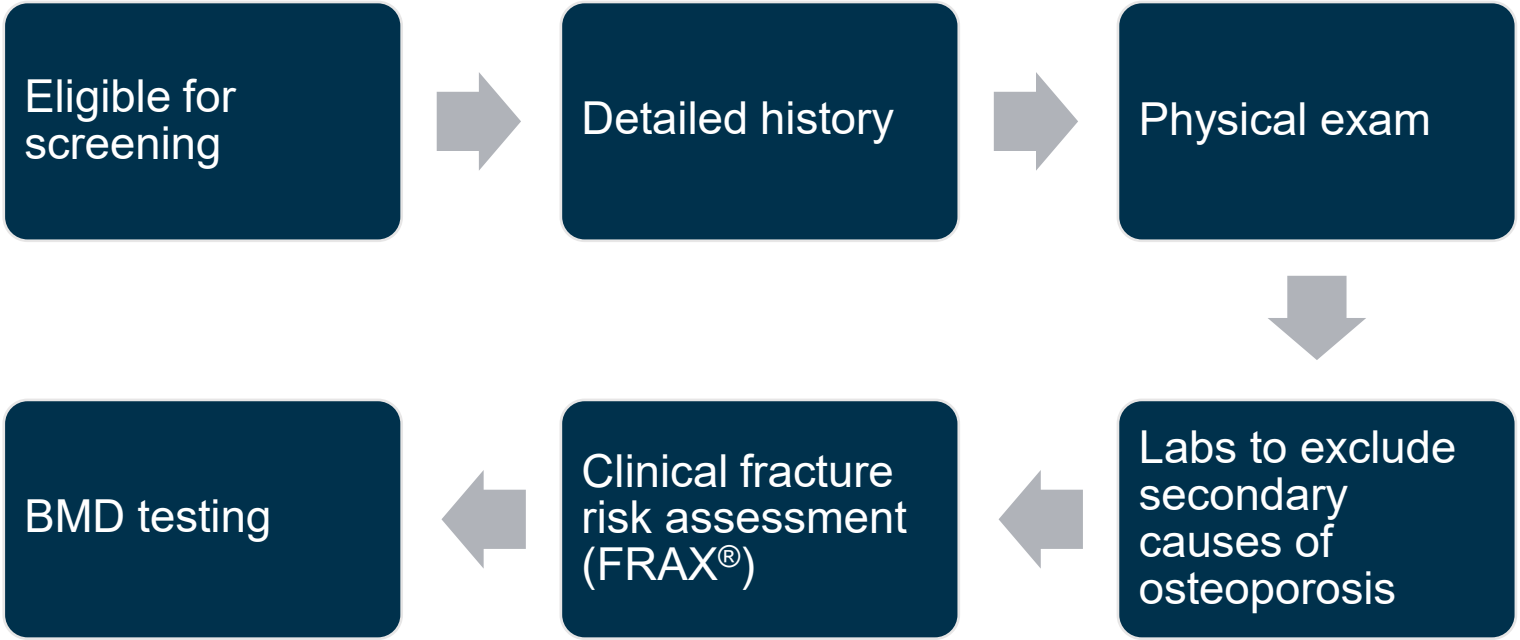
# Assessing Fracture Risk




*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*

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# Risk Stratification

AACE/ACE 2020 Guidelines:

**Low Risk:**

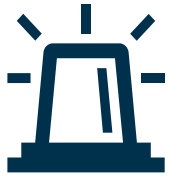
- T-score > -2.5
- No history of fragility fractures
- Low FRAX® probability

**High Risk:**

- T-score ≤ -2.5
- History of fragility fractures
- High FRAX® probability

**Very High Risk:**

- Advanced Age
- Frailty
- Very low t-scores
- Increased fall risk



**Imminent Risk:**

- Recent fractures (within 2 years)
- Multiple fractures

*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*
*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*

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# Assessment Question #2

KJ is a 59-year-old Caucasian female who lives in Chicago. She has a past medical history of hypertension, diabetes, and is a current smoker. Six months ago, she tripped over her rug in her kitchen and was seen in the Emergency Department. Imaging was performed a revealed a fracture to her pelvis.

After the visit, she had an outpatient DEXA scan showing a t-score of –2.1 in the femoral neck and –2.4 at the total hip. **What risk category does KJ fall into for treatment?**

A. Low risk, due to t-score between –1.0 and –2.5

B. Moderate risk, due to t-score between –1.0 and –2.5

C. Very High risk, due to t-score between –1.0 and –2.5 and history of fractures

D. Imminent risk, due to recent pelvic fracture regardless of t-score

# Treatment Targets

- Individualized, achievable goals
- Treat to target & beyond
- Goal based on risk of fracture:
  - Imminent risk: rapidly and maximally reduce fracture risk
    - BMD increase = greater reduction in fracture risk
    - Sustained treatment likely required
  - Not at imminent risk: consider baseline t-scores, fracture history, other major risk factors
    - Baseline T-score ≥ -2.5: T-score level at least < -2.5 at respective skeletal sights
    - Baseline T-score <-2.5: Increase BMD; T-score target not defined

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*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*

# Achieving Treatment Targets

1. Initiating appropriate treatment
   - Probability of achieving treatment target
   - Evaluating fracture risk, t-scores,
   - Other factors: cost, adherence, etc.

2. Following appropriate sequence
   - Sequence matters
     - Anabolic --> anti-resorptive = greater increases in BMD
     - Therapy "escalation" to osteoanabolic agents showed lower increases in BMD



*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*

# Assessment Question #3

KJ is seen by her primary care provider who recommends supplementing with vitamin D and calcium, smoking cessation, and educates on fall prevention. She also wants to start pharmacotherapy and asks for your recommendation. **What treatment target is appropriate for KJ?**

*Reminder: Six months ago, she had a stable pelvic fracture. Her DEXA scan showed a t-score of –2.1 in the femoral neck and –2.4 at the total hip. She is risk-stratified as "imminent risk".*

A. Treat to target a t-score of –1.0
B. Treat to a maintain a t-score of > -2.5
C. Treat to target bone mineral density increases, no t-score goal
D. Treat to target a bone mineral density goal > 1 g/cm$^2$

# Initiating Pharmacotherapy

ASBMR/BHOF Task Force Position Statement (2024)

| | | |
|---|---|---|
| High risk/no prior fractures | First line: Bisphosphonates or denosumab | Alternative therapy: ibandronate, raloxifene |
| Very high risk/prior fractures | First line: Osteoanabolic agents, teriparatide, zoledronate, denosumab | Alternative therapy: alendronate, risedronate |
| Imminent risk | Vertebral, pelvis, hip fractures<br>- First line: Osteoanabolic<br><br>Other fractures: Osteoanabolic, bisphosphonate, or denosumab | Alternative therapy: bisphosphonates or denosumab |

*Camacho, Pauline M et al. Association of Clinical Endocrinologists. 2020; 26(1):1-46.*
*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024; 39(10):1393–1405.*

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# Achieving Targets

- Unsuccessful:
  - As indicated by new fractures
  - Reassess adherence, fall risk interventions, address secondary causes
  - Start/continue the most potent medication or sequence for 2 years
- Successful:
  - BMD expected to decrease once discontinued
  - Transition to bisphosphonates?
    - Recommendations to continue bisphosphonates after denosumab therapy
    - IV zoledronic acid?



*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*

# Successful Treatment

- Goal: prevent fractures
  - Improve BMD
  - Decrease t-scores
  - Reduce fracture risk
- Cannot eliminate risk of fracture
  - Fracture ≠ treatment failure
  - Need to assess secondary causes, adherence, etc
- Does not reverse diagnosis



*Cosman F, Lewiecki M, Eastell R, et al. Journal of Bone and Mineral Research. 2024;39(10):1393–1405.*

# Latest Research

## Infrequent IV zoledronic acid after fracture

| Study | Population | Intervention | Comparison | Outcome |
|---|---|---|---|---|
| Bolland M et al. *NEJM. 2025;392(3) :*239-248. | 1054 female patients | • 1:1:1 infusion at baseline and 5 years<br>• Zoledronate-zoledronate<br>• Zoledronate-placebo<br>• Placebo-placebo | Presence of new vertebral fractures | Zoledronate-zoledronate compared to placebo showed hazard ratio of:<br>0.56 (95% CI (0.34-0.92)) for vertebral fracture<br>0.72 (95% CI (0.55-0.93) for fragility fracture |

## BRIDGE Study

| Study | Population | Intervention | Comparison | Outcome |
|---|---|---|---|---|
| Lewiecki E et al. JECM. 2018;103(9) :3183-3193. | 245 male patients aged 55-90 years | Randomized 2:1 to receive romozosumab 210 mg monthly or placebo for 12 months | Percent change from baseline in LS BMD at 12 months | Romosozumab group had greater increases from baseline in LS and TH BMD (LS: 12.1% vs 1.2%; p<0.001; TH: 2.5% vs –0.5%; p< 0.001) |

LS: Lumbar Spine

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# The Pharmacist's Role

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# Gaps in Care

- Early screening in at-risk individuals
- Prompt diagnosis
- Starting appropriate pharmacotherapy
- Specialist availability
- Patient adherence "silent disease"
- Osteoporosis care in men

# Referrals

Who should be referred?

- Normal BMD and nontraumatic fracture
- Recurrent fractures despite treatment
- Less common secondary causes
- Osteoporosis with severe or unusual features
- Condition that complicates management

LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.

# Pharmacist's Role

- Initial treatment with appropriate pharmacotherapy
- Ambulatory Care Pharmacist roles
  - Bone clinics
  - Endocrinology clinics
  - Family medicine
- Pharmacist led screening & education
  - Counseling
  - Administration of medications
  - Monitoring therapy

# Fracture Liaison Model

## Multidisciplinary model of post-fracture care

- Incorporates **patient needs, goals, values, habits, abilities, and living conditions**
- Evidence based diagnostic and treatment protocols
- Goal: evaluate and treat patients while optimizing provider time

## Examples:

- **Kaiser Permanente "Healthy Bones"**
- **American** Orthopedic **Association's "Own the** Bone" program

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LeBoff, M S et al. Osteoporosis international. 2022;33(10):2049-2102.

# Assessment Question #4

KJ is a 59-year-old Caucasian female who lives in Chicago. She has a past medical history of hypertension, diabetes, and is a current smoker. Six months ago, she tripped over her rug in her kitchen and was seen in the Emergency Department. Imaging was performed a revealed a fracture to her pelvis.

**In addition to the pharmacist's recommendation for an agent to start pharmacotherapy, what other ways can pharmacists play a role in osteoporosis care?**

A. Counseling on medication side effects and monitoring

B. Assisting providers in preparing and following up on prior authorizations

C. Awareness on the latest literature and guideline updates in osteoporosis care

D. All of the above

# Key Takeaways

- Osteoporosis can be diagnosed clinically and based on bone density on DEXA scans
- Patients should be initiated on appropriate pharmacotherapy based on their risk stratification and treatment goals
- Treatment targets should be individualized and achievable
- There are many opportunities for pharmacists to address gaps in osteoporosis management

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# Future Research

- Novel Targets
  - NELL-1: International Space Station testing new NELL-1 modified protein on rats
  - Anti-Basigin therapy: UC Davis Health showed inhibition of basigin protein prevented bone loss and increased strength in mice

- New drug delivery systems: oral robotic delivery of teriparatide (RT-102)
  - Rani Therapeutics
  - Currently in Phase 2 Trials
  - Phase 1 trials showed 3 times higher bioavailability when orally delivered compared to subcutaneous delivery

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# Questions?

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# Revolutionizing Osteoporosis Care: The Latest Advances in Goal-Directed Therapy

## Updates to the 2017 Guidelines

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