

Osteoporosis

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Conflicts of interest

- None to disclose
- Employed by Hawaii Permanente Medical Group (HPMG) and received no compensation for this presentation



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Agenda

Epidemiology

Definition

Signs and Symptoms

Diagnosis

Treatment and Approach



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Epidemiology

- Prevalence: >200 million people worldwide
 - At least 40% of women & 15-30% of men will have one or more fragility fracture
- Approximately 30% of all post-menopausal women in US and Europe
- Hip fracture associated with serious disability and mortality
- Projected by 2050 – Hip fractures will rise from 1.66 million (1990) to 6.26 million 2050



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Definition

Low bone mass, microarchitectural disruption, and skeletal fragility, resulting in decreased bone strength and an increased risk of fracture.

Status	BMD (Bone Mineral Density)
Normal	T-score of ≥ -1
Osteopenia	T-score of -1 to -2.4
Osteoporosis	T-score of ≤ -2.5
Severe Osteoporosis	T-score of ≤ -2.5 or lower and presence of at least one fragility fracture

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Signs and Symptoms

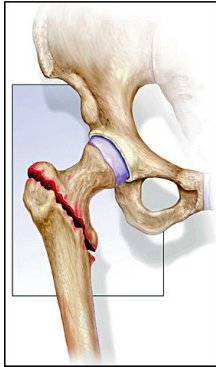
NONE

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Signs and Symptoms

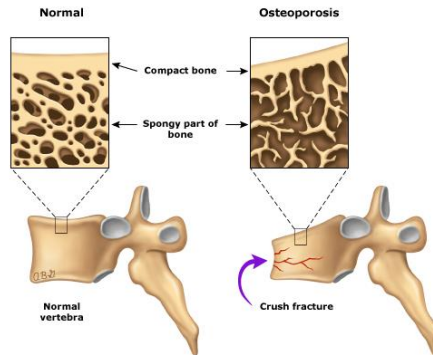
Intertrochanteric hip fracture



The intertrochanteric region contains a large amount of cancellous bone with a good blood supply. Therefore, intertrochanteric fractures typically heal well when properly repaired.

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<https://www.uptodate.com/contents/bone-density-testing-beyond-the-basics/print>

<https://www.uptodate.com/contents/overview-of-common-hip-fractures-in-adults>

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Diagnosis

- **Fragility fracture:** spine, hip, wrist, humerus, rib, and pelvis
- or
- T-score ≤ -2.5 standard deviations (SDs) at **any** (spine or hip) site based upon BMD measurement by dual-energy x-ray absorptiometry (DXA)



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When to screen

- Women ≥ 65 yo
- Postmenopausal women < 65 yo with clinical risk factors
- Controversial for men
 - > 70 yo
 - 50-70 yo when risk factors are present
 - Bone Health and Osteoporosis Foundation (BHOFF; formerly the National Osteoporosis Foundation [NOF])
 - International Society for Clinical Densitometry (ISCD)
 - Endocrine Society

<https://www.uptodate.com/contents/screening-for-osteoporosis-in-postmenopausal-women-and-men>



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Risk Factors

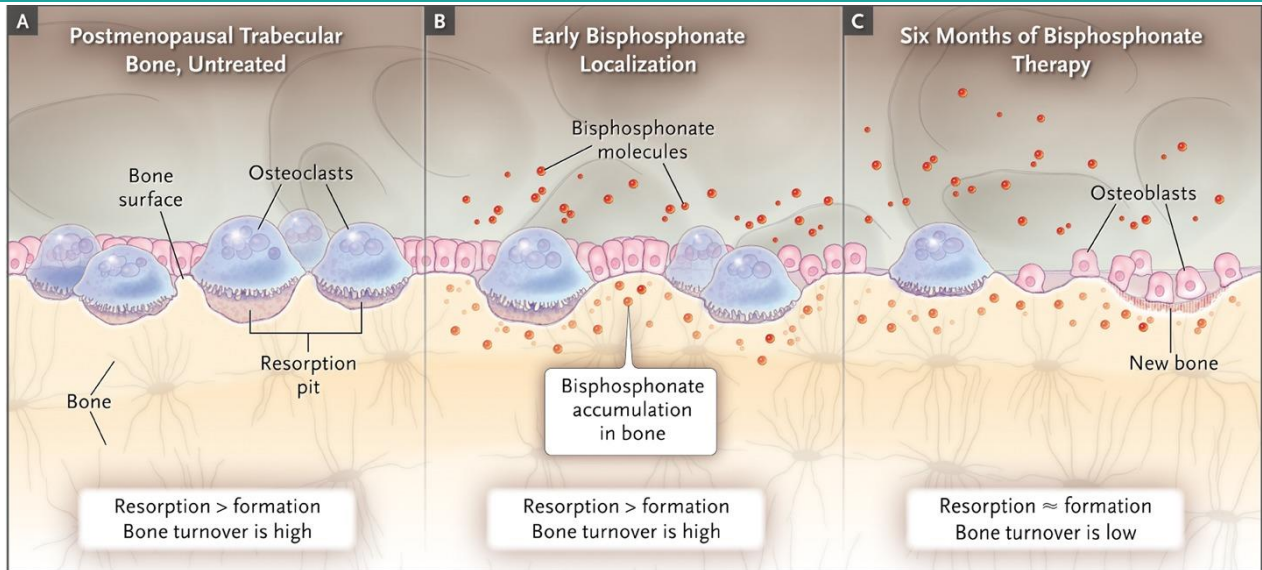
- Advanced age
- Previous fracture
- Long-term glucocorticoid therapy (steroid use, ie Prednisone)
- Low body weight (< 58 kg [127 lb])
- Family history of hip fracture
- Cigarette smoking
- Excess alcohol intake
- Secondary causes for osteoporosis
 - hypogonadism or premature menopause, malabsorption, chronic liver disease, inflammatory bowel disease

<https://www.sheffield.ac.uk/FRAX/>



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Bisphosphonates: How do they work?



Murray, J. N Engl J Med 2010; 363:2027-2035

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Alendronate

- Cost
 - Inexpensive
- Dosing
 - Once weekly dosing
- Side Effects
 - Myalgias (muscle aches)
 - Osteonecrosis of the jaw (1 in 10,000 to 1 in 100,000 patient-years)
 - Hypocalcemia (IV > oral)
 - Acid reflux, esophagitis, esophageal ulcers (low risk when taken appropriately)

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Alendronate

- Weekly dosing preferred
- 70 mg PO q weekly
- Drink with full glass of water (8oz) on an empty stomach
- Remain upright for 30 min afterward

IV Zoledronic acid

- Cost
 - More than oral bisphosphonates
- Dosing
 - Once a year but is IV
- Side Effects
 - Osteonecrosis of jaw (1 in 10,000 to 1 in 100,000 patient-years)
 - Hypocalcemia (IV > oral)
 - Myalgias (muscle aches)
 - Flu like feeling
 - May give acetaminophen prior to infusion and repeat 4-6 hours after infusion as needed

Teriparatide

(PTH - Parathyroid)

- Low dose PTH induces bone formation – promotes osteoblast differentiation and function

Vall H, Parmar M. Teriparatide. [Updated 2023 Jan 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559248>/Collin M. Young DO, ... Brian

W. Skinner PharmD, BCPS, in [Side Effects of Drugs Annual](#), 2022

Teriparatide (Parathyroid Analog)

- Cost
 - Variable depending on insurance
- Dosing
 - 20mcgs subcutaneous daily max of 2 years
- Side Effects
 - Nausea
 - Headache
 - Hypercalcemia
 - Hyperuricemia
 - Hypotension

Teriparatide

■ Concerns: Osteosarcoma

–Osteosarcoma Surveillance Study

–3808 cases of osteosarcoma diagnosed in the US between 2003 and 2016

–1173 osteosarcoma patients who were interviewed

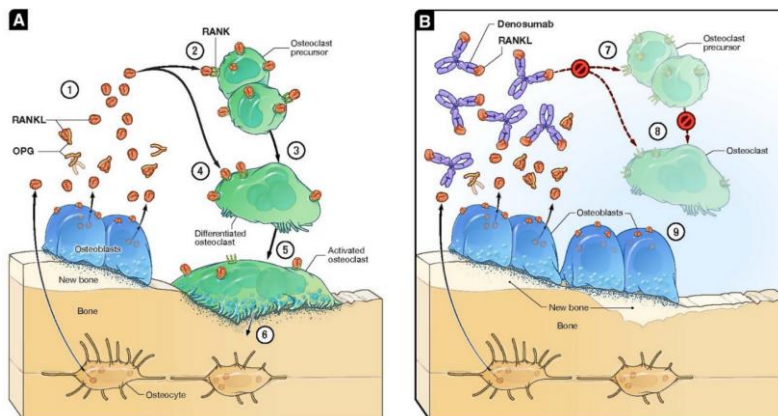
–3 reported a history of teriparatide use (0.2%)

<https://www.uptodate.com/contents/parathyroid-hormone-parathyroid-hormone-related-protein-analog-therapy-for-osteoporosis>



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RANK ligand inhibitor (Denosumab)



- Human monoclonal antibody to the receptor activator of RANK ligand, an osteoclast differentiating factor.
- It inhibits osteoclasts differentiation.



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Denosumab

- Cost
 - Variable depending on insurance
 - Dosing
 - 60mg subcutaneous injection every 6 months
 - Given in clinic (Endocrine or Rheumatology)
 - Side effects
 - Hypocalcemia
 - Rash
 - Serious infections
 - Osteonecrosis of the jaw
- Not first line therapy



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Conclusion

- Osteoporosis is prevalent and affects both men and women
- No symptoms until fracture
- Talk to your doctor about
 - Screening
 - Treatment
- Lifestyle



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Citations

- <https://www.osteoporosis.foundation/health-professionals/about-osteoporosis/epidemiology>
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Questions?