

# FRAGILITY FRACTURES: WHAT? WHO? AND THEN??

Osher Mini Medical School  
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# Disclosure Statement

I have no relevant conflicts of interest, financial relationships with commercial interests or affiliations to disclose.



# Learning Objectives

- What are “Fragility Fractures”?
- What do they mean to me?
- How do we treat them?



# What are Fragility Fractures



# Intro to Fractures

- Fractures = broken bone
- We describe fractures by:
  - Location
  - Open vs closed
  - Mechanism



# Fracture Types

- Traumatic
- Metabolic
- Pathologic
- Fragility



# Fragility Fractures



# Etiology

- Fragility Fractures occur in structurally weak bones due to aging and bone loss

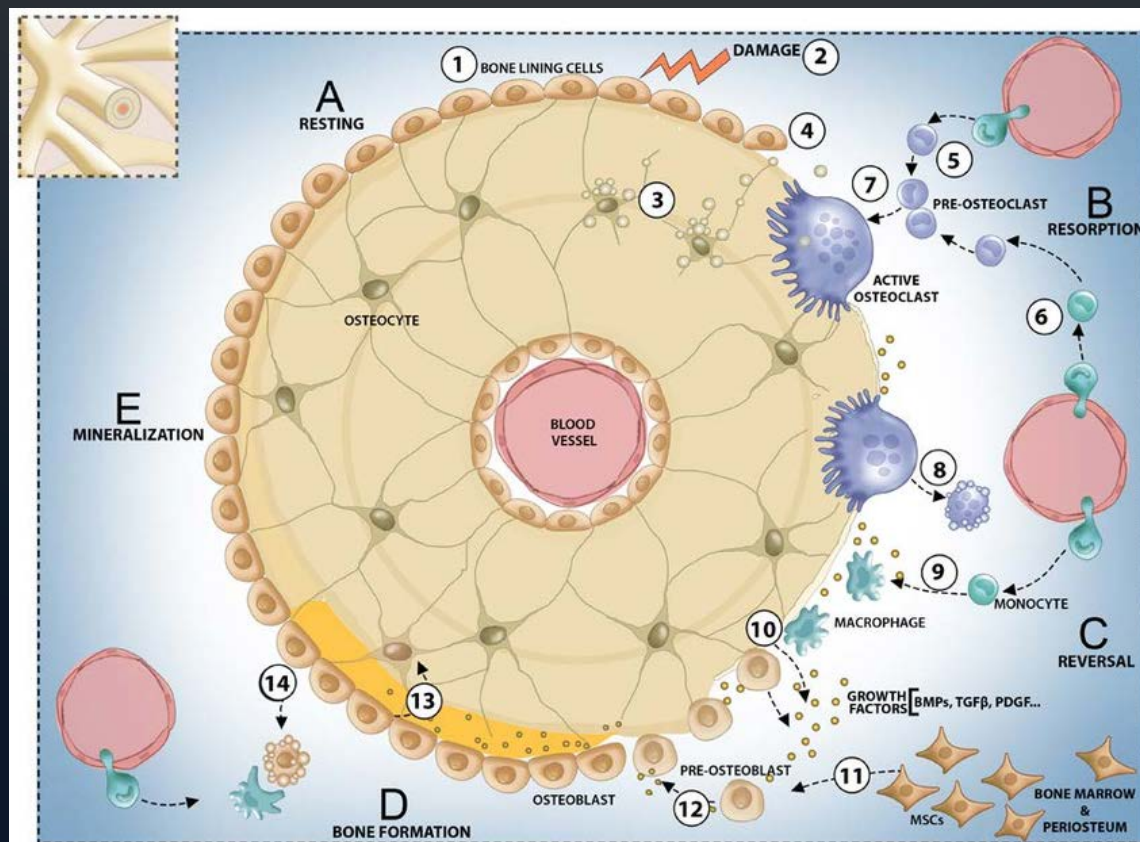
OSTEOPOROSIS





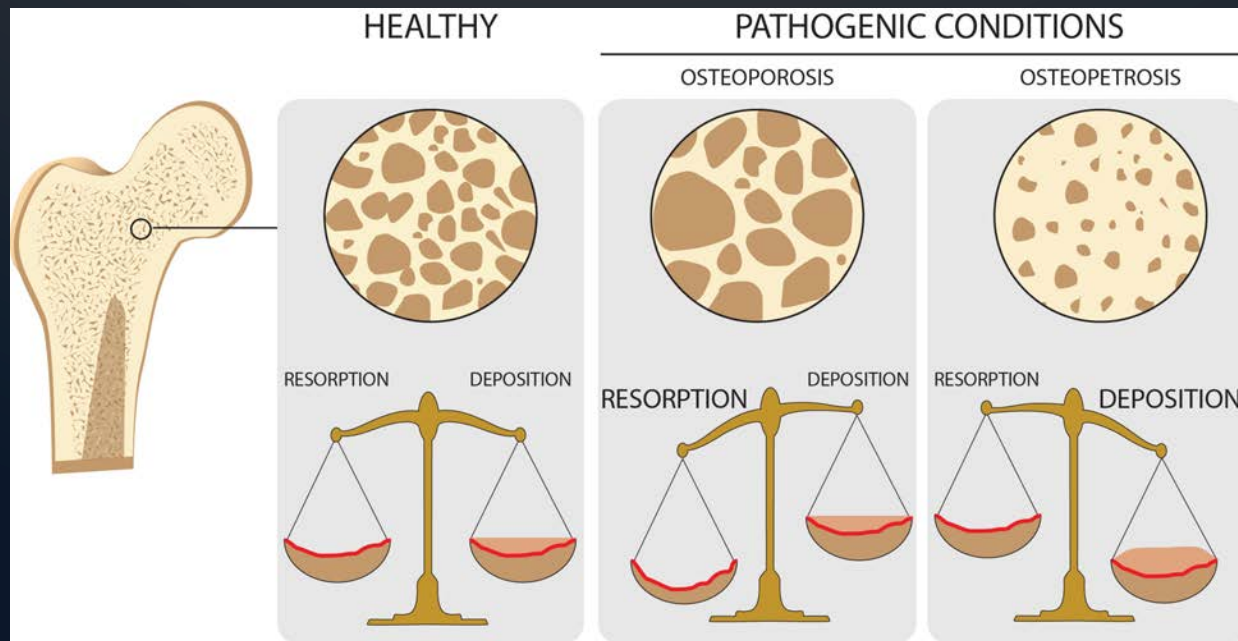
# Osteoporosis

- Bones constantly undergo remodeling, both resorbing old bone and building new bone



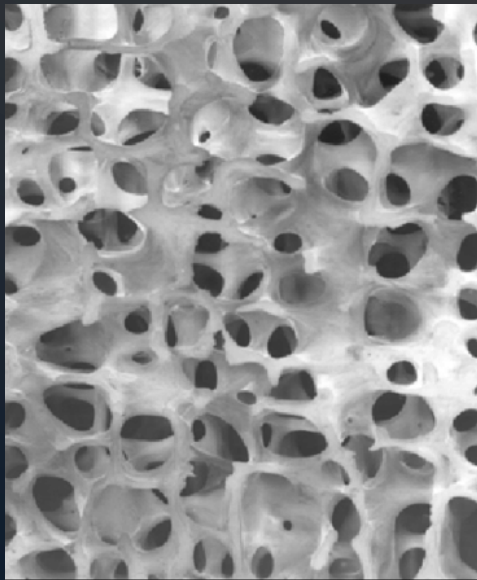
# Osteoporosis

- Imbalances between resorption and formation lead to skeletal health problems

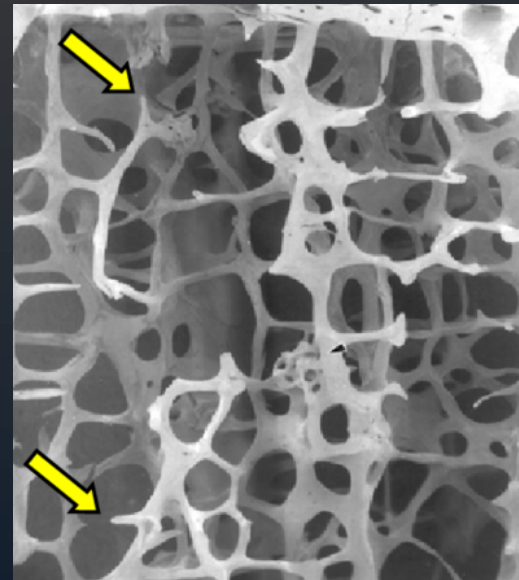


# Osteoporosis

- Loss of bone mass and bone architecture



Normal Bone



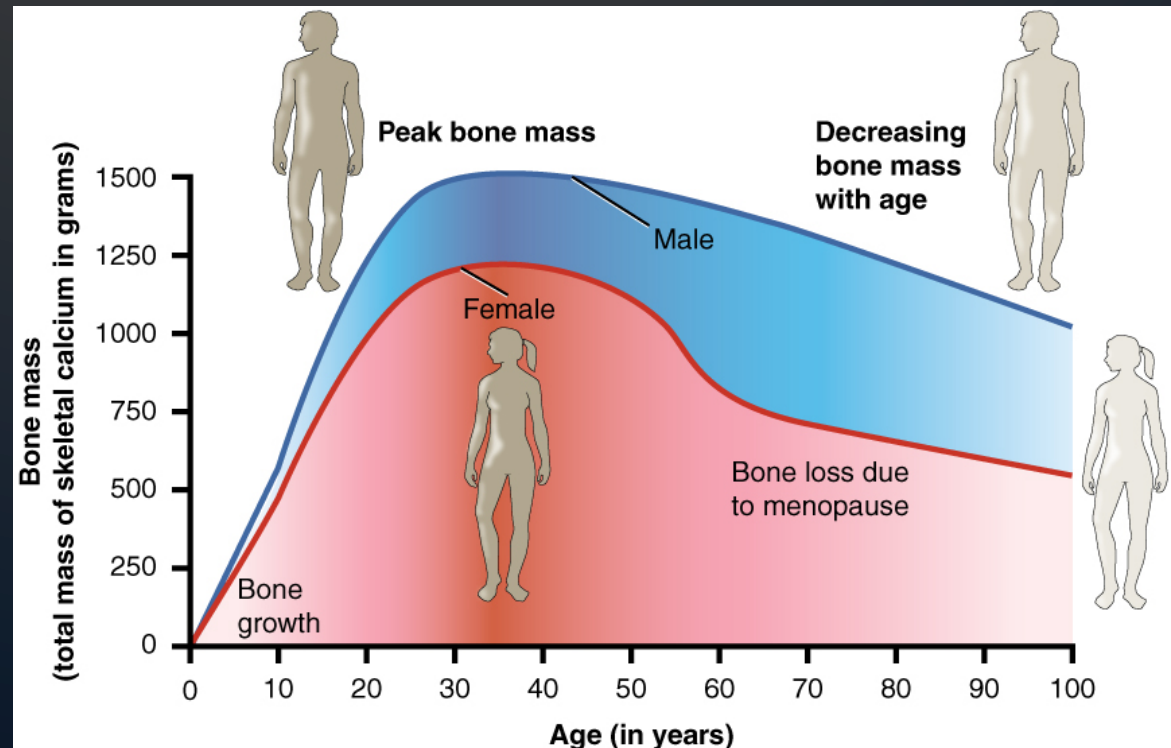
Osteoporotic Bone



# Osteoporosis

- Bone density affected by:

- Age
- Hormones
- Environment
- Genetics
- Lifestyle
- Medications
- Nutrition



# Significance

- Osteoporosis causes 8.9 million fractures annually
  - 1:3 women and 1:5 men > 50 y.o.
- Combined lifetime risk for fragility fracture is 40%
- Significant disability and hospitalization for fragility fractures



# Fragility Fracture Types

- Hip fragility fracture
- Vertebral (spine) fragility fracture
- Upper Extremity fragility fractures



# Hip Fragility Fractures



# Hip Fragility Fractures

## Epidemiology:

- From 1990-2000, hip fractures increased by 25%
- By 2050, estimated 4.5-6.3m hip fractures/yr





# Hip Fragility Fractures

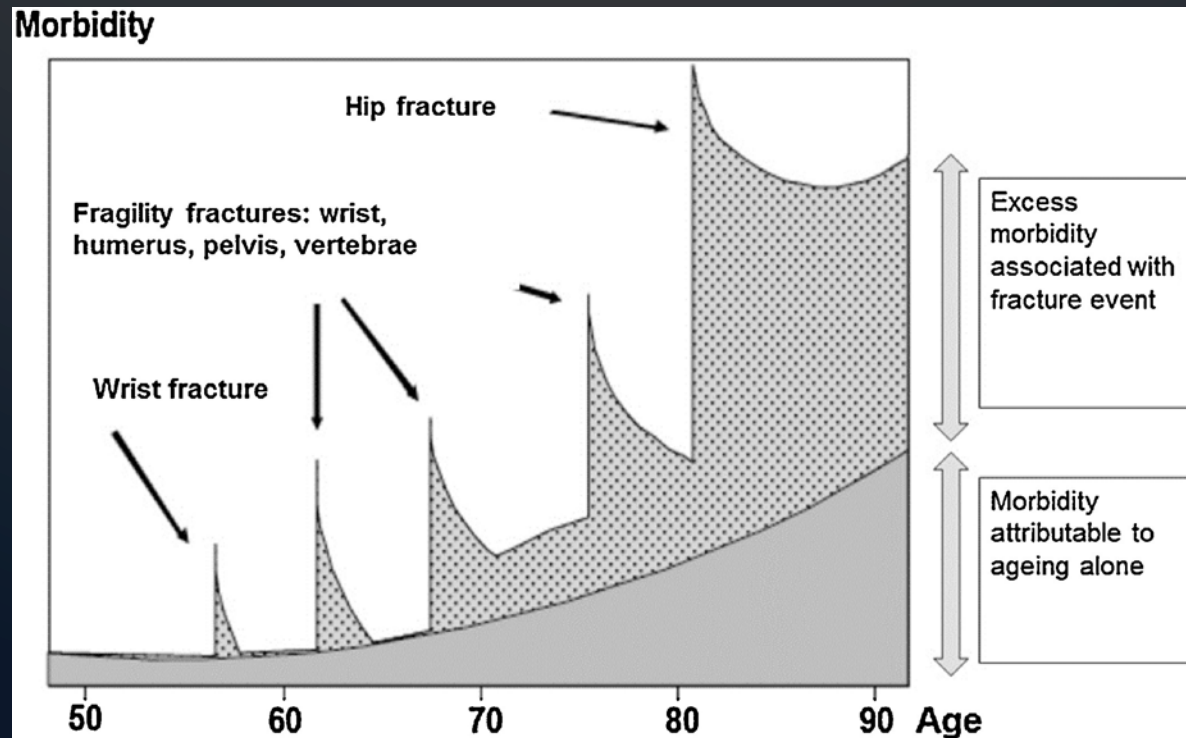
## Significance:

- In white women, lifetime risk is 1:6 (vs 1:9 for breast cancer)
- 20% will die in the 1<sup>st</sup> year after hip fracture
- Fracture begets fracture
  - DOUBLES risk of sustaining another fracture
- Profound loss of function
  - 40% unable to walk independently
  - 60% require assistance
  - 10-20% will require long term nursing care



# Hip Fragility Fractures

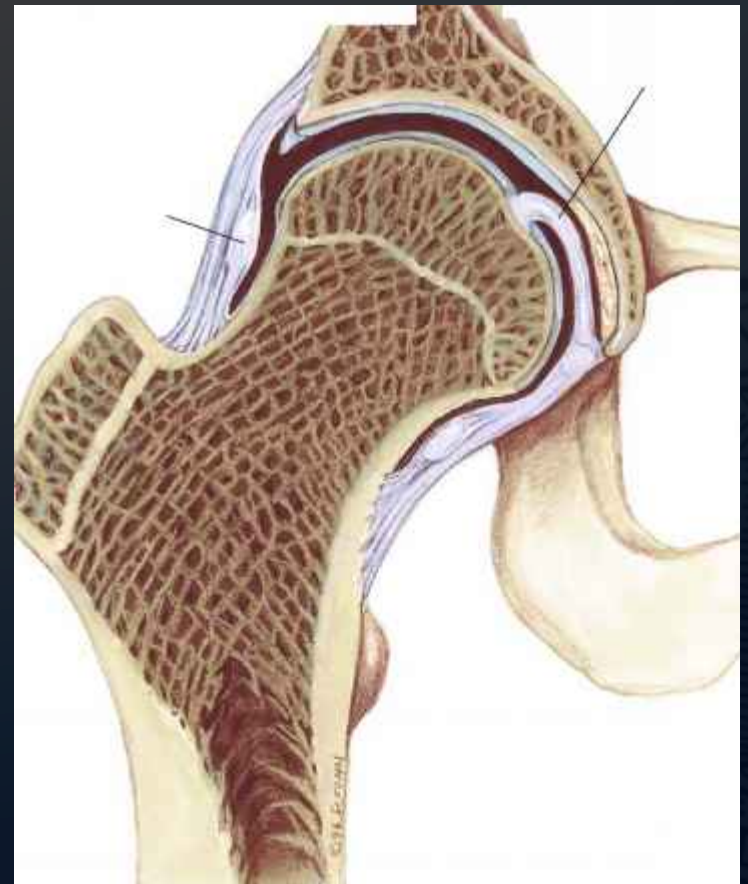
Significance:



# Hip Anatomy

## Bone Anatomy

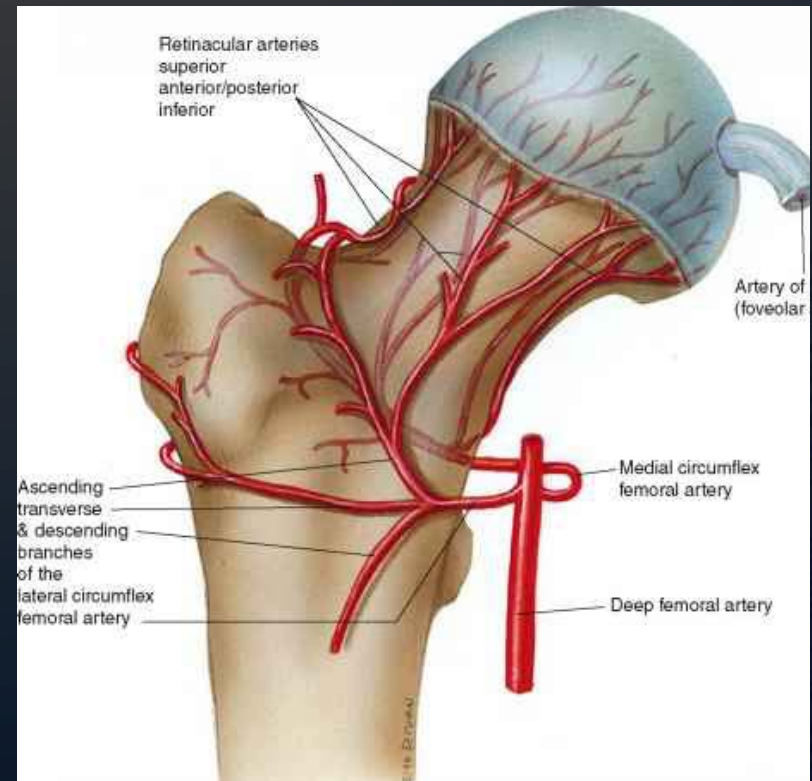
- The hip is a ball-and socket-joint
- Constrained joint
- Hip abductors attach to greater trochanter
- Hip flexors attach to lesser trochanter



# Hip Anatomy

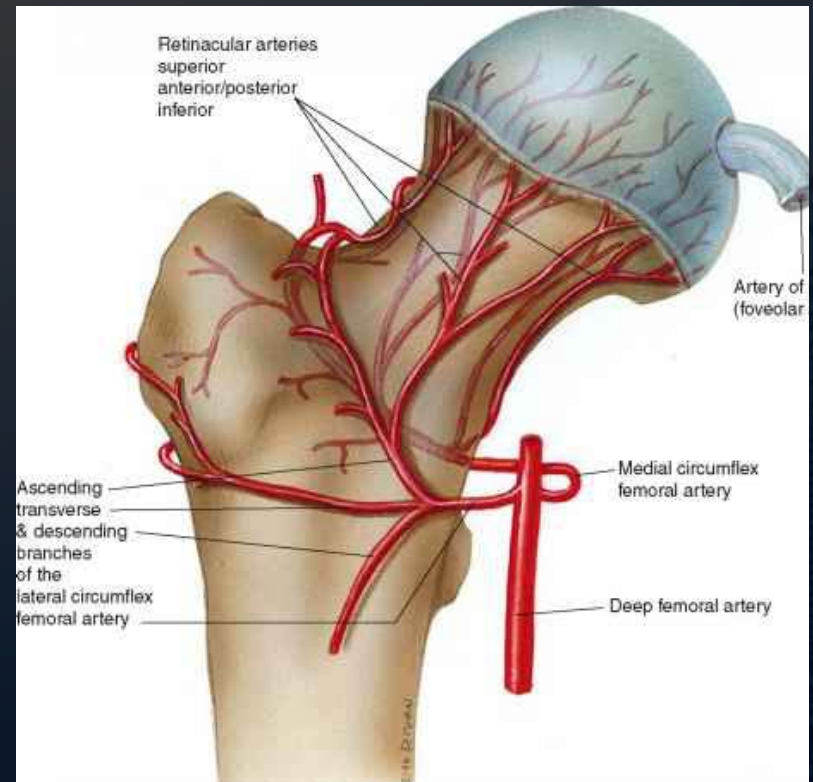
## Blood Supply

- Flow to the femoral head comes from arteries traveling thorough neck



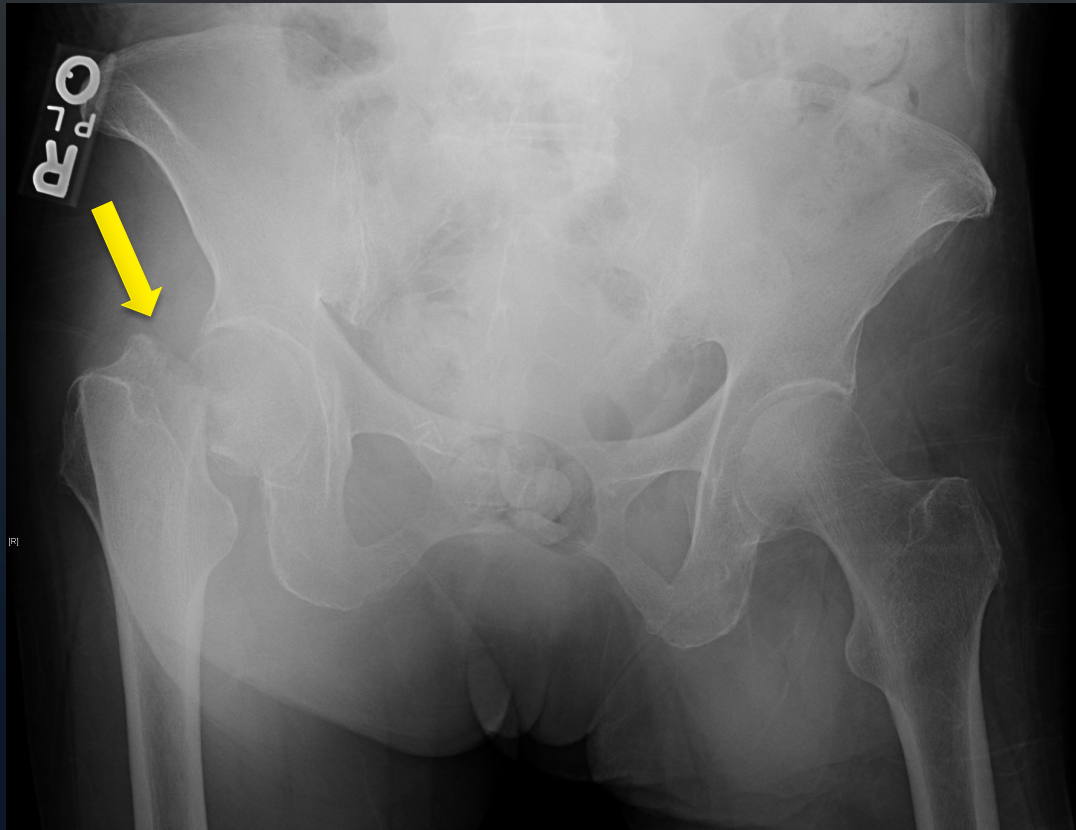
# Types of Hip Fractures

- Hip Fractures are classified by their location
  - Femoral Neck
  - Intertrochanteric
  - Subtrochanteric



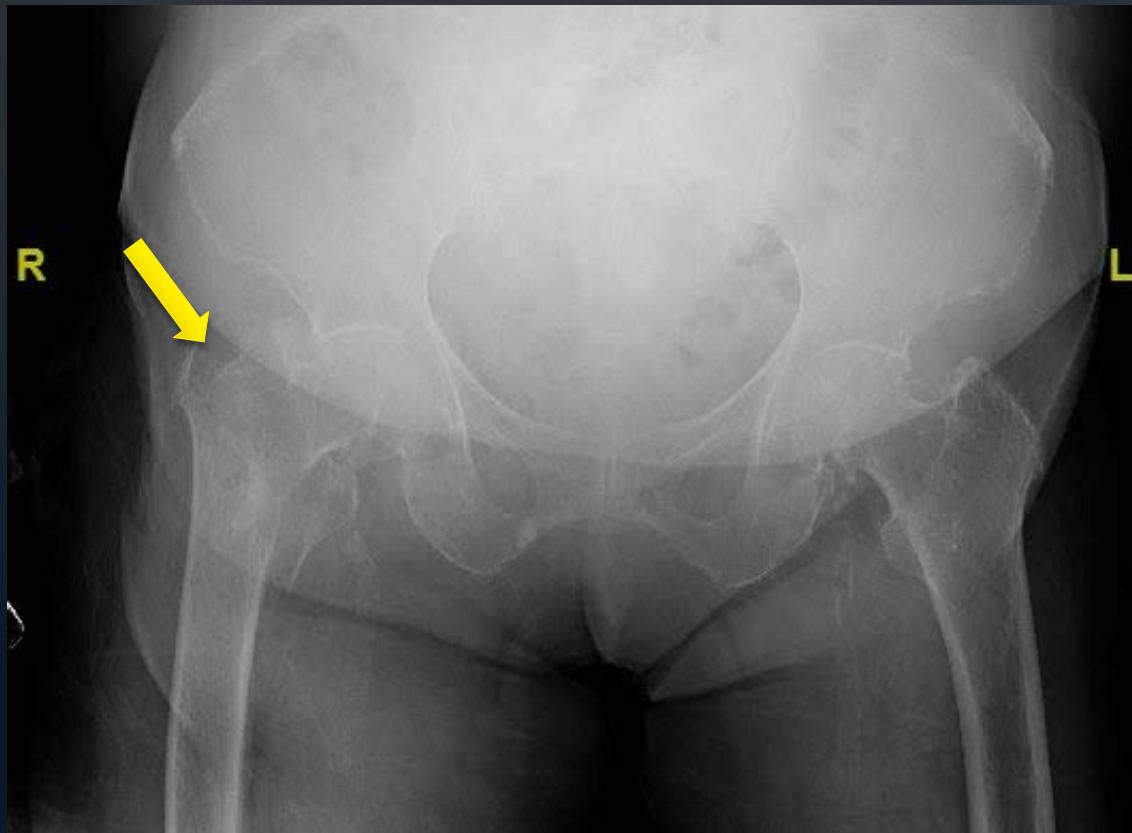
# Types of Hip Fractures

## Femoral Neck



# Types of Hip Fractures

## Intertrochanteric



# Hip Fracture Treatment

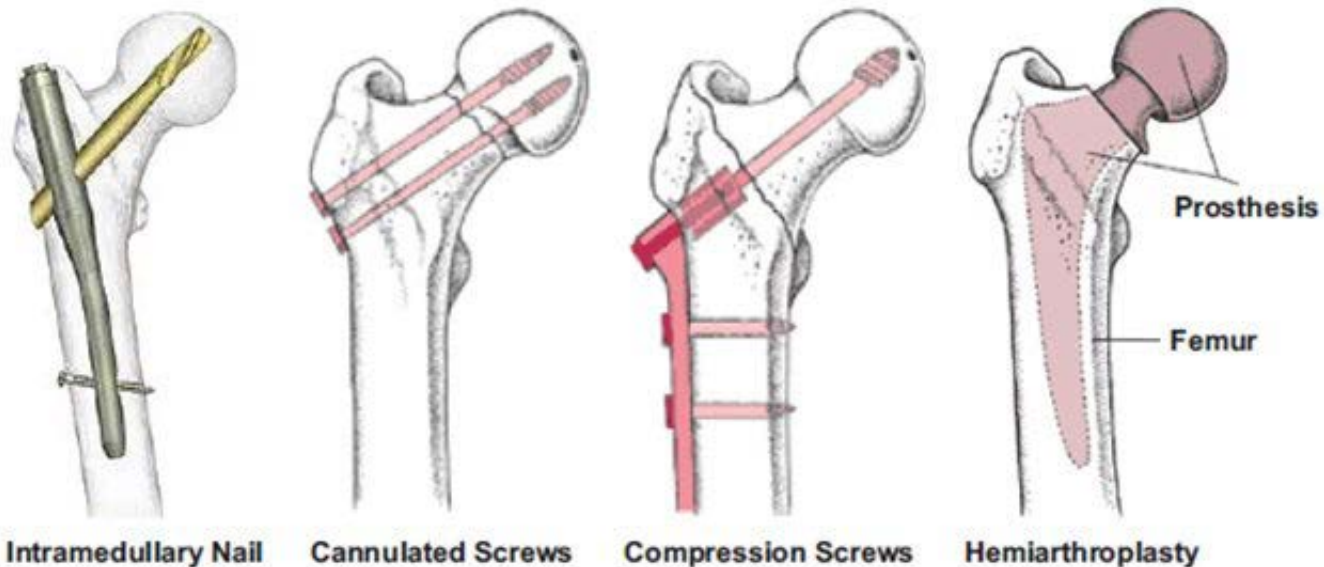
- Virtually all hip fractures are treated with surgery
- Nonoperative treatment only reserved for very frail patients who will not survive surgery
- Early surgery (<48hrs) improves outcomes and survival
  - Immediate weightbearing
  - Early ambulation
  - Early mobilization





# Hip Fracture Treatment

- Different types of hip fractures are treated differently



*Pictures of trochanteric nail, sliding hip screw, and cannulated screws courtesy of AO Principles of Fracture Management, 2<sup>nd</sup> Expanded Edition, 2007. Copyright AO Publishing Davos, Switzerland.*

# Hip Fragility Fractures

**NONDISPLACED FEMORAL  
NECK**



**SCREW FIXATION**



# Hip Fragility Fractures

DISPLACED FEMORAL NECK



JOINT REPLACEMENT

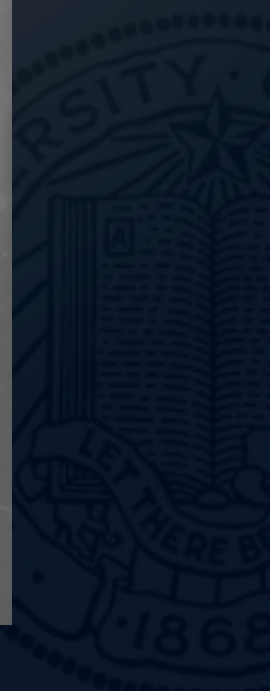


# Hip Fragility Fractures

**INTERTROCHANTERIC FX**

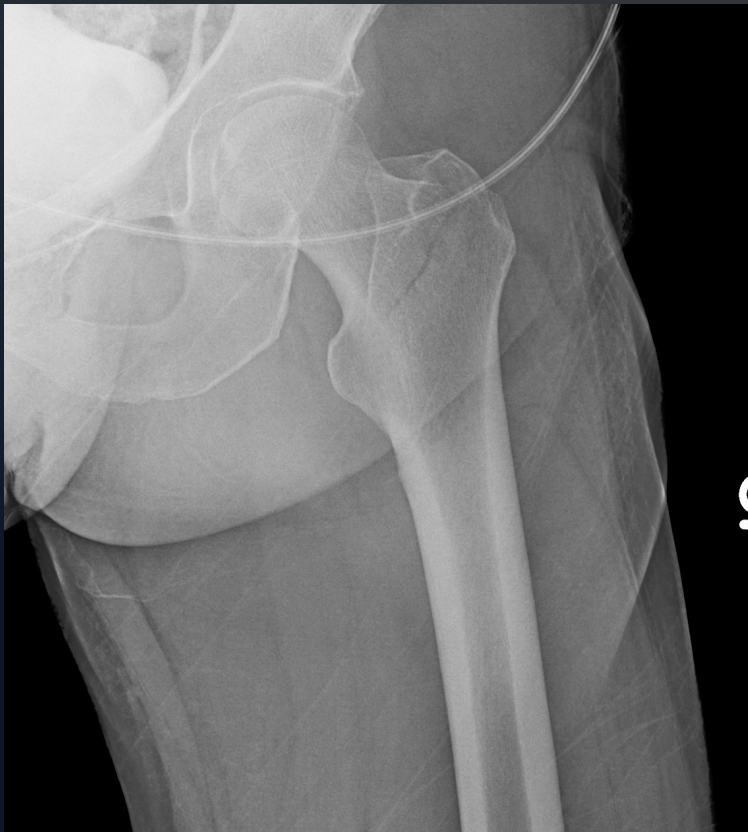


**HIP SCREW**



# Hip Fragility Fractures

**INTERTROCHANTERIC FX**



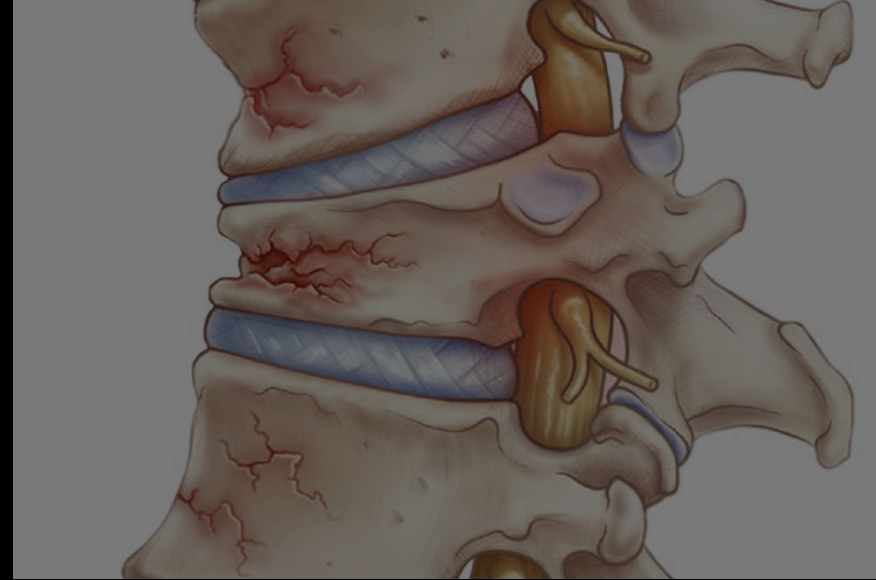
**INTRAMEDULLARY NAIL**



# Hip Fragility Fractures

- Postoperatively:
  - Patients are allowed to weightbear immediately
  - Start medications to prevent blood clots
  - IV antibiotics x24hrs
  - PT/OT for rehabilitation while in the hospital





# Vertebral Fragility Fractures



# Spine Fragility Fractures

## Epidemiology:

- Common in osteoporosis: 1.4m occur worldwide
- One spine fragility fracture occurs every 22s
- A 50 yo woman has a 16% lifetime risk of sustaining a vertebral fracture
- Only 1/3 of fractures are clinically recognized

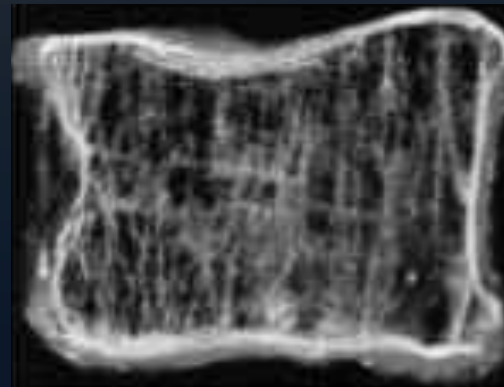
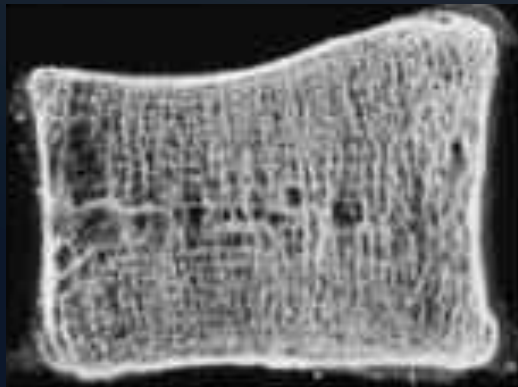




# Hip Fragility Fractures

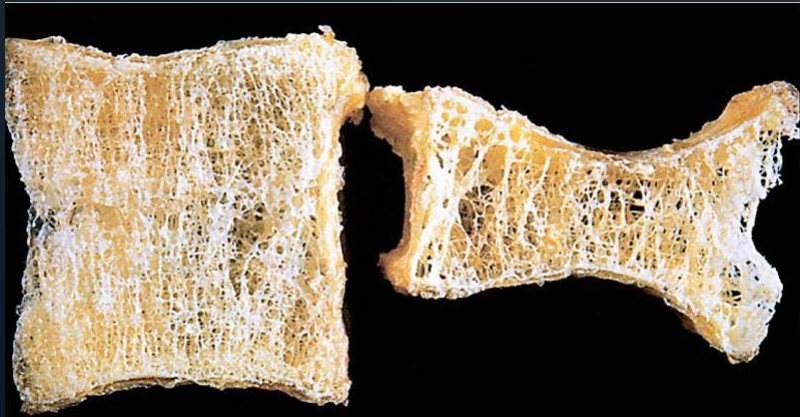
## Significance:

- Leads to back pain, deformity, loss of height, poor mobility, reduced respiratory function
- Associated with an 8-fold increase in mortality
- Fracture begets fracture
  - 1:4 chance of another fracture in next 5 yrs



# Spine Fragility Fractures

- Loss of height
- Deformity



# Distal Radius Fragility Fractures

- Significant association between osteoporosis and distal radius fractures
- Men or women >50yo who have low-energy distal radius fractures should be screened for osteoporosis



**The best way to treat a fragility fracture is to prevent it**



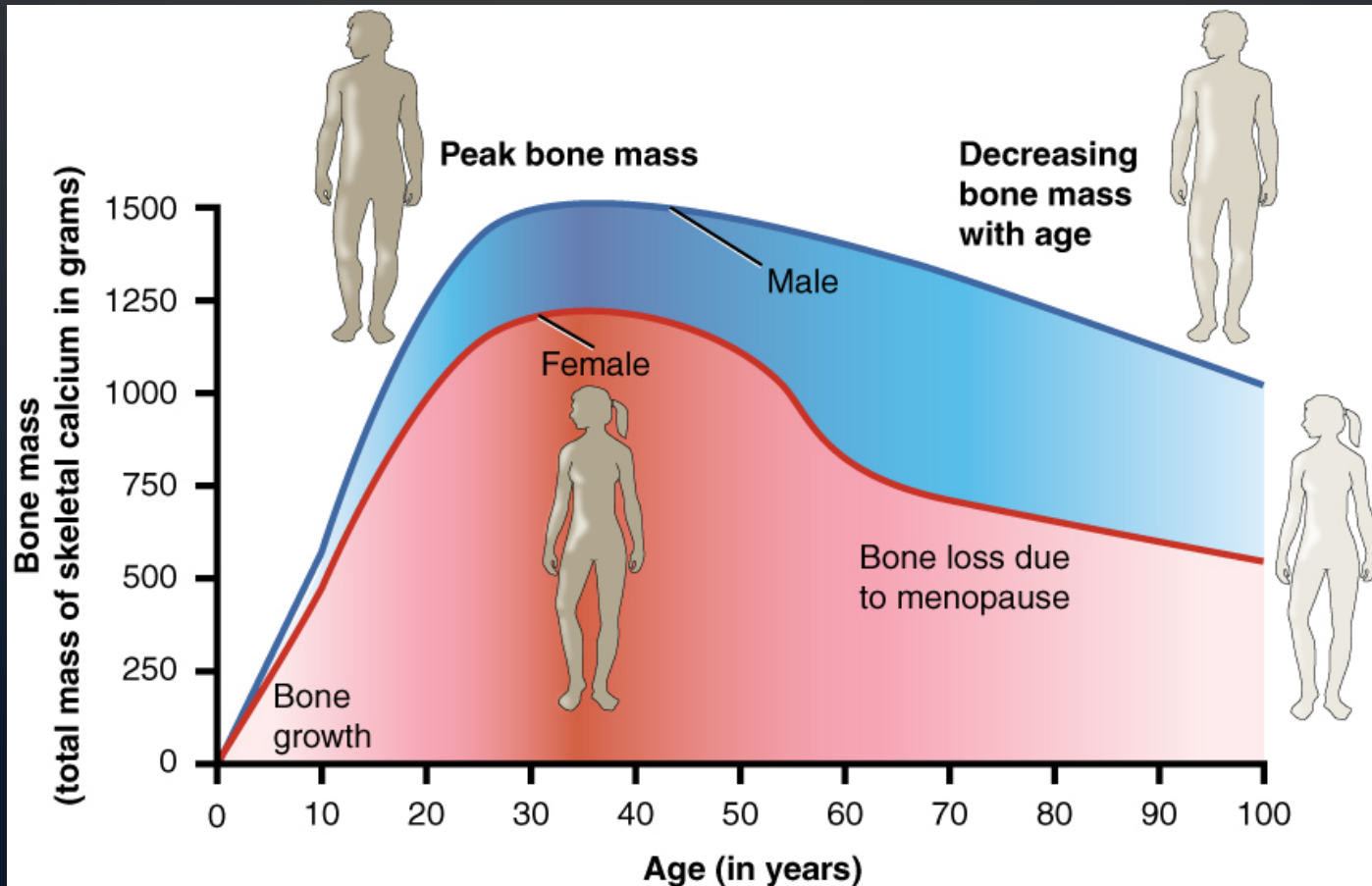
# Fragility Fracture Prevention

## Objectives



- 1** Improve outcomes and quality of care after hip fractures by delivering ANZ professional standards of care monitored by the NZ Hip Fracture Registry
- 2** Respond to the first fracture to prevent the second through universal access to Fracture Liaison Services in every District Health Board in New Zealand
- 3** GPs to stratify fracture risk within their practice population using fracture risk assessment tools supported by local access to axial bone densitometry
- 4** Consistent delivery of public health messages on preserving physical activity, healthy lifestyles and reducing environmental hazards
- 5** Consistent delivery of public health messages to exercise regularly, eat well to maintain a healthy body weight and create healthy lifestyle habits
- 6** Consistent delivery of public health messages on accrual of Peak Bone Mass through a well-balanced diet and regular exercise which promotes bone development

# Fragility Fracture Prevention



# Osteoporosis Screening

## US Preventative Services Task Force:

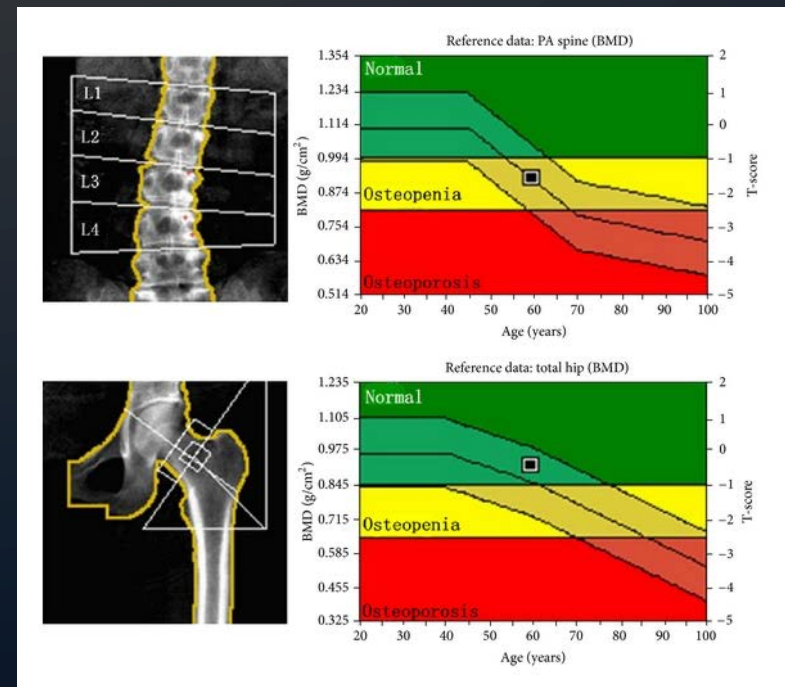
- Women >65yo
- Women <65 yo at risk:
  - Family history
  - Low body weight
  - Smoking, excessive drinking
  - Medical comorbidities
- No recommended routine screening for men



# Osteoporosis Screening

## Dual Energy X-Ray Absorptiometry

- T-score: bone density relative to 30yo
  - -1 to -2.5: osteopenia
  - -2.5 or lower: osteoporosis
- Z-score: age-adjusted

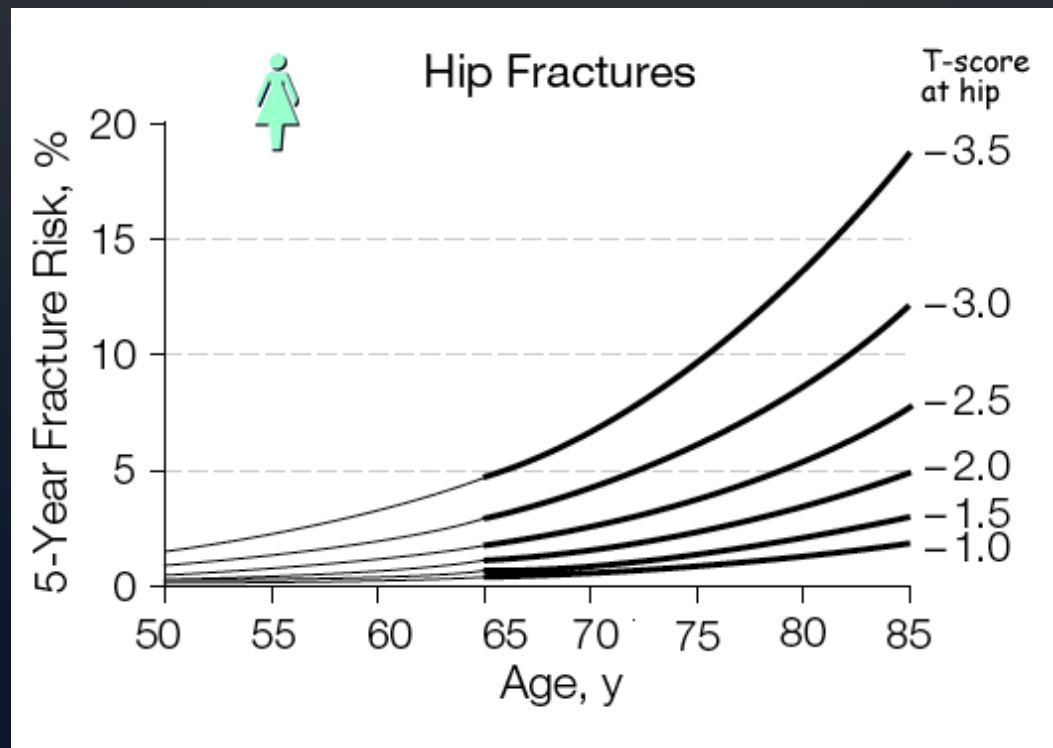




# Osteoporosis Screening

## Dual Energy X-Ray Absorptiometry

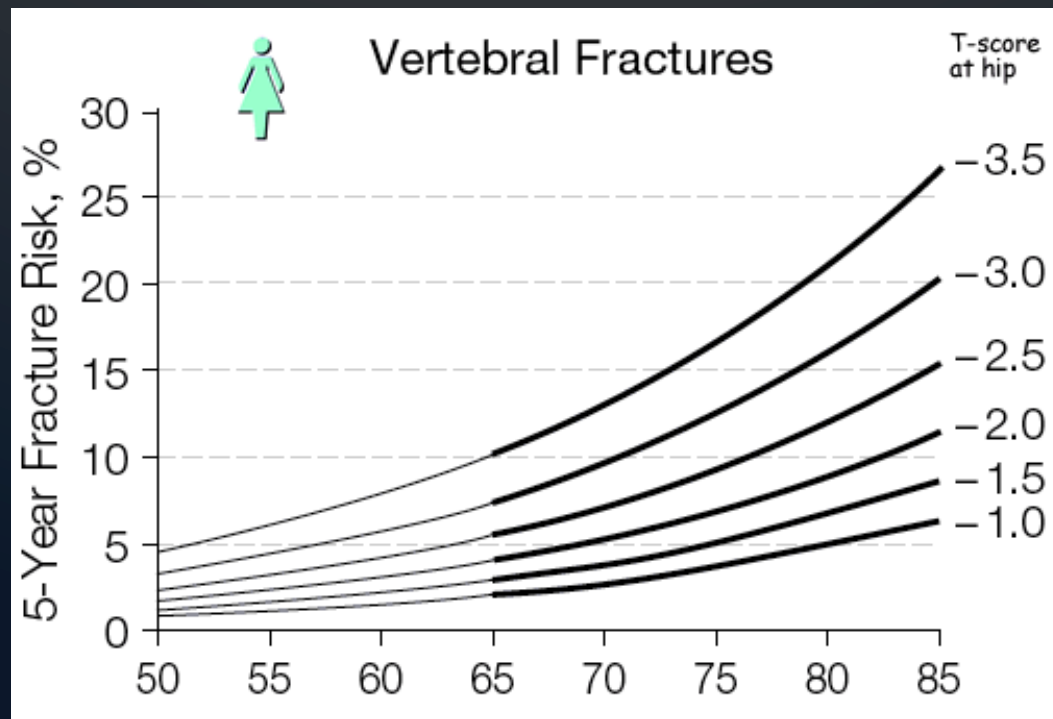
- Correlates with fracture risk



# Osteoporosis Screening

## Dual Energy X-Ray Absorptiometry

- Correlates with fracture risk



# Osteoporosis Treatment

- Calcium / Vitamin D Supplementation

## Antiresorptive

- Hormone Replacement Therapy
- Estrogen Receptor Modifiers
- Calcitonin
- Bisphosphonate
  - Inhibit osteoclast function
  - Induce osteoclast apoptosis
  - Proven to reduce the risk of osteoporosis-related fractures

## Anabolic

- Parathyroid Hormone Analogs



# Preventing Secondary Fractures

- Prior fracture is associated with 86% increased risk of ANY fracture
- After index fracture, it is crucial to have bone health evaluated and begin treatment for osteoporosis
  - Medications to improve strength and decrease fracture risk
  - Fall prevention



# Summary

- Fragility fractures occur in structurally weak bone due to osteoporosis
- Fragility fractures are associated with profound functional loss and mortality risk
- Fracture prevention is critical in osteoporosis
  - High rate of recurrent fragility fracture
  - Timely screening
  - Initiation of osteoporosis treatment



# Thank You

