

Boning Up On Osteoporosis

Nicholas J. Avallone, M.D.

Orthopedic Surgeon

Sports Medicine Specialist

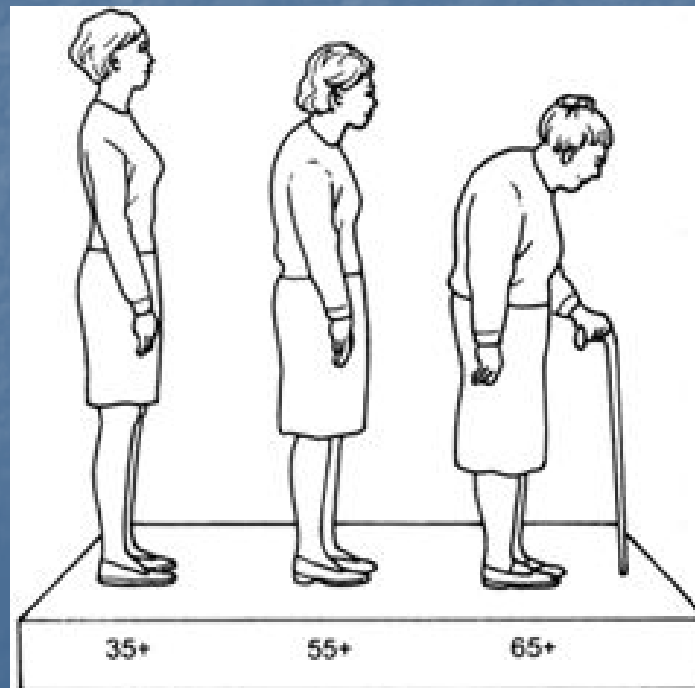
Conflicts of Interest

- I have no relationships with any company listed in this talk.

Resources

- National Osteoporosis Foundation – www.nof.org
- American Academy of Orthopaedic Surgeons – www.aaos.org

Definition and Statistics



Definition

- Osteoporosis is a brittle bone disease that becomes more common as people age
- Fractures most frequently associated with osteoporosis are those of the hip, wrist and spine





Common Problem

- 10 million Americans have osteoporosis
- 33.6 million Americans have low bone mineral density at the hip
- 50% of Caucasian women will suffer a fracture caused by osteoporosis in their lifetime
- 20% of men will have an osteoporosis-related fracture
 - National Health and Nutrition Examination Survey III



Devastating Impact

- 24% of people over 50 will die in the year following a hip fracture
- Those with hip fractures have 2.5x increased risk of another fracture
- 1 in 5 hip fracture patients will require long-term nursing home care
- 40% of hip fracture patients will not return to their pre-fracture level of functioning
 - Surgeon General's Report on Osteoporosis 2004

High Economic Cost

- 17 billion dollars annually due to osteoporosis-related fractures
- Number could triple by the year 2040
- 72% of cost due to hip fractures
 - Surgeon General's Report on Osteoporosis 2004



Basic Science



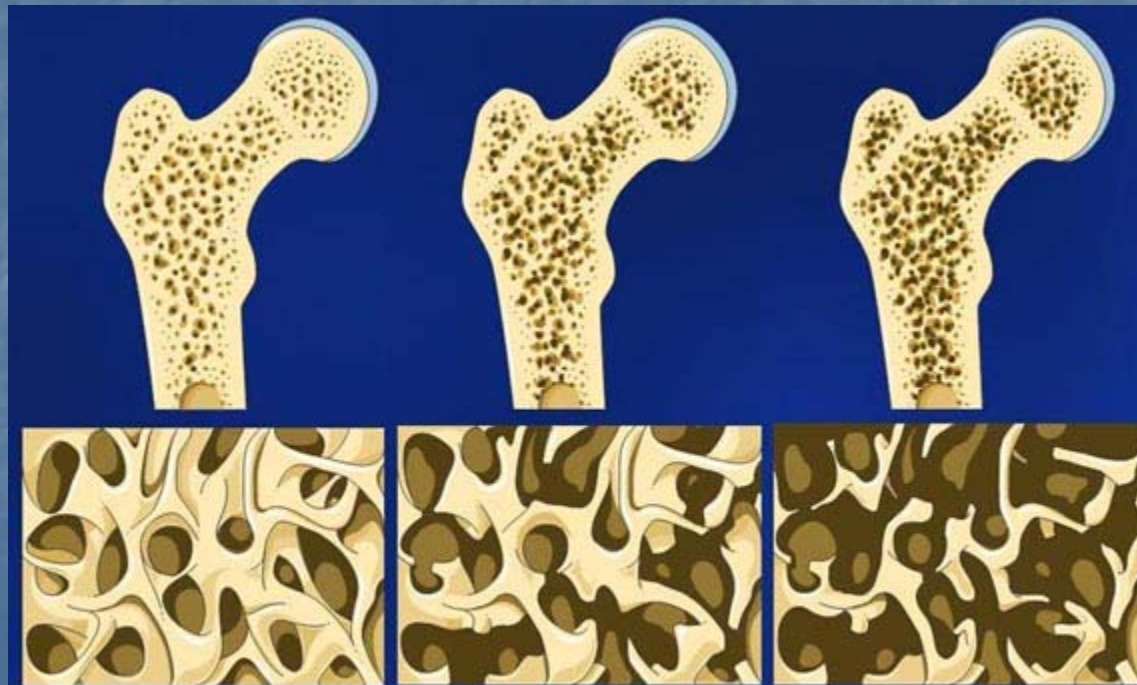
After your mid-30s, you begin to slowly lose bone mass. Women lose bone mass faster after menopause, but it happens to men too.



Source: U.S. Office of the Surgeon General

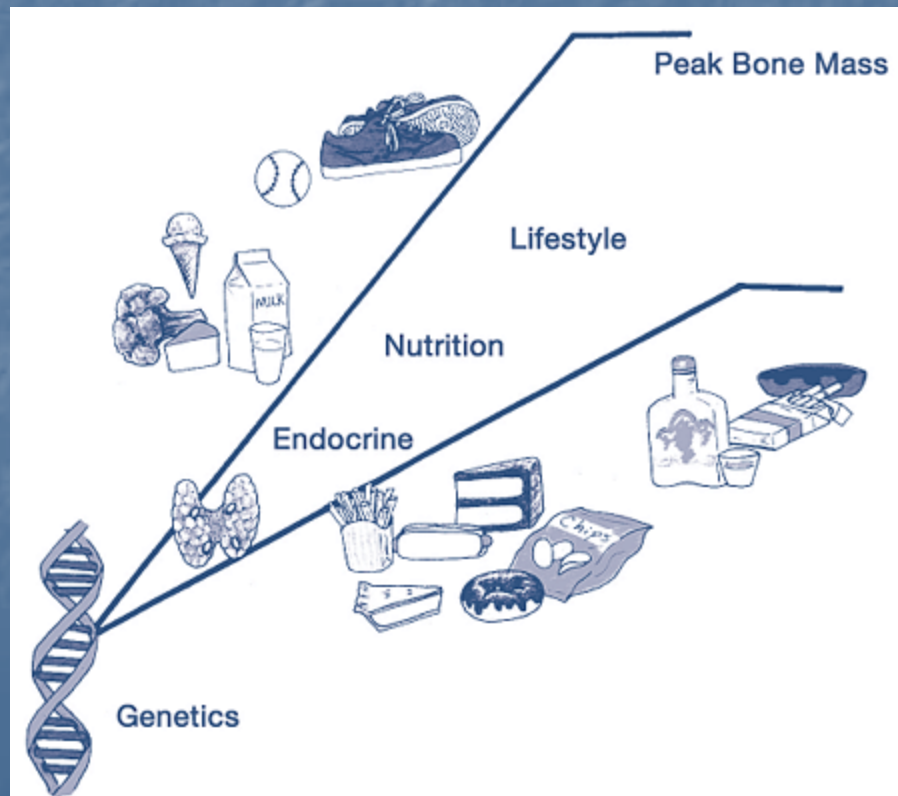
Basic Science

Body normally replaces older bone with new bone, but imbalance occurs in osteoporosis



Osteoporosis

Risk Factors



Lifestyle Risk Factors

- Low Calcium Intake
- Low Vitamin D Intake
- Smoking
- Excessive Alcohol Intake (>3 drks/day)
- Physical inactivity
- Immobilization
 - National Osteoporosis Foundation
- Too Thin
- Frequent Falls





Medical Risk Factors

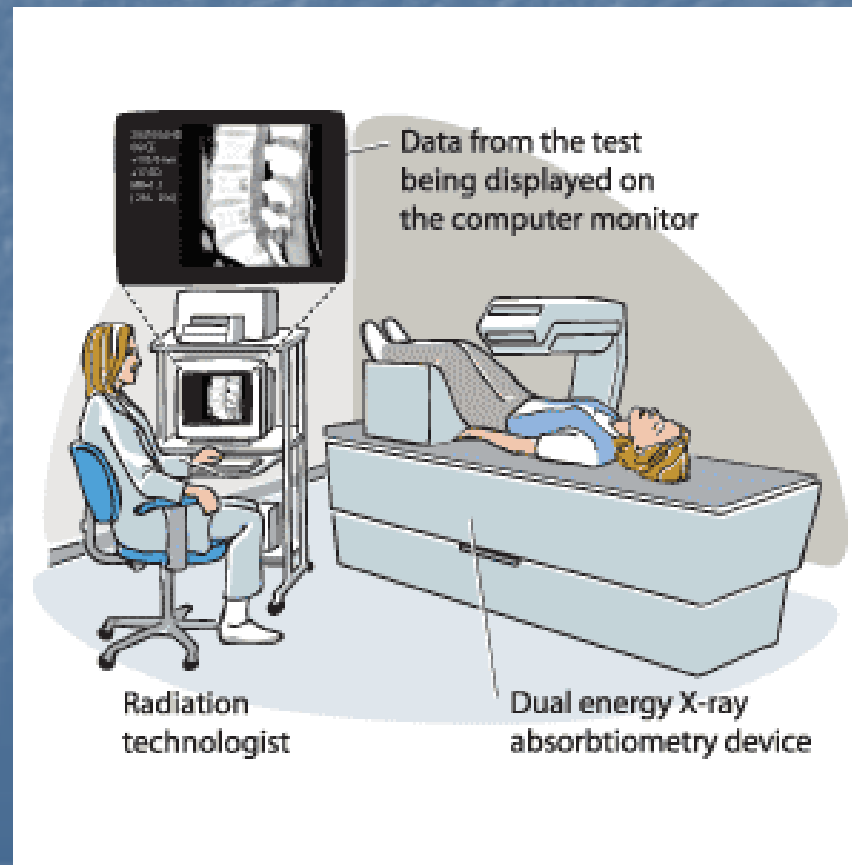
- Parental history of hip fracture/osteoporosis
- Anorexia/Bulimia
- Athletic Amenorrhea
- Menopause
- Diabetes
- Gastric Bypass Surgery
 - National Osteoporosis Foundation
- Rheumatoid Arthritis
- Lupus
- Steroids
- Depression
- Kidney Disease
- Chemotherapy
- Prior Fracture as Adult

Risk Factors for Falls

- Lack of bathroom assistive devices
- Low level lighting
- Slippery outdoor surfaces
- Loose Throw Rugs
- Obstacles in way of walking
 - National Osteoporosis Foundation
- Poor vision/use of bifocals
- Dehydration
- Alcohol
- Sedative Medication
- Hunched back
- Dementia

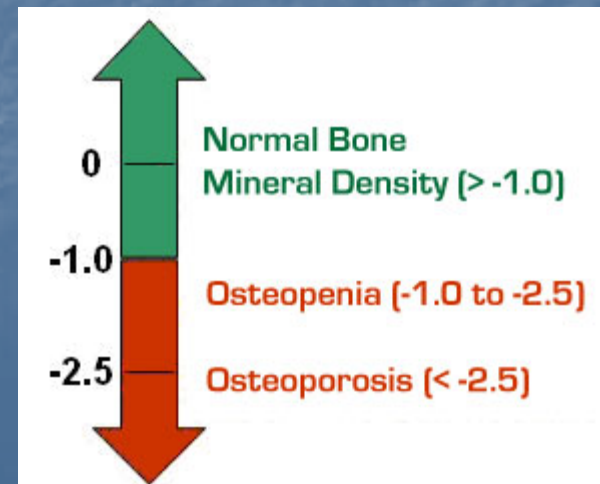


Diagnosis of Osteoporosis



Diagnosing Osteoporosis

- Bone mineral density (BMD) measurements via dual energy x-ray absorptiometry (DEXA) scans
- Low Bone Mass = BMD 1-2.5 standard deviations below the value for a young adult
- Osteoporosis = BMD > 2.5 std dev. below young normal adult
 - World Health Organization





Who should get a DEXA Scan?

- Women age 65 and older
- Men age 70 and older
- Women in menopausal transition who have additional risk factors
- Men age 50-69 with additional risk factors
- Adults with a fracture after age 50
- Adults taking steroids or with a condition associated with development of osteoporosis
 - National Osteoporosis Foundation

Prevention of Osteoporosis



Prevention

Calcium & Vitamin D Intake

■ Calcium Daily Req.

- 1-3 yrs – 500 mg
- 4-8 yrs – 800 mg
- 9-18 yrs – 1300 mg
- 19-49 yrs – 1000 mg
- > 50 yrs – 1200 mg
- Higher doses can cause kidney stones and certain heart conditions

■ Vitamin D Daily Req.

- 1-17 yrs – 400 IU
- 18-71 yrs – 600 IU
- > 71 yrs – 800 IU
- Safe upper limit from Institute of Medicine is 4000 IU

- Sources: American Academy of Pediatrics and National Osteoporosis Foundation



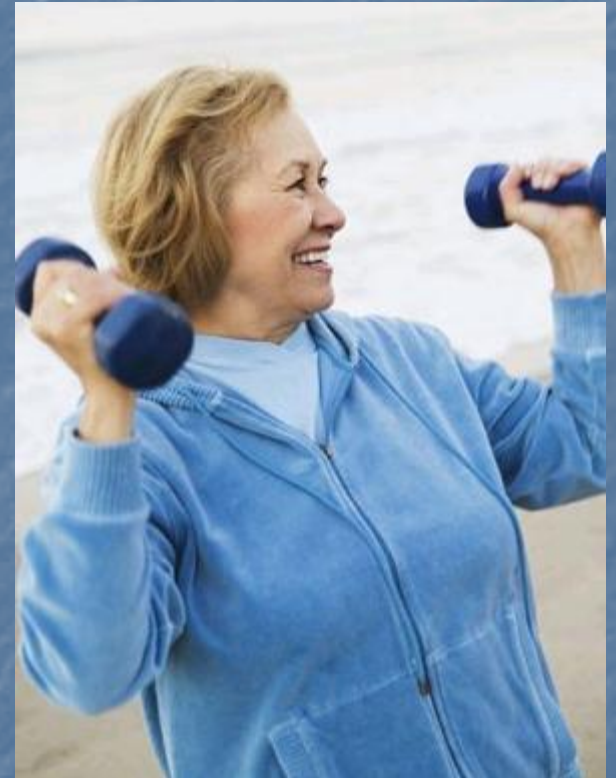
How Much Calcium Is In My Diet?

- Milk 8 oz = 300 mg
- Yogurt 6 oz = 300 mg
- Cheese 1 oz = 200 mg
- Other fortified foods and juices are variable – read label



Physical Activity

- Weight bearing exercise
 - Walking
 - Weight lifting
 - Golf
 - Tennis
 - Yoga



Treatments

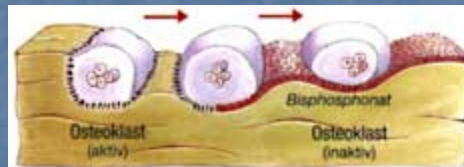
Medications

- Bisphosphonates: Fosamax, Boniva, Actonel, Reclast
- Calcitonin: Miacalcin or Fortical
- Estrogen/Hormone Therapy: eg. Estraderm, Premarin, Prempro
- Estrogen Agonist or Antagonist: Evista
- Parathyroid Hormone: Forteo
- Combination Treatments

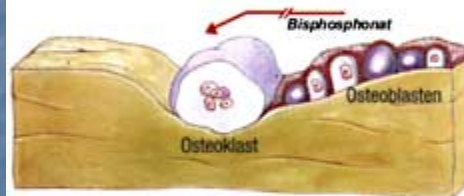


Bisphosphonates

- Inhibit Bone Breakdown by Osteoclast Cells
- Overall, decrease risk of spine fractures by about 50% over three years
- Boniva and Reclast can be given IV



1. Direct inhibition of osteoclasts when they take up bisphosphonate present on bone.



2. Indirect inhibition of osteoclasts via reduction of osteoclast-stimulating activity of osteoblasts.



3. Reduction of number of osteoclasts by influence on their recruitment or life-span.

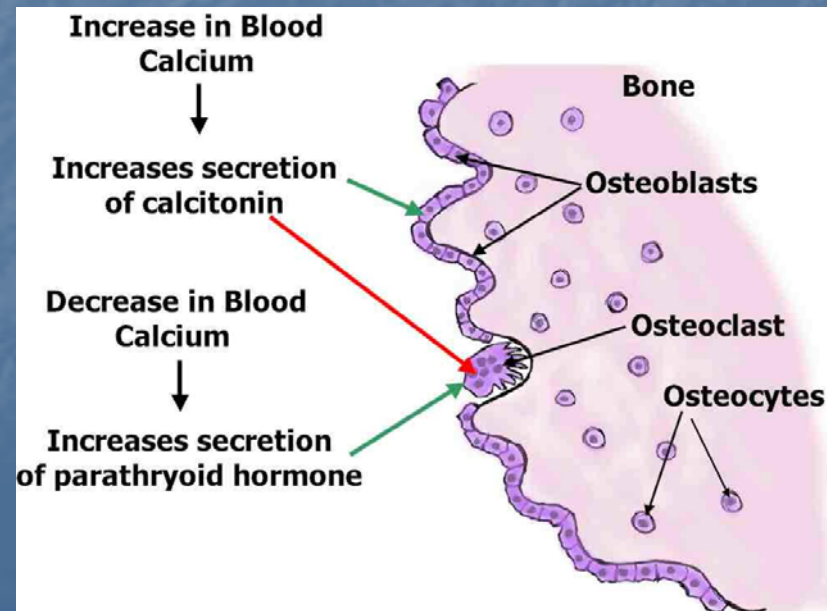


Bisphosphonate Risks

- Ulcers and other GI disturbances
- Osteonecrosis of the jaw in cancer patients treated with IV bisphosphonates
 - Other patients had a very small risk over 5 years
- Visual Disturbances and Red Eye with IV Pamidronate
- Atrial Fibrillation in 1.3% of patients treated with Reclast (0.4% for placebo)
 - National Osteoporosis Foundation

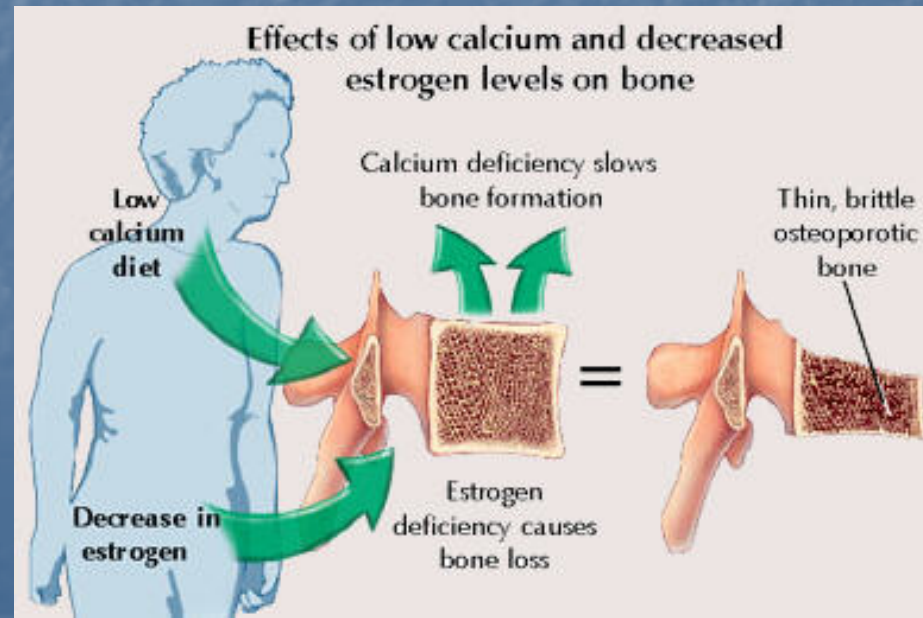
Calcitonin

- Inhibits Bone Break Down by inhibiting osteoclast cells
- Intranasal Spray
- Effectiveness wanes over time
- Few minor side effects



Estrogen/Hormone Therapy

- Replaces depleted biochemicals in postmenopausal women
- Reduces risk of hip and vertebral fractures over 5 years by 34%
 - Women's Health Initiative





ET/HT Risks

- Increased risk of heart attack, stroke, blood clots and breast cancer in patients receiving Prempro in 5 year study
- Estrogen only arm of study did not show any increase in breast cancer over 7 years
- Current recommendation is to use this sparingly for the treatment of osteoporosis
 - Women's Health Initiative

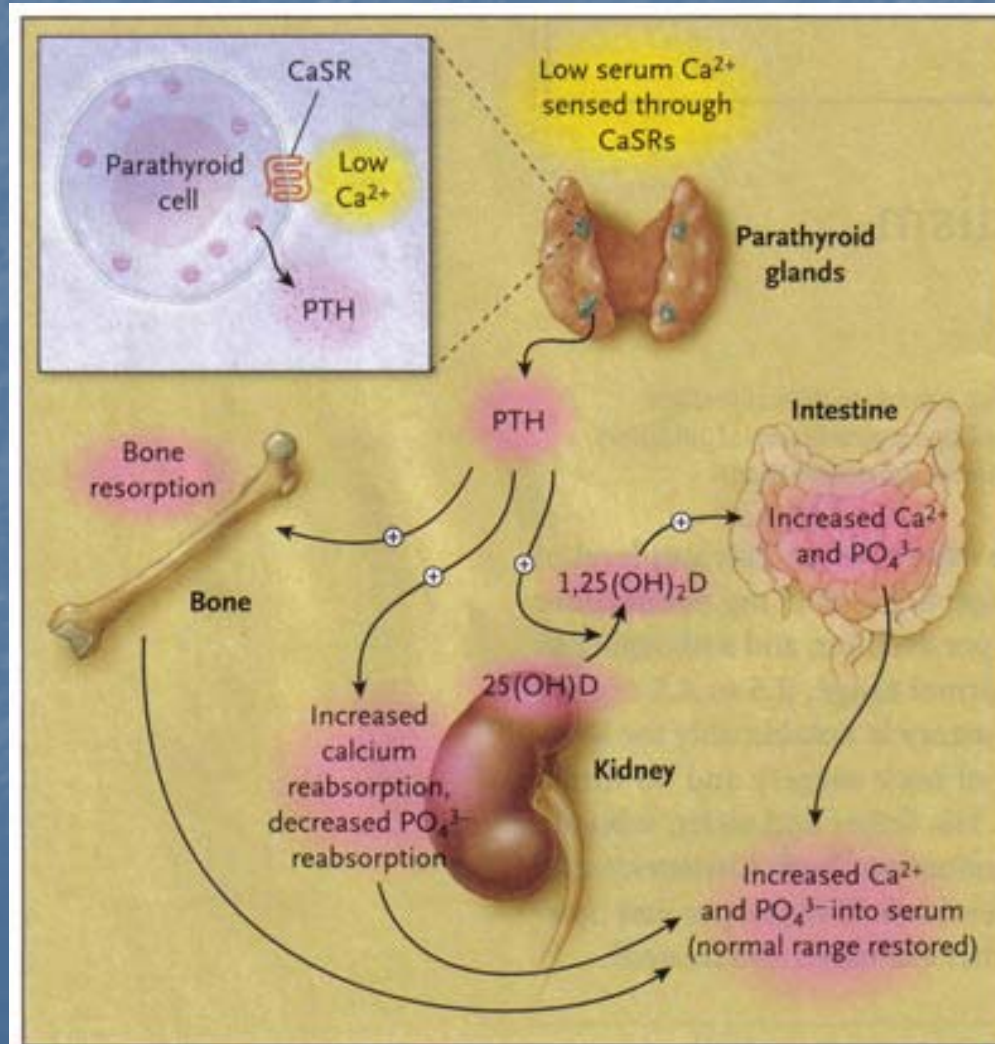
Estrogen Agonist/Antagonist

- Promotes estrogen effects on bone and fats while inhibiting its effects on uterine and breast tissue
- Thus, fewer adverse effects than ET/HT but still higher risk of blood clots
- Reduces risk of spine fracture by average of 42% over 3 yrs



Parathyroid Hormone

- Induces new bone formation through short bursts of indirect stimulation of osteoclasts which then stimulate bone forming osteoblast cells
- Decreases risk of osteoporotic fracture by more than 50% over 2 years



Parathyroid Hormone Risks

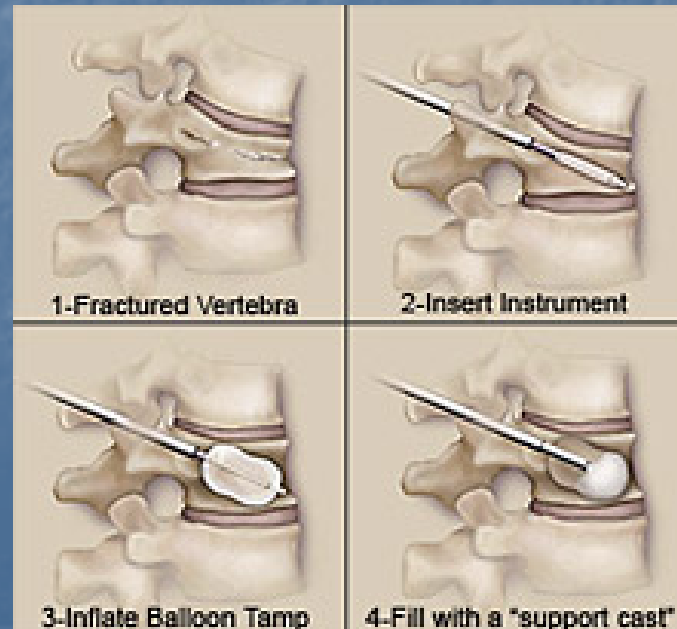
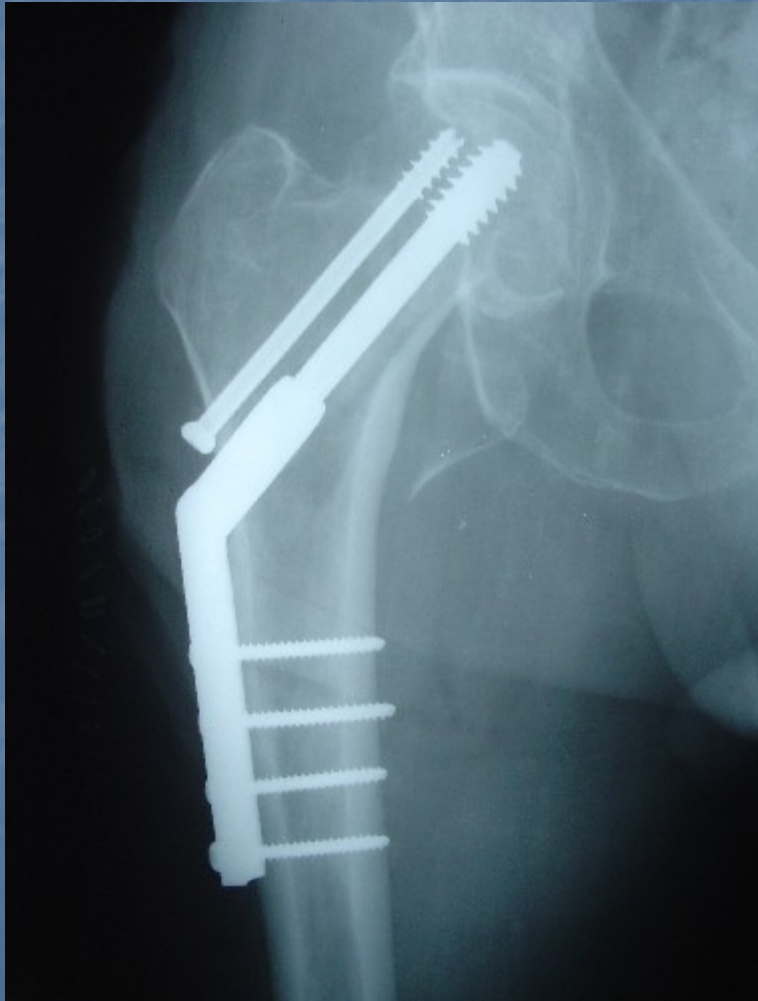
- Not indicated for more than 2 years of use
- Can cause osteosarcoma



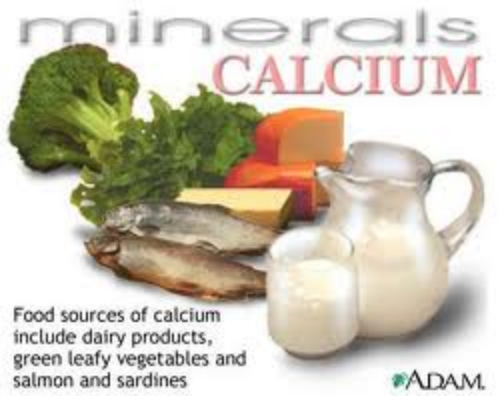
Treatment of Fractures



Casts, Plates, Screws, Cement



Summary



Osteoporosis

- Common Disorder in women
- Preventable through Diet, Exercise and Eliminating Lifestyle Risk Factors
- Prompt Diagnosis essential to preventing fractures
- Medical treatment can decrease risk of fracture
- Surgical Treatments of Fractures Frequently performed

Thank You