

Osteoporosis

↯ Osteoporosis (OP) is characterized by:

- Low bone mass
- Micro-architectural deterioration
- Compromised bone strength
- Increased risk for fracture

↯ “Silent disease” until complicated by fractures

↯ Most common bone disease in humans

Risk Factors

- History of fracture as an adult
- Fragility fracture in first degree relative
- Caucasian/Asian postmenopausal woman
- Estrogen deficiency at early age (< 45 YO)
- Low body weight (< 127 lb= 57.6 kg)
- Low physical activity
- Current smoking
- 2 alcoholic drinks/day
- Use of oral corti costeroids > 3 mo.
- Low calcium intake (lifelong)
- Excess coffee and Soft drinks

Factors Associated with Bone Loss in Men

- Genetics
- Smoking/alcohol
- Calcium intake
- Testosterone production
- Physical activity/strength
- Estrogen production

Diseases Associated with Increased Risk of OP

- COPD
- Malabsorption, Malnutrition
- Cushing’s syndrome
- Thyrotoxicosis
- Hyperparathyroidism
- RA, other autoimmune Connective tissue diseases
- Inflammatory bowel disease
- Psychiatric Disorders e.g. Anorexia nervosa, Depression
- Hypophosphatasia
- Vitamin D deficiency
- Multiple sclerosis

- Multiple myeloma
- Stroke (CVA)
- Insulin dependent diabetes
- Liver diseases
- Kidney disease
- Osteogenesis imperfecta

Drugs Associated with Reduced Bone Mass

- Aluminum
- Lithium
- Anticonvulsants
- Glucocorticosteroids (oral/high dose inhaled)
- Cytotoxic drugs
- Immunosuppressants
- Heparin (chronic use)
- Excess thyroid replacement
- Gonadotropin-releasing hormone

Clinical Features of Spinal OP

- No early warning symptoms.
- Height loss (vertebral wedging and collapse due to compression fracture).
- Dorsal Kyphosis.
- Protuberant lower abdomen with early satiety, bloating and nausea
- Pain (burst fractures involving the posterior cortex)
- Paraspinal muscle pain
- Leg pain and neurologic deficits (neuroforaminal stenosis).
- Restrictive lung disease.

Measurement of Bone Density

Conventional x-ray

- Does not recognize OP until around 25-30% of bone density has been lost.
- Helpful for the diagnosis of fractures secondary to OP.

Dual Energy X-ray Absorptiometry (DEXA):

Measures BMD of spine (L2-L4) and hip

Should be performed on:

- Women age 65 and older.
- Postmenopausal women under age 65 with one or more additional risk factors (besides menopause)
- Postmenopausal women who have had a fracture.
- Women considering therapy for OP
- Women on hormone replacement therapy for prolonged time
- Diseases associated with bone loss.
- Medications that cause bone loss.

BMD is compared to two norms:

1. Young normal (=T-score): compares BMD to optimal or peak density of a 3-year old healthy adult.
2. Age-matched (= Z-score): compares BMD to what is expected in someone of the same age and body size (misleading).

The difference between patient's BMD and that of a healthy young adult is referred to as a standard deviation (SD).

WHO Definitions of OP Based on Bone Density Levels

Normal	T-score within ± 1 SD
Osteopenia	T-score between -1 and -2.5 SD
OP	T-score < -2.5 SD
Severe OP	T-score < -2.5 SD and there has been one or more osteoporotic fractures

Treatment of OP

Patient Education

- Prevention of fall.
- Lifestyle changes:
- Habits: avoid smoking and excessive caffeine and alcohol
- An adequate intake of calcium 1500mg/day and vitamin D 800 IU/day
- Physical activity.

Medications

- Bone-Resorption Inhibiting Agents
 - Estrogen
 - Bisphosphonate

- Raloxifene
- Calcitonin
- Bone-Formation Stimulating Agents
 - Fluoride
 - Androgen
 - Growth hormone
 - Parathyroid hormone
- Acetaminophen, NSAIDs or Narcotics to control pain of vertebral fracture

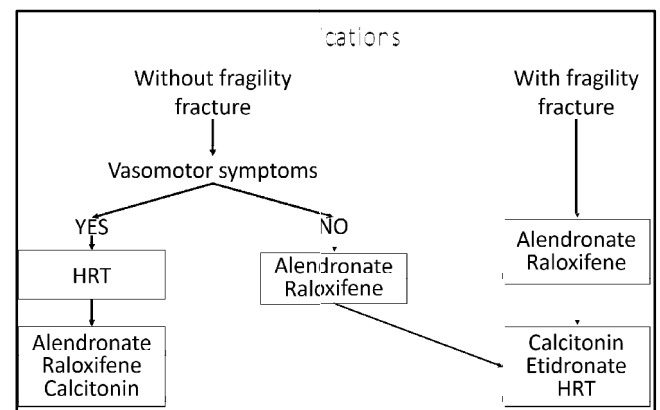
Drugs

- Alendronate (Fosamax®)
 - 10 mg once daily
 - 70 mg once weekly
 - 70 mg/2800 IU weekly
- Risedronate (Actonel®)
 - 5 mg once daily
 - 35 mg once weekly
- Ibandronate (Boniva®)
 - 2.5 mg once daily
 - 150 mg once monthly
- Zoledronic Acid (Reclast®)
 - Approved for treatment of OP in postmenopausal women
 - Single 5 mg infusion given IV over > 15 minutes, once yearly
 - Should still supplement with calcium/vitamin D
 - Ideal for those with GI contraindications to the oral formulations

Who Should Be Treated?

NOF Recommendations – 2008: Initiate therapy to reduce fractures in postmenopausal women/men > 50 with:

- BMD T-scores < -2.5 at hip or spine
- Prior vertebral or hip fracture
- Low bone mass (T-scores -1.0 to -2.5 at hip or spine) with risk of fracture



Rehabilitation

- Bracing for vertebral fracture
 - Indications
 - Acute pain (immobility to lessen bed rest duration).
 - Chronic pain (substitute weak muscles, ↓ligament strain, protection)certain sports and recreational activities.
- Physical therapy
 - Evaluate gait and balance.
 - Improve balance, provide assistive devices if necessary.
 - Teach fall technique, back protection, lifting restriction.
 - Weight-bearing exercises ≥ 30 min at least 3 times/Wk
 - Paraspinal muscle stretching and strengthening
 - Physical modalities for pain relief in vertebral fractures.
- Occupational therapy
 - Home modification to reduce risk of falling:
 - Remove throw rugs
 - Non-skid tape of different colours on the outer edges of steps
 - Use ramps instead of stairs
 - Handrails and lighting dark hallways and bathroom
 - Modify or remove bathtub to avoid stepping over the edge of the tub and bending
 - Work simplification to reduce vertebral compressive forces
 - Repositioning of desks, files, to avoid trunk flexion
 - Wheeled office chairs.
 - Long handled reachers and Wheeled carts of proper height to ↓ vertebral strain
 - Electric can openers, knives and mixers to make kitchen tasks easier.
- Surgical
 - Indications
 - ↯ Progressive painful deformity of kyphoscoliosis,
 - ↯ Neurologic deficits, and instability (stenosis).

- Techniques:
 - ↯ Vertebral fixation.
 - ↯ Vertebroplasty