

# Osteoporosis – definitions

A treatable and preventable disease predominately of the elderly which predisposes to the development of fragility fractures

Reduction in Bone Mass and disruption of bone architecture

**LESS BONE AND WHAT BONE IS LEFT IS POOR QUALITY**

# **Quantitative Definitions of Osteoporosis**

- ● **Using Bone Mineral Density**
  - **We can measure it**
  - **It correlates with fracture incidence**
  - **Osteoporosis is more than BMD**
  - **But we can't measure Bone Quality**

# WHO Definition

**Normal Bone** – within 1 SD of mean young adult normal value for BMD

**Osteopenia** – between -1 and -2.5 SD of young adult normal value for BMD

(Severe Osteopenia is  $-2$  to  $-2.5$  SD)

**Osteoporosis** – less than -2.5 SD of young adult normal value for BMD

# **Osteoporosis – The costs**

## **To Patients**

- **Non vertebral fractures- Colles and Proximal femoral**
- **Vertebral fractures**
  - **Pain, loss of height, kyphosis**
  - **Immobility, deformity**
  - **Loss of independence (50%)**
  - **Perioperative Morbidity Mortality**

## **To the Taxpayer**

- **£ 1.7 Billion per annum in UK**
- **20,000 fragility fractures per annum in Scotland**

# Fractures

## Hip fractures

- **cause greatest morbidity and mortality**
- **usually always follow a fall and require hospitalisation and treatment**
- **mortality at 6 months 12-20 %**
- **Peak age – 80 yrs for females**

## **More Fractures...**

- **Colles fractures**
  - **Fall on outstretched hand**
  - **4-6 weeks in plaster**
  - **Pain, sympathetic dystrophy, deformity, functional impairment**
  - **Peak age – 65 years old for females**

### **Vertebral fractures**

- **Vertebral deformity – loss of height and kyphosis**
- **May occur with bending, lifting, coughing**
- **33 % present with pain possibly radicular**

# Diagnosis when NO fracture

- **No symptoms until fracture**  
**Insufficient resources to DEXA everyone**  
**Need to spot those at high risk of fracture**

## **High Risk**

**Females**

**Age > 60**

**+ ve family history**

## **Others**

**Caucasion**

**Early menopause**

**Low BMI**

**Smokers**

**Sedentary lifestyle**

**Steroids > 3 months**

# **Indications for DEXA**

## **Radiographic osteopenia/vertebral deformity**

- **Loss of height/thoracic kyphosis**
- **Hypogonadism**
- **Previous fragility fracture**
- **Low BMI < 19**
- **Long term steroid therapy**
- **Maternal h/o hip fracture**
- **Diseases associated with OP**
  - **Inflammatory Bowel Disease**
  - **Chronic renal or liver dysfunction**
  - **Hyperthyroidism**
  - **Hyperparathyroidism**
  - **Coeliac disease**
  - **Rheumatoid disease**

- **DEXA Not indicated**
  - **In the very elderly where low BMI is almost universal**
  - **Where there is clear evidence of osteoporosis eg fragility fracture**

# DEXA scanning

- **Low BMD at a site is a good indicator of subsequent fracture at same site**
  - **DEXA measures BMD at at least 2 sites - usually AP Spine and hip**
  - **DEXA scan can predict the 10 year fracture risk as a function of age and BMD**
  - **Low radiation**
  - **Follow up after 2 yrs at minimum**

## **Problems**

- **False high readings with osteophytes and bony spurs or extrasketal calcification.**
- **Access/Expense**
- **Will it alter management ?**

## **Future possibility of using Ultrasound ?**

**Where clinically indicated screen for secondary causes**

- FBC, LFTs, Bone Profile, ESR, PPE, Bence-jones proteins**
- In Men – testosterone, gonadotrophins, Prolactin, 24 hr urinary cortisol**

## **Risk factors for falling (potentially reversible)**

- **Muscle weakness**
  - **Abnormal gait or balance**
  - **Poor eyesight**
  - **Drug therapy – hypnotics sedatives  
antihypertensives and diuretics**
  - **Neurology – PD stroke**
  - **Foot problems**
  - **Arthritis**
  - **Unsafe environment – loose carpets, poor lighting,  
handrails**
- **ASSESS RISK OF FALLS AS WELL AS  
FRACTURES**

## **Prevention of Fragility fractures**

### **Smoking cessation**

#### **Exercise eg walking, tai chi**

**Low impact weight bearing**

**High intensity strength training**

#### **Hip protectors**

**Reduces hip fracture risk by 50-66%**

**Compliance is poor but newer more comfortable ones becoming available**

#### **Calcium**

**High dose supplementation in post menopausal women increased BMD at hip and reduced fracture rate**

**Postmenopausal women should aim for 1000-1200 mg/day or more**

## **Calcium + Vitamin D**

**Reduces incidence of all fractures in  
elderly men and women > 65**

**Should be given to all institutionalised  
elderly patient**

**Cheap and safe**

**Calcium 1000-1200 mg/day**

**Vitamin D 800 iu**

## **HRT**

**Hip fractures median age 80 which is > 25  
years post menopause**

**Risks of Breast cancer with treatments > 10  
years (additional 8 per 10,000)**

**HRT preserves bone mass and reduces  
fracture rate**

**HRT can be used following discussion with  
patient**

## **Bisphosphonates**

**Alendronate**

**Risedronate**

**Etidronate – less potent, less evidence**

- **Taken up by osteoclast and prevent action of osteoclasts to resorb bone.**
- **Reduces bone turnover and maintains bone mass**

Risedronate reduces hip fracture by 40%  
in woman age 70-79 which was similar to

Ca/Vit D

Most Effective are Alendronate and  
Risedronate

Bisphosphonates poorly absorbed 1-5%

Reduces Vertebral and Non Vertebral  
fractures fractures

## Alendronate

- **Given 10 mg/day orally but 70 mg once weekly better tolerated.**
- **S/E Oesophagitis, Gastritis , Anorexia, Weight loss**
- **Take pill in morning with water 30 minutes before meals in up right position**

## Risedronate

- **5 mg po daily or 35 mg once weekly**  
**Give Calcium/Vitamin D along with**  
**Bisphosphonates**

## SERMS

- **Selective Oestrogen Receptor Modulators**
  - **Raloxifene 60 mg /day**
  - **Postmenopausal women**
    - **Alternative to HRT**
  - **Reduces LDL and CV Risk ???**
    - **Worsens hot flushes**
- **No endometrial hyperplasia, uterine bleeding or cancer or breast soreness**
  - **Increased risk of DVT/PE**
- **Reduces risk of Vertebral fractures only**

# Calcitonin

- **Useful for pain relief with osteoporotic fractures – takes 2-4 weeks**
- **Nasal spray 200 iu/dose**
- **Reduces vertebral fractures**
- **Improves bone density 2-3% over 5 years**

## **Parathyroid Hormone**

- **20 mg s/c daily**
- **Analog of PTH – Teriparatide**
  - **Improves BMD**
  - **S/E cramps and dizziness**
    - **2 year max course**
- **causes osteosarcoma in rats**

**Most cost effective prevention is  
Calcium and Vitamin D**

**No evidence that Bisphosphonates  
prevent hip fracture in patients > 80**