

Osteoporosis

Hiteshkumar Tailor

COOP (in the Community)

UCL Medical School
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NHS GP

Objectives

- Definition & Classification
- Pathology
- Clinical Features
- Investigations
- Management
- Prevention

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“Brittle bone disease”

- World Health Organisation (1994)
 - “...a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk.”
- NIH Consensus Development Conference on Osteoporosis (2000)
 - “... a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture.”
 - Bone strength = bone density and quality
 - Bone density = grams of mineral / area or volume
 - Bone quality = architecture

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Clinical definition ^(WHO)

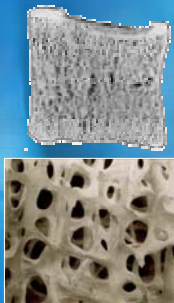
- Bone Mineral Density
- DEXA
 - Normal $T > -1 \text{ SD}$
 - Osteopenia $-1 > T > -2.5 \text{ SD}$
 - Osteoporosis $T < -2.5 \text{ SD}$

(T-score is comparing to young adult mean BMD)

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Architecture

Normal



Osteoporotic



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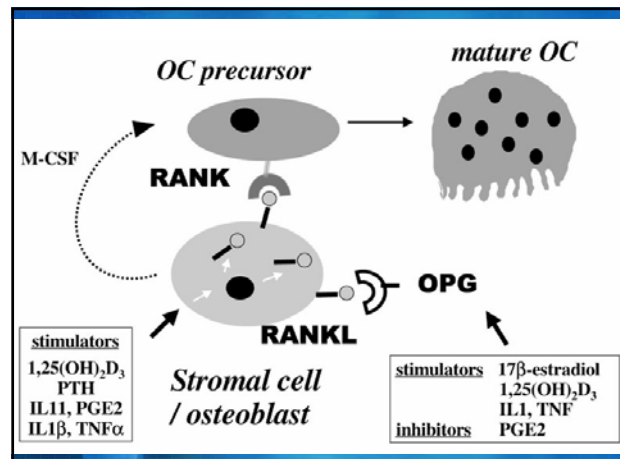
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How does it happen?

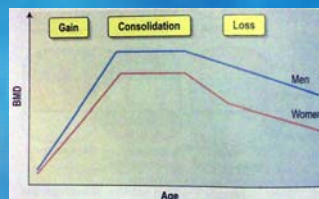
- Osteoclasts (OC) : bone resorption
- Osteoblasts (OB) : bone formation
- Peak bone mass at 25-30 years of age
- Failure of coupling between OB and OC
- Net bone resorption

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How does it happen?

- Increasing age
- Female
- Oestrogen deficiency!
 - Post-menopausal women
 - Premature menopause
- Many more factors...



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Risk factors

- Caucasian/Asian
- Immobility
- Smoking (& alcohol)
- Chronic Diseases
 - Rheumatoid Arthritis
 - GI disease
 - Malignancy
- Hormonal
 - Low oestrogen
 - Low androgen
 - Low Vitamin-D₃ / Ca²⁺
 - Thyrotoxicosis
 - Hyperparathyroid
 - Cushing's syndrome
- Iatrogenic
 - Steroids
- Low BMI

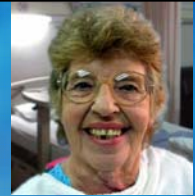
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Mrs Jones

- 70 year old Caucasian woman
- BIBA, Presented with (L) hip pain following a fall in her lounge



- Hip x-ray: #NOF
- Low-energy fracture
 - # from a fall from standing height or less
 - "Fragility fracture"
 - Fall on out-stretched hand : Colles'
 - Back pain/kyphosis (Dowagers Hump)



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Why did Mrs Jones fall?

- Home Hazards



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Why did Mrs Jones fall?

- Home Hazards
- Cardiovascular & Respiratory
 - ECG, Postural BP, Echo [arrhythmias, Pulmonary HTN, IHD]
 - Lung function tests [COPD, fibrosis]
- Neurological
 - Gait, Balance
 - Eyesight
 - Parkinsons, Stroke, Neuropathies, impaired reflexes
- Cognition
 - MMSE, AMTS [Dementia, delirium]

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Why did Mrs Jones fall?

- Medication
 - Polypharmacy, constipation, hypnotics, β -blockers
- Nutrition
 - Malnutrition
 - Vitamin D & Calcium deficiency
 - Alcohol
- Systemic
 - Infection: UTI, sepsis
 - Diabetes Mellitus
 - Renal failure
 - Arthritis with Joint instability

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I would like to run some tests...

- Blood test
 - FBC, U+E
 - Bone parameters: Calcium, ALP, Phosphate
 - Liver function: AST, GGT
 - Creatinine, hormones
- Radiography
 - Femur, Spine, wrist
- DEXA
 - Bone Mineral Density (T-score)
 - Normal / Osteopenia / Osteoporotic



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Management

- Falls Risk reduction



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Management

- Falls Risk reduction
- Lifestyle modification
 - Diet: Increase intake of Ca, Vitamin D
 - Stop/reduce alcohol & smoking
 - Increase physical activity/exercise

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Management

- Medical
 - Medication review
 - Treat co-morbidities
- Environment
 - Home assessment
 - Loose rugs/carpets
 - Footwear / walking aids
 - Staircases

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Rx for Osteoporosis

- Bisphosphonates
- Strontium Ranelate
- SERMs (Selective Oestrogen Receptor Modulator)
- Parathyroid Hormone (rhPTH)



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Bisphosphonates

- Reduce Osteoclast activity
- Alendronate, Risedronate
 - Daily or Weekly
- Ibandronate
 - Monthly
- Zoledronate
 - I.V. once per year
- Adverse effects!



FIGURE 1. Exposed necrotic maxillary bone in a patient receiving zoledronic acid for 6 months. The patient had posterior maxillary extraction performed 6 months earlier. (Courtesy of Dr Jay Neugarten, New Hyde Park, NY.)



...But ...

Mrs Jones fell and had a Colles' fracture 6 months ago!

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Prevention

- Previous fragility fracture
 - ↑↑ risk of a future fracture
- Carpet floor vs. Wooden floor
- Hip protectors



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Interesting statistic

- After a fragility fracture of the hip:
 - 20% die
 - 50% are incapacitated
 - 20% require long-term residential care
- Prevention is better than cure!

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Conclusions

- Osteoporosis = "thinning of the bones"
- Common in post-menopausal women
- Lifestyle changes can increase BMD
- Bisphosphonates are the first line rx
- Minimise the risk of falling by treating co-morbidities and environmental factors

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