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7th EMIRATES FAMILY MEDICINE SOCIETY CONGRESS 2024

DUBAI | UAE | 22 to 24 APRIL

DUBAI WORLD TRADE CENTRE

Osteoporosis prevention,
screening & treatment

Robert A. Baldor, MD, FAAFP
Professor and Chair
Department of Family Medicine
UMass Chan Medical School/Baystate
Springfield/Greenfield Massachusetts,
USA

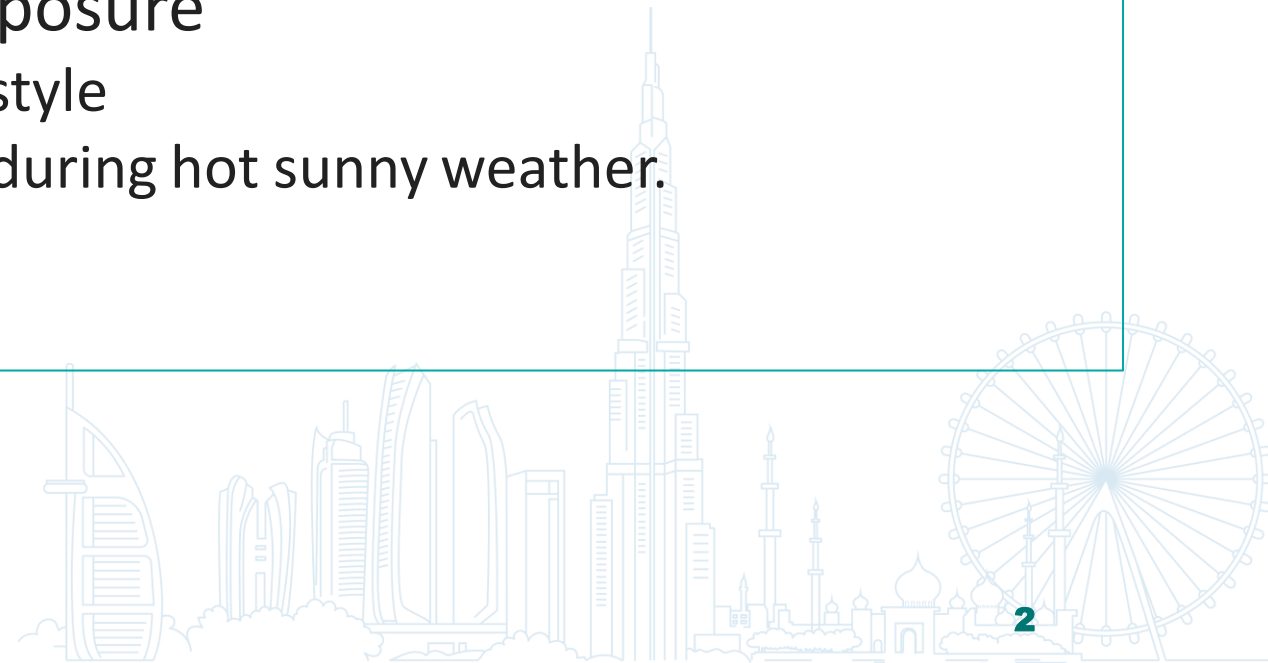
Organized by

WiredIN



Osteoporosis

- Affects 200 million people globally
 - Significant morbidity and mortality
- 2016 UAE report suggested 3.1% prevalence
- UAE women w/ ↑ rates of vit D deficiency
 - Minimizing sunlight exposure
 - conservative dressing style
 - avoiding heat indoors during hot sunny weather.





Osteoporosis

- Low bone mass
 - reflective of inadequate calcium deposition
- Leading to...
 - structural deterioration of bone tissue
 - Increased fracture risk





Definitions.....

- Osteoporosis
 - Spine or hip bone mineral density 2.5 standard deviations *below* the mean measurement of healthy, young women
 - Reported as a ‘T-score’ of -2.5 or below
 - *Hip DEXA has best correlation with outcomes*

Dual-Energy X-ray Absorptiometry (DEXA)





Definitions.....

- Osteopenia (T-score between -1 to -2.5)
 - Spine or hip BMD between 1 and 2.5 standard deviations below mean for healthy, young women.
 - *Not a diagnosis – a descriptor*





Other criteria w/o a $BMD < -2.5$

- H/O a fragility or vertebral fracture
- ACE/others also approach those with osteopenia and a 10-year risk of a fracture $\geq 20\%$ or a risk of a hip fracture of $\geq 3\%$ as having osteoporosis..

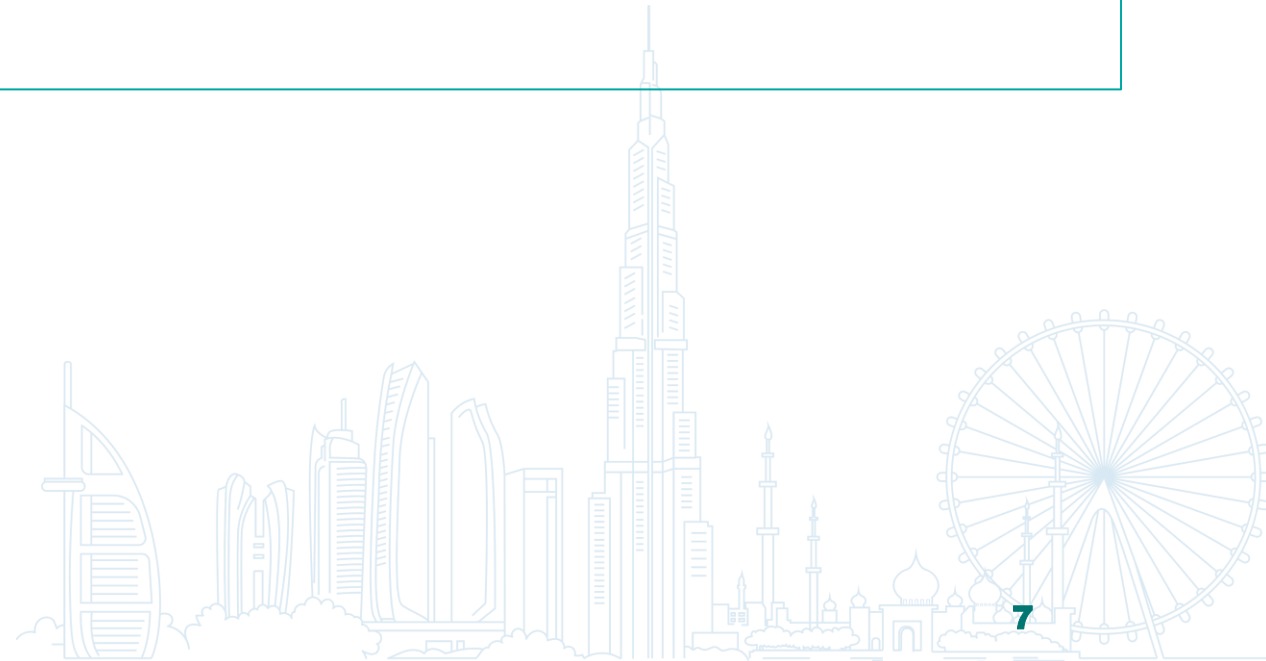




Primary Osteoporosis

Osteoporosis associated with normal aging....

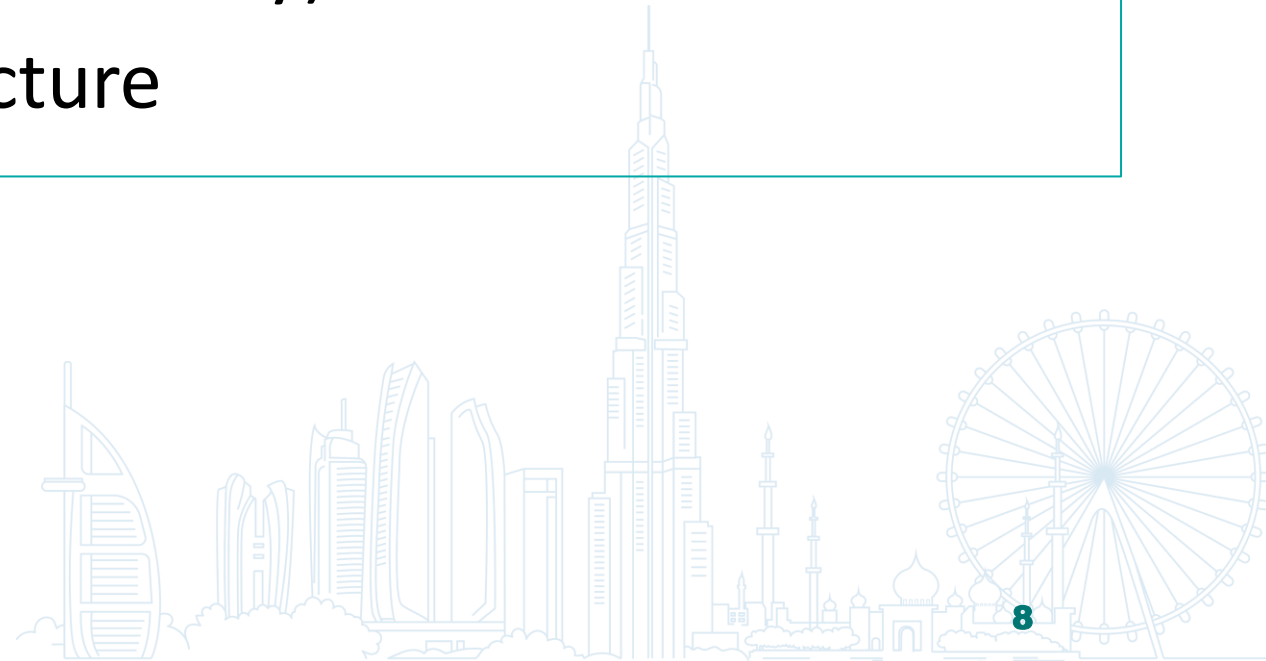
- Reduced gonadal function
- Decreased levels of estrogen
- Leading to bone loss...





Primary Risk Factors

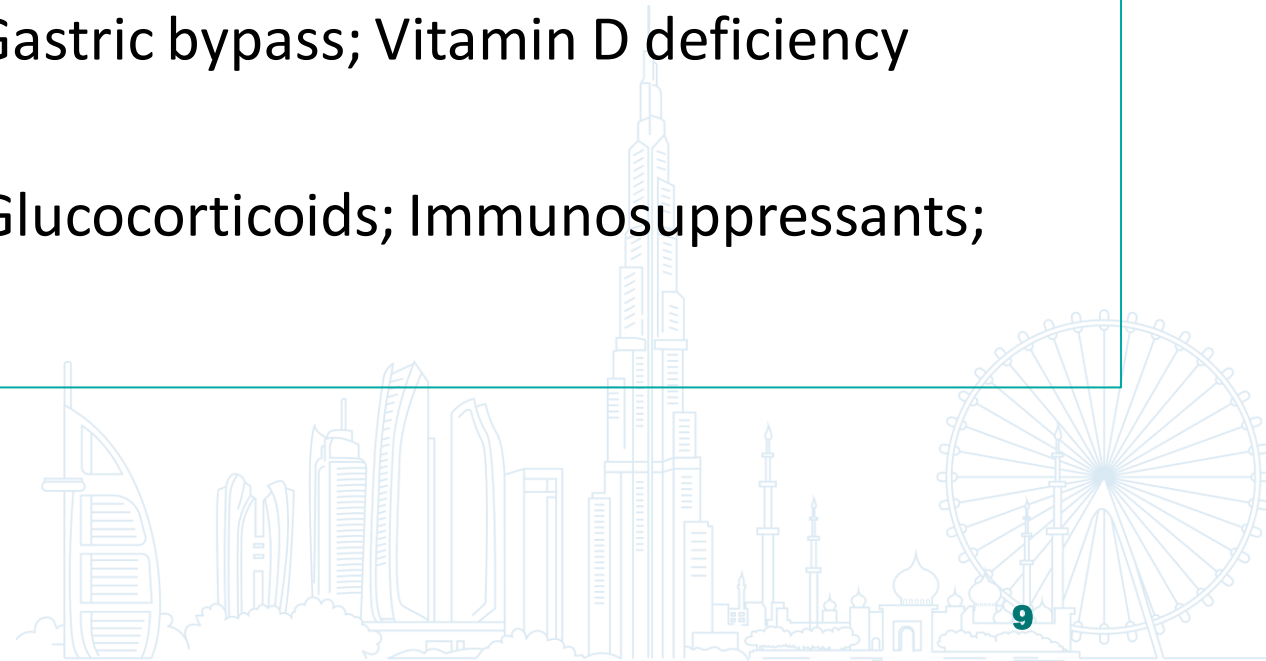
- Low body weight (BMI < 21kg/m²)
- Early menopause
- Tobacco abuse
- Excessive ETOH (> 2drinks daily)
- FH of osteoporotic fracture





Secondary Osteoporosis (not from aging)

- Endocrine disorders
 - T1DM; Hemochromatosis; Hypogonadism; Hyperthyroid
- Chronic disease
 - COPD; RA/SLE; IBD; HIV; Liver disease; Renal insufficiency
- Nutritional influences
 - Anorexia nervosa; Celiac; Gastric bypass; Vitamin D deficiency
- Medication effects
 - Anticonvulsants; Lithium; Glucocorticoids; Immunosuppressants; PPIs; SSRIs





Pathophysiology

- 'Thin' bones
 - due to ineffective calcium metabolism and deposition
- Dependent on Vitamin D & Parathyroid function

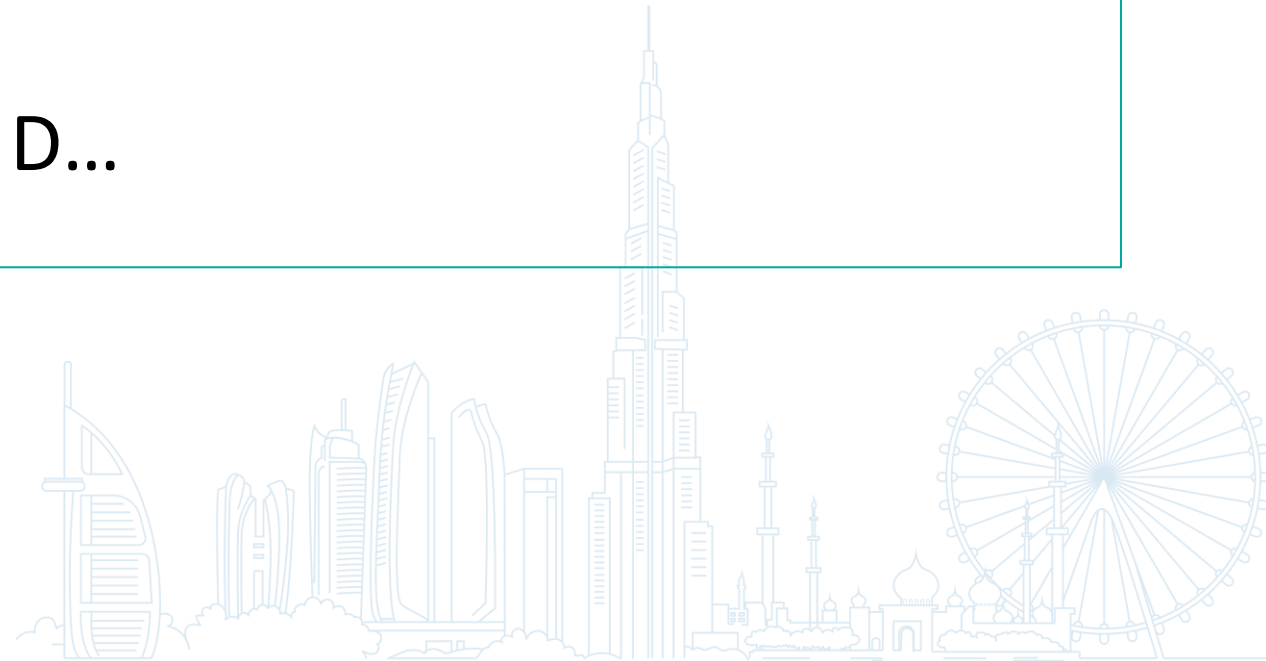




Calcium

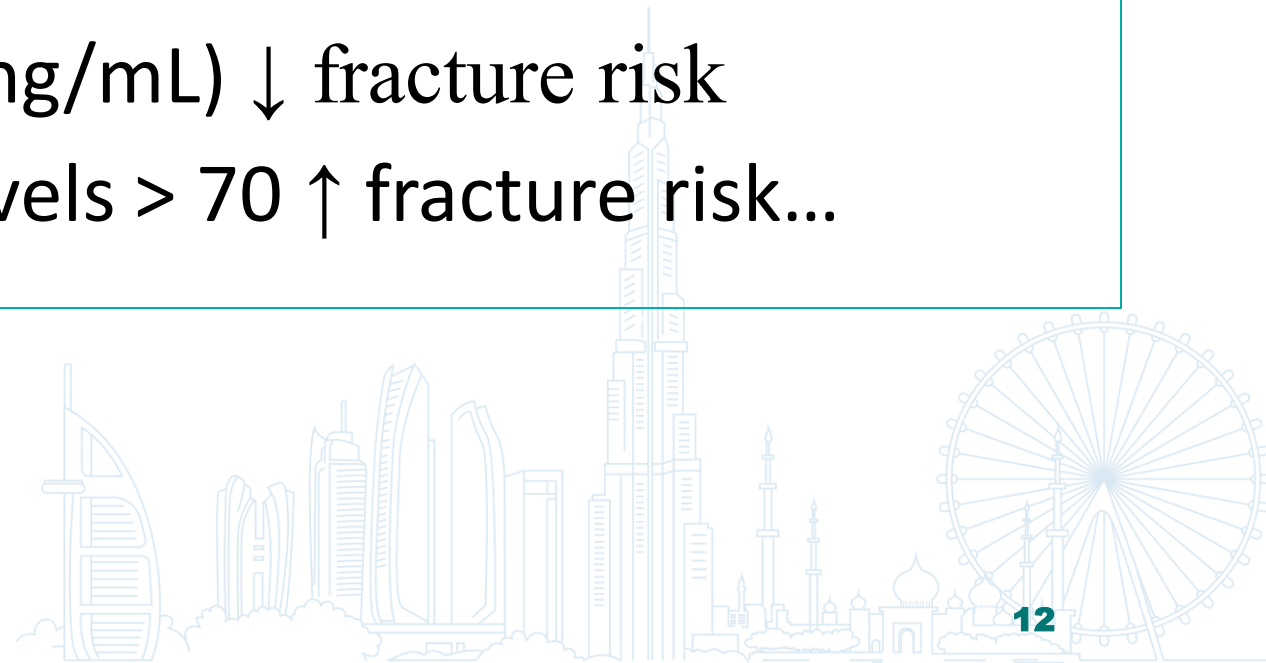
99% of Calcium is stored in bone

- Parathyroid hormone (PTH) releases Ca^+ from bone
 - primary regulation
- Calcitonin promotes Ca^+ uptake by bone
 - minimal effect
- Dependent on Vitamin D...



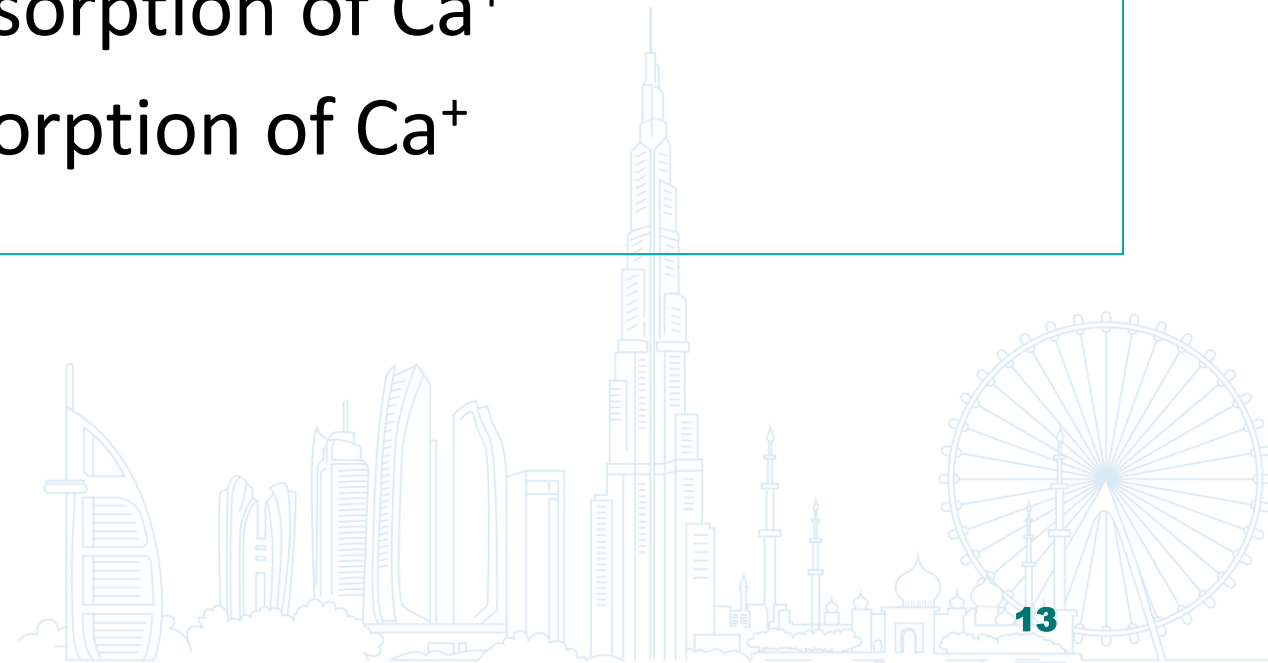
Vitamin D

- Not a Vitamin → a hormone
- Obtained from Diet or Sun exposure
- Promotes Ca^+ binding proteins in small intestine.
- Promotes Ca^+ re-absorption in the kidney
- A normal level (30-50 ng/mL) ↓ fracture risk
- Some evidence that levels > 70 ↑ fracture risk...



PTH/Calcium regulation

- \downarrow serum Ca^+ levels stimulate the parathyroid to \uparrow PTH
- **Main PTH effect is on bone**
 - inhibits osteoblasts/promotes osteoclasts
 - resultant rapid mobilization of Ca^+ from bone (resorption)
- Increases intestinal absorption of Ca^+
- Promotes renal re-absorption of Ca^+



Screening





USPSTF Screening Recommendations

- Does Not recommend screening men
 - Others recommend screening men ≥ 70 years of age...
- All women ≥ 65 years; *and*
- Younger women with a 65-yo woman's fracture risk!

65 yo 10-year fracture risk = 8.4%



So how do you figure that out???

Younger women with a 65-yo woman's fracture risk!

65 yo 10-year fracture risk = 8.4%





The FRAX[®] tool by WHO

To evaluate your patient's fracture risk...
Calculates 10 yr probability of hip fracture

www.shef.ac.uk/FRAX/



Calculation Tool

Please answer the questions below

Country: **Abu Dhabi**

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth

Age:

Date of Birth:

Y:

M:

D:

2. Sex

Male Female

3. Weight (kg)

4. Height (cm)

5. Previous Fracture

No Yes

6. Parent Fractured Hip

No Yes

7. Current Smoking

No Yes

8. Glucocorticoids

No Yes

9. Rheumatoid arthritis

No Yes

10. Second

11. Alcohol

12. Femor

Select

Asia

Europe

Middle East & Africa

North America

Latin America

Oceania

Abu Dhabi

Botswana

Egypt

Ethiopia

Iran

Jordan

Kuwait

Lebanon

Morocco

Palestine

Qatar

Saudi Arabia

South Africa

Syria

Tunisia

Zimbabwe



Weight Conversion

Pounds kg

Convert

Height Conversion

Inches cm

Convert

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Individuals with fracture risk assessed since 1st June 2011

Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: **Abu Dhabi**

Name/ID:

[About the risk factors](#)

Questionnaire:

1. Age (between 40 and 90 years) or Date of Birth

Age:

Date of Birth:

Y:

M:

D:

2. Sex

Male Female

3. Weight (kg)

4. Height (cm)

5. Previous Fracture

No Yes

6. Parent Fractured Hip

No Yes

7. Current Smoking

No Yes

8. Glucocorticoids

No Yes

9. Rheumatoid arthritis

No Yes

10. Secondary osteoporosis

No Yes

11. Alcohol 3 or more units/day

No Yes

12. Femoral neck BMD (g/cm²)

Select BMD

Clear

Calculate

BMI: 19.1

The ten year probability of fracture (%)



without BMD

Major osteoporotic

4.2

Hip Fracture

1.3

65 yo risk = 8.4%
No need for scan



Weight Conversion

Pounds kg

Convert

Height Conversion

Inches cm

Convert

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Individuals with fracture risk assessed since 1st June 2011

Calculation Tool

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No Yes

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No Yes

7. Current Smoking

No Yes

8. Glucocorticoids

No Yes

9. Rheumatoid arthritis

No Yes

10. Secondary osteoporosis

No Yes

11. Alcohol 3 or more units/day

No Yes

12. Femoral neck BMD (g/cm²)

Select BMD

Clear

Calculate

BMI: 19.1

The ten year probability of fracture (%)



without BMD

Major osteoporotic	8.5
Hip Fracture	2.5

65 yo risk = 8.4%
Obtain Dexa Scan



Weight Conversion

Pounds kg

Convert

Height Conversion

Inches cm

Convert

72

Individuals with fracture risk assessed since 1st June 2011



DEXA Scan...

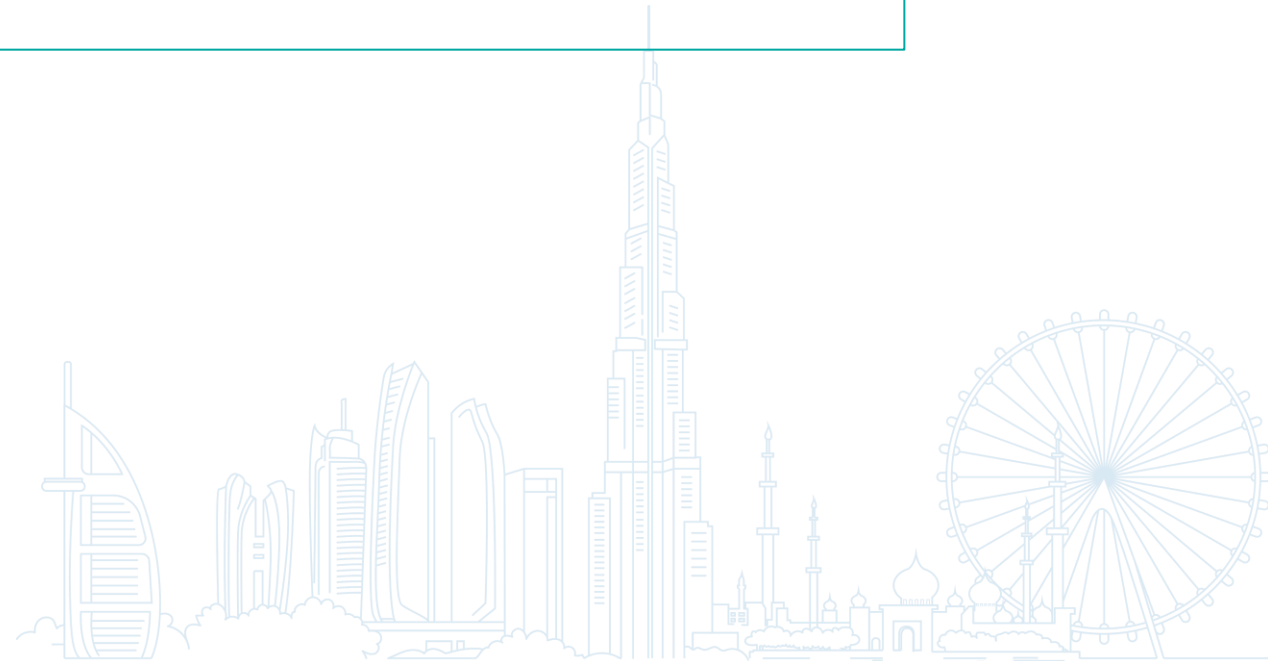
Assess bone mineral density at the hip & lumbar spine

T score \leq -2.5 = Osteoporosis



Once diagnosed – what's the work-up?

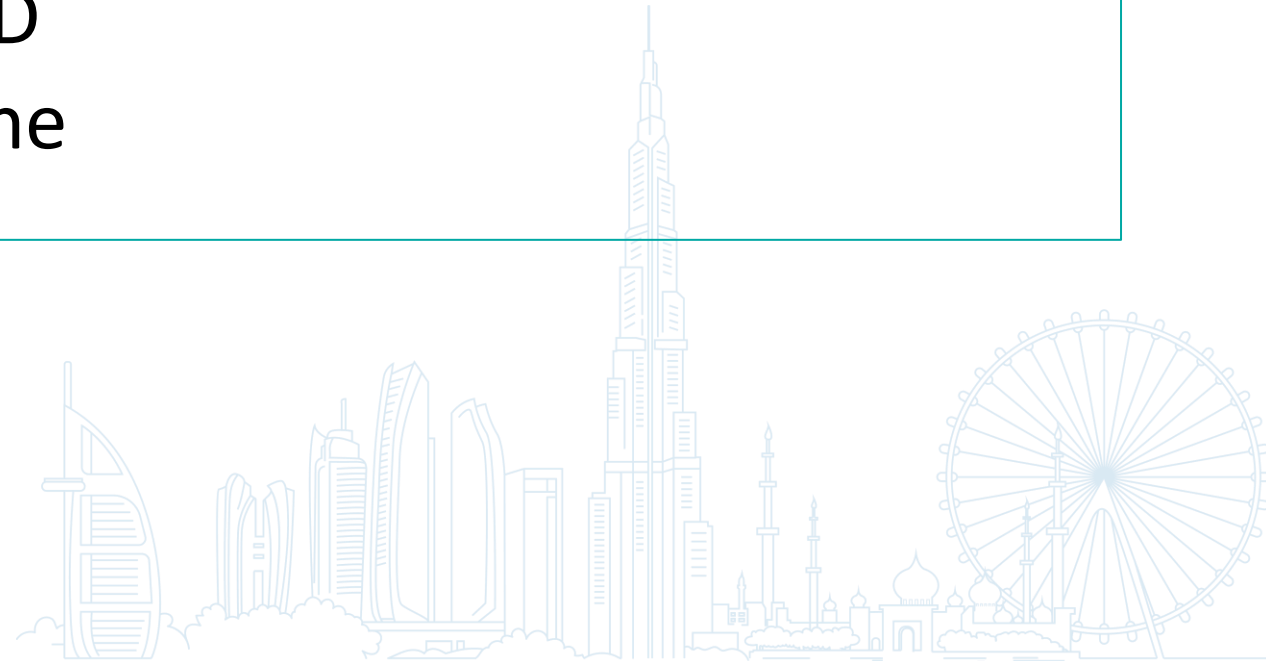
22





Work-up – rule out 2nd causes..

- CBC (immune deficiency)
- BUN/Creat/LFT's
- Alk PO_4 (\uparrow Paget's disease)
- Ca^+ (\uparrow hyperparathyroid; \downarrow malsorption)
- 25-hydroxyvitamin D
- Parathyroid Hormone





If other suspected 2nd causes..

- TSH (hyperthyroid)
- Estradiol (hypogonadism – pre-menopausal)
- SPEP (multiple myeloma)
- Testosterone (men)

Treat any underlying causes....





Treatment Options





For All

- Limit ETOH/Stop smoking
- Walking/Weight training
- Falls prevention strategies
 - Avoid throw rugs, handrails, PT gait training
- Vitamin D (1,000 IU per day)
 - maintain level 30-50 ng/mL
- Calcium (1,200 mg per day)





Is Calcium Bad for Health??

Women's Health Initiative follow-up analysis of VitD/Ca

- Supplement ↓ odds of dying from cancer by 7%.
- However, it also ↑ odds of fatal heart disease by 6%.
 - ? calcium supplements ↑ coronary artery calcification?

Bottom line: "no net effect on all-cause mortality".

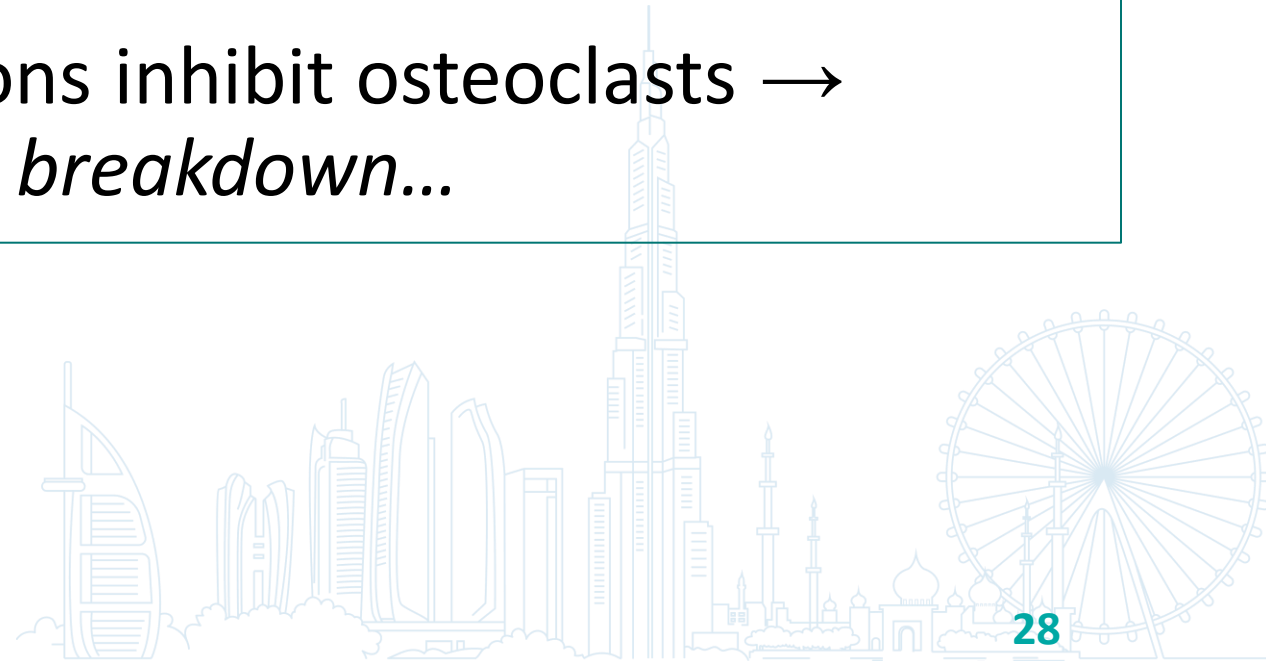


Medications...

Antiresorptive w/proven hip fx reduction:

- Bisphosphonates (alendronate, risedronate, or zoledronic acid)
- Denosumab

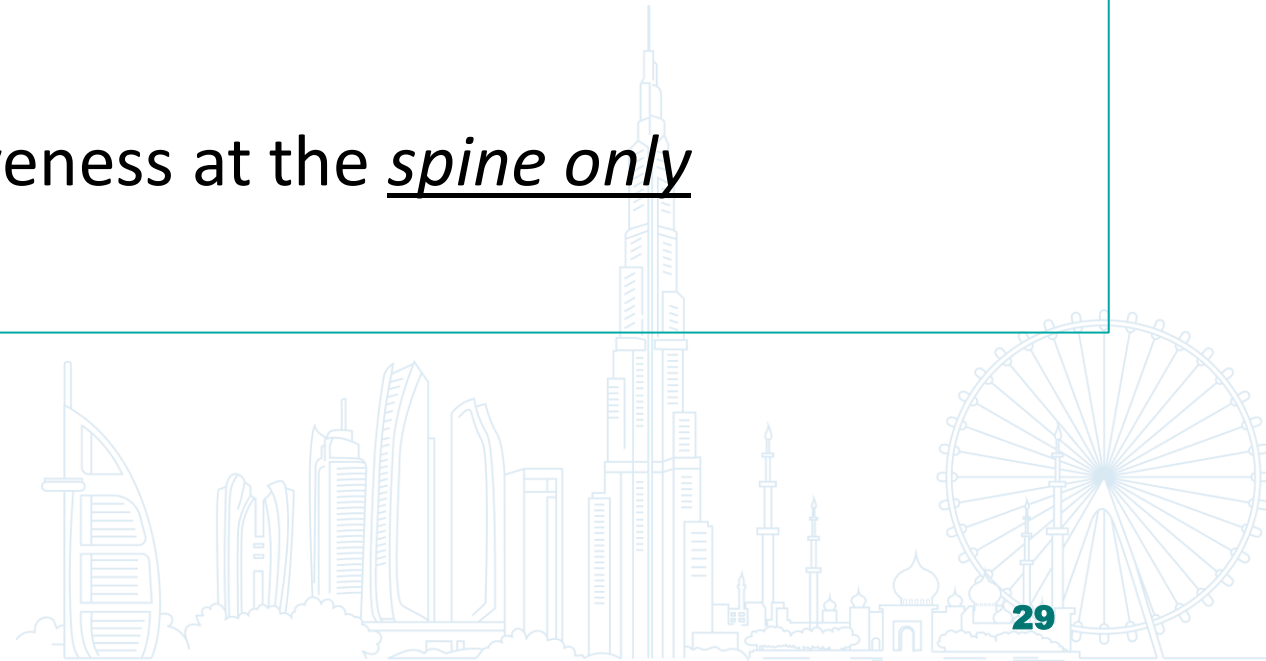
Antiresorptive medications inhibit osteoclasts →
limiting bone breakdown...



Oral Bisphosphonates

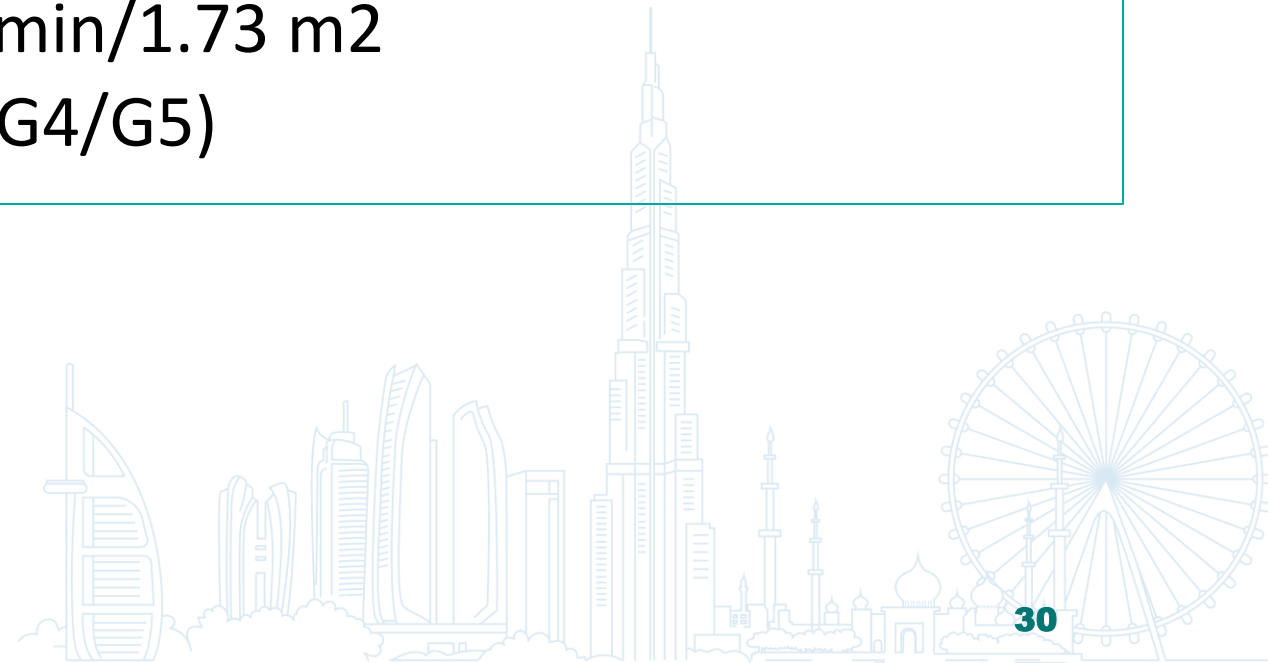
(anti-resorptive: inhibit osteoclasts)

- Alendronate (Fosamax) & Risedronate (Actonel)
 - Demonstrated effectiveness at hip, vertebral & wrist
 - Weekly alendronate 70mg; risedronate 35 mg
- Ibandronate (Boniva)
 - Demonstrated effectiveness at the spine only
 - Monthly 150mg



Prescribing Oral Bisphosphonates

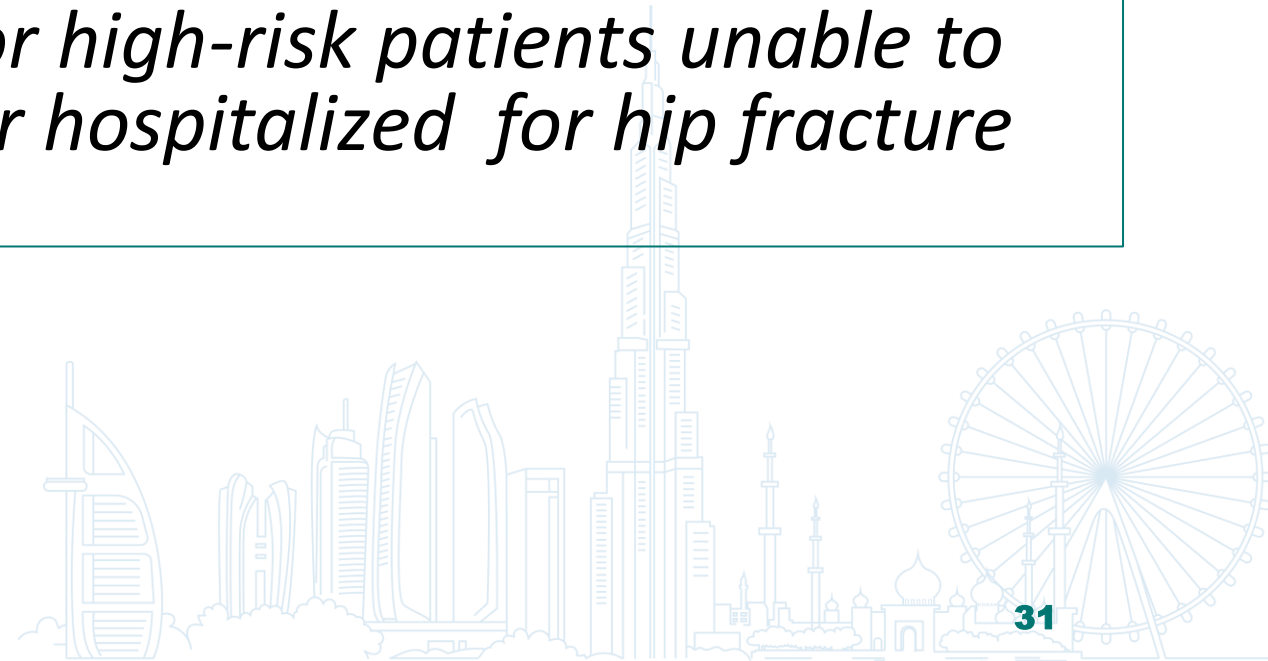
- Take with a full glass of water.
- 30 - 60 minute wait before reclining or consuming medications or food to ↓ upper GI adverse effects
- Avoid if renal disease as renal excretion...
 - Creatinine Cl < 35 mL/min/1.73 m²
 - GFR < 30 (CKD stages G4/G5)



IV Bisphosphonates

- Zoledronic acid (Reclast)
 - 5 mg yearly X 3 years (↓ vertebral and hip fractures)
- Ibandronate (Boniva)
 - 3 mg every 3 months X 4 doses (shown to ↑ BMD)

Cost is high, consider for high-risk patients unable to tolerate oral therapy, or hospitalized for hip fracture



Denosumab (Prolia)

Inhibits Receptor Activator of Nuclear-factor KB Ligand

- RANKL mediates osteoclast activity
- Inhibiting RANKL activity ↓ osteoclasts
 - ↓ the development of osteoporotic bone





Prescribing Denosumab (Prolia)

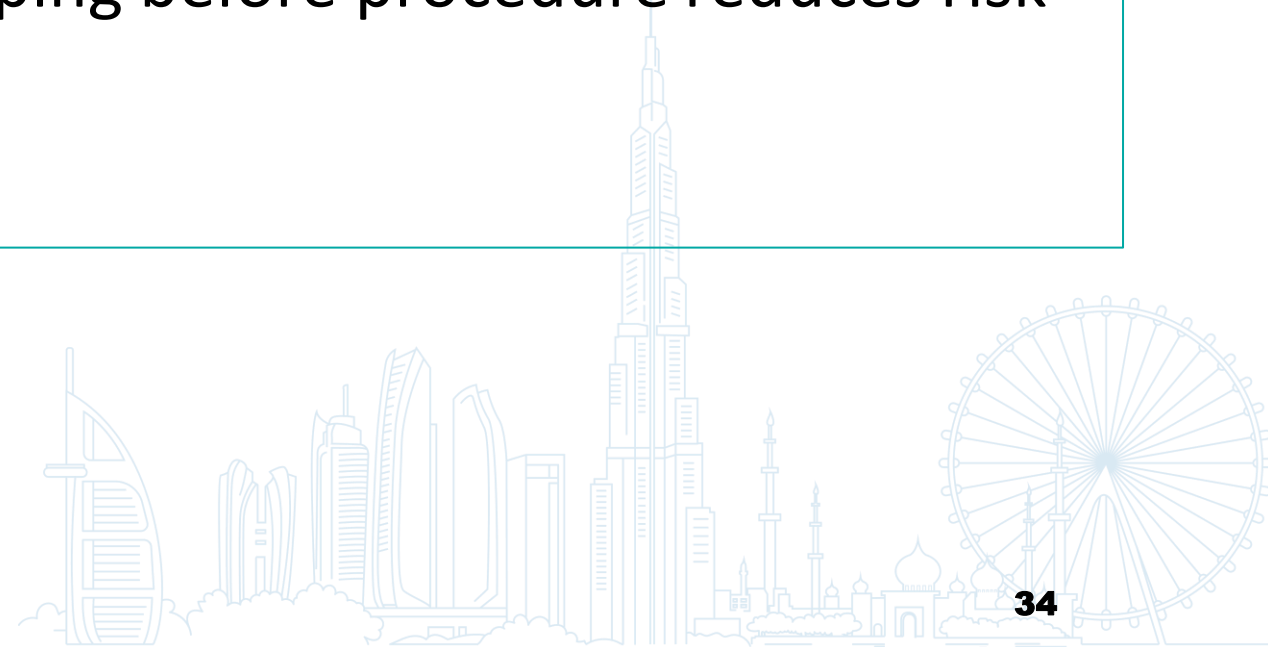
- 60 mg subcutaneously every 6 months
- Indicated for those with
 - Osteoporotic fracture
 - Failed other agents
 - CKD stages 4 or 5
- Ca/Vit D supplement required/monitored
- Concern is for immune side effects
 - severe infections and skin disease





Jaw osteonecrosis w/anti-resorptives?

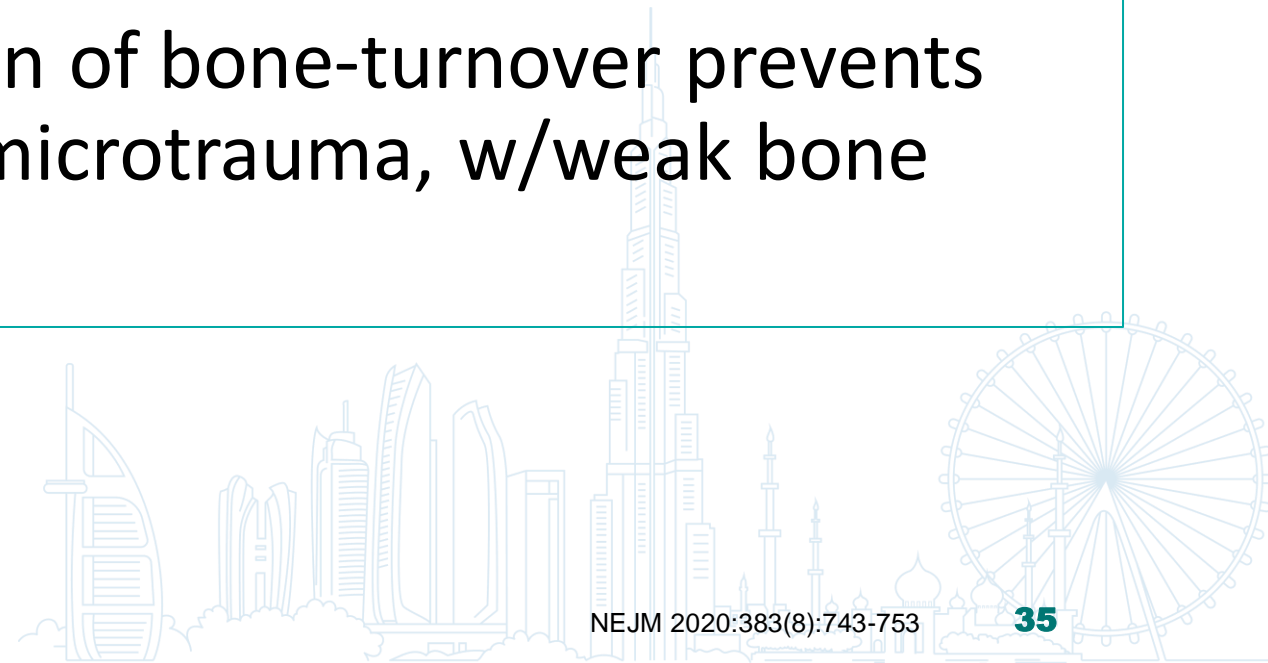
- Exposed bone in mouth that fails to heal after weeks
- 5% of bone cancer patients treated with high doses of IV anti-resorptive agents (bisphosphonates or denosumab), undergoing dental procedures
 - No evidence that stopping before procedure reduces risk
- Rare in typical use





Atypical femur Fx w/anti-resorptives?

- Femoral shaft Fx with minimal or no trauma
- Long-term alendronate (>5 yrs), sometimes w/other antiresorptive drugs, steroids or PPIs
- Report groin/thigh pain weeks/months before
- ? excessive suppression of bone-turnover prevents remodeling to repair microtrauma, w/weak bone



Those at Very High Risk for Fracture..

- Recent Fx (last 12 months)
- Fx during osteoporosis treatment
- Multiple fractures
- T-score < -3.0
- High risk of falls
- FRAX > 4.5% for hip or > 30% for major osteoporotic fx

→ Consider *Anabolic Agents*

↑ Bone mineral density

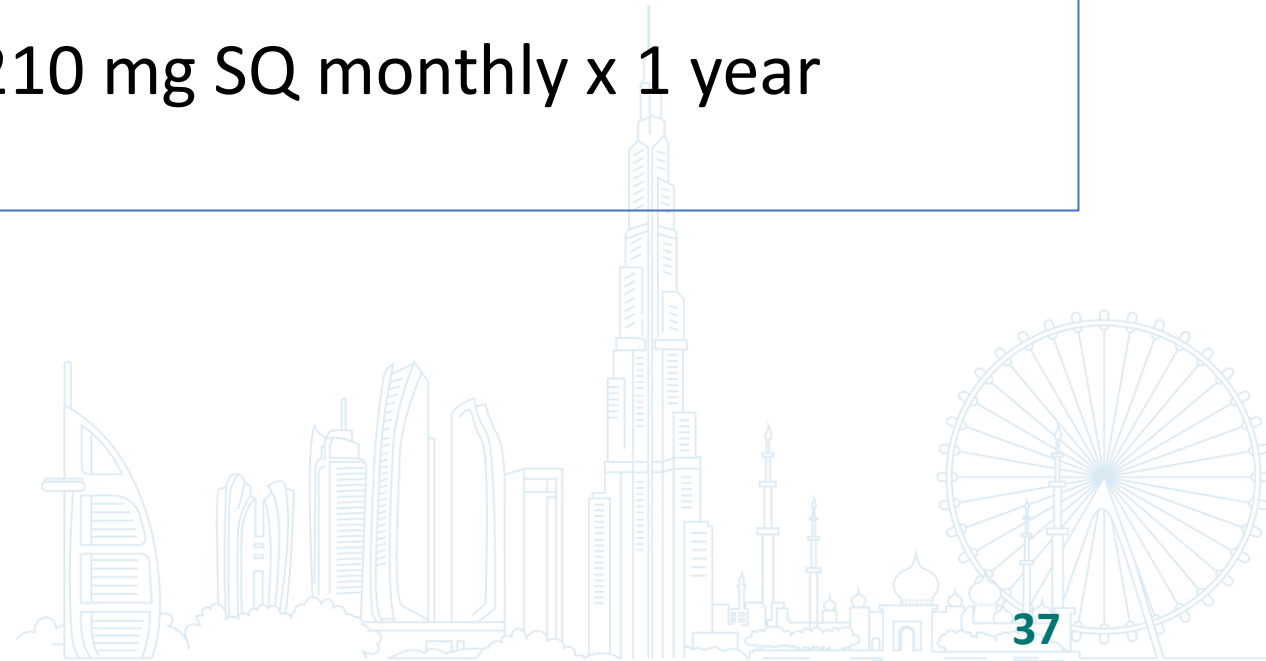
Anabolic Agents

PTH Analogues

- Teriparatide (Forteo) 20 mcg SQ daily X 2 years
- Abaloparatide (Tymlos) 80 mcg SC daily X 18 months

Sclerostin Inhibitor

- Romosozumab (Evenity) 210 mg SQ monthly x 1 year





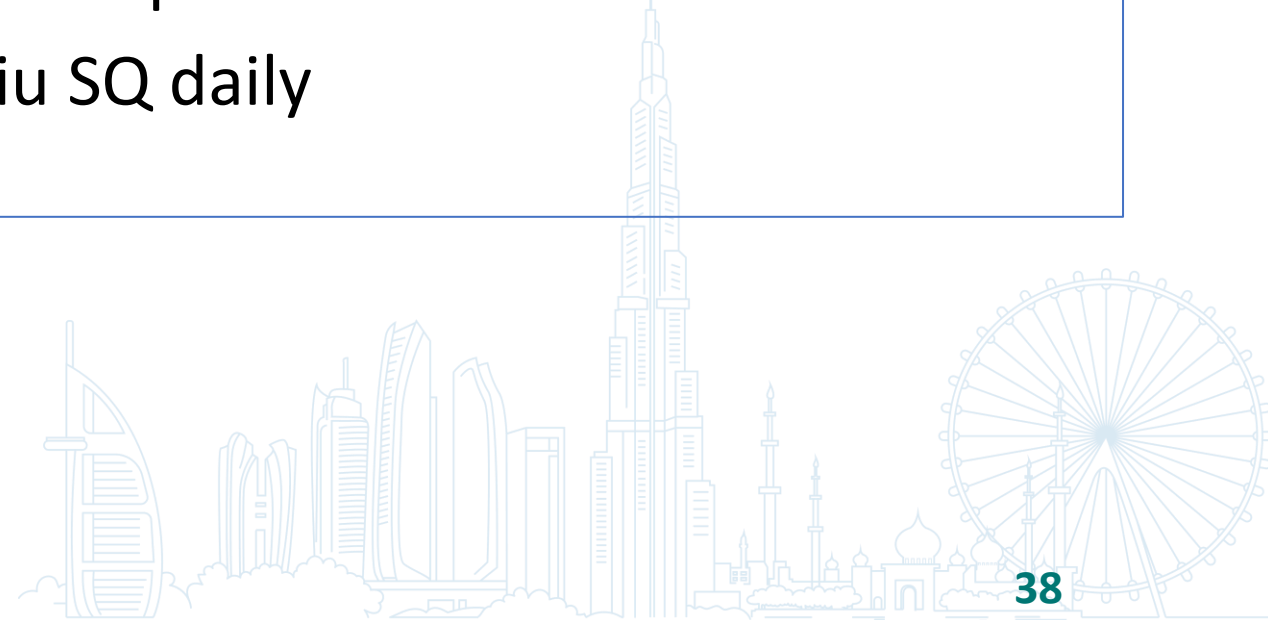
Second- Line Agents....

Selective Estrogen Receptor Modulator (SERM): non-steroids w/estrogen agonist activity on bones

- Raloxifene (Evista) 60 mg QD

Calcitonin – no longer recommended – but analgesic properties in acute & chronic vertebral compression fracture

- 200 iu intranasally or 100 iu SQ daily





A Treatment 'Road Map'

Does your patient meet treatment criteria?

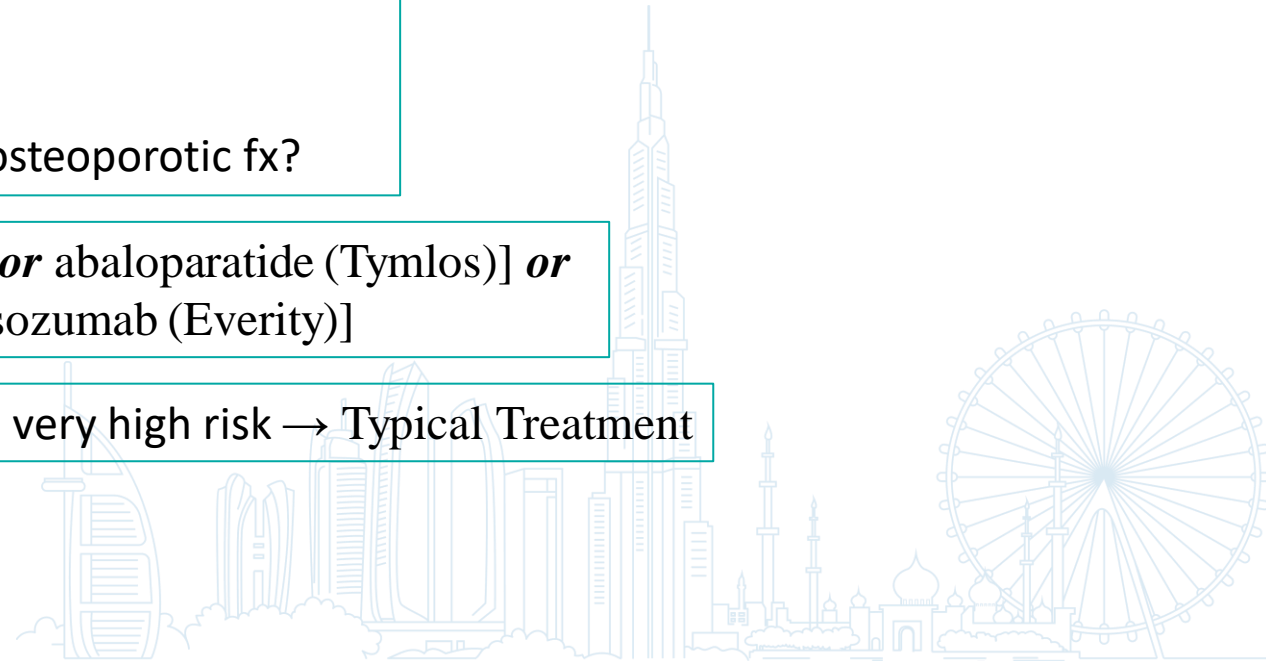
- Prior spine or hip fracture?
- T-score ≤ -2.5 ?
- FRAX score $\geq 3\%$ for hip or $\geq 20\%$ for any major osteoporotic Fx?

If yes → are they at a 'very high risk for Fracture'?

- Recent Fx (last 12 months)?
- Multiple fractures?
- T-score < -3.0 ?
- High risk of falls ?
- FRAX $> 4.5\%$ for hip or $> 30\%$ for any major osteoporotic fx?

If yes → PTH [teriparatide (Forteo) *or* abaloparatide (Tymlos)] *or* Scerostin Inhibitor (romosozumab (Everity))

If Not a very high risk → Typical Treatment





Typical Treatment options

Assess Renal Function
Creatinine clearance < 30 (stage V)?

YES

Denosumab for 10 years

NO

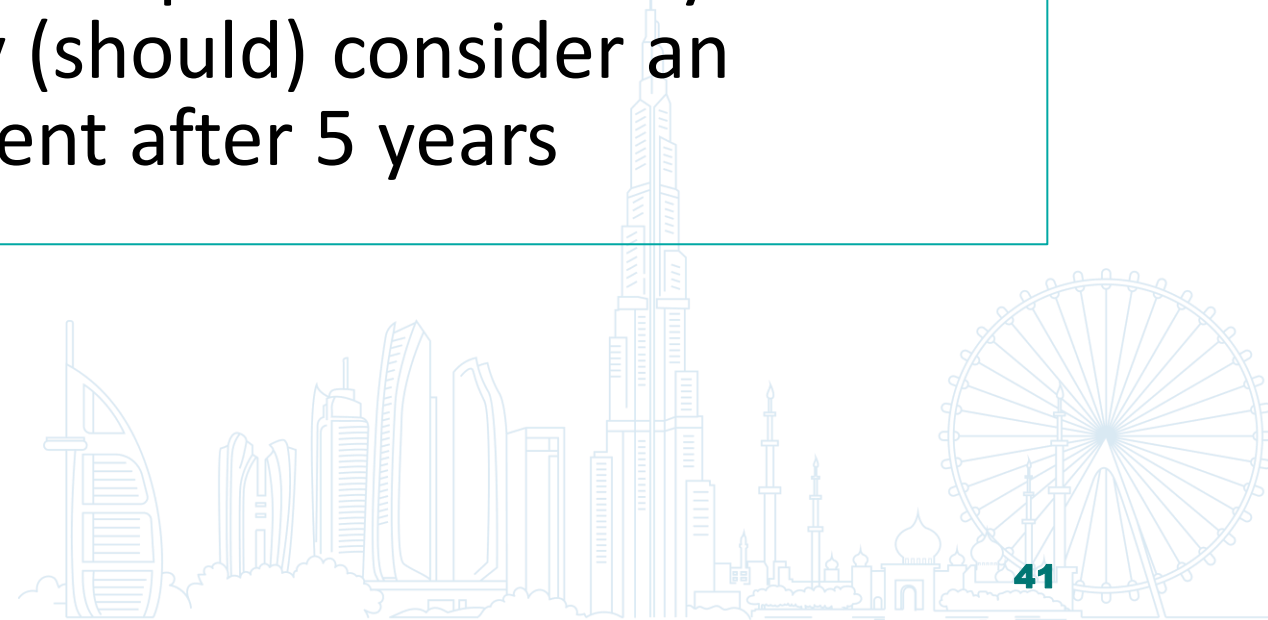
Oral Bisphosphonate [alendronate (Fosamax) *or* risedronate (Actonel)] **OR**
IV Bisphosphonate [zoledronic acid (Reclast) for 3 years



Bisphosphonates – how long?

The optimal length of oral therapy is unknown

- 5 yrs *alendronate* followed by *placebo for 5 yrs* **vs.** 10 years of *alendronate*:
 - no change in incidence of hip and nonvertebral Fx
 - however an increase in vertebral fractures
- A low-risk women with no personal history of vertebral fracture may (should) consider an interruption in treatment after 5 years

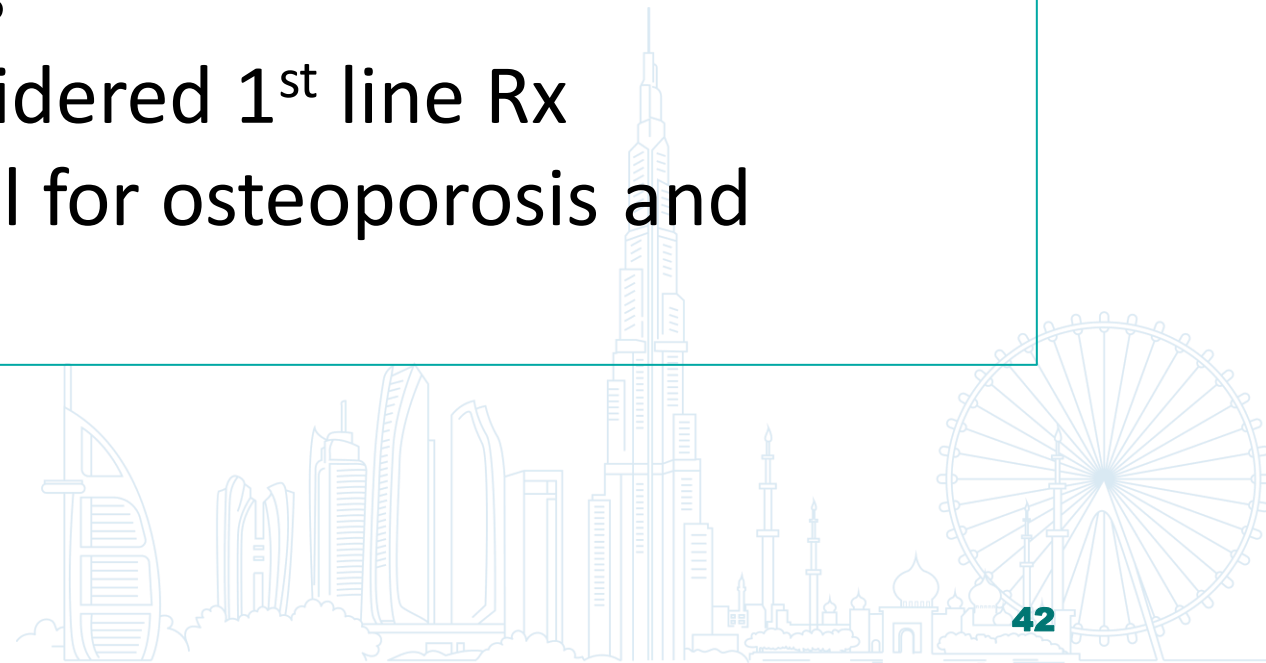




What about men (>70) ???

Consider BMD if at increased risk:

- Low body wgt (BMI < 20)
- Previous fragility fracture
- Corticosteroid/Androgen deprivation therapy
- Evaluate for 2nd causes
- Bisphosphonates considered 1st line Rx
- Testosterone beneficial for osteoporosis and hypogonadism



Serum bone markers?

PINP: procollagen type I N-propeptide

- a marker of bone formation

CTX: C-terminal telopeptide of type I collagen

- a marker for bone resorption

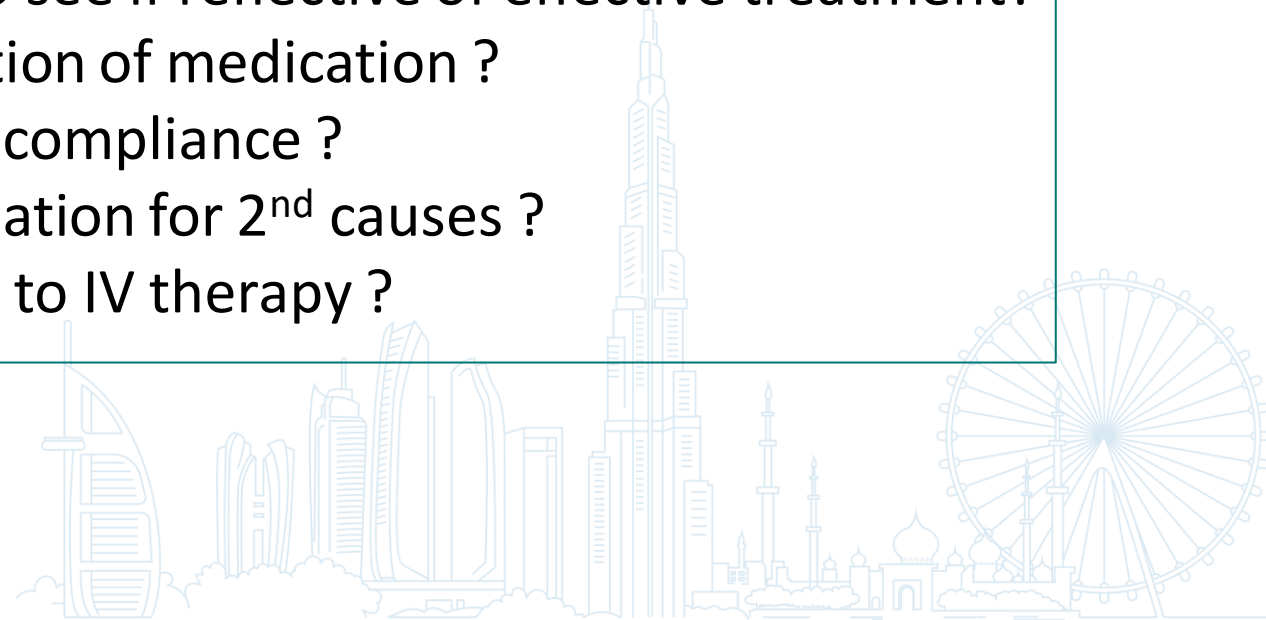
Check 6 months after therapy to see if reflective of effective treatment?

malabsorption of medication ?

poor compliance ?

further evaluation for 2nd causes ?

change to IV therapy ?





Repeat DEXA??

- Obtain a baseline and repeat DEXA every 1 to **2 years** until findings are stable.
- Continue with follow-up DEXA every 1 to **2 years** depending on clinical circumstances.





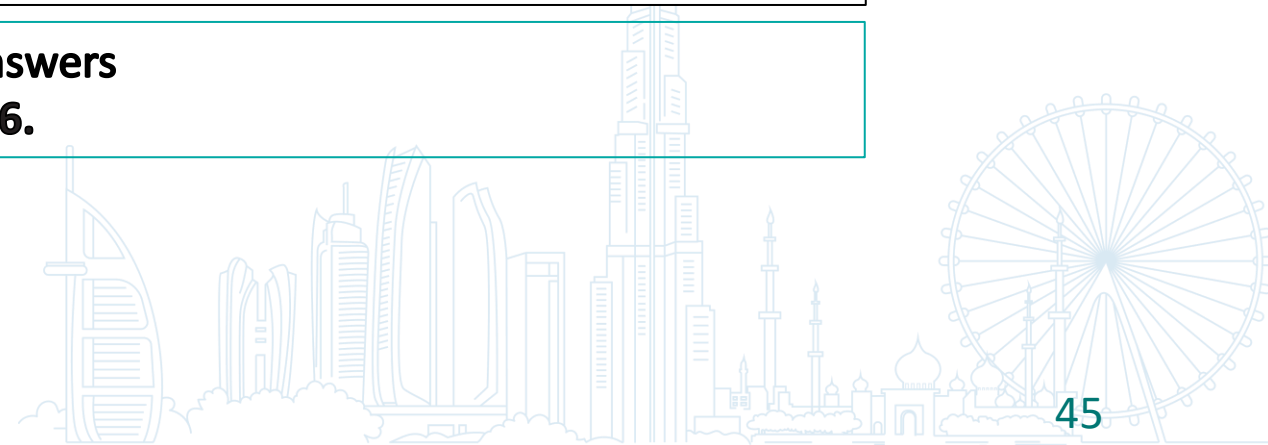
Additional Readings...

Archives of Osteoporosis (2020) 15:109
<https://doi.org/10.1007/s11657-020-00778-5>

CONSENSUS STATEMENT

Diagnosis and management of osteoporosis in postmenopausal women in Gulf Cooperation Council (GCC) countries: consensus statement of the GCC countries' osteoporosis societies under the auspices of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO)

Osteoporosis: Common Questions and Answers
***Am Fam Physician.* 2023; 107(3): 238-246.**





Thank you!

