

# Bone Health and HIV

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# Disclosures

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No conflicts of interest or relationships to disclose

# Disclaimer

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# Brief Case

- 50M living with well-controlled HIV on DTG + TDF/FTC sustains a ground level fall after tripping over his cat. No headstrike, but falls onto his outstretched hand.
- He comes to your office the next day with wrist pain and swelling. His exam shows diffuse tenderness to palpation. You order an XR.



Picture from ClevelandClinic.org

**Beyond the initial management of wrist fracture, what other workup and management should occur?**

# Bone density-related issues in PLWH

- Osteoporosis:
  - T-score less than or equal to  $-2.5$  at hip/spine
  - Z-score less than  $-2.0$
  - Presence of fragility fracture
- Osteopenia:
  - T-score between  $-1.0$  and  $-2.49$  at hip/spine
- Osteomalacia: impaired mineralization of bone matrix
- **People living with HIV (PLWH) have a higher fracture risk as compared to people who are not living with HIV, up to roughly 1.5-2X<sup>1,2,3</sup>**
- **Low bone mineral density occurs in 40-90% of PLWH<sup>4</sup>**

# Mechanisms for Osteopenia/Osteoporosis

- **HIV-related**<sup>5</sup>

- Chronic inflammation from immune activation?
- HIV-protein mediated increases in osteoclast activity / promotion of osteoblast apoptosis?

- **ART-related**<sup>5,6</sup>

- Any ART is associated with 2-6% decrease in BMD
- Tends to stabilize after 1 year of being on ART
- TDF specifically leads to additional 1-2% loss (and ongoing!)

- **Common comorbidities**<sup>5,6</sup>

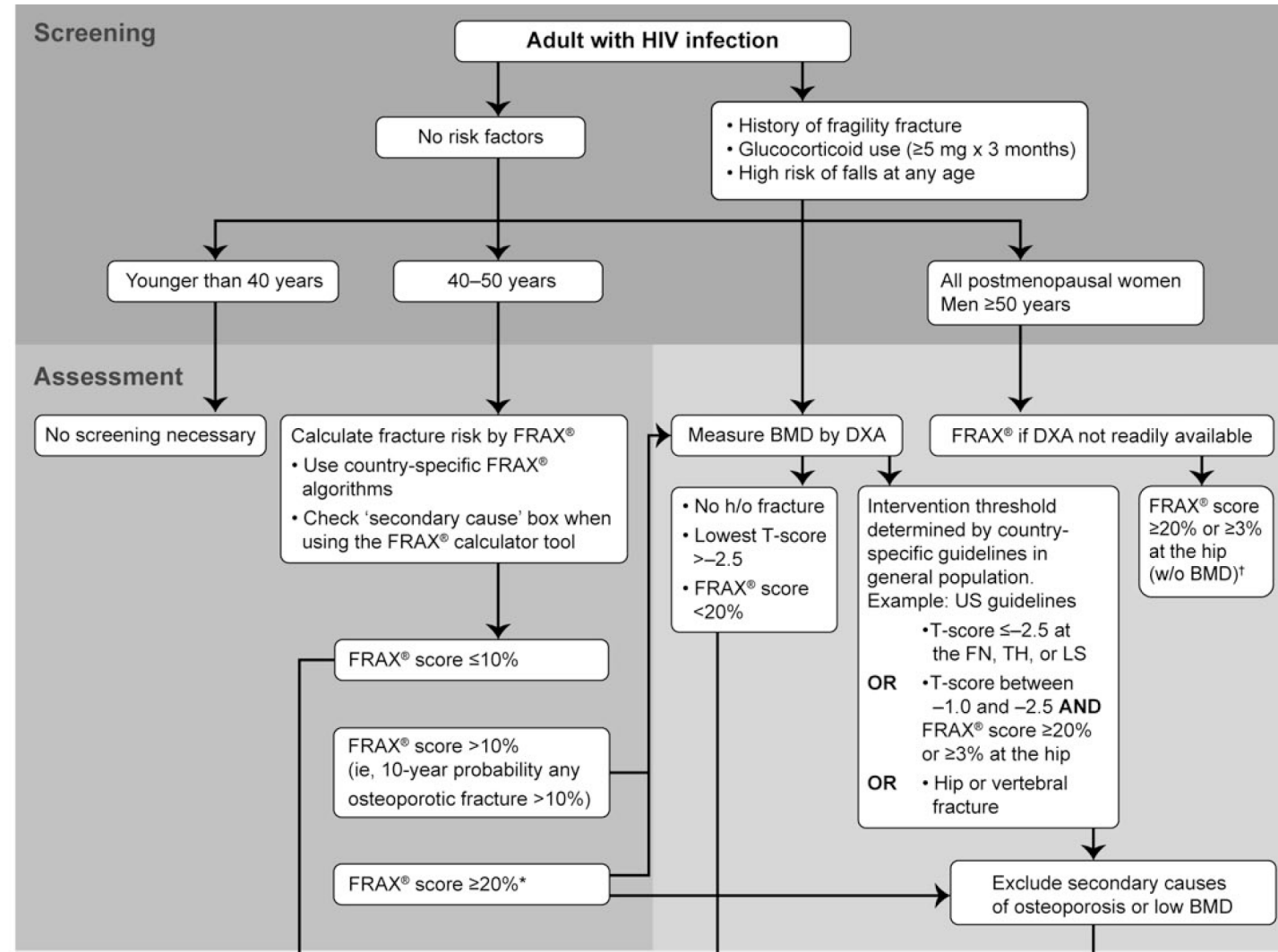
- Vitamin D deficiency
- Hypogonadism
- Excess alcohol use >3 drinks/day
- Smoking
- Hyperthyroidism
- Hyperparathyroidism
- Nutritional status

# Who to screen? How to screen?

- **DEXA**

- **All men >50 with HIV**
- **Postmenopausal women with HIV**
- **Younger adults with risk factors**

- Note: FRAX underestimates risk in PLWH but can still be used in low-resource settings





# Some potential risk factors...

**Table 8**  
**Risk Factors Included in FRAX<sup>®</sup>**

Country of residence  
Ethnicity (U.S. models only — white, black, Hispanic, and Asian)  
Age (accepts ages between 40 and 90 years)  
Sex  
Weight (kg) and height (cm) used to calculate body mass index; a converter from English to metric units is provided within the FRAX<sup>®</sup> tool  
Family history (either parent with a hip fracture)  
Personal history of fragility fracture, including radiographic vertebral fracture  
Glucocorticoid use (prednisolone 5 mg daily or more for 3 months or longer, current or past)  
Rheumatoid arthritis (confirmed diagnosis)  
Smoking (current)  
Alcohol use (2 or more units daily)  
Secondary osteoporosis<sup>a</sup> (specifically mentioned are type 1 diabetes, osteogenesis imperfecta in adults, untreated long-standing hyperthyroidism, hypogonadism or premature menopause, chronic malnutrition or malabsorption, and chronic liver disease)  
BMD. Femoral neck BMD should be entered. The model also works without BMD.

Abbreviations: BMD = bone mineral density; FRAX<sup>®</sup> = fracture risk assessment tool.

<sup>a</sup>Because the effects of causes of secondary osteoporosis on fracture risk are assumed to be mediated through changes in BMD, a “yes” answer to this question does not change fracture risk if BMD is entered into the risk tool.

Reproduced with permission from Watts NB, et al. *J Bone Miner Res*. 2009;24:975-979 (274).



# Some potential risk factors...

**Table 9**  
**Factors that Increase Risk of Falling and Fracture**

Neurologic disorders
Parkinson disease
Seizure disorder
Peripheral neuropathy
Prior stroke
Dementia
Impaired gait or balance (or both)
Autonomic dysfunction with orthostatic hypotension
Impaired vision
Impaired hearing
Frailty and deconditioning
Proximal myopathy
Sarcopenia
Medications
Sedatives and hypnotics
Antihypertensive agents
Narcotic analgesics
Environmental factors
Poor lighting
Stairs
Slippery floors
Wet, icy, or uneven pavement
Uneven roadways
Electric or telephone cords
Walking large dogs, being tripped up by small dogs
Throw rugs
Positioning in a wet or dry bathtub

# Management of any identified osteoporosis/osteopenia

- **Lifestyle changes**

- Weight-bearing exercise
- Smoking cessation
- Decrease excess alcohol

- **Rule out osteomalacia<sup>6,9</sup>**

- Typically symptomatic (bony pain)
- Check labs: expect ↑ALP, ↓Ca, ↓P, ↑PTH, ↓25OHD
- Check XR for potential pathognomonic signs

- **Pharmacologic<sup>6</sup>**

- Osteopenia:
  - If vitamin D deficiency: supplement with Ca/vit D until deficiency resolved
  - Some controversy about role for Ca
  - Recheck DEXA in 1 year
- Osteoporosis:
  - Change ART off of TDF
  - Start bisphosphonate
  - No extra data in PLWH: denosumab, calcitonin, anabolic agents
  - Testosterone replacement if relevant

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