

Reducing the Risk of Bone Fracture in People with HIV

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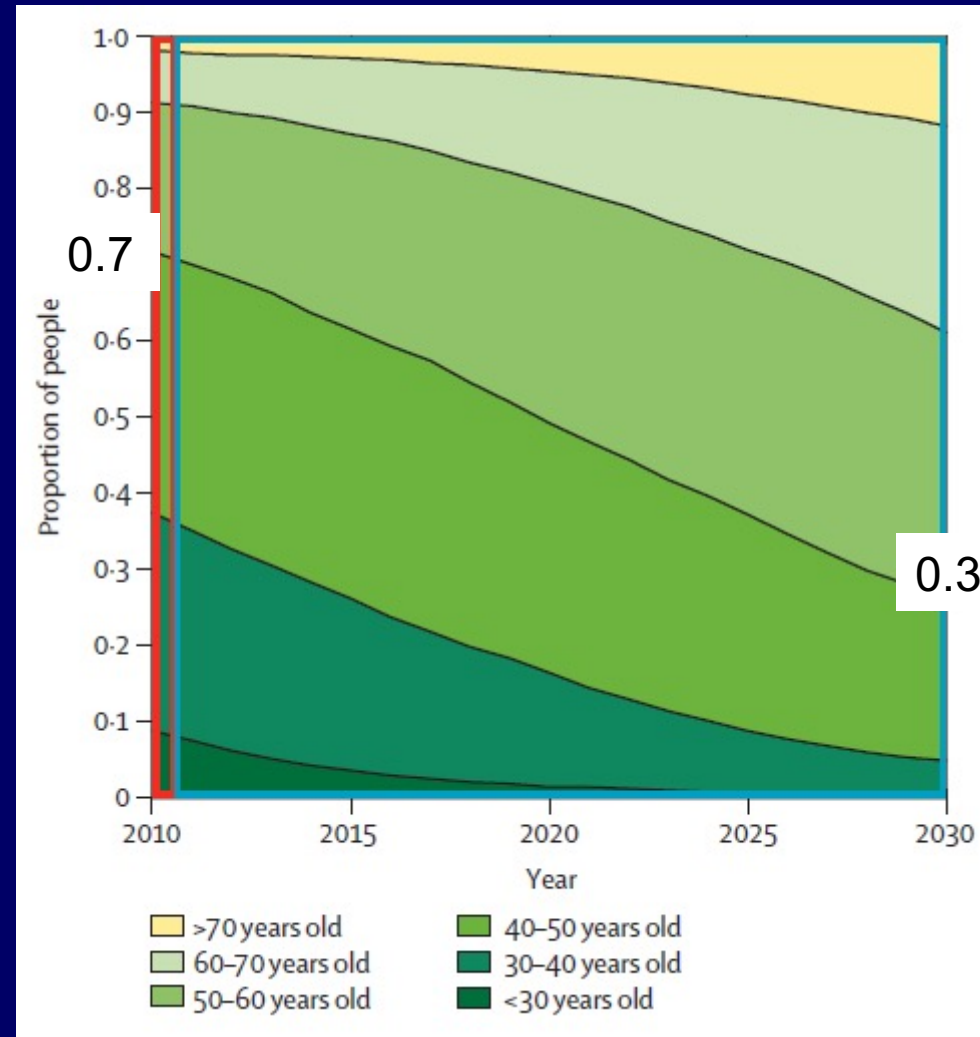
Division of Endocrinology, Diabetes, & Metabolism

Johns Hopkins University

Disclosures

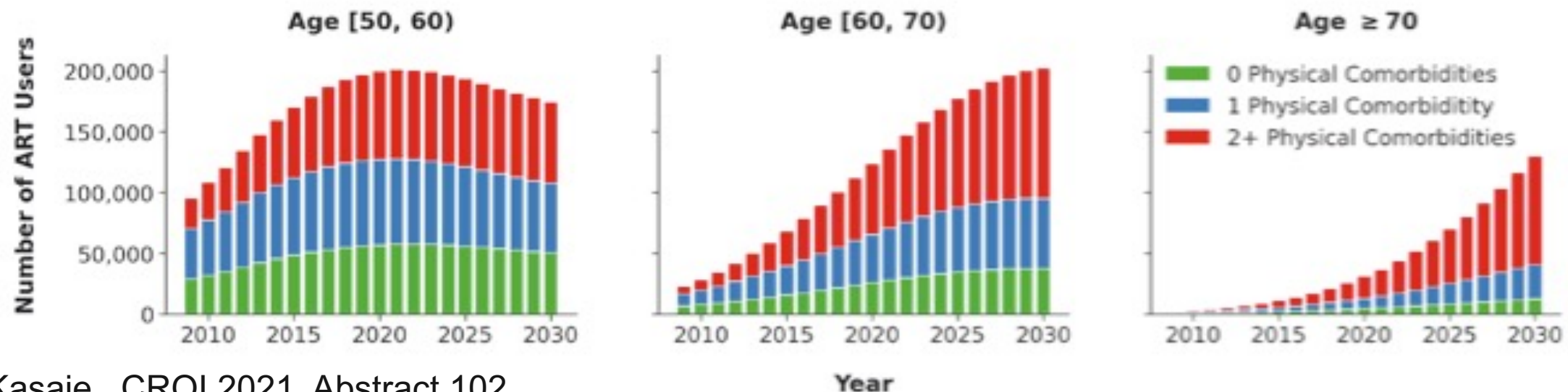
- Dr Brown has served as a consultant to Gilead Sciences, Inc, GlaxoSmithKline, Janssen, Merck & Co, Inc, Theratechnologies, and ViiV Healthcare.

The Aging of the HIV Population: Netherlands

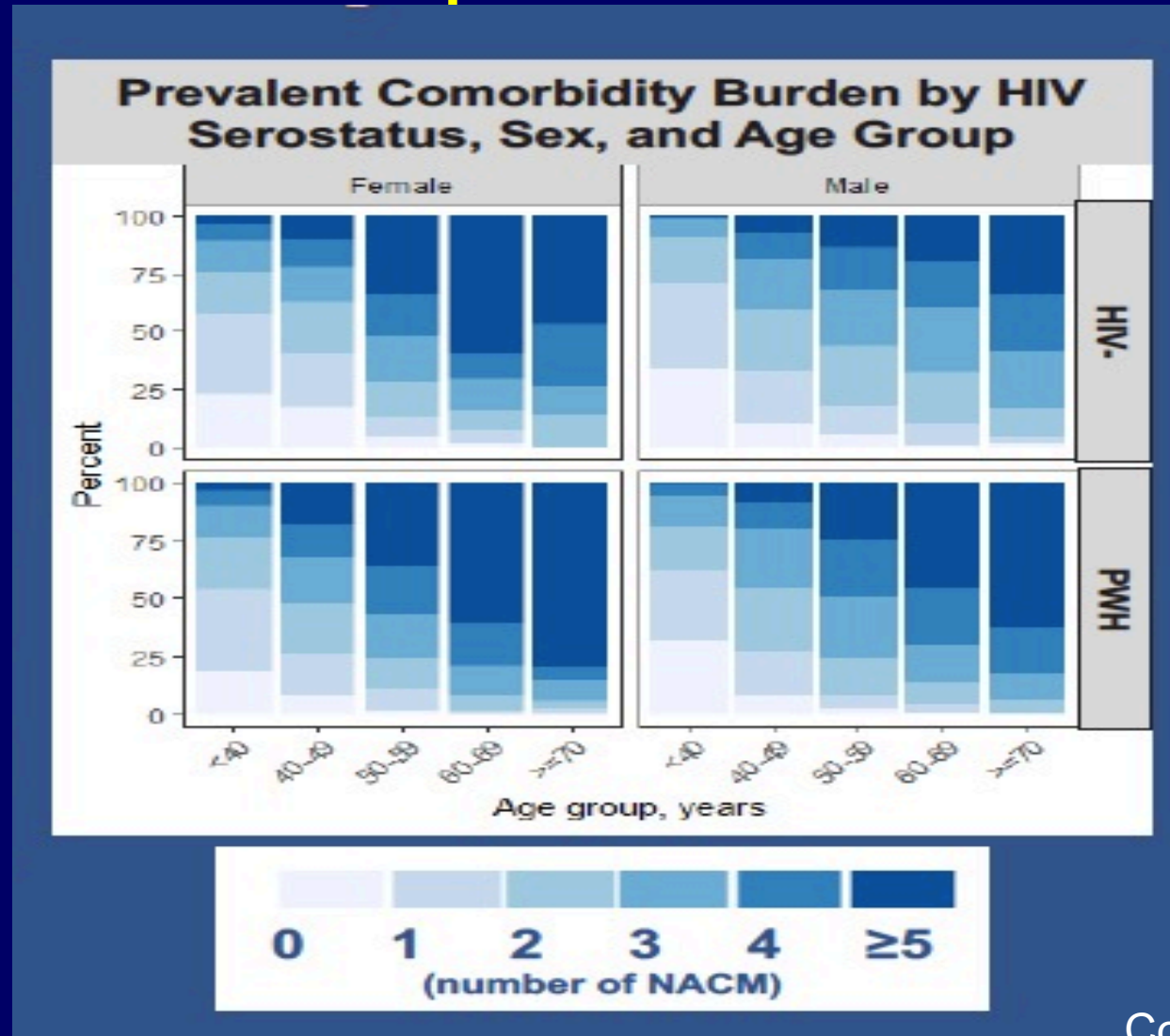


Multimorbidity will increase markedly in persons living with HIV (PLWH) over the next 10 years

- Older age-groups experience an **increase in population size and prevalence of multimorbidity**
- Among those ≥ 70 yrs, the projected prevalence of multimorbidity increases from 58% (in 2020) to 69% (in 2030), corresponding to an additional 71,000 individuals living with 2+ physical comorbidities beside HIV by 2030



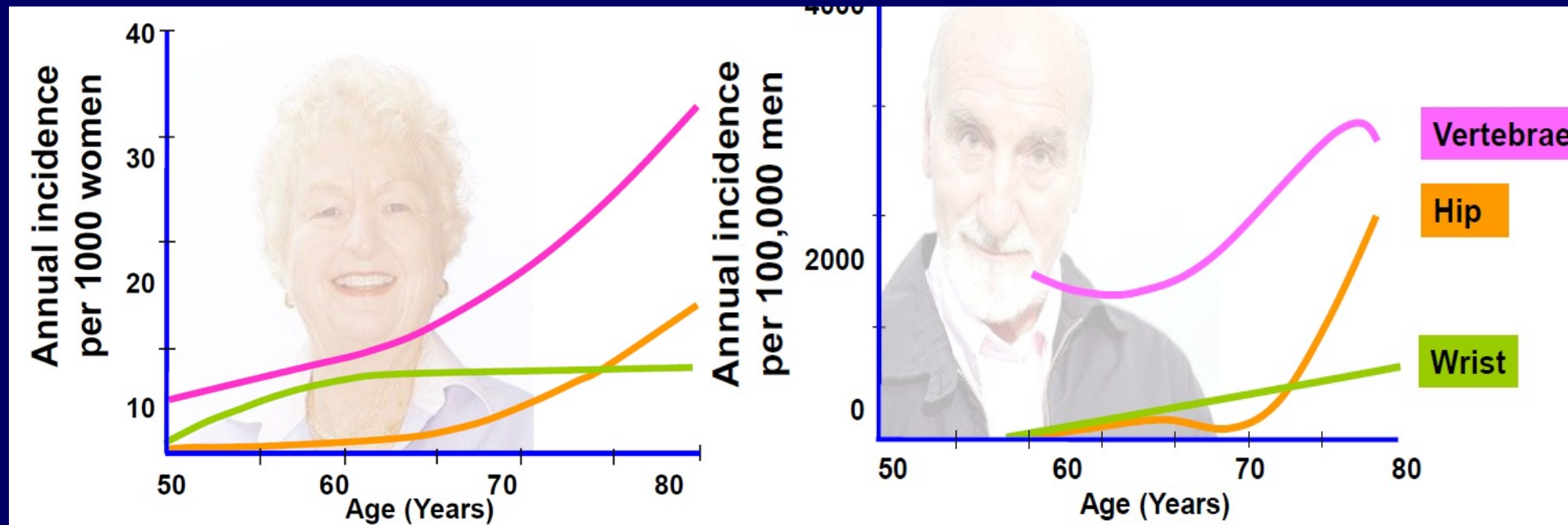
Multimorbidity burden is greater in PWH vs People without HIV



Why worry about osteoporosis?

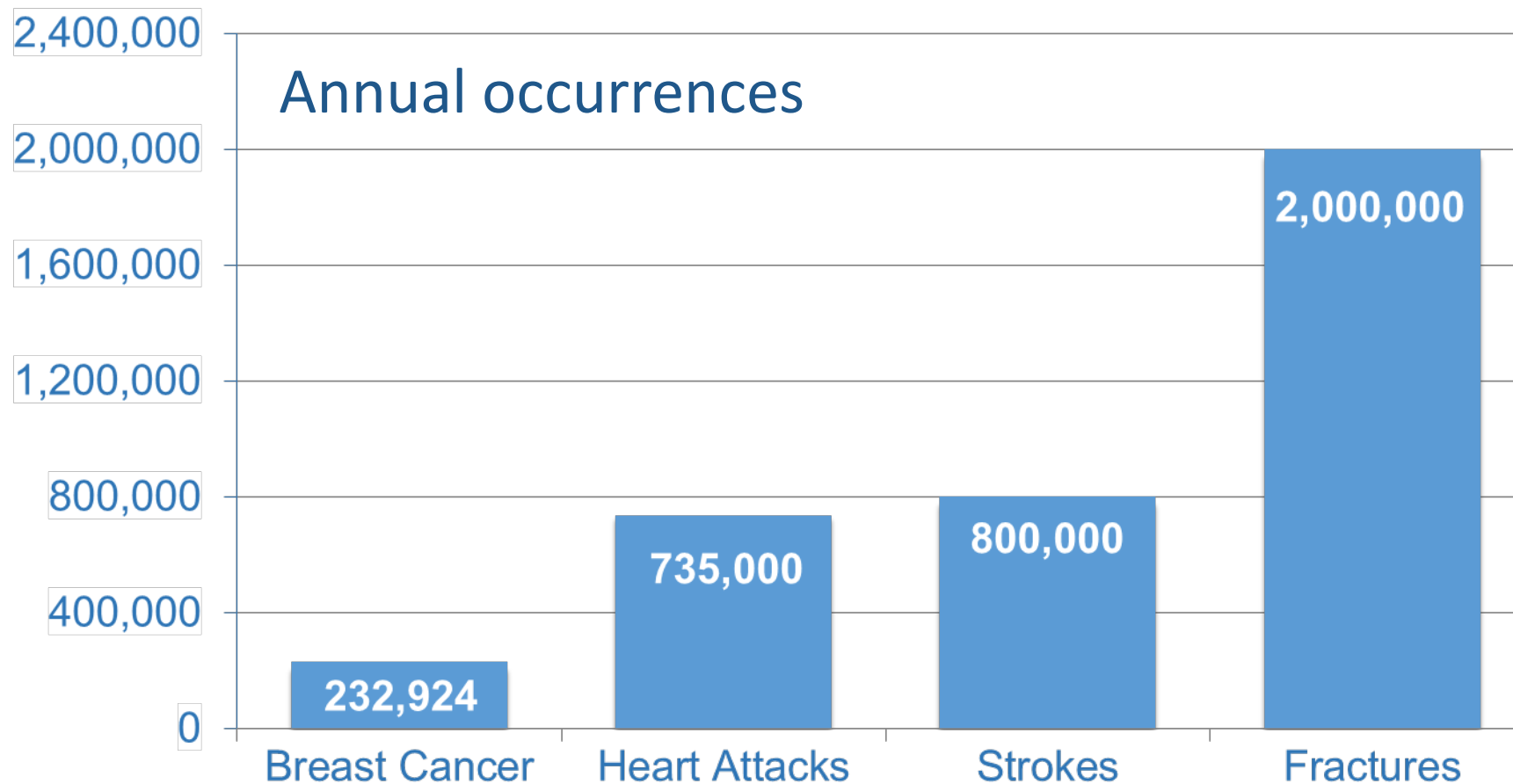
- Osteoporosis is common among older populations and more common in PLWH compared to matched persons without HIV
- Osteoporotic fractures are a major source of morbidity & mortality
- Osteoporosis is a silent disease until fractures occur
- Osteoporosis can be detected in a pre-clinical stage and fractures can be prevented

Fragility Fractures in Women and Men over 50 years



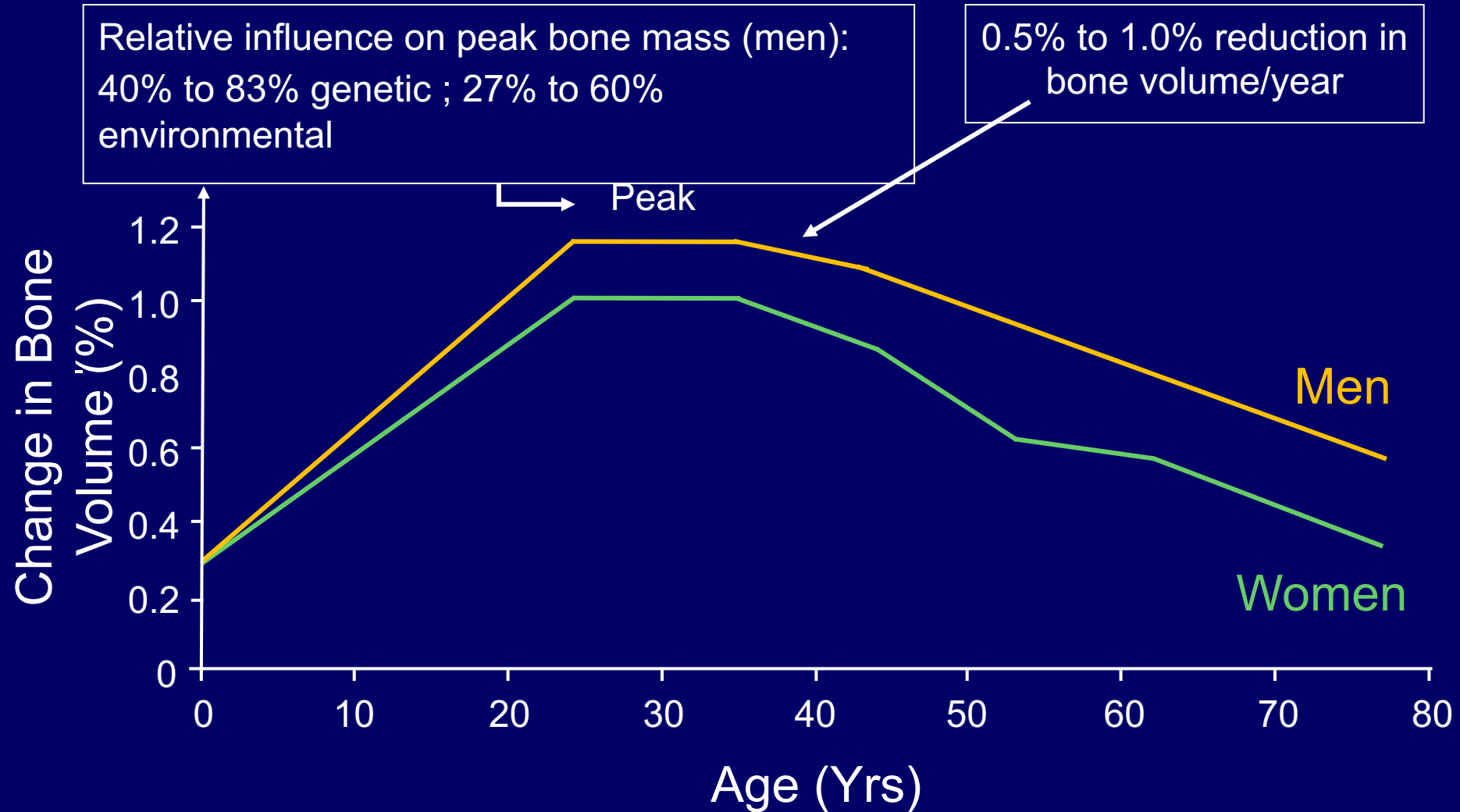
Wasnich RD, Osteoporos Int. 1997

Compared to Other Health Issues

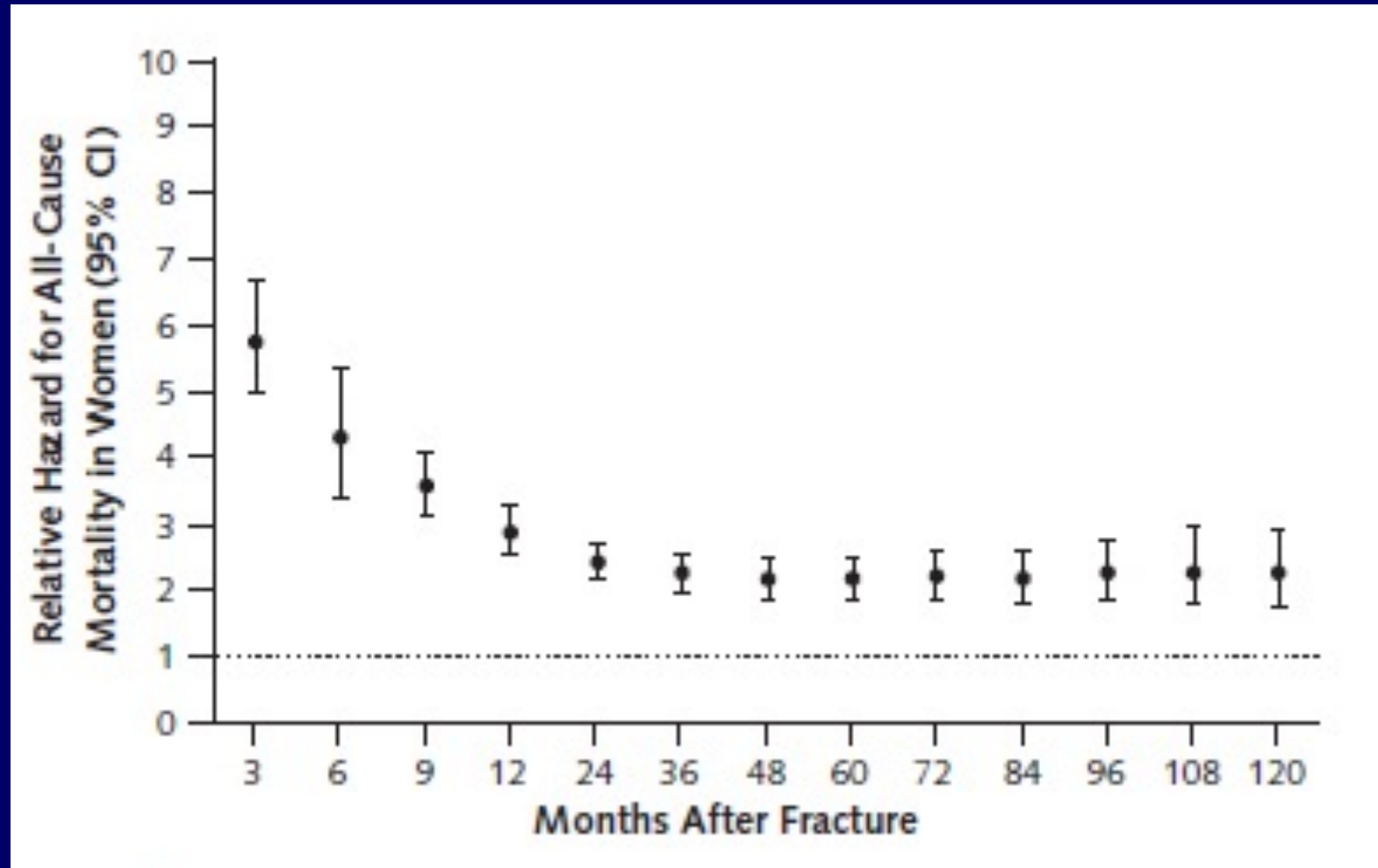


Centers for Disease Control & Prevention 2016
Centers for Disease Control & Prevention, 2015
Centers for Disease Control & Prevention, 2015
National Osteoporosis Foundation, 2015

BMD Decreases With Age

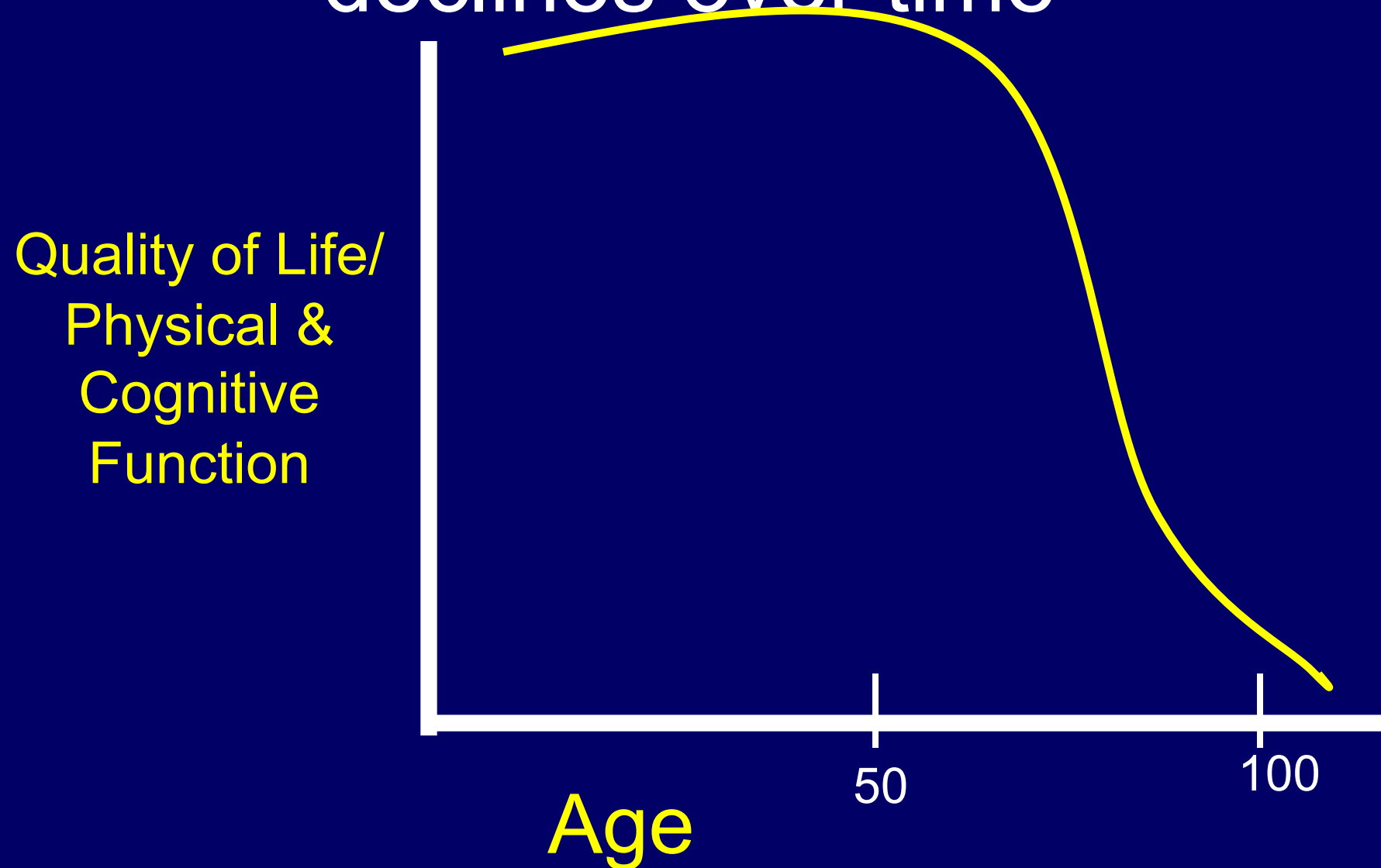


Increase Mortality After Fragility Fractures

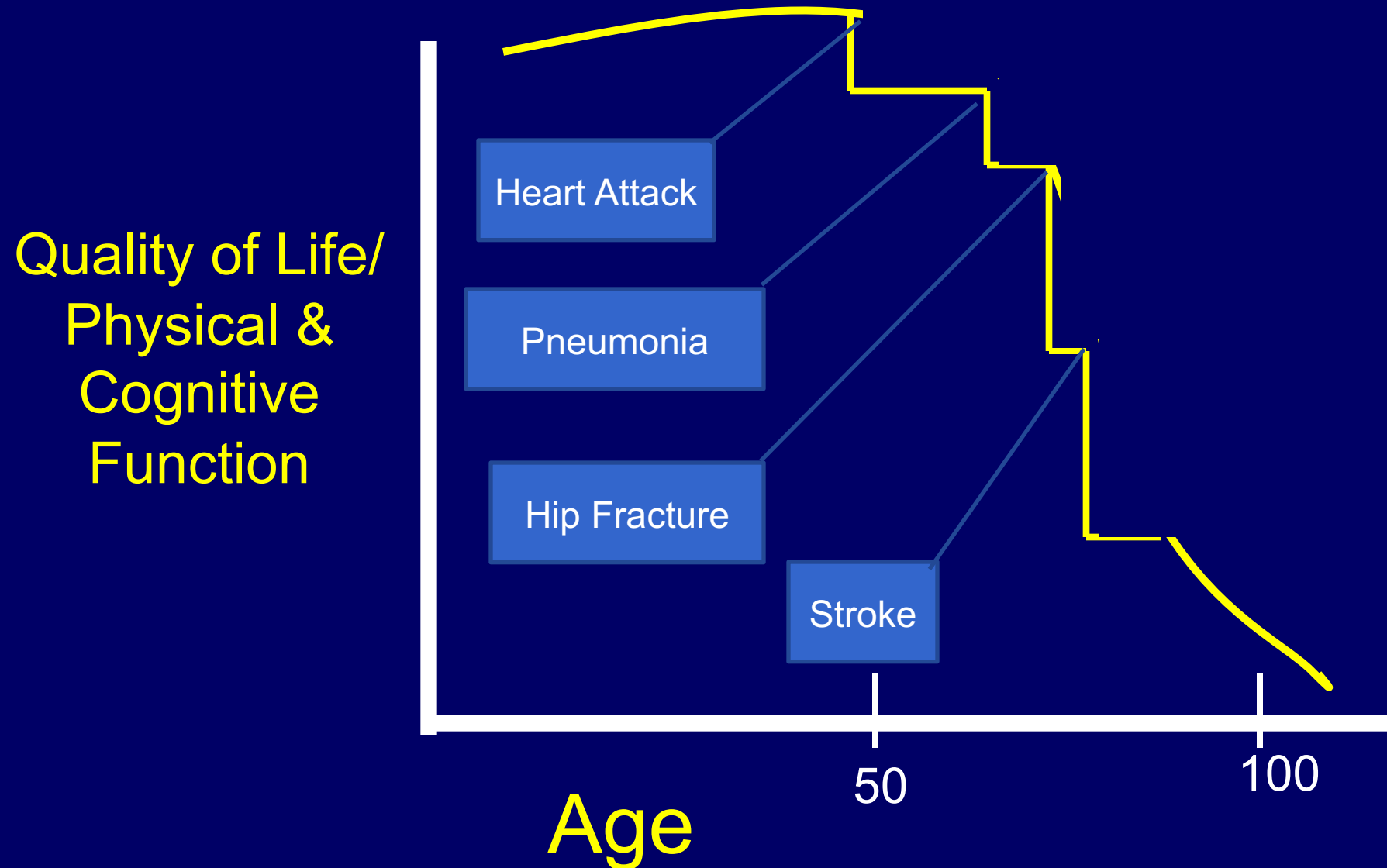


Haentjens, Annals Int Medicine, 2010

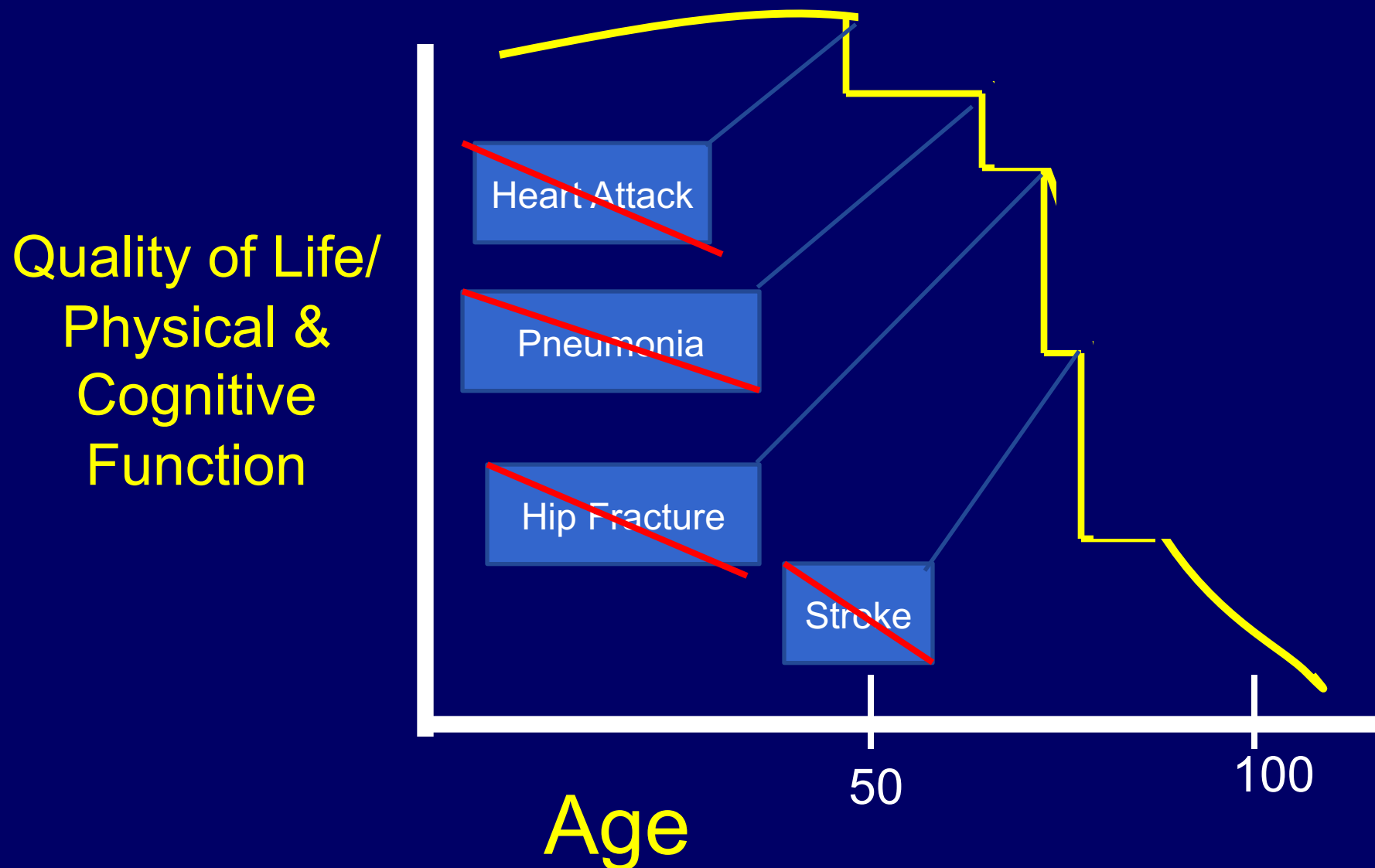
Physical & cognitive function generally declines over time



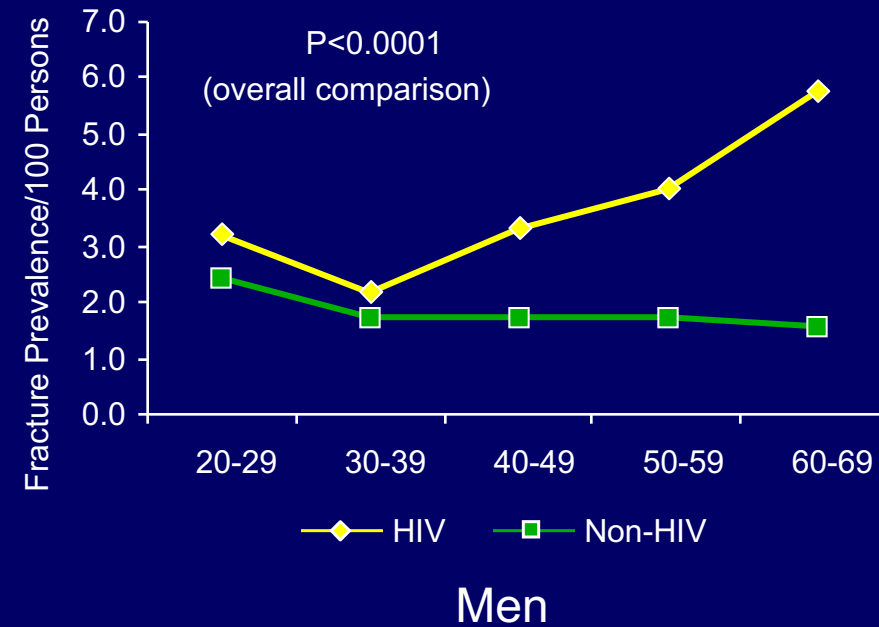
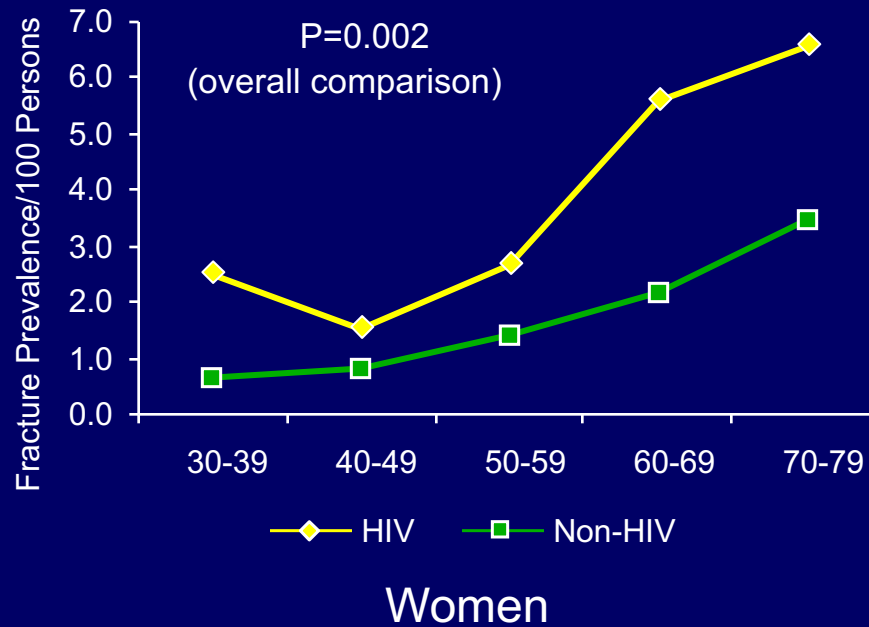
Decline in Function May Not Be Gradual



Preventing comorbid events, including fracture, is critical to maintain function



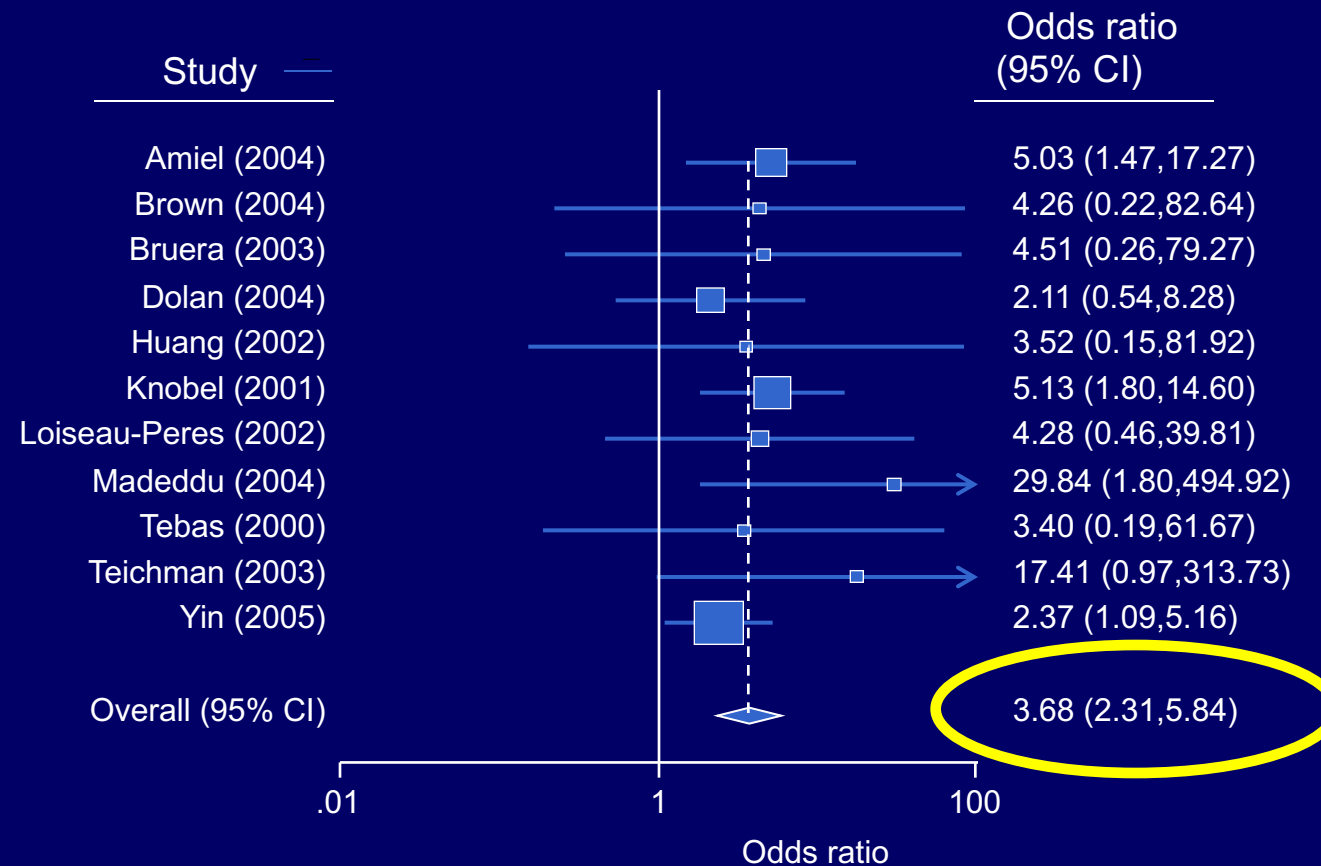
Fracture Prevalence in PLWH and Persons without HIV in MGH/Partners Healthcare System: 1996-2008



8,525 PLWH
2,208,792 without HIV

Prevalence of Osteoporosis in PLWH vs Persons without HIV: A Meta-analysis

Overall prevalence of osteoporosis in PLWH: 15%



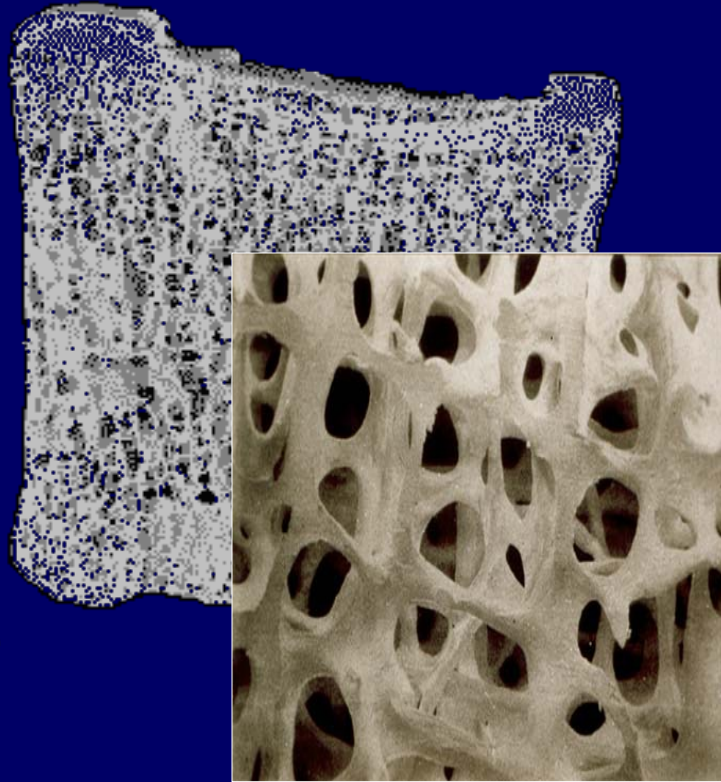
Definitions

Osteoporosis:

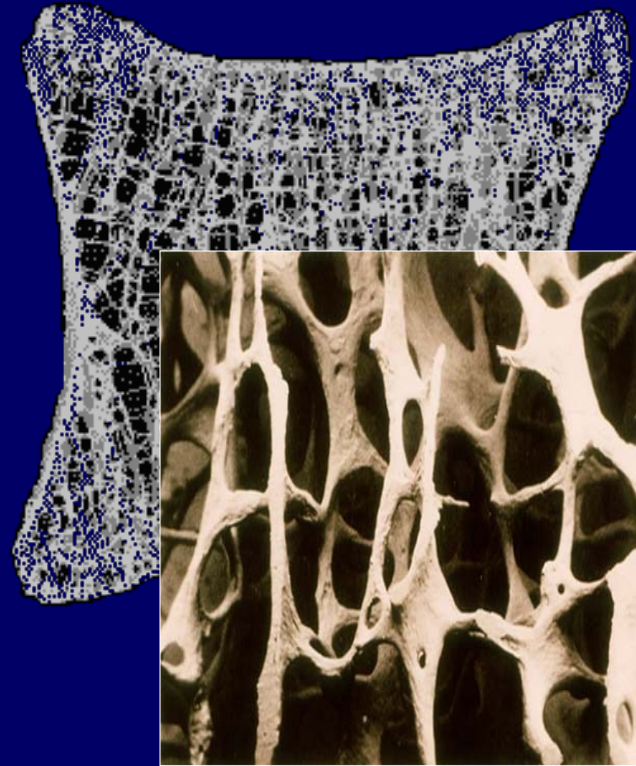
“systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and fracture”

Vertebral body: Normal vs Osteoporosis

normal



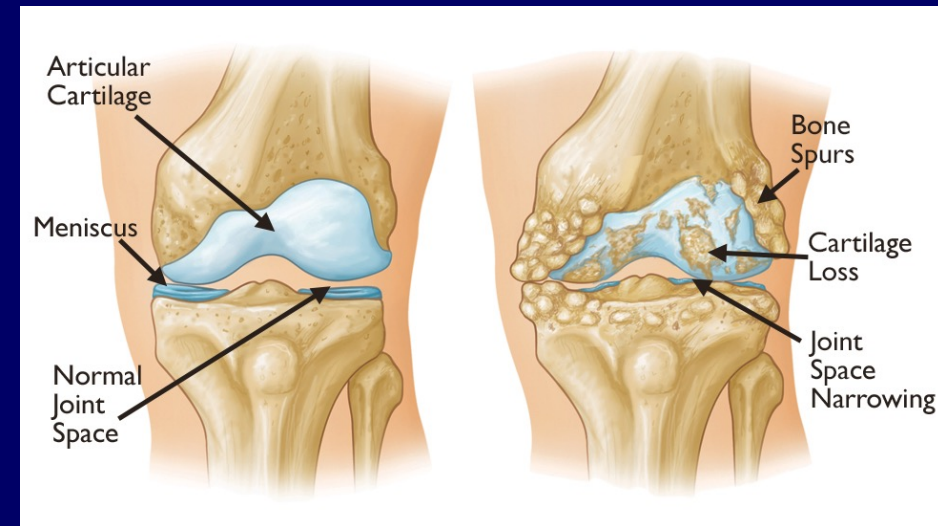
osteoporotic



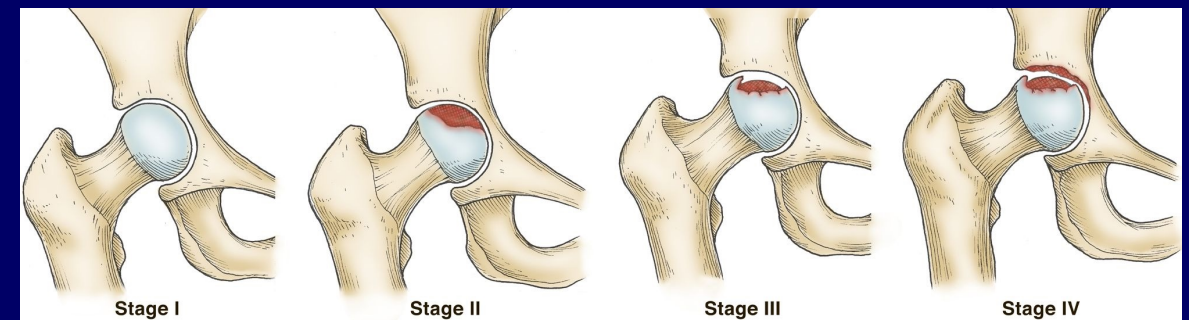
What osteoporosis is not

- Osteoarthritis: “a degenerative joint disease that can affect the many tissues of the joint..., including bone, cartilage, ligaments, fat and the tissues lining the joint (the synovium). Osteoarthritis can degrade cartilage, change bone shape and cause inflammation, resulting in pain, stiffness and loss of mobility.”
- Osteonecrosis (Avascular Necrosis): “death of bone tissue due to a lack of blood supply”
 - Steroid use, sickle cell, alcohol, HIV

Knee Osteoarthritis



Osteonecrosis of the Hip



Definitions

Operational Definition (DXA)- WHO Definition

- Osteoporosis: T-score ≤ -2.5
- Osteopenia: T-score = -1.0 to -2.4
- Normal: T-score > -1.0

↑ Risk of fracture by 1.5-3.0 x for each SD decrease

Caveats:

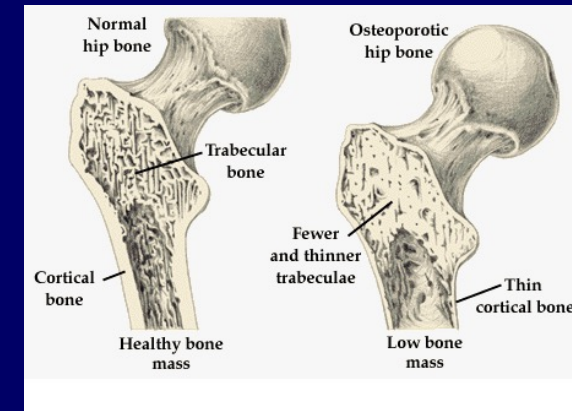
- Z-score (≤ -2.0) used in men < 50 years and premenopausal women
- BMD explains only about 50% of fracture risk

DXA Scanning

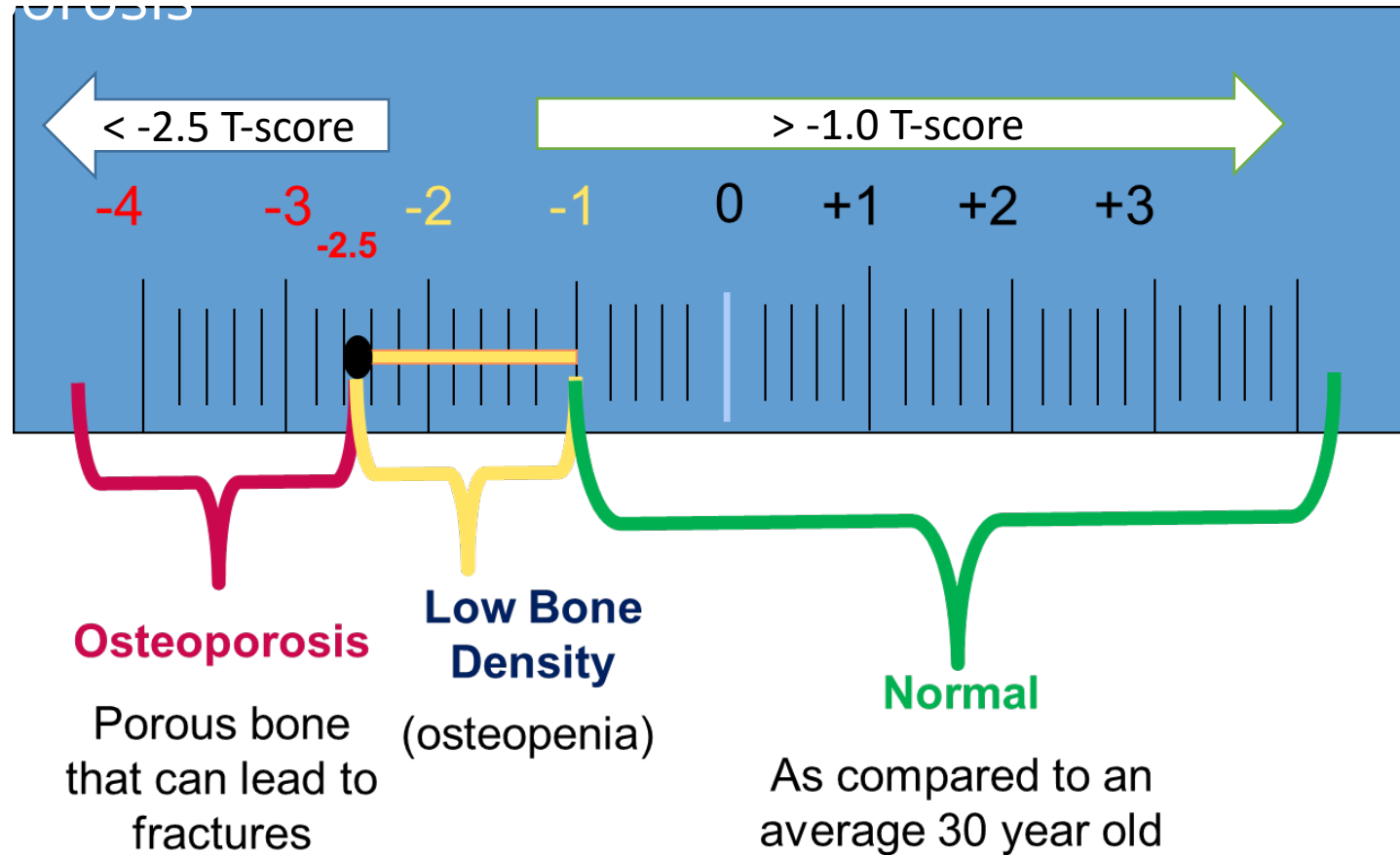


- Lumbar Spine
- Hip
 - Femoral neck
 - Total hip
- Forearm (distal 1/3)

Sites differ in proportions of cortical and trabecular bone



Understanding Your DXA Results



*Even though you may have a low bone density,
you may not have an increased fracture risk.
Your peak bone density may never have reached the “normal” range.*

Name: Express Scans, 2
Patient ID:
DOB: August 24, 1944

Sex: Female
Ethnicity: White

Height: 65.0 in
Weight: 150.0 lb
Age: 61

Referring Physician:

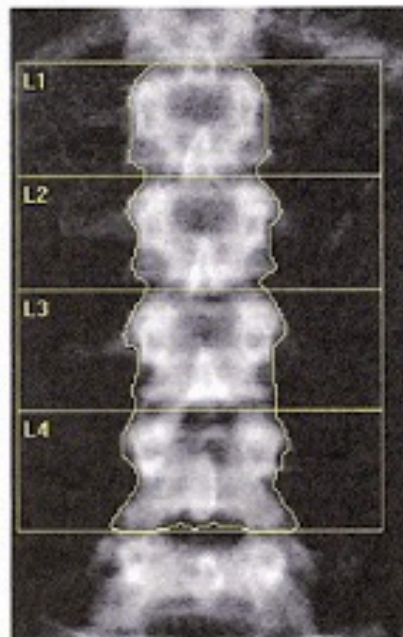


Image not for diagnostic use
k = 1.138, d0 = 48.0
116 x 149

Scan Information:

Scan Date: November 12, 2005 ID: A11120501
Scan Type: x Lumbar Spine
Analysis: November 12, 2005 09:48 Version 12.4:3
Lumbar Spine

Operator:
Model: Discovery C (S/N 81202)
Comment:

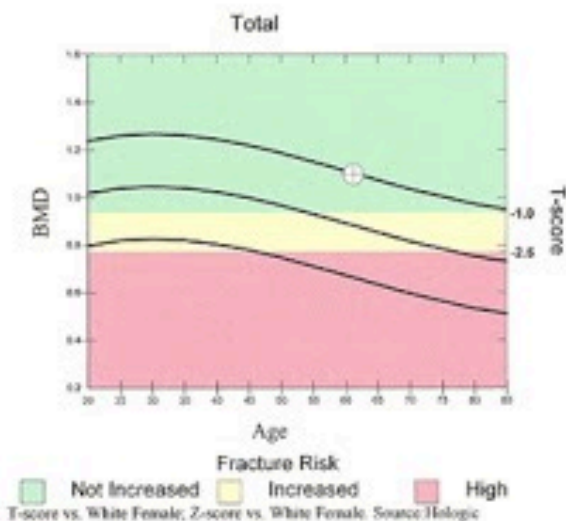
DXA Results Summary:

Region	Area (cm ²)	BMC (g)	BMD (g/cm ³)	T - score	PR (%)	Z - score	AM (%)
L1	14.41	14.44	1.002	0.7	108	2.0	129
L2	15.27	16.33	1.069	0.4	104	1.8	123
L3	16.99	19.69	1.159	0.7	107	2.2	127
L4	18.74	21.27	1.135	0.2	102	1.8	121
Total	65.41	71.72	1.096	0.4	105	1.9	124

Total BMD CV 1.0%, ACF = 1.000, BCF = 1.000, TH = 3.855

WHO Classification: Normal
Fracture Risk: Not Increased

Physician's Comment:



Bedford Osteoporosis Center

35 Crosby Drive
Bedford, MA 01730

Telephone: 781-999-7300

E-Mail: info@hologic.com

Fax: 781-290-0614

Name: Smith, Jane
Patient ID: 00368
DOB: February 19, 1927

Sex: Female
Ethnicity: White
Menopause Age: 46

Height: 61.0 in
Weight: 121.0 lb
Age: 71

Referring Physician: Wilson



Image not for diagnostic use

Scan Information:

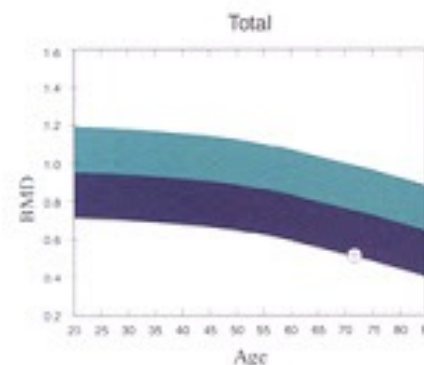
Scan Date: 11/2/98 ID: B11029500
Scan Type: f Left Hip
Analysis: 11/2/99 10:31 Version 8.26
Left Hip

Operator: AR
Model: QDR
Comment: BASELINE

DXA Results Summary:

Region	Area (cm ²)	BMC (g)	BMD (g/cm ³)	T - score	Z - score
Neck	5.08	2.07	0.408	-4.0	-2.1
Trochanter	12.61	4.62	0.366	-3.3	-1.9
Inter	16.52	10.70	0.648	-2.9	-1.6
Total	34.20	17.39	0.508	-3.6	-2.0
Ward's	1.04	0.20	0.193	-4.6	-2.0

Total BMD CV 1.0%, ACF=1.031, BCF=1.020, TH=5.208
WHO Classification: Osteoporosis
Fracture Risk: High



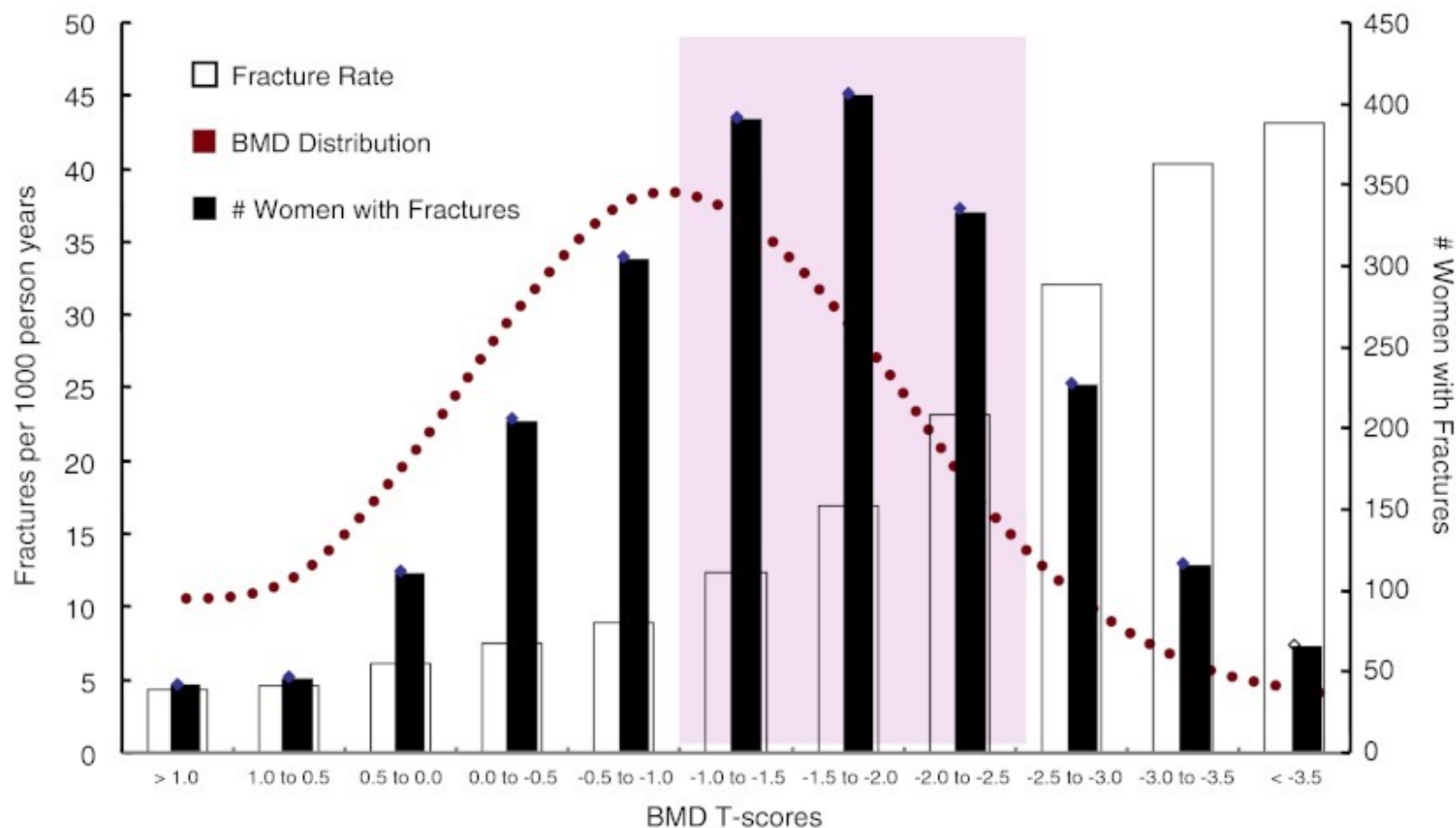
Physician's Comment:

HOLOGIC

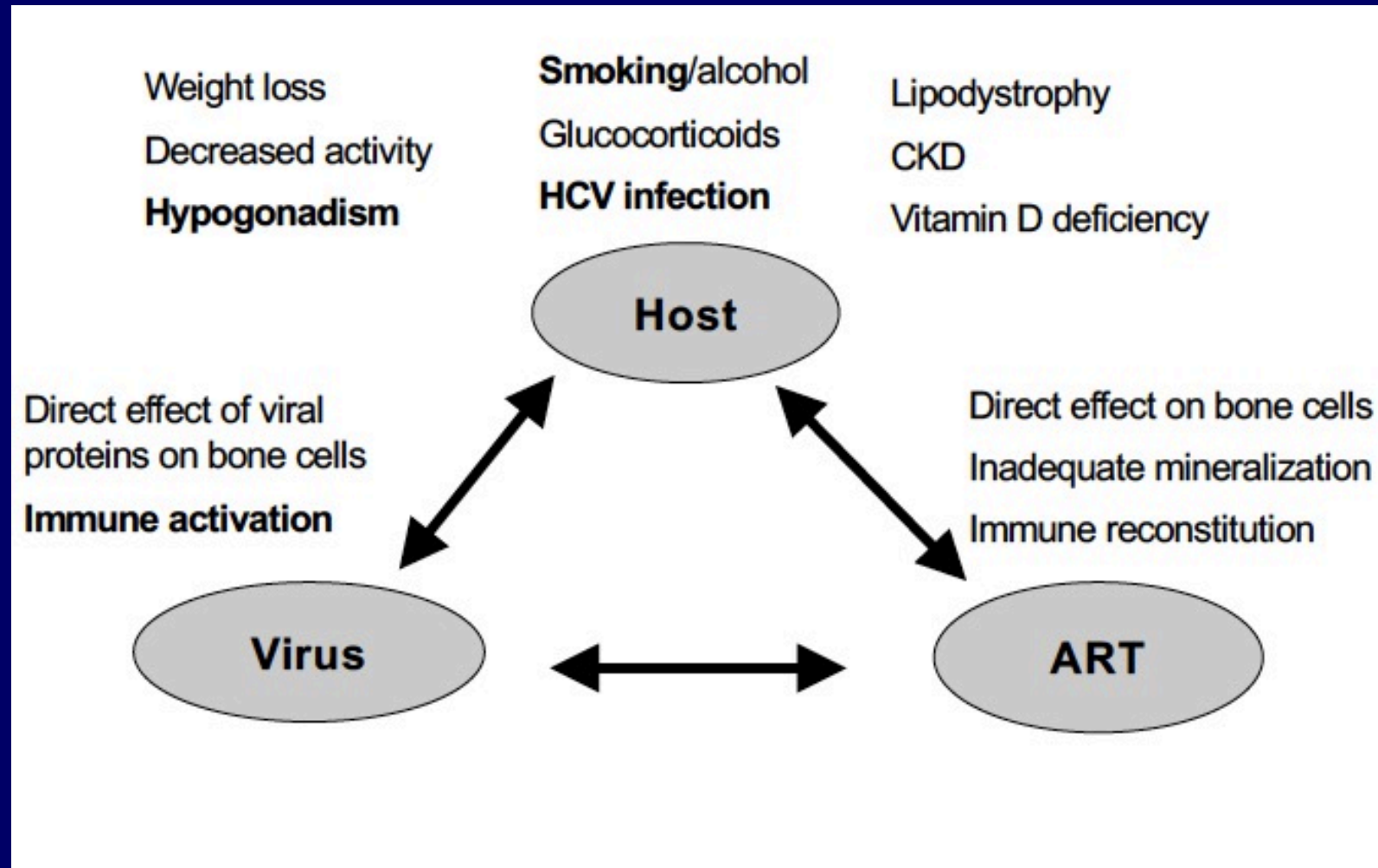
M-021 US/International

HOLOGIC

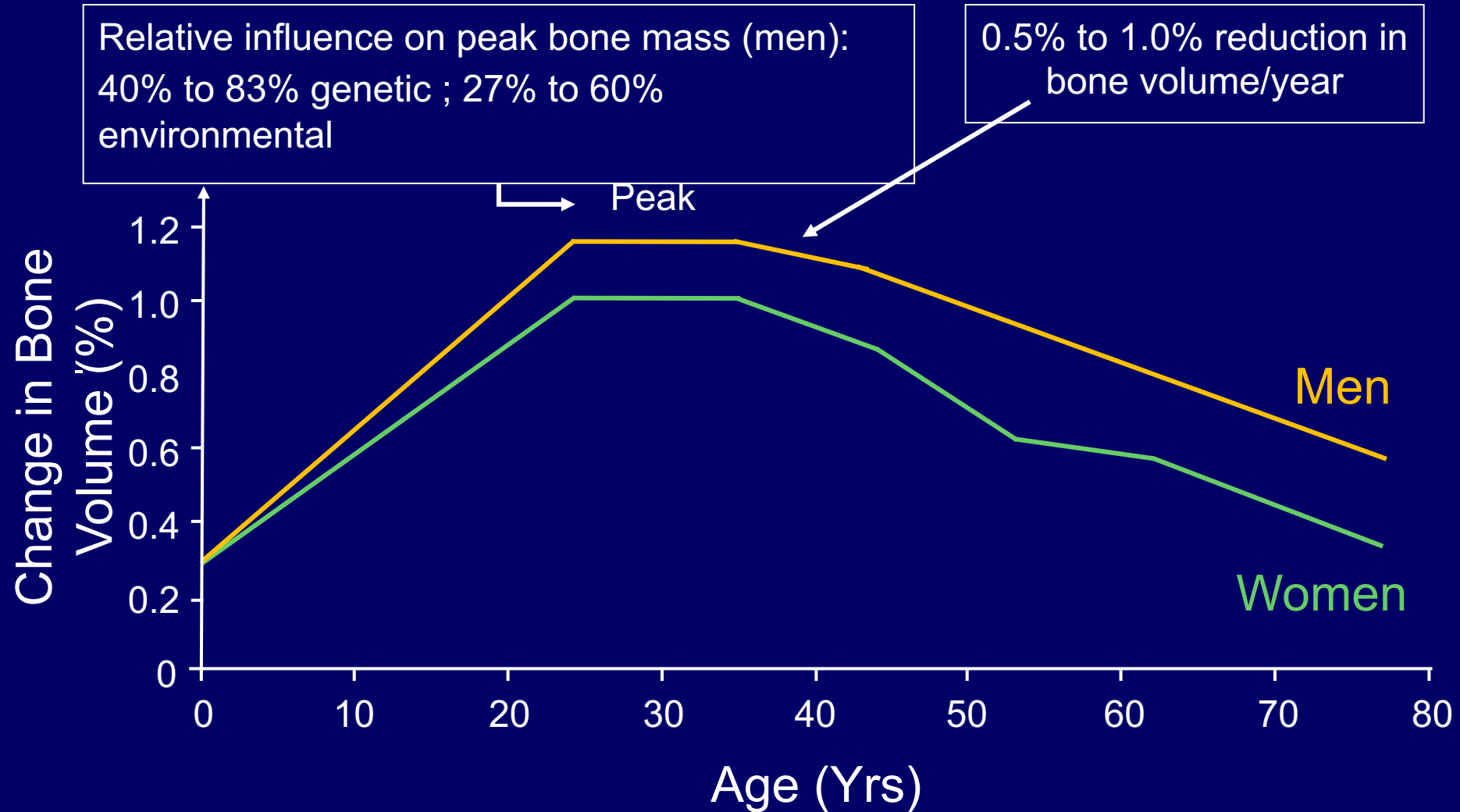
Fractures Happen at all BMDs



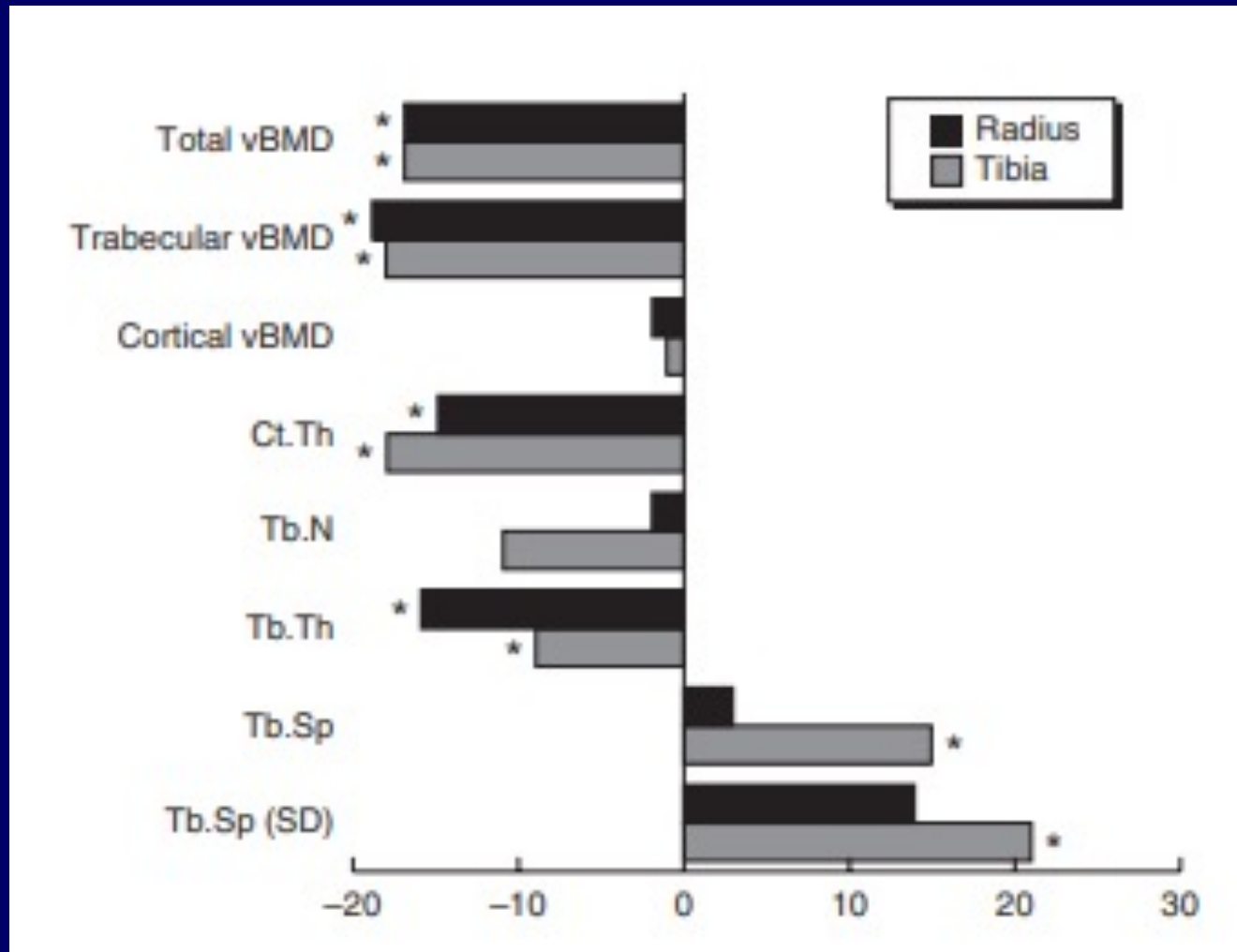
Multifactorial Etiology of Bone Loss in HIV



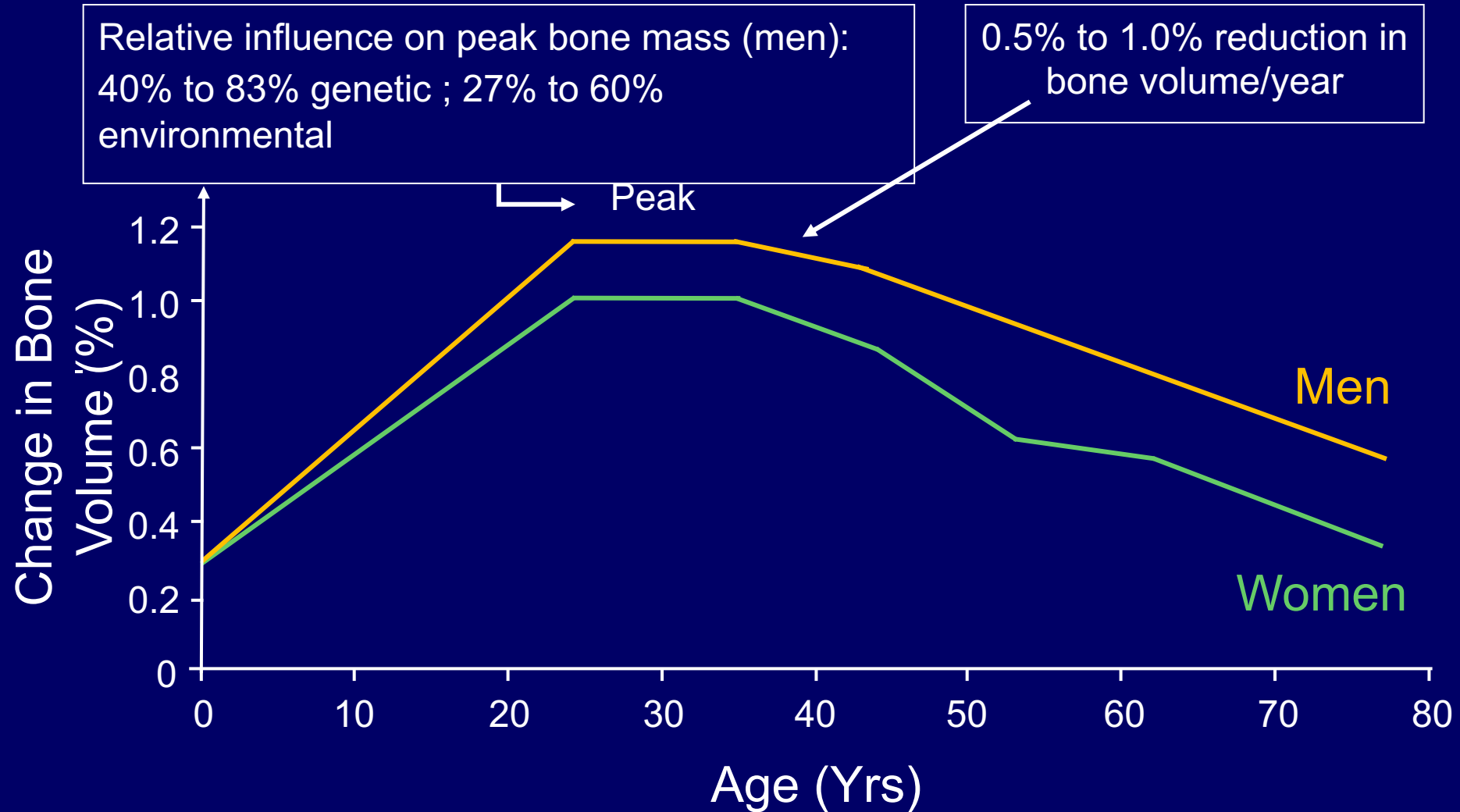
BMD Decreases With Age



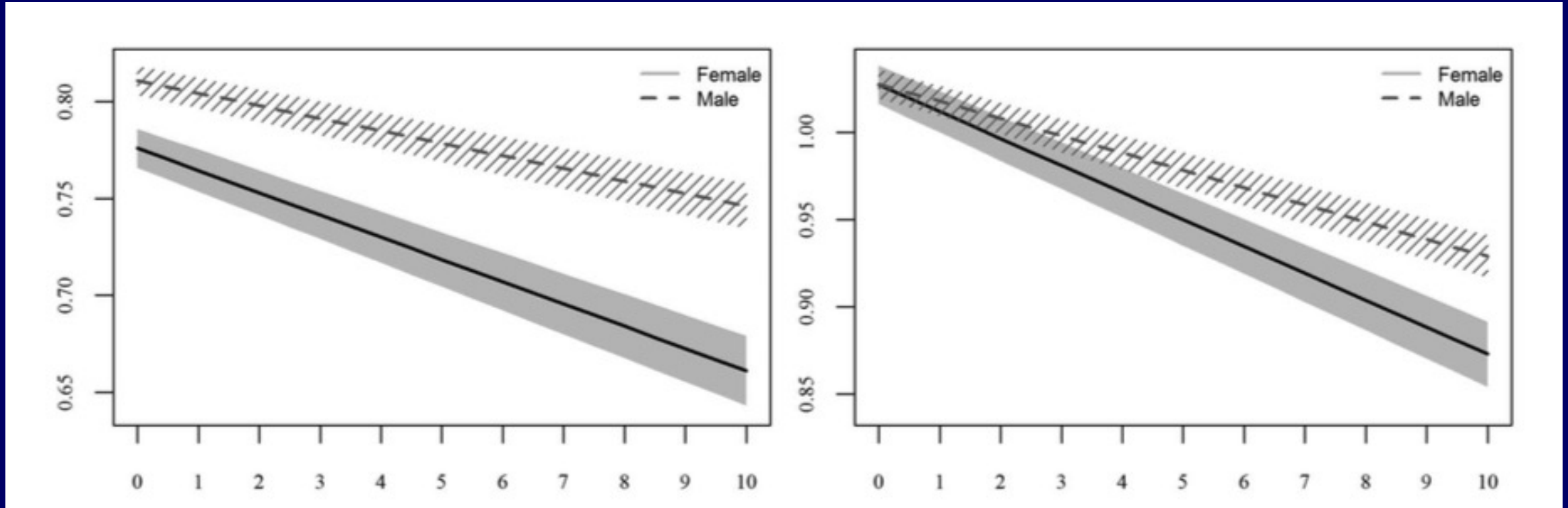
Young men with HIV have lower BMD than men without HIV: Potential Consequences on Peak Bone Mass



BMD Decreases With Age



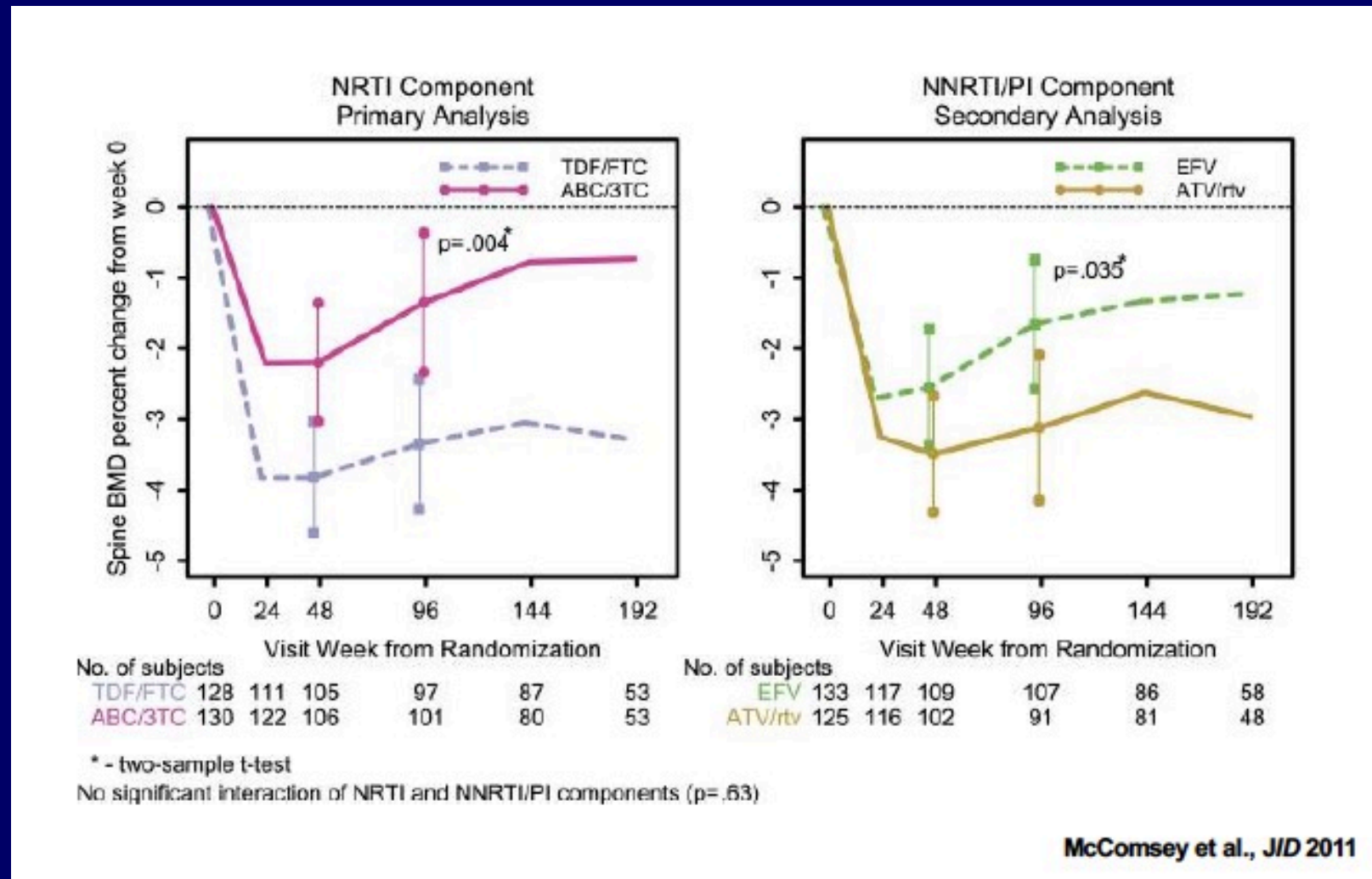
BMD Declines Twice As Fast in Women vs Men in PLWH



Femoral Neck

Lumbar Spine

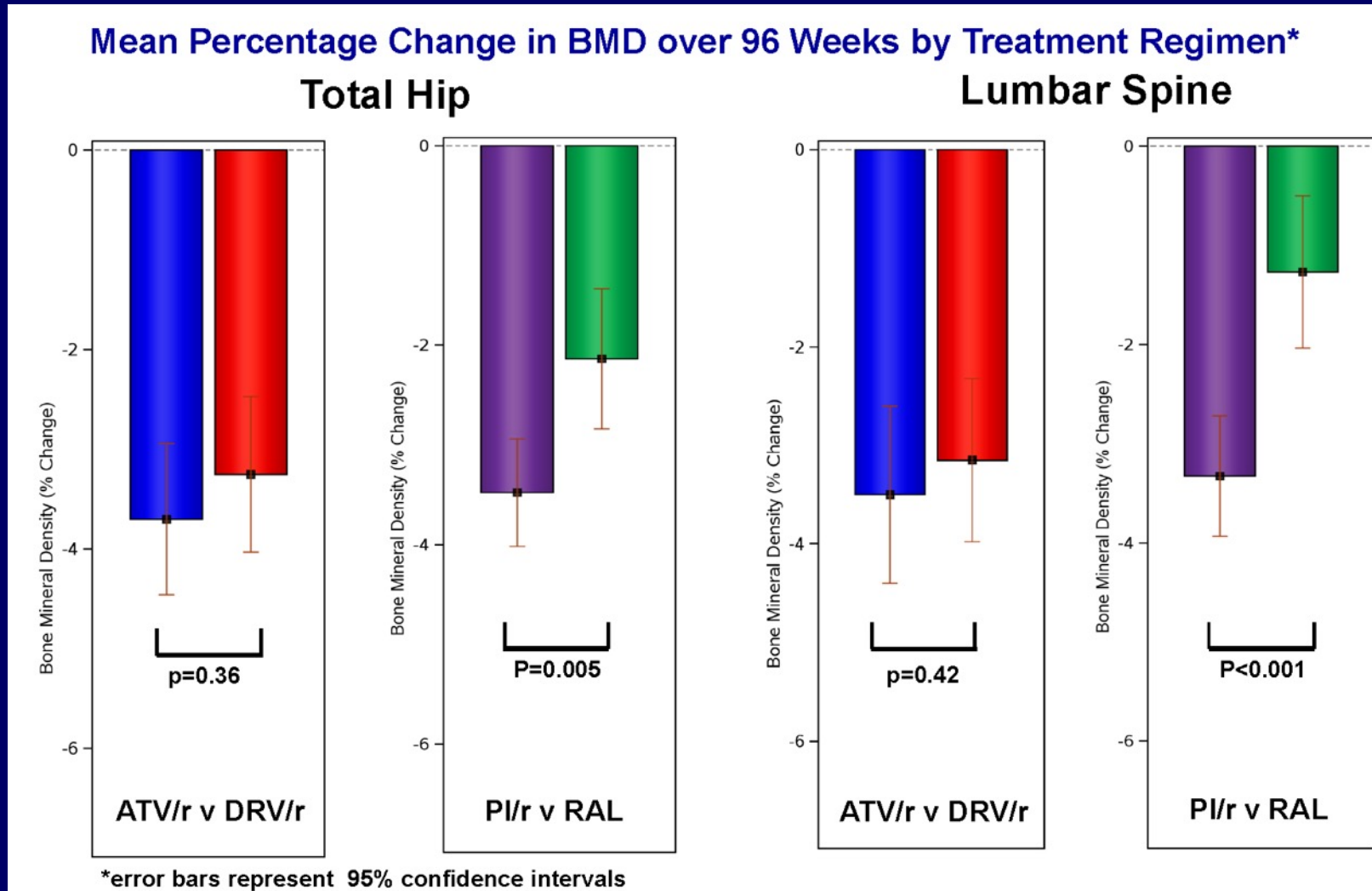
Bone Loss Occurs First 6 Months after ART Initiation



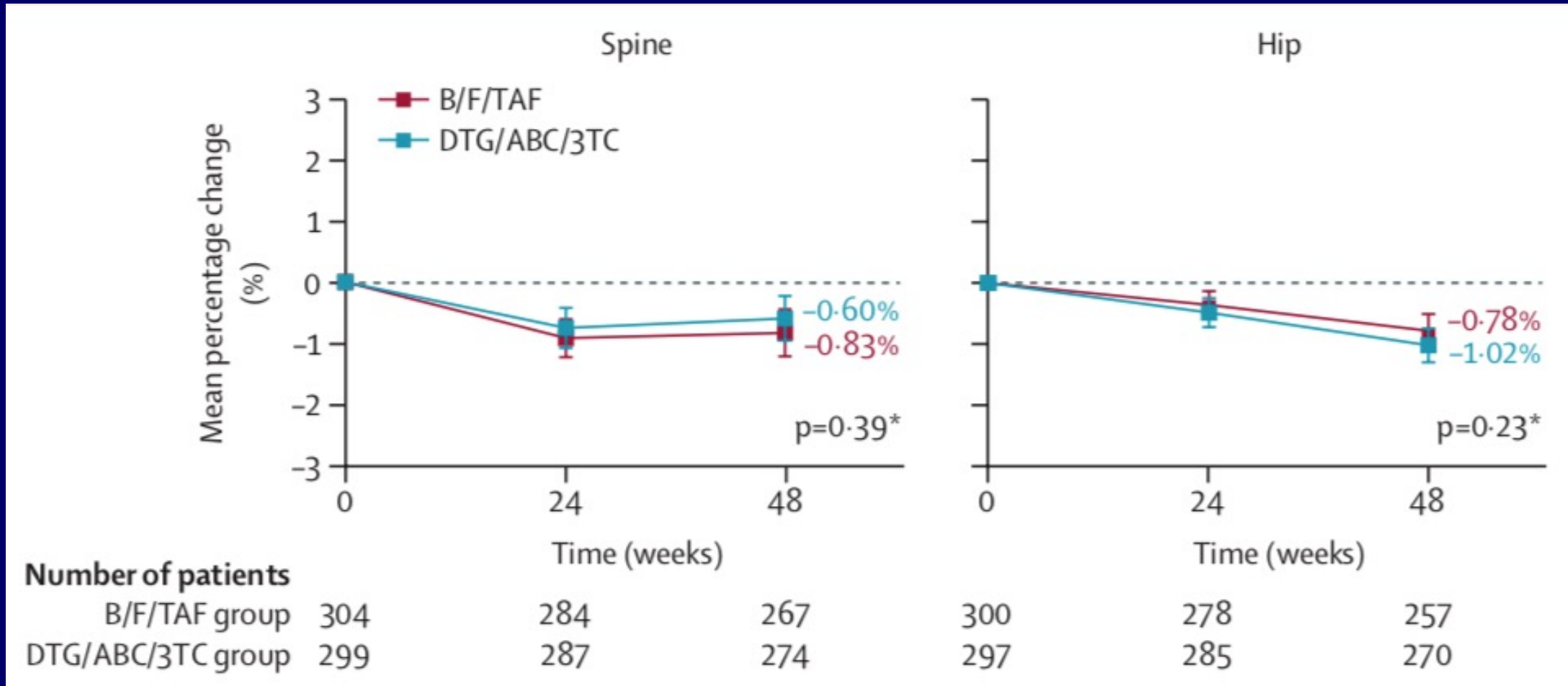
Bone Loss with ART Initiation: TDF

Study	ART regimens	Change in LS BMD
Stellbrink, ASSERT 2010	TDF/FTC + EFV ABC/3TC + EFV	-3.6%* -1.9%
McComsey, ACTG 5224s 2011	TDF/FTC ABC/3TC ATV/r EFV	-3.3%* -1.3% -3.1%* -1.7%
Reynes, PROGRESS 2013	TDF/FTC+LPV/r RAL+LPV/r	-2.5%* +0.7%
Sax, Gilead 104-111 2015	E/C/F/TDF E/C/F/TAF	-2.9%* -1.3%

Bone Loss After ART Initiation: PIs vs RAL



Starting ART without TDF or PIs: 0.5-1.0% Bone Loss



BMD improves with ART switch

TDF  **TAF or raltegravir**

Ritonavir-boosted protease inhibitor  **raltegravir**

Study	Sample/ Duration	ART regimens	Change in LS spine	Change in FN or TH BMD
Pozniak JAIDS 2017	N=242 eGFR 30-69 ml/min 48 wks	TDF/FTC/EVG/Cobi to TAF/FTC/EVG/Cobi	+2.3%*	+1.5%*
Bloch TROP 2014	N=37 48 wks	TDF+PI/r to RAL+PI/r	+3.0%	+2.5%
Curran SPIRAL-LIP 2012	N=74 48 wks	NRTIs+LPVr to NRTIs+ RAL Stay on NRTIs+LPVr		+0.01 g/cm²* no change

How can we prevent fractures in PLWH?

- ART switching
 - avoid TDF & PIs in individuals with higher fracture risk
- Appropriate screening
 - DXA: Men ≥ 50 y & all post-menopausal women
 - Caveat: Explains only about 50% of fracture risk

To Screen or Not to Screen....



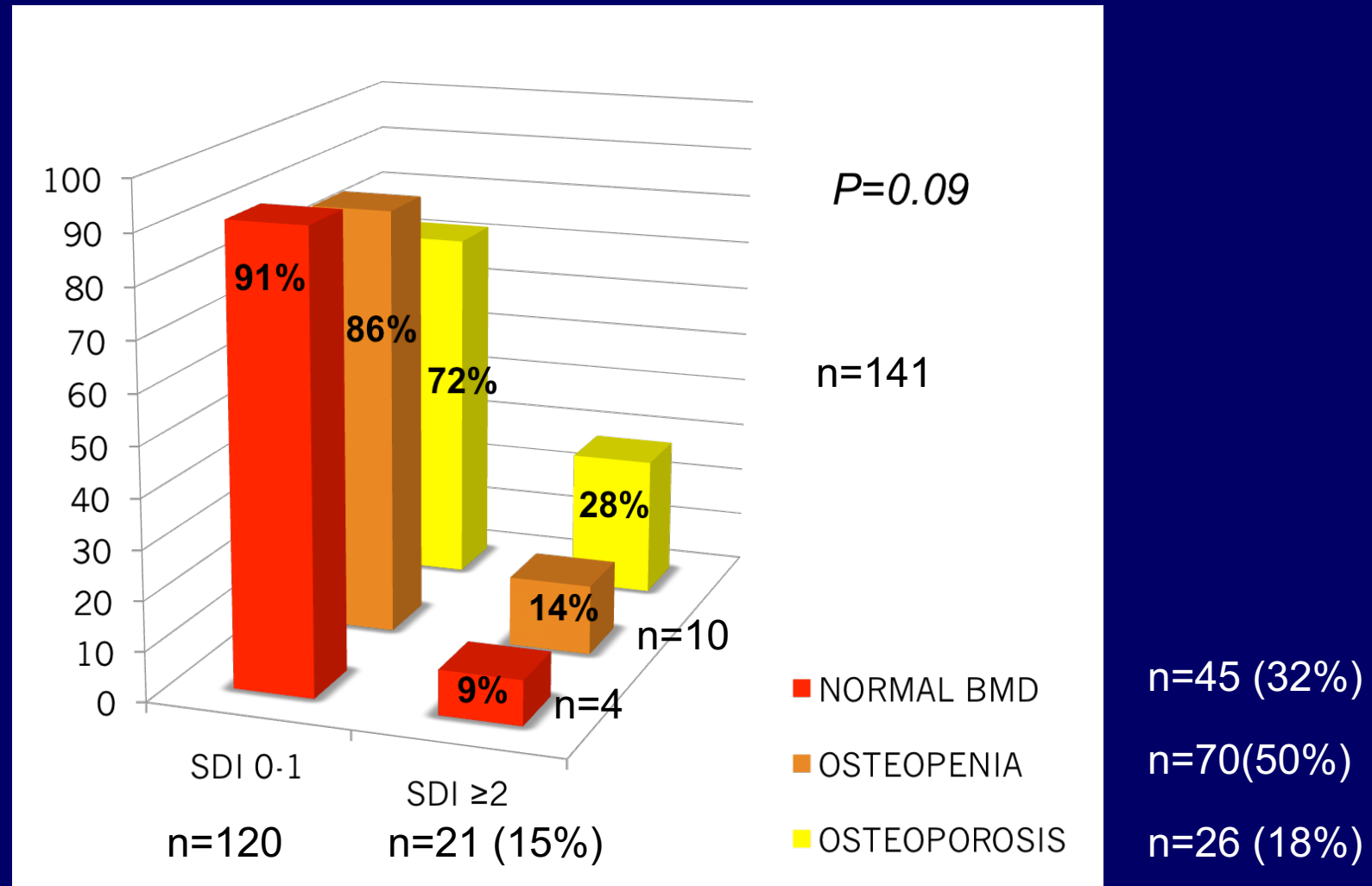
Bone Health and Osteoporosis Foundation (BHOFF) Guidelines for DXA Screening

- Those with a fragility fracture after age 50
- Women ≥ 65 yrs, Men ≥ 70 yrs
- Younger postmenopausal women and men 50-69 years with clinical risk factors for fracture
- Adults with a condition (e.g., rheumatoid arthritis) or taking a medication (e.g., glucocorticoids in a daily dose ≥ 5 mg prednisone or equivalent for \geq three months) associated with low bone mass or bone loss

Other Modalities to Assess Fracture Risk

- Skeletal
 - Spine X-rays

Subclinical Vertebral Fracture in an Italian Cohort



2/3 of those with subclinical vertebral fractures did not have osteoporosis

BHOF Guidelines: Indications for Vertebral Imaging

- All women aged ≥ 65 years and all men aged ≥ 80 years if T-score at the lumbar spine, total hip, or femoral neck is ≤ -1.0
- • Men aged 70 to 79 years if T-score at the lumbar spine, total hip, or femoral neck is ≤ -1.5
- • Postmenopausal women and men age ≥ 50 years with specific risk factors:
 - Fracture during adulthood (age ≥ 50 years)
 - Historical height loss of 1.5 in. or more
 - Prospective height loss of 0.8 in. or more
 - Recent or ongoing long-term glucocorticoid treatment
 - Medical conditions associated with bone loss such as hyperparathyroidism

How can we prevent fractures in PLWH?

- ART switching
 - avoid TDF & PIs in individuals with higher fracture risk
- Appropriate screening
 - DXA: Men ≥ 50 y & all post-menopausal women
 - Caveat: Explains only about 50% of fracture risk
- Identifying appropriate candidates for treatment

BHOF Guidelines: Whom to Treat*

- Those with hip or vertebral fractures
- Those with fracture of the pelvis, proximal humerus, or distal forearm in a person with low bone mass or osteopenia
- Those with BMD T-scores ≤ -2.5 at the femoral neck, total hip, 33% radius, or spine by DXA
- Those with T-score b/t -1 and -2.5 (osteopenia) at above sites AND 10-year hip fracture probability $\geq 3\%$ or 10-year all major osteoporosis-related fracture $\geq 20\%$ based on FRAX model

*applies to post-menopausal women and men ≥ 50 years



FRAX™ WHO Fracture Risk Assessment Tool

HOME CALCULATION TOOL PAPER CHARTS FAQ REFERENCES Select a Language

Calculation Tool

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



Weight Conversion:

pound:

Height Conversion:

inch:

Country : **US(Black)** Name / ID : About the risk factors

Questionnaire:

1. Age (between 40-90 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 more units per day ☒ No ☐ Yes

12. Femoral neck BMD

FRAX underestimates fracture risk in PLWH
 Yang, AIDS, 2018

Should treatment thresholds be any different in
 PLWH?

Risk factors

For the clinical risk factors a yes or no response is asked for. If the field is left blank, then a "no" response is

<http://www.shef.ac.uk/FRAX/>

Screening for Secondary Causes of Low BMD

- Vitamin D deficiency → 25 OH Vit D
- Hyperparathyroidism → PTH, Ca^{++}
- Subclinical Hyperthyroidism → TSH
- Hypogonadism → Males: Free Testosterone, Women: Menstrual Hx
- Phosphate wasting → Fractional Excretion of Phosphate
- Idiopathic Hypercalciuria → 24 hr Urinary Calcium
- Celiac Sprue → Tissue Transglutaminase
- Multiple Myeloma → Serum Protein Electrophoresis
- Mastocytosis → Serum Tryptase
- Cushing's Syndrome → 24 hr Urinary Free Cortisol

General Recommendations

- Calcium
 - goal: 1200 mg daily, preferably from diet
- Vitamin D supplementation
 - at least 800 IU or target 25OHD > 20 ng/mL (50 nmol/L)
- Smoking cessation
- Alcohol reduction
- Weight-bearing exercise
- Discontinuation of medications associated with osteoporosis (eg, steroids, some diabetes medications (glitazones), proton pump inhibitors)

Dietary Sources of Calcium

Food	Item	Calcium Range
Dairy	Low Fat Yogurt, Milk, Cheese	150-400 mg
Proteins	Tofu (with Calcium), Sardines (With Bones), Garbanzo Beans, Almonds	75 - 400 mg
Vegetables	Collards, Bok Choy, Kale, Broccoli	20-260 mg
Other Foods	Pizza, Lasagna, Mineral Water (Gerolsteiner), Dried Figs	120 - 450 mg

How To Read a Nutrition Label

Add a zero to the calcium %
to get milligrams per serving.

$$20\% + 0 = 200 \text{ mg}$$

Nutrition Facts			
Serving Size 2/3 cup (55g)			
Servings Per Container About 8			
Amount Per Serving			
Calories 230		Calories from Fat 72	
		% Daily Value*	
Total Fat	8g		12%
Saturated Fat	1g		5%
Trans Fat	0g		
Cholesterol	0mg		0%
Sodium	160mg		7%
Total Carbohydrate	37g		12%
Dietary Fiber	4g		16%
Sugars	1g		
Protein	3g		
Vitamin A			10%
Vitamin C			8%
Calcium			20%
Iron			45%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily value may be higher or lower depending on your calorie needs.			
	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

If You Need a Supplement

If you don't eat 2-3 servings of a calcium-rich food every day, you may need a supplement.

- Two types of calcium supplement

Calcium citrate

i.e., Citracal

Easier on stomach,

Take with or without food

Calcium carbonate

i.e., Caltrate

Less expensive,

Take with food

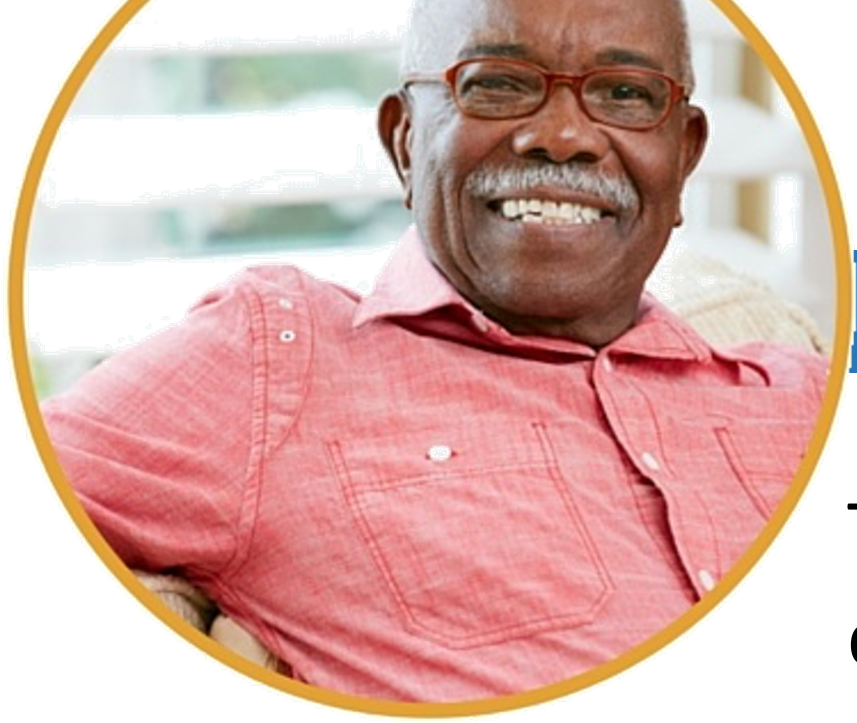
- Body can only absorb 500-600 mg at a time
- Do not take more than 1,500 mg/day

Vitamin D is Essential

- Calcium needs vitamin D to get absorbed in the intestine
- Sunshine alone is not a reliable source of vitamin D
- RDA varies from 600- 2,000 International Units per day

Food	Item	Vitamin D Range
Fatty Fish	Salmon, Sardines,	150-500 IU
Dairy	Milk, Fortified with D	100-125 IU
Other Foods	Fortified Cereals, Juices	50-75 IU
Protein	Egg Yolk	44 IU

It's very hard to get enough vitamin D through diet!
Supplements are not expensive.



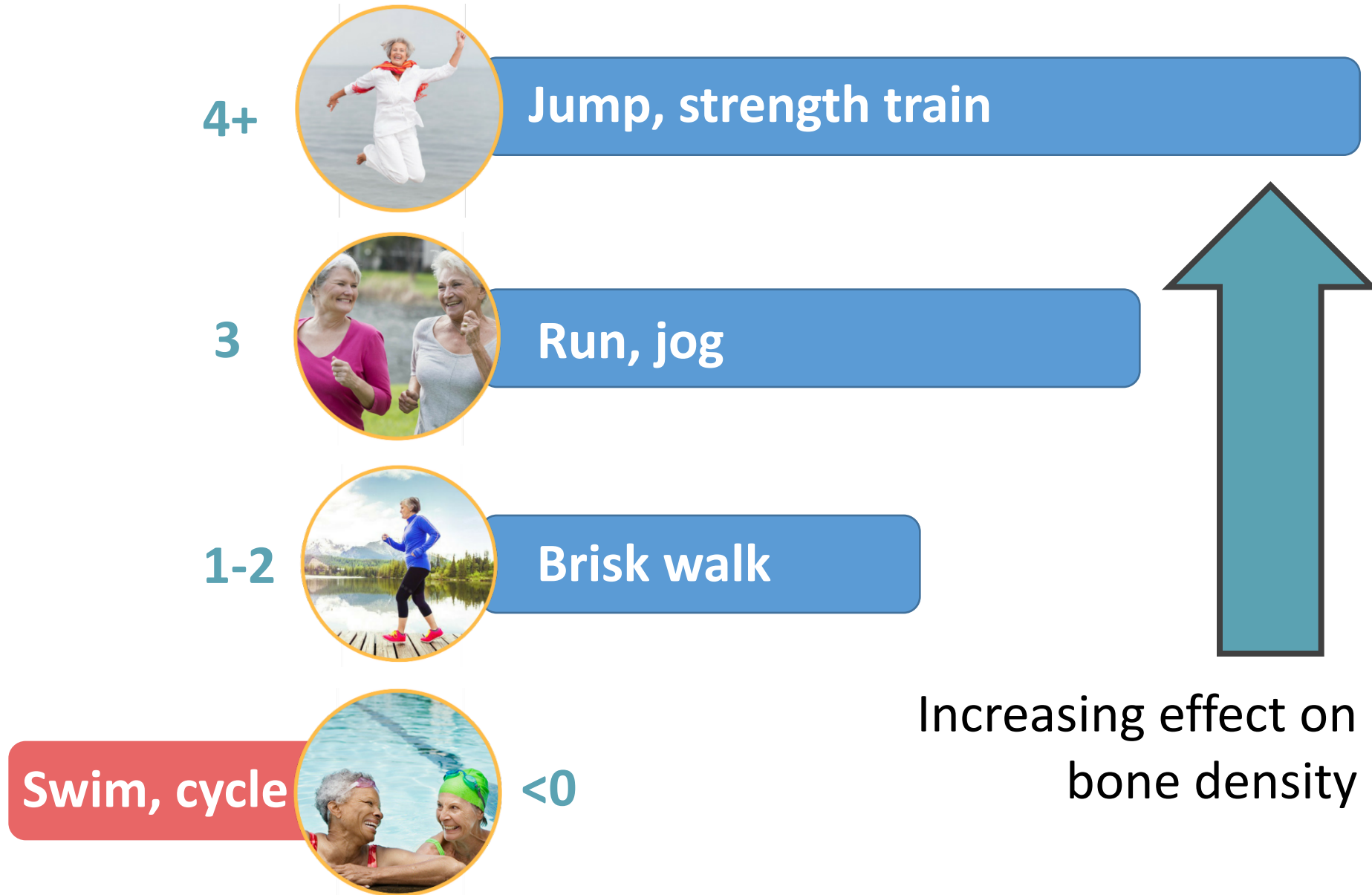
Bones Like a Load

To build bone density, you must do activities that “surprise” and add weight to the bone.

*Activities that strengthen muscles,
strengthens bone.*

Loads Vary by Activity

Levels of Load by Body Weight

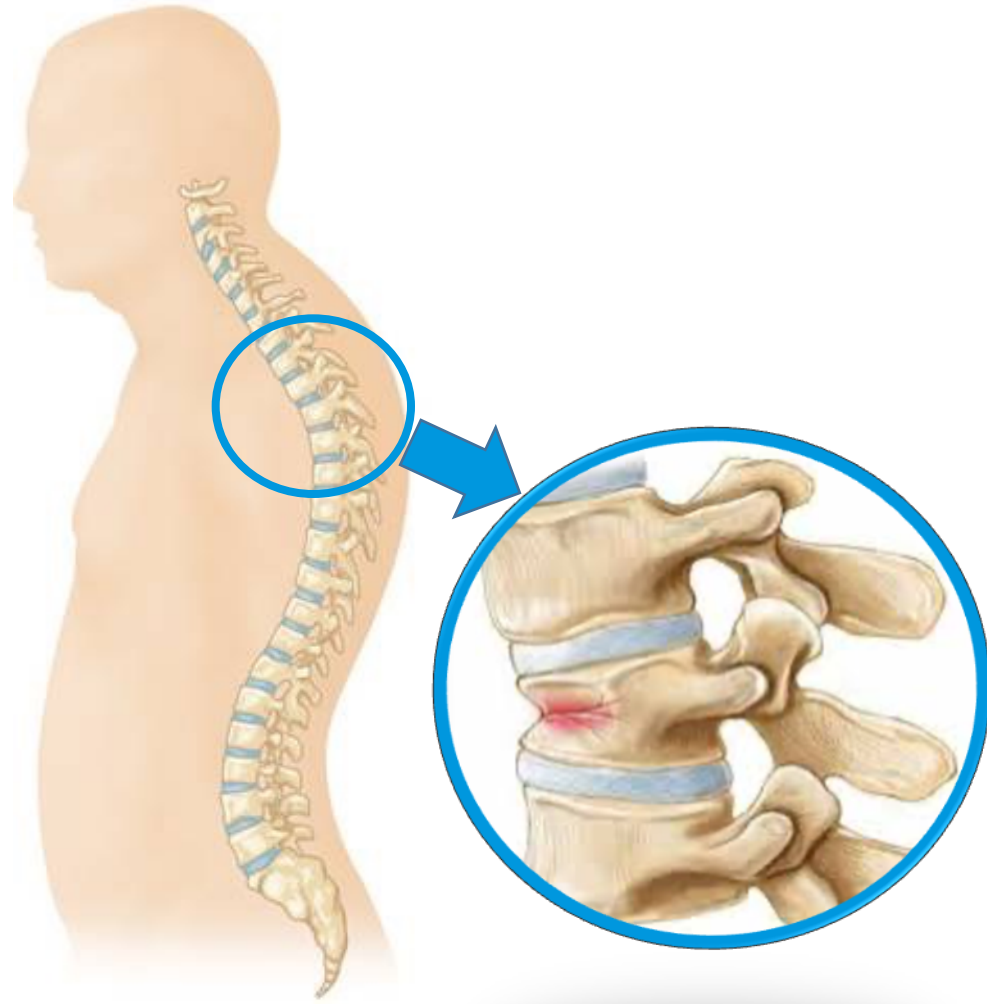


Load Safely


The spine is most
VULNERABLE
when rounding forward.

AVOID compression
fractures.

ALWAYS bend at the hips
with a straight spine.



Support the Spine Bones

- 
- 1 Practice great posture
 - 2 Use great body mechanics
 - 3 Expand chest muscles
 - 4 Strengthen back muscles
 - 5 Strengthen abs
(plank is great!)

Strengthen back muscles

Standing “W” Exercise

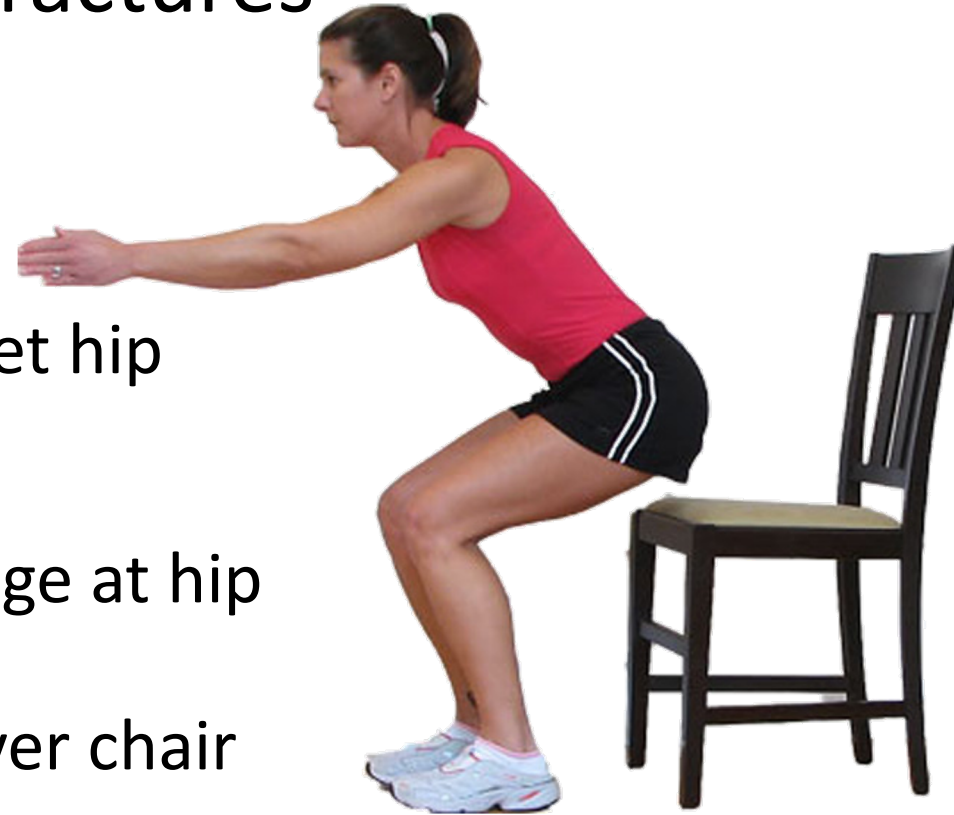
- 1 Raise arms parallel to floor
- 2 Pull arms backwards, pinch shoulder blades
- 3 Hold for 3 seconds. Breathe.
- 4 Repeat as often as you can!



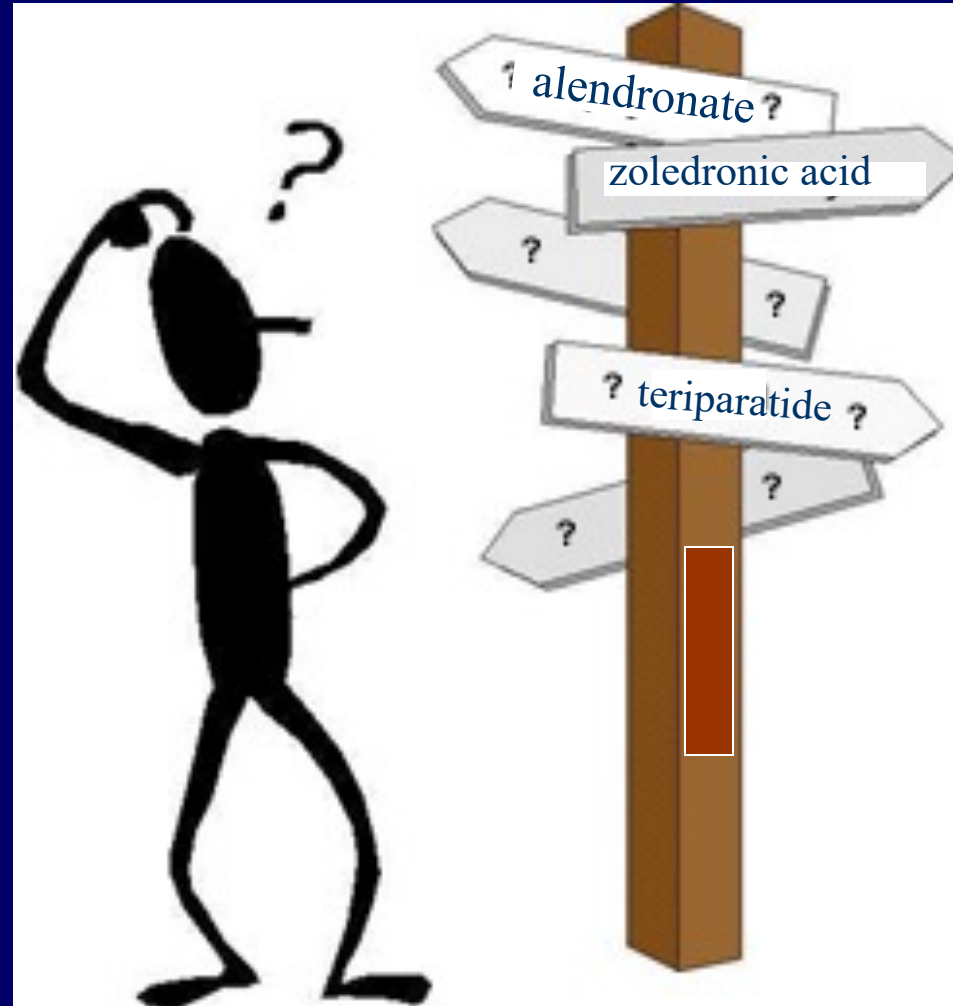
Reduce falls and fractures

Modified Squat

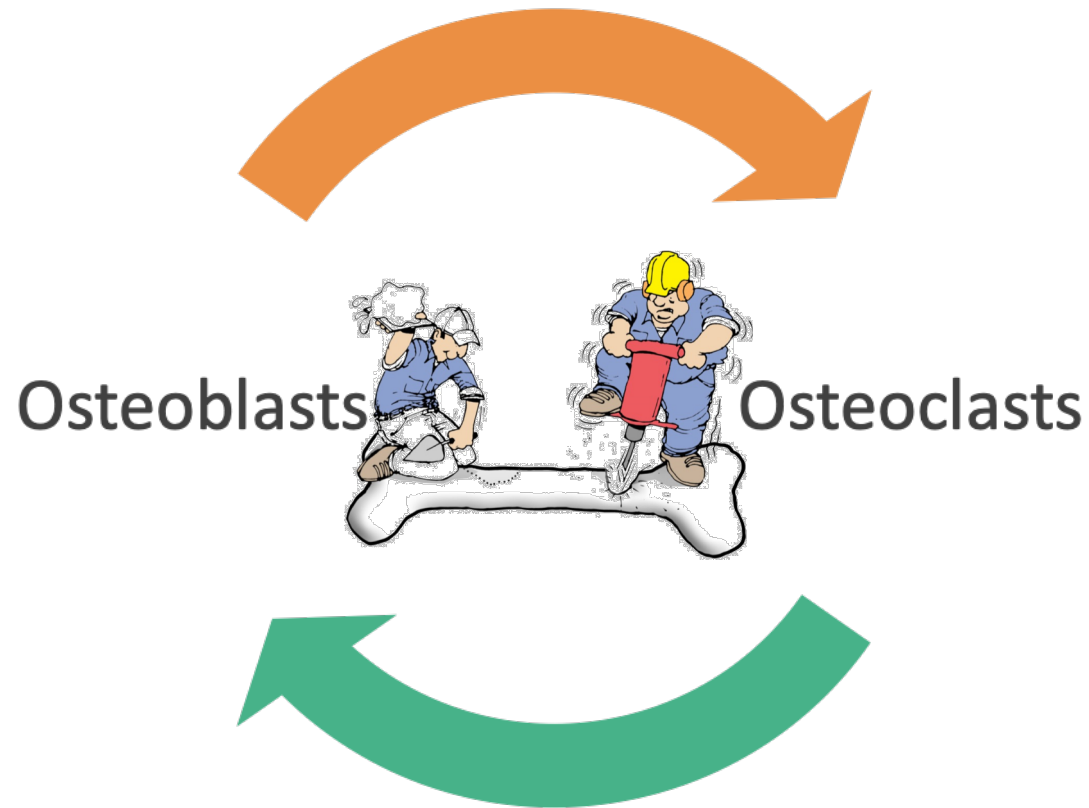
- 1 Stand close to chair – feet hip distance apart
- 2 Keep a straight back, hinge at hip
- 3 Squat back and hover over chair
- 4 Hold as long as you can, work up to 30 seconds



What treatment should be given?



Bones Are Living Tissue



Bone remodeling
means you have
the opportunity
to have
new bones
every
7-10 years!

Osteoblasts- build new bone

Osteoclasts- remove old or damaged bone

Pharmacologic Therapies for Osteoporosis

Antiresorptive

(Osteoclast Directed)

- bisphosphonates
- SERMs (raloxifene)
- denosumab
- hormone replacement therapy

Anabolic

(Osteoblast Directed)

- PTH/PTHrP Analogs
(teriparatide, abaloparatide)
- romosozumab

Bisphosphonates

– Reduce vertebral & non-vertebral fractures by 25-50% in non-HIV

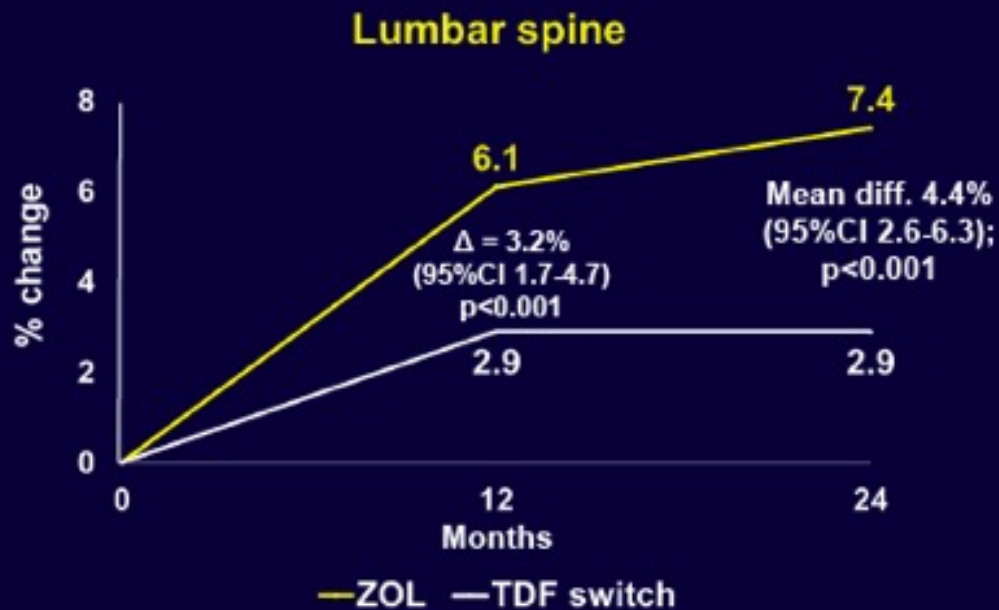
Author, year (N)	T-score	Medication (duration)	Spine	Hip
Guaraldi, 2004 (N=41)	< -1.0	Alendronate 70 mg/wk (1 yr)	NS	NS
Mondy, 2005 (N=31)	< -1.0	Alendronate 70 mg/wk (1 yr)	+5.2% vs +1.3%*	NS
McComsey, 2007 (N=82)	< -1.5	Alendronate 70 mg/wk (1 yr)	+3.1% vs +1.1%*	+4.0% vs +1.4% [†]
Rozenberg, 2012 (N=44)	< -2.5	Alendronate 70 mg/wk (2 yrs)	+7.4% vs +4.1%	NS
Bolland, 2007 (N=43)	< -0.5	Zoledronic acid 4 mg/year (2 yrs)	+8.9% vs +2.6% [†]	+3.8% vs -0.8% [†]
Huang, 2009 (N=30)	< -1.5	Zoledronic acid 5 mg/year (1 yr)	+3.7% vs +0.7%*	+3.2% vs -1.8%*

*P < 0.05; [†]P < 0.001; NS = not significant

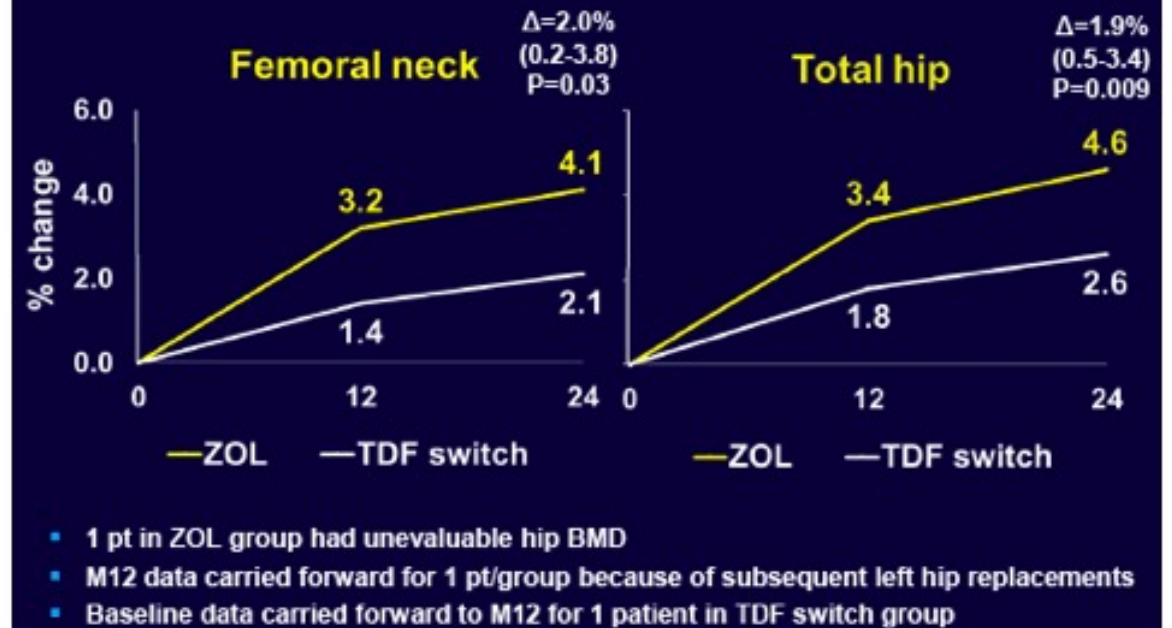
Guaraldi G, et al. *HIV Clin Trials*. 2004;5(5):269-77; Mondy K, et al. *J Acquir Immune Defic Syndr*. 2005;38(4):426-31; McComsey GA, et al. *AIDS*. 2007;21(18):2473-82; Rozenberg S, et al. *AIDS Res Hum Retroviruses*. 2012;28(9):972-80; Bolland MJ, et al. *J Clin Endocrinol Metab*. 2007;92(4):1283-8; Huang J, et al. *AIDS*. 2009;23(1):51-7.

Switch off TDF vs Bisphosphonate: ZEST Study

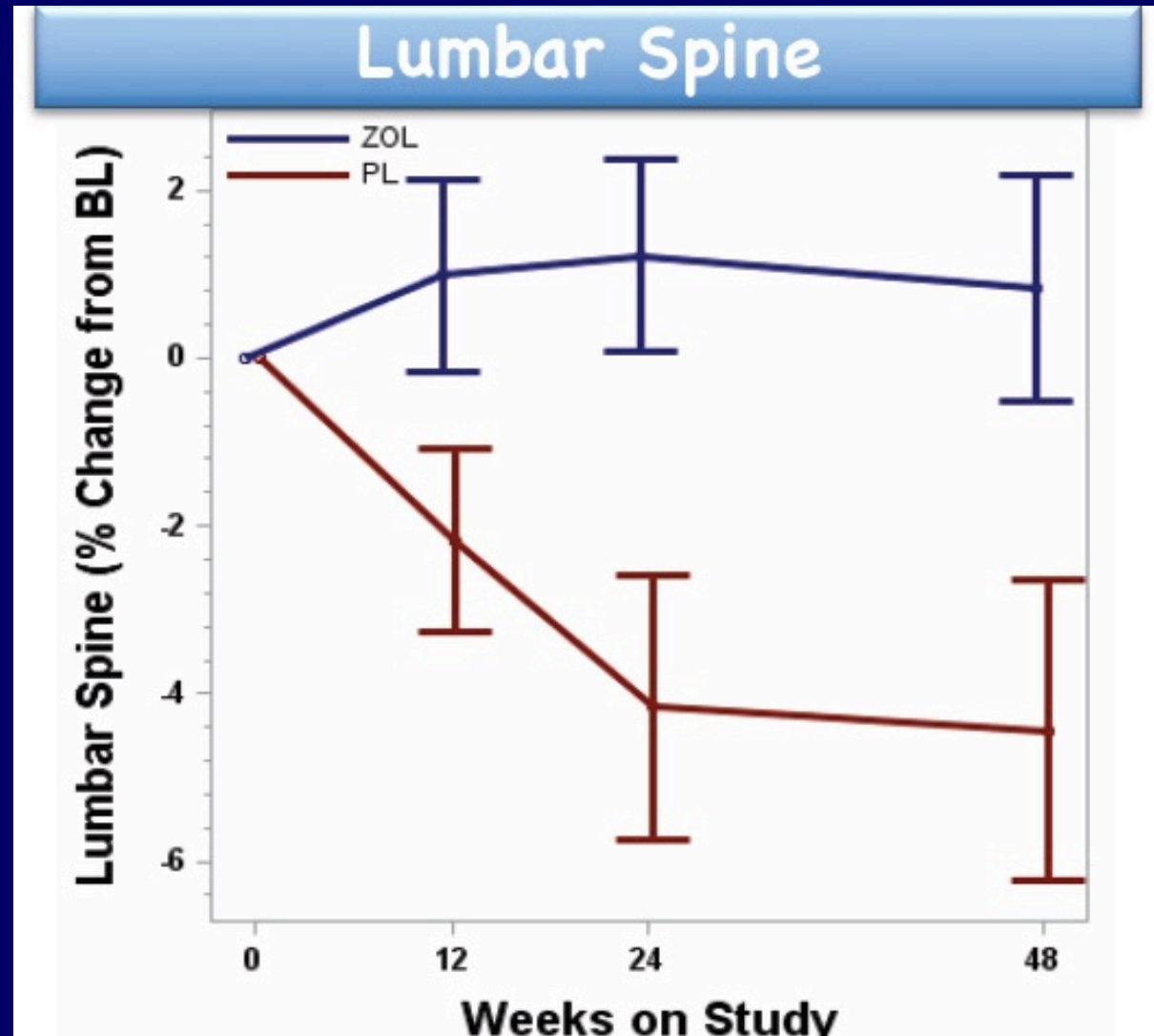
ZOL vs TDF switch for low BMD Changes in BMD



ZOL vs TDF switch for low BMD Changes in BMD - hip



Zoledronic Acid Prevents Bone Loss with ART Initiation



60

Oral vs IV Bisphosphonate

Oral (alendronate)

- Lower Cost
- GI problems
- Not absorbed well from the gut
- Poor compliance/persistence

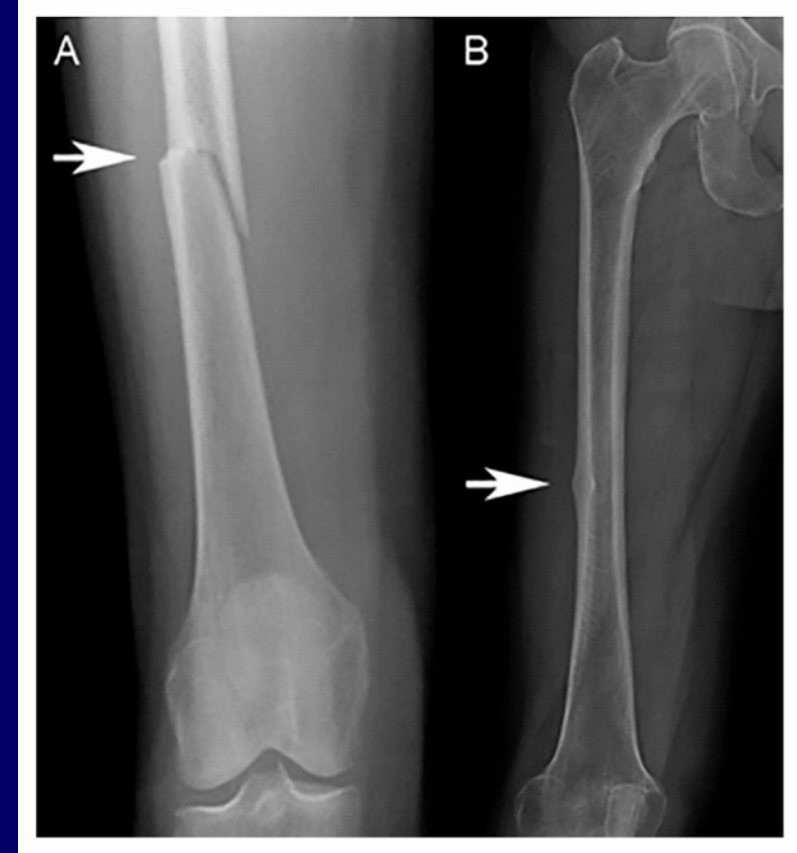
IV (zoledronic acid)

- Clinic administered
- Acute phase reaction (20-30% with first dose)
- Low Calcium
- Directly observed therapy

Antiresorptives: Long Term Adverse Events

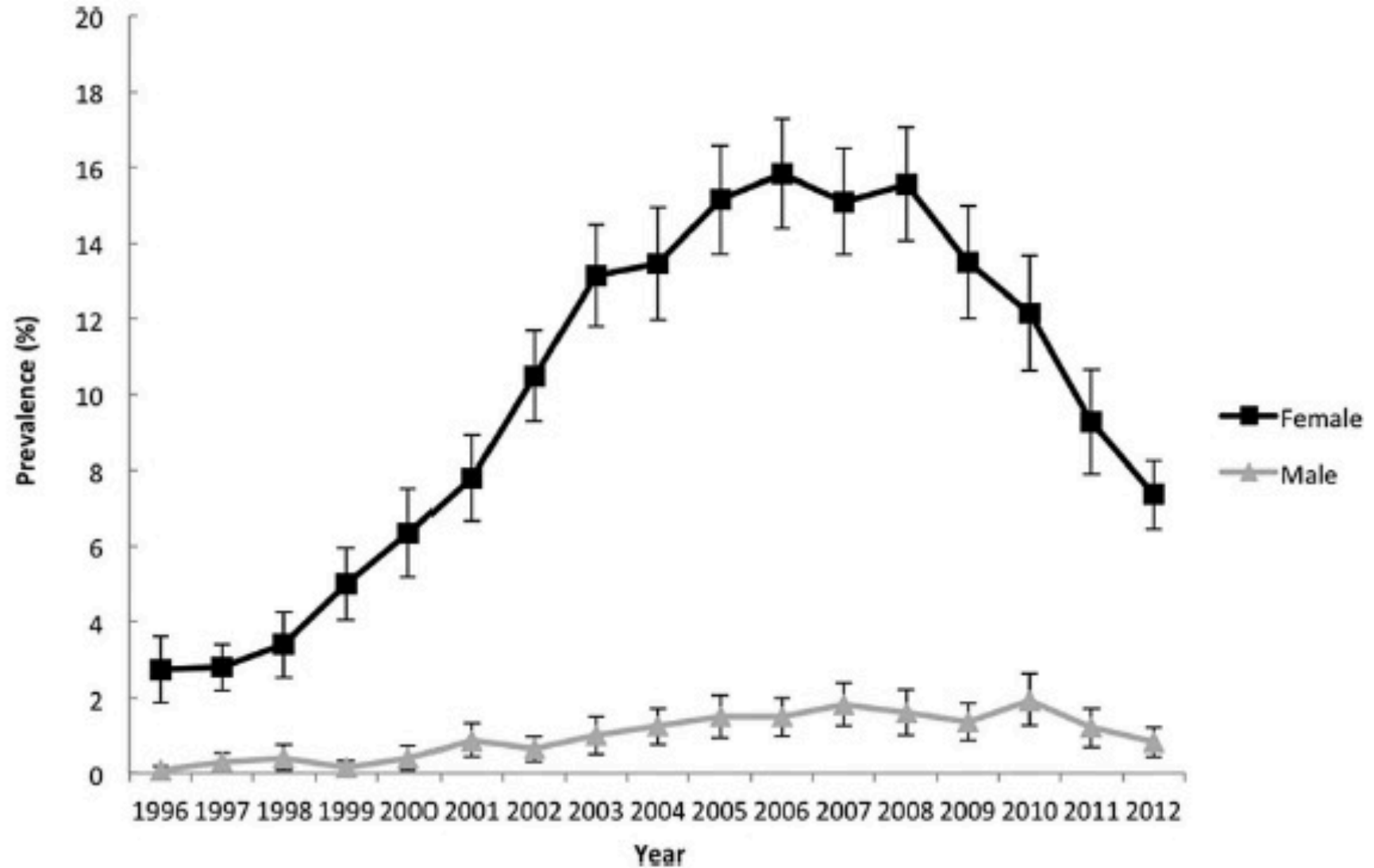


Osteonecrosis of the Jaw
1 to 10 cases per 100,000 person-years

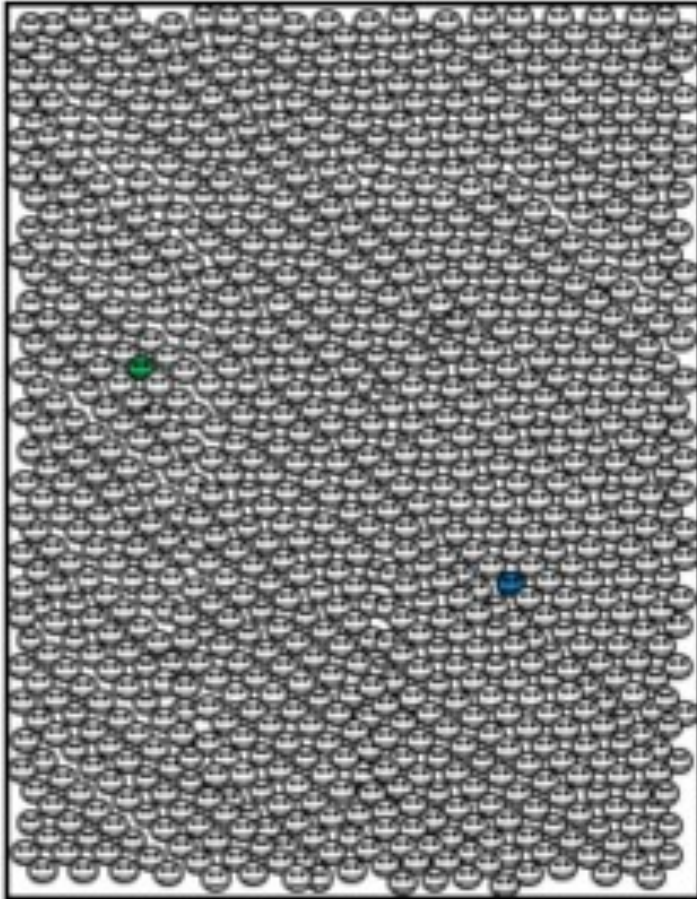


Atypical Femoral Fracture
3.2 to 50 cases per 100,000 person-years

Declining Use of Bisphosphonates





Benefits of Osteoporosis Treatment Greatly Outweigh Risks




THE RISK OF ADVERSE EVENTS WITH OSTEOPOROSIS MEDICATION

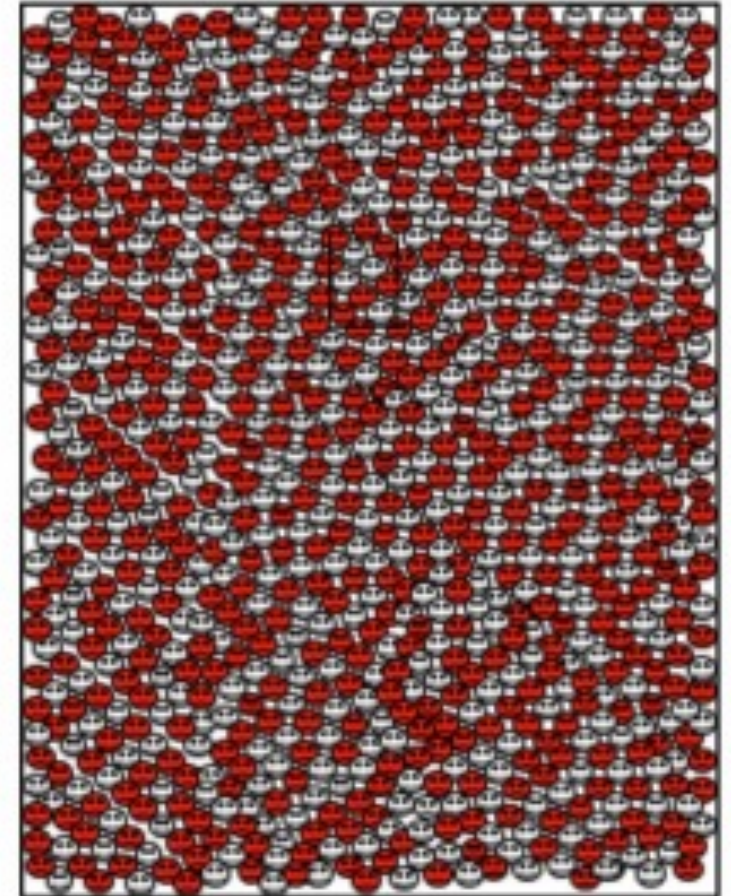
Out of 1,000 people on osteoporosis medication for 5 years:

-  <1 may have osteonecrosis of the jaw (.01/1000)
-  <1 may have an atypical femur fracture (.16/1000)

THE RISK OF FRACTURE WITHOUT OSTEOPOROSIS MEDICATION

Out of 1,000 women:

-  500 will suffer a fracture without treatment for osteoporosis during their lifetime.



Bisphosphate Holiday

Table 2 Recommendations for Drug Holiday from Bisphosphonates

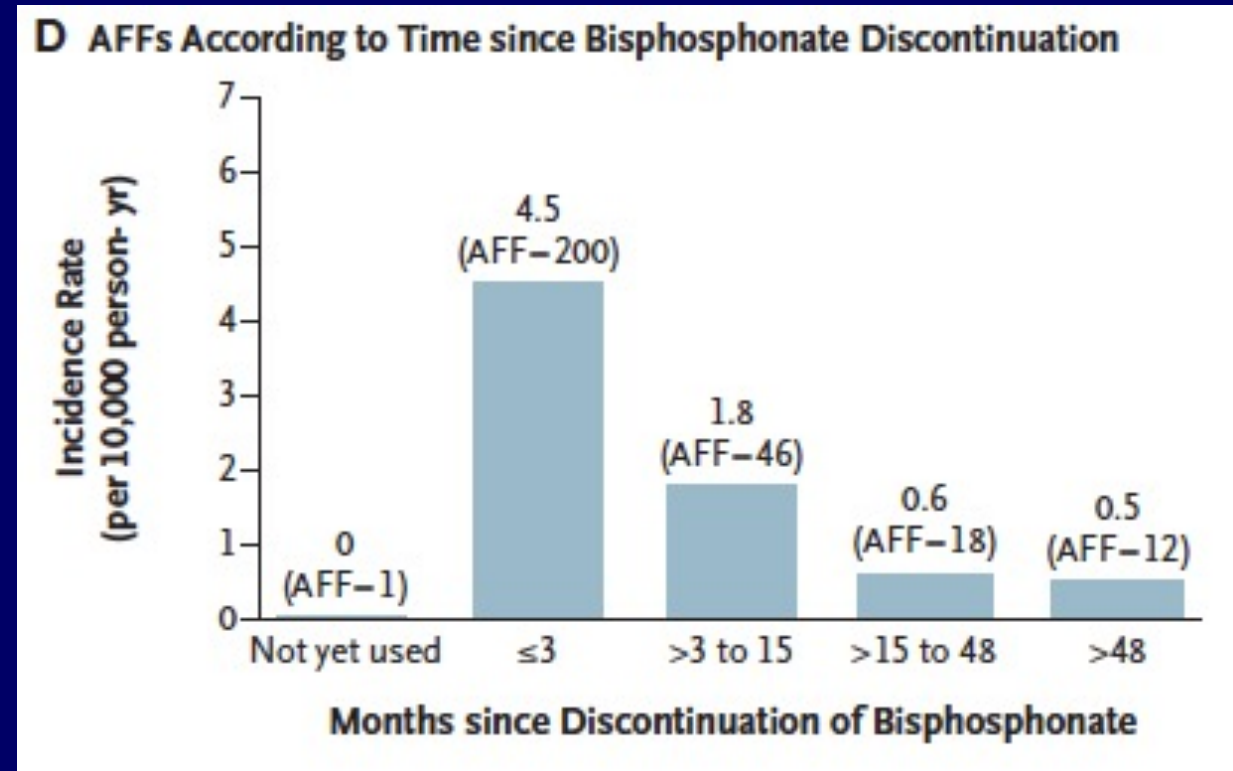
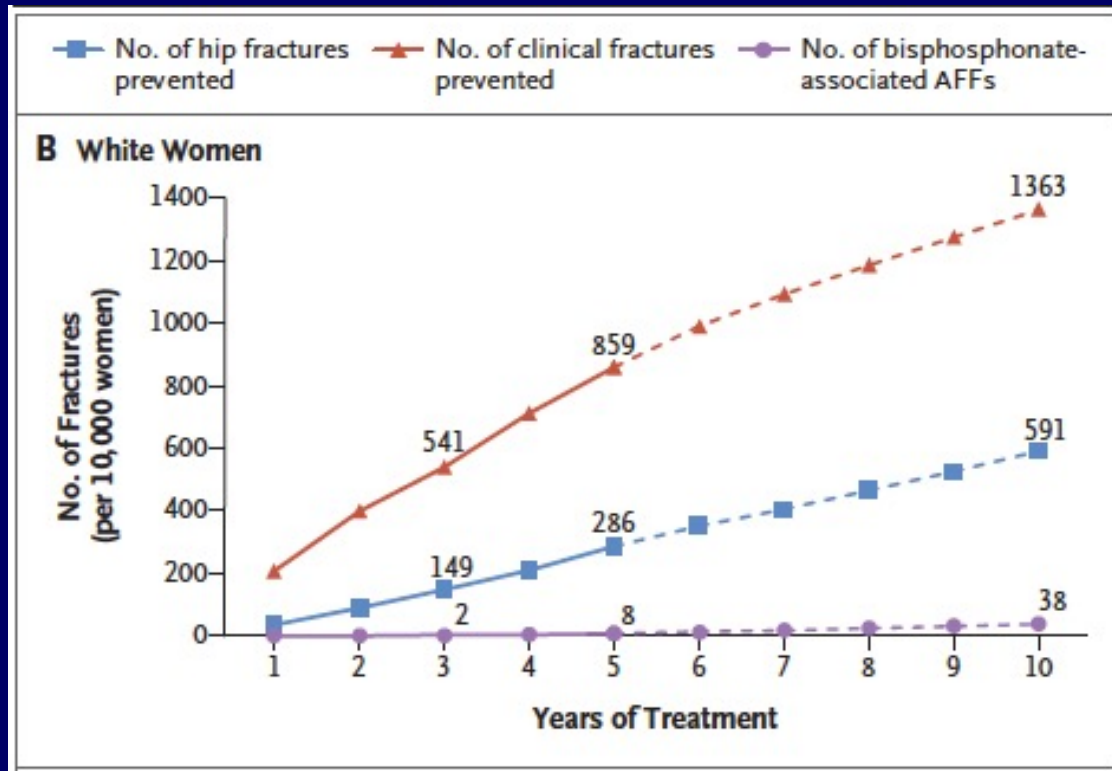
Patient Category	Recommendation
High-risk: T-score still ≤ -2.5 at the hip, previous fracture of the hip or spine or ongoing high-dose glucocorticoid therapy.	Drug holiday not justified.
Moderate risk: Hip bone mineral density value is now > -2.5 (T-score), and no prior hip or spine fracture.	Consider drug holiday after 3-5 years of alendronate, risedronate, or zoledronic acid therapy. No information about ibandronate and drug holidays.
Low risk: Did not meet current treatment criteria at the time of treatment initiation.	Discontinue therapy

How long?

How to monitor?

What medications after the holiday?

Fragility Fracture v Atypical Femoral Fracture



Black, NEJM, 2020

Pharmacologic Therapies for Osteoporosis

Antiresorptive

(Osteoclast Directed)

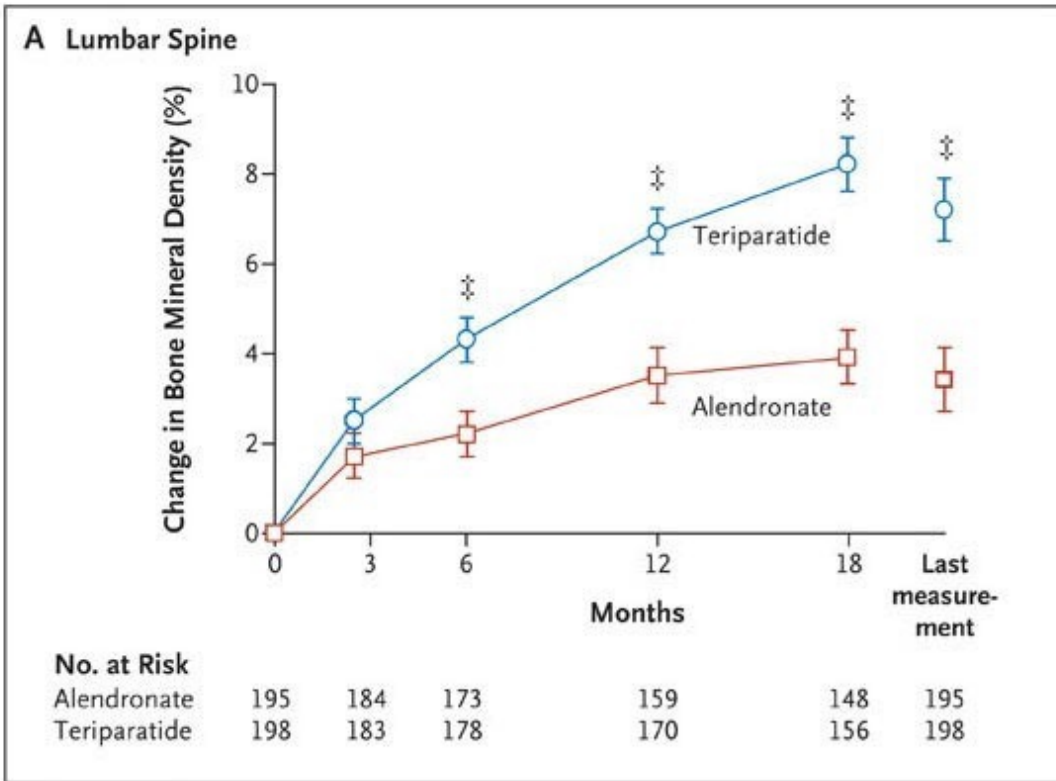
- bisphosphonates
- SERMs (raloxifene)
- denosumab
- hormone replacement therapy

Anabolic

(Osteoblast Directed)

- PTH/PTHrP Analogs
(teriparatide, abaloparatide)
- romosozumab

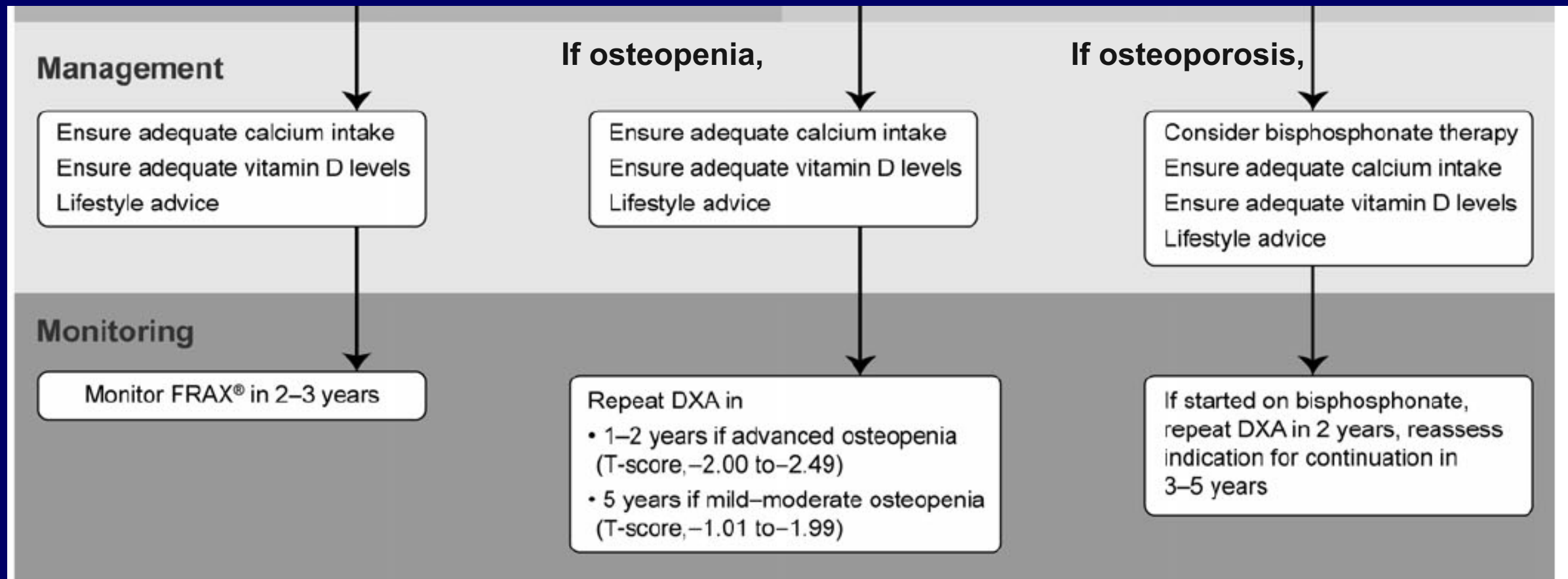
PTH/PTHrP Analogs



- Generally given after BP failure
- Can be first line in severe osteoporosis
- 18-24 month duration of therapy
- Need to follow with an antiresorptive
- Daily SC injection

Teriparatide increases BMD more than alendronate
In glucocorticoid-induced osteoporosis

Monitoring



Preventing falls will prevent fractures



Risk Factors for Falls

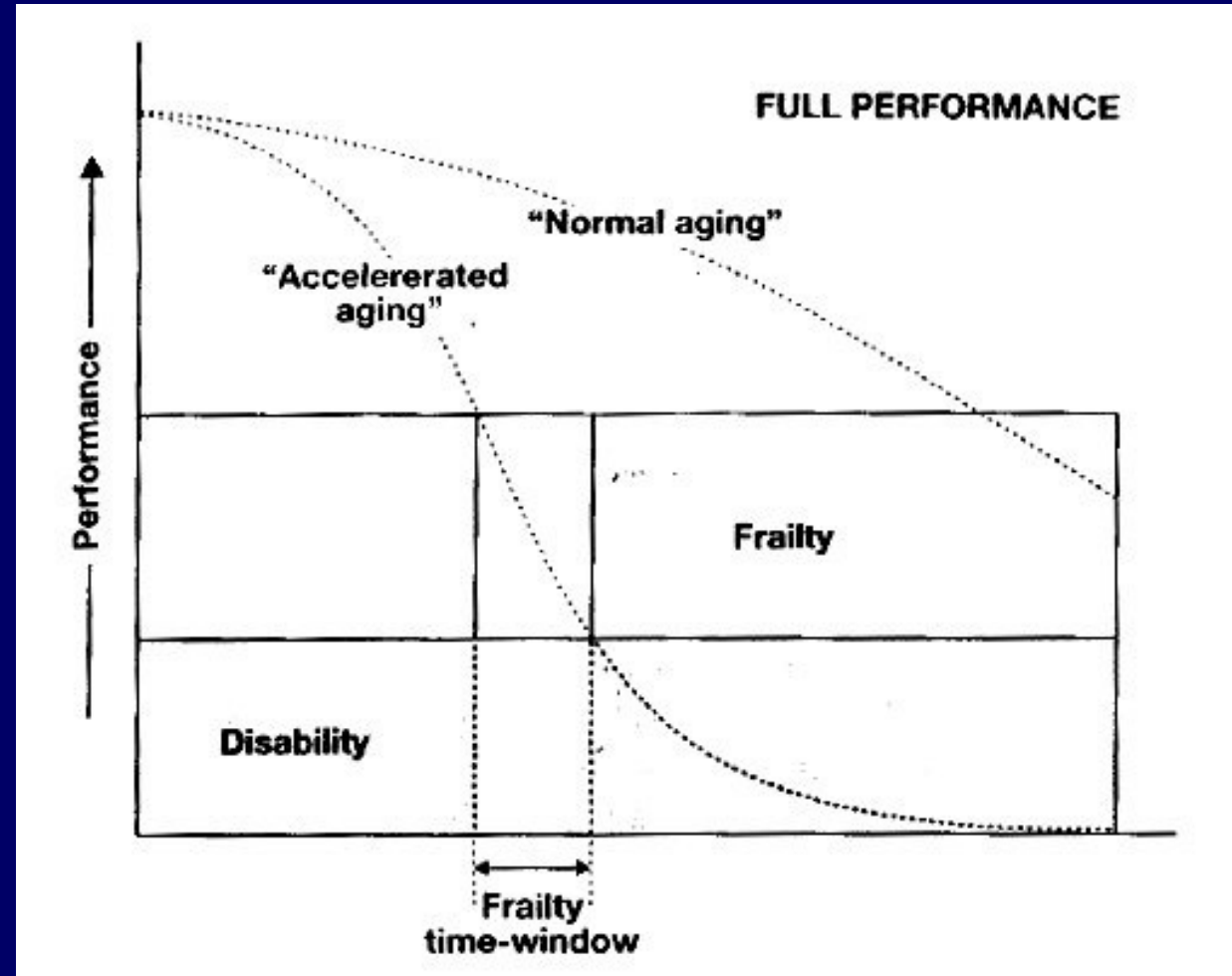
- Sedative use
- Cognitive or visual impairment
- Lower-extremity disability
 - Neuropathy
- Muscle Weakness
- Frailty

Strategies to Prevent Falls

- Assess Fall Risk (Are you worried about falling?)
- Physical Therapy Assessment for Strength and Balance
- Environmental Assessment/Modification
 - keep bathroom lights on
 - avoid loose rugs
 - remove clutter
 - keep wires behind furniture
- Behavioral Assessment/Modification
 - avoid excess alcohol, drugs
 - consider de-prescribing
 - wear sturdy shoes
 - avoid slippery/uneven surfaces

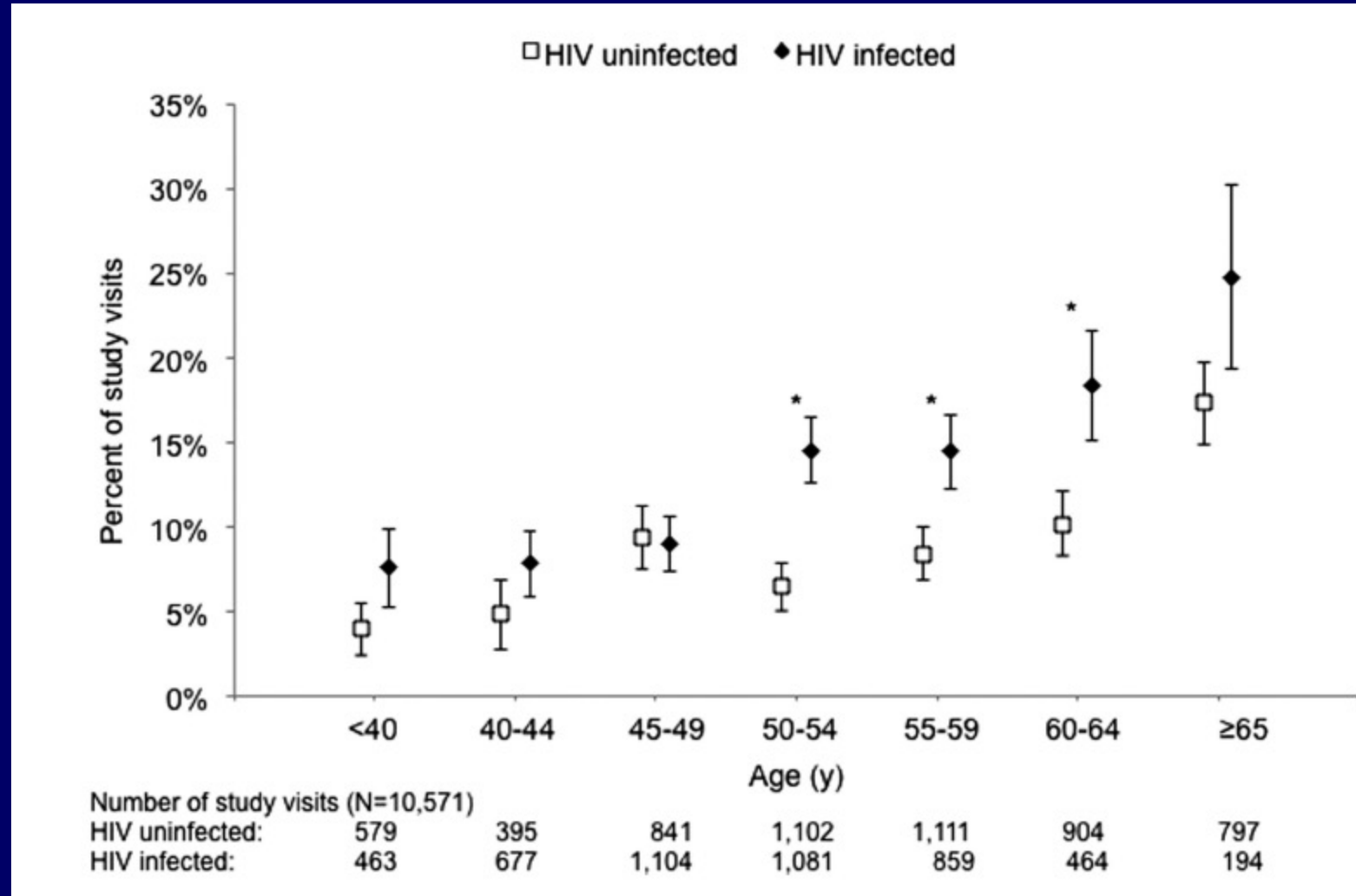
Frailty: A Brief Overview

- **Weight loss**
- **Weakness**
- **Exhaustion**
- **Slowness**
- **↓ Physical Activity**



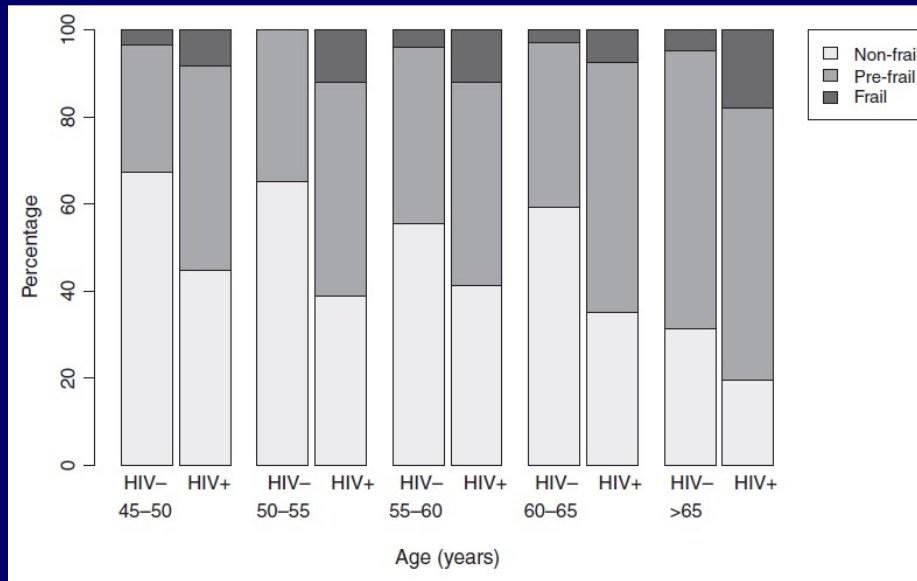
Men with HIV Are More Frail At a Younger Age vs HIV- Men: MACS

Slide 73



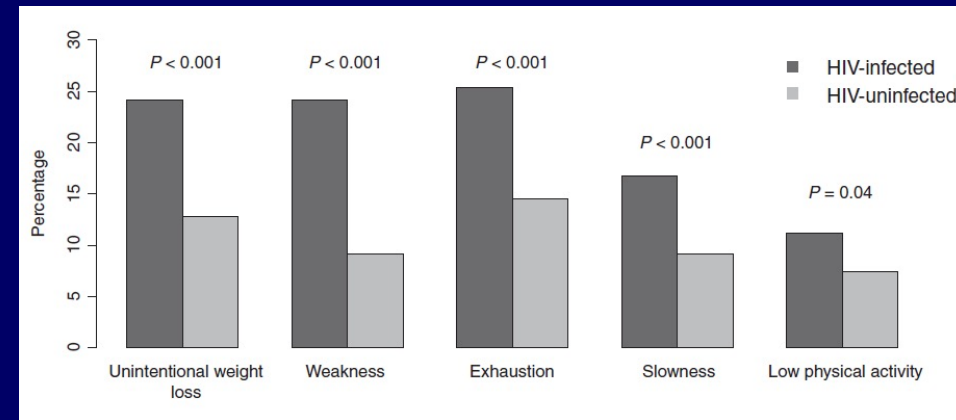
Althoff, J of Gerontology, 2013

Prevalence of Frailty At a Younger Age in PLWH versus People without HIV

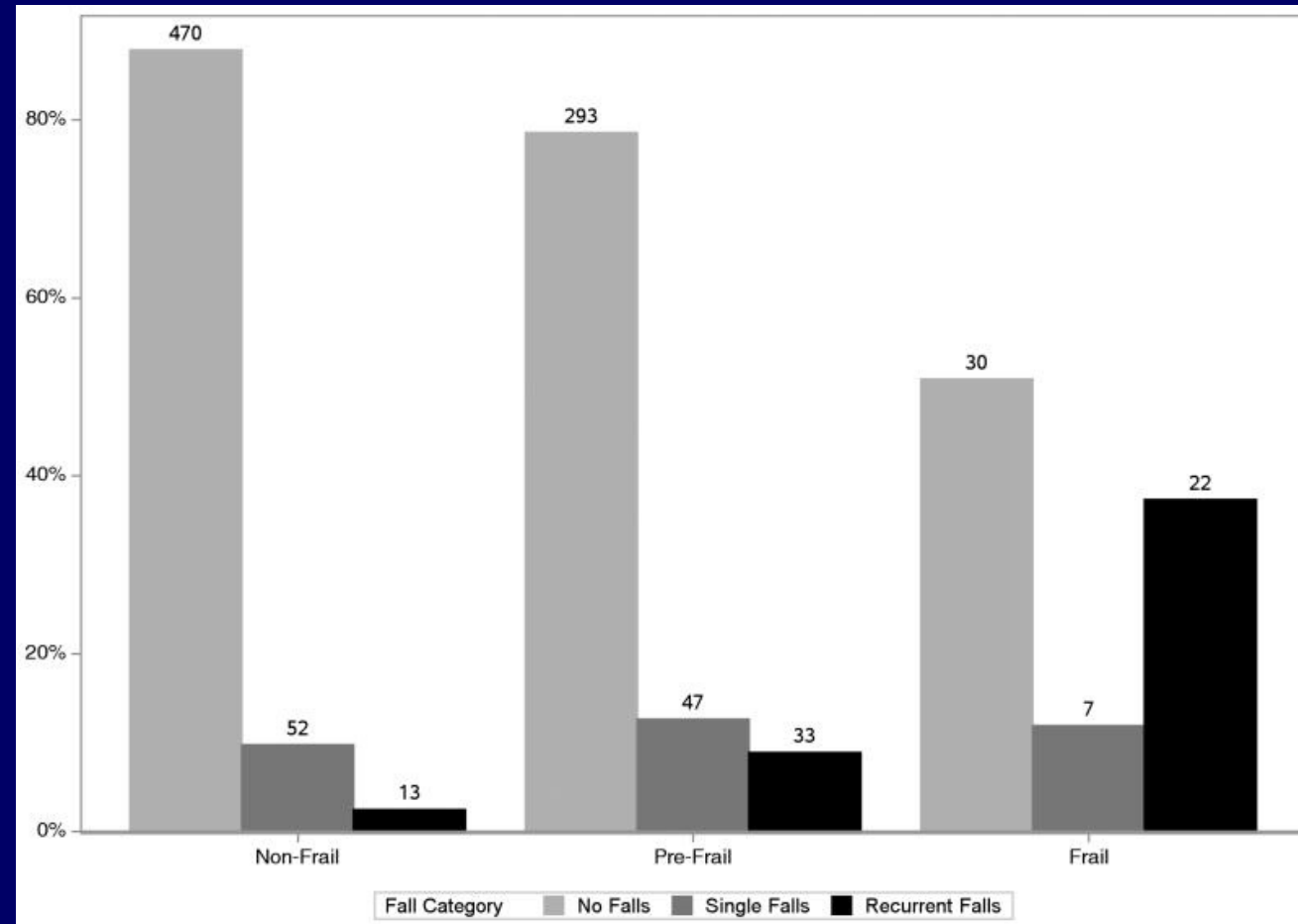


- Frailty/prefrailty associated with
 - HIV infection
 - Advanced age
 - Male sex
 - Current smoking
 - Chronic HCV infection
 - Depression
 - Central adiposity

- All Five Individual Frailty Criteria were more common among HIV-infected persons.
 - Unintentional weight loss
 - Decreased grip strength
 - Slower walking times
 - Reported exhaustion
 - Reported low physical activity

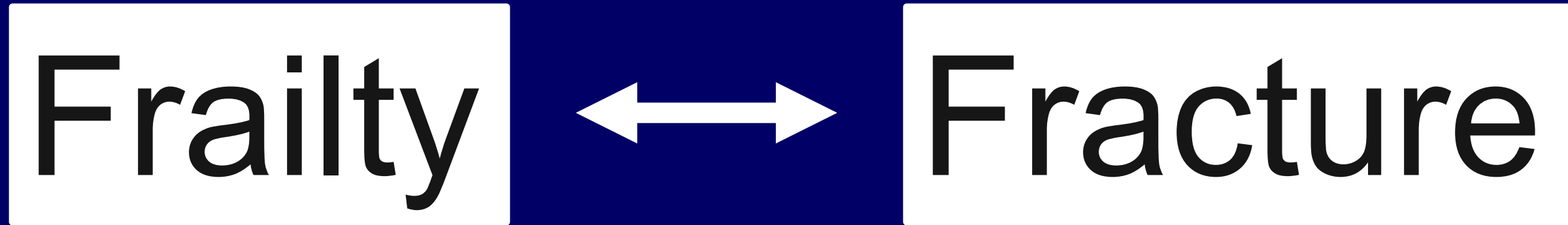


Frailty is strongly associated with recurrent falls in PWH: HAILO Cohort



Frailty predicts fractures among women with and at-risk for HIV

**Anjali Sharma^a, Qiuhu Shi^b, Donald R. Hoover^c, Phyllis C. Tien^{d,e},
Michael W. Plankey^f, Mardge H. Cohen^g, Elizabeth T. Golub^h,
Deborah Gustafsonⁱ and Michael T. Yin^j**





FRAX™ WHO Fracture Risk Assessment Tool

HOME CALCULATION TOOL PAPER CHARTS FAQ REFERENCES Select a Language

Calculation Tool

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



Weight Conversion:

pound:

Height Conversion:

inch:

Country : **US(Black)** Name / ID : About the risk factors

Questionnaire:

- Age (between 40-90 years) or Date of birth
Age: Date of birth: Y: M: D:
- Sex ☐ Male ☐ Female
- Weight (kg)
- Height (cm)
- Previous fracture ☒ No ☐ Yes
- Parent fractured hip ☒ No ☐ Yes
- Current smoking ☒ No ☐ Yes
- Glucocorticoids ☒ No ☐ Yes
- Rheumatoid arthritis ☐ No ☐ Yes
- Secondary osteoporosis ☒ No ☐ Yes
- Alcohol 3 more units per day ☒ No ☐ Yes
- Femoral neck BMD

Should fracture risk calculators include other factors, like fall risk or frailty?

Risk factors

For the clinical risk factors a yes or no response is asked for. If the field is left blank, then a "no" response is

<http://www.shef.ac.uk/FRAX/>

Collaborative Practice – Role of the Endocrinologist

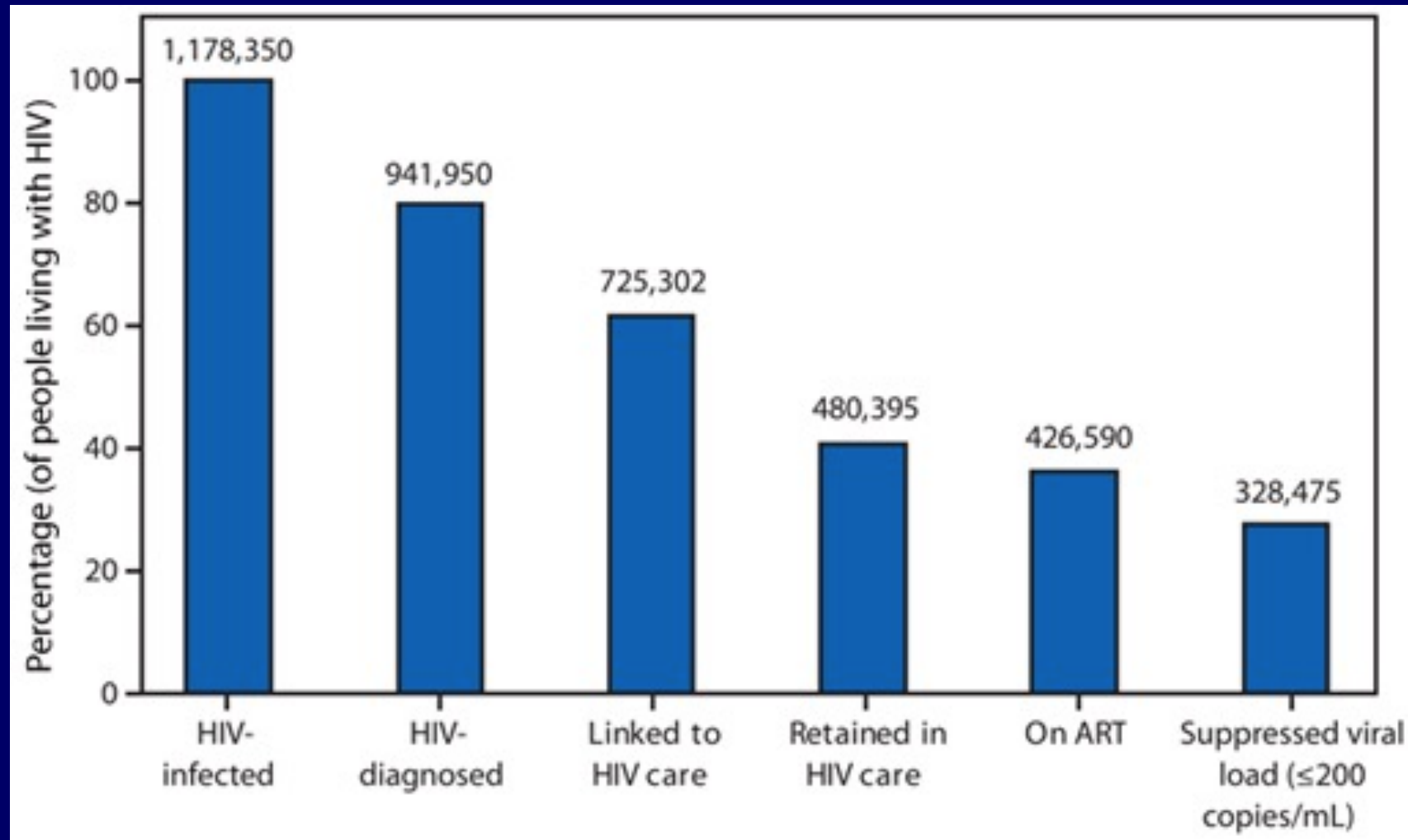
AACE Guidelines

1. Osteoporosis unexpectedly severe or has unusual features at the time of initial assessment
 - Very low BMD (T-score < -3.0 or Z-score < -2.0)
 - Young age (premenopausal)
 - Fractures despite borderline or normal BMD
2. Suspected or known condition that may underlie the osteoporosis (eg, hyperthyroidism, hyperparathyroidism, hypercalciuria, Cushing's syndrome, or hypogonadism)
3. Candidates for combination therapy or teriparatide therapy
4. Is intolerant of approved therapies
5. Fails to respond to treatment
 - Takes estrogen yet has low baseline BMD
 - Is undergoing treatment yet shows an apparent loss of BMD on serial studies
 - Has fractures despite treatment

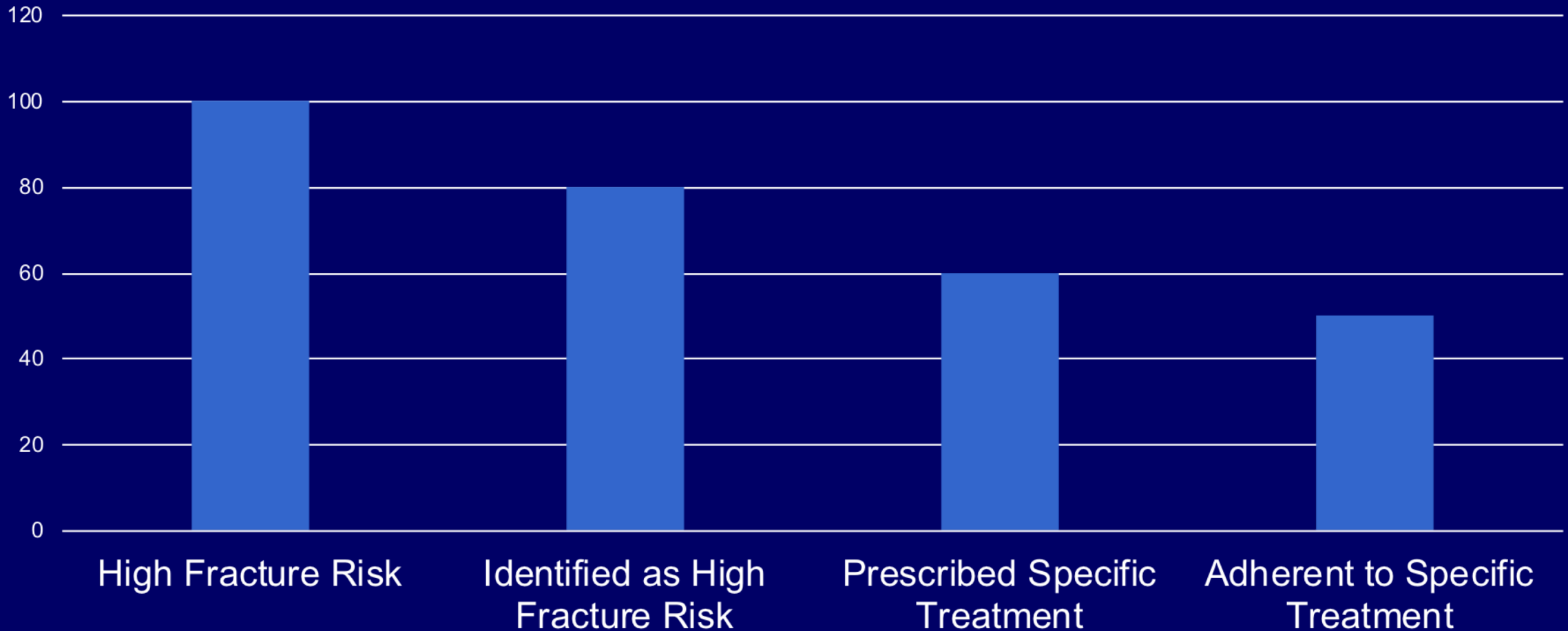
Conclusions

- Fractures likely to be a major source of morbidity for aging PLWH.
- DXA screening should be more aggressive in PLWH
- Bisphosphonates should be considered first line therapy
- Adherence to treatment is a major challenge
- Many questions remain re: the optimal duration of treatment & sequencing of medications
- Fall prevention is essential to prevent fractures.

HIV Treatment Cascade: Identifying and Closing the Gaps in Care



Closing the Gaps for Fracture Prevention in PLWH

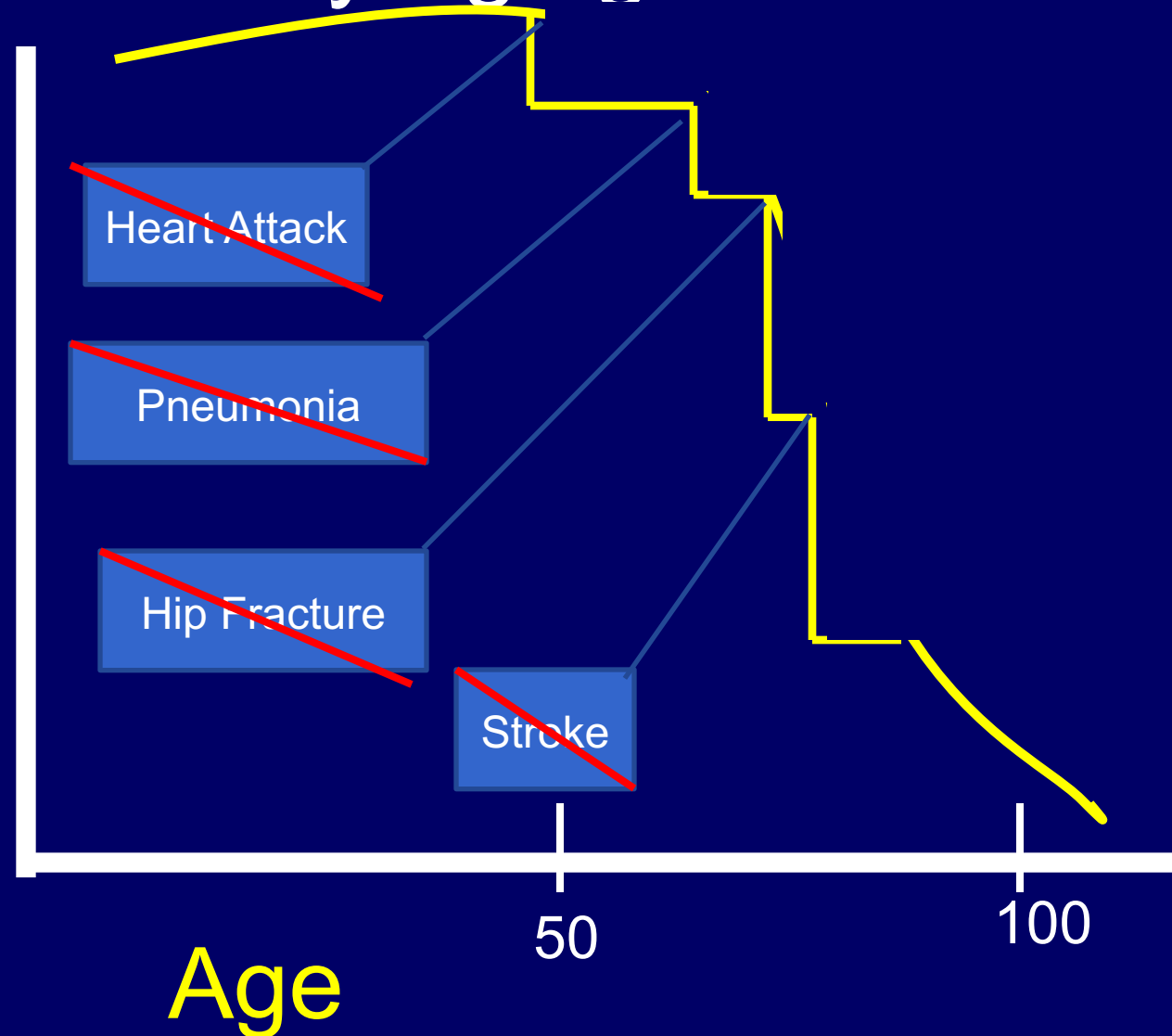


For Illustration Only; numbers are fictional

Preventing Comorbid Events is Critical for Healthy Aging

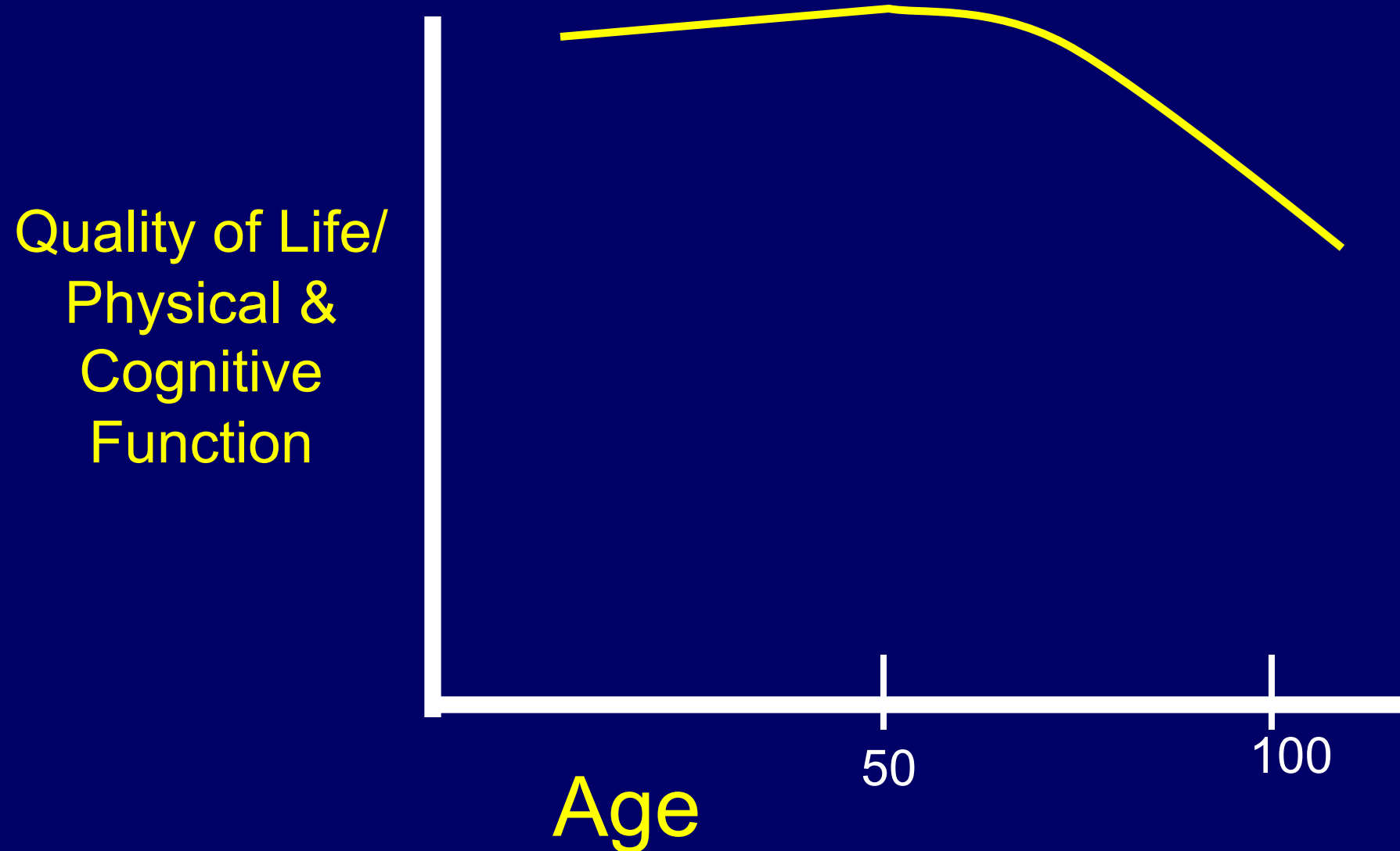
Slide 83 of 84

Quality of Life/
Physical &
Cognitive
Function



Preventing Comorbid Events is Critical for Healthy Aging

Slide 84 of 84



Let's Get Screened!

Condition	Tests	Frequency
Diabetes	Fasting Glucose Hgb A1C	Yearly
High Cholesterol	Lipid Panel	Yearly
High Blood Pressure	BP Measurement	At least Yearly
Kidney Disease	Serum Creatinine	Every 6-12 months
Osteoporosis	DXA Scan	Age 50+
Anal/Cervical Cancer	Pap test	Yearly
Lung Cancer	CT (if smoker)	debated
Liver Cancer	Ultrasound (if HBV or HCV+)	Yearly
Breast Cancer	Mammogram	Yearly
Colon Cancer	Colonoscopy	Every 5 years
Prostate Cancer	PSA	debated