

New Practices for Managing Osteoporosis and Reducing Fractures

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**...and I have no
disclosures**



A classic primary care cluster

- Frailty
- Sarcopenia
- Osteopenia/osteoporosis
- Medications
- Preoccupations

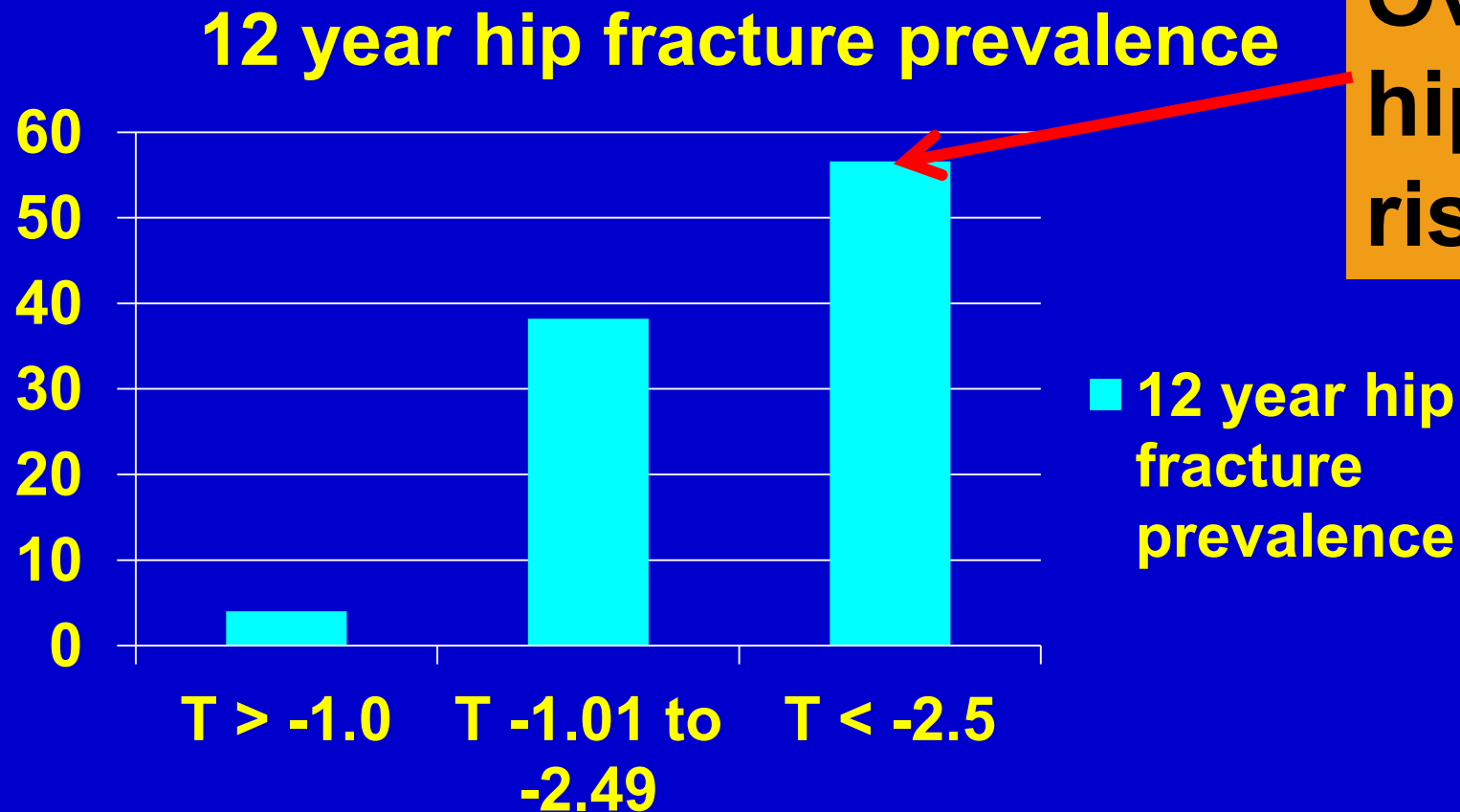
Six typical patients:

- The average patient over 65 who reports a fall
- The patient with osteopenia
- The patient with osteoporosis
- The patient with a hip fracture
- The patient with persistent osteoporosis
- The patient on long term steroids

My goals:

- 1. Never forget the basics:**
 - Falls break bones
 - Vitamin D is a hormone, don't over do it!
 - Practice, practice, practice (i.e. exercise)
- 2. Ensure enough calcium (1000 mg)**
- 3. Know the bisphosphonates:**
 - 5 years
 - Patient messaging: 30 min AC, clear H2O
- 4. Know the options beyond bisphosphonates:**
 - Estrogens
 - PTH derivatives
 - Biomodulators

Framingham cohort pre bisphosphones (1987-99), mean age 74.8 years, what about lifetime risks:



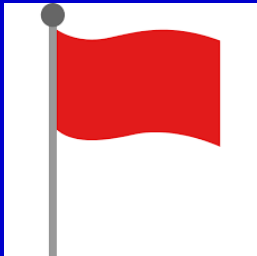
**Over 50 %
hip fracture
risk / 12 yrs**

Patient #1:

74 year old woman seen for a routine annual examination?

She reports that she tripped and fell recently.

There was no injury.



What can you do in your office?

1. Ask who is around to pick up the patient?
2. Ask about risk taking behaviors?
3. Ask whether a Lifeline is needed?
4. Look at the med list?
5. Perform a TUG?

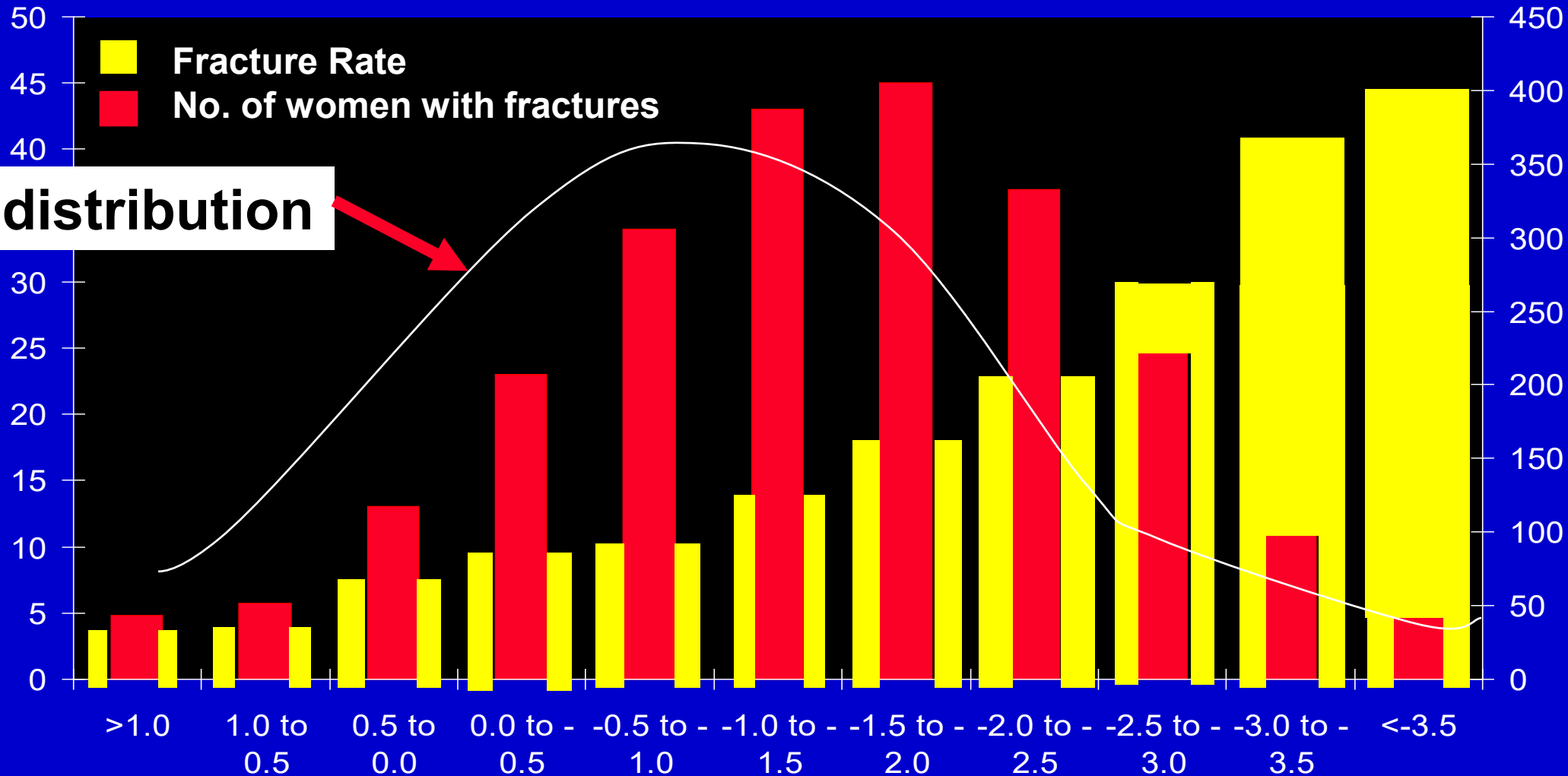
Falls cause fractures



NORA data: BMD and fracture risk (White women; age 64.5)

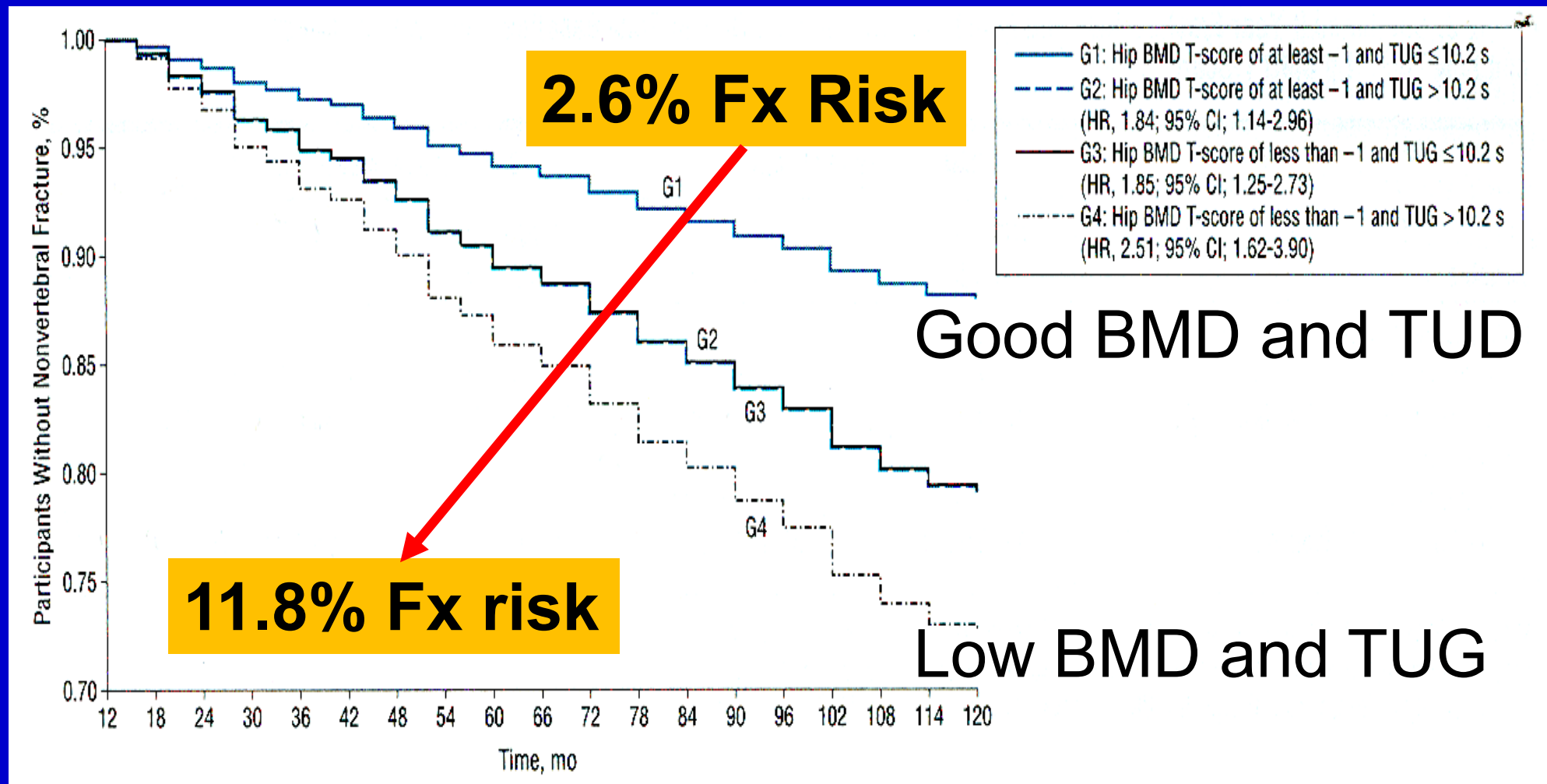
Fracture rate per 1000
person-years

No. of women
with fractures



Australian women, 10 yr follow-up

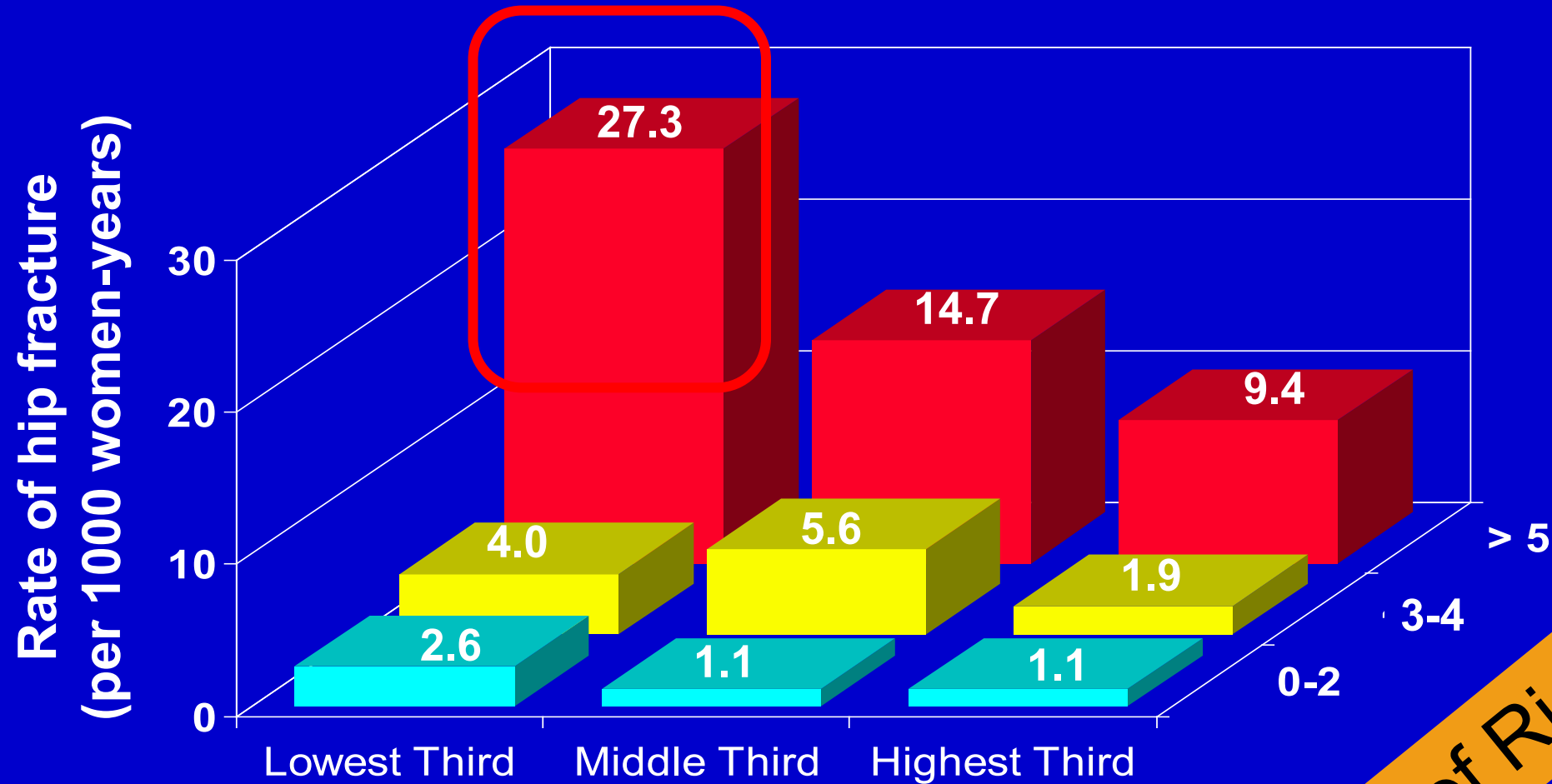
TUG: Timed up and go over 10 seconds
(chair>>walk 10 ft>>chair)



Medications associated with fall risk

	Odds Ratios (95% C.I.)
Sedative/hypnotics	1.31 (1.14-1.50)
Neuroleptics/antipsychotics	1.71 (1.44-2.04)
Antidepressants	1.72 (1.40-2.11)
Antihypertensives	1.26 (1.08-1.46)

Risk factors add up!



Bone Density

No. of Risk Factors

Do you watch your patients walk?

1. No
2. Yes, but not in a structured way
3. Yes, and I look for the three stages

Always remind patients about of heel–toe walking and circle turning



Contact

Mid-stance

Propulsion

**Never forget the value of a stick
(AKA cane)**



What do you do next?

1. Get a bone density test
2. Check a FRAX
3. Recommend Calcium
4. Recommend Vitamin D
5. Recommend balance exercises

USPSTF Guidelines for screening

Screening women for osteoporosis, 2 year interval (Grade B, 100% covered by ALL plans)

Women $\geq$ 65 years

Women $\leq$ 60 years whose 10 year fracture risk $\geq$ 65 year old white women without RF per risk assessment tool.

Screening men for osteoporosis, 2 year interval (Grade Indeterminate, NOT covered)

Men whose 10 year fracture risk is $\geq$ 65 year old white women without RF

What do others recommend?

National Osteoporosis Foundation

All women ≥ 65 , all men ≥ 70

AAFP Choosing Wisely

All women ≥ 65

American College of OB/GYN

All women ≥ 65

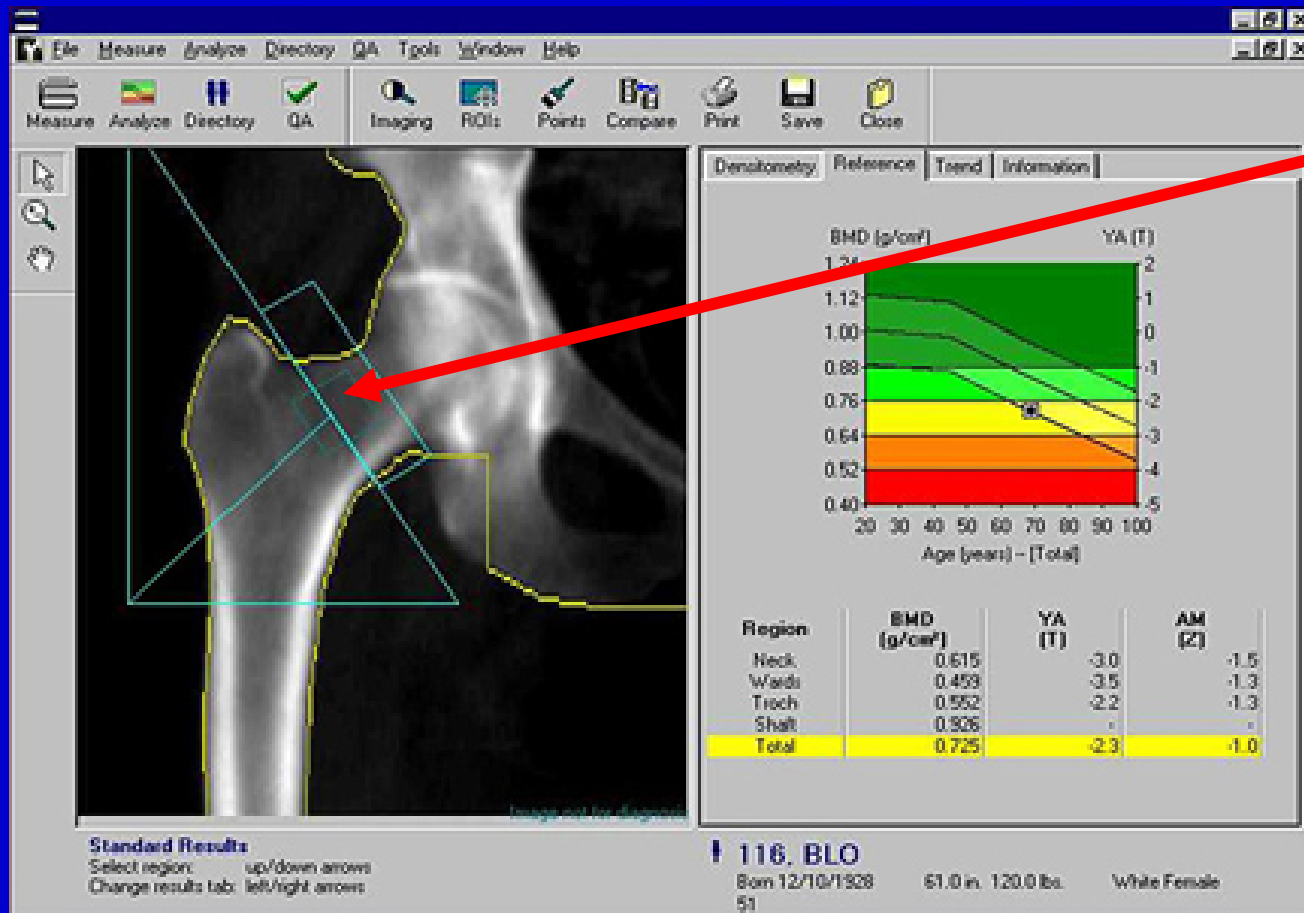
American Association of Clinical Endocrinologists

All women ≥ 50

The Endocrine Society

All adults age 50-69 with risk factors, fracture after age 50, men ≥ 70

You have to choose your site:
I prefer the femoral neck



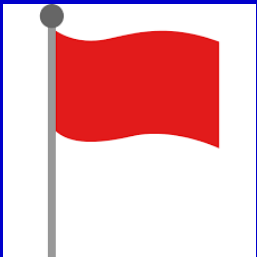
Femoral neck

“z” Score:
S.D. difference
vs. peers
“t” Score: S.D.
difference
vs. early life

WHO categories of osteoporosis

Osteopenia: BMD T -1 to -2.5
S.D. below healthy mean
(30-40 yr)

Osteoporosis: BMD T $\leq$ - 2.5 S.D.
below healthy mean

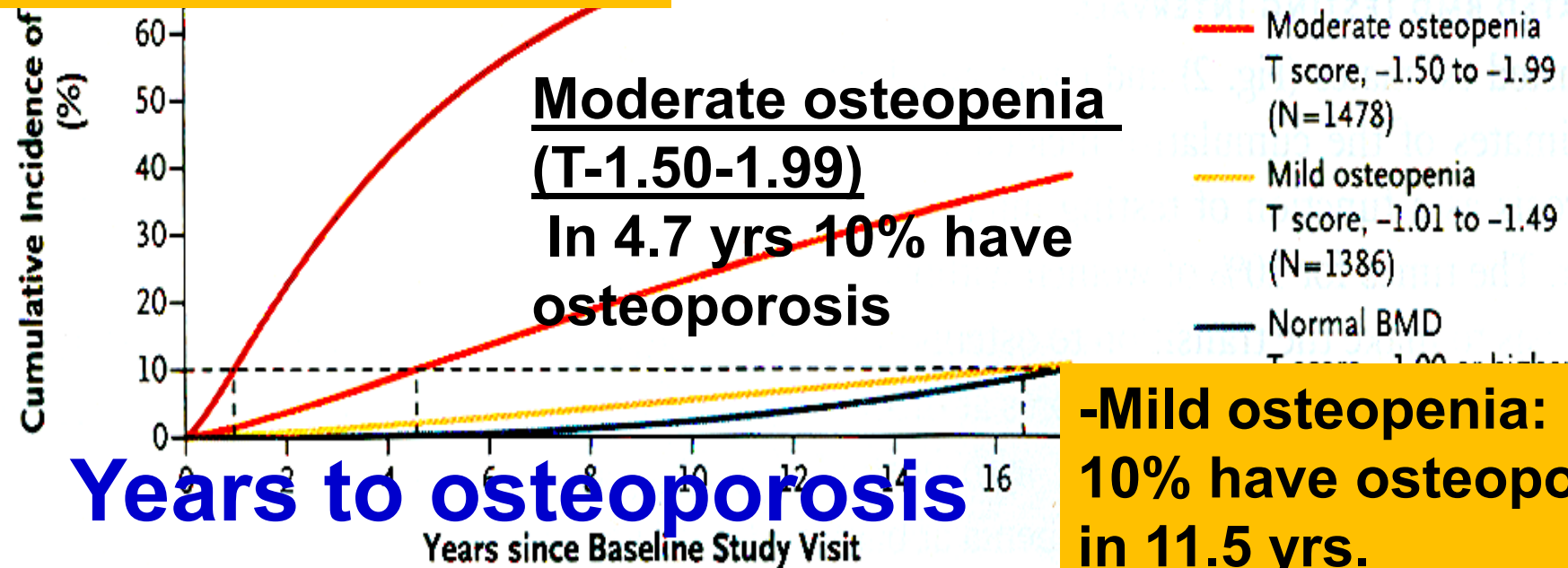


Severe osteoporosis: Osteoporosis
with a non-violent fracture

Good early BMD predicts lower future risk for progression to osteoporosis

(9704 North Carolina white women followed 15 yrs)

-Severe osteopenia
(T -2.00 to -2.49):
10% have osteoporosis
in 1.1 yrs.



-Mild osteopenia:
10% have osteoporosis
in 11.5 yrs.

-Normal: 10% in 16.8 yrs

What about online tools?

- FRAX has become the standard but...only 70% accurate
- No measure of frailty
- Based on country-specific data
- Little added value beyond the BMD and age

WHO FRAX risk factors

Age

BMI

Sex

Personal fracture history

Steroid use

Presence of rheumatoid arthritis

Presence of DM, osteogenesis imperfecta, untreated
hyperthyroidism, early menopause, malnutrition, liver
disease

Parental hip fracture

Current smoking

Alcohol ($\geq 3/d$)

Calculation Tool

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

Country: **US (Caucasian)**

Name/ID: Jane Doe

About the risk factors 

Questionnaire:

1. Age (between 40-90 years) or Date of birth

Age:

50

Date of birth:

Y:

M:

D:

2. Sex

☐ Male

☒ Female

3. Weight (kg)

54.43

4. Height (cm)

170.18

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 per day

☐ No

☒ Yes

12. Femoral neck BMD (g/cm²)

T-Score

-2

Clear

Calculate

BMI 18.8

The ten year probability of fracture %

with BMD

Major osteoporotic

18

Hip fracture

3.7



Weight Conversion

Pounds  Kgs

120

Convert

Height Conversion

Inches  Cms

67

Convert



FRAX[®]

WHO Fracture Risk Assessment Tool

Home

Calculation Tool

Paper Charts

FAQ

References

English

Calculation Tool

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

Country: US (Caucasian)

Name/ID: Jane Doe

About the risk factors

Questionnaire:

1. Age (between 40-90 years) or Date of birth

Age: 50

Date of birth: Y: M: D:

2. Sex

☐ Male ☒ Female

3. Weight (kg)

54.43

4. Height (cm)

170.18

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

11. Alcohol 3 or more units per week

12. Femoral neck BMD

T-Score

Clear

BMI 18.8

The ten year probability of fracture with BMD

Major osteoporosis-related fracture

Hip fracture

High risk = 10-year probability of hip fracture $\geq 3\%$ or a 10-year probability of any major osteoporosis-related fracture $\geq 20\%$

8

FRAX underestimates actual fracture rate

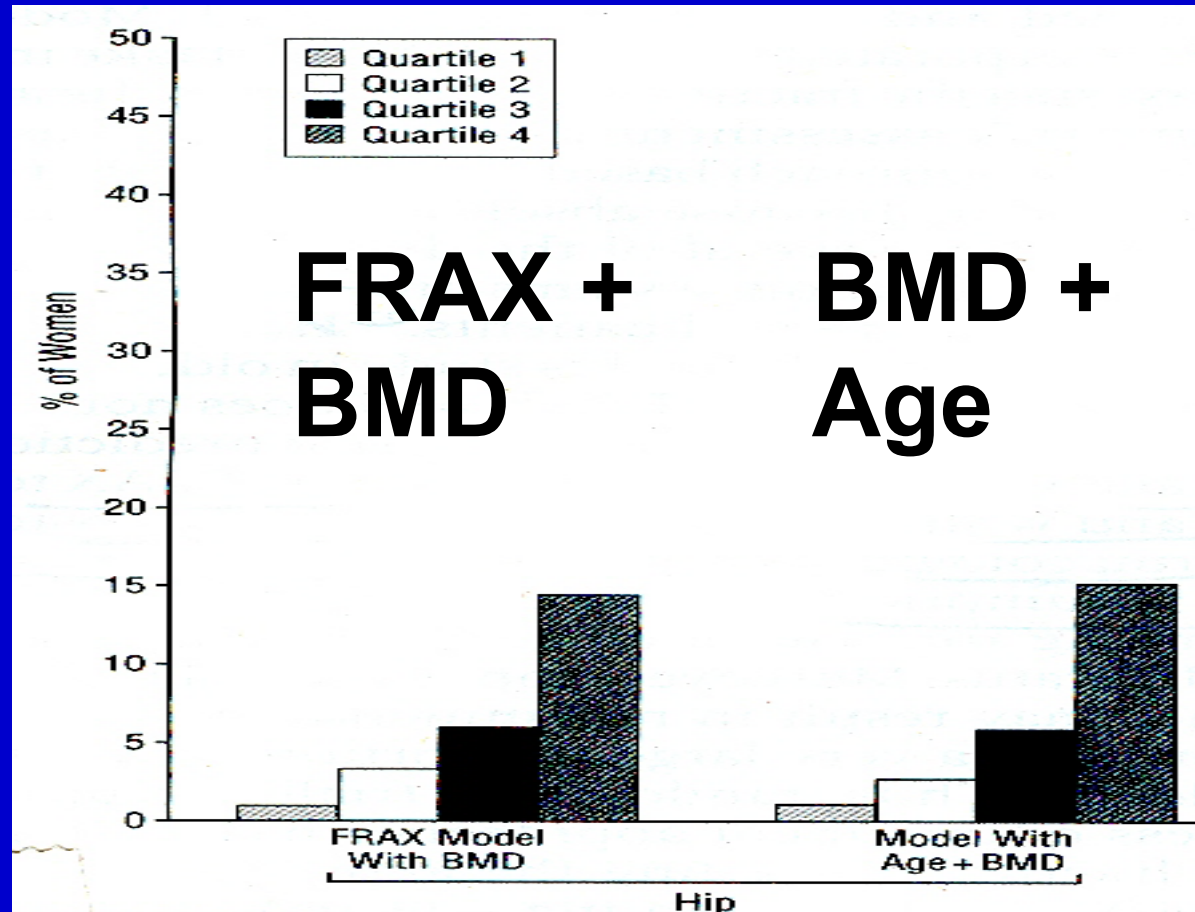
(Israeli cohort, N = 1,054,818, age 50-90)

Women: FRAX predicted fractures vs. actual fractures

	Predicted %	Actual %
60-64 years	0.7	1.0
65-69 years	1.2	2.0
70-74 years	2.4	3.7
75-79 years	4.3	6.8
80-84 years	6.0	10.6
85-89 years	6.8	12.9

FRAX with BMD no different then BMD alone in predicting hip fractures in women

Percent
with fx



USPSTF (2018) assessment of risk assessment tools

“...results from studies of accuracy of bone measurement tests or clinical risk assessment tools for ...predicting fractures vary, in general they report no more than moderate accuracy and this evidence was graded low to moderate...
tools incorporating BMD had higher accuracy...”

Patient #2:

68 year old woman whose femoral neck bone density $T = -1.8$.

What would you do?

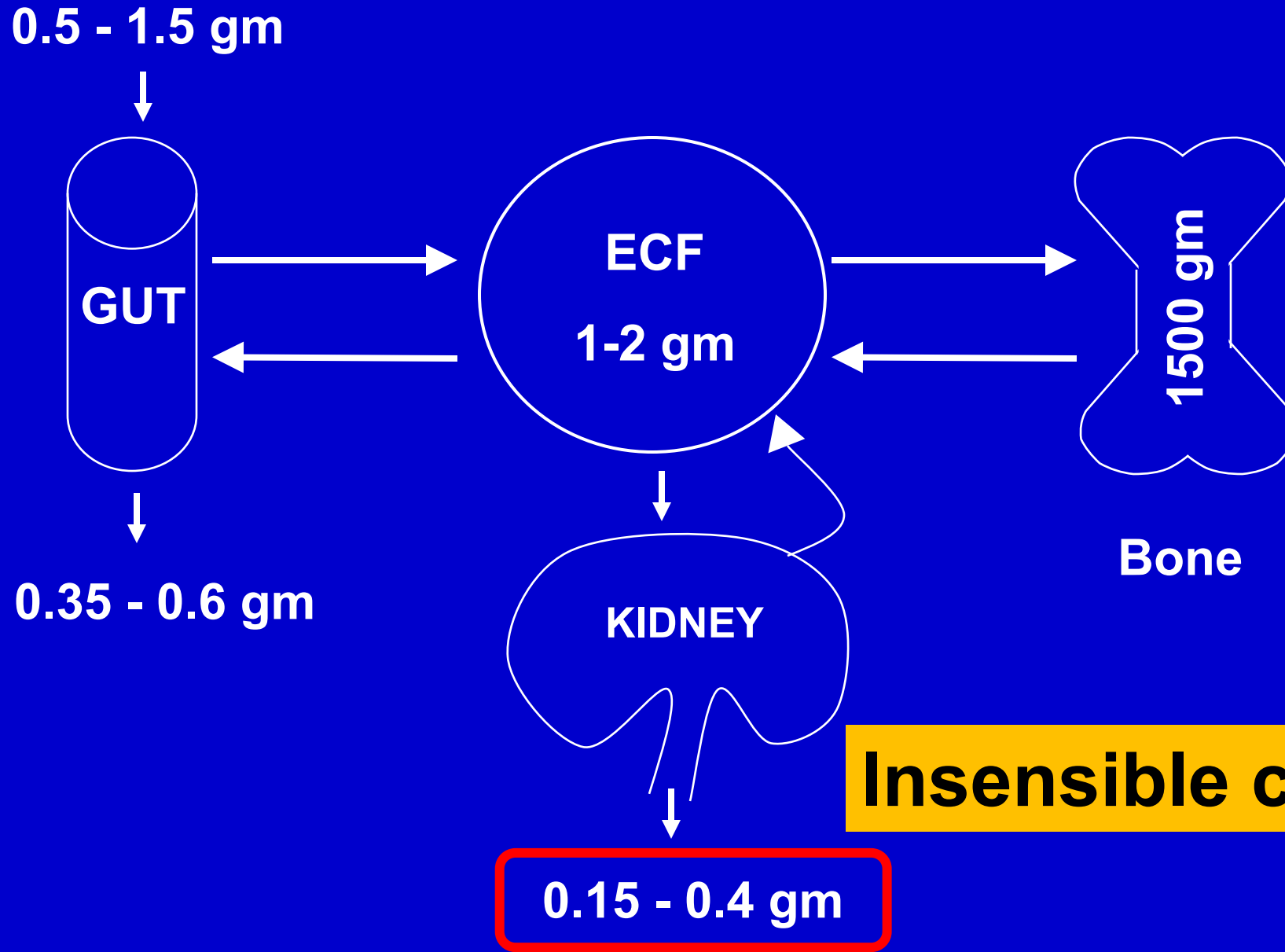
What should be done for the patient with osteopenia?

1. Check: CBC, ESR, Ca^{++} , $\text{PO}_4=$, Vitamin D, PTH, TSH?
2. Recommend Calcium?
3. Recommend Vitamin D?
4. Recommend balance exercises?

Does calcium cause CAD?

1. Yes
2. No
3. Rumor has it

Calcium homeostasis



The calcium myth busted (2016): No risk for cardiovascular disease

REVIEW

Annals of Internal Medicine

Calcium Intake and Cardiovascular Disease Risk

An Updated Systematic Review and Meta-analysis

Mei Chung, MPH, PhD; Alice M. Tang, SCM, PhD; Zhuxuan Fu, MPH; Ding Ding Wang, MPH; and
Sydney Jennifer Newberry, MS, PhD

“Calcium intake within tolerable upper intake levels (2000-2500 mg/d) is not associated with CVD risk in generally healthy adults.”

WHI: Calcium reduces fracture rate (N=36282, 62 yrs of age, 7 yrs follow-up)

	Calcium + D ⁺	Placebo	Hazard Ratio (95% C.I.)
Hip fracture rate/year (%)			
Intention to treat	0.14	0.16	0.88 (0.72-1.08)
Adherent patients ⁺⁺	0.10	0.14	0.71 (0.52-0.97)

⁺ Calcium 1000 mg/d + Vitamin D 400 I.U./d

⁺⁺ Took 80% or more of medication

Meta-analysis (17 RCTs) show calcium reduces fracture risk

	Risk Reduction (95% C.I.)	NNT (95% C.I.)
Calcium+/-Vitamin D	12% (5-17)	63 (37-192)

Foods with calcium bring along calories

Consider a supplement

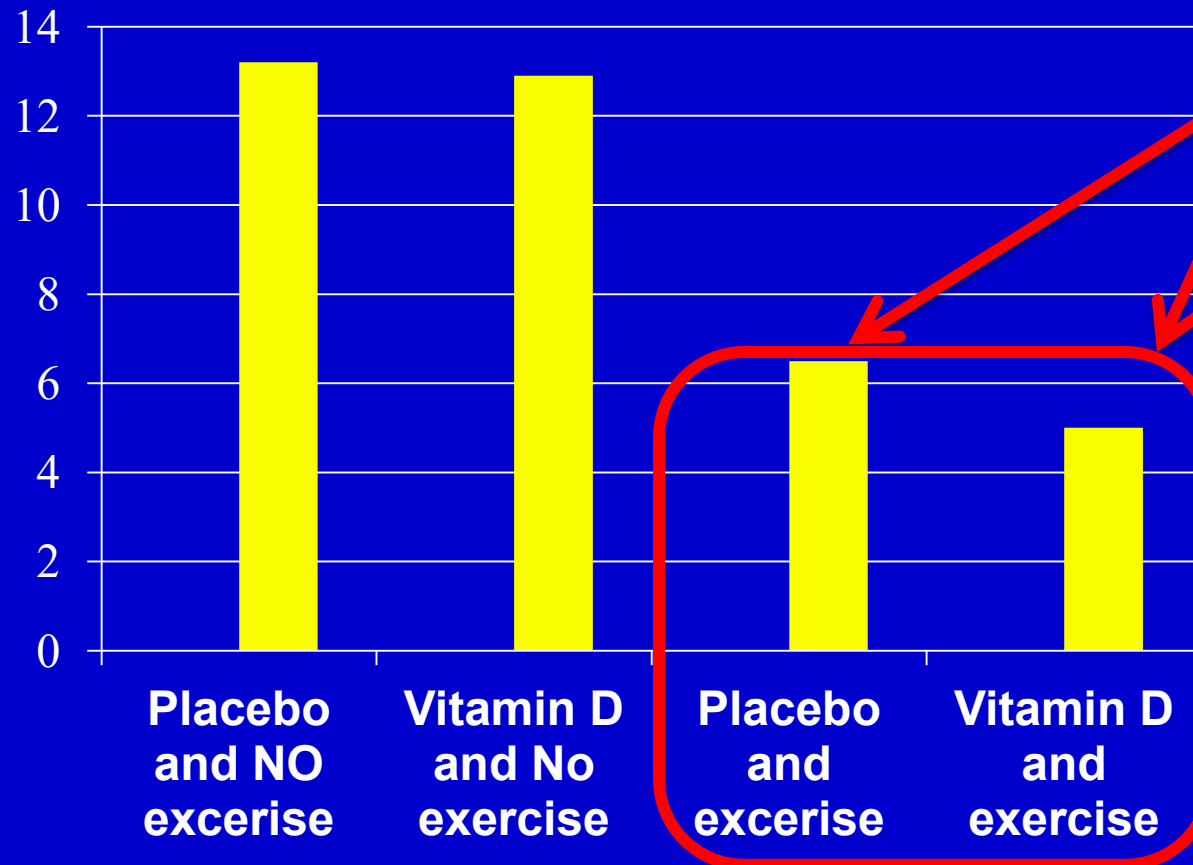
Food	Calcium (mg)
General Mills Total (3/4 cup)	1,000*
Lactaid Calcium Enriched Milk (1 cup)	500*
Silk Almondmilk or soymilk (1 cup)	450*
Orange juice, with calcium (1 cup)	350*
Yogurt, plain, nonfat (6 oz.)	340
Milk (1 cup)	300
Yogurt, fruited, nonfat (6 oz.)	260
Sardines, canned (3 oz.)	250
Salmon, canned, with bones (3 oz.)	240
Mozzarella, Part skim (1 oz.)	220
Swiss cheese (1 oz.)	220
Frozen yogurt, premium (1/2 cup)	200
* Contains added calcium	

Does exercise reduce fall risk?

1. Yes
2. No. But Tai Chi does
3. Yes, but only for the very committed

Two years of an aggressive exercise* program reduced injurious falls but not overall fall rates

Falls per
100 pt yrs



**Over 50%
reduction in
injurious falls**

■ Injurious falls

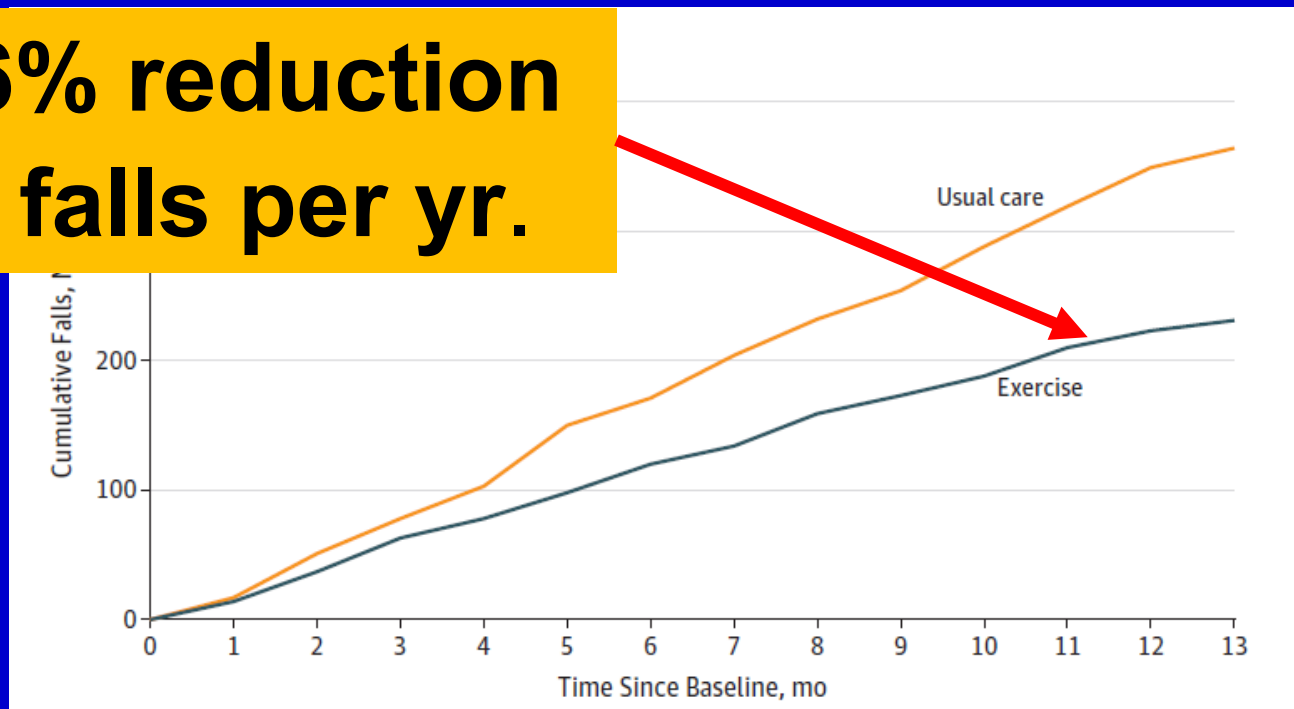
***Twice a week for
12 weeks then weekly
for 2 years**

The value of exercise

(Canadian RCT, N = 345, age 81.6 yrs. MD advice vs. home PT*. 1 yr. follow-up)

*Home PT: 5 strength exercises, 11 balance exercises. 4 visits over 2 months, 1 hour each. One visit at 6 mos.

**36% reduction
in falls per yr.**



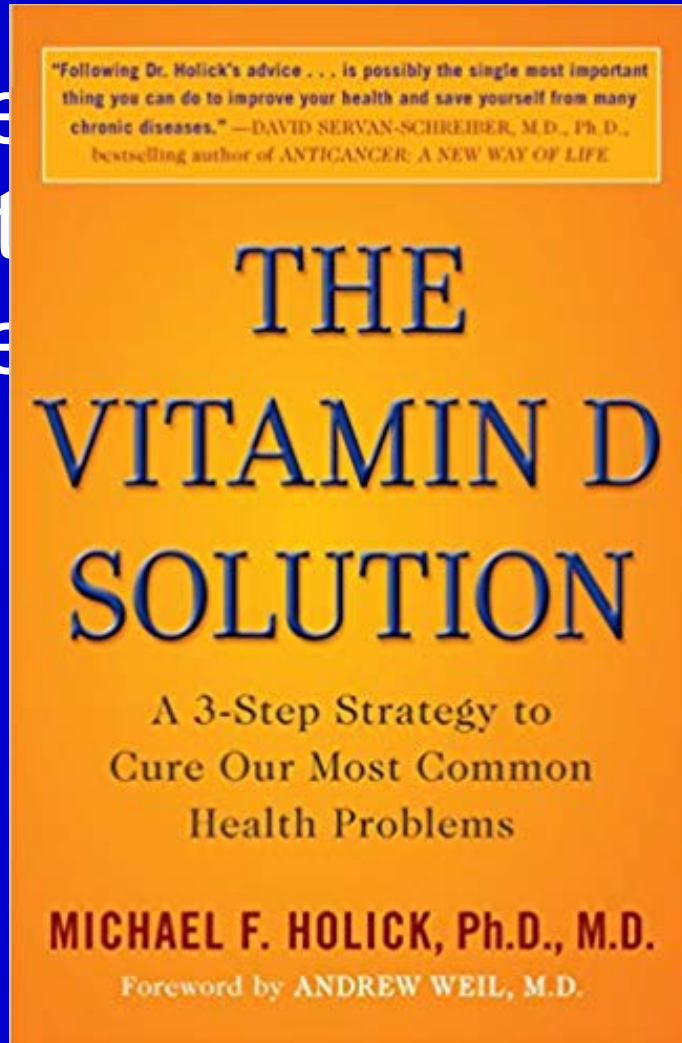
Annual fall rates
-Control 2.1/yr.
-Exercise 1.4/yr.

What about vitamin D?

1. We don't get enough
2. Is this really a vitamin?
3. We drank the Kool aide

What about vitamin D?

1. We
 2. Is t
 3. We
- gh
nin?
aide



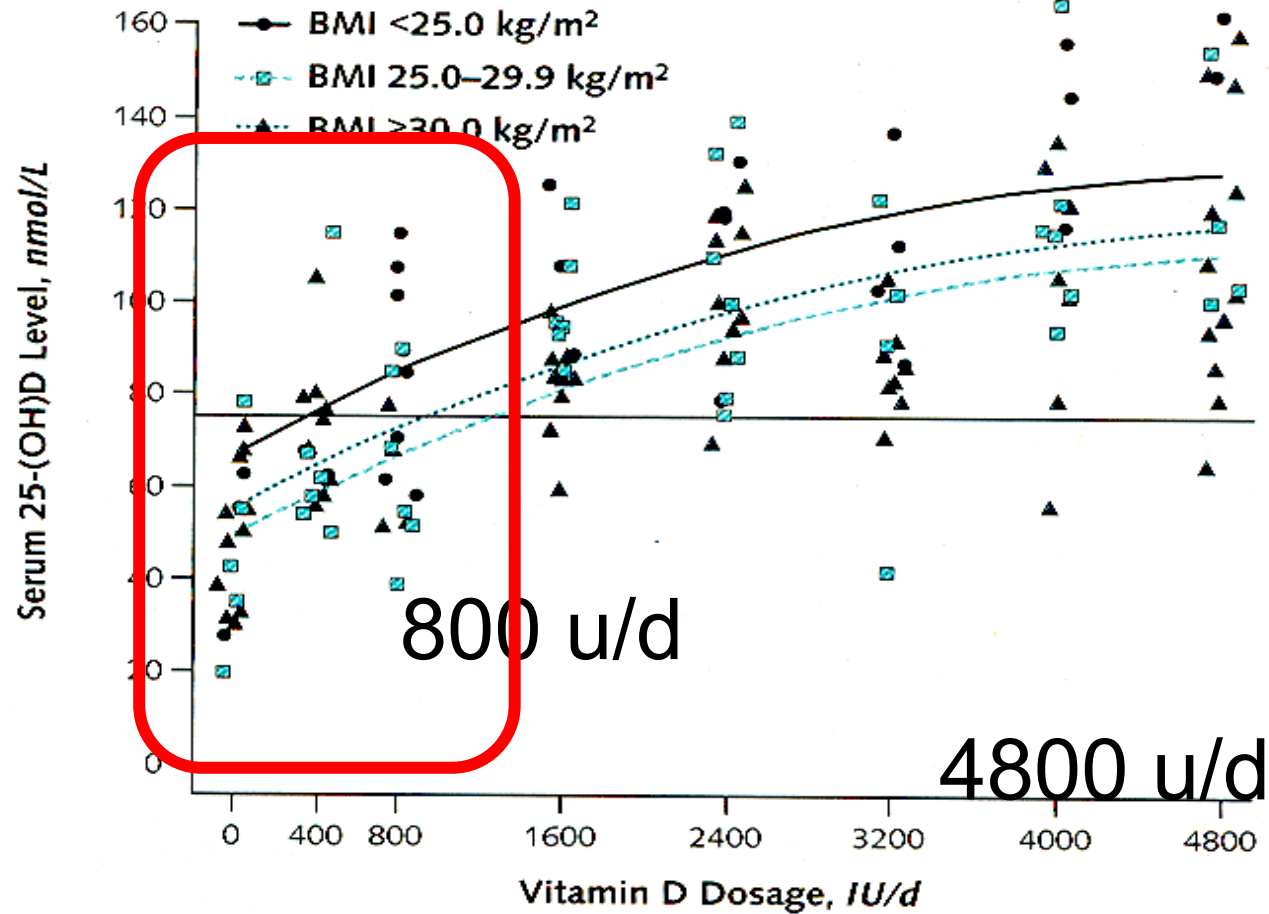
**We are vulnerable to
“expert opinion.”**
--Homocysteine
--Vitamin E
--Fish oil

USPSTF meta-analysis: value of vitamin D not supported

	Risk Ratio (95% C. I.)
Mortality overall	0.83 (0.70-0.99)
<u>Mortality, institutional</u>	<u>0.72 (0.56-0.94)</u>
Mortality, non institutional	0.93 (0.73-1.18) NS
Hip fracture	0.96 (0.72-1.29) NS
Any fracture	0.98 (0.82-1.16) NS
Any fall	0.84 (0.69-1.02) NS

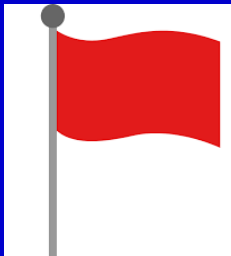
Don't overdo vitamin D

**Vitamin D
levels < 20
with 800-
1000 u/d**



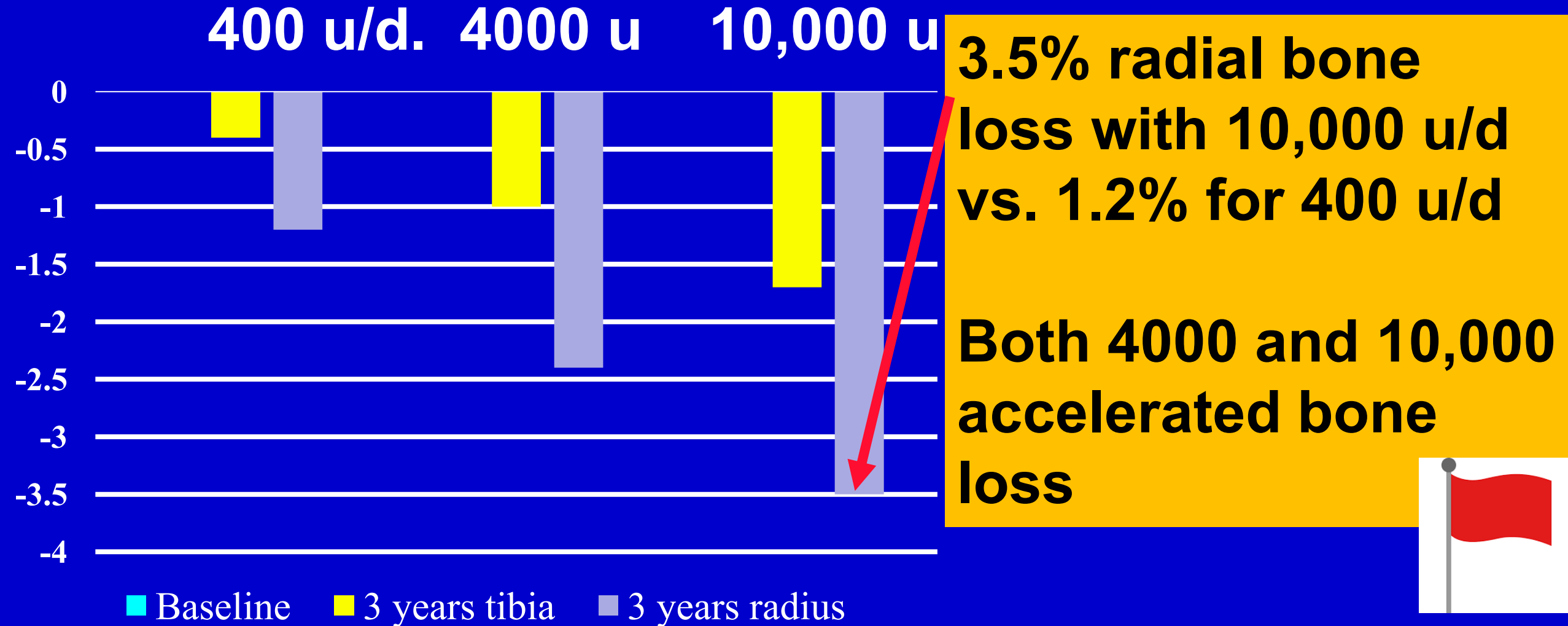
Vitamin D supplement doses

Annals Intern Med 2012; 156:425-437



Is this the end of vitamin D?

(N= 311; men and women, ages 55 to 70 yrs. 3 yrs. follow up.
Blinded RCT of vitamin D: 400 u/d, 4000 u/d, and 10,000 u/d)



Current “target” levels for Vitamin D

Deficiency	<20 ng/mL
Probably normal	20-30 ng/mL
Optimal	30-50 ng/mL
Possibly toxic	> 50 ng/mL
Clearly toxic	>499 ng/mL

Vitamin D treatment strategies

Recommended daily

Age 19-50 years

600 units/d

Age > 50 years

600-800 units/d

Deficiency treatment

50,000 units/week for 8 weeks

or

6000 units/d

Then...

1500-2000 units/d for maintenance

Patient #3:

68year old woman with a femoral neck bone density $T = -2.8$.

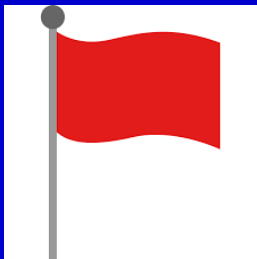
What would you do now?

What do you need to know about bisphosphonates?

1. Not much, they are the purview of the oncologist and endocrinologists.
2. They are most commonly used to treat osteopenia.
3. They are most commonly used to treat osteoporosis.
4. Treatment should be considered indefinite when used to treat osteopenia or osteoporosis.

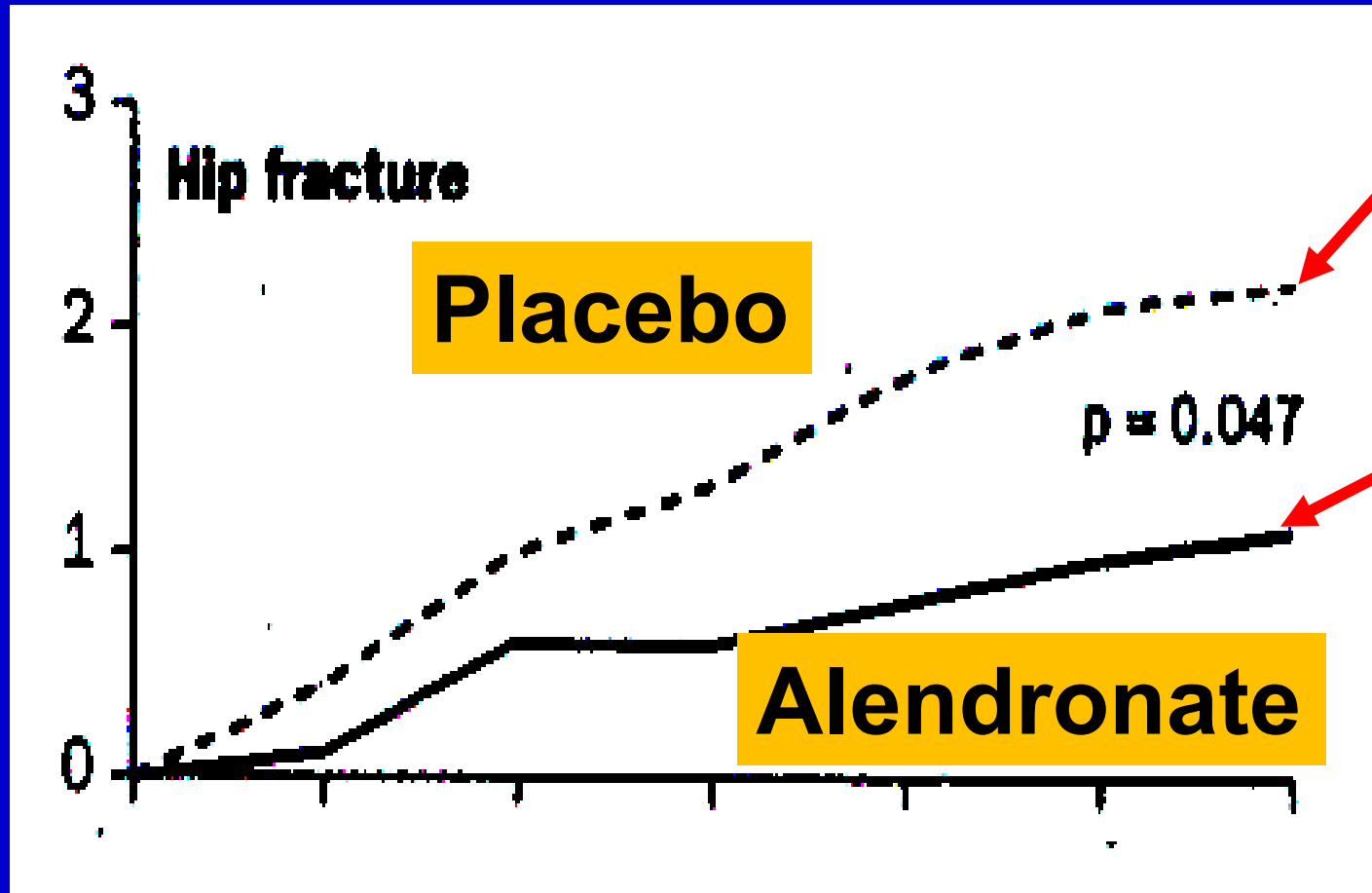
Bisphosphonates

- Inhibits bone resorption
- Renal clearance (avoid when GFR under 30-35)
- Long “terminal” half life for alendronate (i.e. is stored in the bone and recycled for 10-20 years)
- Work in all age groups



US: Alendronate reduces fracture rate in severe osteoporosis ($T < -2.1$ and fracture history, 1996)

Proportion of women
with fracture

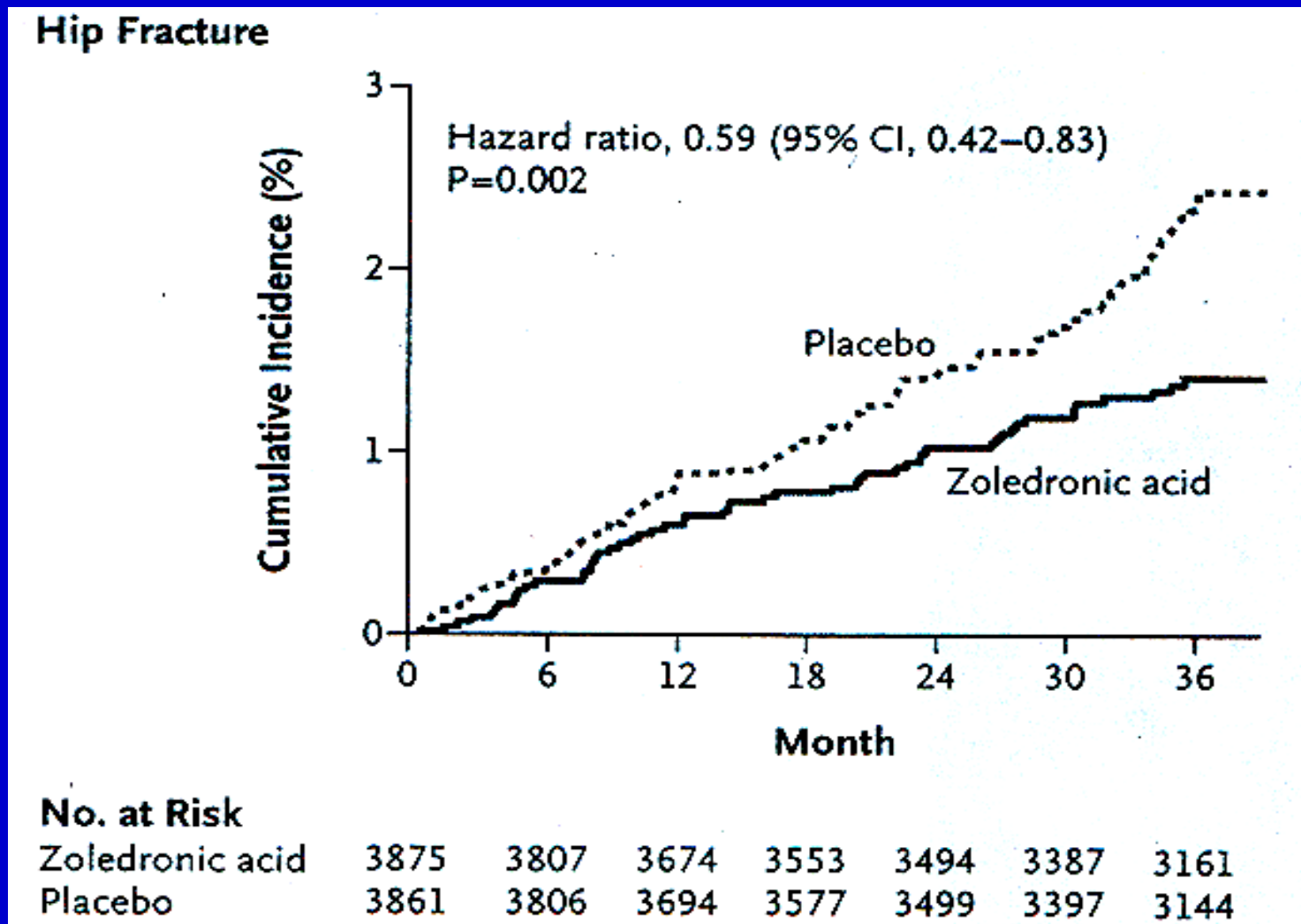


2.2% / 3 years

51% reduction

1.1% / 3 years

Annual Zoledronate infusions reduce hip fracture rates



**41% lower
hip fracture
rate**

Has the time come to use bisphosphonates for osteopenia...in elderly women (> 66 years)?

ORIGINAL ARTICLE

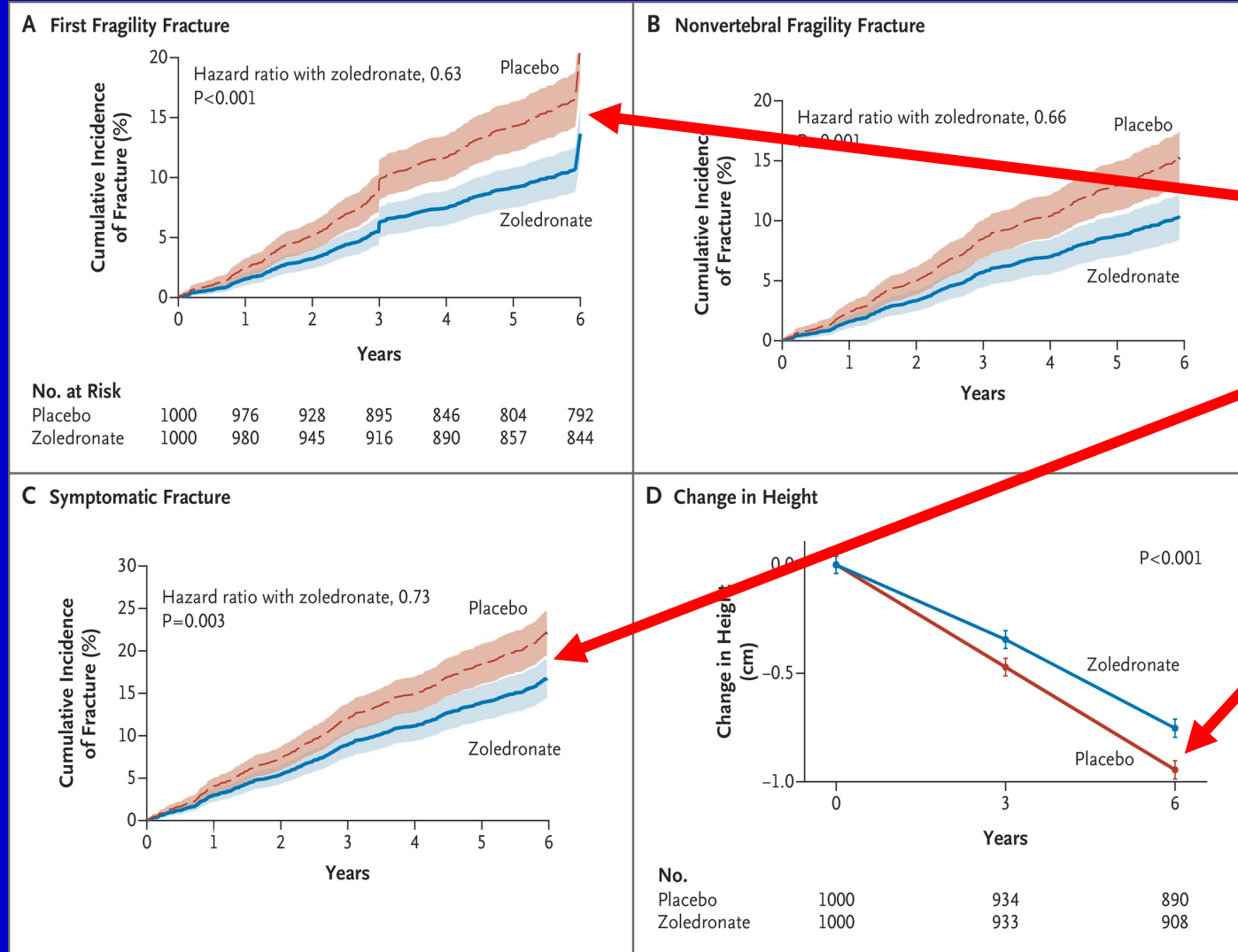
Fracture Prevention with Zoledronate in Older Women with Osteopenia

Ian R. Reid, M.D., Anne M. Horne, M.B., Ch.B., Borislav Mihov, B.Phty., Angela Stewart, R.N., Elizabeth Garratt, B.Nurs., Sumwai Wong, B.Sc., Katy R. Wiessing, B.Sc., Mark J. Bolland, Ph.D., Sonja Bastin, M.B., Ch.B., and Gregory D. Gamble, M.Sc.

2018: 2000 New Zealand women, mean age 71.5 (66-76). Femoral neck = T -1.6. 24% with history of nonvertebral fracture.

- ❑ RCT: IV Zoledronate every 18 mos. vs. placebo
- ❑ Follow-up 6 years.

IV Zoledronate for osteopenia:



37% reduction in fragility fractures

27% reduction in symptomatic fractures

11.5% fewer patients lost ≥ 1 cm in height

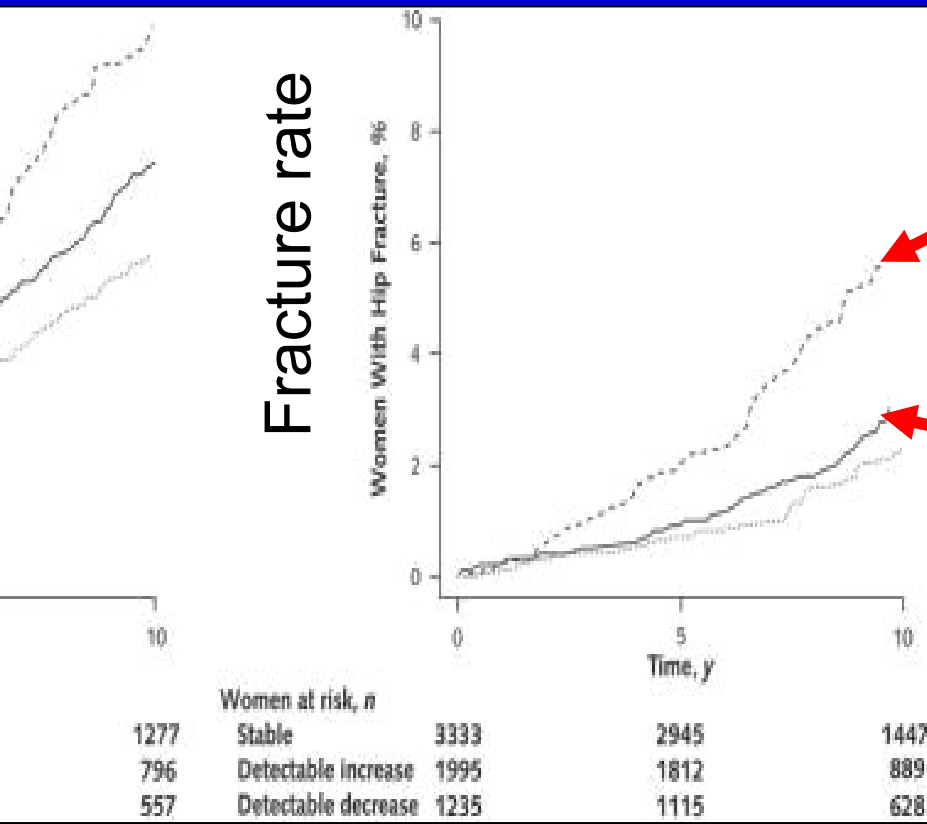
NNT for one fracture = 15

Bisphosphonates side by side

	Dose	“Retention” half-life	Cost
Alendronate	70 mg/wk	> 10 yrs	\$ 4/mo
Risedronate	35 mg/wk	9.5 days	\$40/mo
	150 mg/wk		\$40/mo
Zolendronate	5mg/yr IV	7 days	\$1300/yr

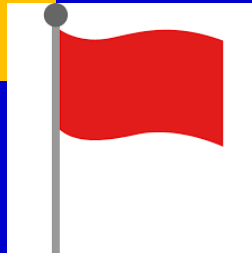
If the bone density does not improve with an oral bisphosphonate, move on

Manitoba, Canada cohort, N = 6629 women
treated with alendronate, follow-up 9.2 years
“Detectable change” at femoral neck = 0.055 gm/cm²



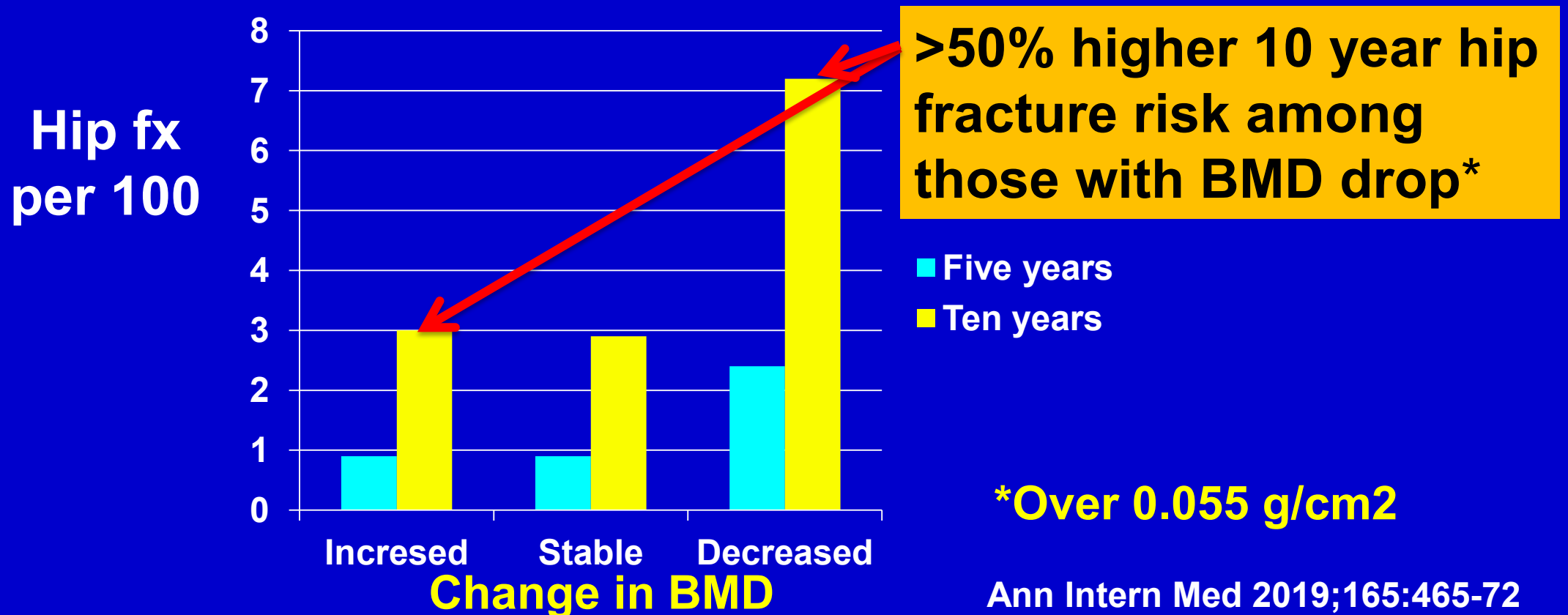
Detectable decrease vs. stable:
5.5% increased fracture rate
at 10 yrs.

Detectable increase vs. stable:
2.6 % lower fracture rate at 10 yrs.



>50% lower hip fracture rate after 10 years for treatment responders

(Manitoba, Canada, cohort. N = 6629 women, > 40 yrs. Treated for osteoporosis for 10 years)



Patients who take their bisphosphonates do better!

(N=35,537, national cohort)

	Persistent (%)	Non-persistent (%)	RR (p value)
Bisphos use	<u>≥80%</u>	<80%	
Vertebral fracture	1.7	2.6	0.643 (p<0.001)
Hip fracture	1.3	2.1	0.612 (p<0.001)

What are the risks from bisphosphonates?

1. Jaw osteonecrosis
2. Esophageal CA
3. Spontaneous vertebral fractures
4. Atrial fibrillation

Bisphosphonates safety

September 2011. FDA report on bisphosphonates:

“The safety of long-term bisphosphonate therapy continues to be unclear as study results are conflicting as to whether or not ONJ, atypical femoral fractures or esophageal cancer are associated with use of bisphosphonates for the prevention and treatment of osteoporosis... findings with increased duration of exposure to oral bisphosphonates, with the highest prevalence observed at 4 or more years of use.”

Jaw osteonecrosis



Bisphosphonates and femoral shaft fractures

In 2008, Neviaser et al reported a case series of 20 patients with low energy transverse or short oblique femoral fractures, 19 taking alendronate.

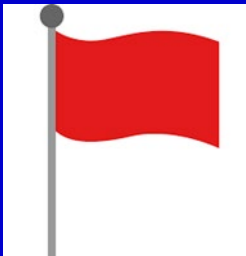
RR = 139 X
(95% C.I. 19-939)

Femoral shaft fractures



Subtrochanteric fracture risk highest after 5 years of bisphosphonate use

	Transient	< 3 years	3-5 years	<u>≥ 5 years</u>
Odds ratio	1.0	0.9 (NS)	1.59 (NS)	<u>2.74</u>



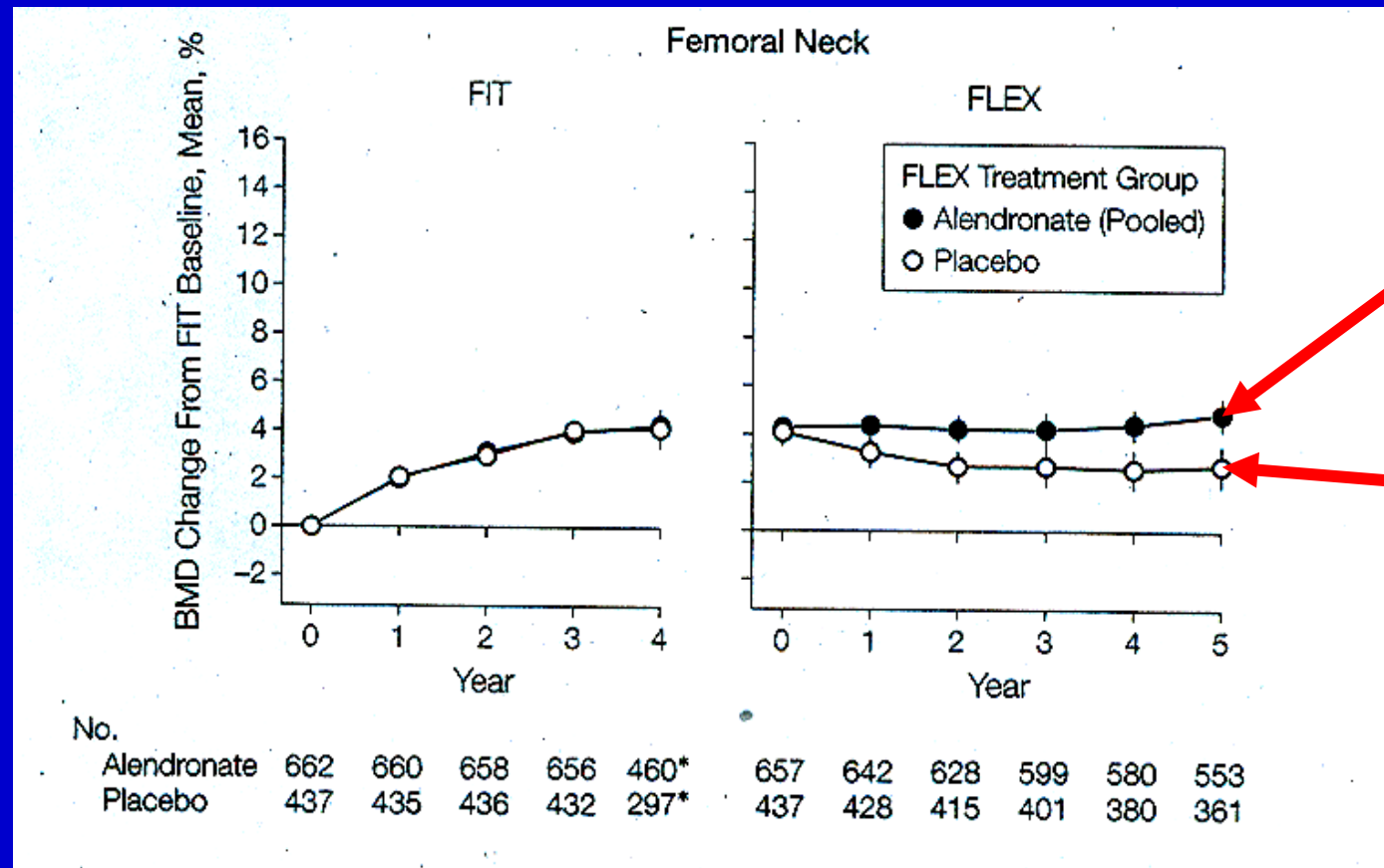
When should your patients take a bisphosphonate holiday?



5 years for alendronate

- Follow BMD and resume if decline
- Follow BMD and switch to alternative if decline

Hip BMD declines slightly after 5 years among patients on alendronate but fracture rate did not



**NS change
in fx rate**

**Alendronate
continued**

**Alendronate
stopped**

How do the numbers add up?

For 1000 women treated with bisphosphonates for 6 years...



50-70 fractures
prevented



vs.

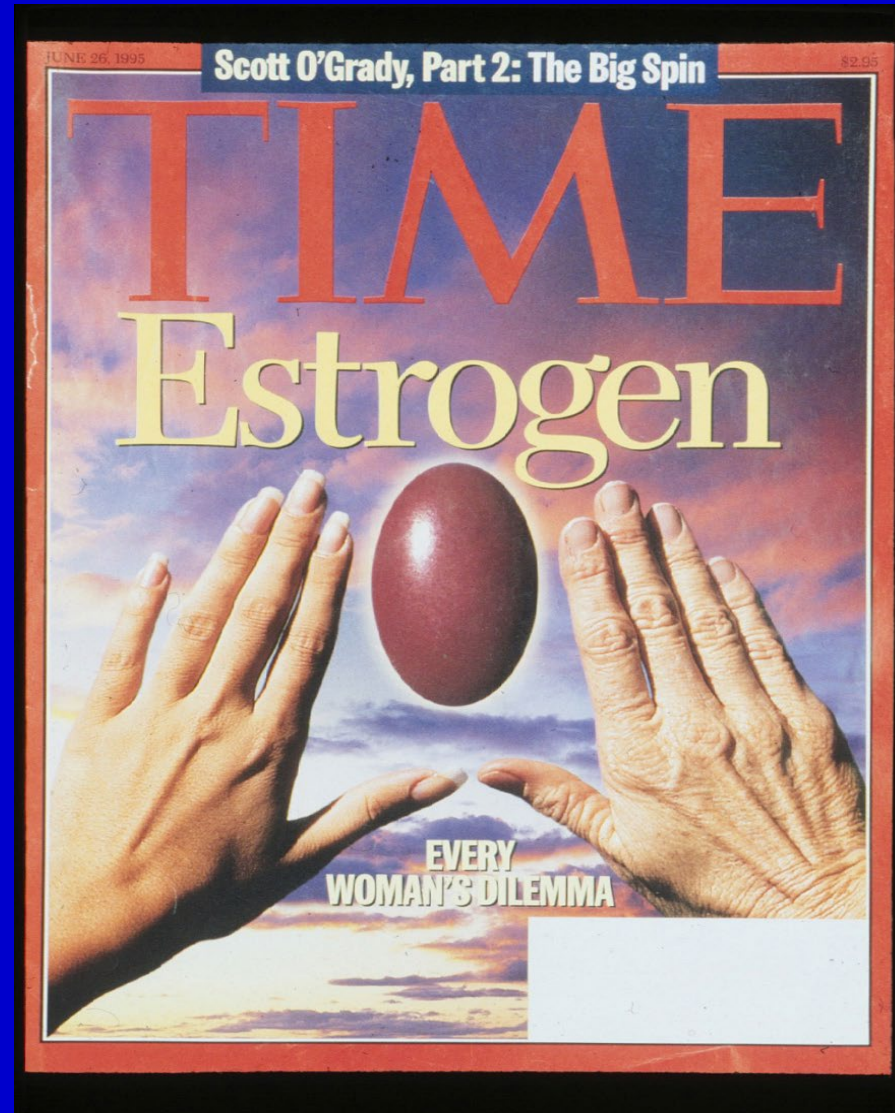


2 atypical fractures
or jaw osteonecrosis

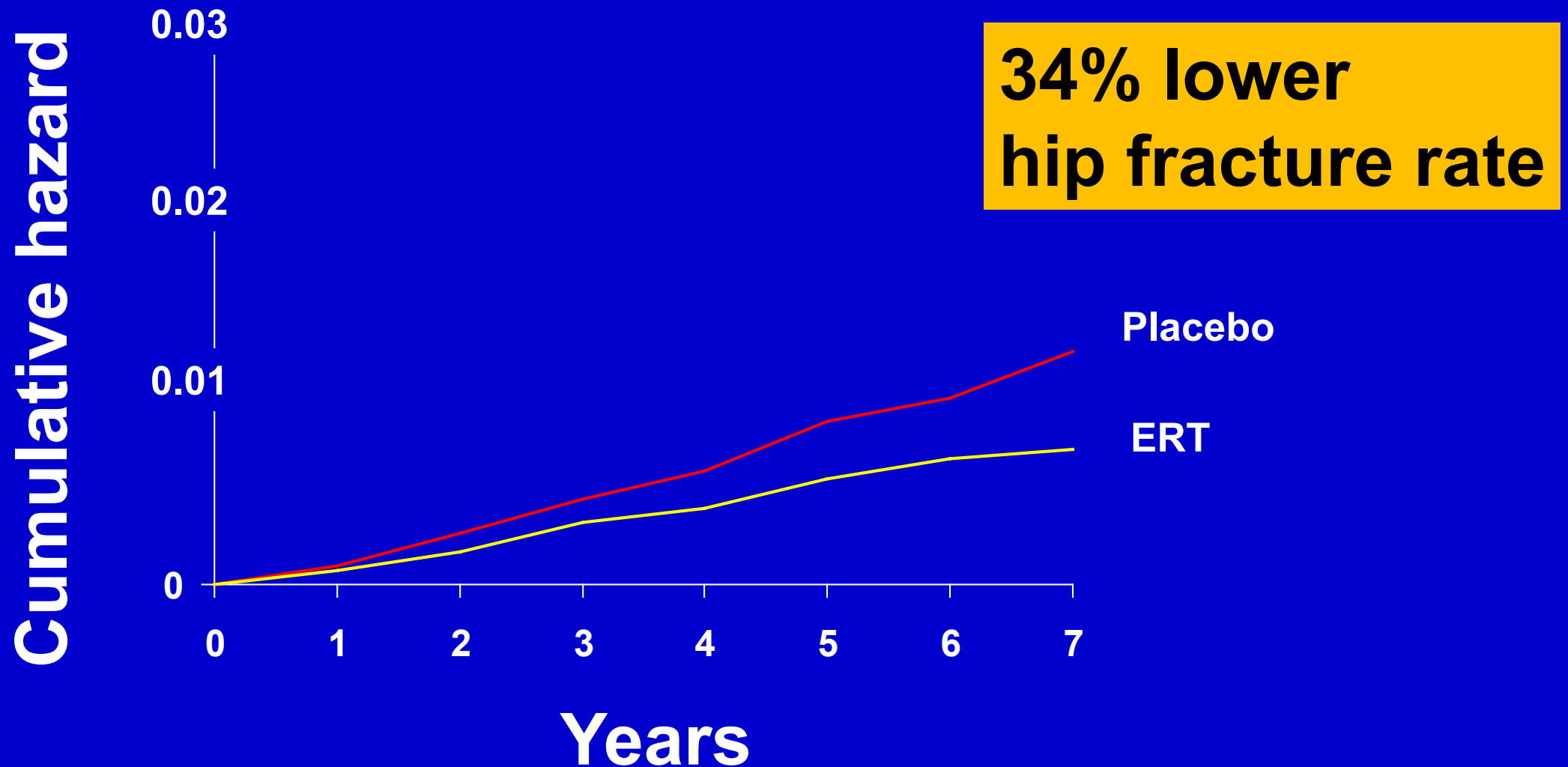
In summary: Bisphosphonates should be used with circumspection

- **When are bisphosphonate appropriate?**
 - **$T \leq -2.5$ at the femoral neck**
 - **“Advancing” osteopenia**
 - **Osteopenia over 66 or with early fracture**
- **How long should they be used?**
 - **Five years**
- **What do you need to know about the side effects?**
 - **Osteonecrosis, insufficiency fractures**

Up until 2002, nearly all women
received hormone replacement therapy



WHI: Combination ERT vs. placebo, hip fracture risk



WHI: Patient outcomes

Combination estrogen/progestin vs. placebo

Absolute excess events per 10,000 patient years

CAD events	7
CVAs	8
PEs	8
Invasive breast cancer	8
Total	31 ⁺

⁺ Approximate three events for 200 women treated for five years

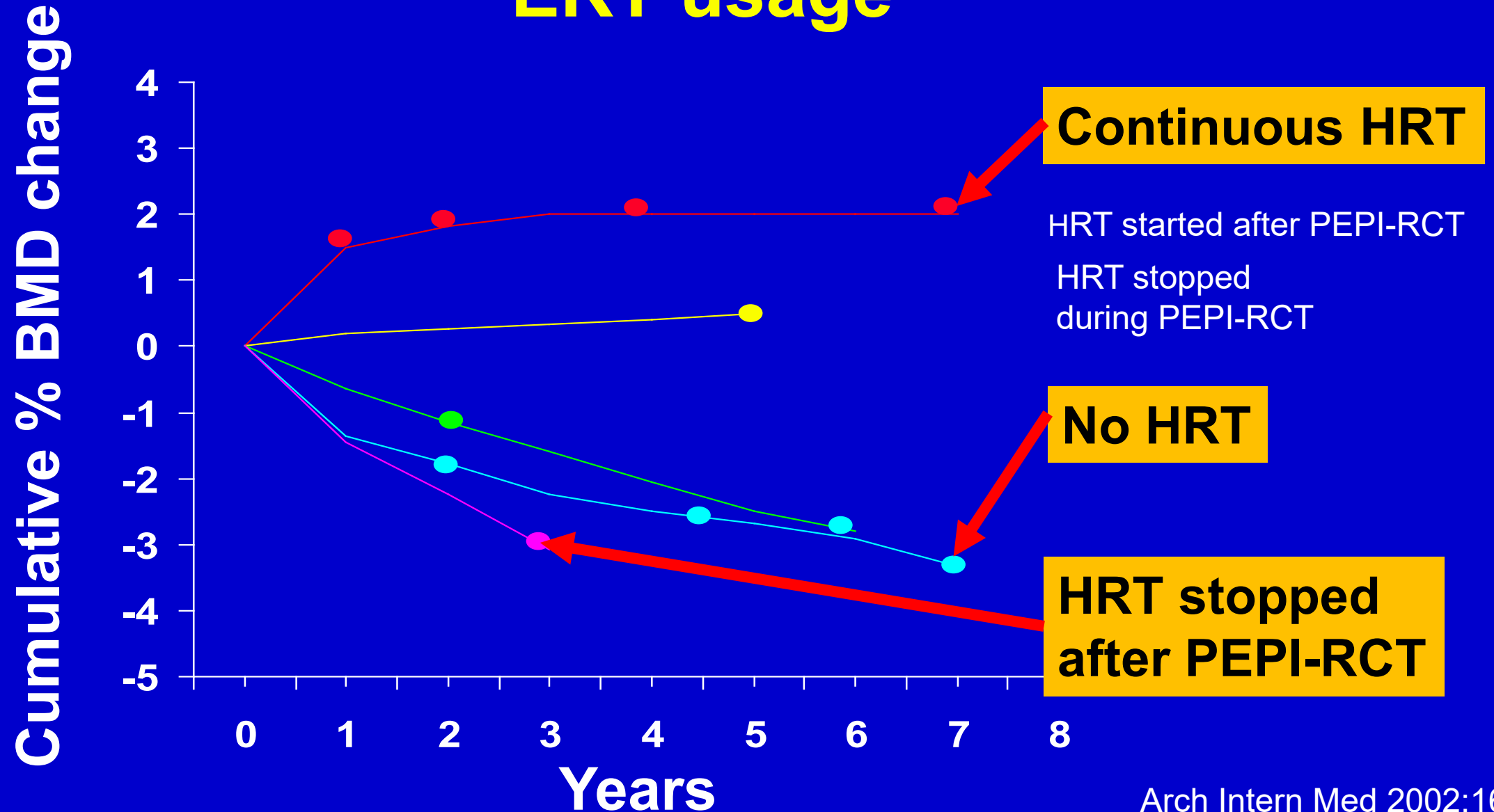
WHI: A new narrative (2017)

The 18 year follow-up report

Hazzard ratios vs. placebo

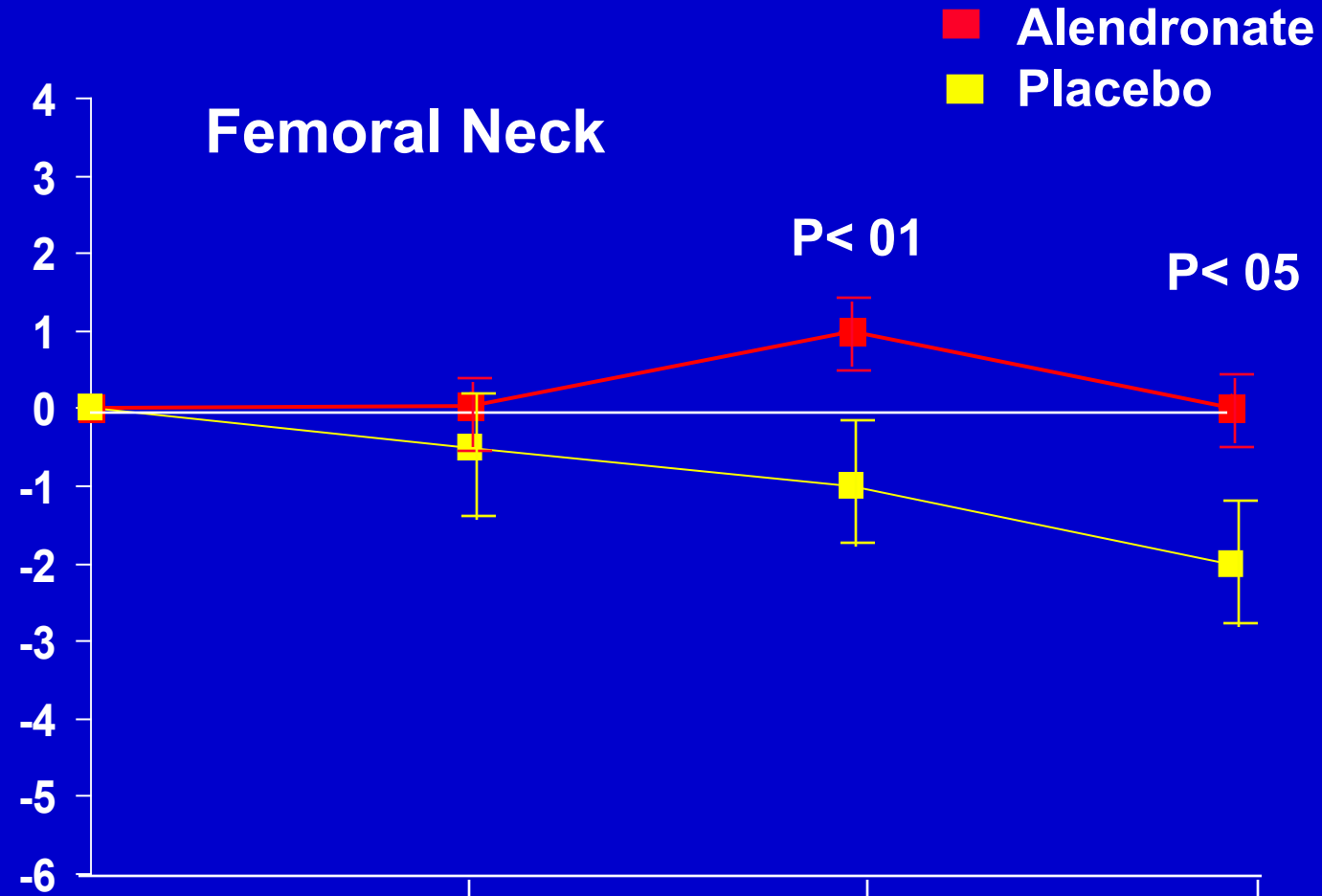
	Estrogen plus progestin	Estrogen alone
All cause mortality	1.02 (NS)	0.94 (NS)
CVD mortality	1.03 (NS)	0.97 (NS)
Stroke mortality	1.12 (NS)	0.98 (NS)
Cancer mortality	1.06 (NS)	0.99 (NS)
Breast cancer mortality	1.44 (0.07)	0.55 (0.02)
Colorectal CA mortality	1.01 (NS)	1.21 (NS)
Dementia mortality	0.93 (NS)	0.01 (0.01)

PEPI: Bone density change and ERT usage



Alendronate stabilizes BMD after discontinuation of ERT

Mean % change from
baseline (95% CI)



Patient #4:

75 year old woman seen following a hip fracture.

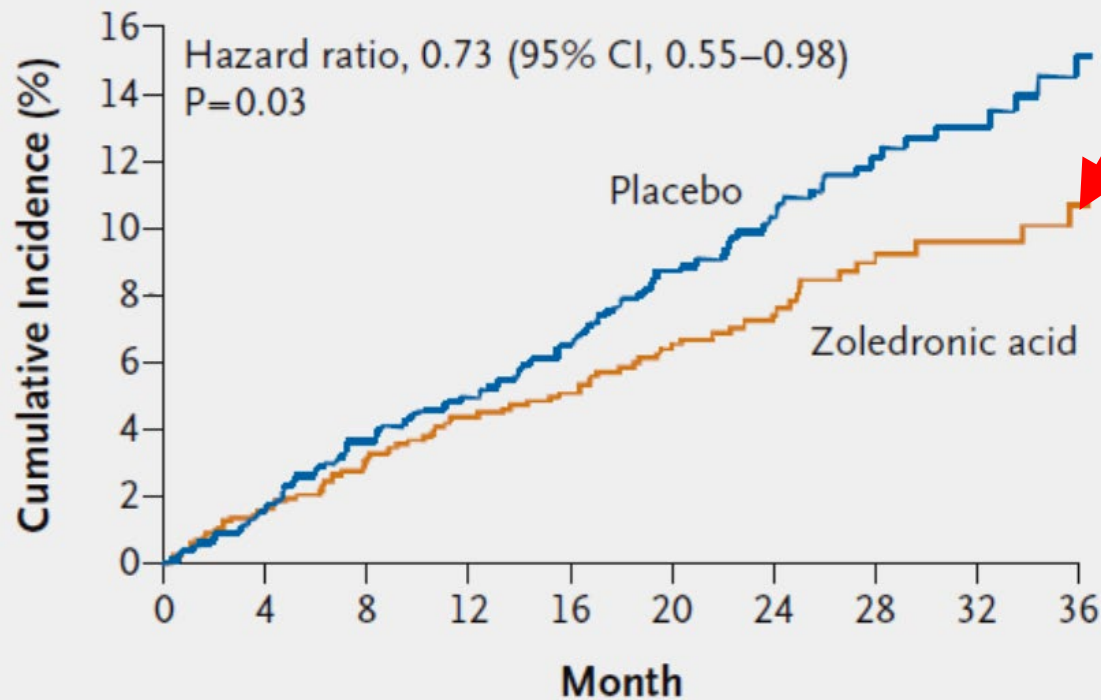
What would you recommend?

Zoledronic acid after hip fracture

RCT, N = 2127. Osteopenia and osteoporosis

Placebo vs. annual IV Zoledronic acid. FU 3 yrs.

B Clinical Nonvertebral Fracture



**27% reduction
in non vertebral
Fractures**

**28% reduction
in mortality**

No. at Risk

Zoledronic acid	1065	1015	957	903	770	636	478	321	217	130
Placebo	1062	1014	961	902	758	626	458	320	201	129

Patient #5:

75 year old woman who completed 5 years of alendronate. Her femoral neck BMD was $T = -2.2$ at the completion of treatment.

After two years, her $T = -2.8$.

What would you recommend?

**There MAY be patients who should continue on
bisphosphonates, those
with persistent severe osteoporosis**

FLEX Extension (beyond 5 yrs of alendronate)

Vert fx rate

Placebo Alend NNT

BMD, start of extension

T < -2.5	9.3%	4.5%	21
T -2.5 to -2.0	5.8%	2.8%	33
T > -2.0	2.3%	1.2%	81

The world beyond bisphosphonates

- **Hormonal**
 - Teriparatide
 - Abaloparatide
- **Biomodulators**
 - Denosumab
 - Romosozumab
- **Combination therapies**
 - Estrogens and bisphosphonates
 - Teriparatide and denosumab

Teriparatide mechanism:

Intermittent PTH fraction administration has an *anabolic* effect. Trabecular bone density and strength increase. Cortical bone strength increases by improving the bone thickness with little change in bone density. NOT used with bisphosphonates.

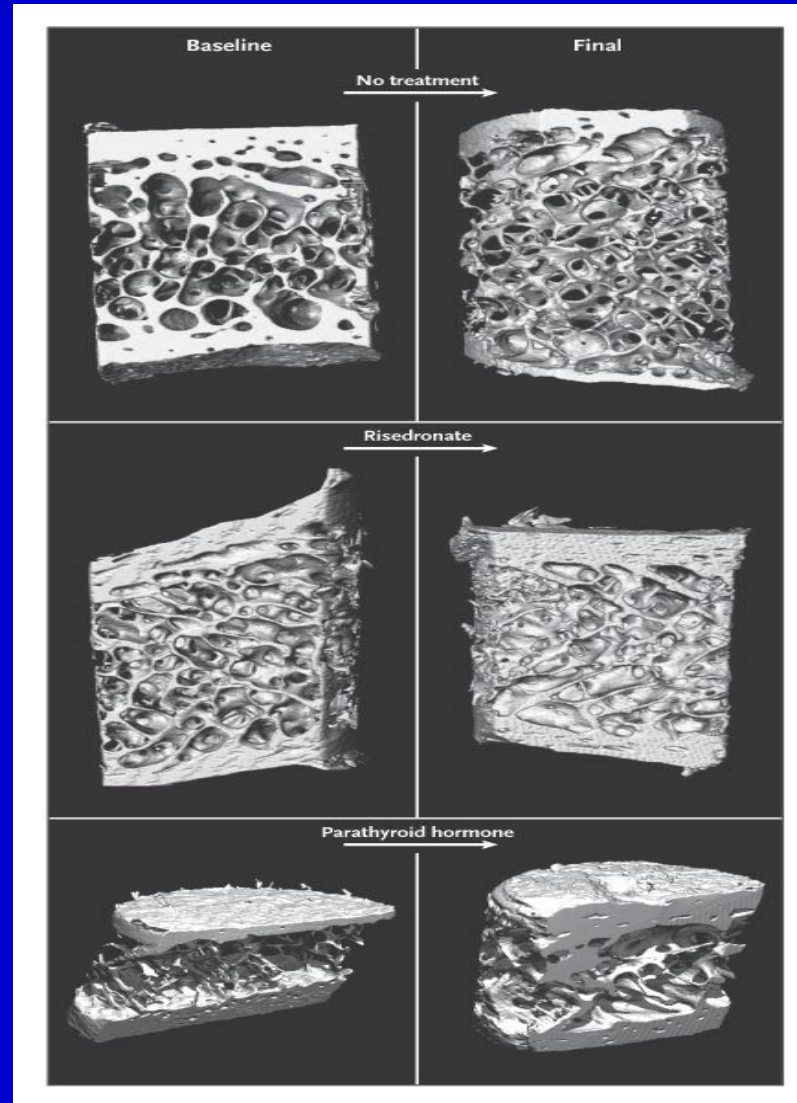
Dosage:

20-40 mg subcutaneously

Side effects:

Myalgia, hypercalcemia

PTH thickens internal bone trabeculation and cortex with less impact on BMD

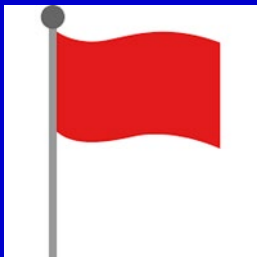
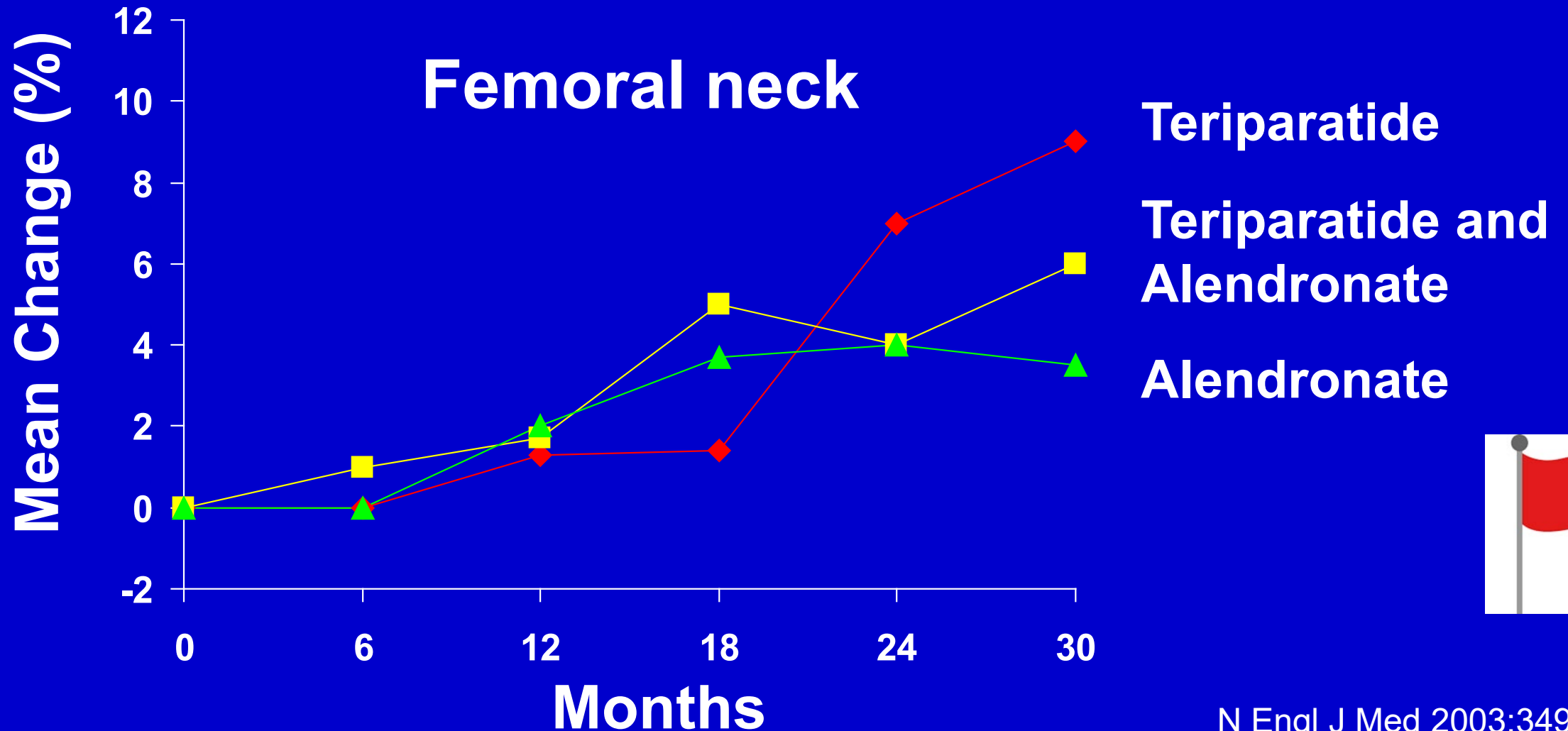


No treatment

Risedronate

Teriparatide

PTH alone improves bone density more than combination or alendronate alone



Teriparatide works, especially at LS spine

2013 Meta-analysis:

8 RCTs, 2388 patients with osteoporosis

	Spine	Hip
BMD increase	8.14%	2.48%
Fracture reduction	70.0 %	38.0%

Abaloparatide mechanism:

Peptide designed to bind the PTH receptor site with different kinetics than teriparatide resulting in a shorter duration of activity and more potency

Dosage:

80 mg subcutaneously daily

Side effects:

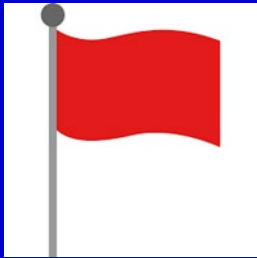
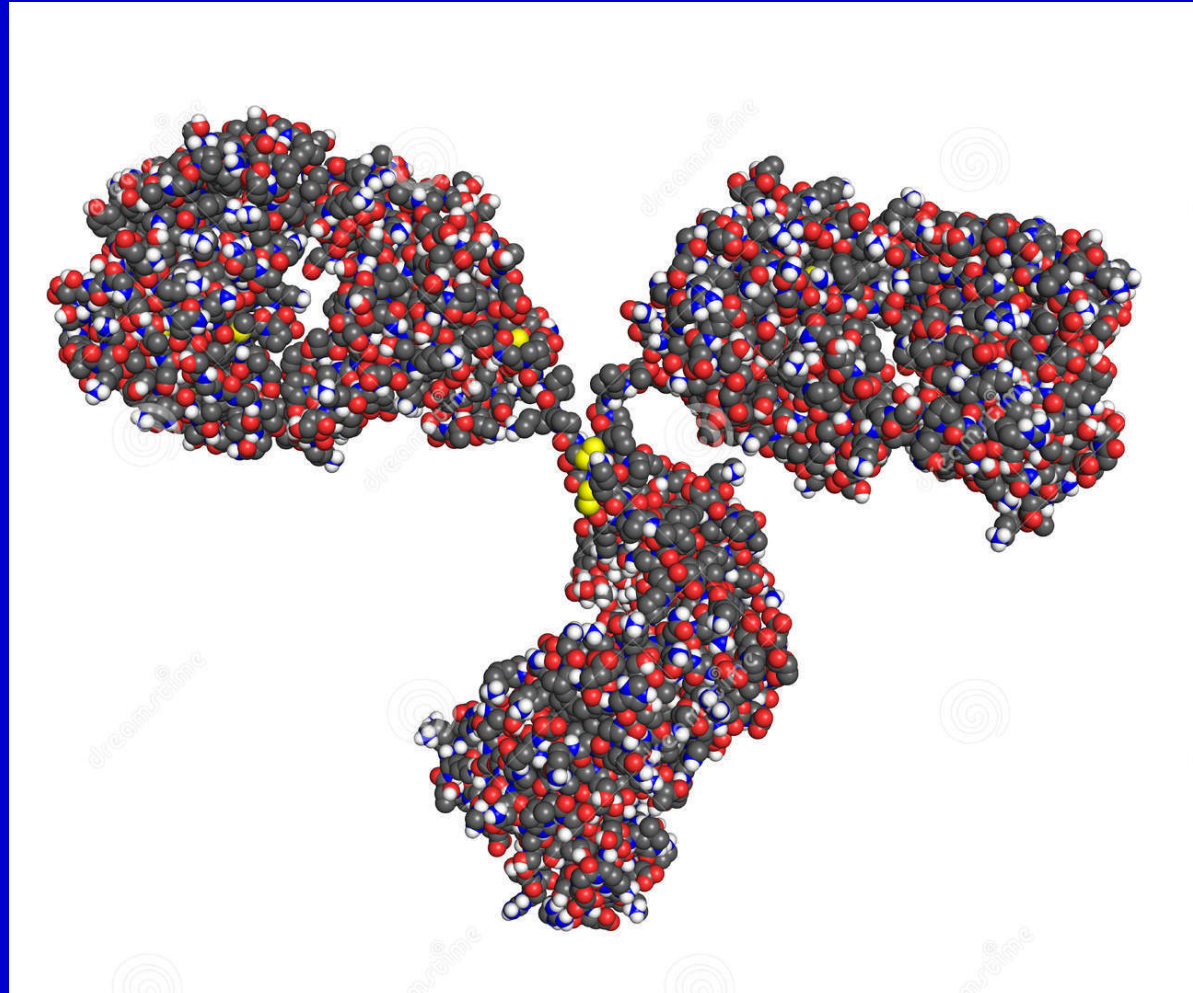
Hypercalcemia

Abaloparatide does slightly better vs. teriparatide

N = 2463 women, mean age 69 yrs, T < -2.5 lumbar or femoral neck, and two fractures, followed 18 mos.

	Abaloparatide (N = 824)	Placebo (N = 821)	Teriparatide (N = 818)
New vertebral fracture, %	0.6	4.2	0.8
New nonvertebral fracture, %	2.7	4.7	3.3

The Brave New World: Monoclonal antibodies



The biologics

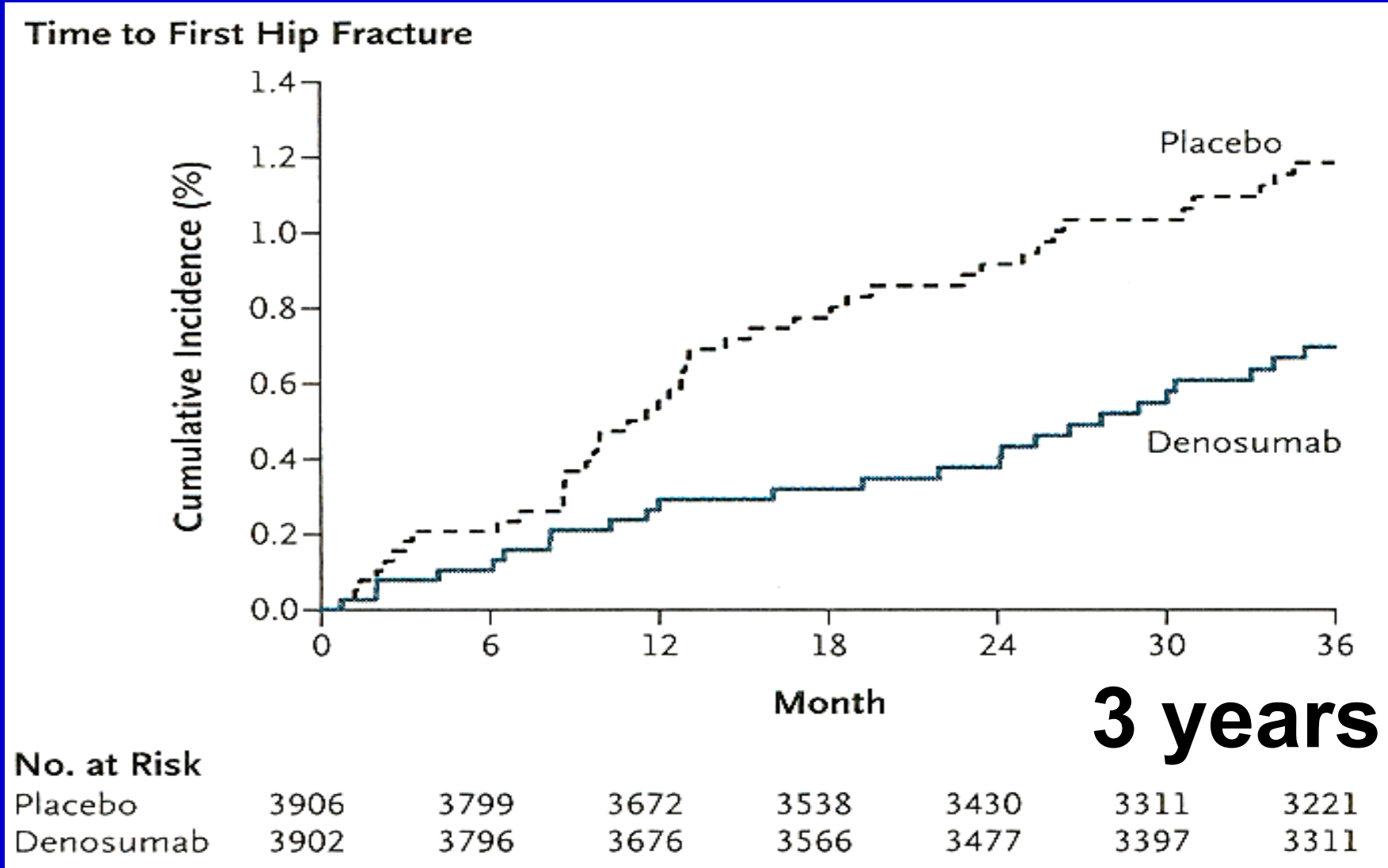
Denosumab: Monoclonal antibody directed against the receptor ligand (RANKL). Binding the ligand reduces osteoclastic activity (with cutaneous activity). 60 mg subcutaneously Q 6 months

Side effects: Eczema, cellulites

Romosozumab: Monoclonal antibody, inhibits sclerostin (an inhibitor of bone formation with vascular activity). Increases formation and decreases absorption. 210 mg subcutaneously, monthly.

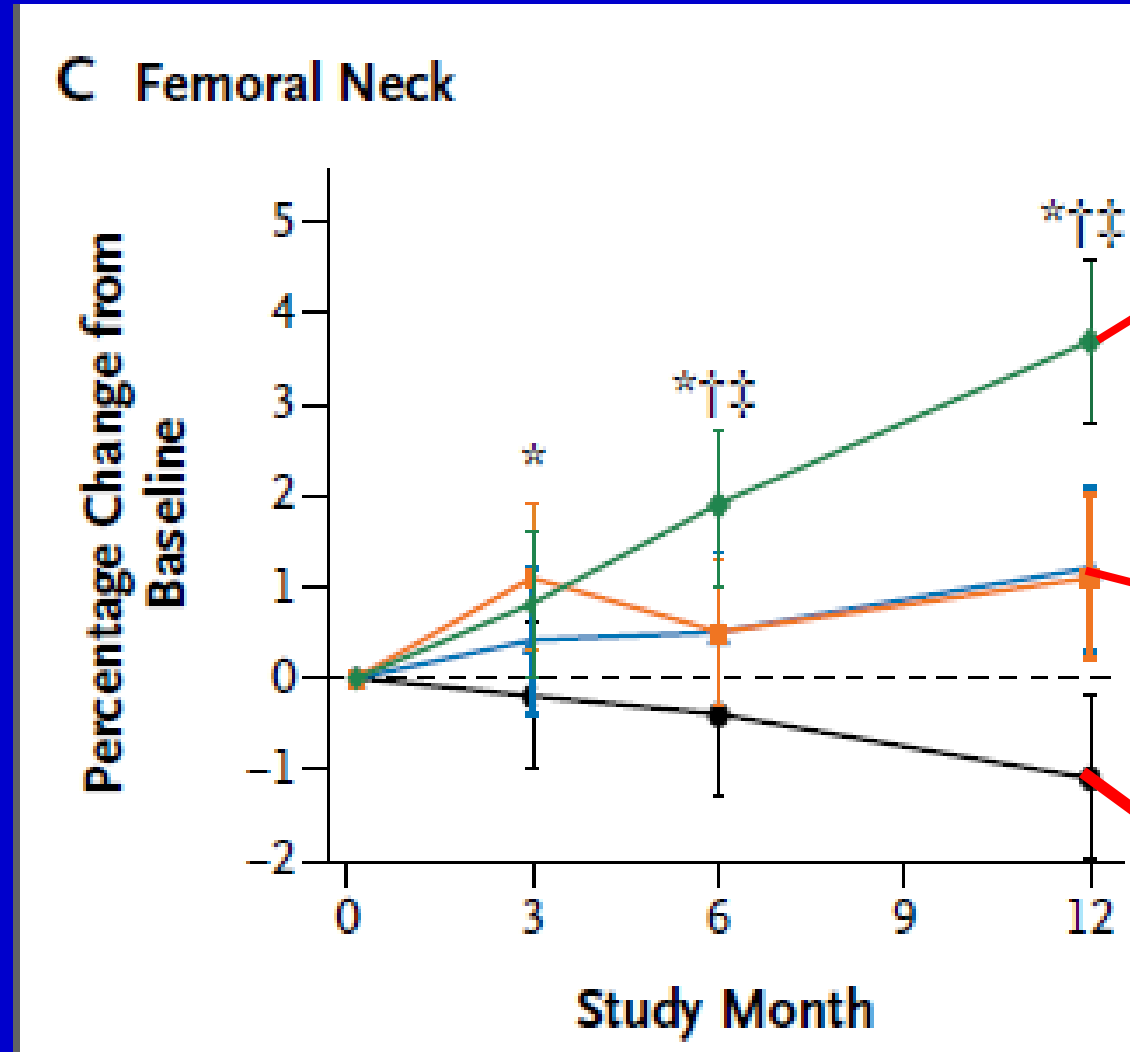
Side effects: Jaw osteonecrosis and insufficiency fractures vascular, tumor

Denosumab reduces hip fractures



**20% lower
hip fracture
rate**

Romosozumab out performs other anabolic agents....in osteopenia



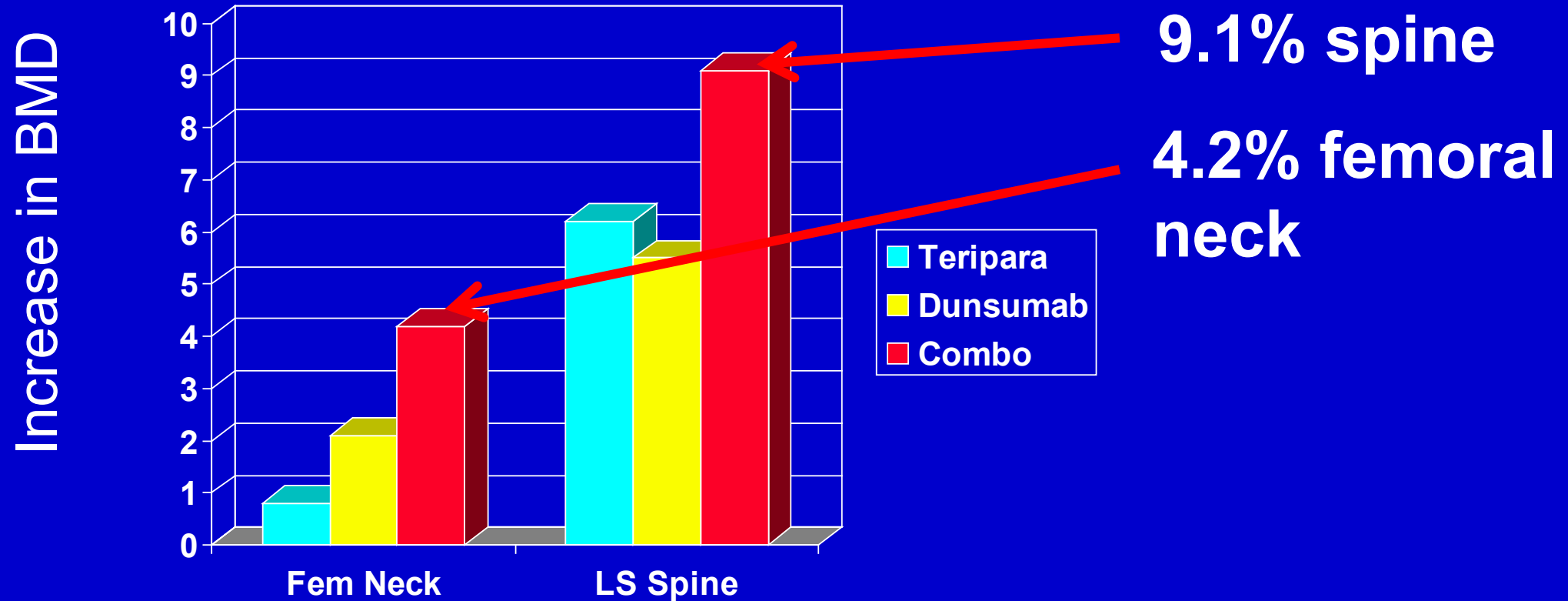
3.7% increase in BMD at 12 months with Romosozumab

< 1% increase in BMD with both alendronate and teriparaitide

Placebo

Teriparatide and denosumab combination therapy

RCT, 1 year, 94 women with osteoporosis
Outcome: % BMD increase



BUT...There may be unintended consequences of the biologics : 2017 case series of 24 patients with “rebound” vertebral fractures after denosumab discontinuation

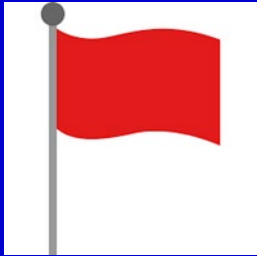
- Reported fractures 8-16 months after stopping denosumab
- Mean 4.7 fractures per patient
- Highest T12-L1
- Higher risk after 2 years (5.2 vs. 3.2)

**Alendronate vs.
Romosozumab then alendronate
RCT. N = 4093 12 months Romosozumab with
transition to alendronate vs. alendronate. 36 mos.**

	Alendronate alone	Romosozumab to Alendronate
All fractures	13.0%	9.7%
Non-vertebral fx	10.6%	8.7%
Hip fx	3.2%	2.0%
CV events	1.9%	2.5%
Jaw osteonecrosis	< 0.1%	< 0.1%
Atypical femoral fx	0.2%	< 0.1%

Patient #6:

68 year old woman, femoral neck BMD T = -1.8
started on prednisone for Giant Cell Arteritis



What would you do?

What about patients on long-term steroids?

1. Obtain a bone density?
2. Ensure adequate calcium and vitamin D?
3. Start a bisphosphonate, full dose?
4. Start a bisphosphonate, half dose?

Bone protection with Steroids

2017 Am College of Rheumatology

- **All patients:** Calcium 1000-1200 mg/d; Vitamin D 800-1000/d (level $\geq$ 20 ng/ml); Lifestyle (exercise)
- **Moderate/high risk***: Bisphosphonate, teriparatide, denosumab, or raloxifene if no other option for women.

*** History of osteoporosis fx OR $T \leq -2.5$ at hip or spine OR FRAX $\geq$ 10% OR High dose**

ACR risk assessment treatment thresholds

White women over age 50 years:

	50	55	60	65	70	75	80	85+
-2.5								
-2.0								
-1.5								
-1.0								
-0.5								
0.0								
0.5								
1.0								

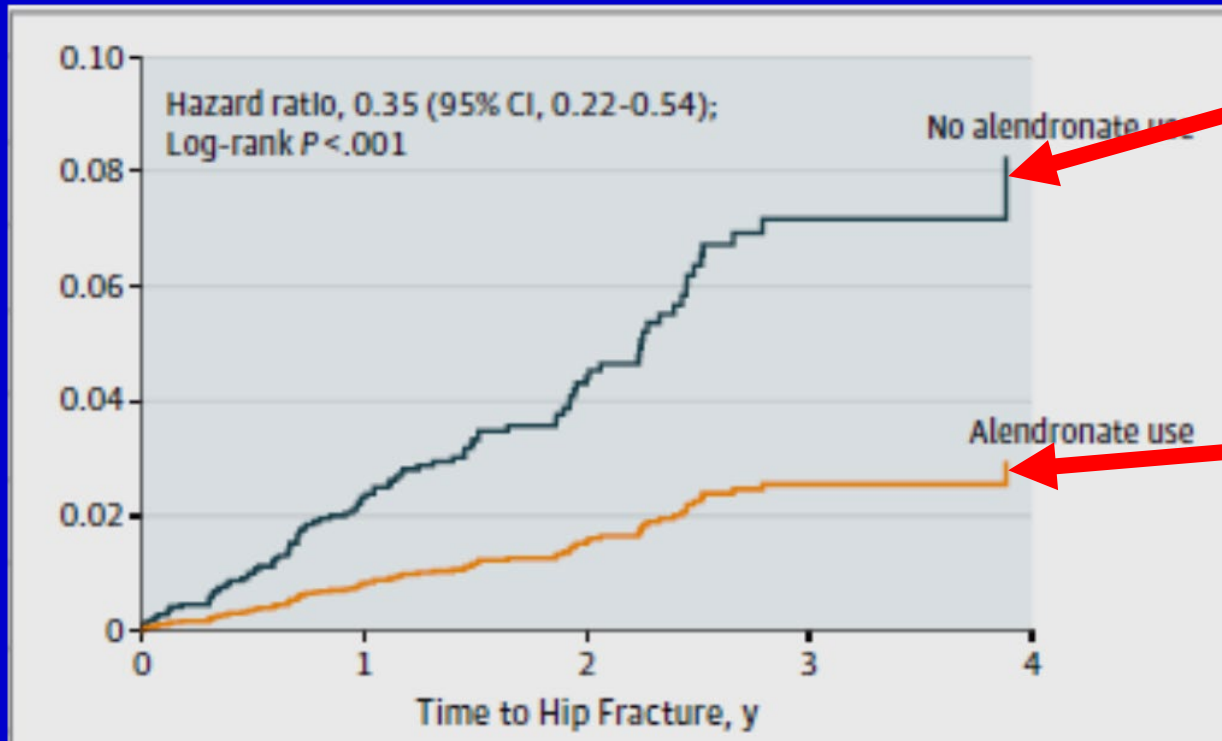
High risk +
prednisone $\geq$
5 mg/d, $\geq$ 3
months

Medium or
Low risk +
prednisone $\geq$
7.5 mg/d, $>$ 3
months

Bisphosphonate use reduces fractures among patients on steroids

Swedish retrospective case control study, N=433,195

- Age 79.9 years, 70% women
- Median follow-up 1.32 years
- Prednisolone dose average 7.6-8.5 mg/d



No alendronate
106 fractures/468 pts.

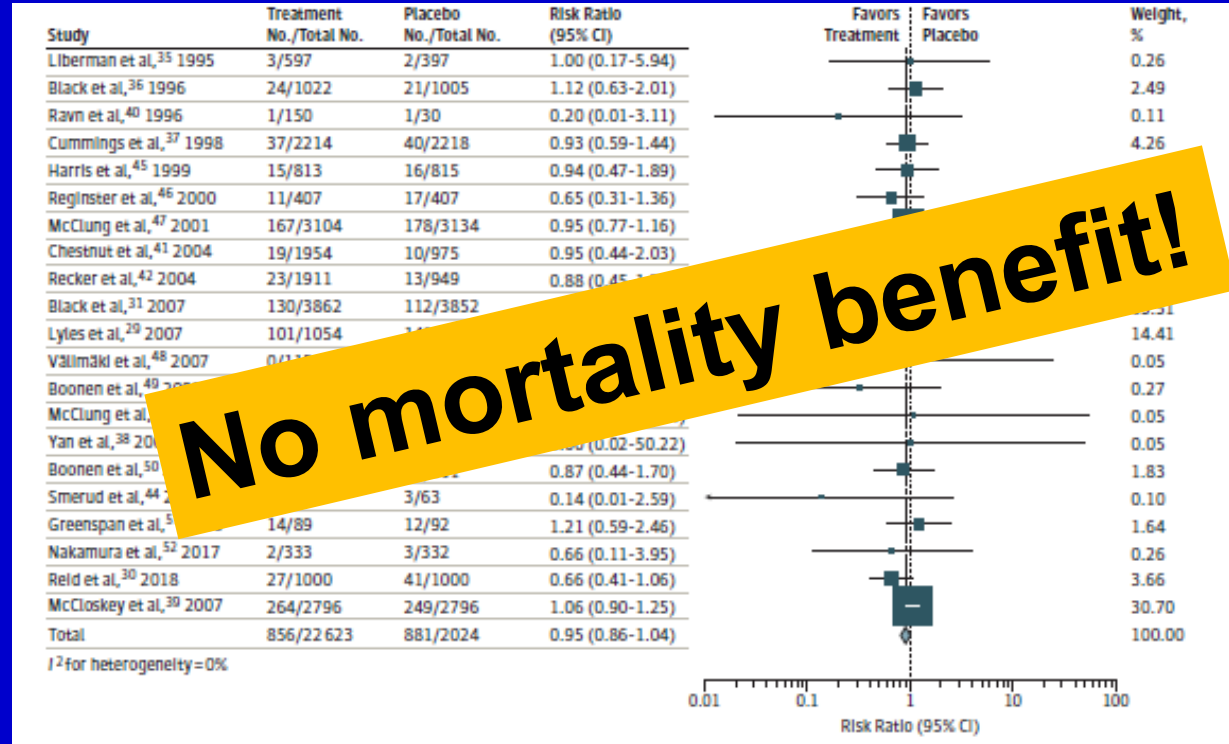
Alendronate
59 fractures/498 pts

The bottom line

Drug	Prevention dose	Treatment dose	Cost
Alendronate (Fosamax)	35mg/wk.	70 mg/wk.	\$13.30
Ibandronate (Boniva)		150 mg/mo.	\$111.00
Residronate (Actonel)	150 mg/mo.	150 mg/mo.	\$149.90
Zoledronic acid (Reclast)	5 mg/2 yrs.	5 mg/yr.	\$267.50
Denosumab (Prolia)		60 mcg/6 mos.	\$1219.10
Romoszumab (Evenity)		210 mcg/mo.	\$1825.00
Teriparatide (Forteo)		20ug/d.	\$3426.50

Do bisphosphonates save lives?

(Meta-analysis; N=101,642; 27 RCTs)



“...drug treatments for osteoporosis and treatments with bisphosphonates in particular, are not associated with reduced overall mortality rates in addition to decreased fracture rates...”

Key points

1. Always address fall risks and offer advice: PT, a cane, hand holds...
2. Ensure adequate calcium, 500 mg per day.
3. Ensure adequate vitamin D, over 20
4. Bisphosphonates work, 5 years.
5. More advanced therapies (PTH derivatives, biologics) work but the data is sparse and there may be unintended side effects (rebound fractures).

Next steps

1. Ensure adequate calcium, 500 mg per day.
2. Ensure adequate vitamin D over 20
3. Consider a PT referral
4. Use bisphosphonates:
 - Osteoporosis
 - Severe osteopenia
 - Concurrent to extended steroids
 - After a fracture

Thank you

- Questions?