

# Reducing Fracture Risk in the Very Elderly

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# Disclosures

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I am disclosing financial relationships as follows:

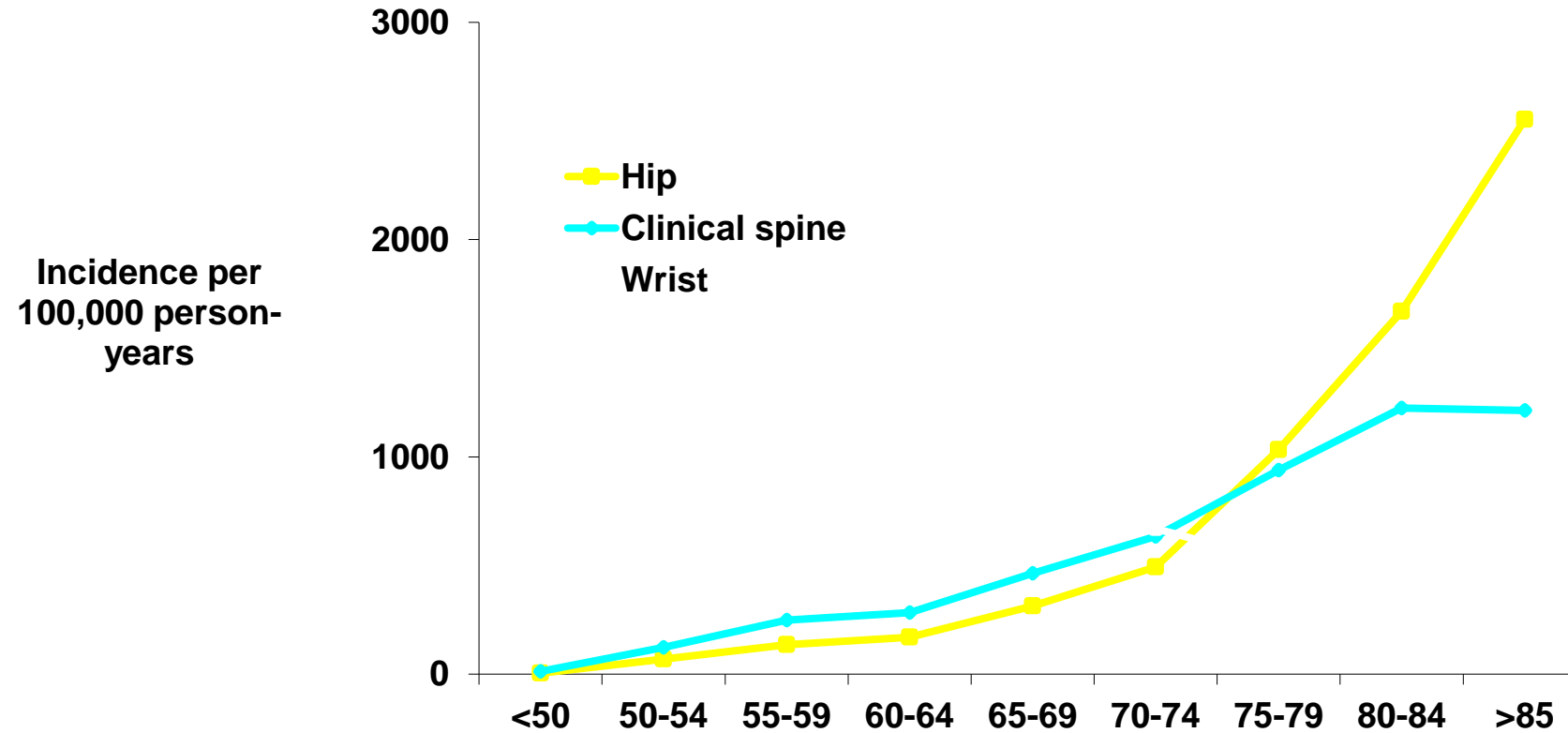
Scientific Advisory Boards: Amgen

Honorarium for speaking: Amgen, Radius

Michael McClung, MD

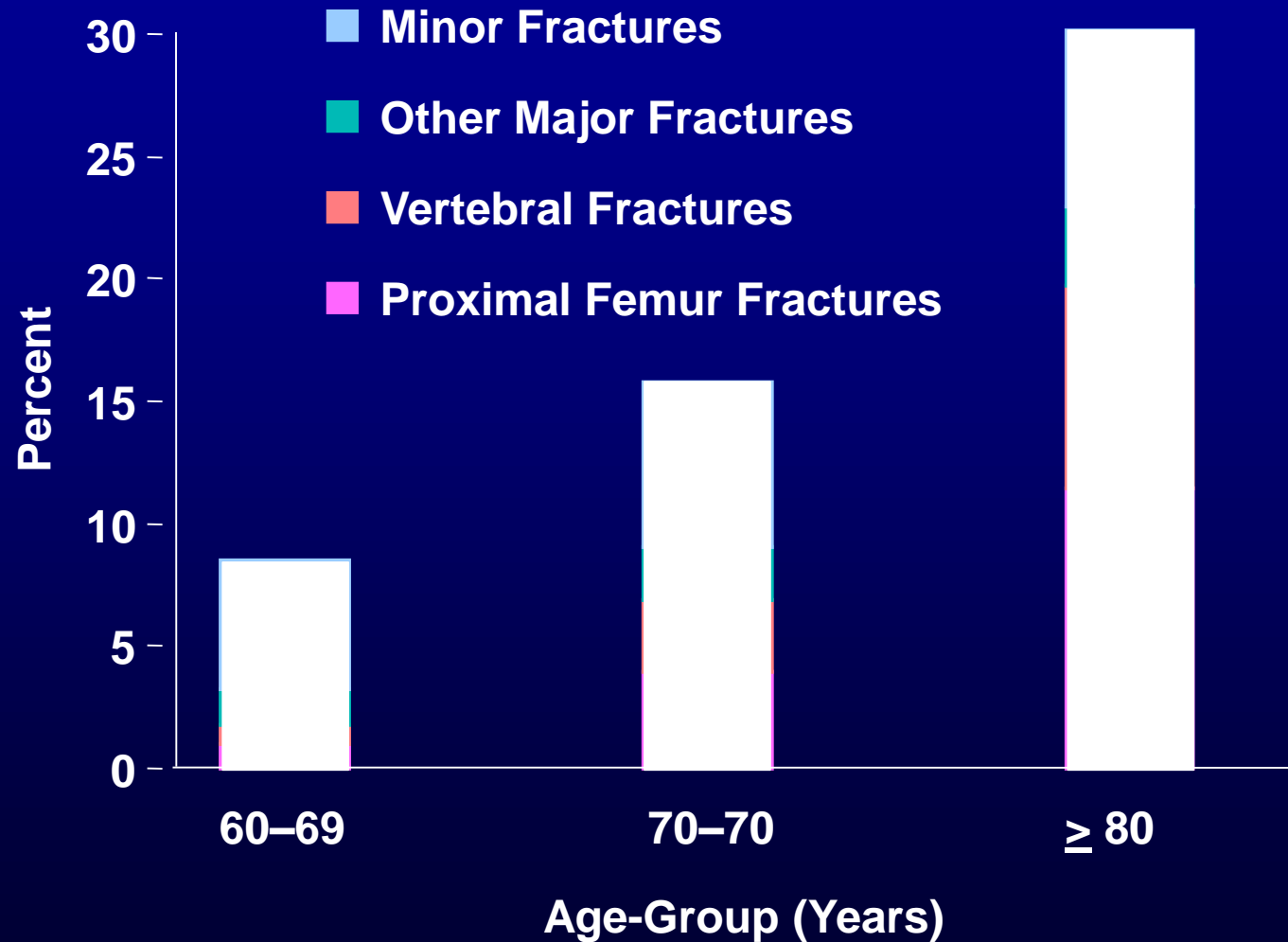
2019

# Fracture Risk and Age



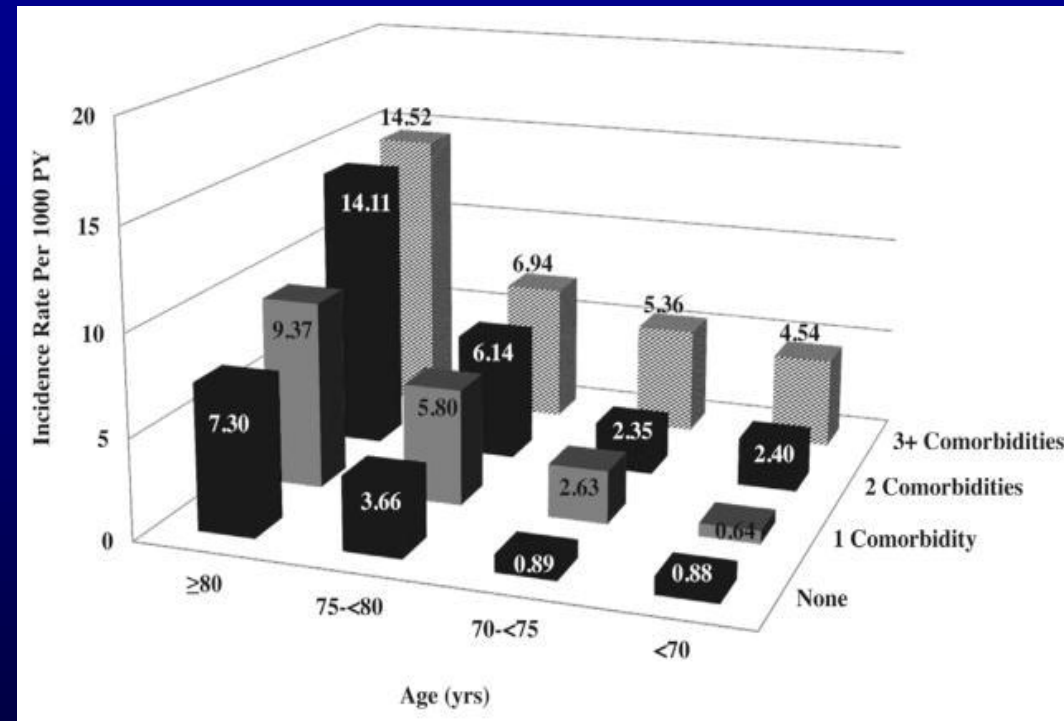
# Fractures by Age

Dubbo Osteoporosis Epidemiology Study, 1989–1994



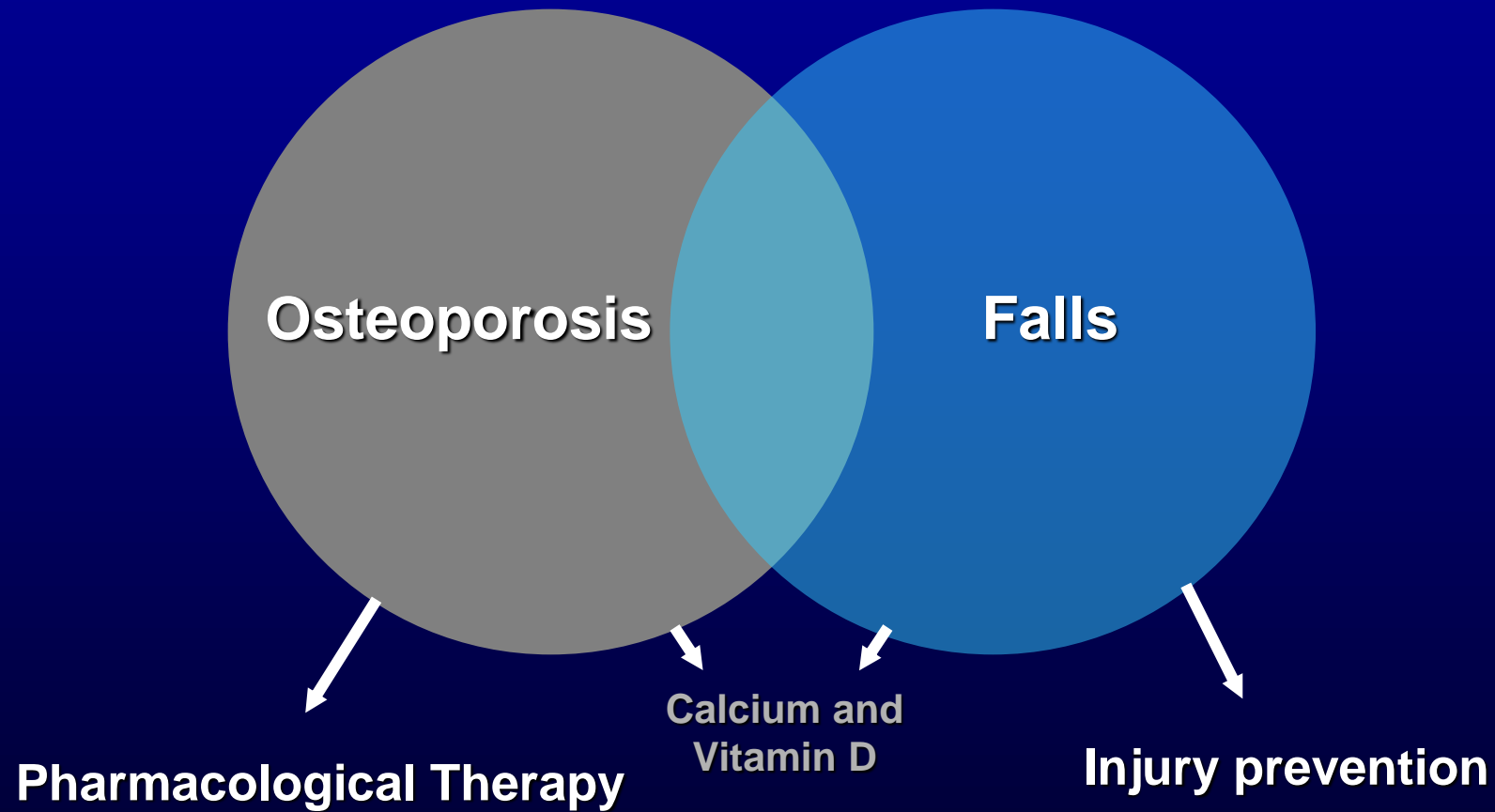
# Risk Factors for Fracture in Elderly Men

Advanced age  
Low BMD  
Prior fracture  
Risk of falls  
Co-morbidities



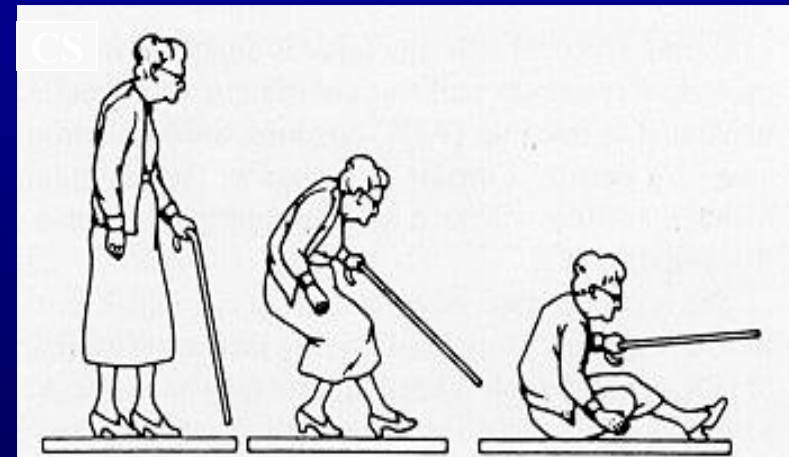
# Strategies for Reducing Hip Fracture Risk

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# Falls and Fractures

- Almost all hip fractures occur after a fall to the side – not forward or backwards.
- In older men and women, the risk of falling is highest among those with low activity/low performance, but most falls (57-64%) and relatively high fall rates (3.0-4.35/year) occurred in the other groups (low activity/high performance, high activity/high performance and high activity/low performance; 70% were in these groups).



# Reducing Fall Risk

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- **Exercise for strength and balance**
  - **Vision correction**
  - **Good nutrition**
    - **Calcium and vitamin D**
      - **correcting vitamin D deficiency improves muscle strength and reduces fall risk**
      - **no evidence that elderly require more vitamin D or calcium than younger people**
      - **but larger doses of vitamin D often given to elderly to ensure adequate intake**
    - **Adequate protein**



# Protein Requirements for Elderly Patients

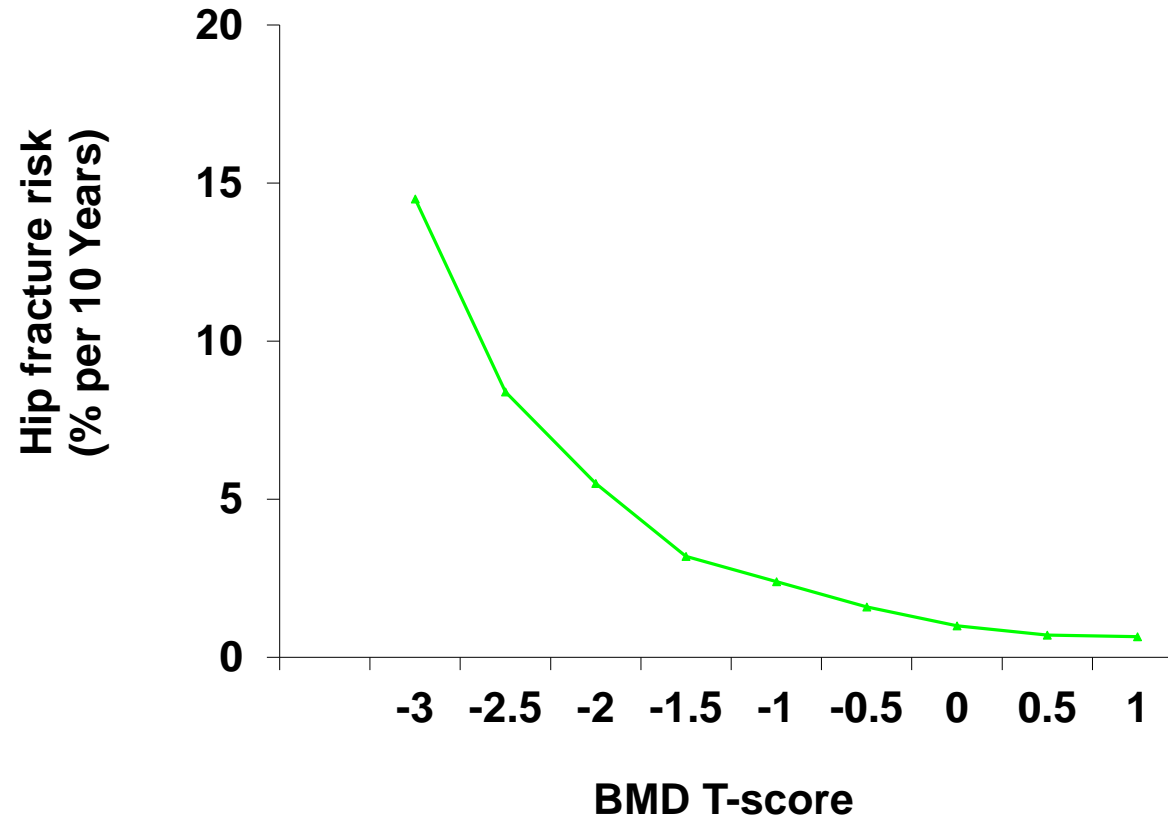
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- Older persons require more protein than their younger peers in order to maintain and build up muscle.
- Between 1.0 and 1.2 g protein per kilogram body weight should be consumed daily.
- The anabolic threshold for the daily protein and amino acid intake is higher in older than in younger adults, and should be set at approximately 25 to 30 g per meal, containing 2.5 to 2.8 g leucine.
- The source of protein and the amount of protein should be considered in all meals based on these recommendations for optimal protein intake.

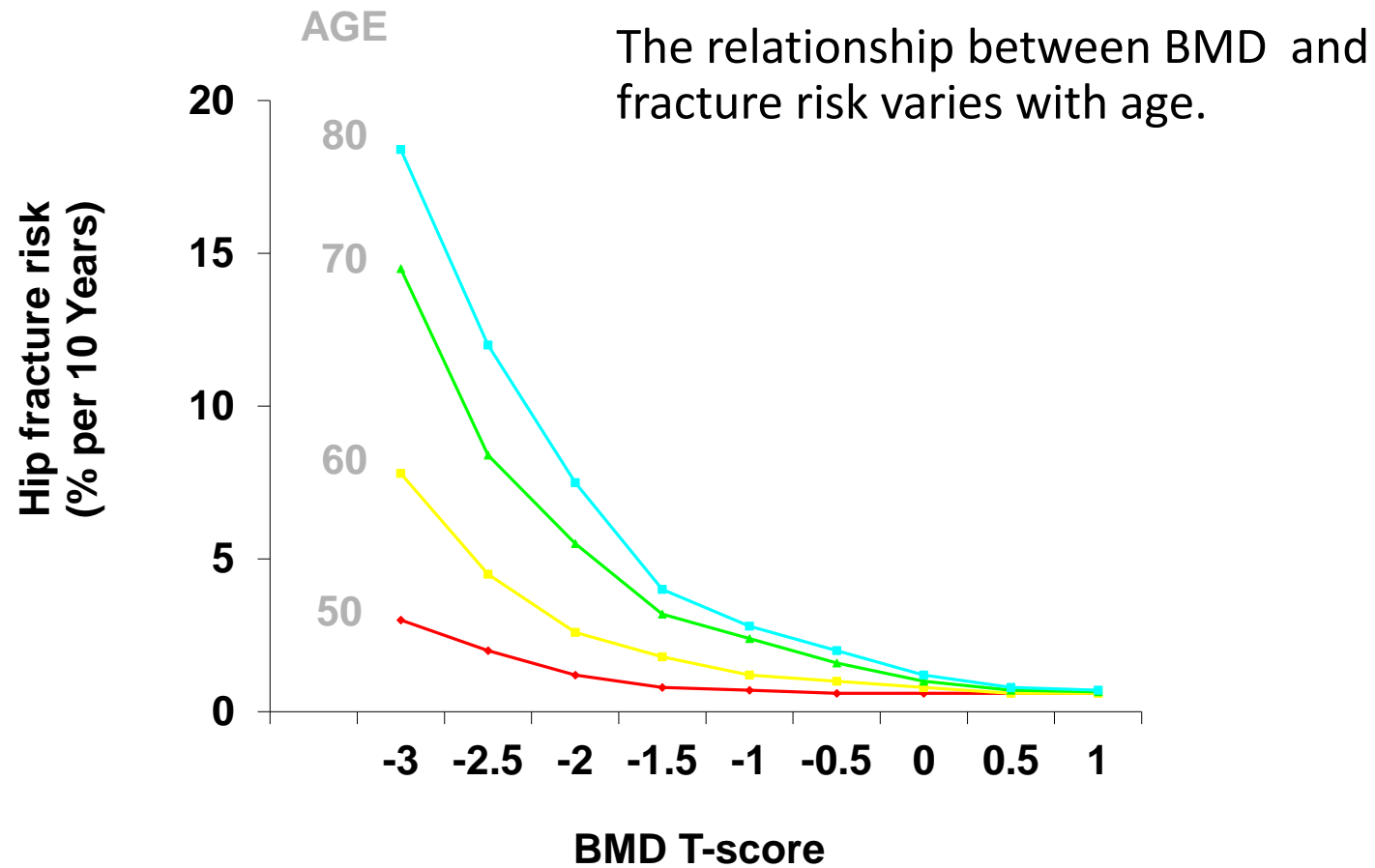
Bauer JM, Diekmann R. Protein and older persons. *Clin Geriatr Med* 2015;31:327-38

# BMD, Age and Hip Fracture Risk

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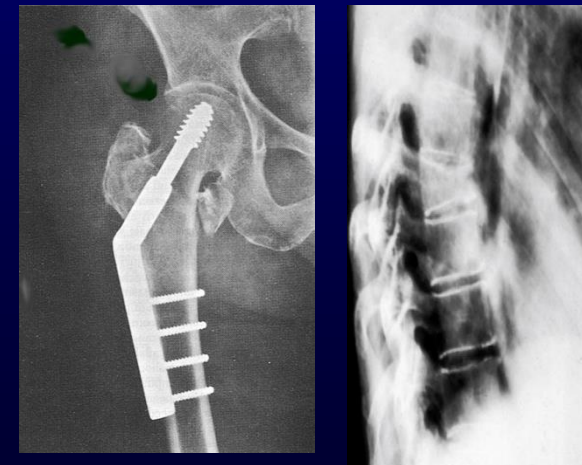
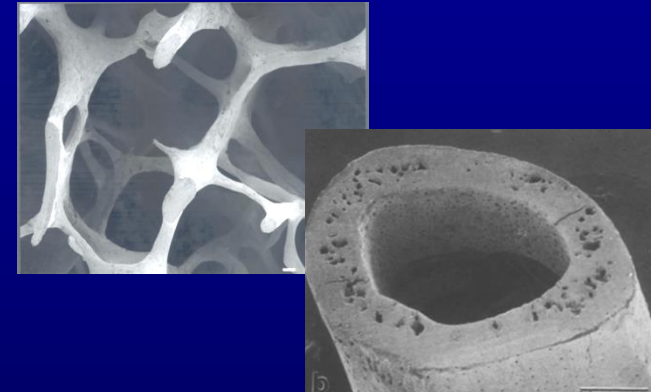


# BMD, Age and Hip Fracture Risk

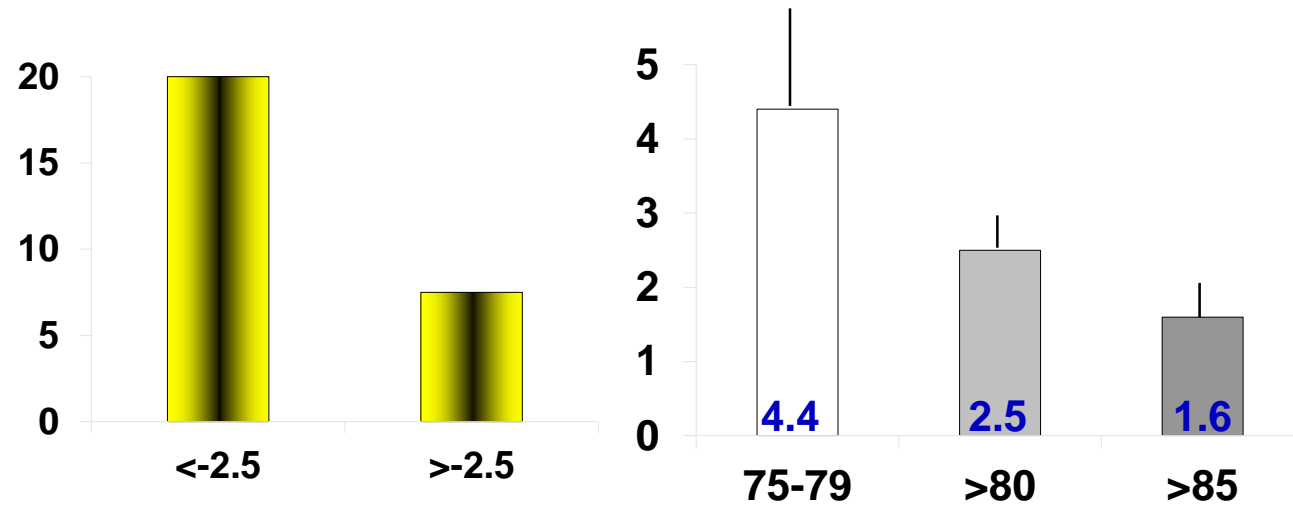


# Osteoporosis in the Very Elderly

1. Very elderly have most severe deficits in trabecular and cortical bone structure and strength
2. Fracture risk increases exponentially with advancing age
3. Consequences of fractures are most serious in the very elderly
4. There are questions about effectiveness of osteoporosis treatments in the very elderly
5. Many older patients have impaired renal function which may limit usefulness of bisphosphonates

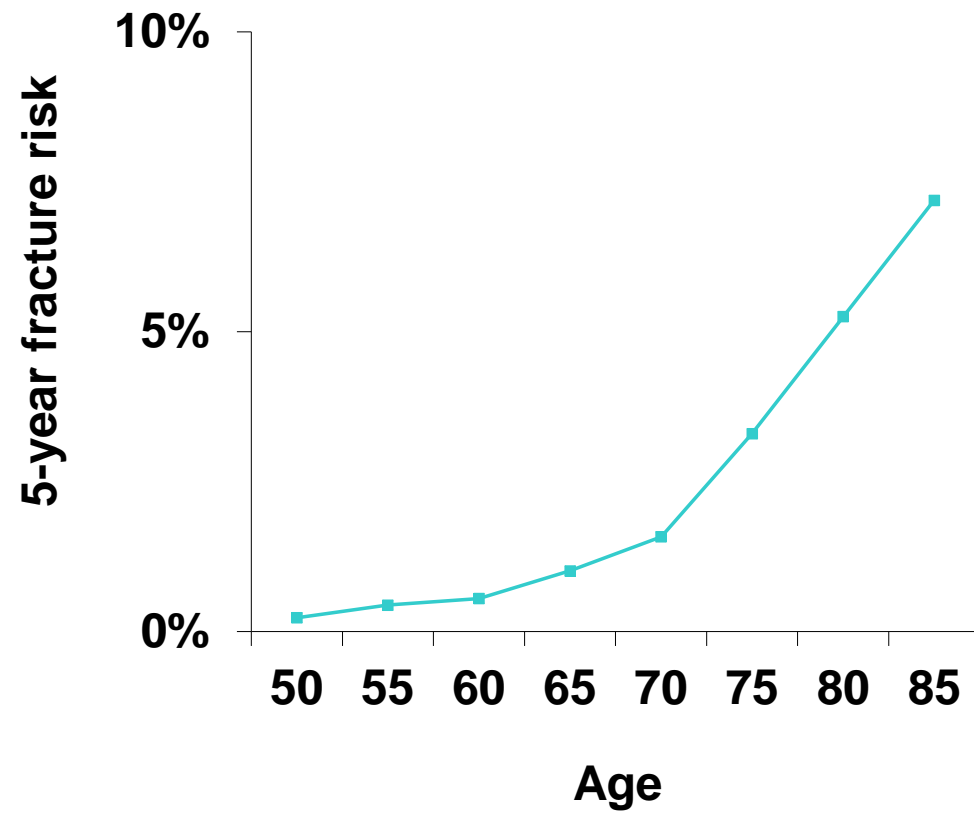


# BMD and Hip Fracture Risk in Elderly Women

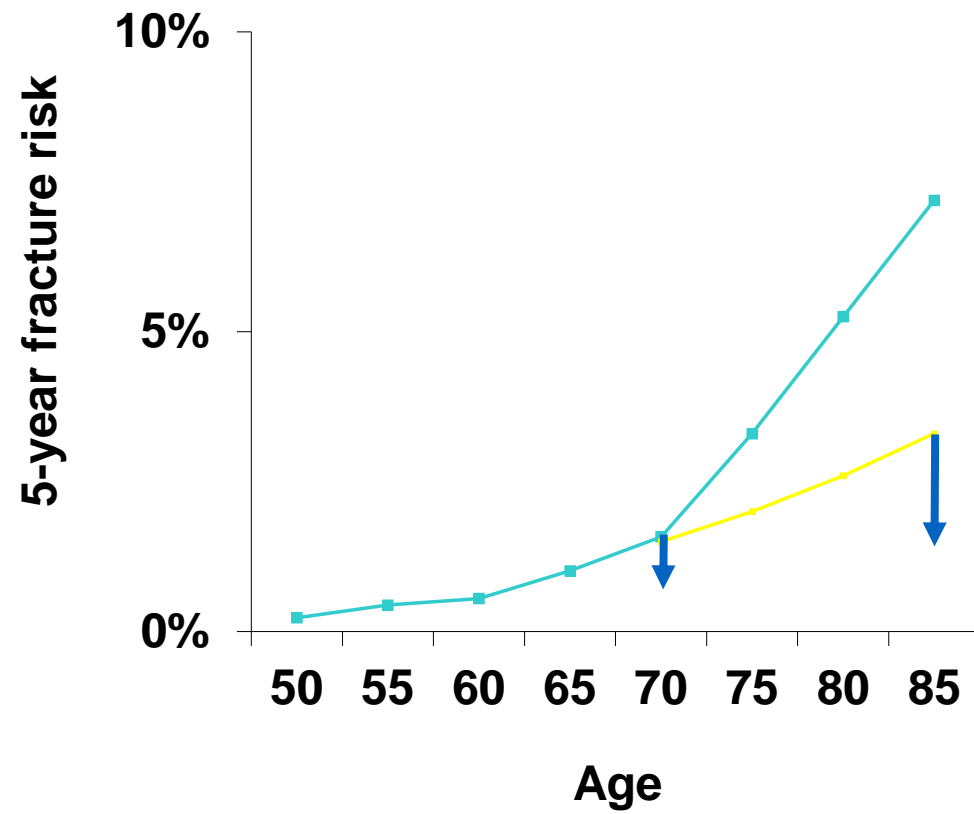


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# Age and Hip Fracture Risk



# Age and Hip Fracture Risk



# BMD and Fracture Risk in the Elderly

## Conclusions:

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# Strategies to Reduce Fracture Risk

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- **General measures**
  - **Exercise**
  - **Vision correction**
  - **Good nutrition**
    - **Calcium and vitamin D**
    - **Adequate protein**

# Therapy to Reduce Hip Fracture Risk

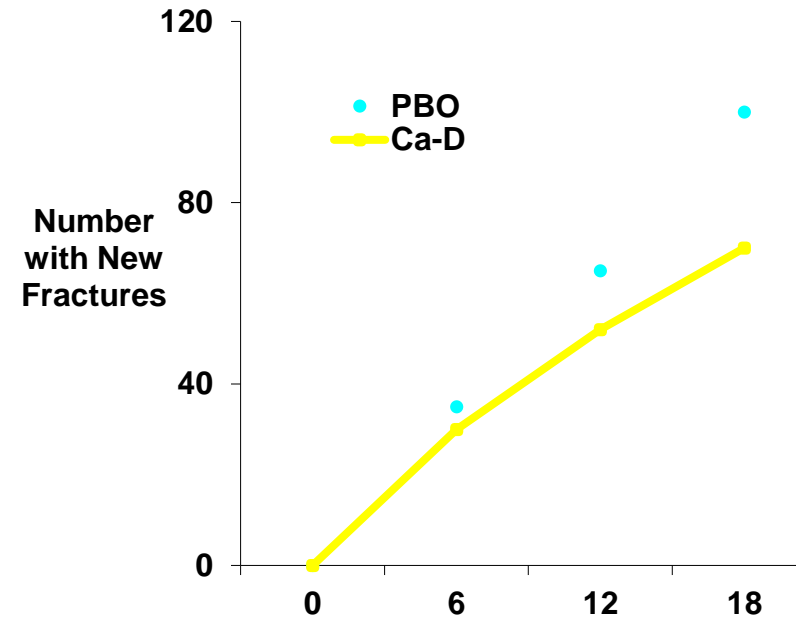
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## Calcium and vitamin D

- older adults are increasingly dependent upon adequate calcium and vitamin D intake
- vitamin D deficiency is very common among elderly, especially in those with hip fracture
- vitamin D deficiency is associated with muscle weakness and increased fall risk and well as accelerated bone loss

# Calcium and Vitamin D

3270 mobile elderly women (mean age 84±6 years) living in nursing homes were randomly assigned to receive 1200 mg calcium daily in the form of tricalcium phosphate plus vitamin D3 800 IU daily or double placebo



# Osteoporosis: Calcium and Vitamin D

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- USA Institute of Medicine
  - Calcium intake: 1200 mg total intake daily
  - Vitamin D: Recommended intake: 800 IU daily
    - For vitamin D, RDAs of 600 IU/d for ages 1–70 yr and 800 IU/d for ages 71 yr and older, corresponding to a serum 25-hydroxyvitamin D level of at least 20 ng/ml (50 nmol/liter), meet the requirements of at least 97.5% of the population.

# Strategies to Reduce Fracture Risk

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- General measures
  - Exercise
  - Vision correction
  - Good nutrition
    - Calcium and vitamin D
    - Adequate protein
- Pharmacological therapy for patients at high fracture risk  
*Is this effective?*

# HIP Trial: Inclusion Criteria

## Group 1 Low Bone Density

70-79 years old  
Fem. Neck T-Score  $< -4^{**}$   
or  
Fem. Neck T-Score  $< -3^{**}$   
plus  $\geq 1$  Risk Factor \*

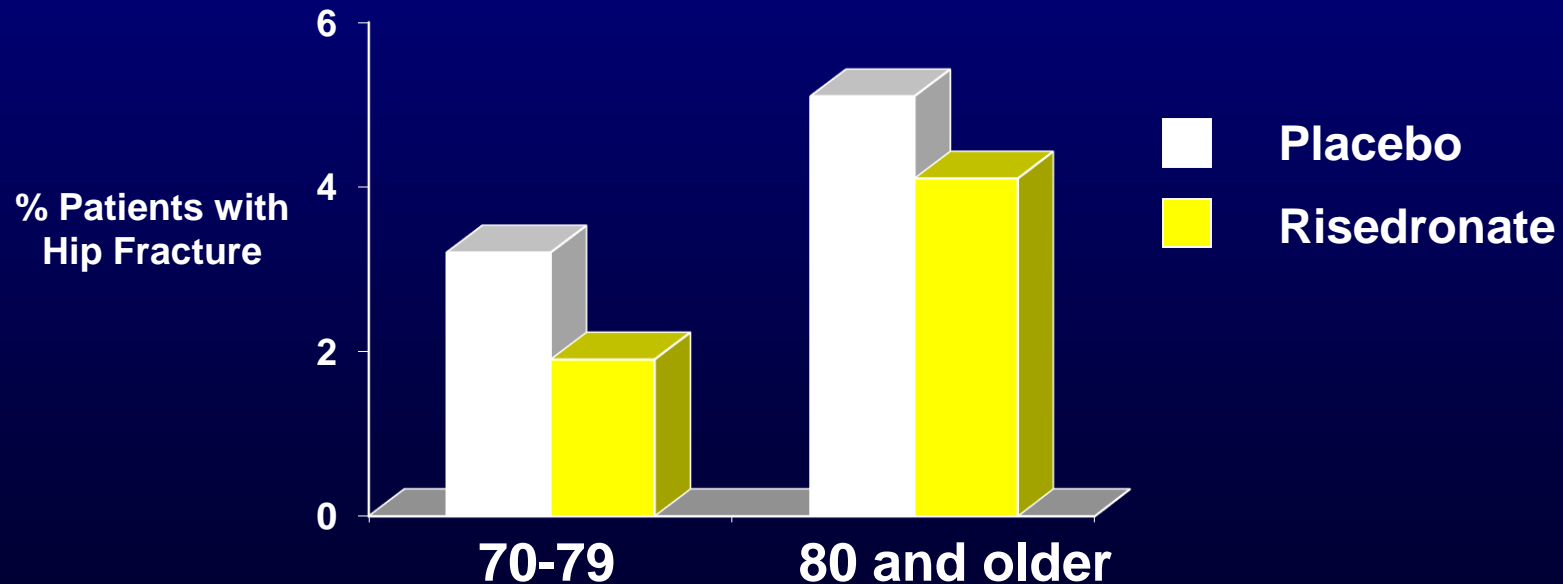
## Group 2 Clinical Risk Factor

$\geq 80$  years old  
no BMD requirement  
 $\geq 1$  Risk Factor \*  
or  
Fem. Neck T-Score  $< -4^{**}$

# Risedronate Therapy and Hip Fractures

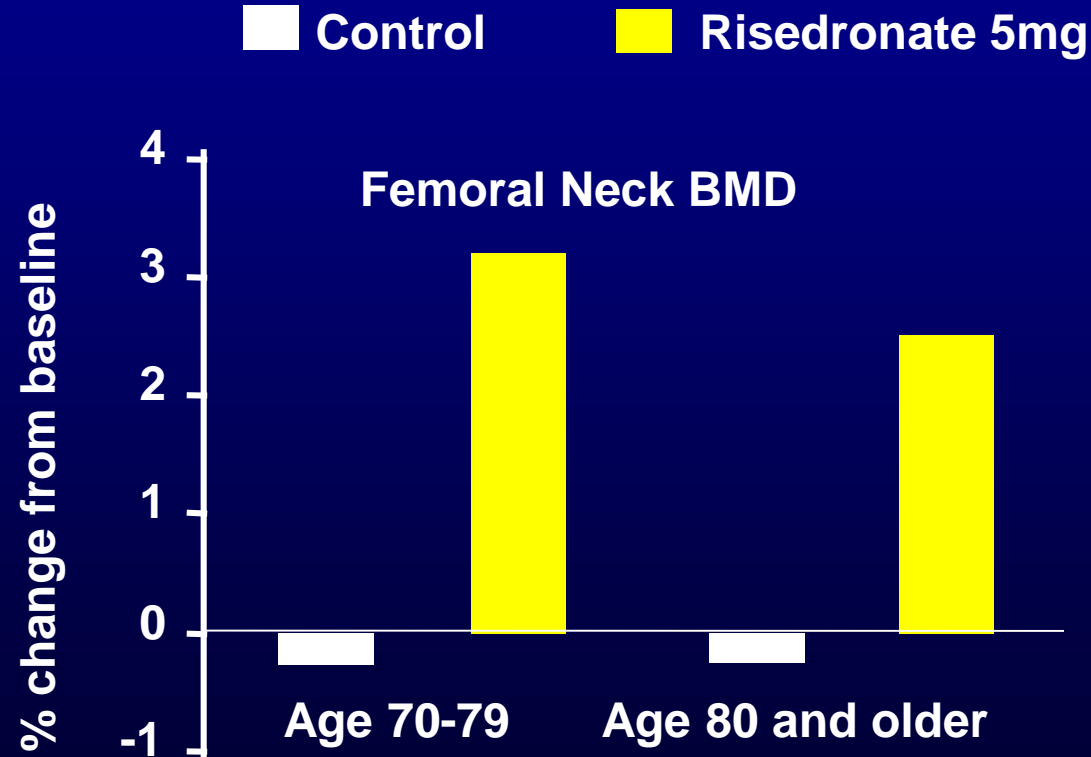
## HIP Study

Patients	Age 70-79 with low BMD	Age $\geq$ 80 with Clinical Risk factors for Hip Fracture
Number	5445	3886
Risk reduction % (CI)	40% (10, 60) $p=0.009$	20% (-20,40) $P = 0.35$



# BMD: 3 Year Results in Hip

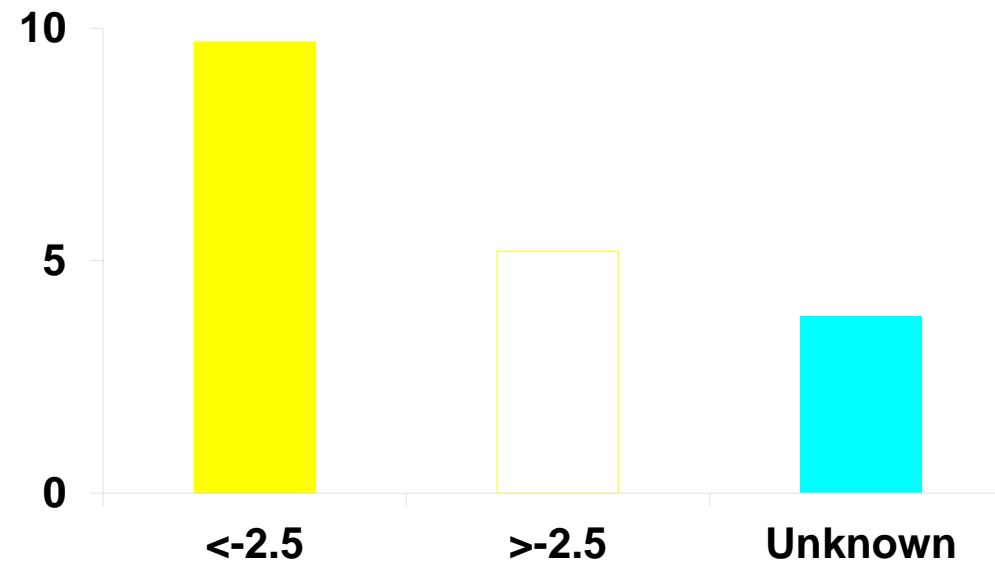
*BMD responses were similar in younger and older patients*





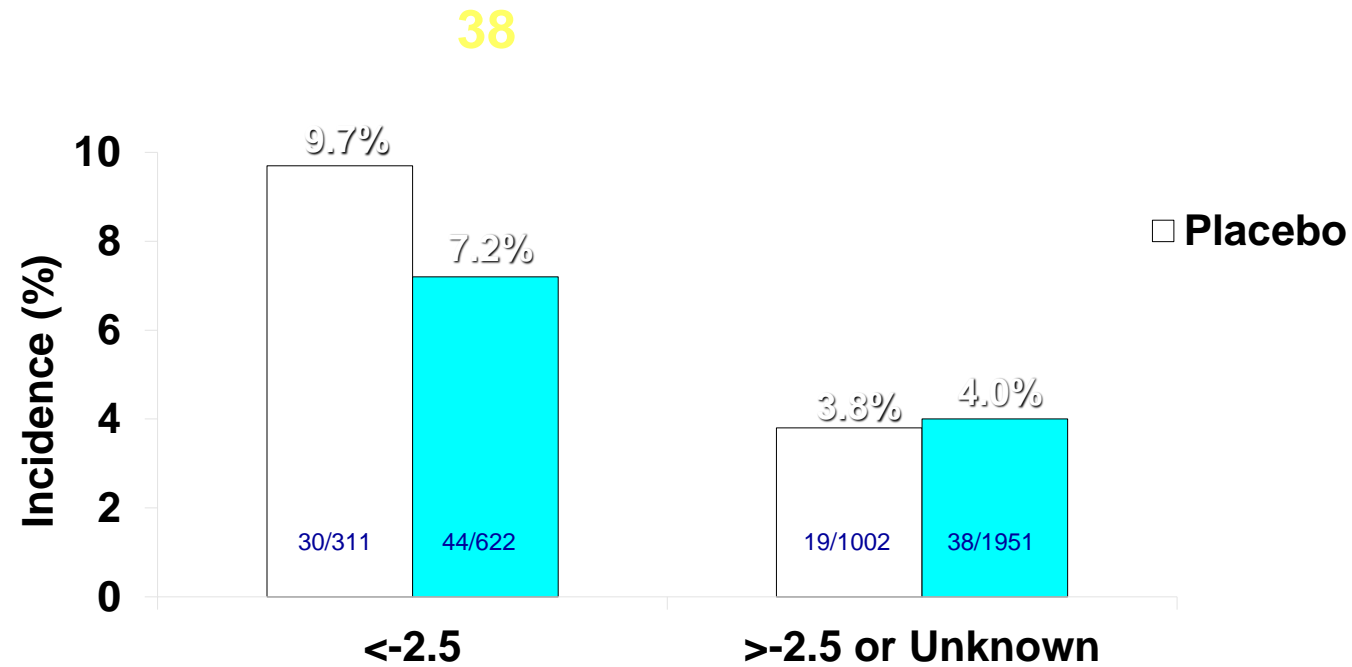
# Osteoporosis Status of Elderly HIP Subjects

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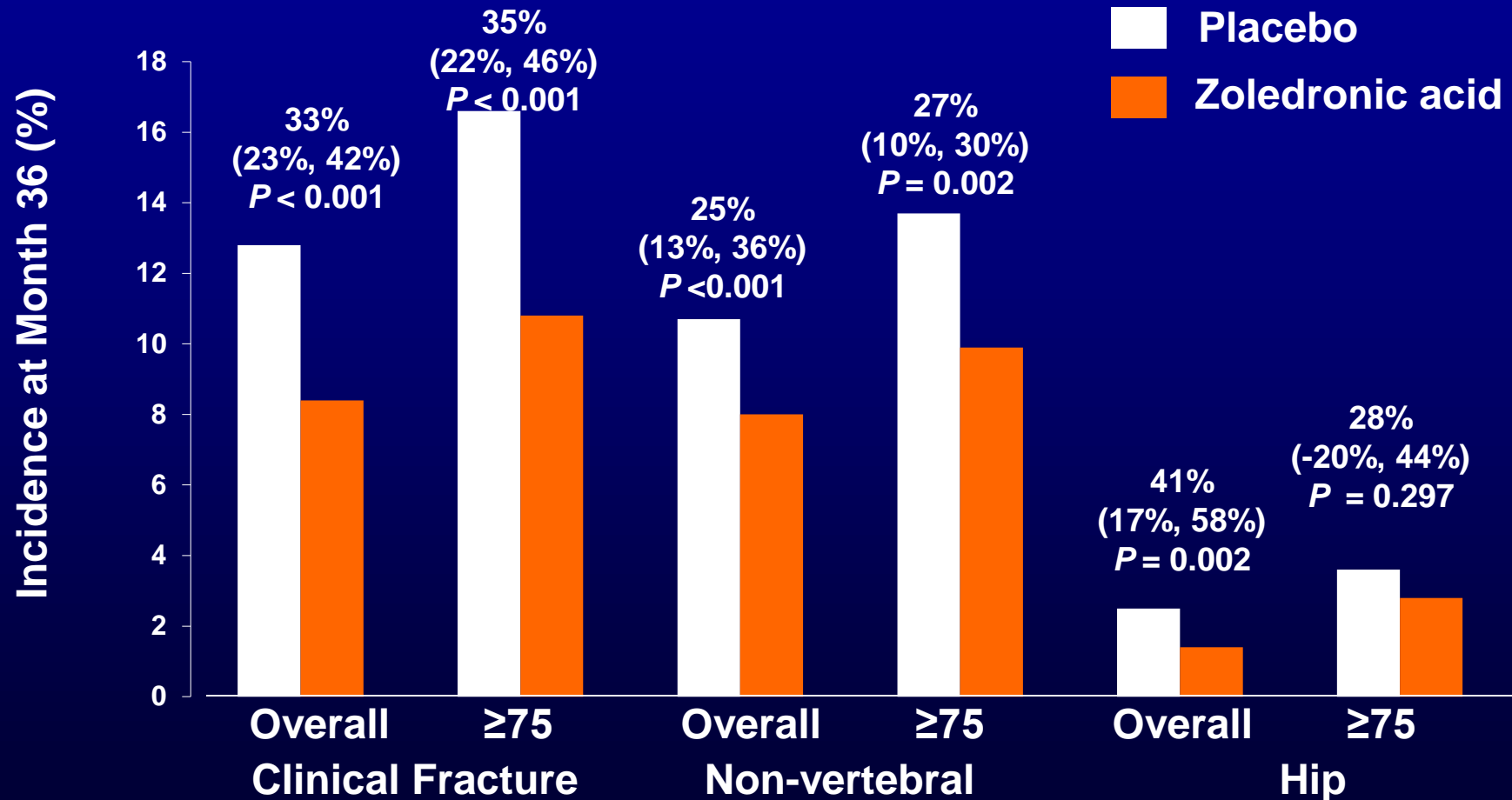
# Risedronate: Group 2 Subgroups

Women ages  $\geq 80$  with  
 $\geq 1$  RF for hip fracture  
**Retrospective analysis**



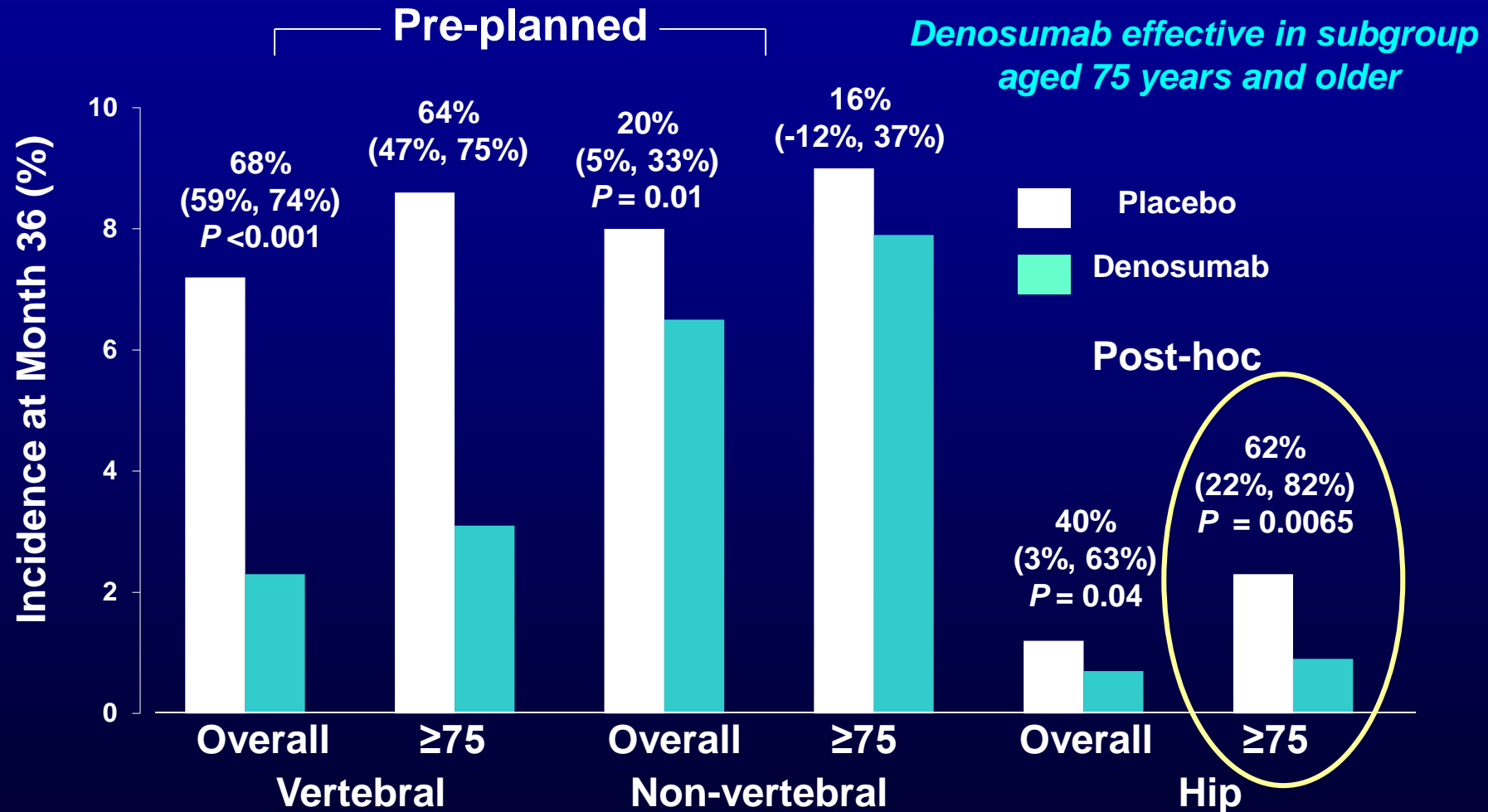
# Zoledronic Acid and Fracture Risk

## Post-hoc Analyses in Patients Age 75 and Older



# Denosumab and Fracture Risk

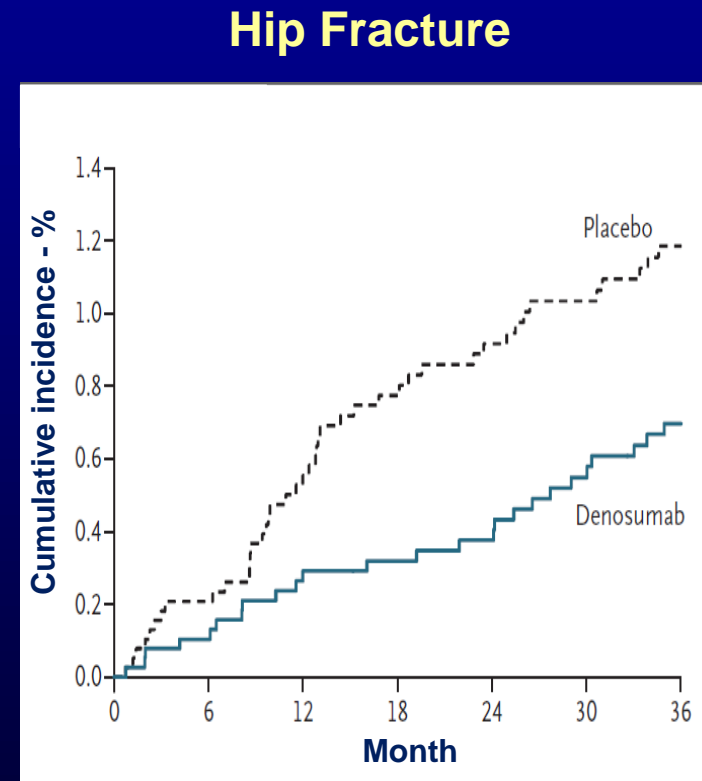
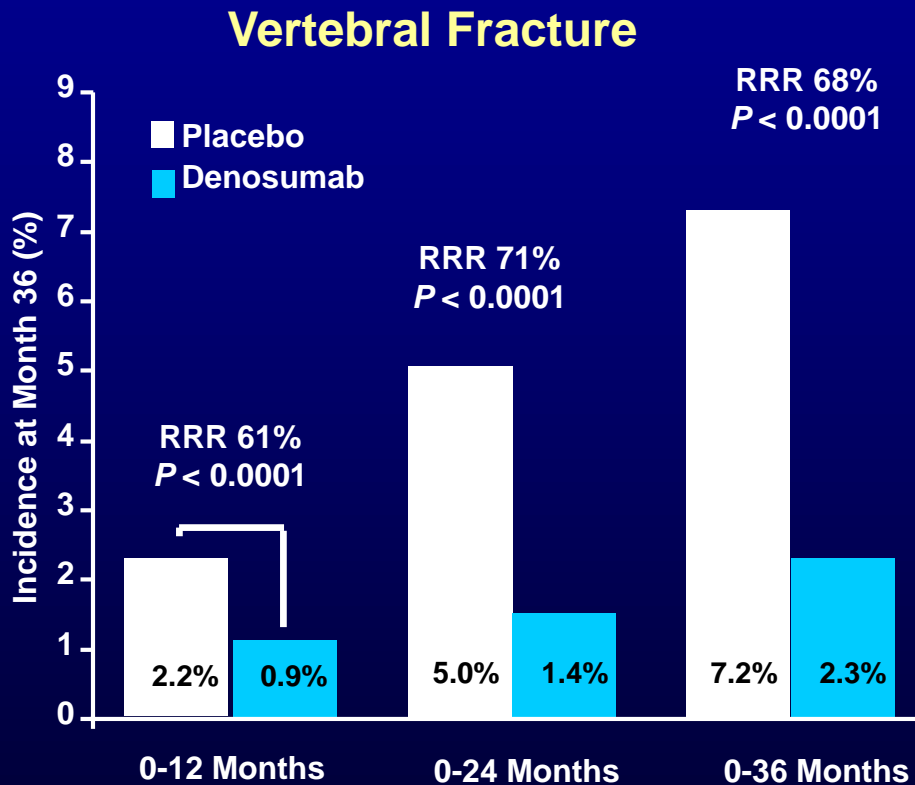
## Analyses in Patients Age 75 and Older



# Denosumab FREEDOM Study

## Incidence of Vertebral and Hip Fracture

Effect of fracture protection seen with in first 12 months of therapy



# Teriparatide and Abaloparatide in the Elderly

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- Subgroup analyses suggest that the effectiveness of teriparatide and abaloparatide on BMD or fracture risk is not affected by age

Boonen S et al. J Am Geriatr Soc 2006;54:782-9  
Marcus R et al. J Bone Miner Res 2003;18:18-23  
McClung MR et al. Menopause 2018;25:767-71

# Osteoporosis Treatment Among Nursing Home Residents

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- Among 96,408 women with osteoporosis in a Medicare database, with osteoporosis, prevalence of evidence-based medication use was 42.3% in 2006 and dropped slightly to 40.4% in 2008.
- Long-term care residents were significantly less likely to use any osteoporosis medication compared with community dwellers (40.6% vs. 53.1%).
- Bisphosphonates were the top choice among medication users, but were prescribed much less often to long-term care residents (RR = 0.79, 95% CI 0.75-0.83) compared with community residents

# Osteoporosis Treatment Among Nursing Home Residents

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- Retrospective cohort analysis of nursing home residents in the Omnicare Senior Health Outcomes (OSHO) data repository during the time period of October 1, 2011, to September 30, 2012.
- A total of 23,666 (13.5%) had a coded diagnosis of osteoporosis
  - mean age was 82.5 years
  - 85.1% were female
  - 89% met criteria for “high risk” based on age and history of falls or fracture
  - 10.8% had hip fracture, and 15.8% had other fracture.
- Only ~1/3 of patients with osteoporosis received active treatment
- Treatment rates were similar between those with (31.7%) and without (32.0%) a hip fracture



# Reducing Fracture Risk in the Oldest Old

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- Fracture risk is high among very elderly patients
- General measures and fall prevention are important
- There is strong evidence that treatment with bisphosphonates or denosumab is effective in these patients
- Few older patients receive osteoporosis therapy
- In ambulatory, functional elderly patients at high fracture risk with life expectancy of > 6 months, pharmacological therapy to reduce fracture risk should be a ***very high priority***

McClung M. Personal opinion 2019

# Thank you

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