

Breaking down osteoporosis: reducing fracture risk

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September 17, 2025

Land acknowledgment

I acknowledge that where I live and work is located on the territory of Indigenous and Métis people. I respect the sovereignty, lands, histories, languages, culture, and knowledge systems of all First Nations, Métis, and Inuit nations.

Learning outcomes

1. What is osteoporosis?
2. Why does it matter?
3. What are some causes of osteoporosis?
4. How do we diagnose osteoporosis?
5. How do we prevent / treat osteoporosis?

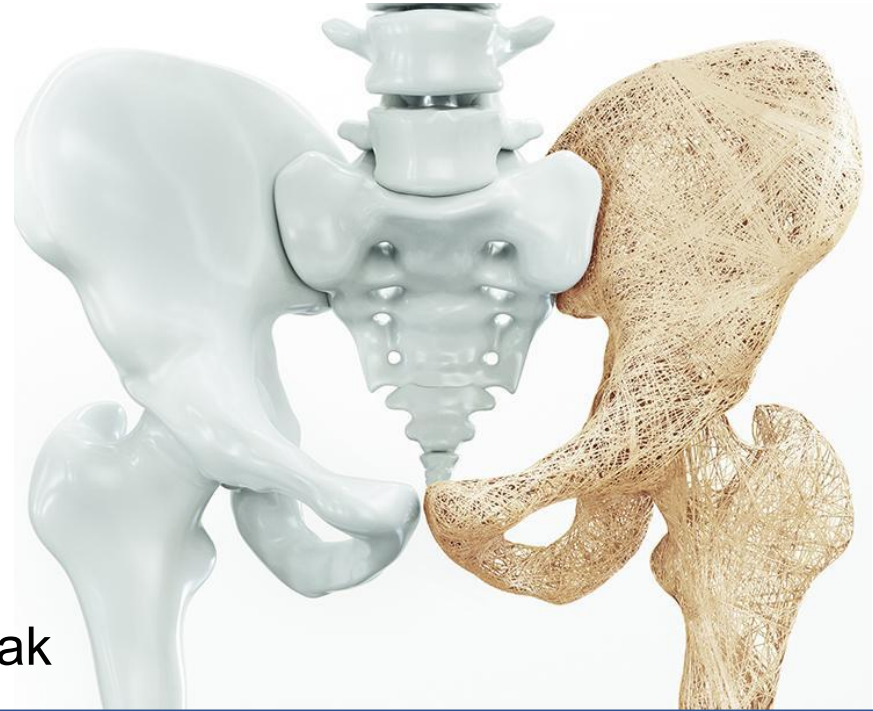
Please feel free to interrupt and ask any questions as they come up

What is osteoporosis?

osteoporosis

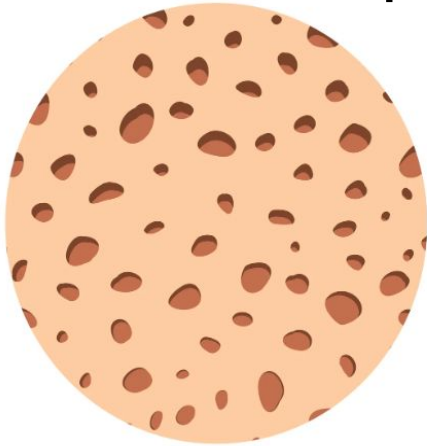
osteo- 'bone'
poros 'pore'
-osis 'condition of'

More practically, it translates to weak bones that are more likely to break

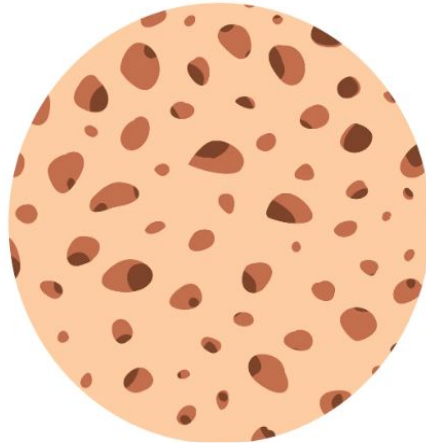


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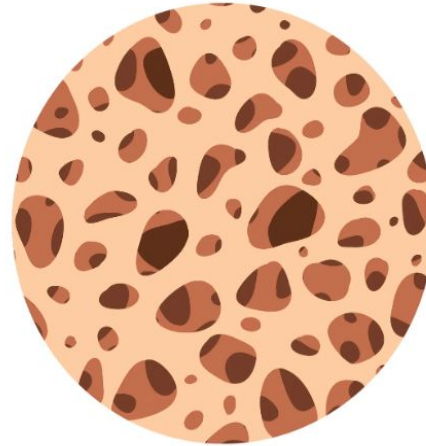
Osteoporosis exists on a spectrum



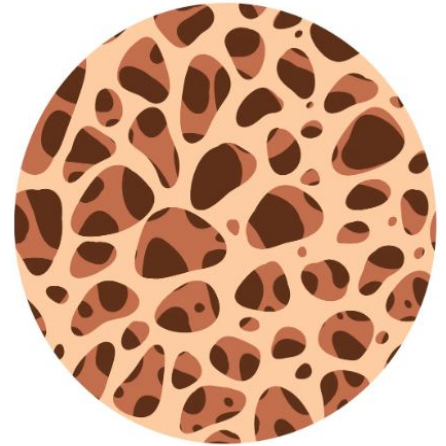
NORMAL BONE



Low bone mass

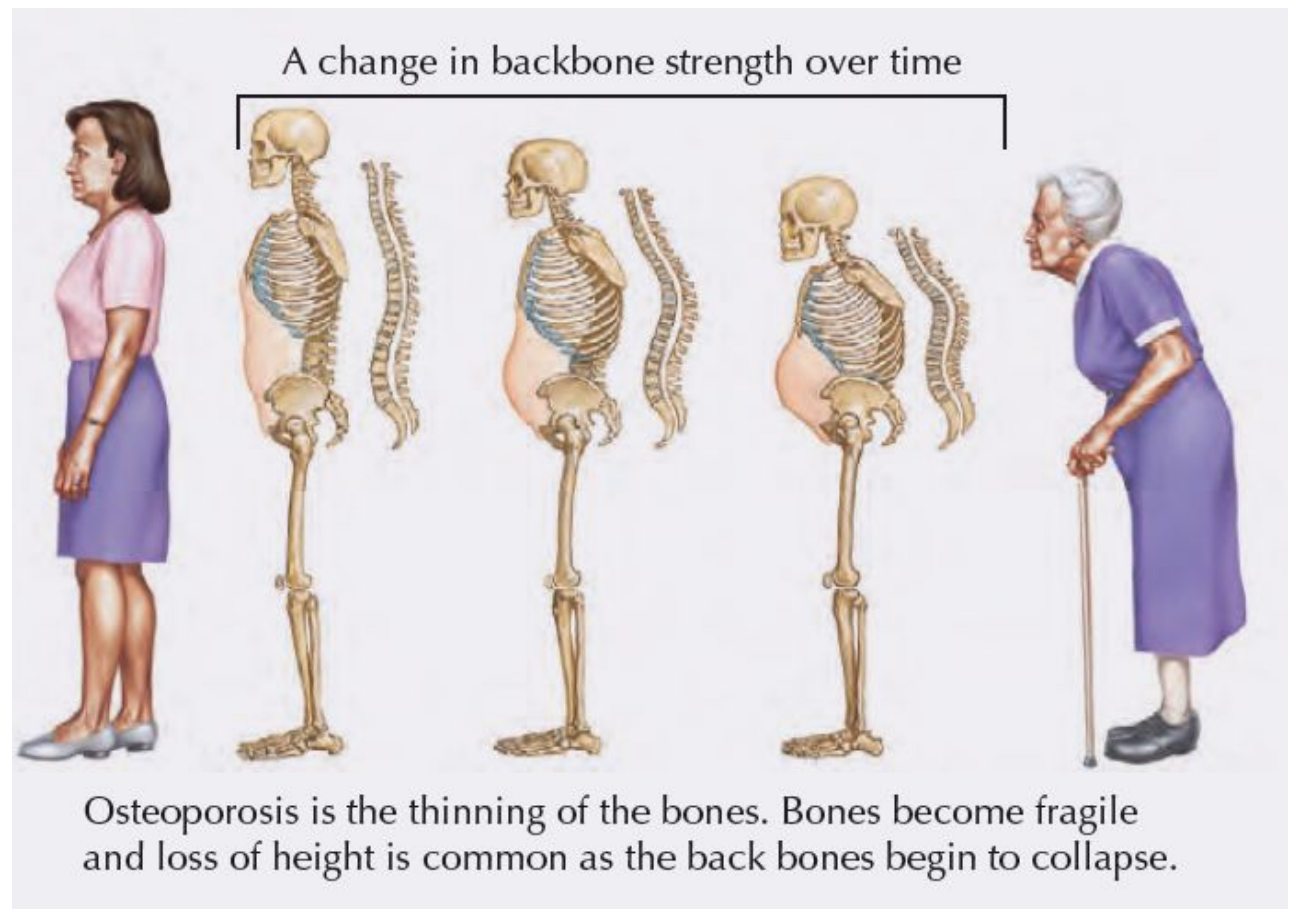
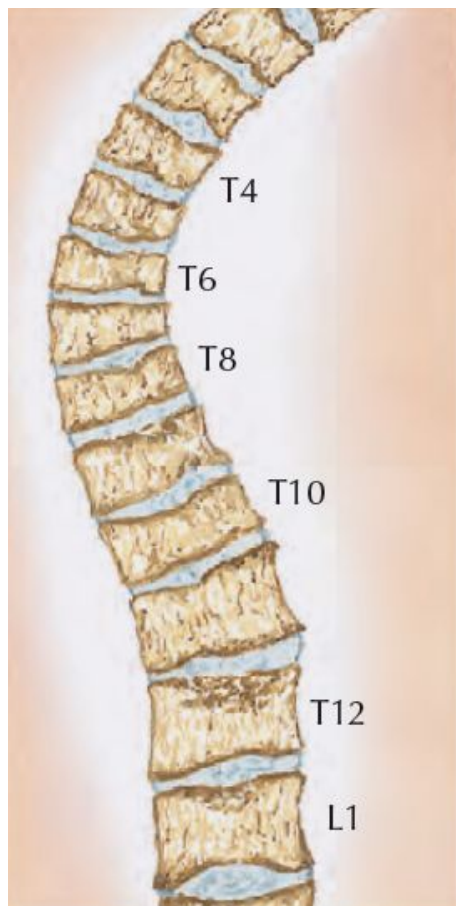


OSTEOPOROSIS



SEVERE OSTEOPOROSIS



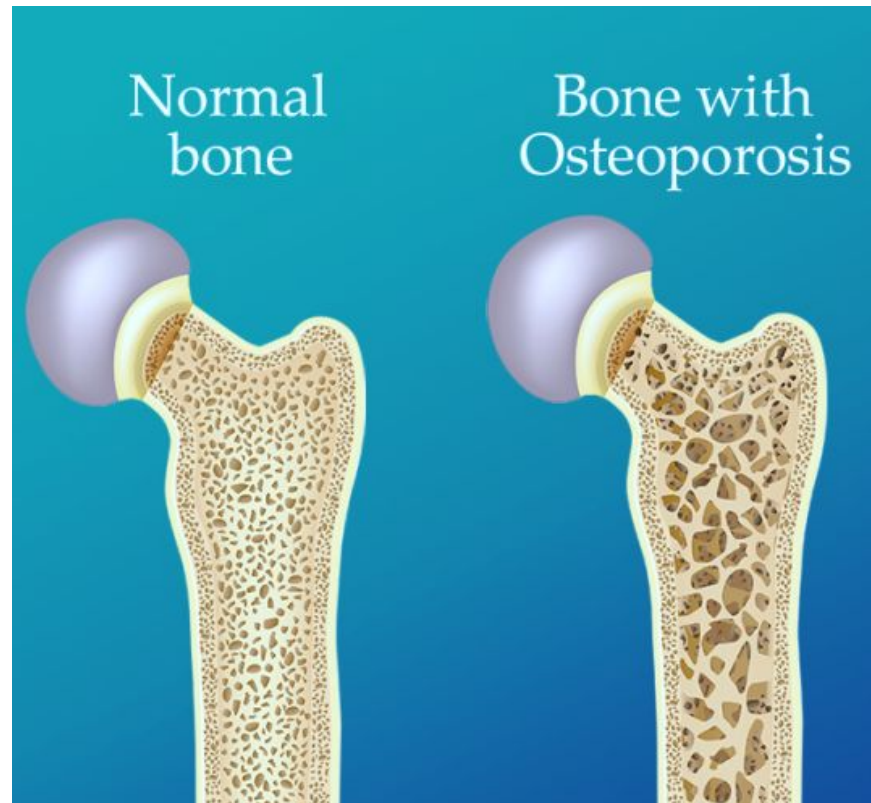
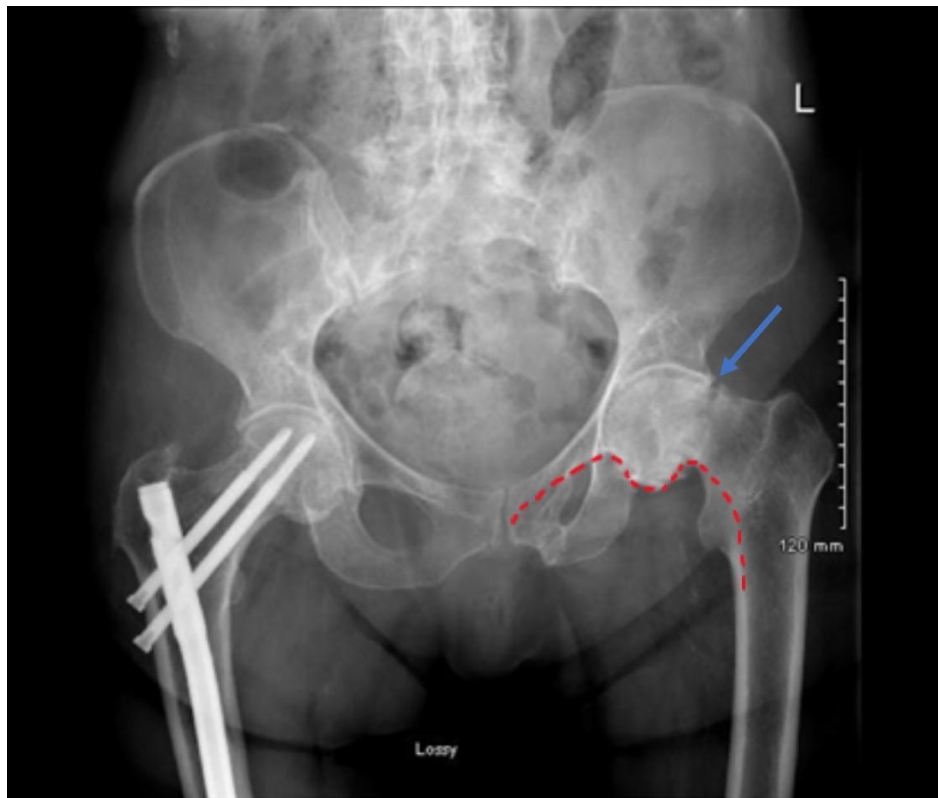




Vertebral compression fractures



Hip fractures



But isn't it normal for bones to weaken with age?

Most people think that bone does not change



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But bone is living!



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Why does osteoporosis matter?

The dark side of osteoporosis

Prevalence:

- 2 million in Canada
- 1 in 5 women >50 years
- 1 in 20 men >50 years

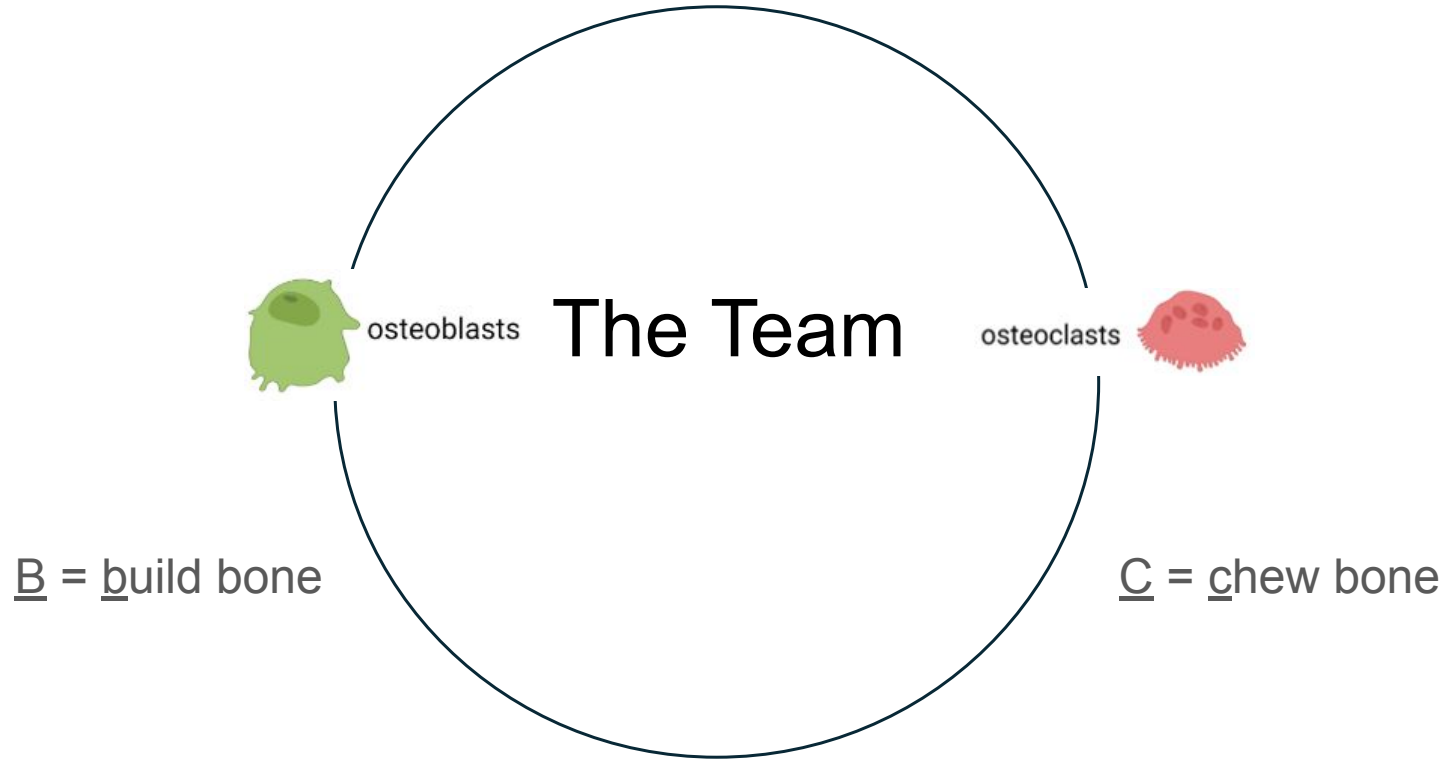
Hip fractures carry a high mortality rate and lead to loss of independence

“Fracture cascades”

After an osteoporosis-related fracture, you are 5x likely to suffer another fracture within 1 yr



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It's not that osteoblasts are “good guys” and
osteoclasts are “bad guys”



It's good to have balance

It's not that osteoblasts are “good guys” and
osteoclasts are “bad guys”

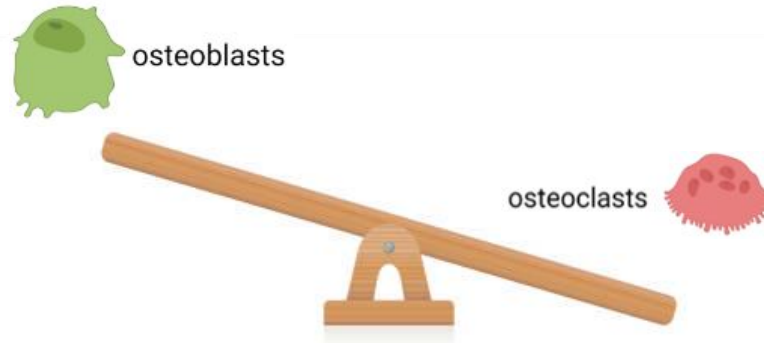


osteoblasts

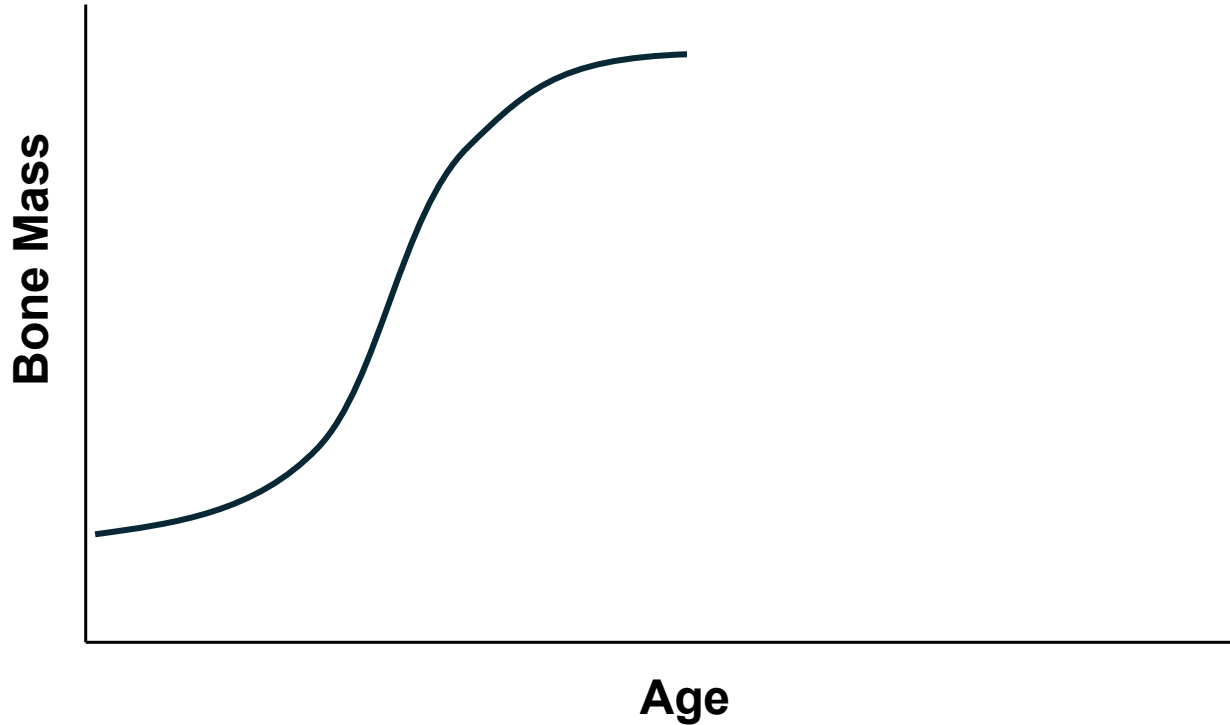
osteoclasts



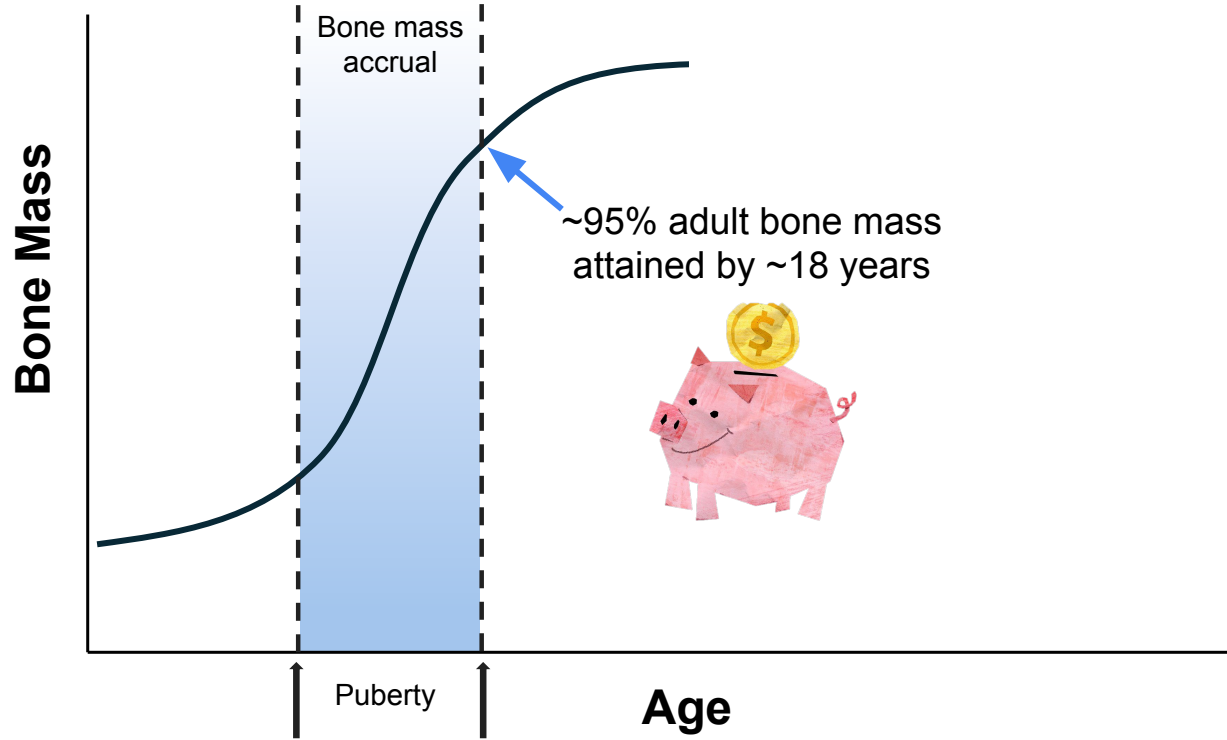
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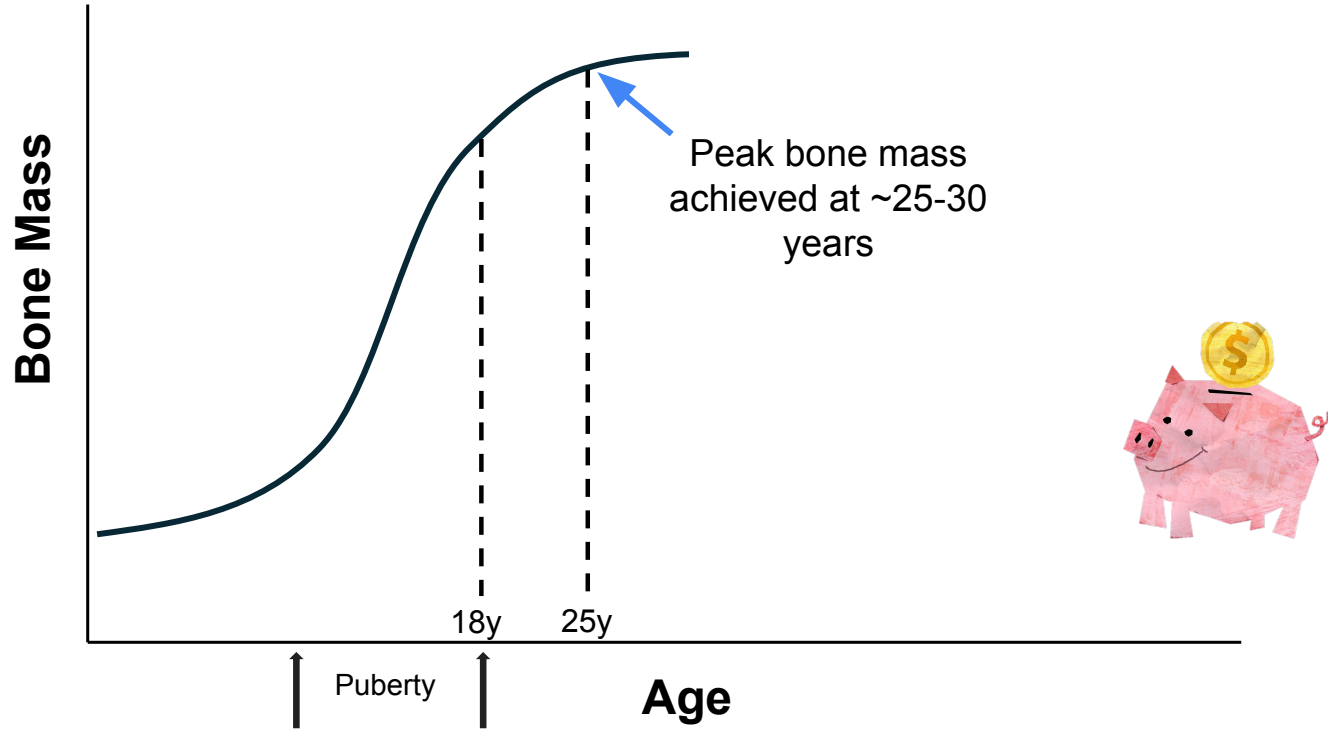
Bone Mass Acquisition over a Lifetime



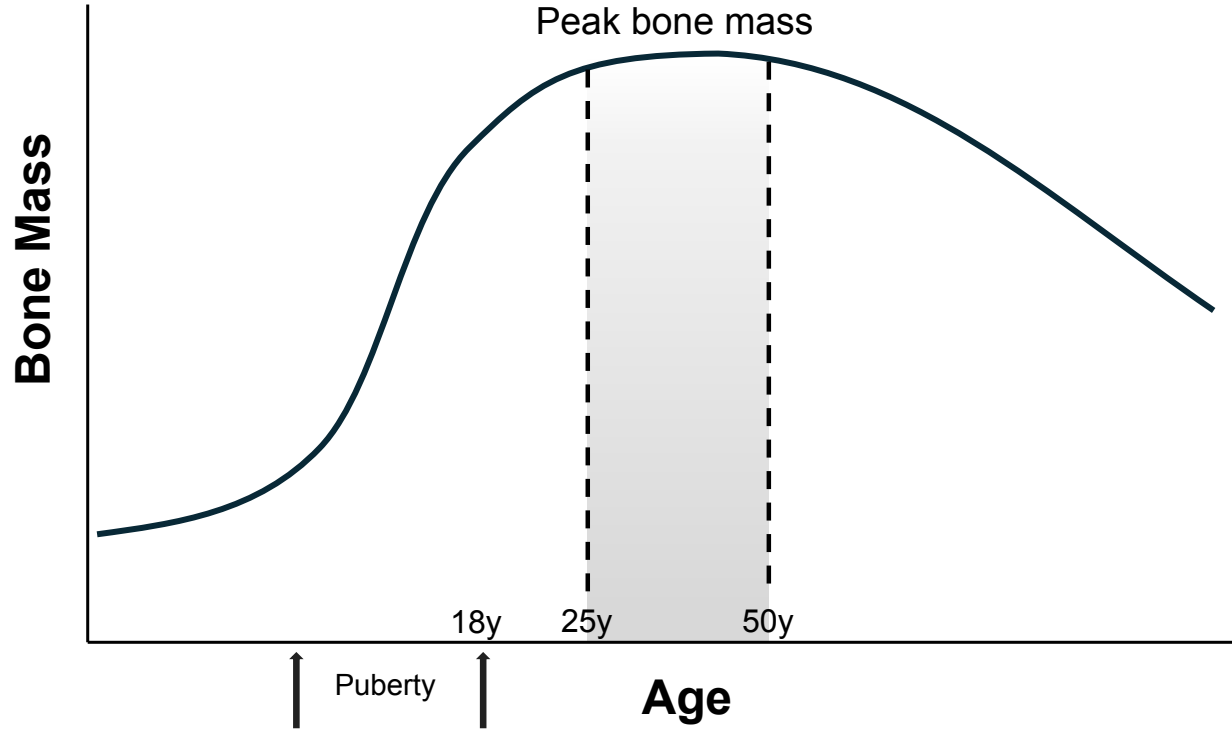
The Golden Years



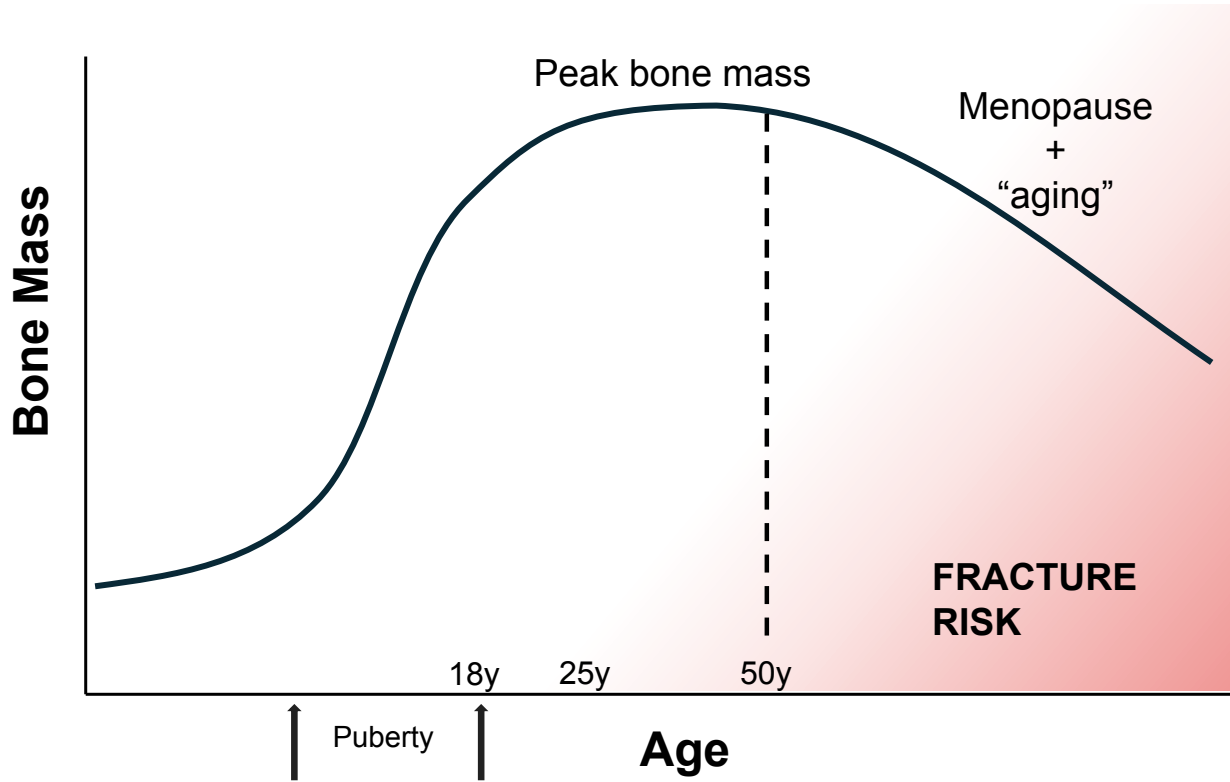
Peak Bone Mass



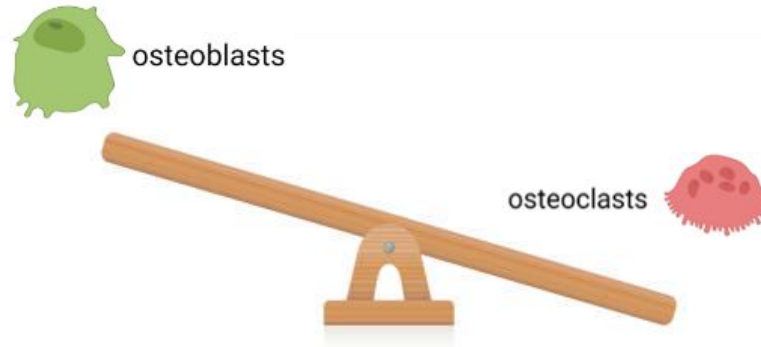
Middle Age



Bone Loss



It's not that osteoblasts are “good guys” and osteoclasts are “bad guys



- Estrogen normally slows down osteoclasts
- During menopause, body stops making estrogen
- So, osteoclasts become stronger



What are some causes of osteoporosis?

Causes of osteoporosis

Women - biggest one is menopause

Men - most common is low testosterone

Other causes

- Overactive thyroid
- Overactive parathyroid
- Steroid use
- Alcohol use
- Celiac disease
- Chronic liver disease
- Chronic kidney disease

How do we diagnose osteoporosis?

Diagnosis

Osteoporosis is diagnosed in 2 ways:

1. Fragility fracture (low-trauma fracture)
2. Bone density with T-score less than -2.5



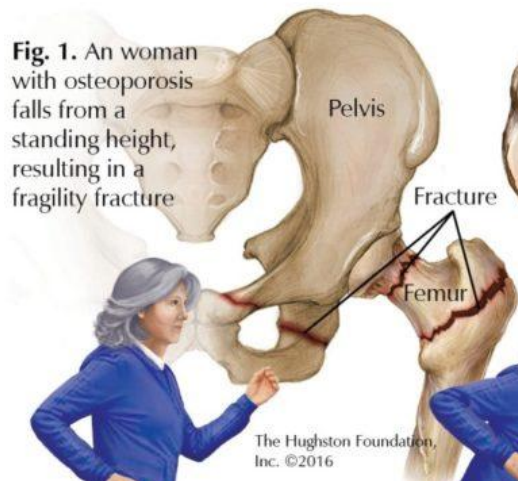


Fig. 1. An woman with osteoporosis falls from a standing height, resulting in a fragility fracture

The Hughston Foundation, Inc. ©2016

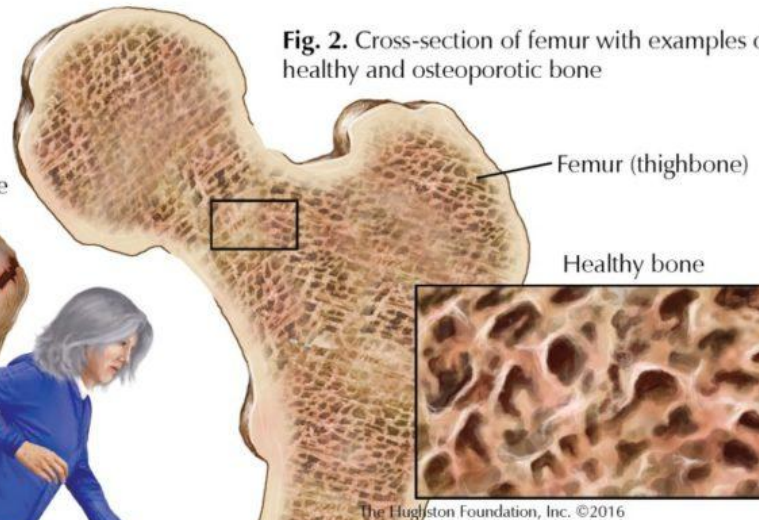


Fig. 2. Cross-section of femur with examples of healthy and osteoporotic bone

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Fragility fracture = **osteoporosis** = medical treatment

Diagnosis

Osteoporosis is diagnosed by 2 criteria:

1. Fragility fracture
2. Bone density with T-score less than -2.5





DXA (Dual-Energy X-Ray Absorptiometry)

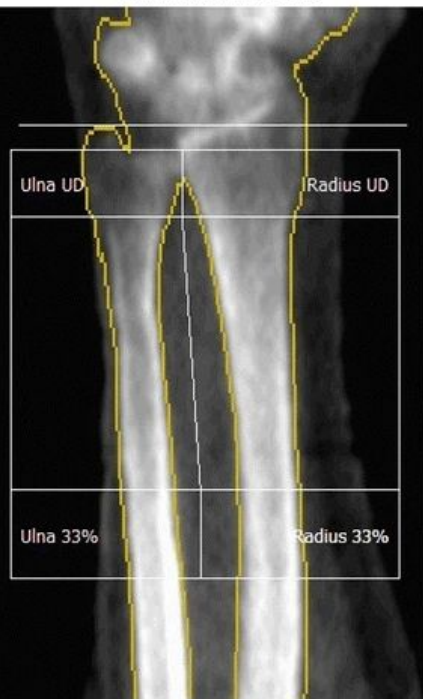
Measures the calcium content in your bone
Test is quick (<15 minutes) and is painless

All individuals age > 50y would probably
benefit from BMD

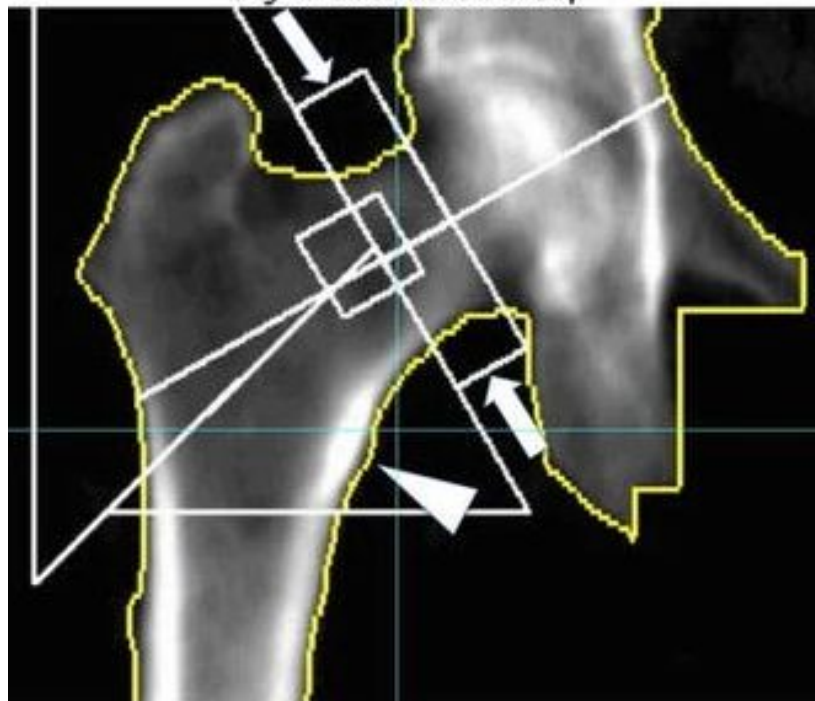


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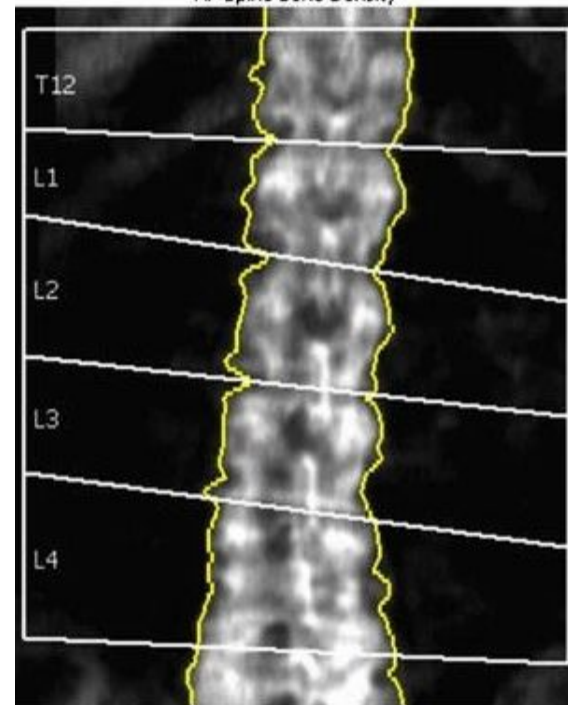
Left Forearm Bone Density



Right Femur Bone Density



AP Spine Bone Density



Bone Densitometry

	BMD (g/cm ²)	T-SCORE
LUMBAR SPINE	0.795	-3.2
LT HIP NECK	0.823	-1.5
LT HIP TOTAL	0.870	-1.1



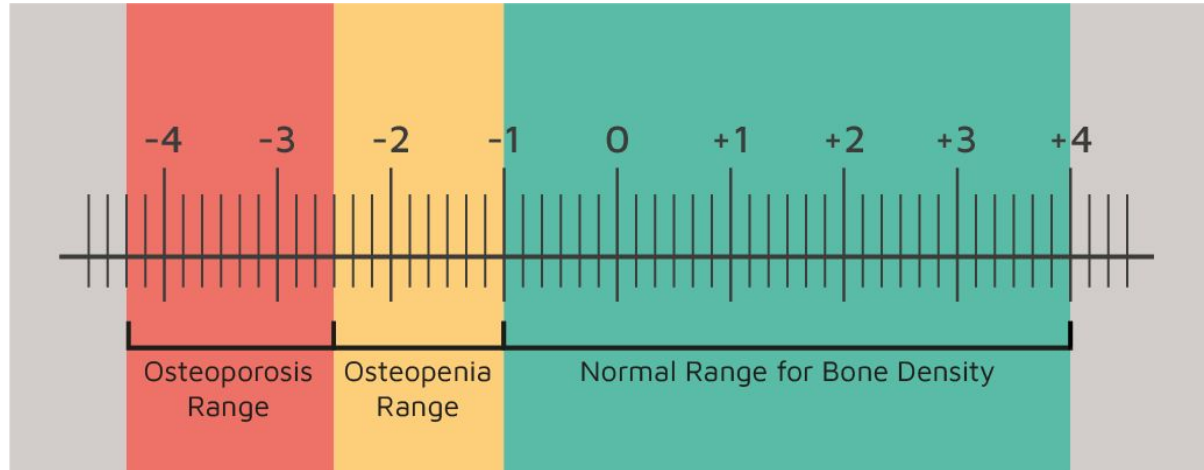
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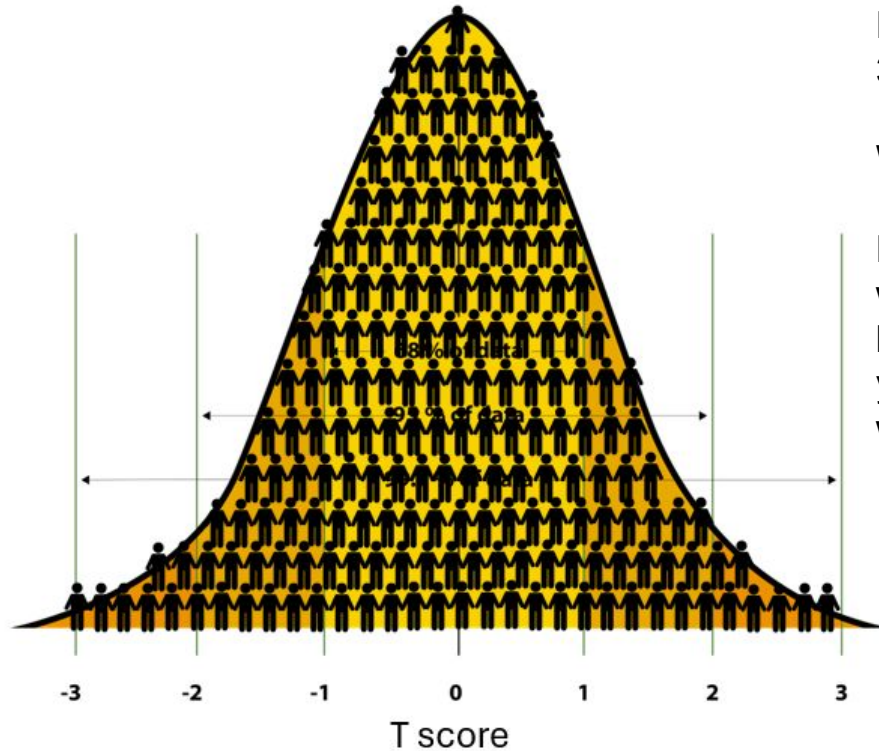


T-scores

- Statistical measurement that compares your bone mineral density to a reference population



Bell Curve



Healthy population of young,
30-year-old women

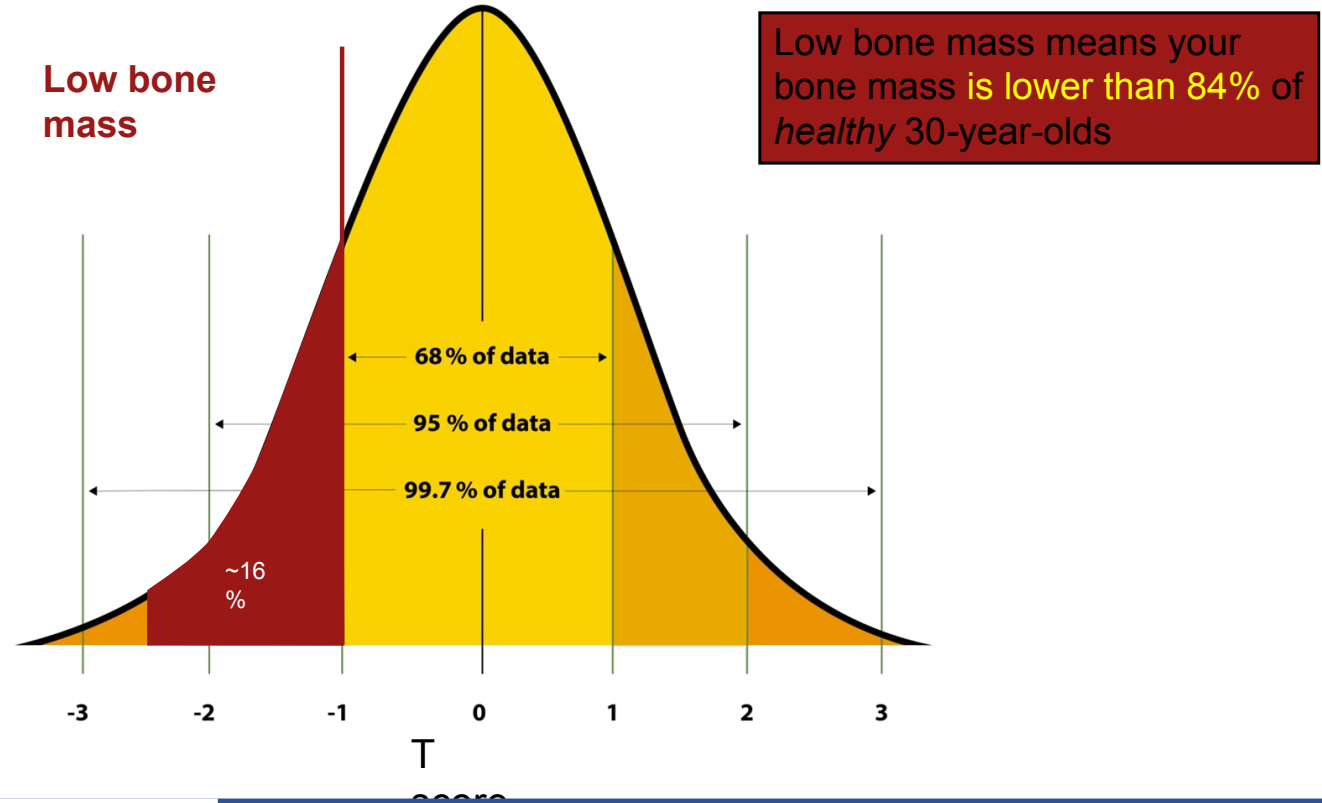
Why 30-year-old?

Remember this is when you
would have reached peak
bone mass (so it's comparing
your bones now to when they
would have been their best)

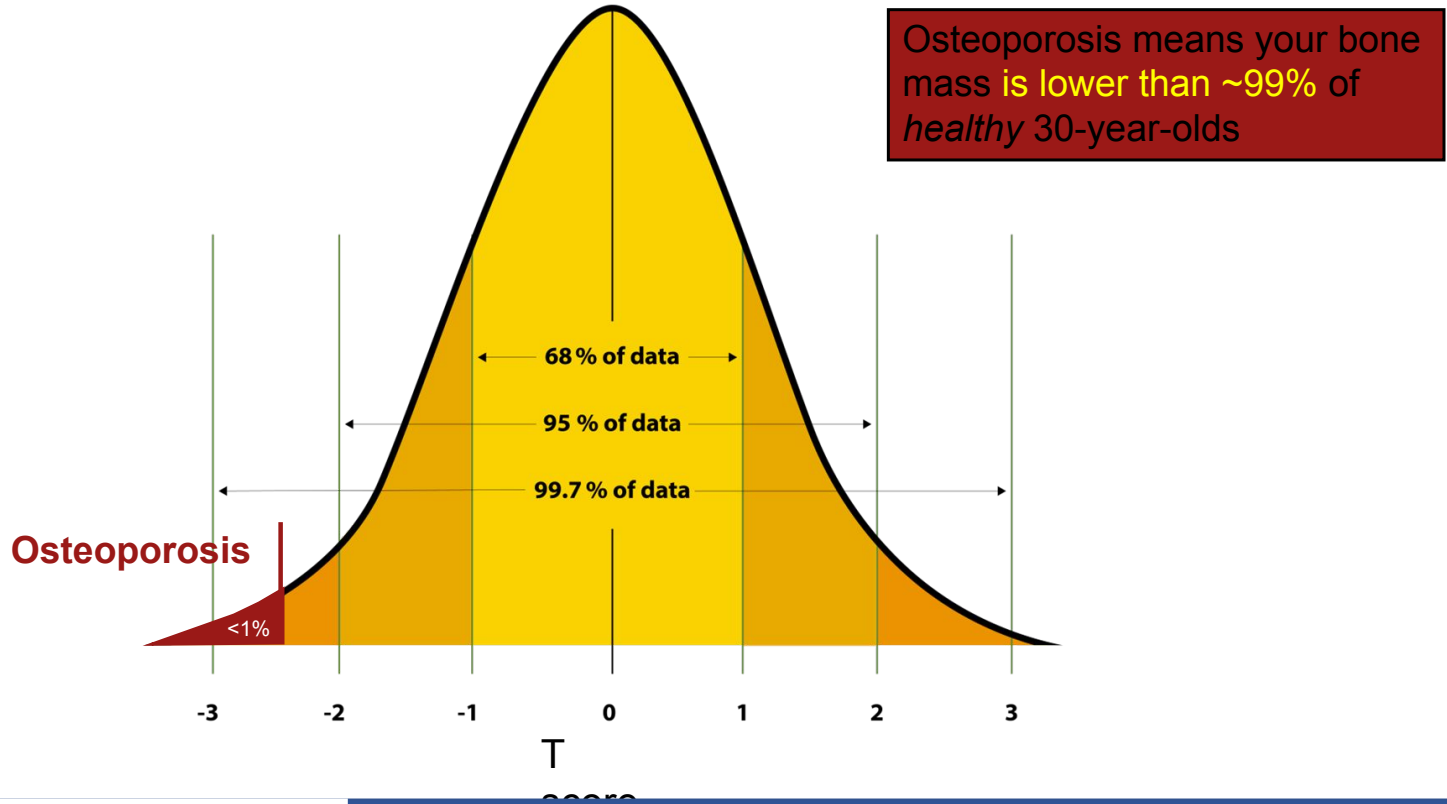


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Bone Density Bell Curve



Bone Density Bell Curve



How do we prevent/treat osteoporosis?

Treatment strategies

1. Lifestyle
2. Medication

Treatment strategies

1. Lifestyle → **probably a good idea for all with osteoporosis**
 - Calcium 1200 mg/d (from diet + supplements if needed)
 - Vitamin D 1000-2000 units daily (or higher doses if needed to make sure vitamin D levels are good)
 - Stop smoking
 - Reduce alcohol
 - Exercise 30 minutes 3x/week

Treatment strategies

2. Medication

Your risk for a future osteoporotic fracture exists on continuum



Fracture Risk Assessment Tool (FRAX)



Calculation Tool

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

Country: **Canada** 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



Weight Conversion

Pounds kg

Height Conversion

Inches cm

01533787

Individuals with fracture risk
assessed since 1st June 2011

[Print tool and information](#)



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Your risk for a future osteoporotic fracture exists on continuum



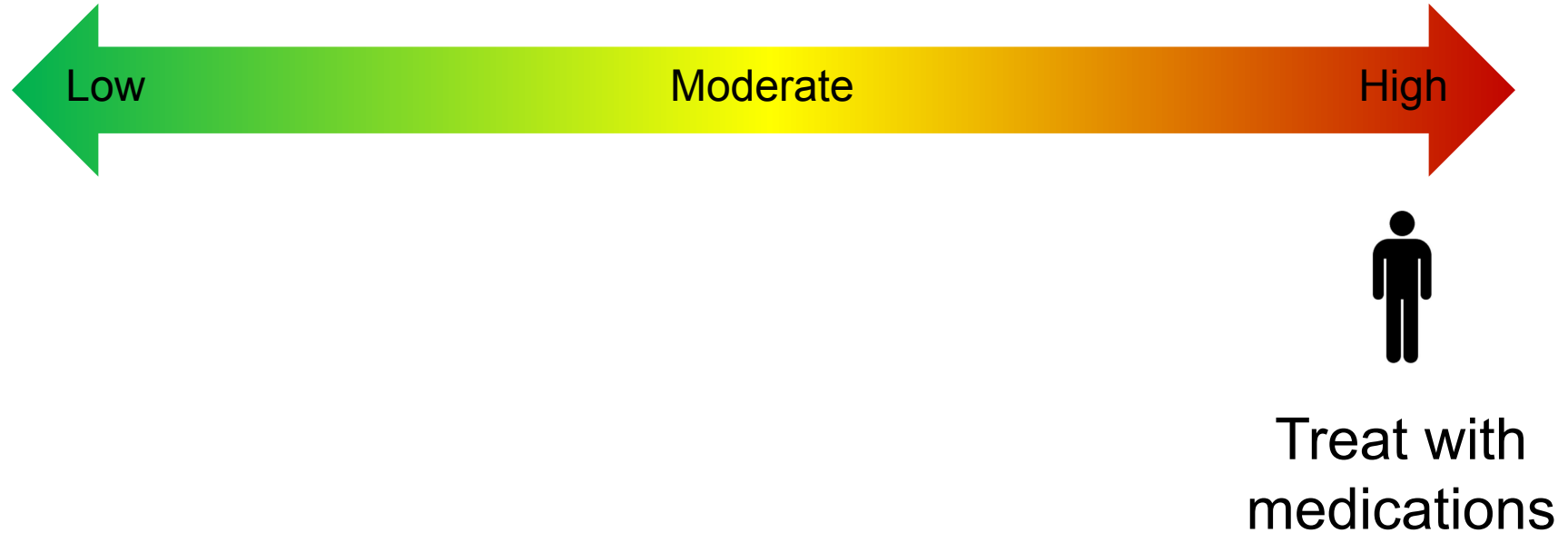
10-year risk of major
osteoporotic fracture

>20%



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Risk exists across a continuum



Your risk for a future osteoporotic fracture exists on continuum



10-year risk of major
osteoporotic fracture

<10%



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Risk exists across a continuum



No medications



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Risk exists across a continuum



Most would likely benefit
from medication



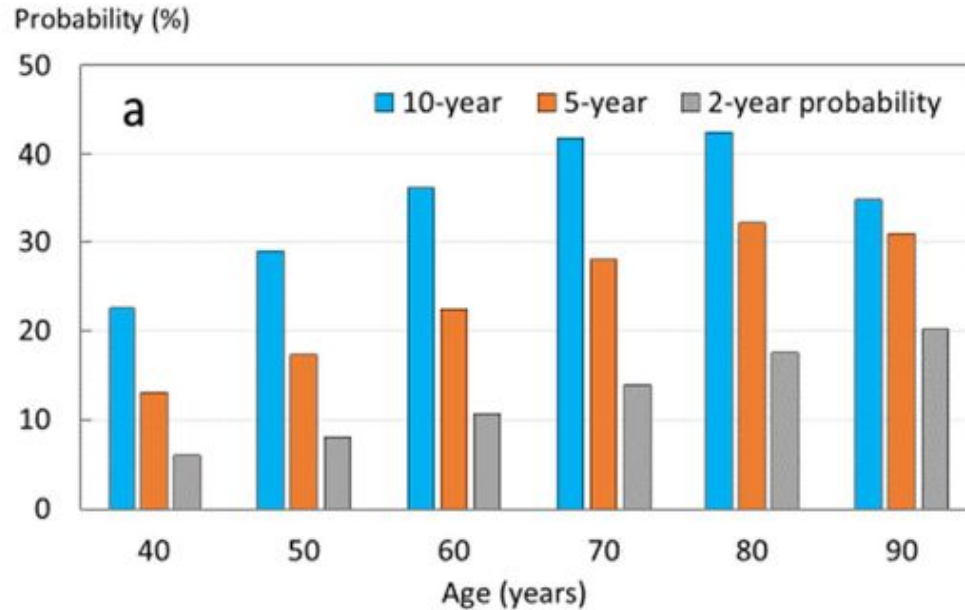
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What kind of medications are available?

1. Anabolic medication (“bone-building medication”) - **STRONGEST**
 - Romosozumab (Evenity) - once a month injection for 1 year
 - Teriparatide (Forteo) - once a day injection for 2 years

2. Anti-resorptive medication (“prevent bone loss”) - **LESS STRONG**
 - Denosumab (Jubbonti) - once every 6 month injection
 - Zoledronic acid (Aclasta) - once a year injection
 - Alendronate/Risedronate (Fosamax/Actonel) - once a week pills

Imminent fracture risk



In those with imminent fracture risk, anabolic therapy is preferred

Take-Home Messages

- One fracture can increase the risk of future fractures
- All individuals aged > 50 years would likely benefit from a bone density
- For all individuals with osteoporosis, lifestyle changes are key
 - Make sure dietary + supplement calcium is 1200 mg/d
 - Ensure they are getting enough vitamin D
 - Exercise
 - Smoking cessation
 - Alcohol cessation
- Anabolic medications can dramatically reduce fracture risk and improve bone density, especially for those who with “imminent” fracture risk



Thank you for your attention!

Questions?

