

Improvement through Movement

Depends upon what and how you
practice intentionally as well as in daily
living routines

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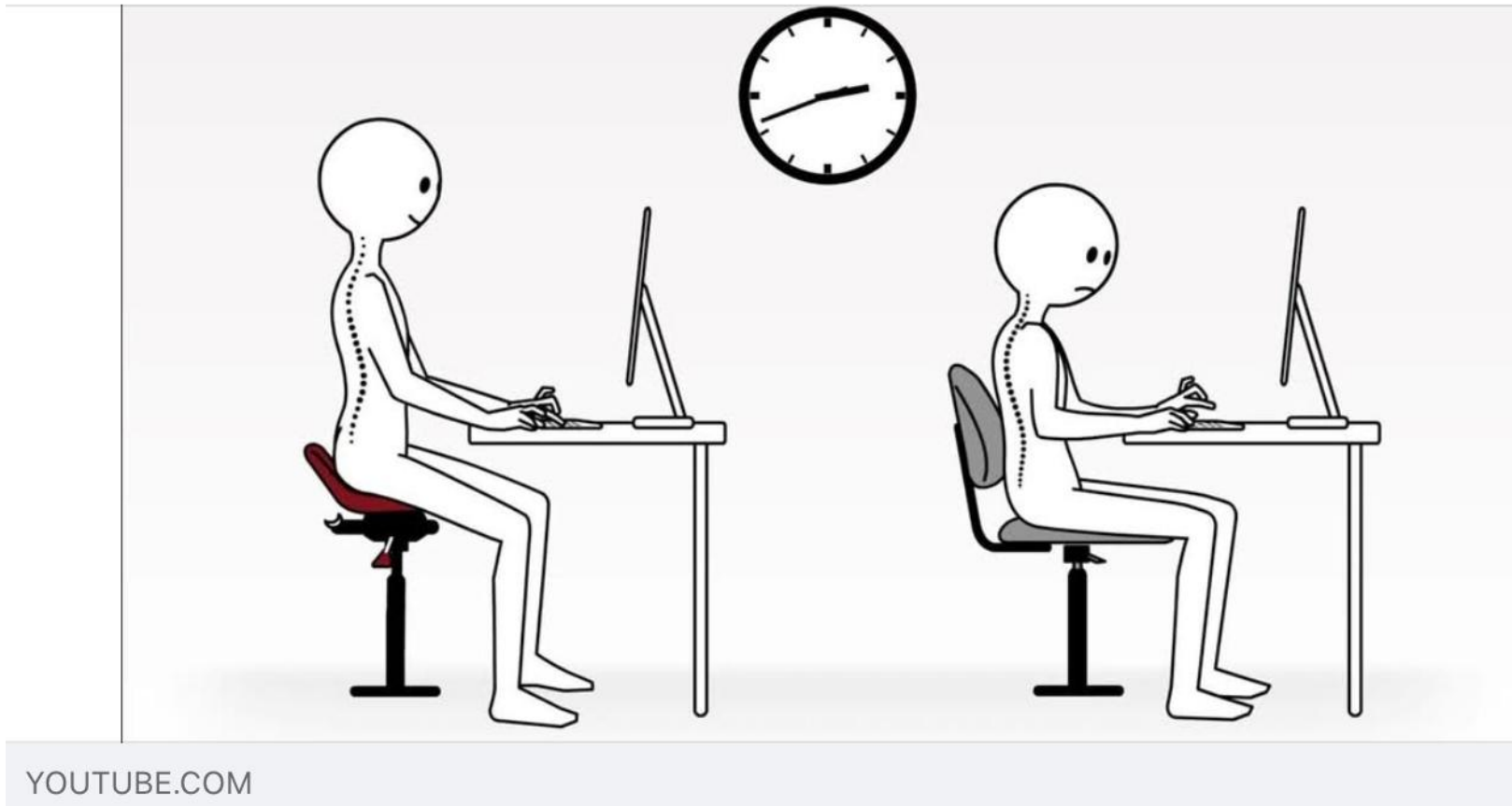
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Passive versus active sitting, which one looks better for your back



The 5 Myths of Osteoporosis

Myth #1: Your Grandmother's Osteoporosis is Your Osteoporosis

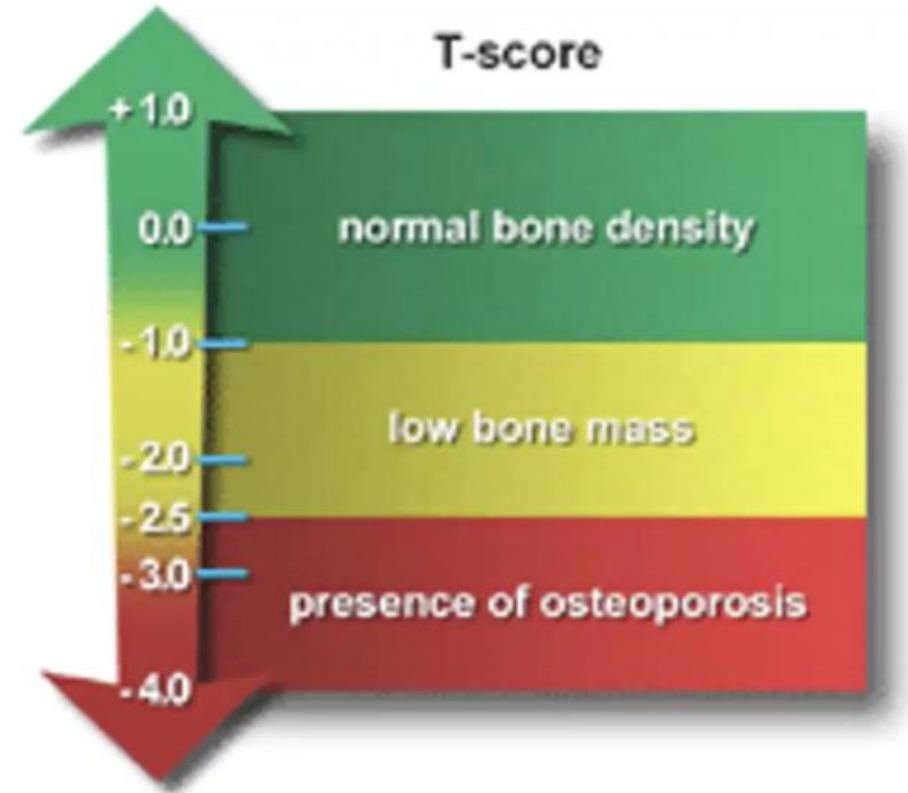
Everyone loses bone mass as they get older. What is normal bone loss, and what is a cause for concern?

Under the new WHO guidelines, millions of 50+ year old women became classified with a potentially serious condition.

Researchers involved in the classification noted that the thresholds were "somewhat arbitrary" and intended for epidemiological studies, not as a clinical threshold.

By the end of the 20th century, millions of physicians were referring people for clinical BMD testing and prescribing osteoporosis drugs on the basis of the BMD readings alone.

[Osteoporosis: The emperor has no clothes](#)



The 5 Myths of Osteoporosis

Myth #1: Your Grandmother's Osteoporosis Was the Same as Your Osteoporosis

In your mother or grandmother's time, osteoporosis was diagnosed after a fracture occurred.

In 1994, WHO published new guidelines for the [classification of osteoporosis](#) based on T-scores.

The WHO standards defined osteoporosis as bone density -2.5 standard deviations and for osteopenia -1.0 to -2.5 standard deviations below the average bone mass density (BMD) of healthy 30-year-old white females.

DEXA Scan:

Dual Energy X-ray Absorptiometry

How much bone mineral mass?

Compared to large sample.

Myth #2: DEXA Scans Give a Reliable Measure of BMD

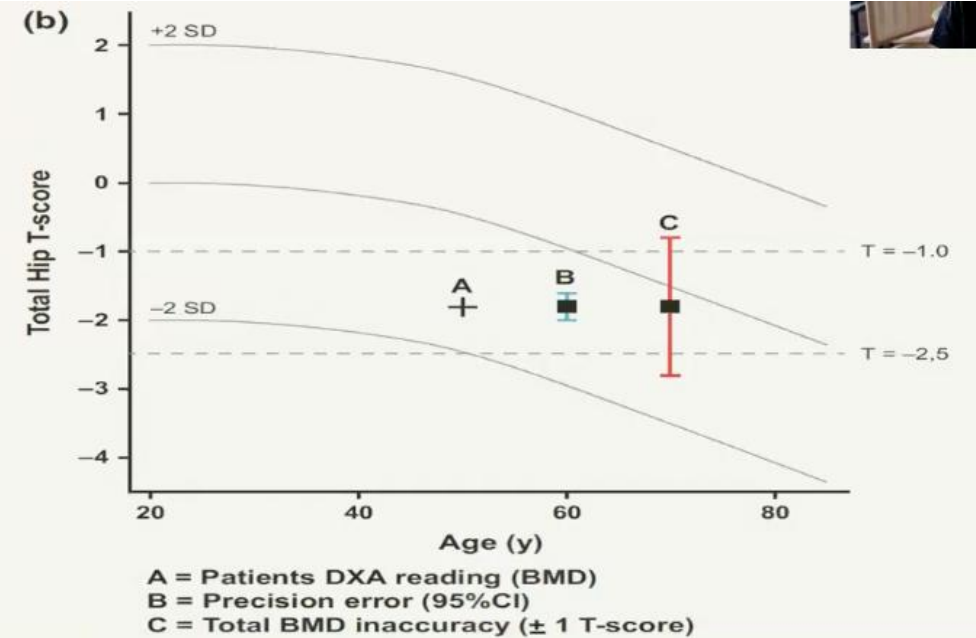
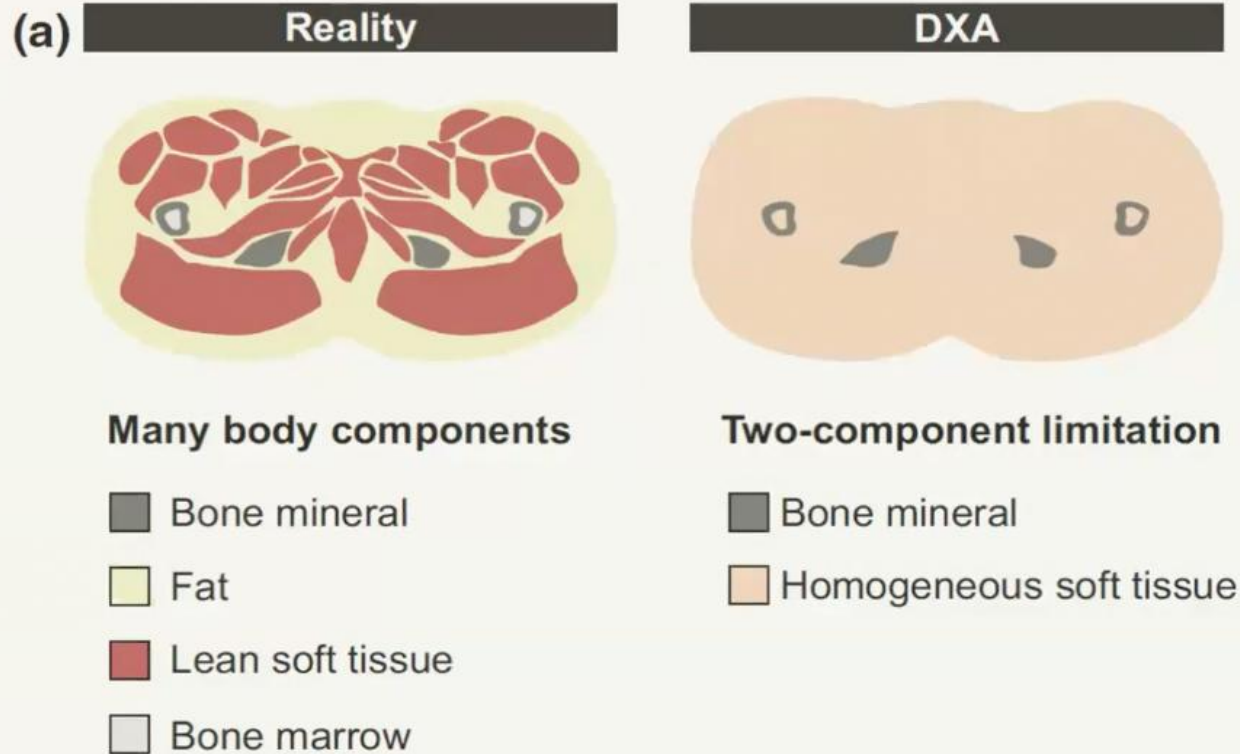
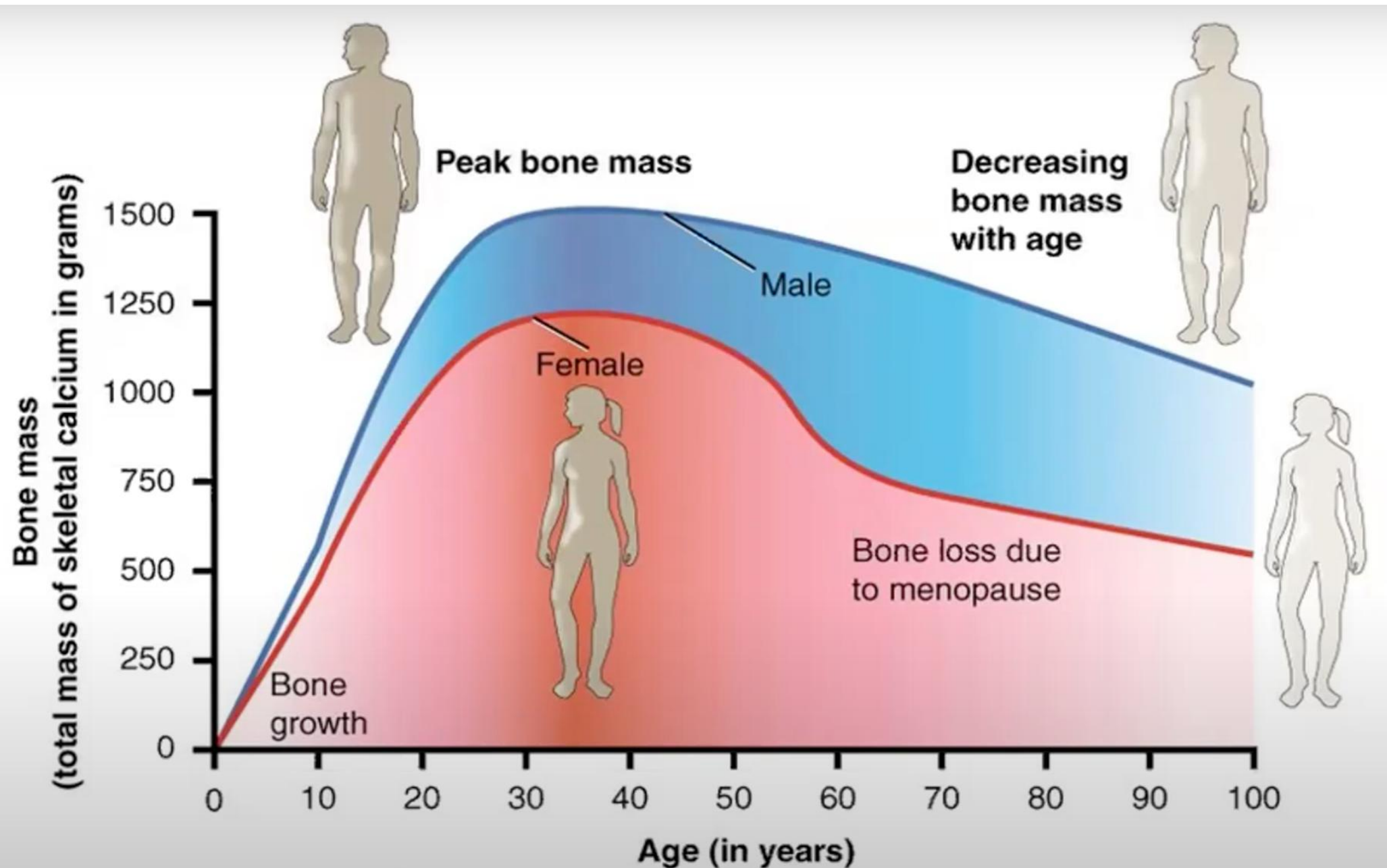


Fig. 3 Inherent inaccuracy related to dual-energy X-ray absorptiometry (DXA)-derived bone mineral density (BMD) seriously undermines the method. (a) The three body components of bone mineral, fat and lean soft tissue have different attenuation coefficients, but DXA employs two photon energies and can thus only resolve two components at a time. Therefore, assumptions are made with DXA about fat versus lean tissue ratios in the calculation of BMD. Numerous studies (using both phantoms and cadaver specimens) have consistently shown that the magnitude of uncertainty inherent in BMD measurement can be ± 1 T-score. (b) To illustrate the difference between

Osteoporosis: the emperor has no clothes

T = How your 'bone density' measures up to women 25-30 years of age.

Z = How your 'bone density' measures up to others in your age group.





Osteopenia and Osteoporosis (Low Bone Density)

Types of fragility fractures common in females

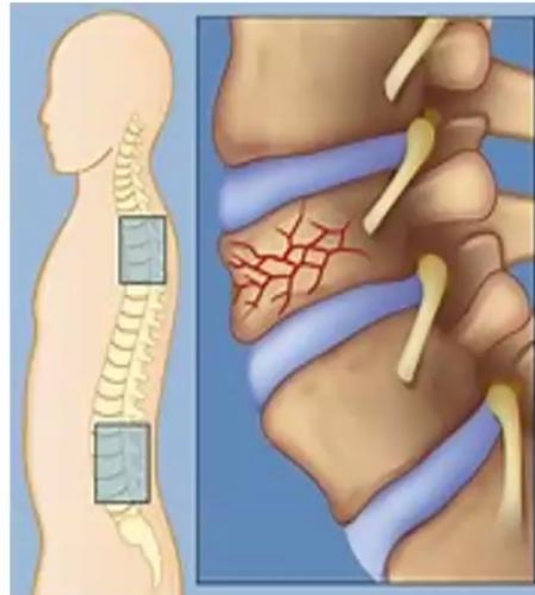
Proximal humerus (upper arm)

Distal forearm (wrist)

Hip

Spine

Source: Christ Hospital Webinar



-STUDY: Bone Mass Density May Not Be the Best Way to Predict Fracture Risk

- "Patients with hip fractures do not appear to be distinctly more osteoporotic than persons of similar age."
- Therefore, factors besides bone mass, such as a tendency to fall, may be important determinants of which elderly persons will have fractures.
- Thus, measurements of bone mass might not be a reliable way to identify those at greatest risk of hip fracture.

Are patients with hip fractures more osteoporotic? Review of the evidence

S R Cummings

PMID: 3976707 DOI: [10.1016/0002-9343\(85\)90343-2](https://doi.org/10.1016/0002-9343(85)90343-2)

Abstract

This report critically reviews 15 case-control studies that disagree about whether patients who fracture their hip are significantly more osteoporotic than persons of similar age who do not. The most rigorously designed studies observed less bone mass in the hips of patients with fractures than in the hips of control subjects, but the differences were usually small and overlapping. Measurements at other sites in the skeleton did not consistently find differences. Those studies that protected against ascertainment bias generally found smaller differences than studies that did not. Patients with hip fractures do not appear to be distinctly more osteoporotic than persons of similar age. Therefore, factors besides bone mass, such as a tendency to fall, may be important determinants of which elderly persons will have fractures; thus, measurements of bone mass might not be a reliable way to identify those at greatest risk of hip fracture.

Why Are Fractures Such a Big Deal?

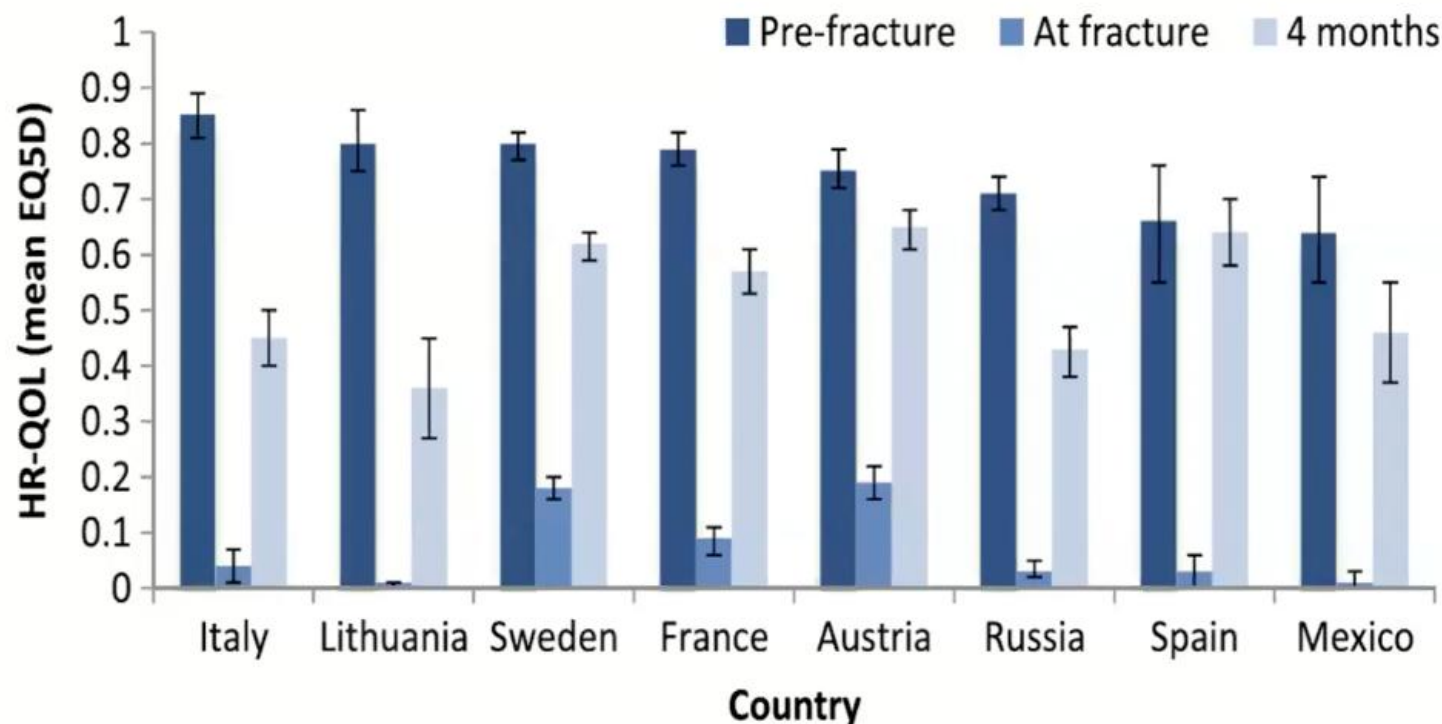


Fig. 2 Health-related quality of life (HR-QOL) as measured by EQ5D before, after and at 4 months following hip fracture. *Source:* Borgstrom et al. [33]. NB. pre-fracture QOL was determined retrospectively

Who gets it?

- **More common in women**

- They have a lower lean body mass initially and cross the threshold quicker than men² (because of menopausal-related changes).
- Women have greater functional impairment than men and muscle weakness develops earlier.

- **Can happen even to fit elderly individuals...who retain their functional status and still lose mass¹**

- This is one reason why the disease is so poorly understood

Common Reactions

- Women reporting low bone density became more fearful of falling
- They are more likely to take measures to prevent fractures than those with normal density
- They are more likely to limit their activities to avoid falling
- They develop strategies to manage the distress caused by the diagnosis

4. Stress and the Bone Connection

Stress often leads to rapid, shallow breathing, which increases stress hormones like cortisol.

High cortisol levels are linked to bone loss and a higher risk of osteoporosis⁷⁸⁹.

Managing stress and practicing deep, relaxed breathing can help protect your bones⁸⁹.

Shallow Breathing and Rib Health

Shallow breathing means the ribs and chest muscles don't move fully, leading to stiffness, pain, and even inflammation in the rib joints and muscles [6](#).

Over time, this lack of movement can reduce circulation and flexibility in the chest, making it harder to maintain good posture and bone health [6](#)

. Mechanical Loading: Deep, diaphragmatic breathing helps move the ribs and spine, providing gentle mechanical stimulation that supports bone strength [10](#).

Osteoporosis and Sarcopenia

Sarcopenia accounts for a similar percentage of healthcare costs as osteoporosis, but no campaigns are in place to reduce the prevalence of sarcopenia.

These disorders often follow one another:

- Muscle prevents bone loss, if muscle is lost, so is bone.

When losing muscle, balance is affected, and the risk of falling increases dramatically.

- Leads to fractures...which leads to disability...
- Low muscle mass has a strong influence on hip fracture¹²

Weight-bearing exercise-particularly multi-directional exercise-prevents bone loss and muscle loss, thus decreasing the prevalence of the two disorders simultaneously.

The #1 Antidote to Osteoporosis, Fractures and Disability: Tackling Sarcopenia (Age-Related Loss of Muscle Mass)

Of all the risk factors for fractures, loss of muscle mass is the most universally applicable

Muscle mass naturally begins to decline at around age 30 at a rate of 3-5% per decade. It is termed sarcopenia muscle loss impacts daily functioning

The condition is diagnosed based on decreased muscle mass combined with reduced muscle strength and/or physical performance

→ Probable sarcopenia is identified by low muscle strength

→ Confirmed sarcopenia requires both low muscle strength and low muscle quantity/quality

→ Severe sarcopenia is diagnosed when all three criteria are present: low muscle strength, low muscle quantity/quality, and low physical performance

Why Haven't You Heard about This Before?

The new diagnosis criteria using BMD as a marker for fracture risk were developed in 1994.

In the intervening time, our picture of the true risk factors for fracture have developed dramatically.

Understanding the nature of frailty and its precursors is complex and harder to translate into layperson's language.

Falls, frailty, sarcopenia, etc. don't have a marketing budget. There is a growing body of research on the wide-reaching effects on frailty, but no drugs that can be prescribed for it.

Not Just about Muscle Mass & Strength- Training: From Sarcopenia to Dynapenia

It was once thought that the well-characterized age-related atrophy of muscle was to blame for poor muscle strength.

Recent studies show that muscle atrophy is a relatively small contributor to the loss of muscle strength.

Dynapenia is a new term introduced to define the age-related loss of muscle strength and power. *Dyna* refers to "power, strength, or force" and *penia* refers to "poverty."

Dynapenia is an important prognostic indicator of functional impairments in elders.

Osteoporosis Vs. Sarcopenia

Effects on Fracture Risk

Research indicates that sarcopenia, especially when defined by muscle function rather than mass alone, may be an equally important or even stronger predictor of fracture risk in some populations.

The strongest predictor appears to be the combination of both conditions (osteosarcopenia), which synergistically increases fracture risk beyond what would be expected from either condition alone.

“It’s time to shift the focus in fracture prevention from osteoporosis to falls”.

~ *Teppo L N Järvinen, 2008*

Implications: Step 2: From Falls to Neuromuscular Integration and Strength Building

Why You Fall

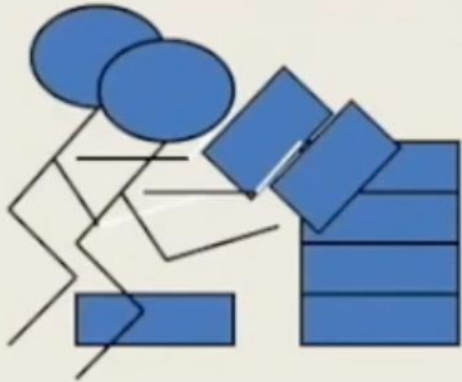
"You didn't fall because you tripped. You fell because you couldn't recover."

~Howard Luks, MD, 2005

- WE NEED TO CHALLENGE OUR BALANCE DAILY IF WE WANT TO BUILD OR MAINTAIN IT!!!!

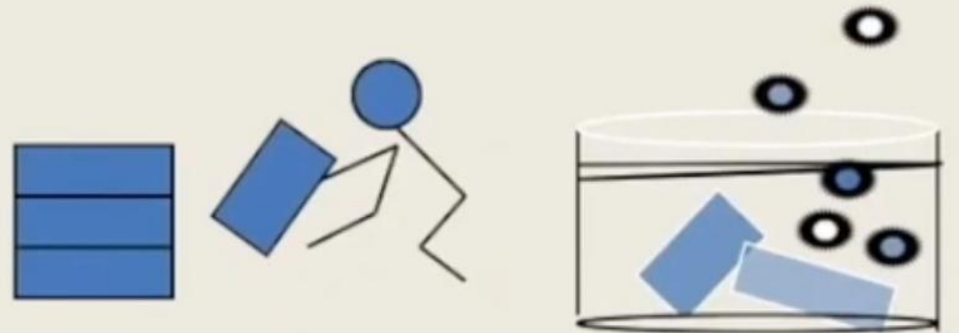
A game of give and take

Osteoblasts and osteocytes



>

Osteoclasts



Osteonecrosis

Spontaneous Fracture

Retarded Healing

Gastrically Drastic

Atrial Fibrillation

Scleritis

Episcleritis

“Ucky
Results”

From using most
recommended
Osteoporosis Medicines

Episcleritis is a mild, superficial inflammation of the tissue on the eye's surface, while **scleritis** is a severe, deep inflammation of the white part of the eye that can threaten your vision

Jawbone can become degraded in some people taking **Bisphosphonates**

Side Effects

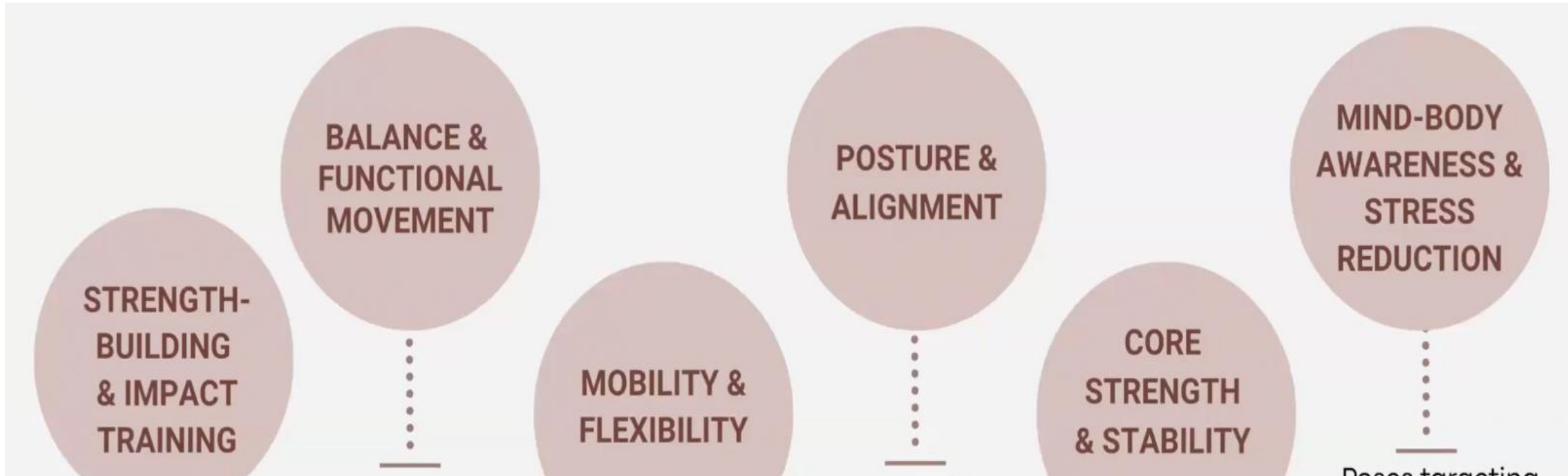
Yoga

Balance
Range of Motion
Strength
Coordination
Lower Anxiety

Fosamax

- Abdominal or stomach pain
- Difficulty with swallowing heartburn
- Irritation or pain of the esophagus
- Muscle, pain, rash
- Abdominal or stomach cramps
- blistering, peeling, or loosening of the skin
- bloating or swelling of the face, arms, hands, lower legs, or feet
- bone, joint, or muscle pain, severe and occasionally incapacitating
- chest pain
- Chills, confusion, convulsions, cough diarrhea
- difficulty with breathing
- difficulty with moving
- Heartburn, heavy jaw feeling
- hives or welts, irregular heartbeats, itching
- joint pain
- large, hive-like swelling on the face, eyelids, lips
- Tongue, throat, hands, legs, feet, or sex organ
- loosening of a tooth
- muscle aching or cramping
- muscle cramps in the hands, arms, feet, legs, or face
- numbness and tingling around the mouth, fingertips, or feet
- pain or burning in the throat
- pain, swelling, or numbness in the mouth or jaw
- rapid weight gain
- red skin lesions, often with a purple center
- red, irritated eyes, redness of the skin
- shortness of breath, sore throat
- sores, ulcers, or white spots on the lips or tongue or inside the mouth
- swollen joints, tingling of the hands or feet
- Tremor, unusual tiredness or weakness, unusual weight gain or loss
- Vomiting, Constipation, diarrhea, full or bloated feeling
- Gas, headache, nausea, sensation of spinning
- Blurred vision or other change in vision
- dizziness or lightheadedness
- eye pain

The 6 Essential Elements of Fracture Prevention



Precautions in Movement

1984 Study

Women 49-60 yr. old with osteoporosis.

<u>Intervention</u>	<u>Compression or Wedge Fracture</u>
• Group 1 – Extension	16%
• Group 2 – Flexion	89%
• Group 3 - Ext plus Flex	53%
• Group 4 - No Exercise	67%

Source: Mersheed Sinaki MD and Beth Mikkelsen, MD

Postmenopausal spinal osteoporosis: flexion versus extension exercises

Dr. Lora Giangregorio, PhD
Kinesiologist at Waterloo University
Tier 1 Canada Research Chair in Bone Health and Exercise Science



Exercise programs designed to improve balance, coordination and physical functioning (2139 participants 7 studies)
Reduce falls - high certainty; Reduce fractures - low certainty

Walking, dance, resistance training - no effect or not enough studies to estimate

Best: Balance, physical functioning and resistance training reduced fall risk by 34% (moderate certainty)

<https://www.youtube.com/watch?v=CGHn8kEis8w>

What Turns Bone Building On and Off?

The Mechanostat Theory

- In contrast, when bones experience greater than typical peak loads above the daily loads, bone formation increases.
- This bone formation occurs where the high strains are detected, creating targeted reinforcement exactly where needed.
- In other words, bones become stronger specifically where they are challenged to respond to greater loading.
- This has implications for how and where we build bones based on the forces they are exposed to.
- The system rewards consistent mechanical challenge while responding quickly to neglect, making regular movement loading essential for maintaining optimal bone health.



Prevention Is Power

- You cannot reverse aging — but you can reverse bone loss
- Studies show structured exercise can increase bone density by 2–8% in postmenopausal women
- Adequate calcium intake reduces fracture risk by 20–30% in postmenopausal women
- Vitamin D plus calcium reduces fracture risk by 10–15% in older adults
- Balance and strength programs cut fall risk by more than 60% and even partly reverse bone loss

How Much Calcium Do You Need?

Age & Sex	Recommended Daily Calcium	Notes
Women, age 50 and younger	1,000 mg/day	Includes food + supplements
Women, age 51 and older	1,200 mg/day	Higher needs after menopause
Men, age 70 and younger	1,000 mg/day	Often achievable through diet alone
Men, age 71 and older	1,200 mg/day	Increased needs with aging
Upper safe limit, all adults 50+	2,000 mg/day	Don't exceed — can raise other health risks

Source: Institute of Medicine / National Academy of Medicine reference intakes.

Vitamin D: Calcium's Essential Partner

WHY IT MATTERS

- Vitamin D enables your body to absorb calcium from food
- Without enough D, even high calcium intake fails to reach bone
- Older adults produce vitamin D less efficiently from sunlight
- Deficiency is extremely common, especially in northern climates
- Low D is linked to muscle weakness and falls — a double hit

HOW TO GET ENOUGH

- Adults 51–70: at least 600 IU/day (15 mcg)
- Adults 71+: at least 800 IU/day (20 mcg)
- Foods: salmon, trout, fortified milk and cereal, egg yolks, mushrooms
- Ask your doctor for a 25-OH vitamin D blood test
- Supplement if your level is below 30 ng/mL

Don't Forget Protein and Other Nutrients

- Protein — provides the collagen matrix on which calcium is deposited; aim for 0.8–1.0 g per kg body weight daily
- Magnesium — supports vitamin D activation; found in nuts, seeds, whole grains, leafy greens
- Vitamin K — directs calcium to bone (not arteries); leafy greens, broccoli, fermented foods
- Potassium — neutralizes acid load that pulls calcium from bone; fruits, vegetables, beans
- Vitamin C — needed to form collagen; citrus, peppers, berries
- Limit excess sodium and caffeine, which can increase urinary calcium loss

Putting it in Perspective

- Exercise induced increases in BMD are minor in adults
- Physically active men and women have nearly ½ the hip fx risk than their sedentary counterparts

CONCLUSION:

While BMD is a factor in fracture risk, it is not the only contributor, other properties of bone along with fall risk reduction are at play.

Osteopenia and Osteoporosis (Low Bone Density)

Your bone health is important!

- Limit your modifiable risk factors
- Speak with your primary care provider
 - May recommend supplements versus prescription medication (bisphosphonates)
- Continue with low impact exercise, resistance exercise and stay active
- Prevent falls



A Final Thought



You cannot choose your genes, but you can choose what you eat, how you move, and how often you stand tall. Your bones respond to those choices at every age.

— Bone Health Education Series

Sources & Resources:

The [Bone Health and Osteoporosis Foundation](#) (BHOF)

The [World Health Organization](#)

Yoga U webinars & courses

The Rogue Pharmacist podcasts

“Great Bones, Taking Control of Your Osteoporosis” R. Keith McCormick, DC

- To view videos and enjoy a guided meditation video, “TLC for the Nervous System <https://www.vibrantaging.life> where you can also access the “5 weeks for \$5 Fitness for Mature Adults.
- Thanks to Cynthia Allen (Future Life Now), The Federation for Movement Intelligence, and Ruthy Alon (creator of Bones for Life®) for their guidance and training in Bones for Life® and to Dr. Ganesh Mohan & family for the in-depth yoga therapy training.
- To contact Sharon: sharonbyrnesyoga@gmail.com 513-658-1952

Ratios of Bone Composition

- Cortical 80%
- Trabecular 20%
- Minerals including calcium 60-70%
- Organic including collagen 20-40%

