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Osteoporosis



Loren Fishman, MD, B. Phil.,(oxon.)
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Osteoporosis

- *Osteoporosis is a disease in which bones become fragile and more likely to break. If not prevented or if left untreated, osteoporosis can progress painlessly until a fracture occurs. These are typically in the spine, hip and wrist.*

Osteoporosis

- *Osteoporosis is a **disease** in which **bones** become **fragile** and more likely to break. If not prevented or if left untreated, osteoporosis can **progress painlessly** until a bone breaks. These broken bones, also known as **fractures**, occur typically in the **spine, hip and wrist**. – NOF*

Osteoporosis – Osteopenia

- Diagnosis
- Treatment and Prevention



**If you don't know where
you're going, how can
you get there?**

Objective Assessment

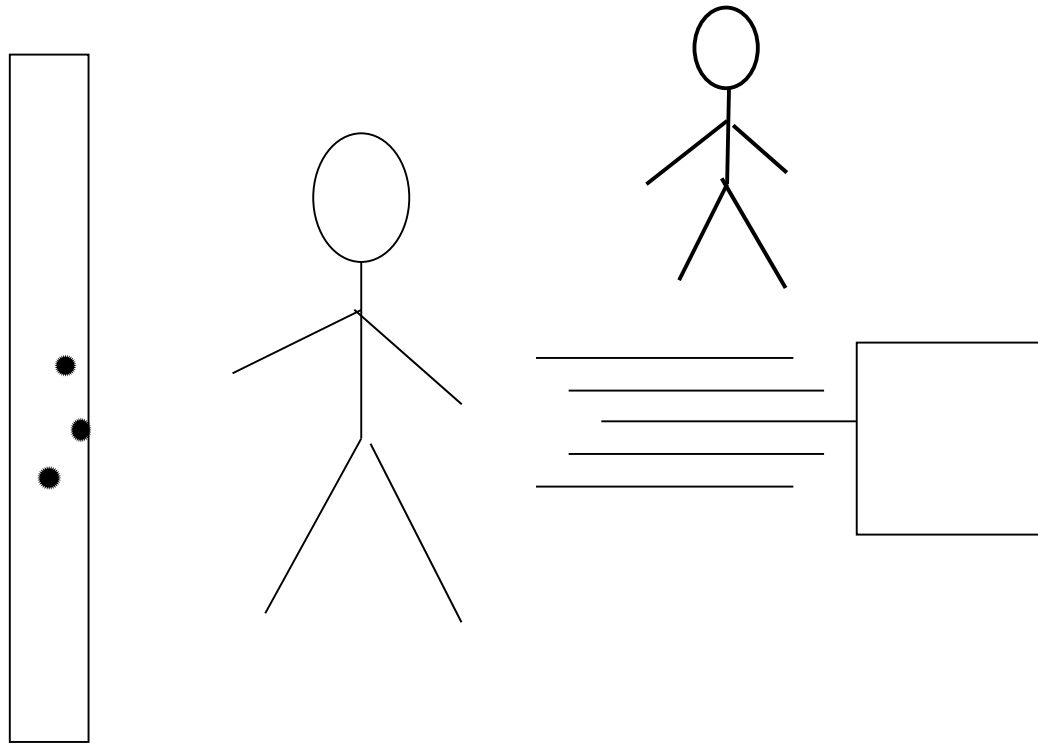
- DEXA Scan:

Dual Energy X-ray Absorptiometry

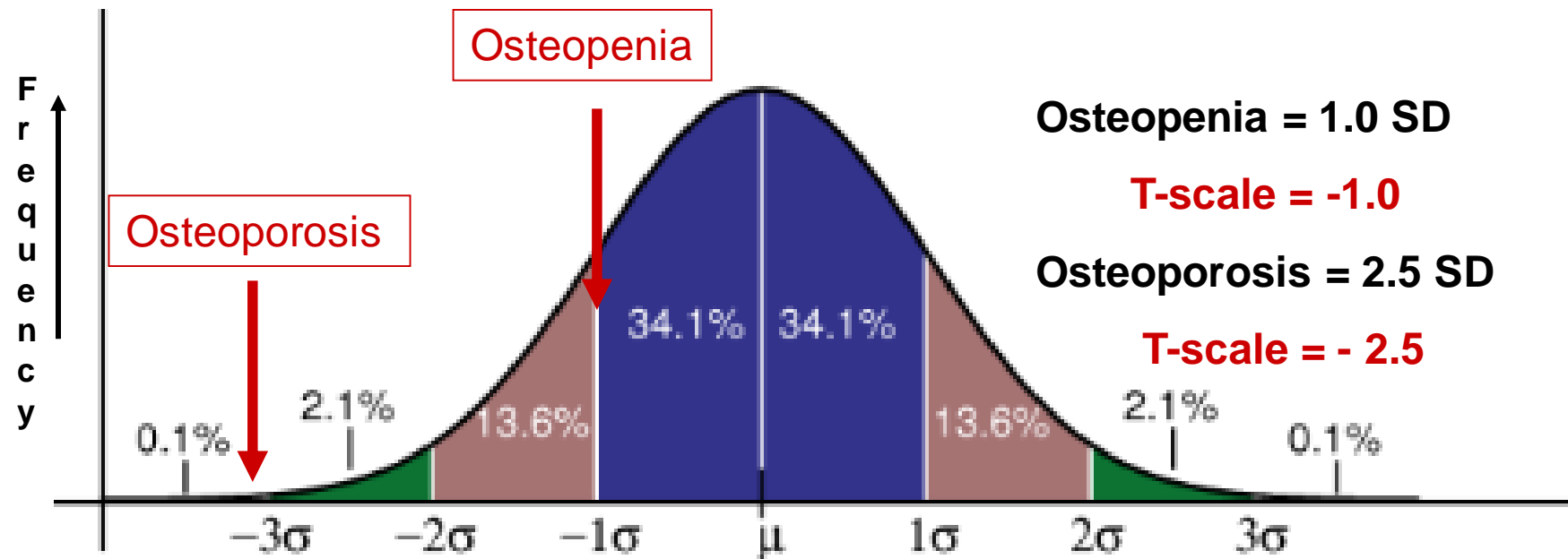
How much bone mineral mass?

Compared to large sample.

What stands between?



Abnormal Distribution



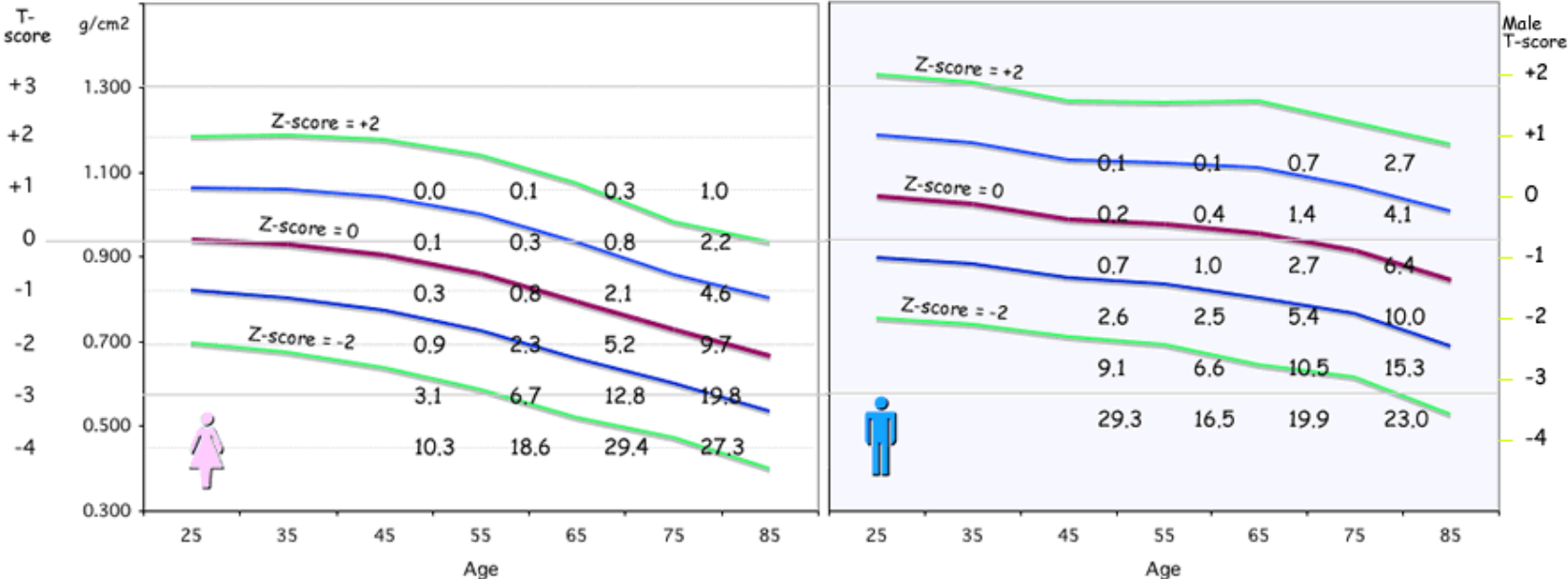
Osteoporosis from T to Z

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

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

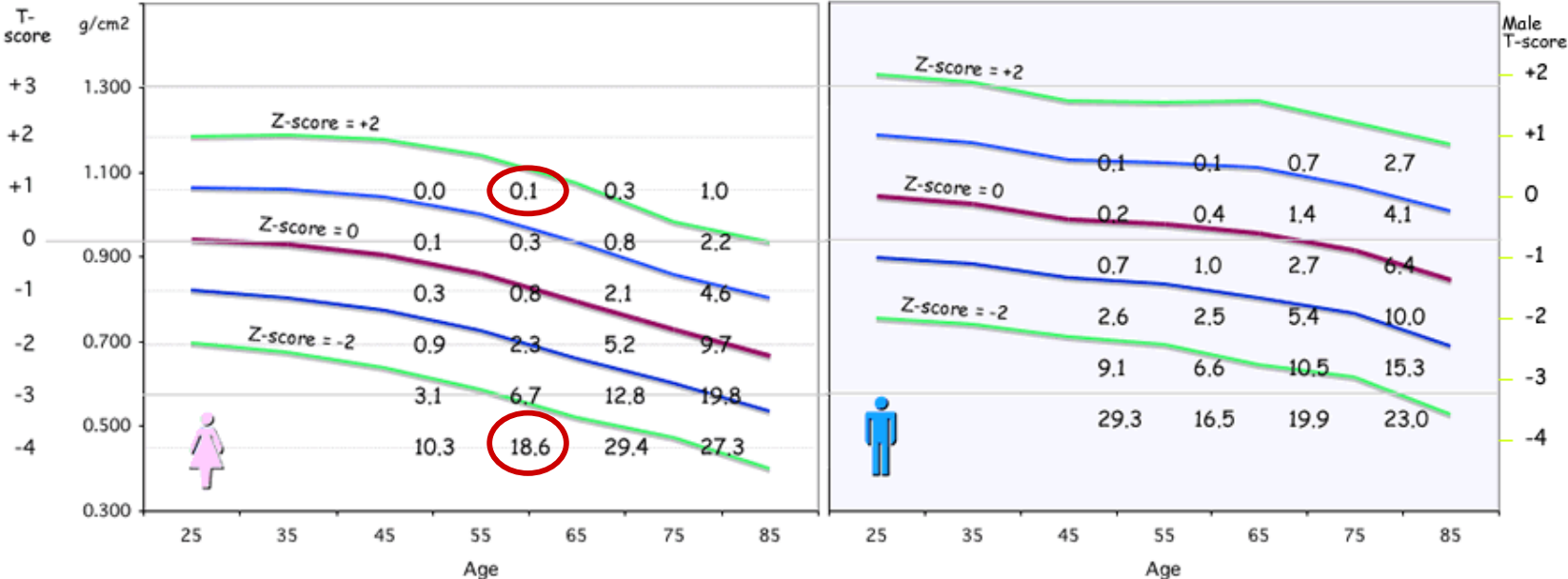
Bone Density correlates with Fracture Risk

Ten-year probability of hip fracture based on total hip BMD

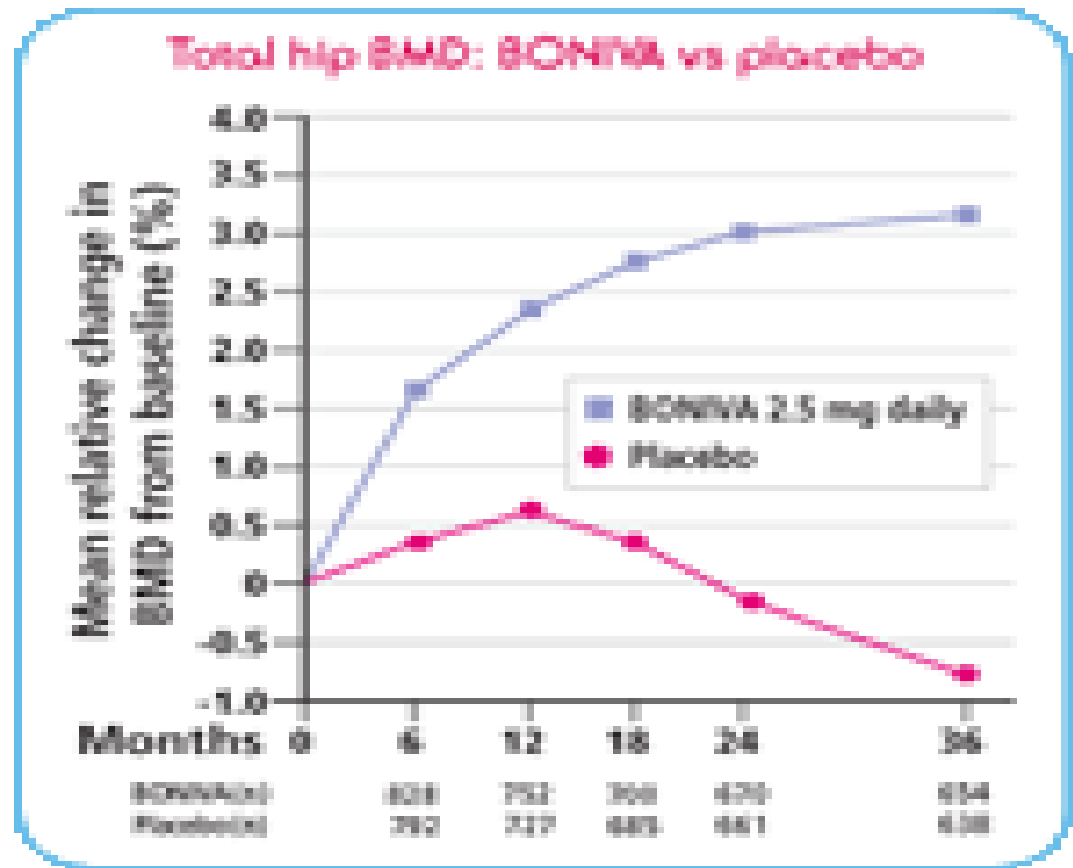
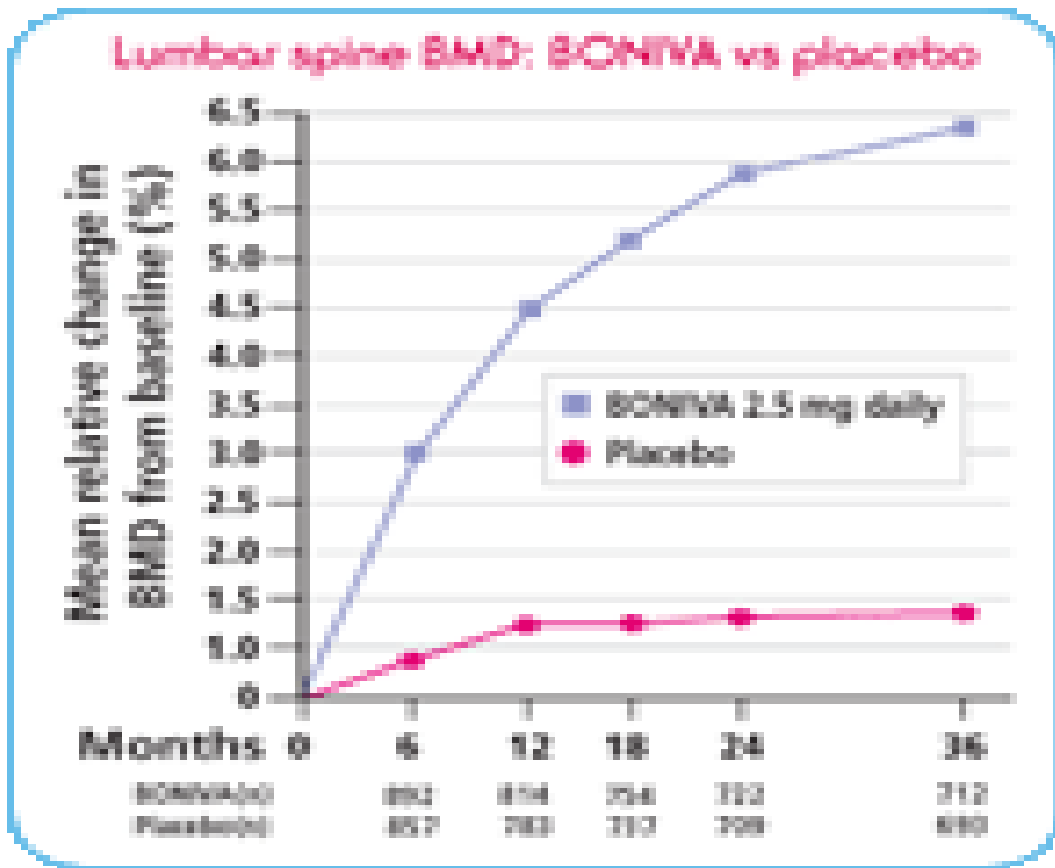


Bone Mineral Density correlates with Fracture Risk

Ten-year probability of hip fracture based on total hip BMD



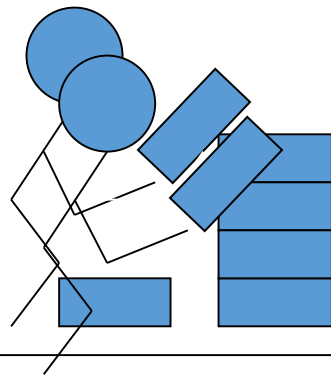
The Medicines Work



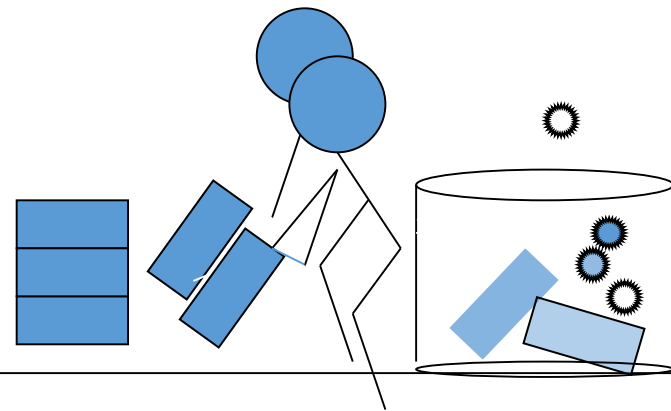
Cannot ignore Bone Physiology

A game of give and take

Osteoblasts and osteocytes



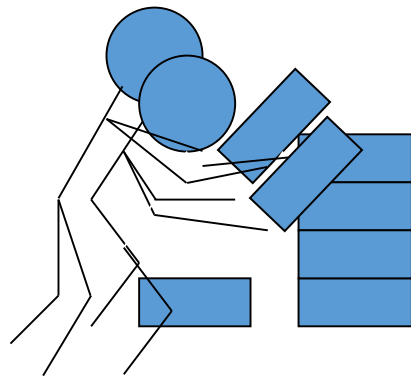
Osteoclasts



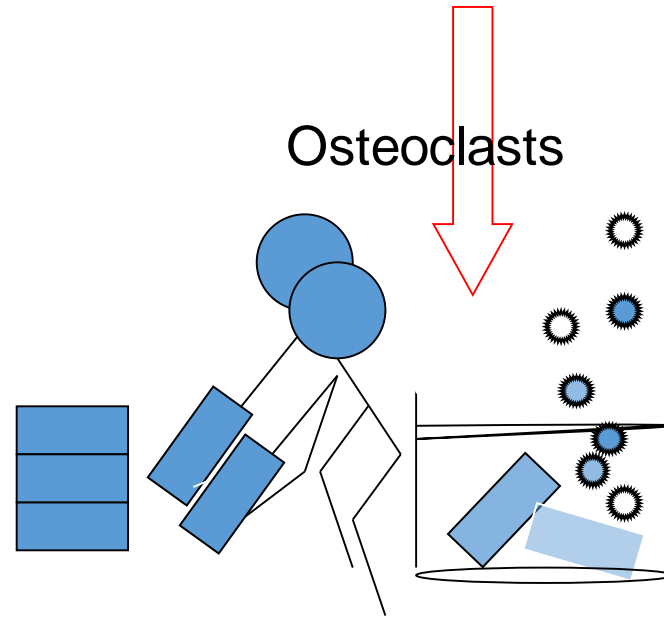
Game Changer

A game of give and take

Osteoblasts and osteocytes

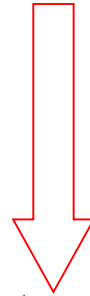


Osteoclasts

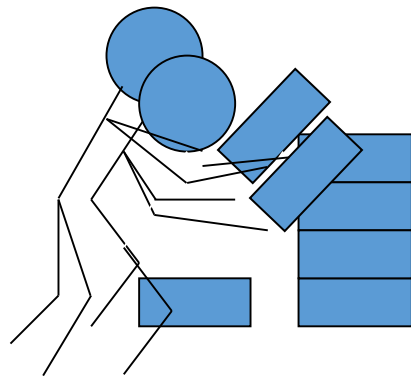


Game Changer

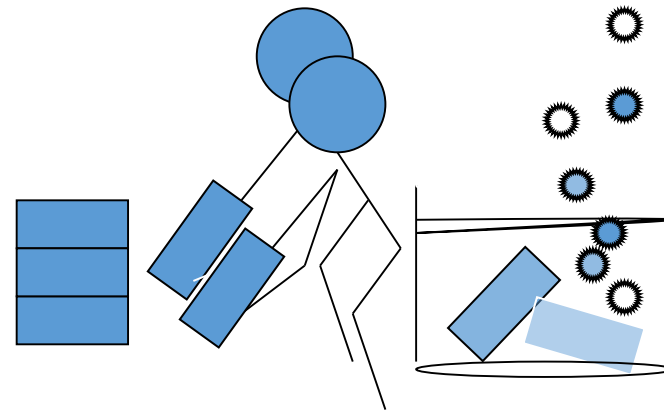
Hormonal Therapy



Osteoblasts and osteocytes



Osteoclasts

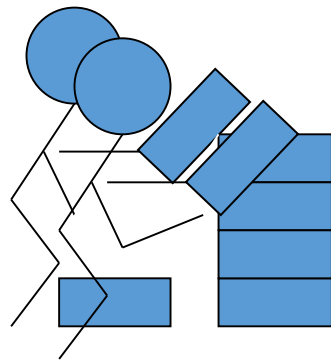


You do the math:

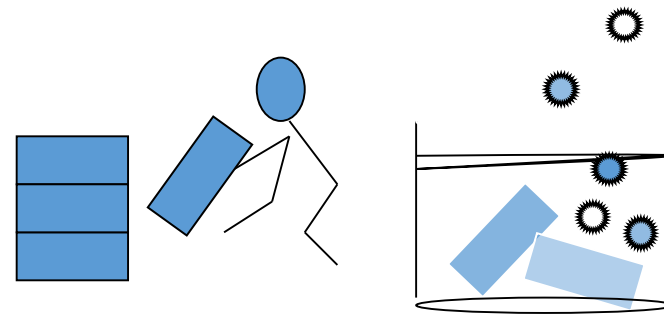
The Medicines:

A game of give and take

Osteoblasts and osteocytes



Osteoclasts

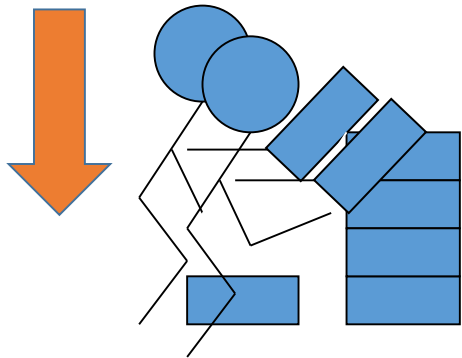


Hormonal Therapy:

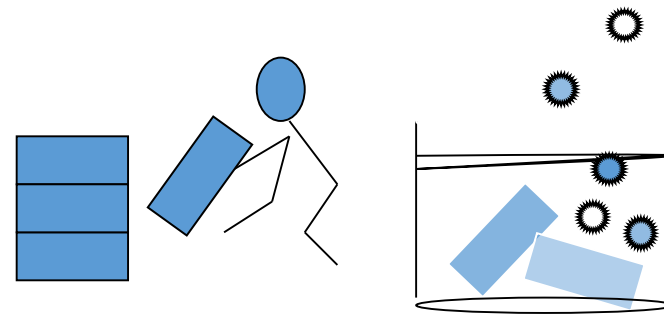
The Reverse:

A game of give and take

Osteoblasts and osteocytes



Osteoclasts



Medications Problematical

Bisphosphonates:

Osteonecrosis

Spontaneous Fracture

Retarded Healing

Gastrically Drastic

Atrial Fibrillation

Scleritis, Episcleritis

Medications Problematical

Bisphosphonates:

Osteonecrosis

Spontaneous Fractures

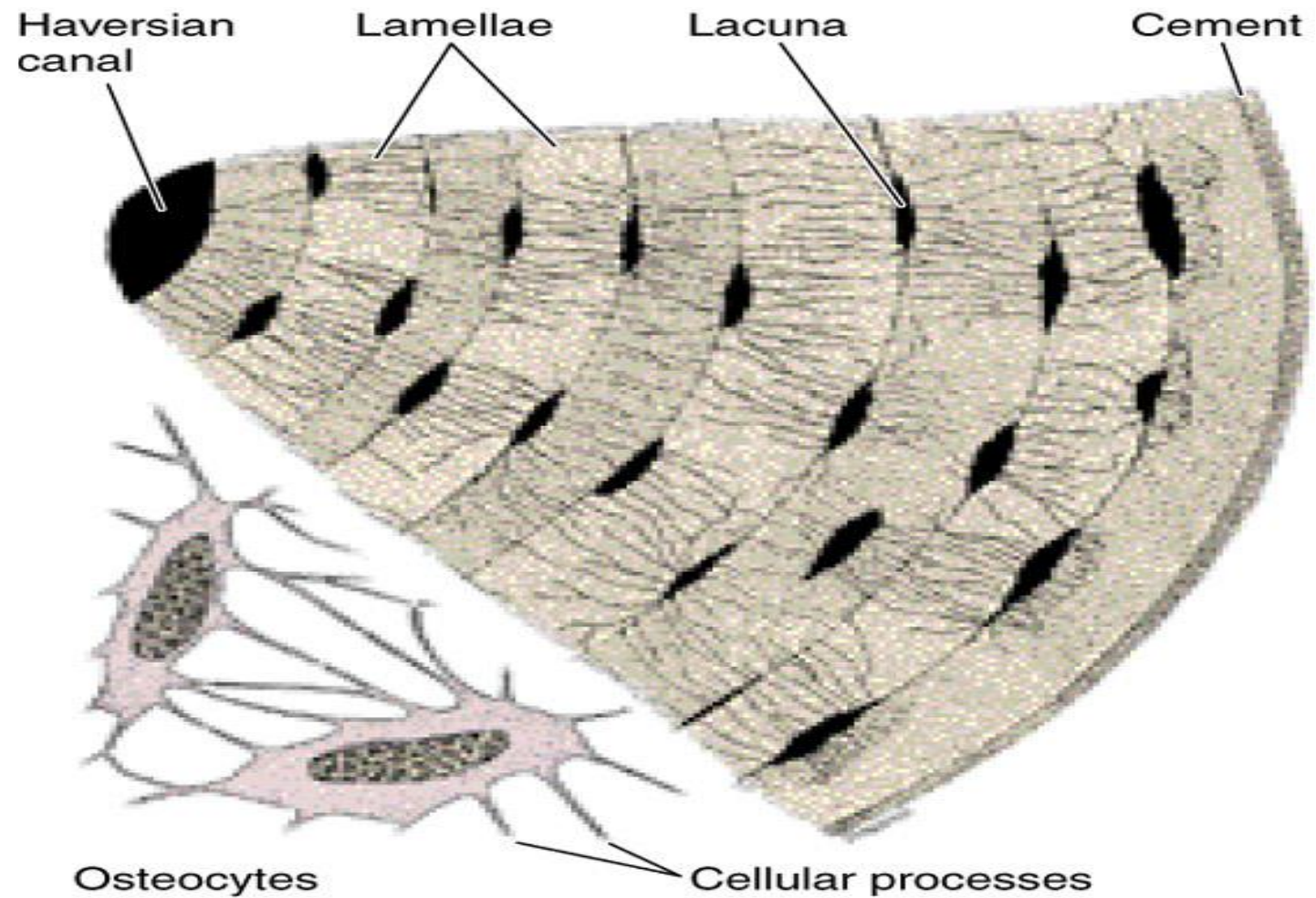
Retarded Healing

Gastrically Drastic

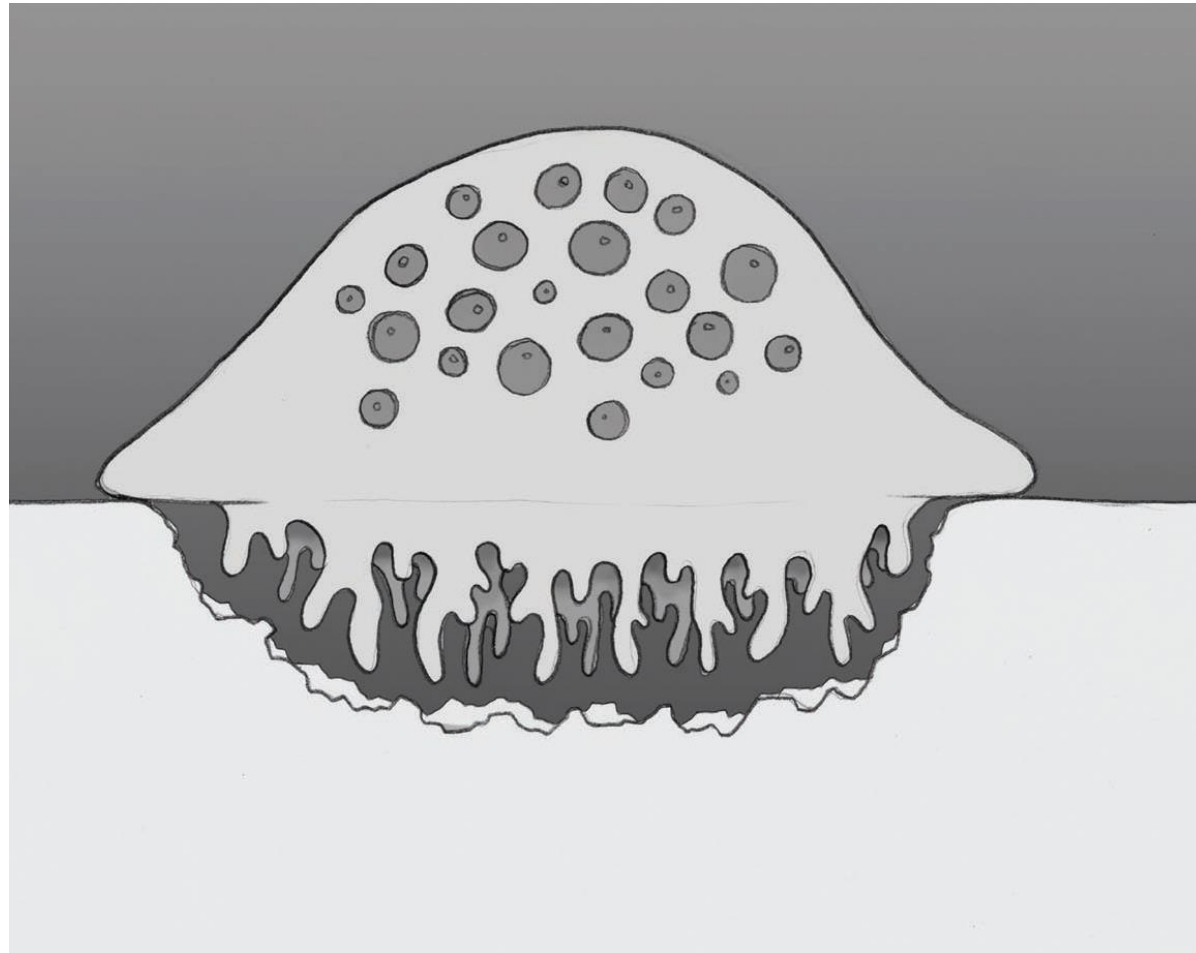
Atrial Fibrillation

Scleritis, Episcleritis

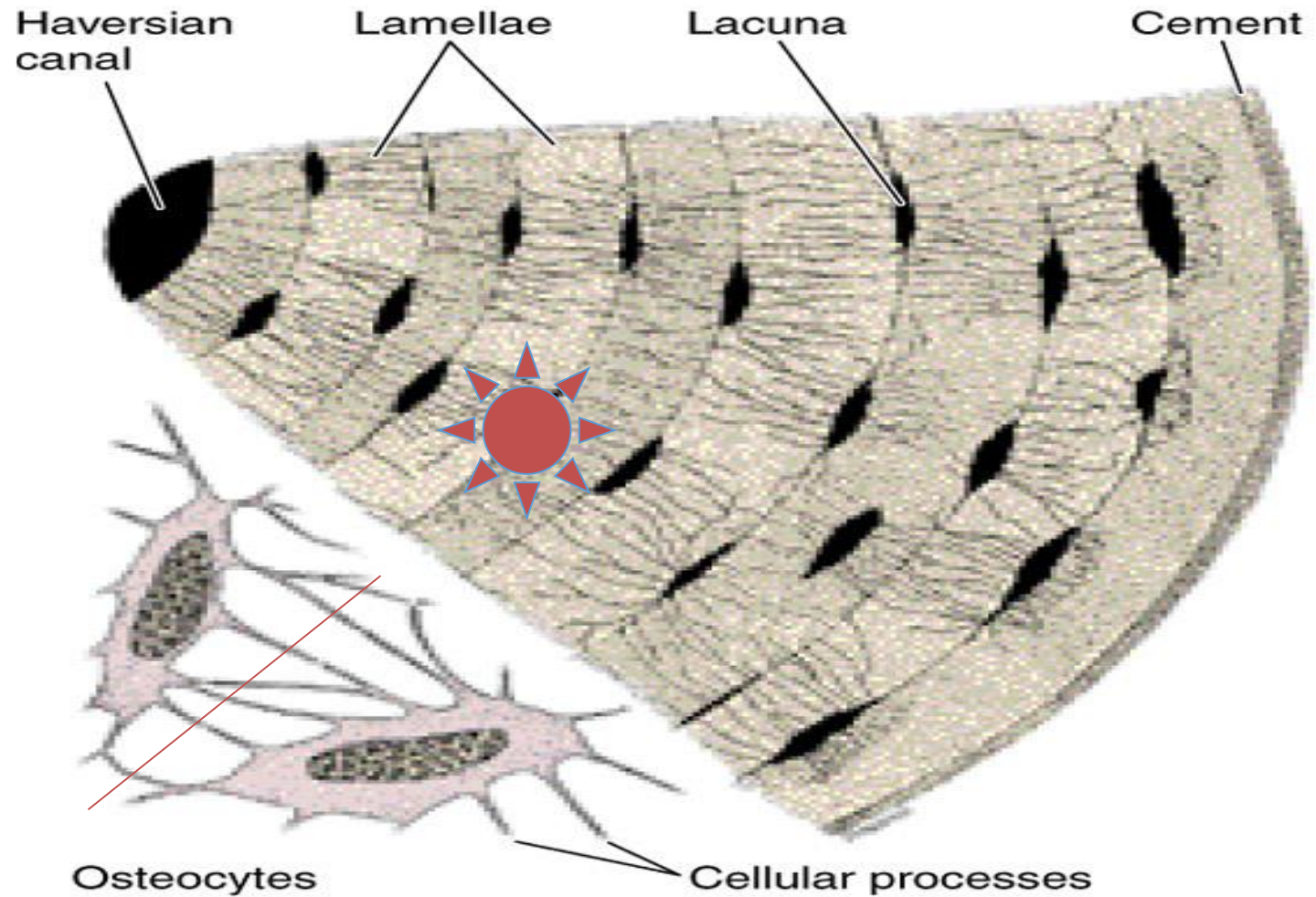
Not Every Osteocyte For Itself



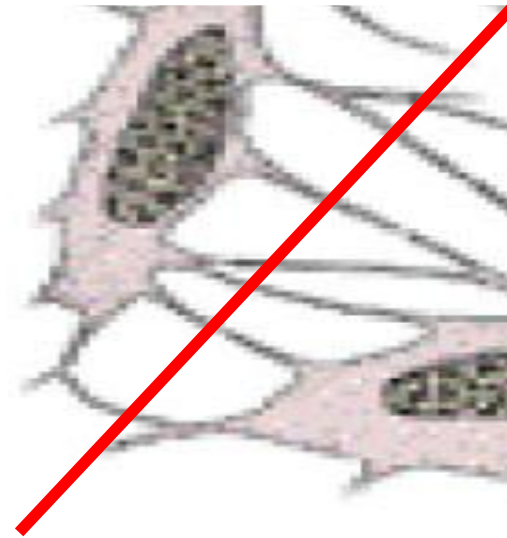
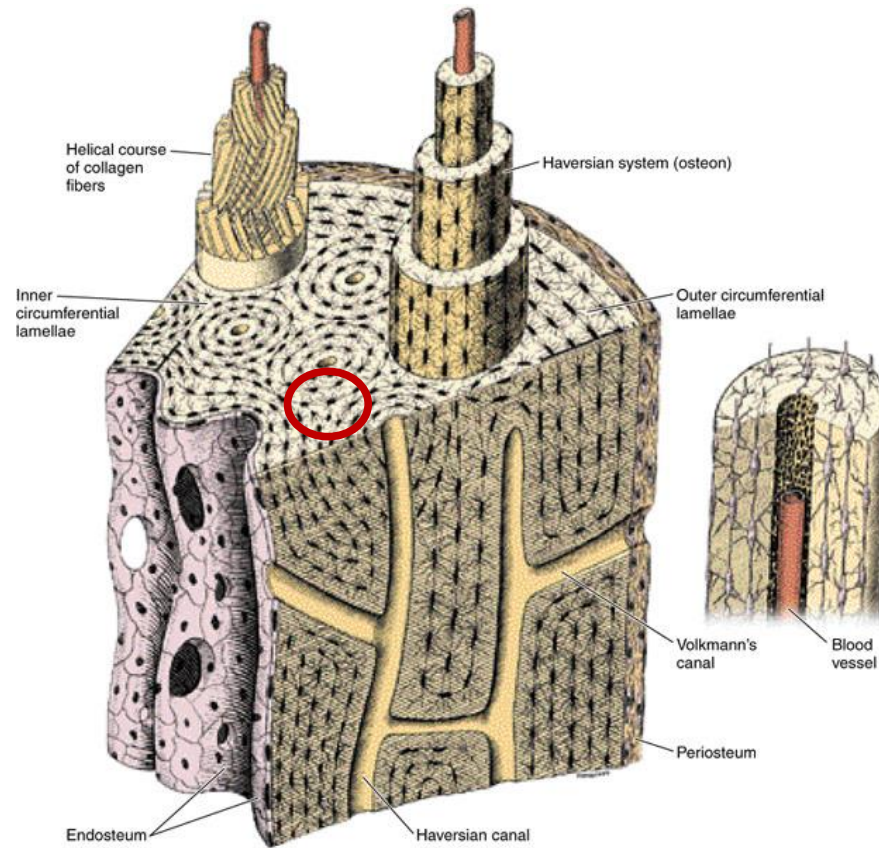
The Osteoclast: Enemy and Friend



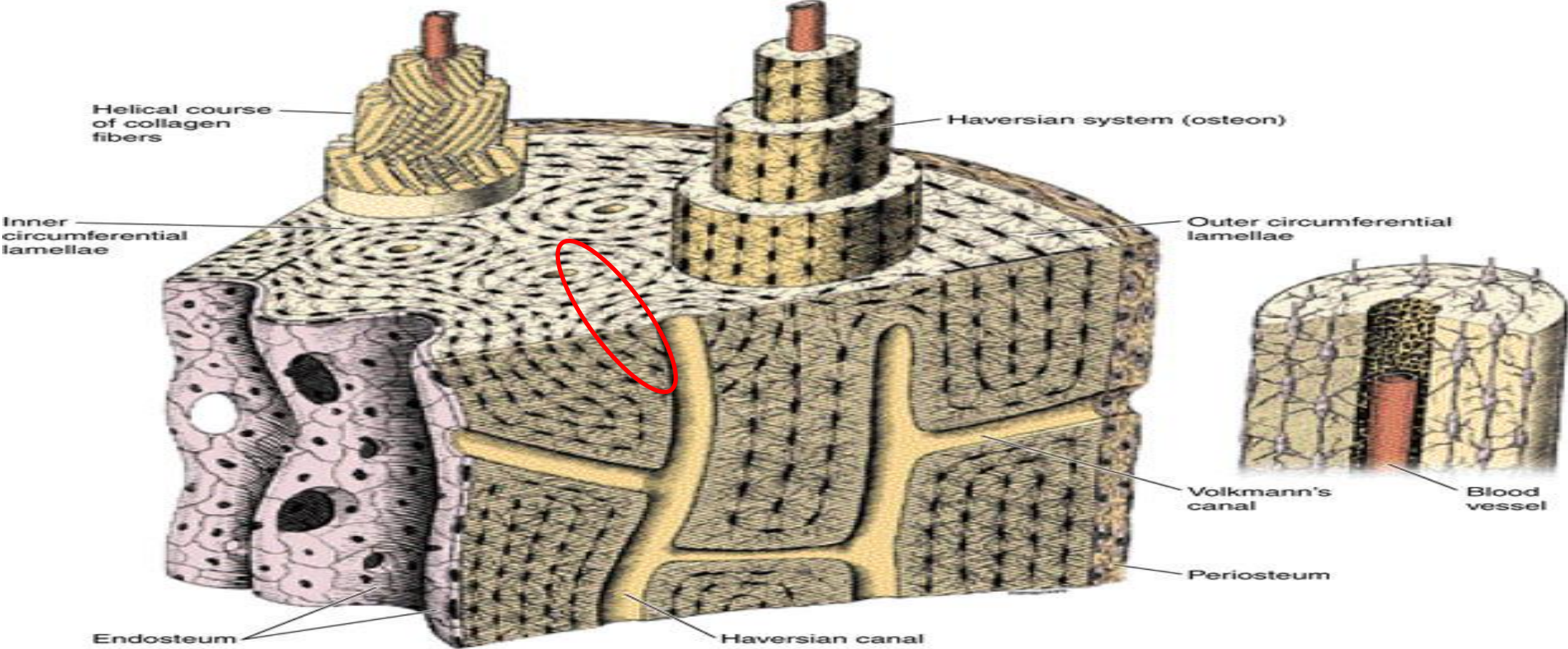
Osteoclasts Initiate Repair



Without the Dynamic Support System



Massive Dysfunction



Medications Problematical

Bisphosphonates:

Osteonecrosis
Spontaneous Fractures

Lupron

- Long Term Side Effects:

Depression, convulsions, emotional instability, amnesia

Hypertension, chest pain, difficulty breathing, asthma,

Tingling, itching, headache, migraine, dim vision, fainting, dizziness

Severe joint pain, nausea, weakness, muscular pain, bone pain,

Nausea/vomiting, abdominal pain, insomnia, weight gain

Lowered libido, erectile dysfunction, hot flashes, acne, E.M.

Reclast

Zoledronic acid, a Bisphosphonate

- An IV injection once every two years:
 - Headache, dizziness, fatigue
 - Flu-like symptoms (e.g., fever, chills, muscle/joint aches)
 - Cough
 - Vision problems
 - Nausea, diarrhea, diverticulitis, *no ulcers*
 - Everything else you get with bisphosphonates!

Forteo

Troublesome

- A Skin Rash
- A Tooth Disease
- Cough
- Headache
- Insomnia
- Sweating
- Leg Cramps
- Neck Pain
- Sensation Of Spinning Or Whirling
- Throat Irritation
- Digestive Disorders
 - Diarrhea
 - Indigestion
 - Vomiting

Serious

- Angioedema
- Hypercalcemia
- Hypertension
- Orthostatic Hypotension
- Osteosarcoma
- Trouble Breathing
- Angina, A Type Of Chest Pain
- Depression
- Fainting
- High Blood Pressure
- Pneumonia

Evenity (Romosozumab)

- Allergic Reaction(s)

Rash; hives; swelling of the face, lips, mouth, tongue, or throat which may cause difficulty in swallowing or breathing, anaphylaxis.

- Hypocalcemia

- Osteonecrosis

- Atypical femoral fractures.

- Joint pain and headaches.

- Poverty (\$21,900/annum)

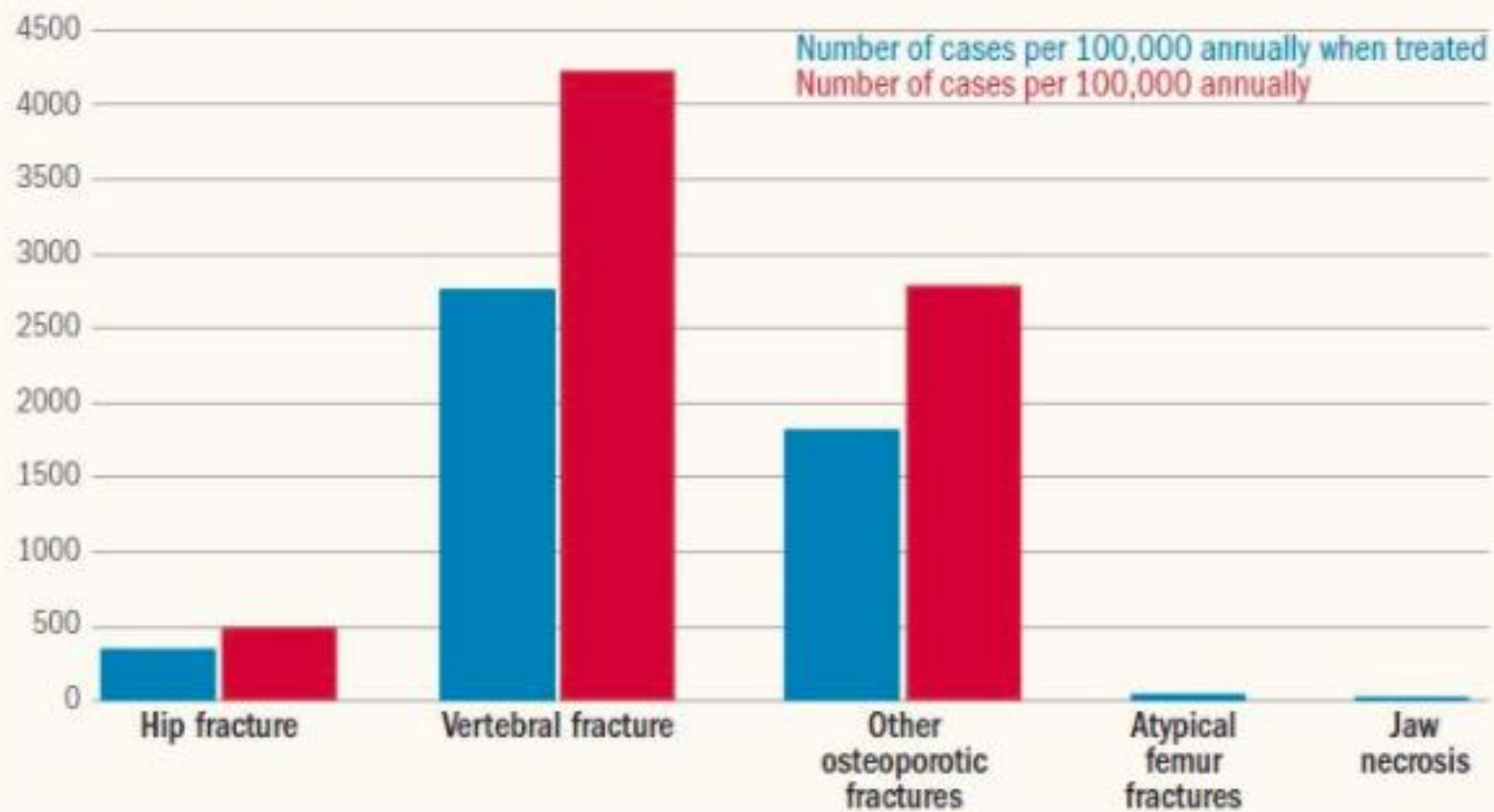
Economic Cost of Falls

- Falls: \$31,000,000,000¹
- Hip Fracture \$160,000²
- Yoga ... \$75

1. Stevens JA, Corso PS, Finkelstein EA, Miller TR. The costs of fatal and nonfatal falls among older adults. *Injury Prevention* 2006a;12:290–5.

2. Barrett-Connor, E. “The economic and human costs of osteoporotic fracture.” *Am. J. Med.* 1995;(98)2,(1):3S-8S.

Risks with and without bisphosphonate therapy



Source: Adapted from Adler RA et al. "Managing osteoporosis patients after long-term bisphosphonate treatment." *Journal of Bone and Mineral Research* (Jan. 2016), Vol. 31, No. 1, pp. 16-35.

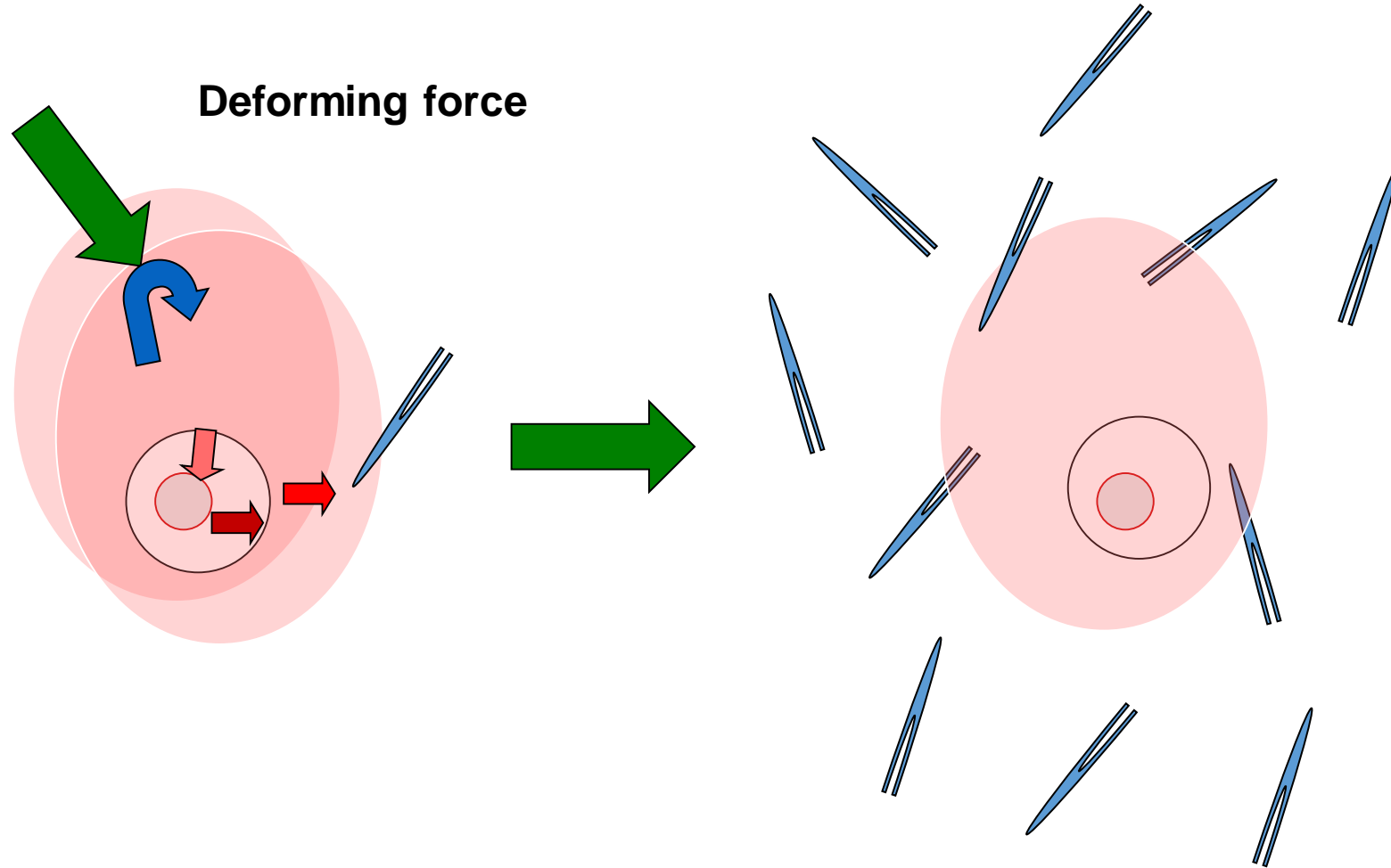
What's so good about Yoga?



Osteogenesis: Wolff's Law

Architectonic of bone follows the lines of force to which the bone is exposed.

Wolff, J: *The Law of Bone Transformation*. Berlin, A. Hirschwald, 1892.



Osteogenesis: Wolff's Law

Architectonic of bone follows the lines of force to which the bone is exposed.

***Physical Stress* stimulates mechanoreceptors**

Mechanoreceptors activate new DNA

New DNA synthesizes new protein

Extruded protein attracts:

phosphates and calcium

which makes bone

Osteogenesis: Wolff's Law

Architectonic of bone follows the lines of force to which the bone is subject.

Physical Stress stimulates mechanoreceptors

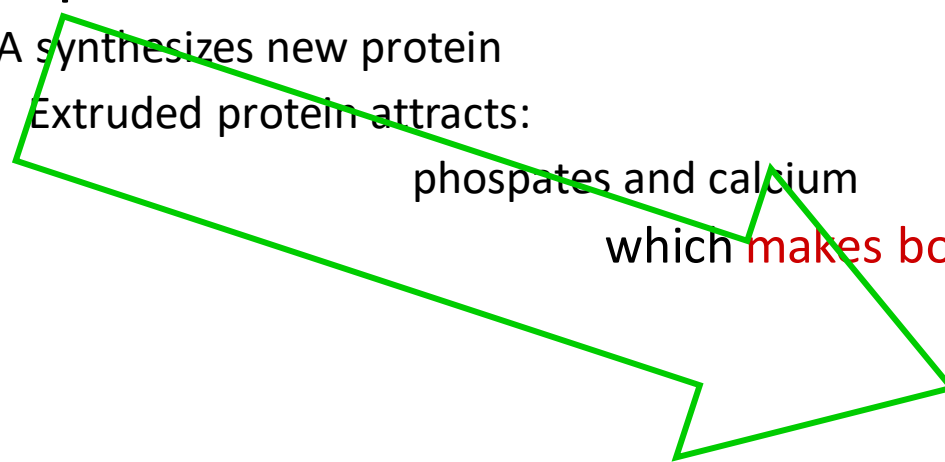
Mechanoreceptors activate new DNA

New DNA synthesizes new protein

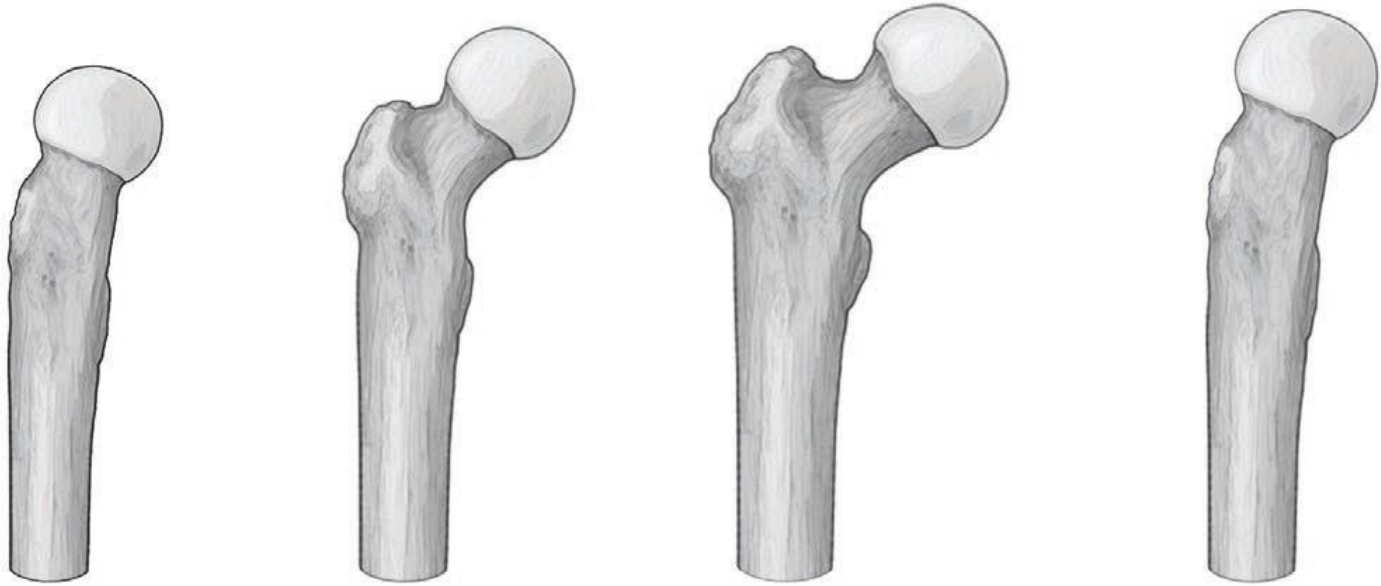
Extruded protein attracts:

phosphates and calcium

which **makes bone**



The Power of Wolff



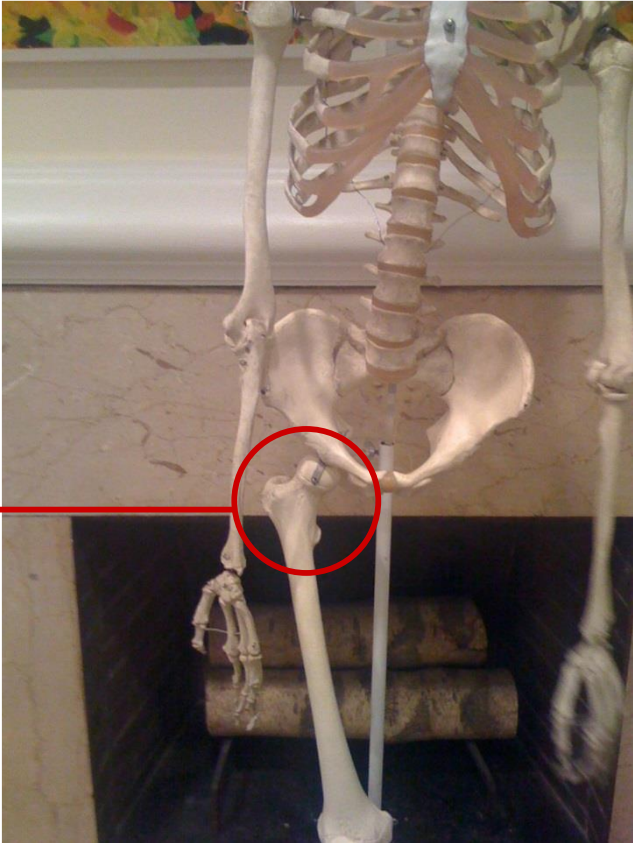
Birth

3 Years

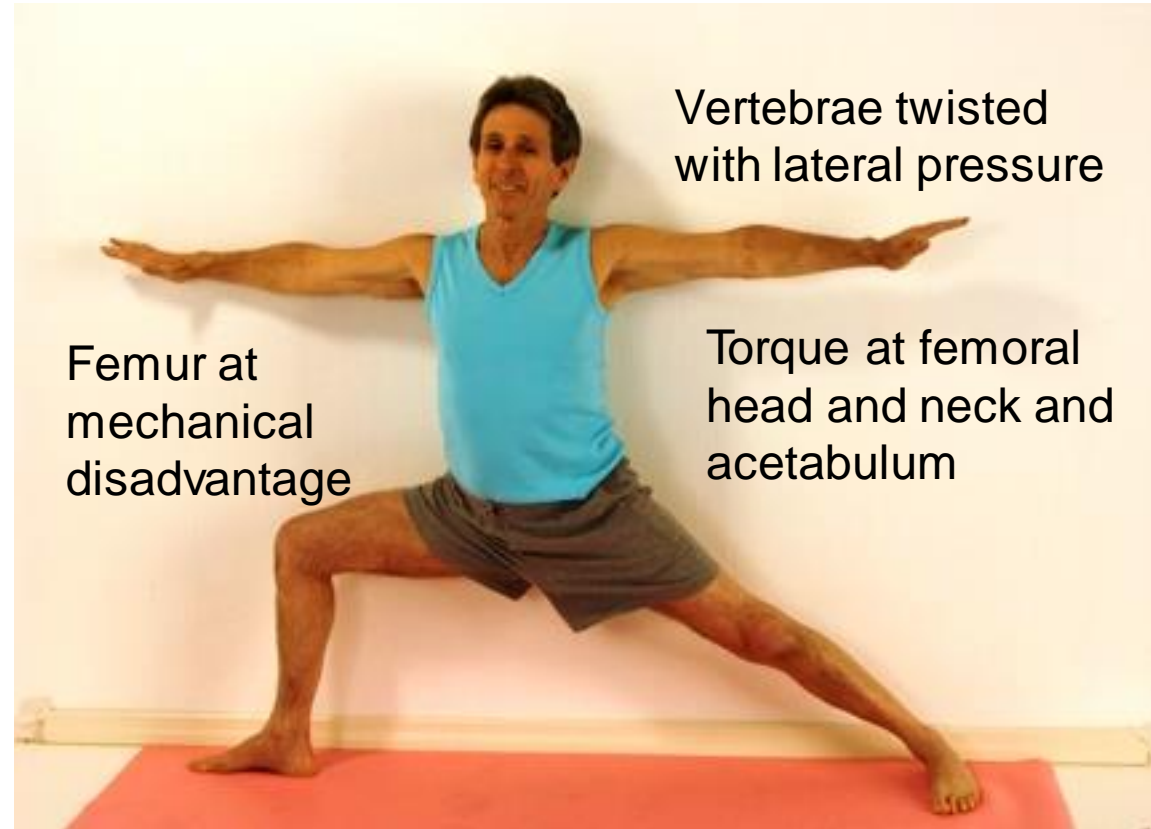
5 Years

Paraplegic

Support you in the manner



What's so good about Yoga?



Yoga outdoes gravity

- Muscles are stronger than gravity.
- *Asana* stress bones more than gravity.
 - Agonist vs antagonist

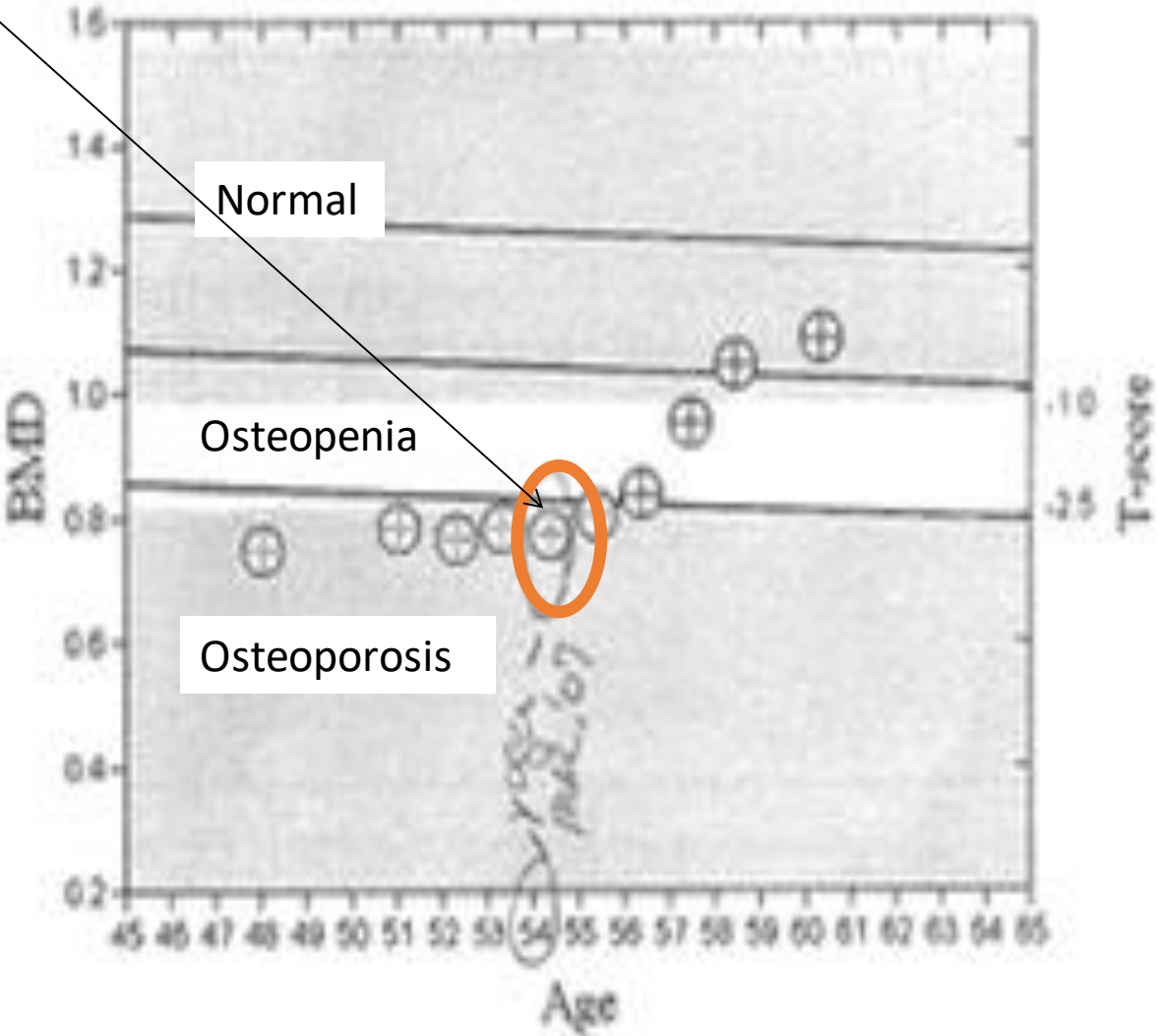
Curb your Enthusiasm

“There is nothing that dooms a good idea to lack of acceptance faster than overambitious claims by its protagonists.”

- L.E. Lanyon, 1989

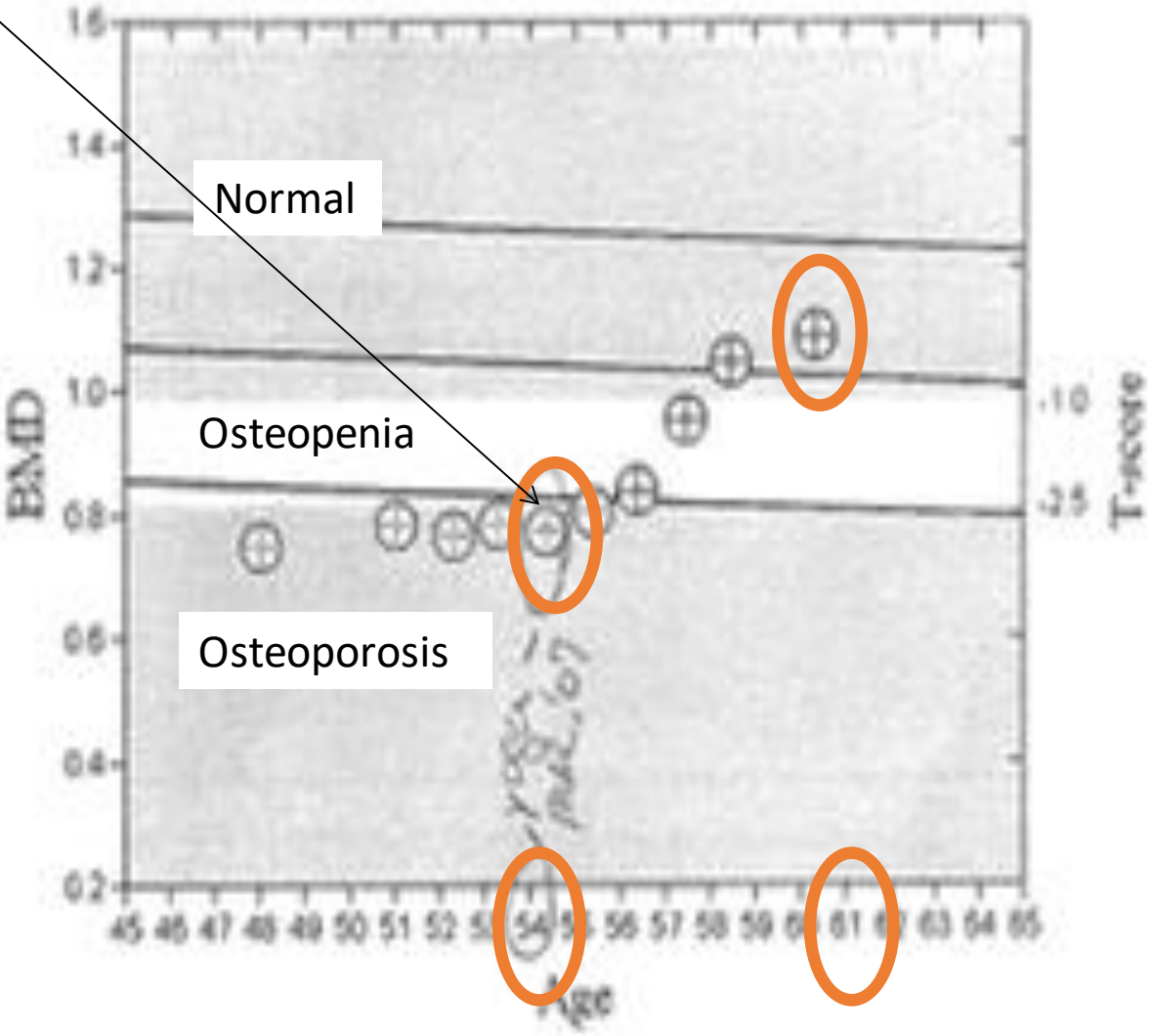
Started doing Yoga

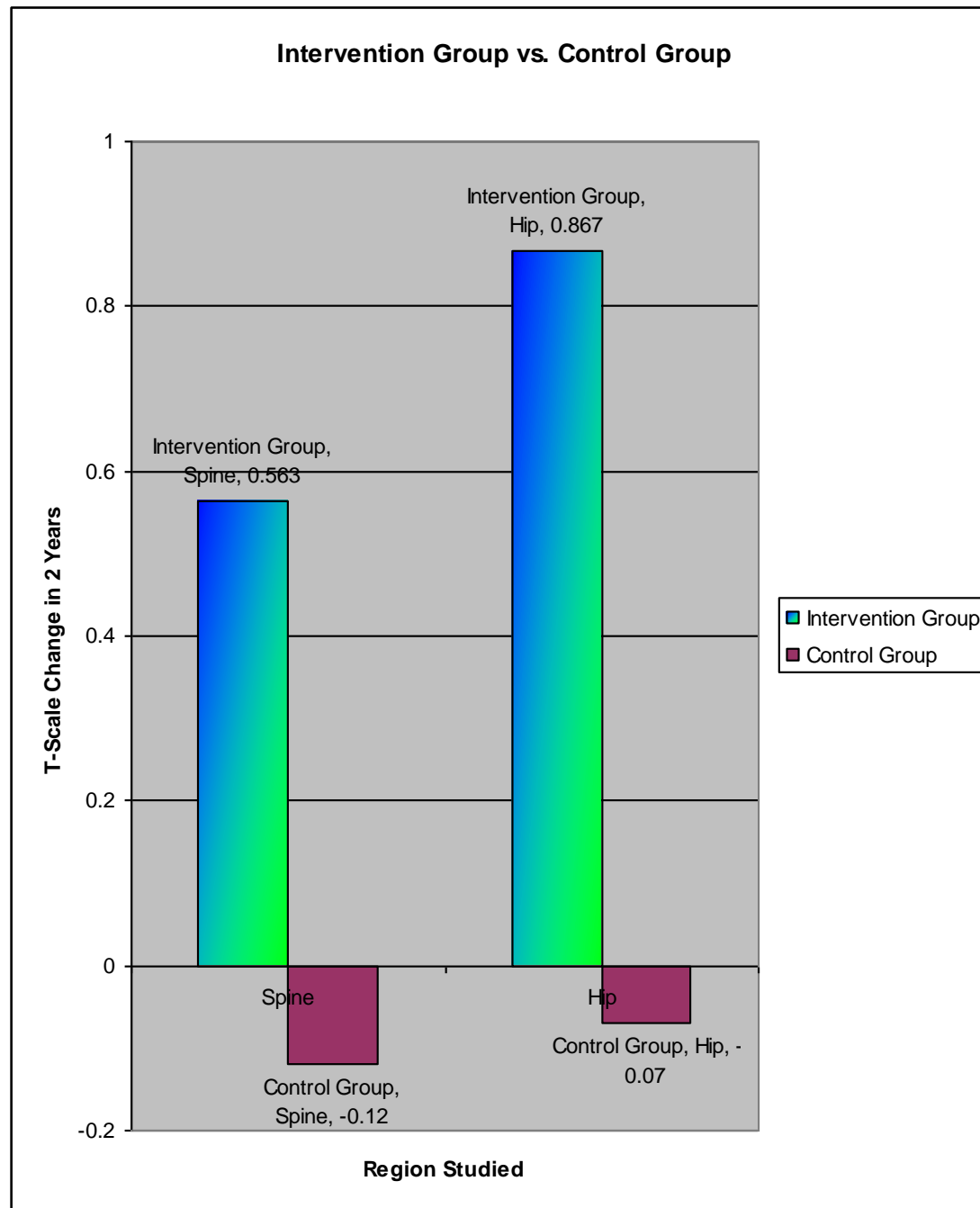
L1-L4



Started doing Yoga

L1-L4





Fishman, LM.
"Yoga for Osteoporosis"
Topics in Geriatric Rehabilitation
August 15, 2009

Two Years before starting Yoga

VS

Two Years doing Yoga

Location	Pre-Yoga	Number	Timing	SD	Post-Yoga	Timing	Number	SD
Spine	-0.036	128	47	.125/.118	0.048	21.7	71	.551/.44
Left Hip	-0.017	130	52	.117/.183	0.088	22	81	.103/.159
Left Femur	-0.03	125	48	.317/.192	0.003	24	83	.129/.133

Negative *vs* Positive

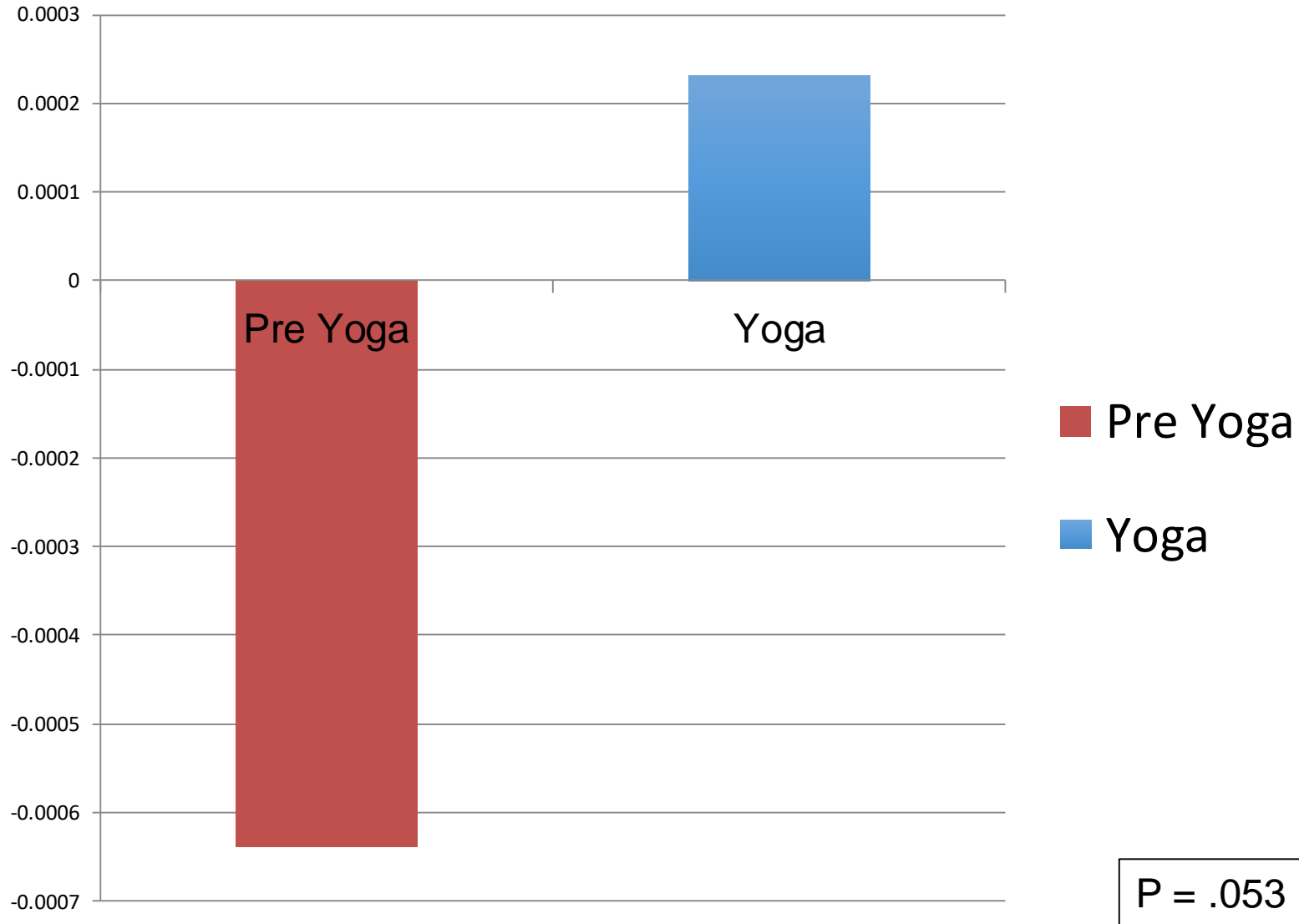
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Left Femur	-0.03	125	48	.317/.192	0.003	24	83	.129/.133

Two Years Before *vs* Two Years After

	Number of patients Pre yoga	Time interval Pre yoga	Change per month Pre yoga	Number of patients Post yoga	Time interval Post yoga	Change per month Post yoga	P value
Spine	68	12 to 177 months	-0.0009±0.0002	27	11 to 59 months	0.0010±0.0007	0.0215
Left Hip	40	12 to 177 months	-0.0006±0.0002	16	23 to 59 months	0.0003±0.0007	0.0139
Left Femur	22	24 to 177 months	-0.0011±0.0003	14	11 to 59 months	0.0009±0.0003	0.0002

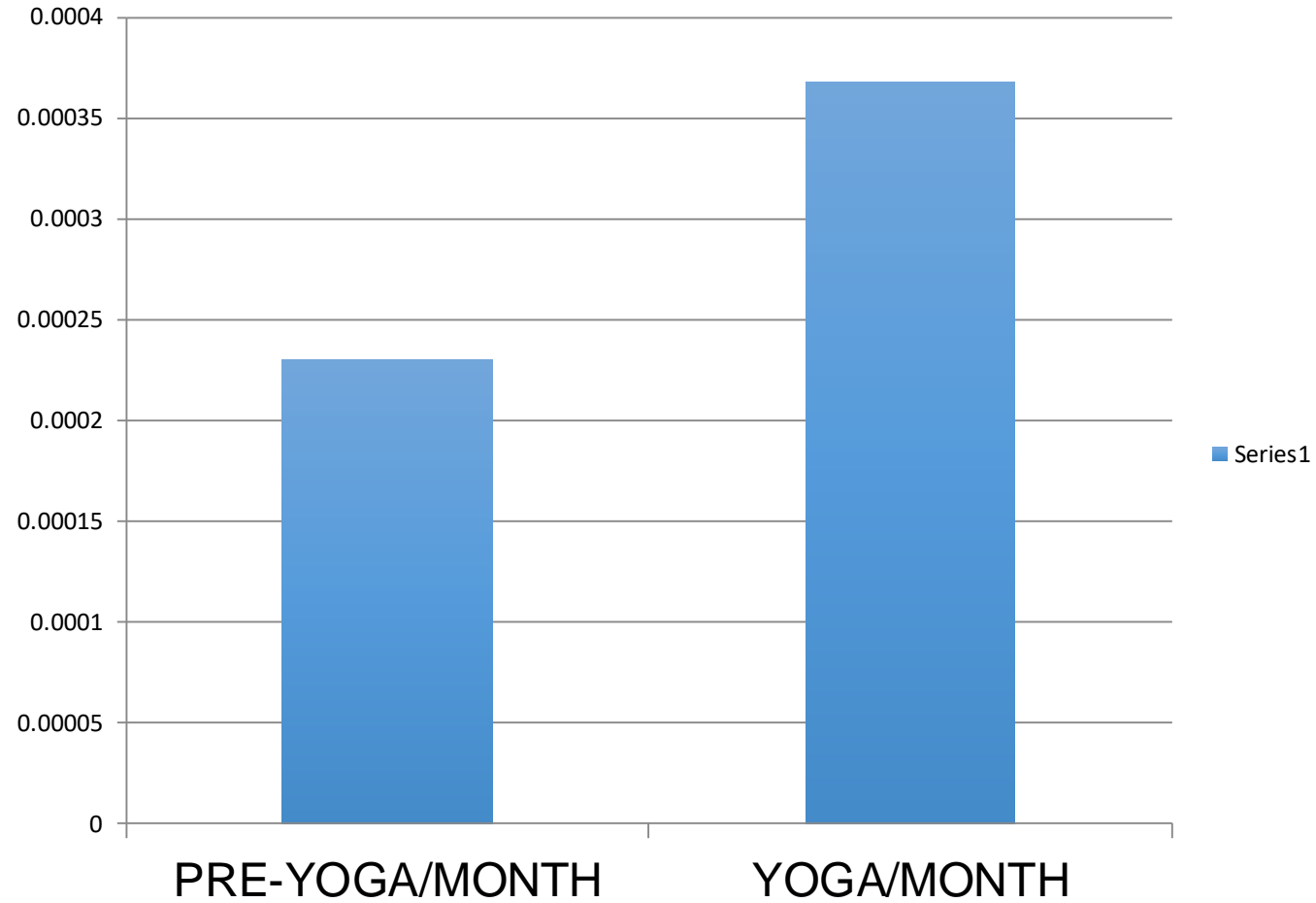
Monthly Change Before and After Yoga

Femur



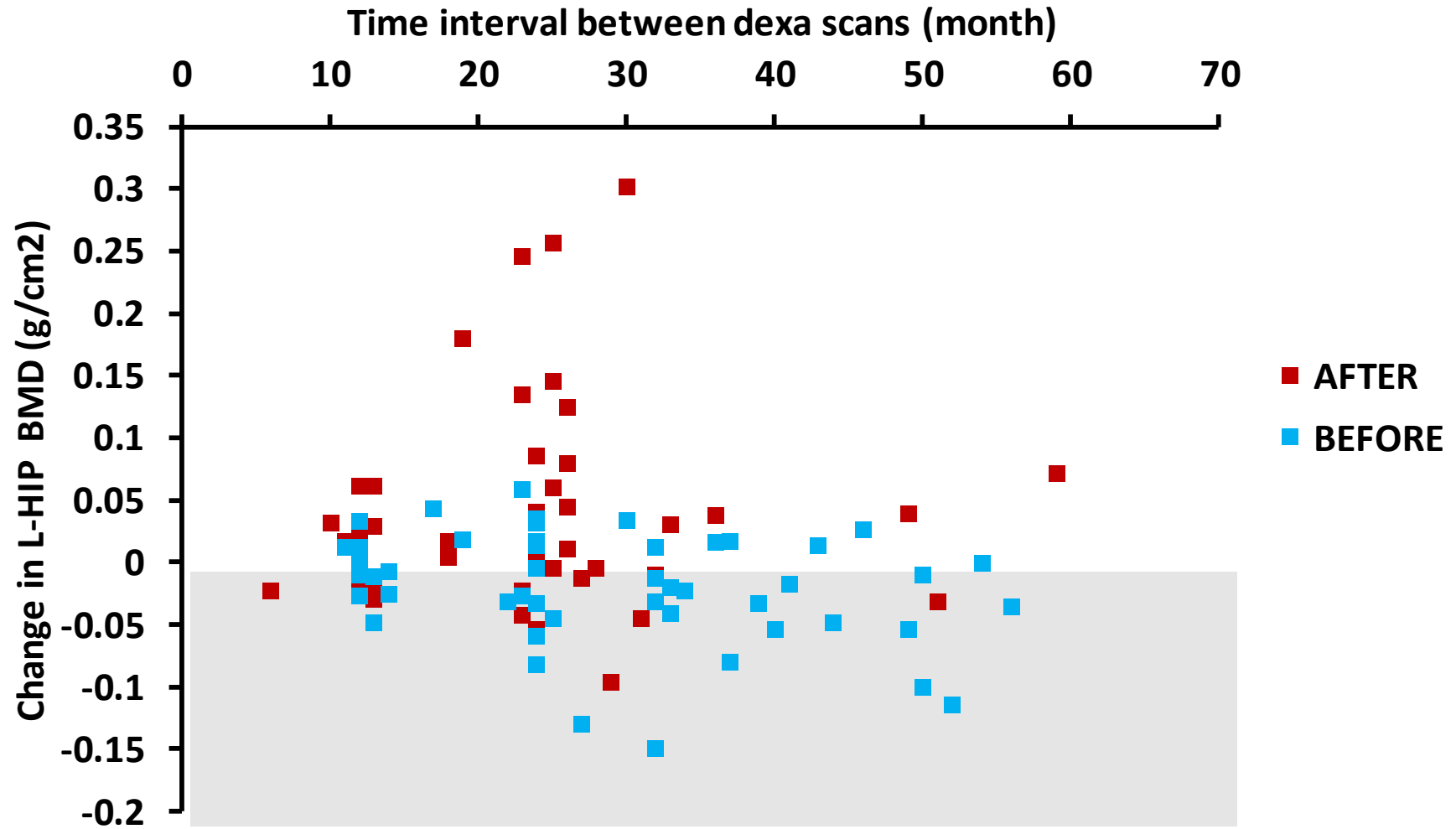
Mean Monthly Gain Before and After Yoga

Hip

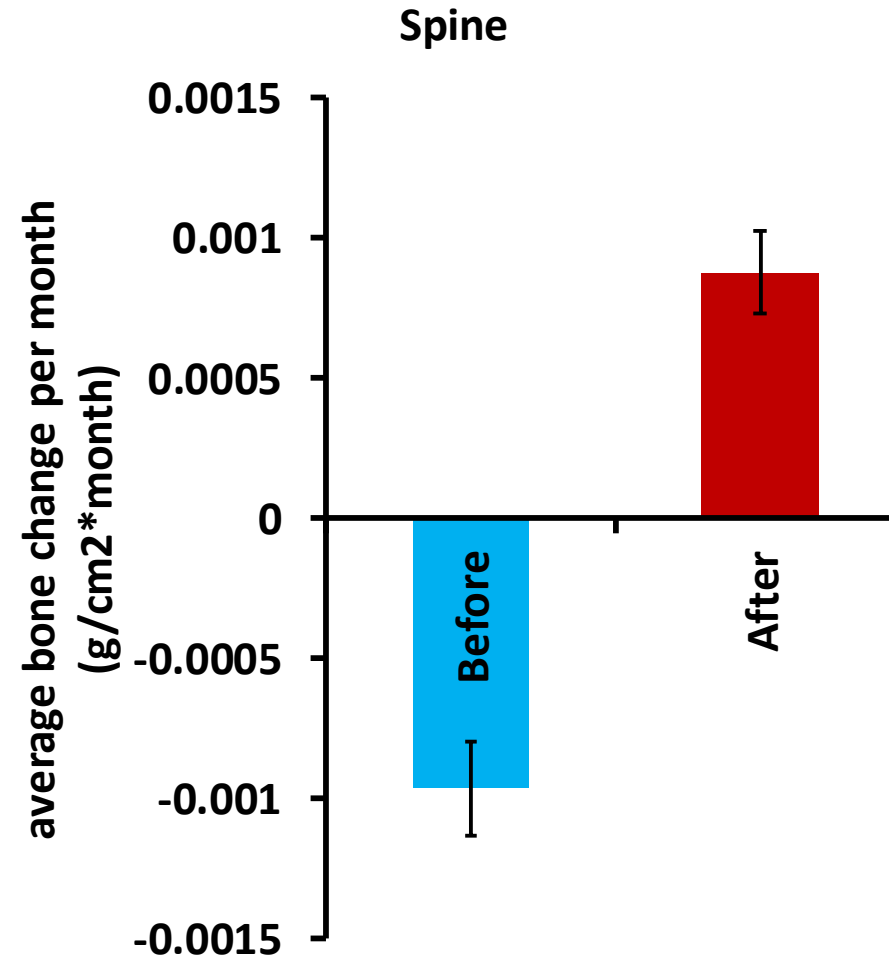


Not Significant

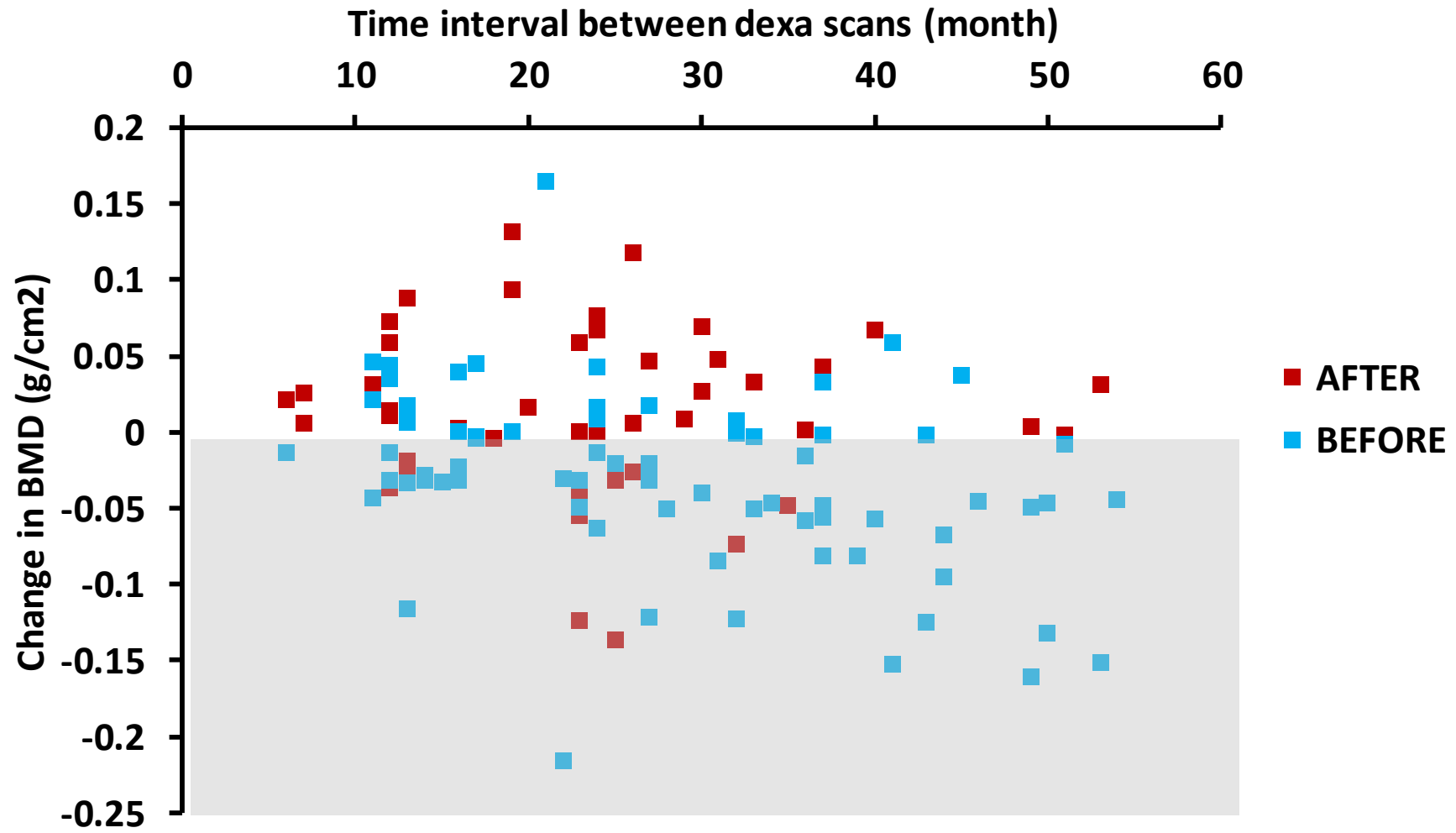
HIP



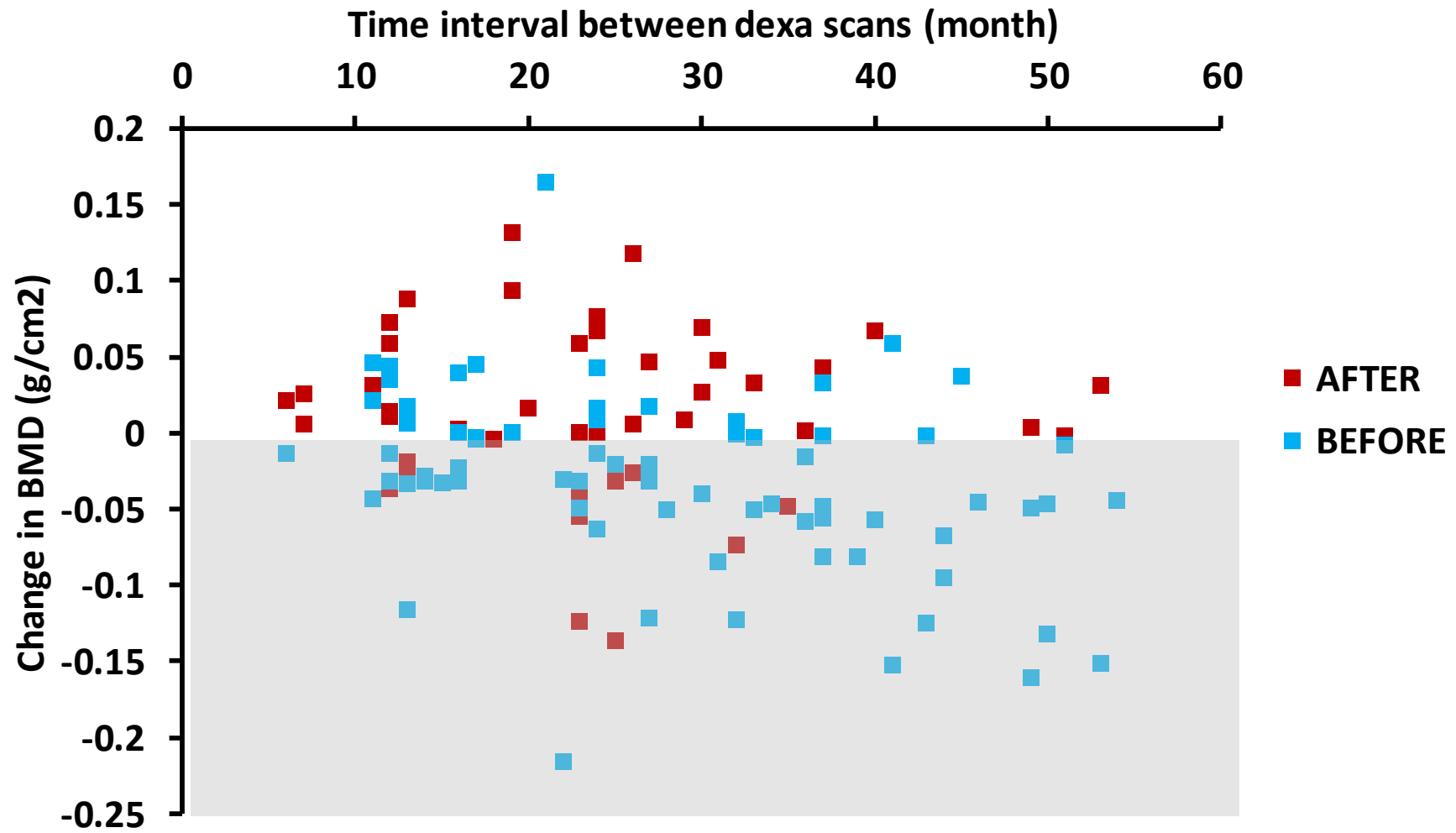
Average bone density change (Spine)



SPINE

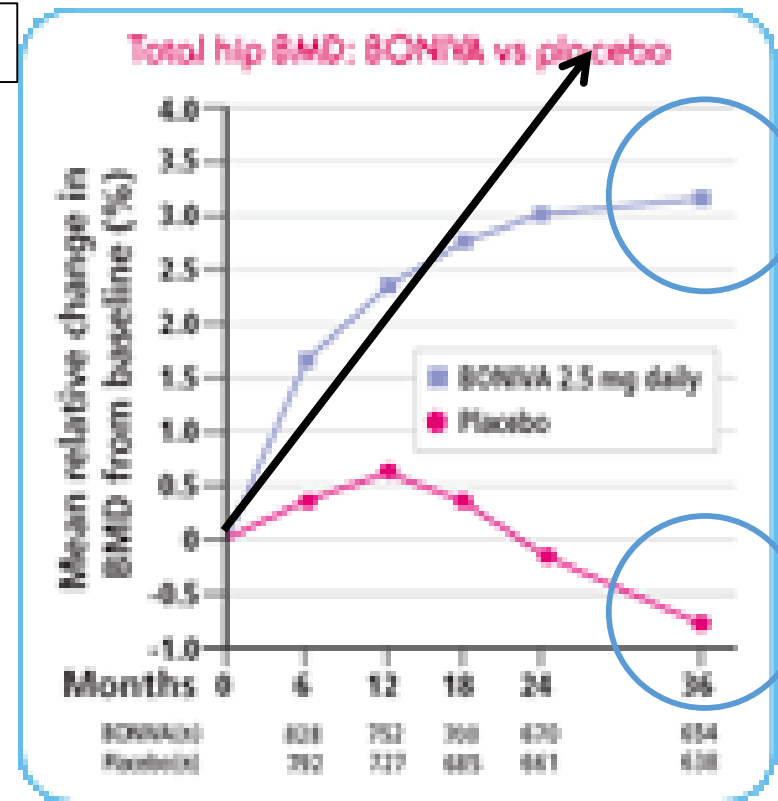
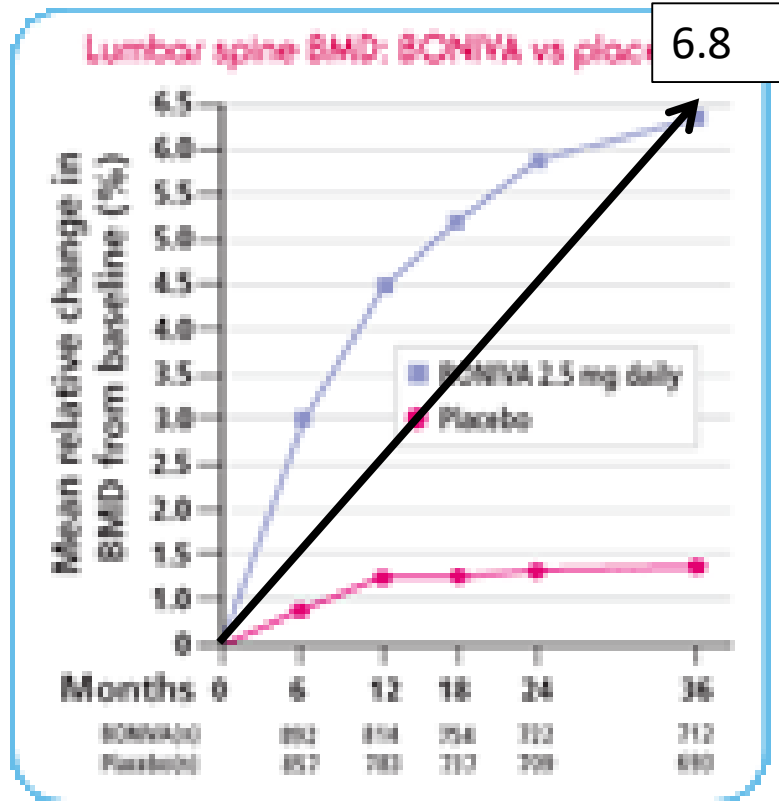


SPINE



Yoga vs. Boniva

5.6



Cardiovascular Advantage:

- Suptapadangusthasana I and II:



[A. V. Bisconti](#), [E. Cè](#), [S. Longo](#), [M. Venturelli](#), [G. Coratella](#), [E. Limonta](#), [C. Doria](#), [S. Rampichini](#), [E. Esposito](#). Evidence for improved systemic and local vascular function after long-term passive

Libido, ED, Feminization

- "At my age..."
- Frankness
- Love is.

Article on Testosterone and COVID-19

- The researchers hope that these androgen-blocking drugs will control TMPRSS2, the enzyme that functions as a welcome mat to the coronavirus in men. Studies in Italy and the United States have shown that men with prostate cancer who took drugs to reduce their testosterone levels were as much as one-quarter as likely to contract COVID-19.

<https://www.sfchronicle.com/health/article/Unwelcome-mat-Male-sex-hormones-appear-to-help-15395442.php>

Dire Warnings



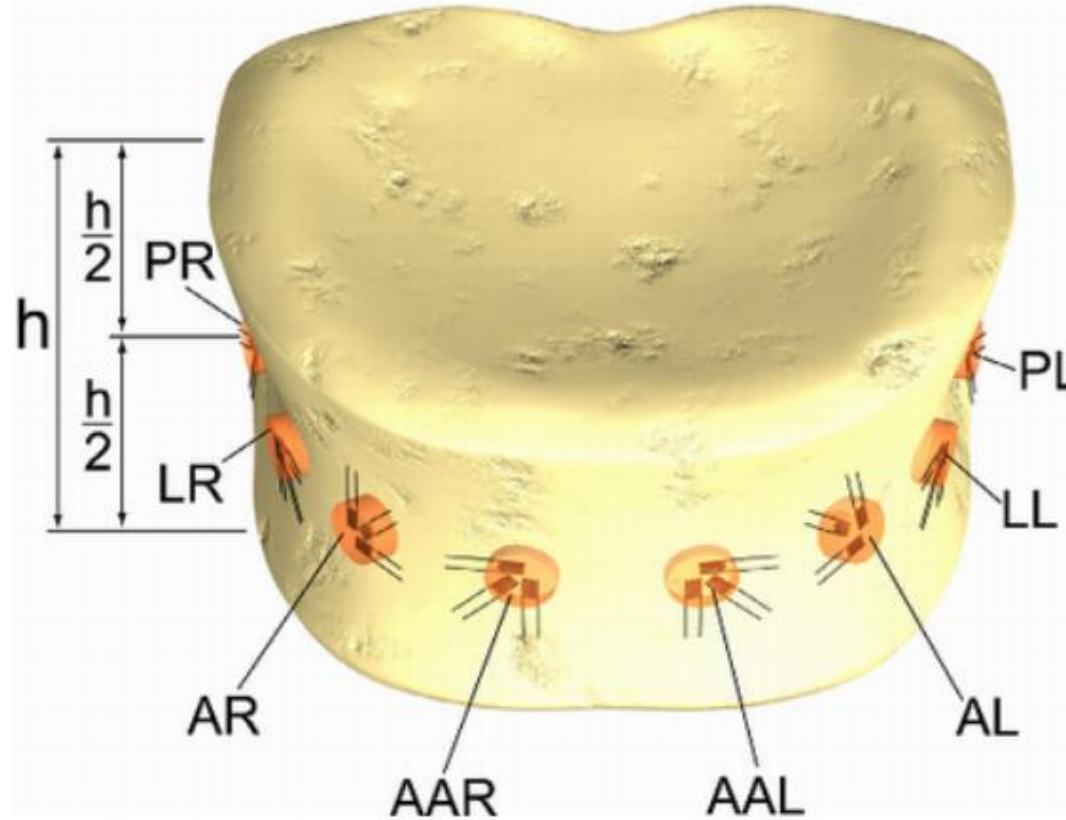
Cervical Fracture

Rotator Cuff Syndrome

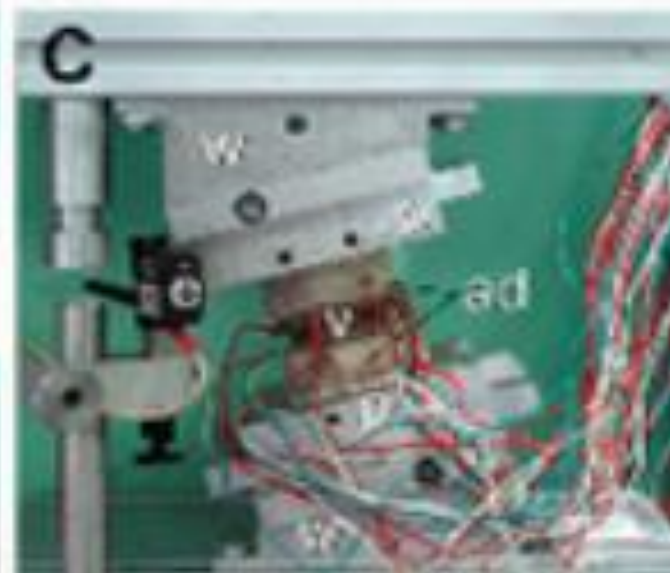
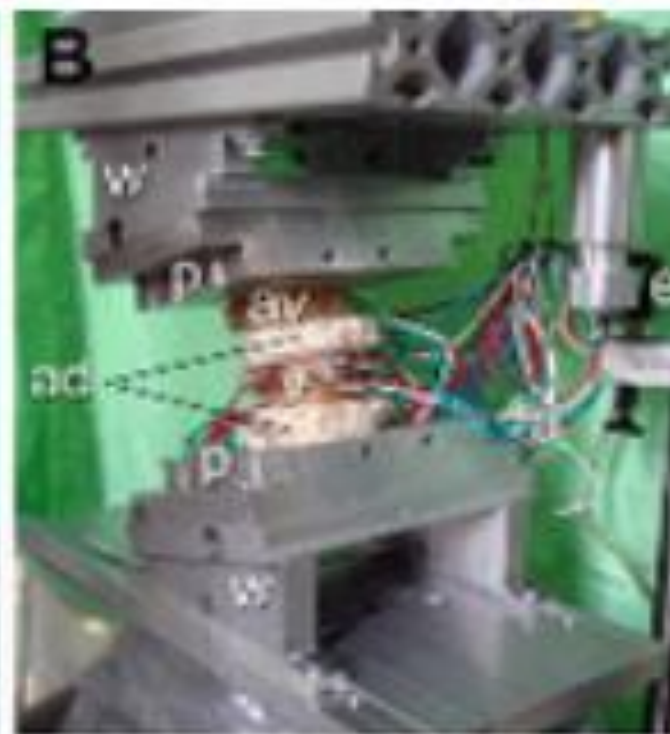
Spinal Fracture

Other Fractures

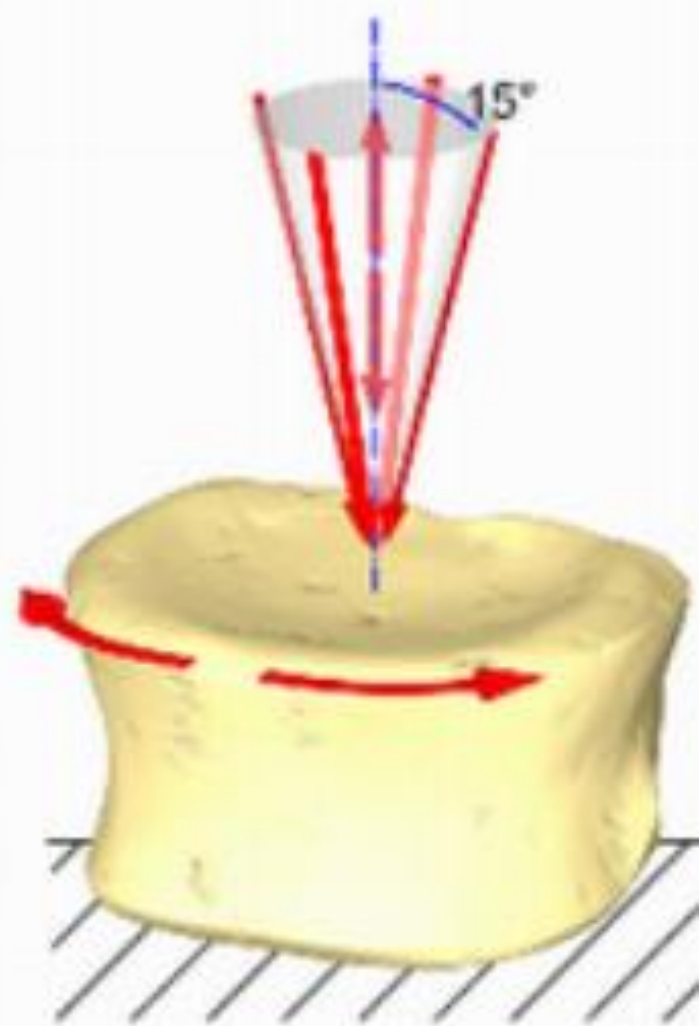
Dislocation at the hip

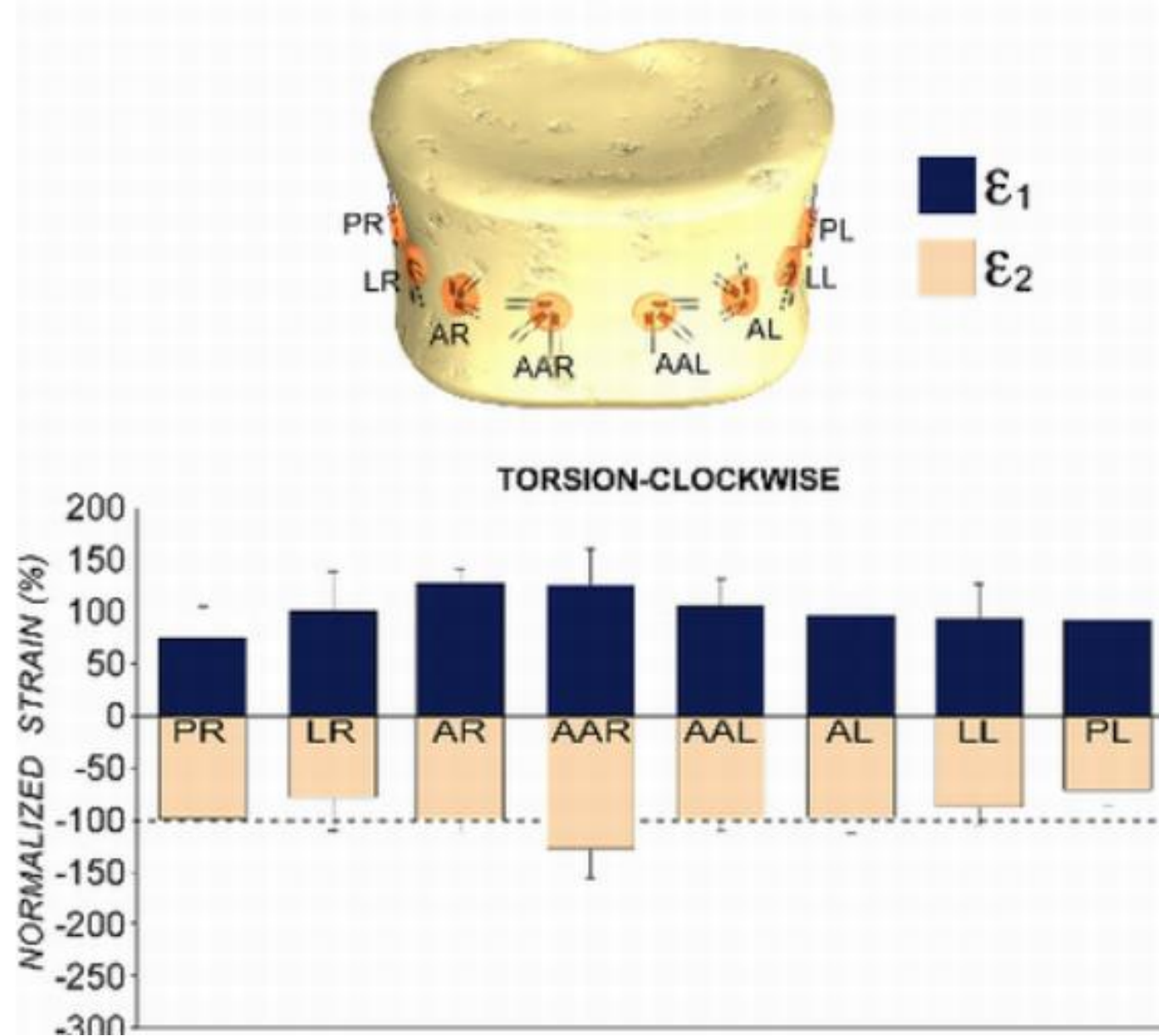


Cristofolini L, Brandolini N, Danesi V, Juszczak MM, Erani P, Viceconti M. "Strain distribution in the lumbar vertebrae under different loading configurations." *Spine J.* 2013 Oct;13(10):1281-92.

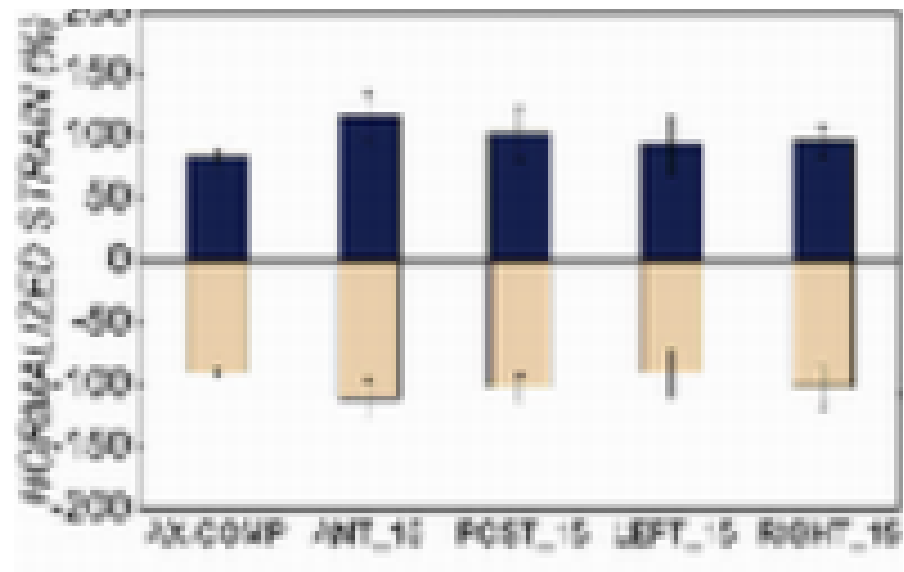


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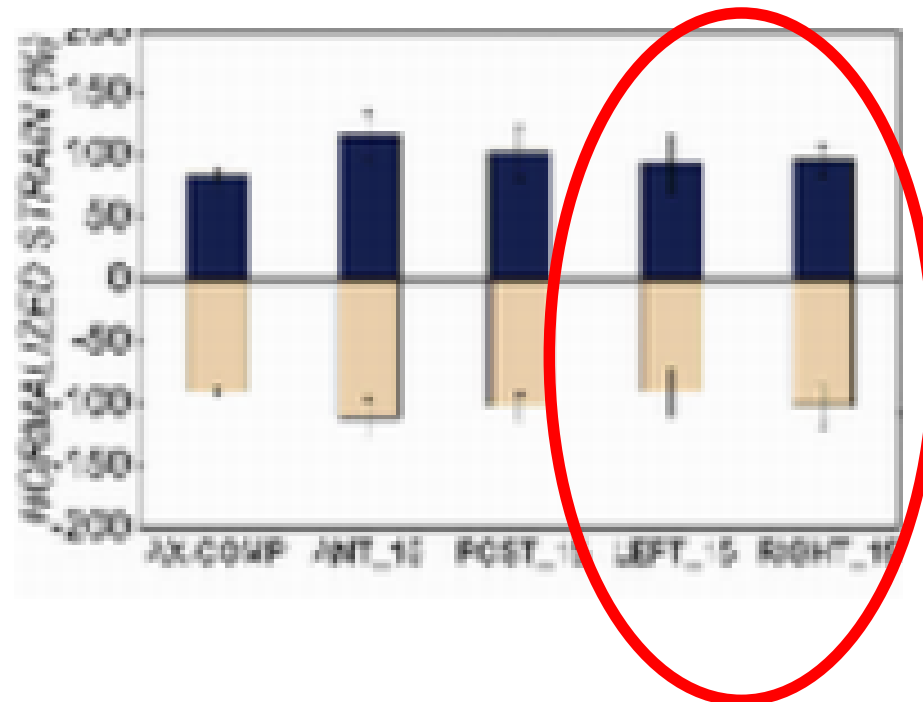




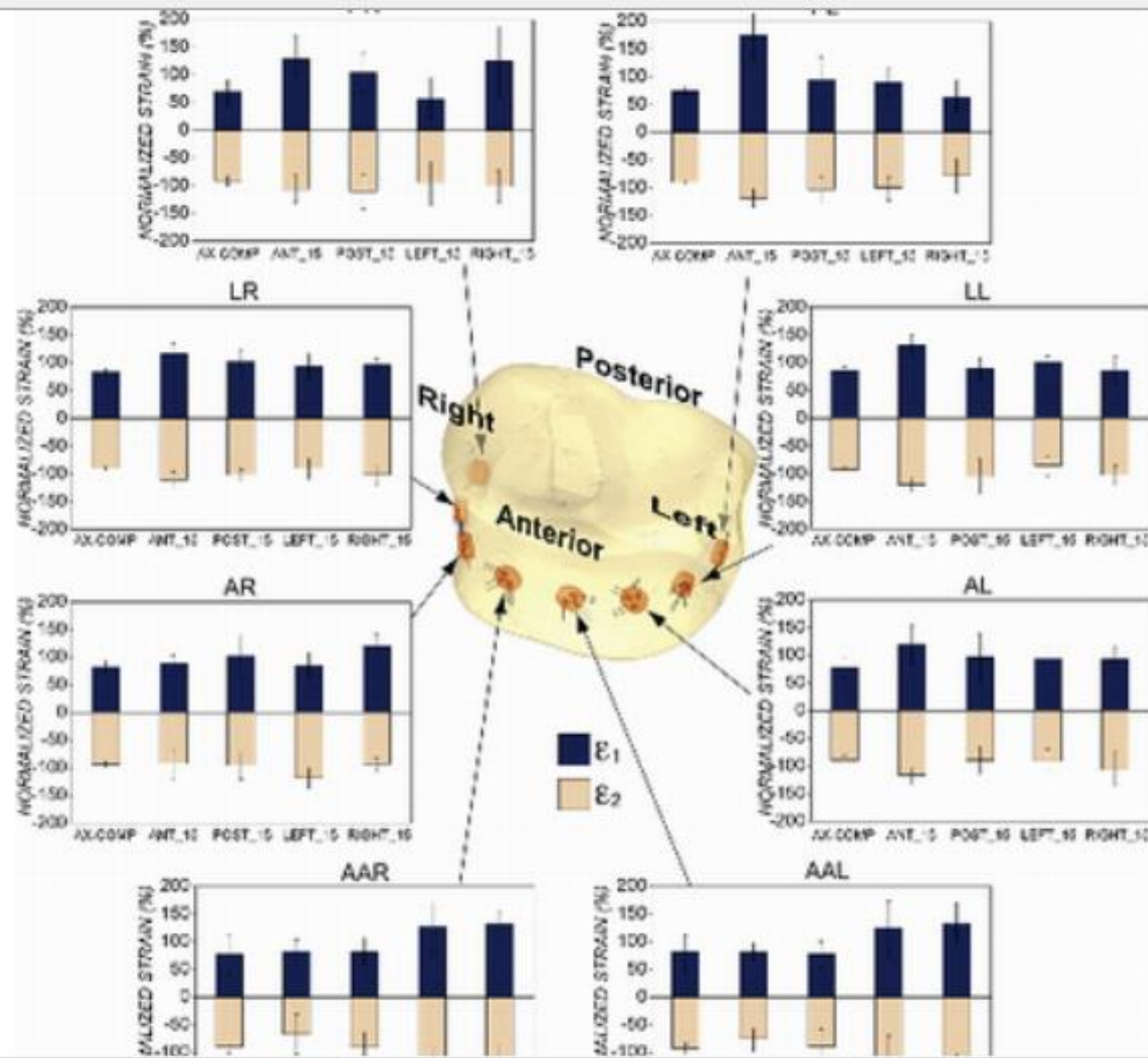
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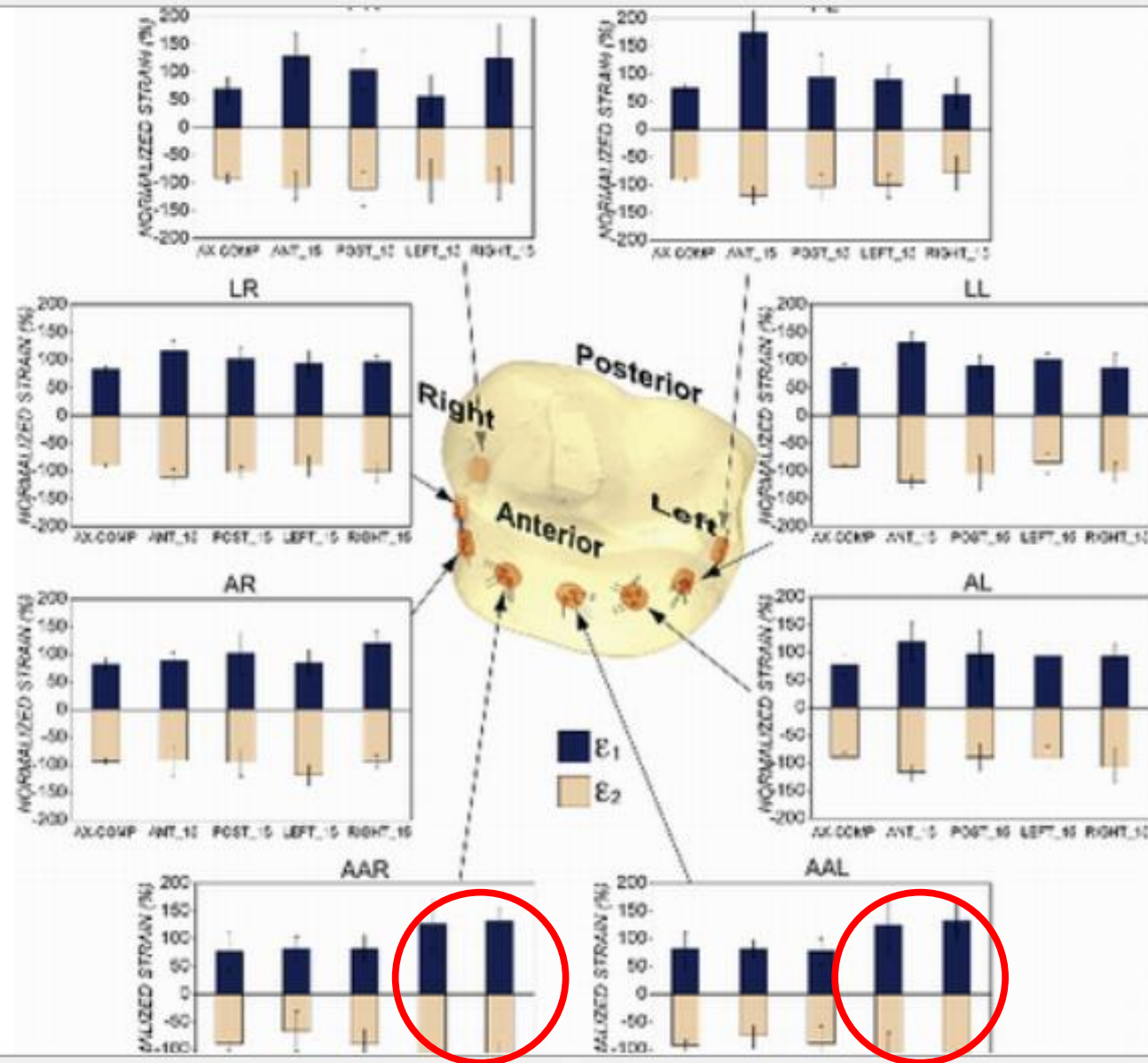
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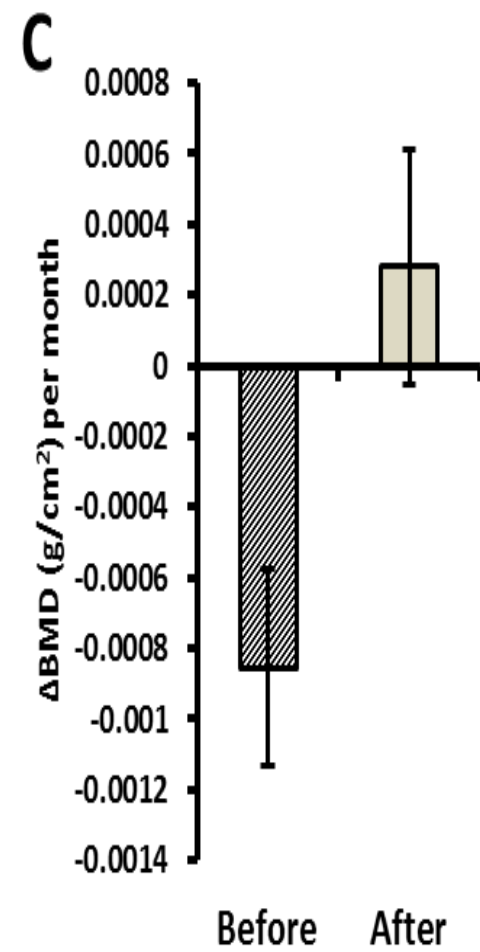
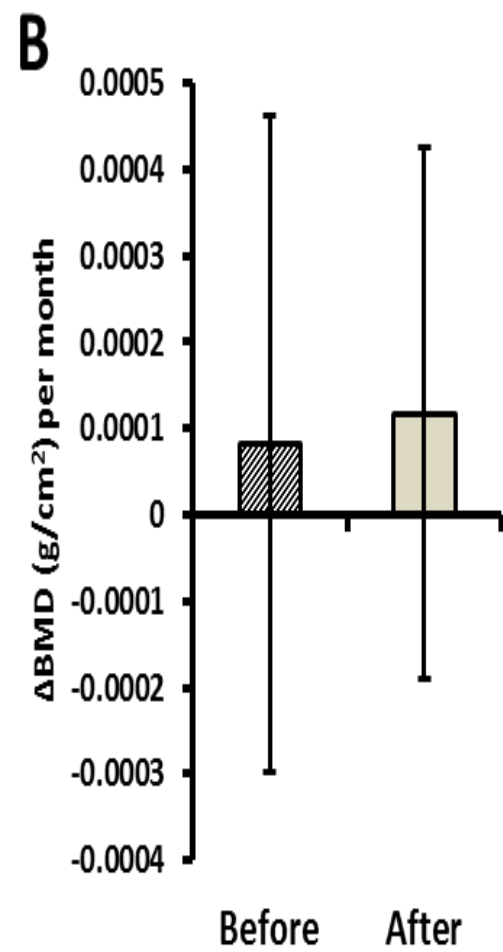
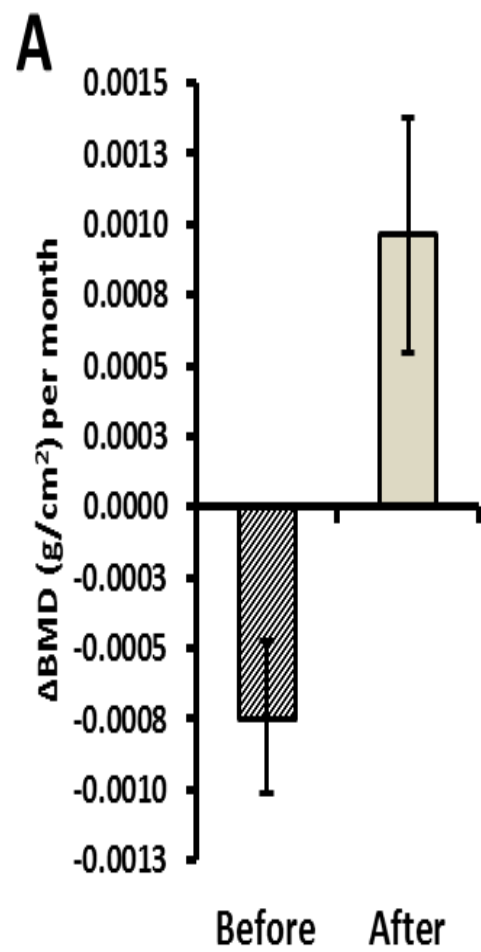
Best Study

- 741 participants
 - Osteoporosis
 - Osteopenia
- 150,000 hours
- No fractures

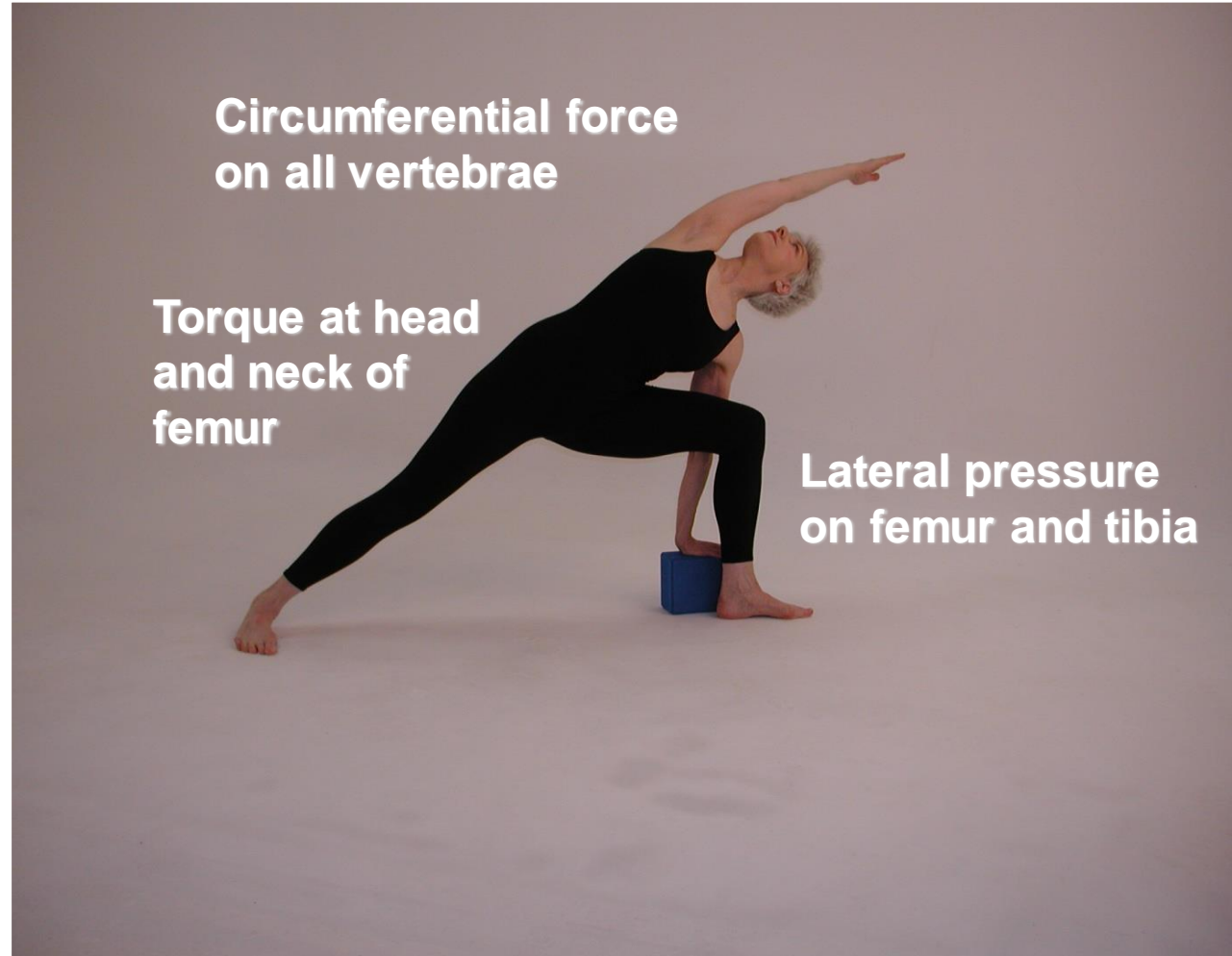
No serious injuries

What did they have to do?

- 12 minutes of yoga
- That means a class or two
- Do the poses at least every other day, and best daily
- Try



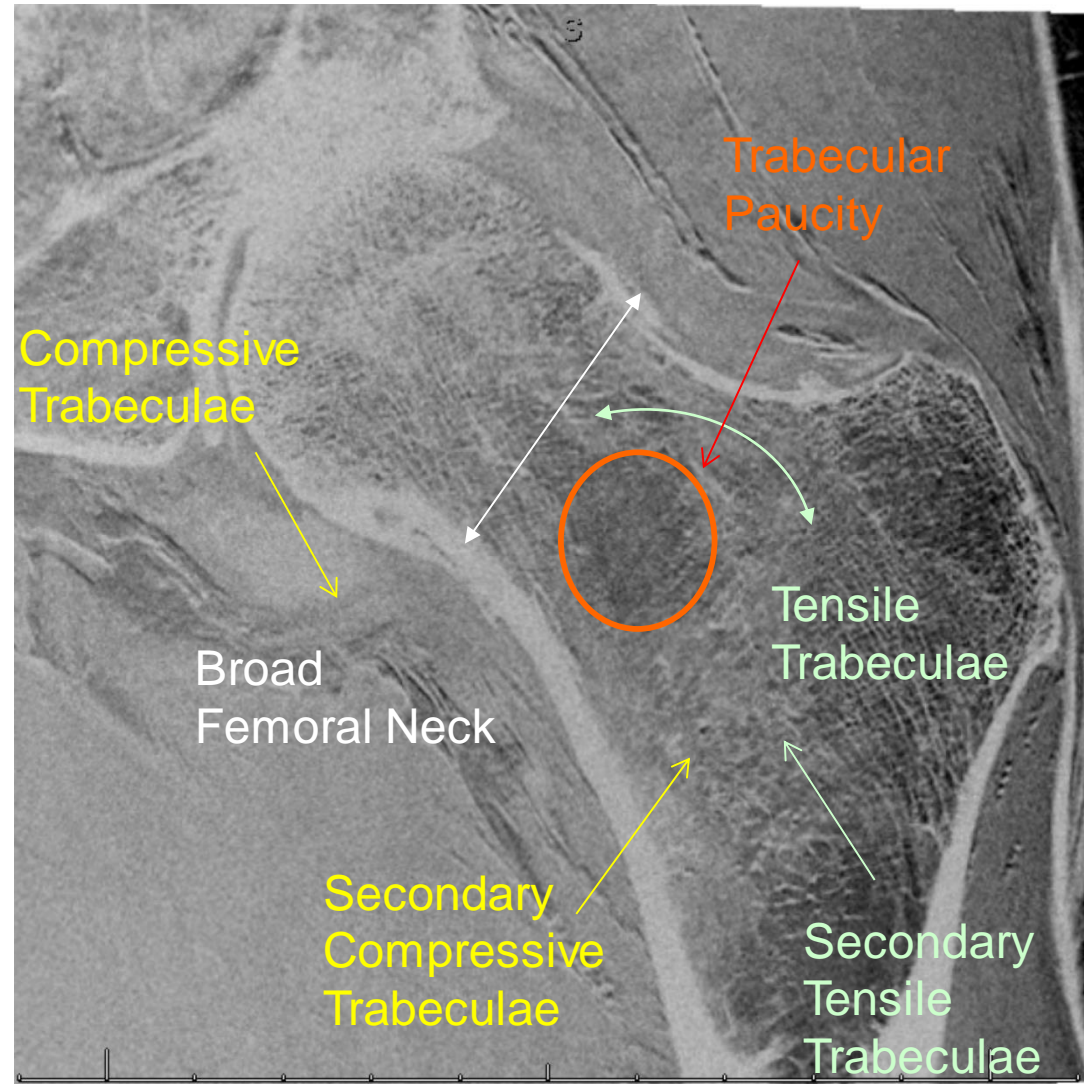
Consider Parsvakonasana



Bone Quality

- How effectively the bone resists fracture
- Finite element analysis:
- 18 yogis:
 - Yoga appears to improve bone quality.

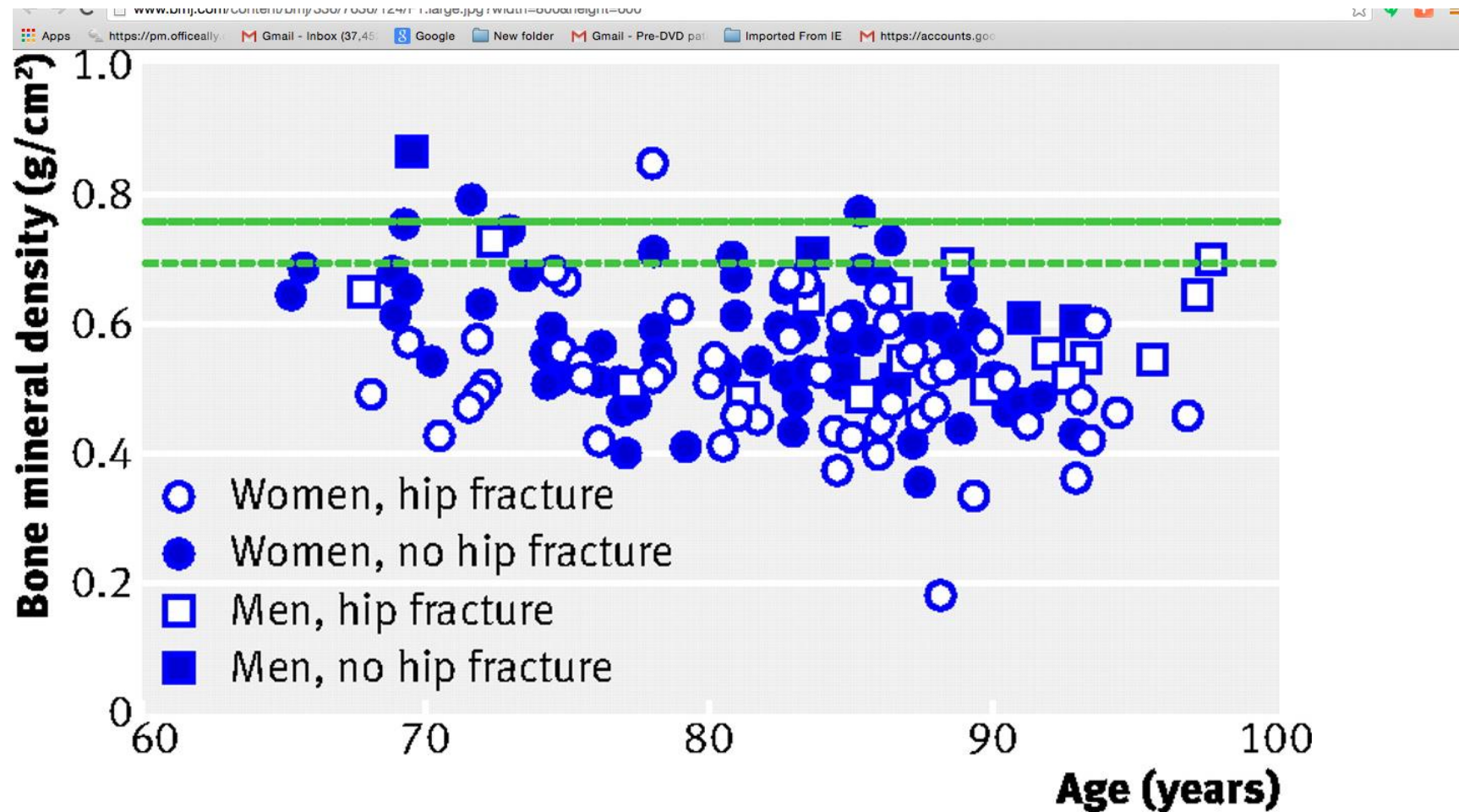
Preliminary Analysis



Why is Osteoporosis a Bad Thing?

- Low Bone Mass = weight loss.
- Save the world's calcium.
- Donate your calcium to the next guy/gal.

FRACTURE



Järvinen TLN, Sievänen H, Khan KM, Ari Heinonen A, Kannus P. "Shifting the focus in fracture prevention from osteoporosis to falls." *BMJ* 2008;336:124.

How do you get Fractures?

- Posture (Spine)
- Falls (Spine and everywhere else)
- Low BMD
- Poor Bone Quality

Fractures: Poor Posture and Falls

Spine

Hip

Femur

Wrist

Fractures: Poor Posture and Falls



Spine

Spine
Hip
Femur
Wrist

Fractures: Poor Posture and Falls

```
graph TD; A["Fractures: Poor Posture and Falls"] --> B["Spine"]; A --> C["Spine<br/>Hip<br/>Femur<br/>Wrist<br/>Ribs"];
```

Spine

Spine
Hip
Femur
Wrist
Ribs

What NO medicine does

Posture

Balance

Range of Motion

Strength

Coordination

Anxiety*

Yes, some medicines lower anxiety. But they impair balance.

Side Effects

Yoga

Posture
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

How to start using Yoga vs. Osteoporosis

- www.sciatica.org

Go to Osteoporosis tab.

Go to Events Upcoming and Ongoing tab.

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Photos by Chuck Baker

UPCOMING WEB EVENTS

LIFESTYLE MEDICINE and BONE HEALTH – How the newest medical specialty uses yoga

FREE

Wednesday, July 8th, 8:00 – 9:00 PM EDT

Click [HERE](#)

YOGA FOR OSTEOPOROSIS – The First Series

Tuesday July 14th 5:30 – 6:30 PM

Click [HERE](#)

Twelve Poses Vs. Osteoporosis
Streaming on You Tube – click
[here!](#)

February 8, 2017

Regenerative Medicine

September 22, 2015

[View All Events](#)

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Ancient Saying

- Meds: *at first like heaven*
After a while like poison
- Yoga: *at first like poison*
After a while like heaven.