Osteoporosis and Spine Fractures

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Disclosures

Industry—

Honoraria for CME events and/or grants (to my institution) from:

- Amgen
- Eli Lilly

Non-industry—

Chair, Osteoporosis Canada Scientific Advisory Council

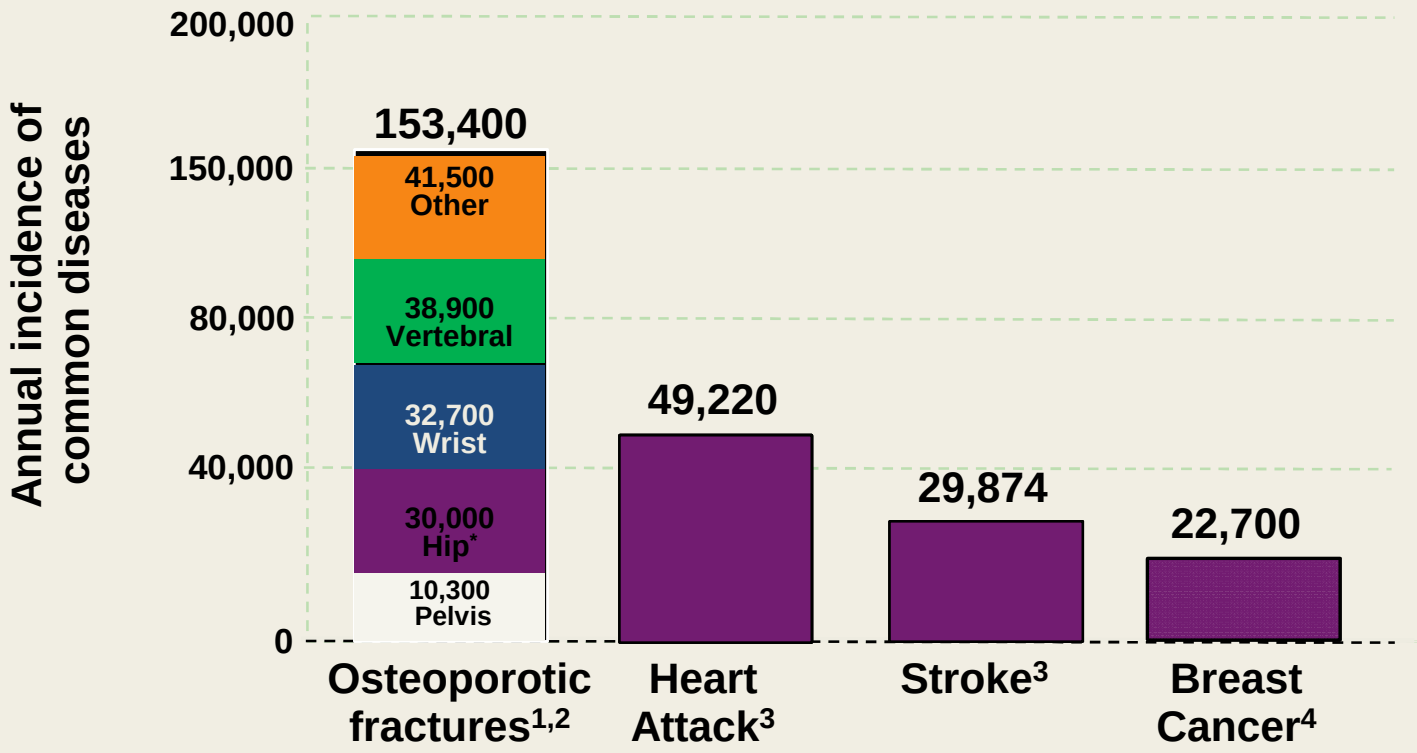
Chair, Canadian Bone Strength Working Group

Learning Objectives

At the end of the session, participants will be able to:

1) Describe the prevalence of osteoporotic spine fractures
2) Discuss the 2010 Osteoporosis Canada recommendations for the diagnosis and management of osteoporosis and fractures
3) Assess an individual with spine fractures and prescribe exercises to improve truncal strength and to decrease pain according to the 2014 Osteoporosis Canada exercise recommendations

Prevalence of Fractures in Canada

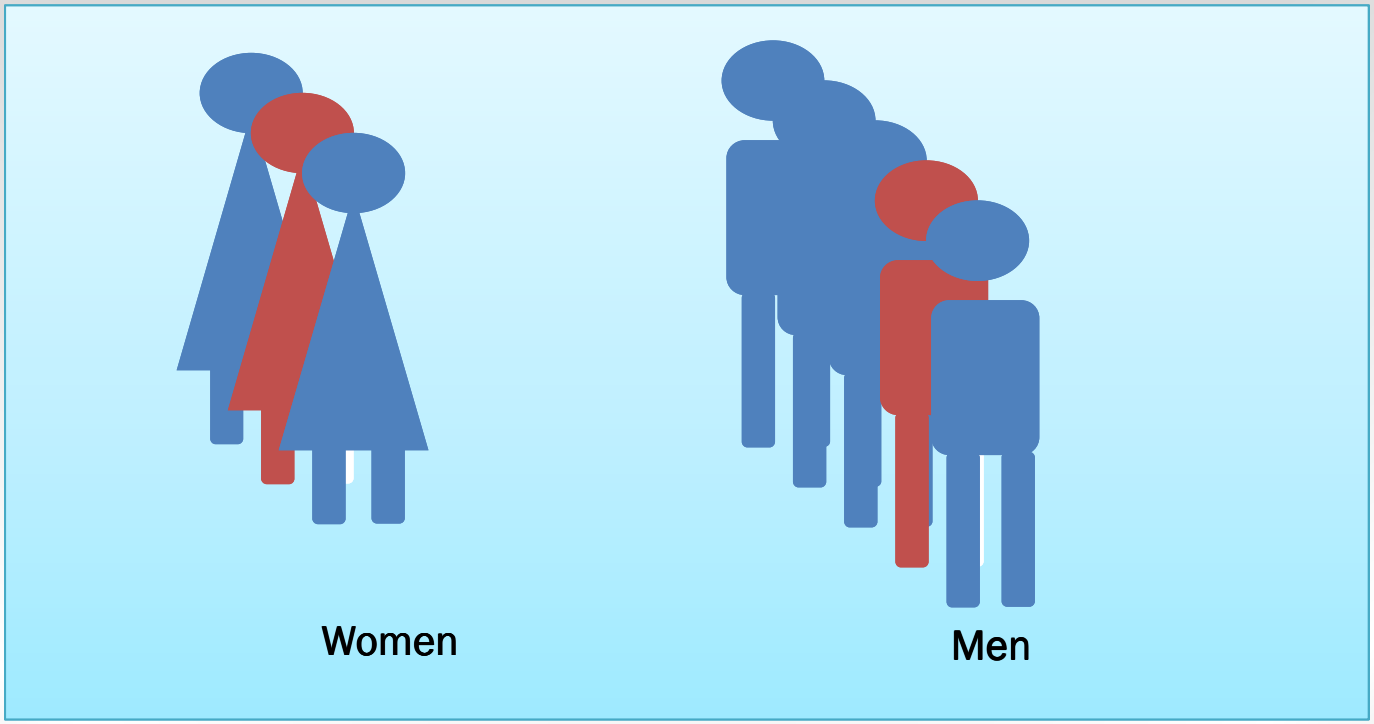


*Canadian hip fractures from (1); Non-hip fracture data extrapolated from (2).
†Other represents non-osteoporotic fractures sites (humerus, clavicle, hands/fingers, patella, tibia, fibula).[2]

1. Leslie WD, et al. *Osteoporos Int .* 2010; 21:1317-1322; 2. Burge J, et al. *J Bone Miner Res.* 2007;22:465-475;
3. Canadian Institute for Health Information (2009) Health Indicators. ; 4. Canadian Cancer Society. 2009.

Prevalence of Fractures in Canada

- At least 1 in 3 women and 1 in 5 men suffer an osteoporotic fracture during their lifetime[1]



1. Osteoporosis Canada. Facts & Statistics. Accessed Nov 2011. Available at: http://www.osteoporosis.ca/index.php/ci_id/8867/la_id/1.htm.
2. Melton LJ et al. *J Bone Miner Res.* 1997 Jan;12(1):16-23

COMMENTARY

Osteoporosis and Fractures

Missing the Bridge?

Angela M. Cheung, MD, PhD

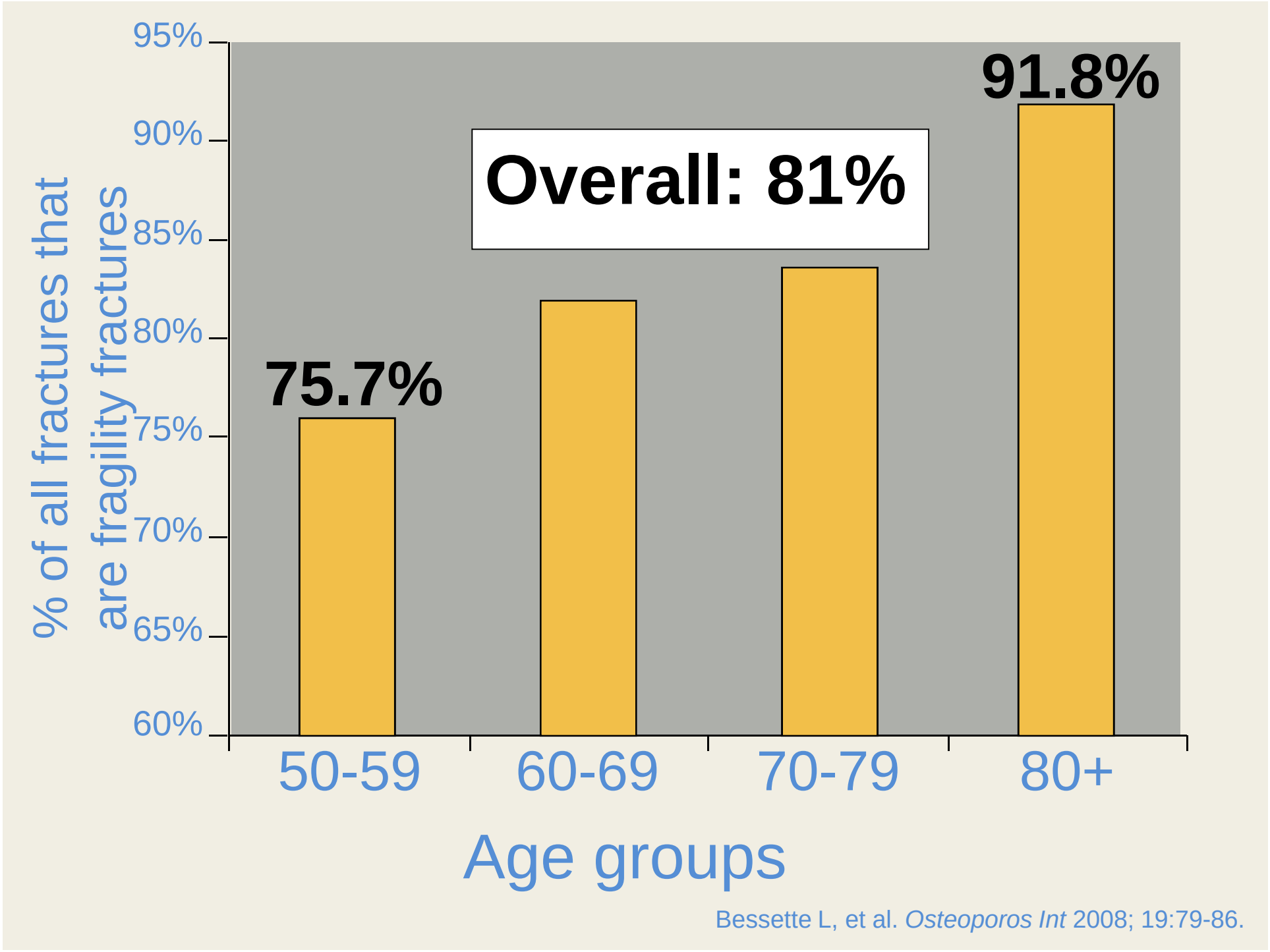
Allan S. Detsky, MD, PhD

lung disease, early satiety, chronic pain, and low self-esteem. Even asymptomatic vertebral fractures are associated with decreased quality of life, increased hospitalization, and mortality.[4,5] Women and men who sustain a hip

What Happened?

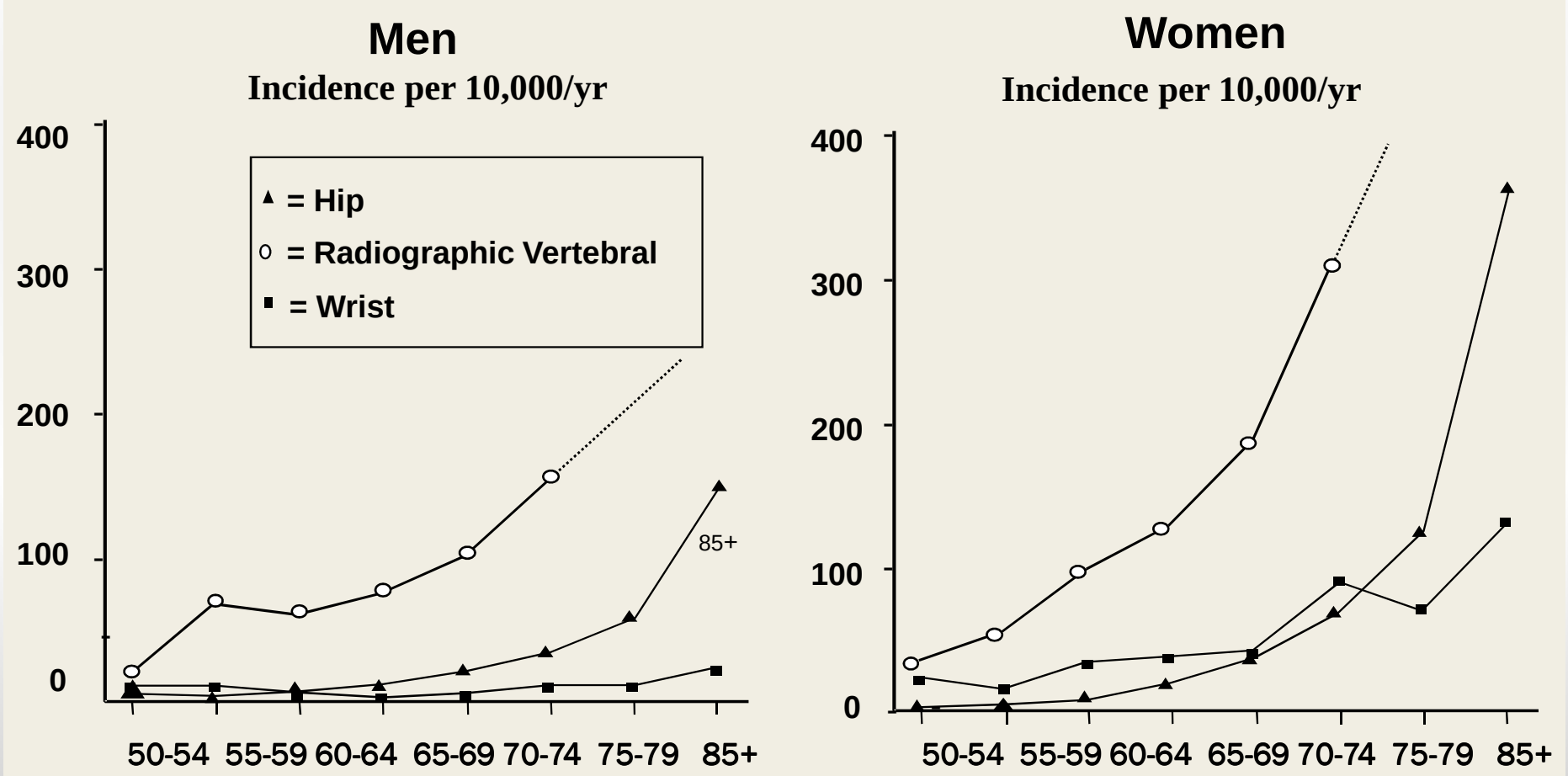
- The floor was slippery
- I was clumsy
- I lost my balance
- I wasn't looking where I was going …

It was an ACCIDENT!



Bessette L, et al. *Osteoporos Int* 2008; 19:79-86.

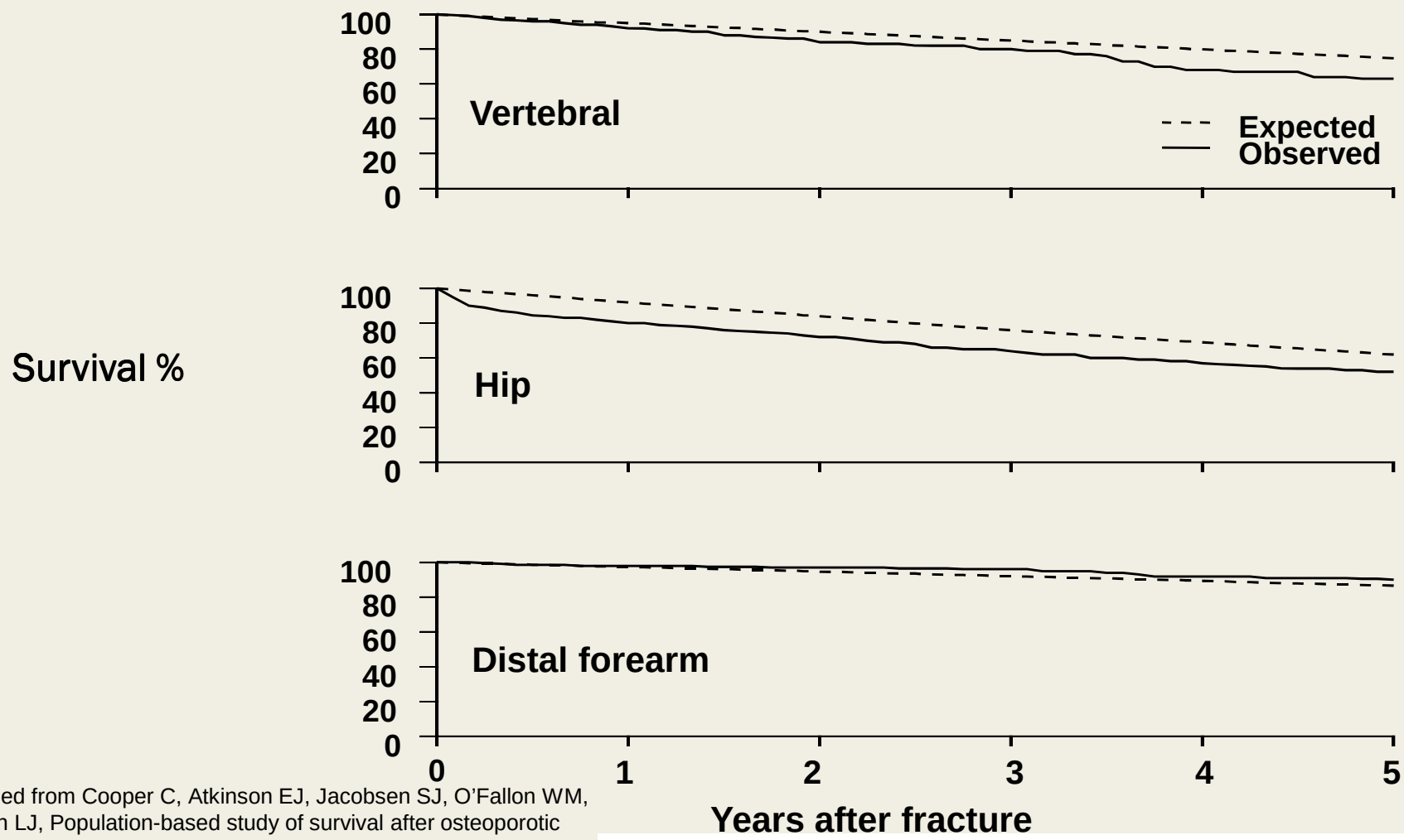
Incidence of Osteoporotic Fractures Increases with Age



Modified from Bone, vol. 29, van Staa TP, Dennison EM, Leufkens HG, Cooper C, Epidemiology of fractures in England and Wales, pp. 517-522, Copyright 2001, with permission from Elsevier.

Contributed by Nicholas Harvey, Susannah Earl, and Cyrus Cooper

Reduced survival after vertebral and hip fracture



Modified from Cooper C, Atkinson EJ, Jacobsen SJ, O'Fallon WM, Melton LJ, Population-based study of survival after osteoporotic fractures, Am J Epidemiol, 1993, vol. 137, pp. 1001-1005, by permission of Oxford University Press.

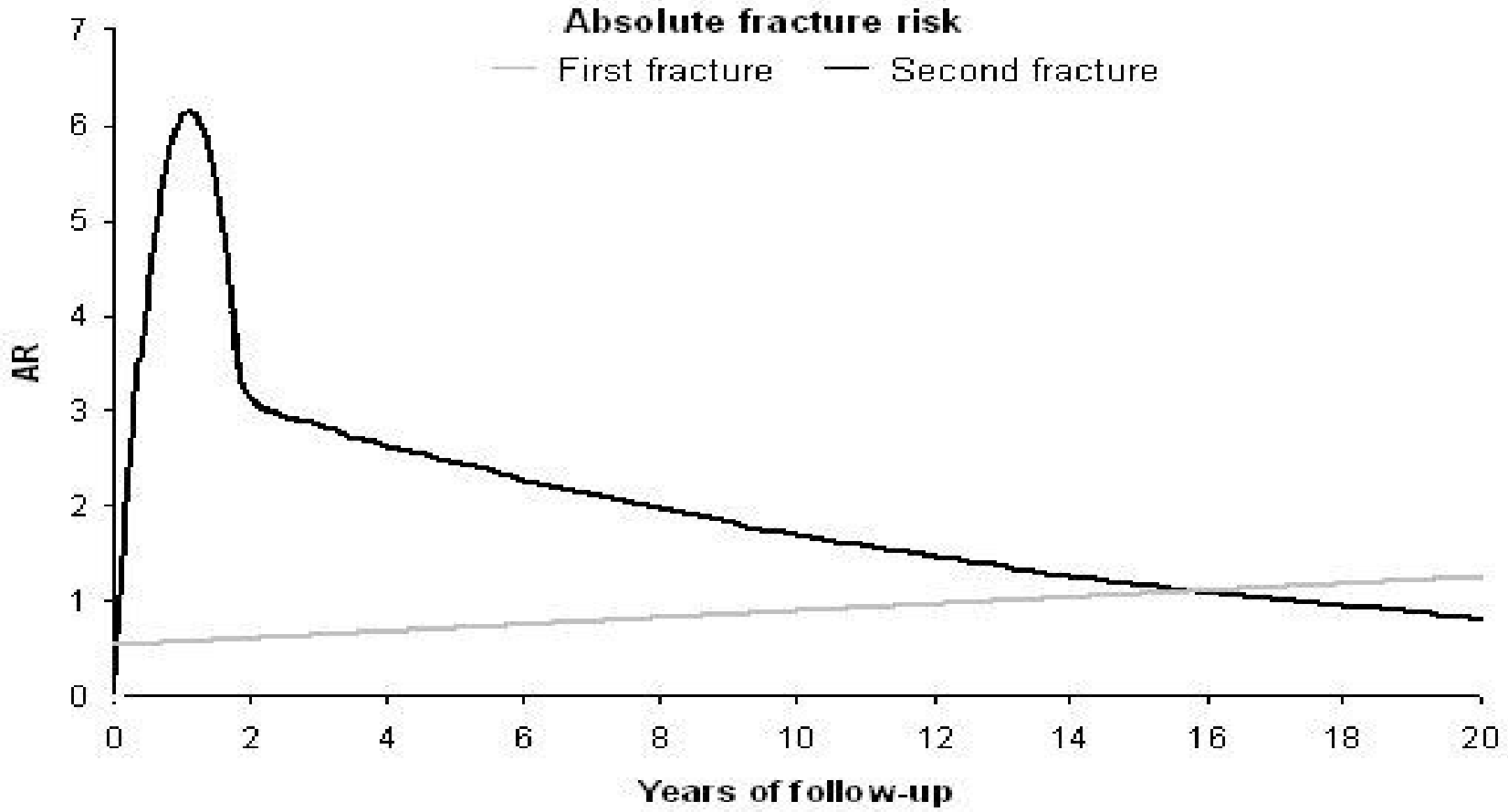
Contributed by Nicholas Harvey, Susannah Earl, and Cyrus Cooper

Bone is an Organ

Fracture = Bone Failure

“Bone Attack”

Fracture -- Predictor of Future Fractures!



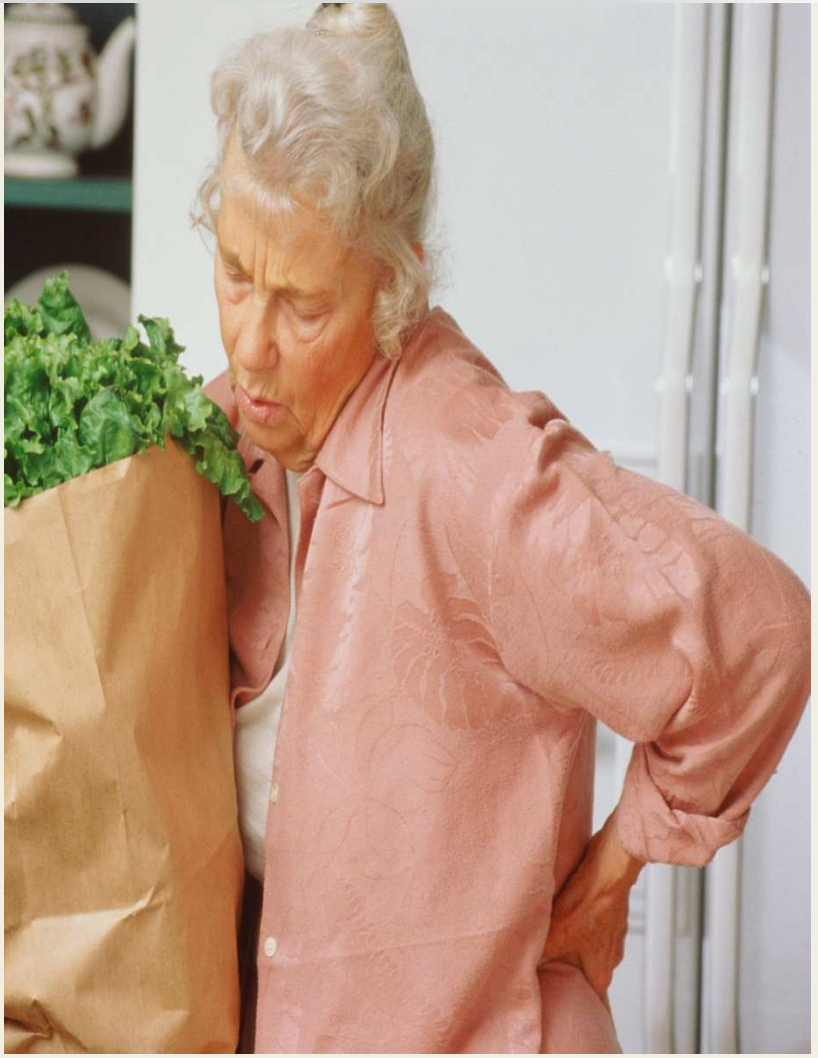
Signs of VCF

Acute Event:

- Sudden onset of back pain with little or no trauma

Chronic Manifestation(s):

- Loss of height
- Spinal deformity ("Dowager's hump")
- Protuberant abdomen



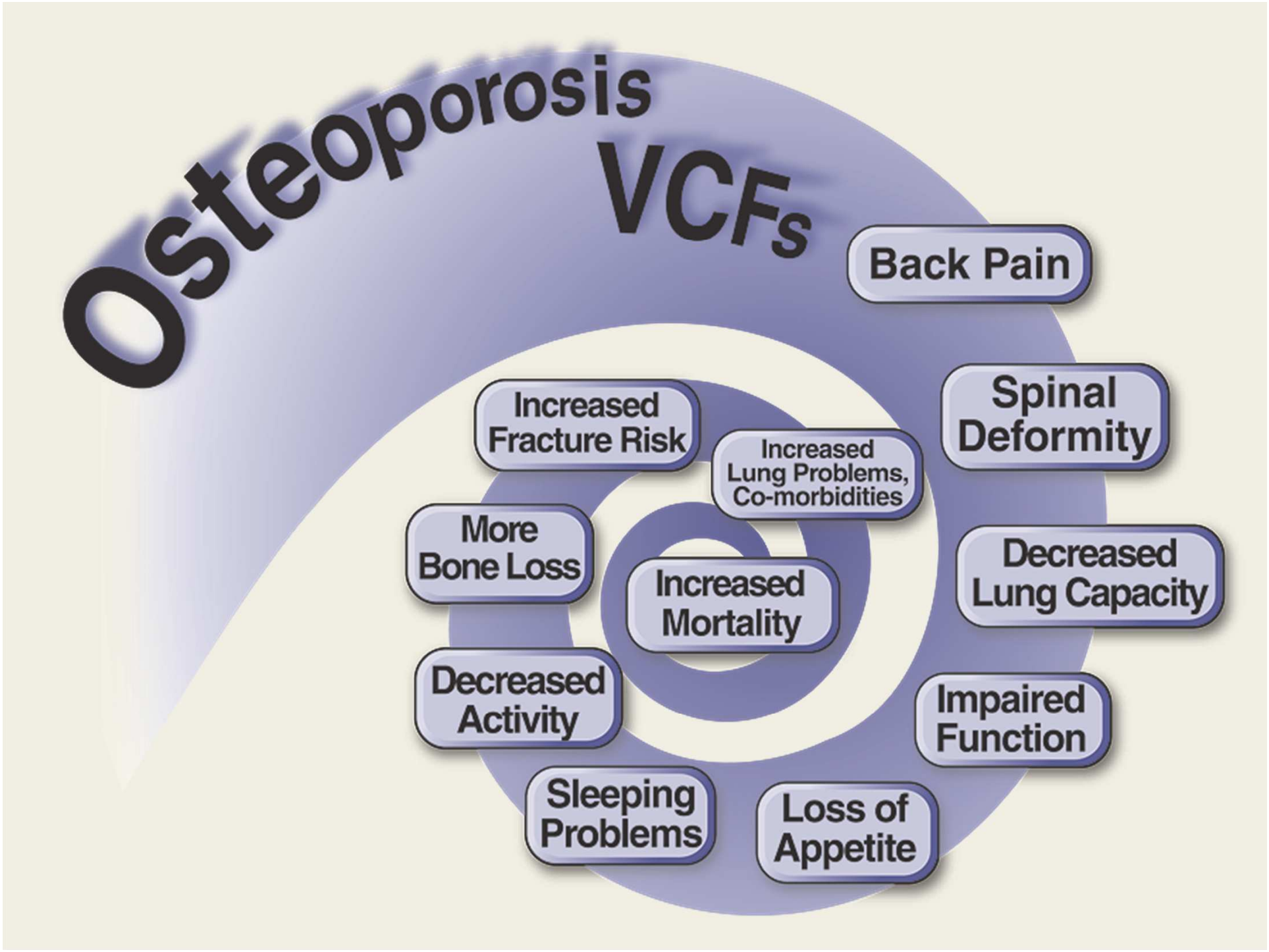
Gold et al., Osteoporosis 1996,2001

Physical Impact of VCF

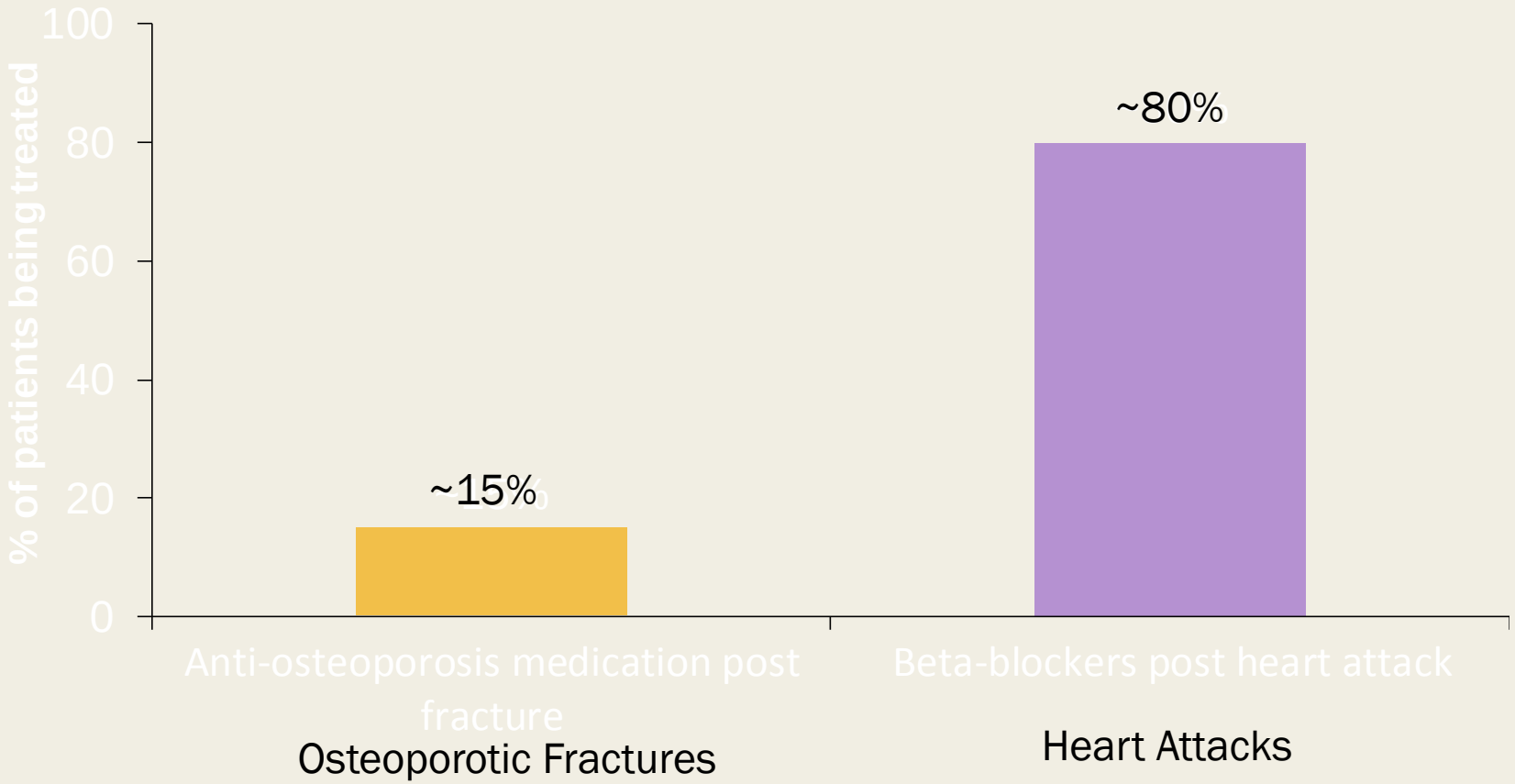
Age 50

Age 75

National Osteoporosis Foundation


Osteoporosis
VCFs
Back Pain
Spinal Deformity
Increased Fracture Risk
Increased Lung Problems, Co-morbidities
More Bone Loss
Increased Mortality
Decreased Lung Capacity
Decreased Activity
Impaired Function
Sleeping Problems
Loss of Appetite

Post-fracture Care Gap: Comparison with Heart Attack



1. Bessette L, et al. *Osteoporos Int* 2008; 19:79-86.
2. Austin PC, et al. *CMAJ* 2008; 179(9):901-908.

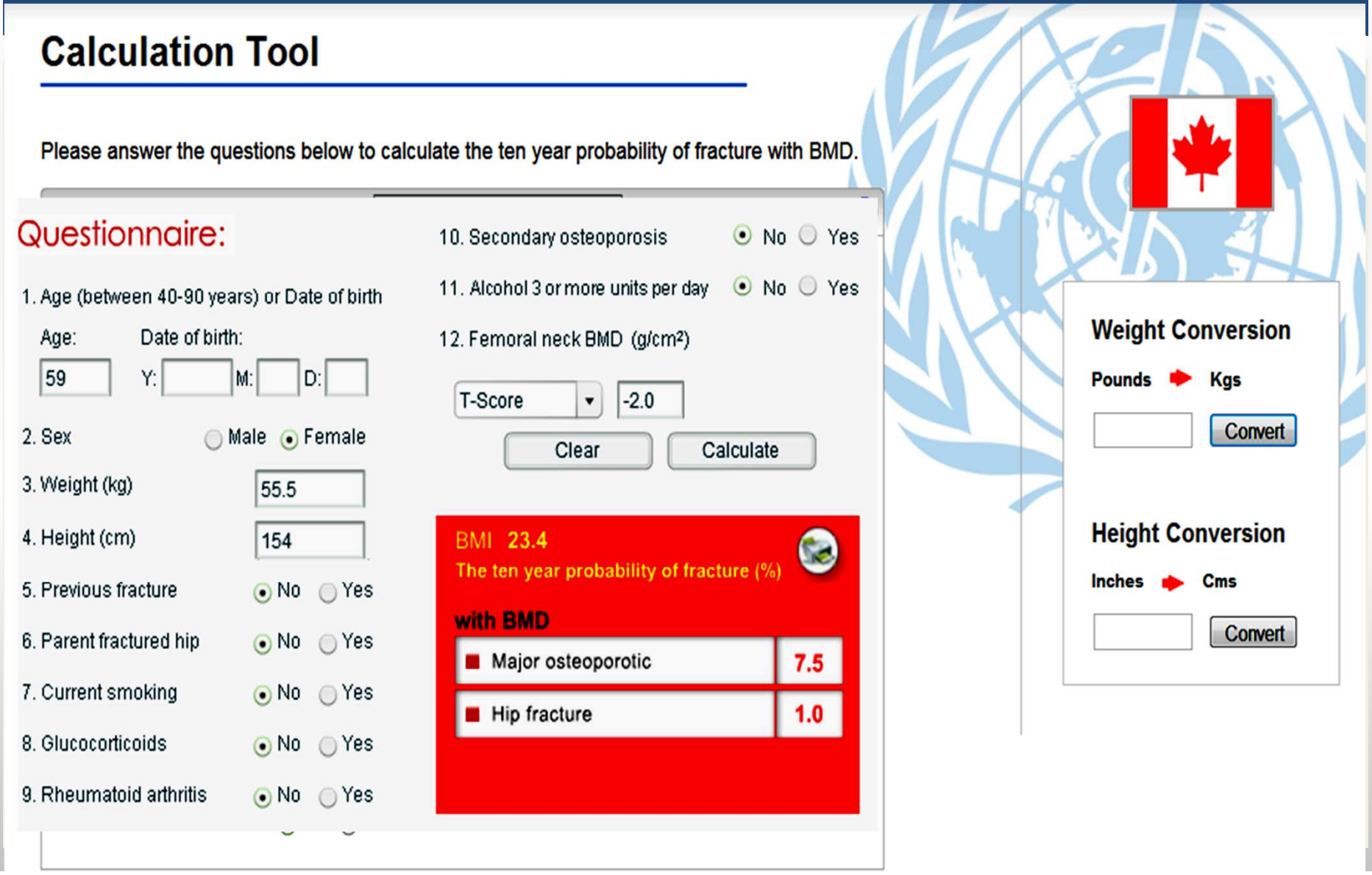
Osteoporosis Canada

2010 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada: summary

Alexandra Papaioannou MD MSc, Suzanne Morin MD MSc, Angela M. Cheung MD PhD, Stephanie Atkinson PhD, Jacques P. Brown MD, Sidney Feldman MD, David A. Hanley MD, Anthony Hodsman MD, Sophie A. Jamal MD PhD, Stephanie M. Kaiser MD, Brent Kvern MD, Kerry Siminoski MD, William D. Leslie MD MSc; for the Scientific Advisory Council of Osteoporosis Canada

Papaioannou A., Morin S. *CMAJ*. 2010.DOI:10.1503/cmaj.100771.

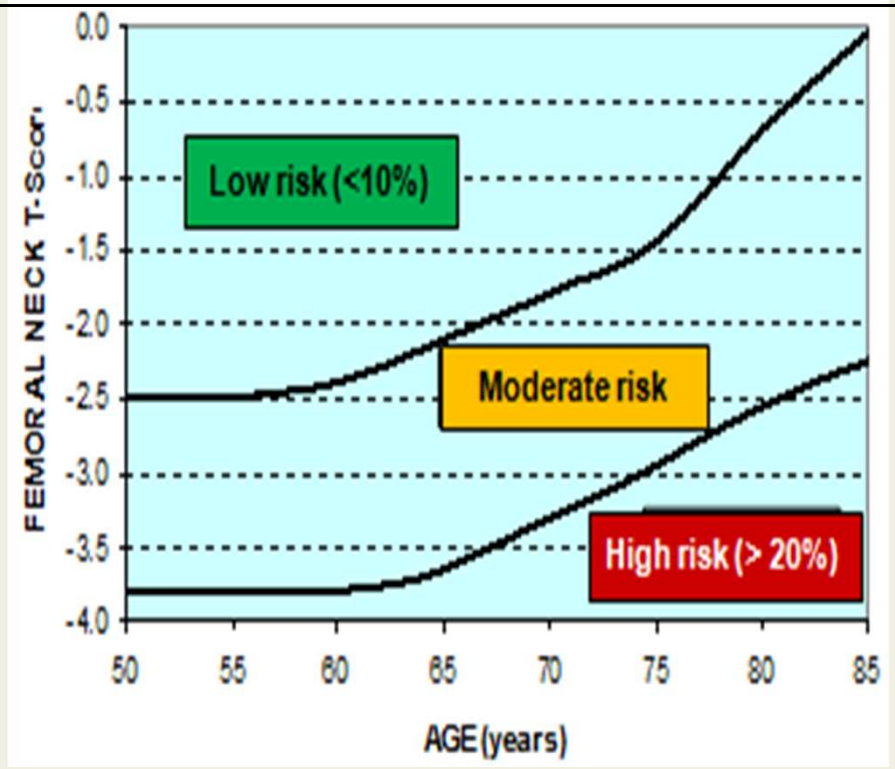
FRAX Tool: On-line Calculator



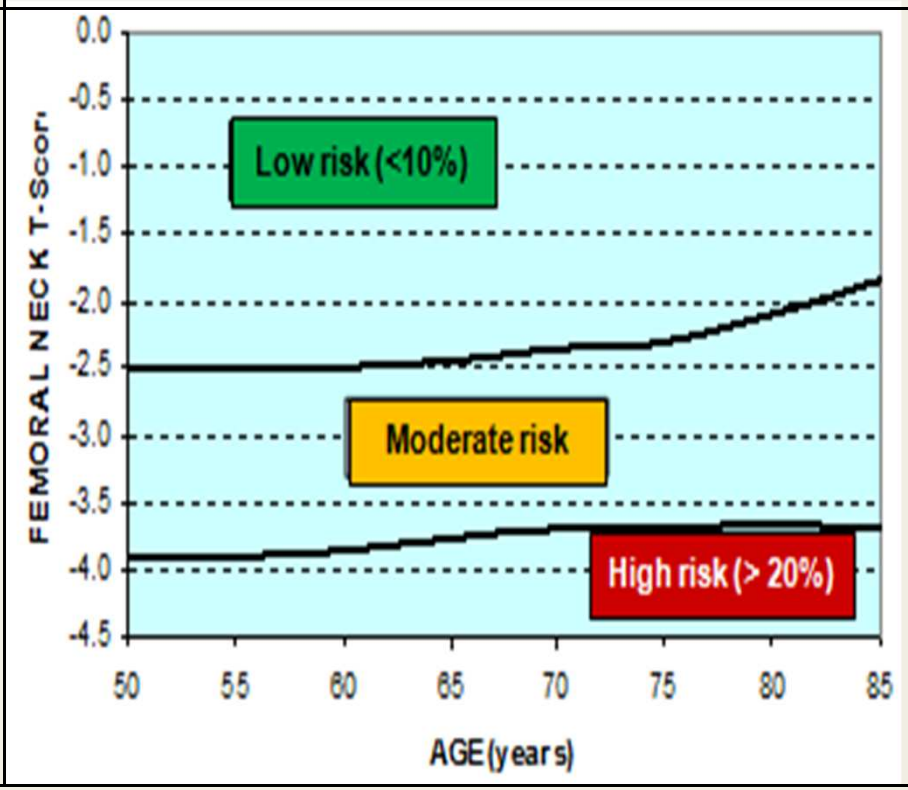
2010 Osteoporosis Canada Guidelines

2010 CAROC tool:
Assessment of Basal 10-year Fracture Risk

Women



Men



Spine Fracture = HIGH RISK (>20%)

High 10-Year Fracture Risk

Those with:

1) Vertebral Fractures
2) Hip Fractures
3) ≥2 fragility fractures
4) ≥1 fragility fracture + steroid use

Recommended Biochemical Tests

- Calcium, corrected for albumin
- Complete blood count
- Creatinine
- Alkaline phosphatase
- Thyroid stimulating hormone (TSH)
- Serum protein electrophoresis for patients with vertebral fractures
- 25-hydroxy vitamin D (25-OH-D)*

* Should be measured after 3-4 months of adequate supplementation and should not be repeated if an optimal level ≥75 nmol/L is achieved.

How can we Prevent Fractures?

- Lifestyle modifications
  - –Vitamin D
  - –Calcium
  - –Exercise
  - –Falls prevention

- Pharmacologic therapy
  - –Bisphosphonates
  - –Other anti-resorptives
    - •Denosumab
    - •Hormone therapy
    - •Raloxifene
    - •Calcitonin
  - –Parathyroid hormone

High 10-year Fracture risk

= treat

OC Current Recommendations

Calcium intake = diet + supplements

~1200mg per day

On average,

Good diet (no diary products) = 300mg per day

Good diet (+ diary products) = 500mg per day

OC Current Recommendations

Vitamin D = 800 – 2000iu per day

Aim for a serum 25-hydroxyvitamin D level ≥75nmol/L

First Line Therapies with Evidence for Fracture Prevention in Postmenopausal Women*

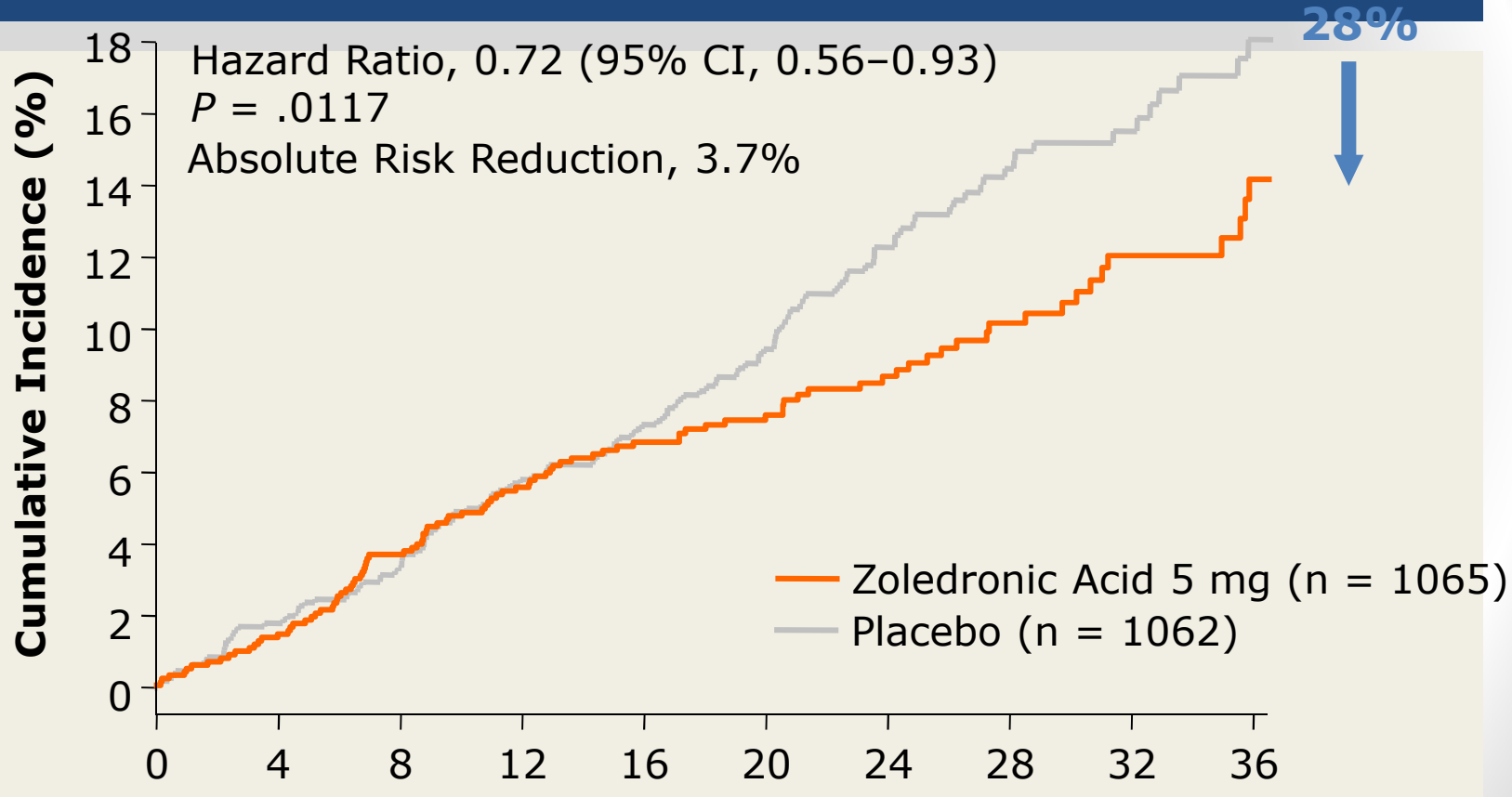
Type of Fracture	Antiresorptive therapy						Bone formation therapy
	Bisphosphonates			Denosumab	Raloxifene	Hormone therapy (Estrogen)**	Teriparatide
	Alendronate	Risedronate	Zoledronic acid				
Vertebral	✓	✓	✓	✓	✓	✓	✓
Hip	✓	✓	✓	✓	-	✓	-
Non-vertebral+	✓	✓	✓	✓	-	✓	✓

* For postmenopausal women, ✓ indicates first line therapies and Grade A recommendation. For men requiring treatment, alendronate, risedronate, and zoledronic acid can be used as first line therapies for prevention of fractures [Grade D].
+ In clinical trials, non-vertebral fractures are a composite endpoint including hip, femur, pelvis, tibia, humerus, radius, and clavicle.
** Hormone therapy (estrogen) can be used as first line therapy in women with menopausal symptoms.

Highlighting newer drugs…

- Actonel DR 35mg po q week (on ODB)
- Prolia 60mg sc q 6 months (LU code)
- Aclasta 5mg iv q year over 30mins (LU code)
- Forteo 20ug sc od for 2 years (EAP)

Zoledronic Acid 5 mg reduced all-cause mortality



No. at Risk

Zol	1054	1029	987	943	806	674	507	348	237	144
Placebo	1057	1028	993	945	804	681	511	364	236	149

Lyles KW, *et al*. *N Engl J Med*. 2007;357:1-11.

Are there situations where we should not use antiresorptive therapies?

Three common questions:

- Fracture healing
- Kidney function
- ONJ and AFFs

FREEDOM Trial – fracture healing

	Placebo N = 3,876	Denosumab 60 mg Q6M N = 3,886
Nonvertebral Fractures, n	465	386
Patients With Nonvertebral Fractures, n	364	303
Delayed Healing, n	5	2
Other Complications Associated With the Fracture or Its Management		
Non-union, n	1	0
Surgical Intervention, n (%)	120 (26%)	79 (21%)
Any Complication, n/N† (%)	20/364 (5%)	5/303 (2%)‡
Most Common: Infection, n/N† (%)	4/364 (1%)	2/303 (<1%)

Renal Dysfunction

- Alendronate
- Risedronate
- Raloxifene
- Denosumab

} Reduces fractures in CKD (1-4) patients

* No CKD 5 patients in RCTs

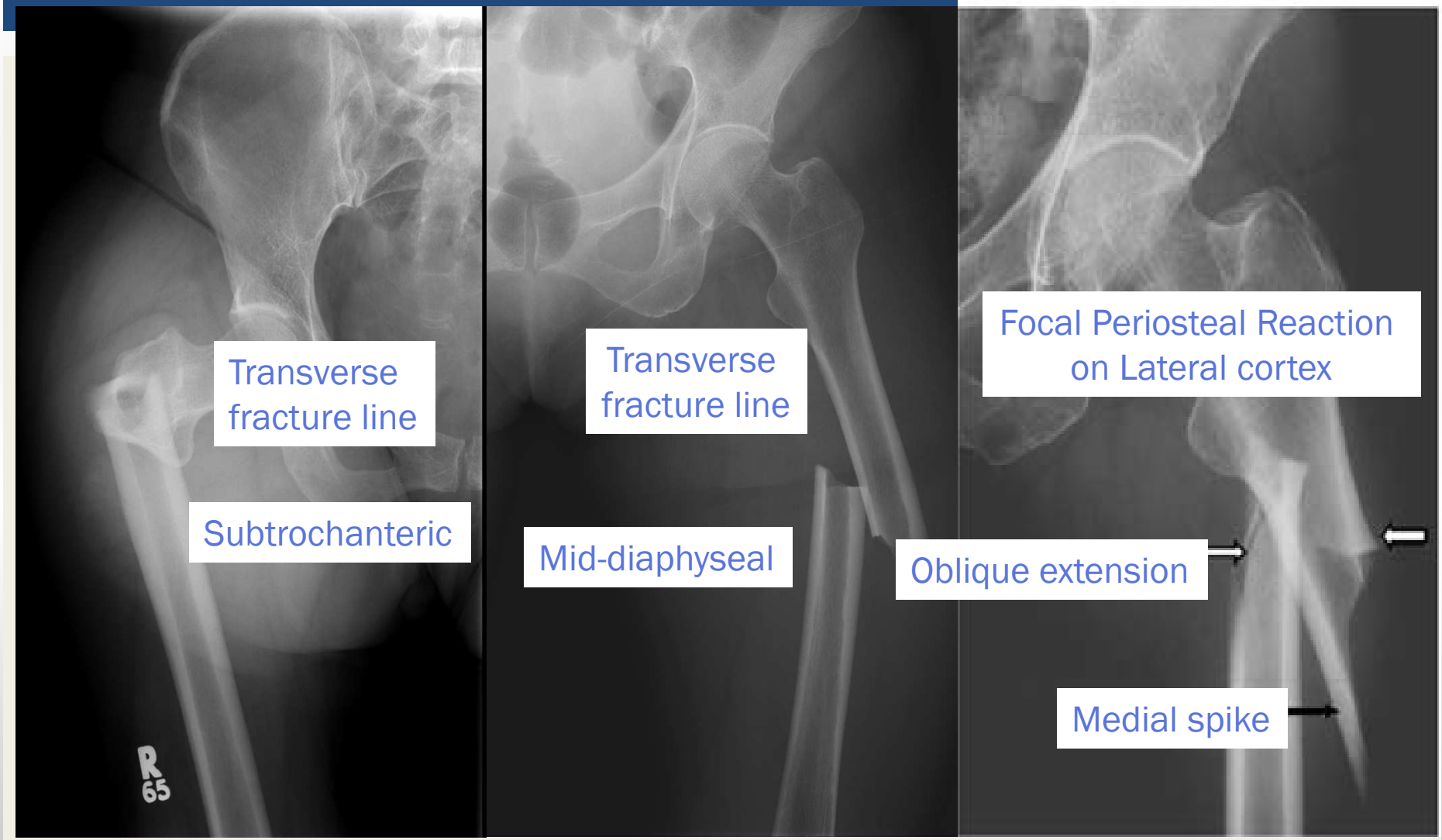
Osteonecrosis of the Jaw

FIGURE 7. A nonhealing extraction socket such as this is a common complication when teeth are removed in patients receiving pamidronate or zoledronate therapy.

Marx et al. Bisphosphonate-Induced Exposed Bone of Jaws. J Oral Maxillofac Surg 2005.

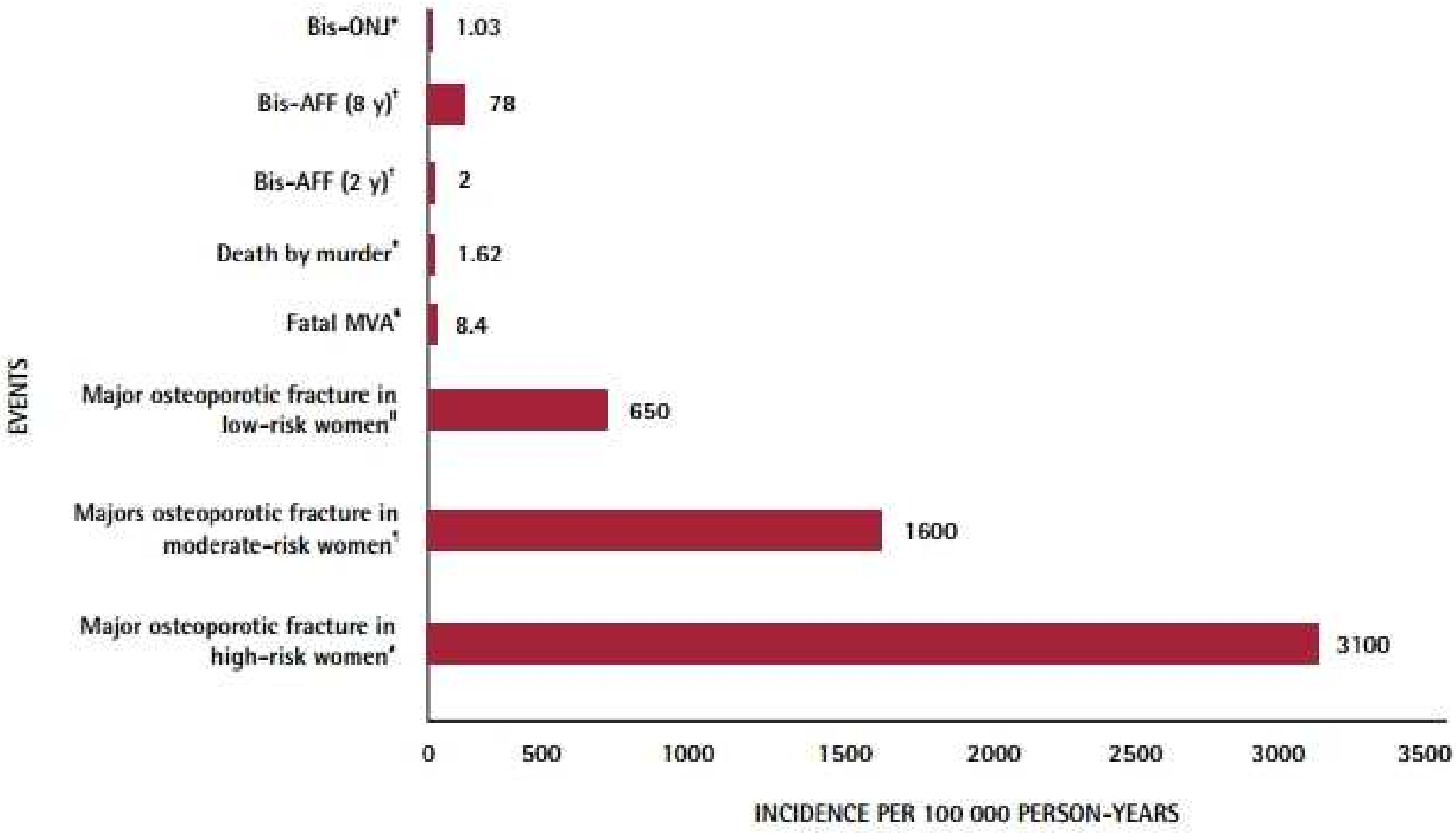
- Exposed bone in the oral cavity for 8 weeks or longer
- Can occur spontaneously or following dental surgery
- Can be associated with antiresorptive therapy

Radiographic Images of AFFs



ASBMR AFF Task Force Report, JBMR 2010, 25 (11): 2267

Figure 1. Risks of major osteoporotic fracture and other rare events



Falls Assessment

Periodic case finding in Primary Care: Ask all patients about falls in past year

No Falls

No Intervention

Recurrent Falls

Single Fall

Gait/ balance proble ms

Check for gait/ balance problem

No Problem

Patient presents to medical facility after a fall

Fall Evaluation

Assessment
History
Medications
Vision
Gait and balance
Lower limb joints
Neurological
Cardiovascular

Multifactorial intervention (as appropriate)
Gait, balance and exercise programs
Medication modification
Postural hypotension problem
Environmental hazard modification
Cardiovascular disorder treatment

OC Current Recommendations

Falls prevention and reduction

- Med check
- Assistive device
- Environmental changes – grab bars, non-slip floors
- Muscle strengthening and balance exercises
- Prevent vertebral fractures

Exercise and Bone Health

Osteoporosis Canada
Ostéoporose Canada

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- News
- Health Care Professionals
- After The Fracture
- Fracture Liaison Service

Osteoporosis Canada Launches New Exercise Recommendations

New multicomponent exercise recommendations combine muscle strengthening and balance training as a means of reducing falls and resulting fractures for people living with osteoporosis

People with osteoporosis, and those at risk of developing it, can prevent bone loss, fractures and falls by combining specific types of exercises, says new recommendations that Osteoporosis Canada released. Osteoporosis Canada is developing tools related to the new guidelines, including a booklet called Too Fit to Fracture: Managing Osteoporosis through Exercise, which covers the importance of exercise; what types of exercise; strength, balance, aerobic and posture training; barriers to exercise and much more.

- Click here to learn more

Donate now!

Calculate my calcium

Upcoming Events

THU 09 APR 2015 — Bone Matters - Travelling with Osteoporosis — Online Webcast

WED 15 APR 2015 — Osteoporosis: Demystify the Diagnosis — Winnipeg, MB

WED 22 APR 2015 — Bones N Beer — Peterborough, ON

Exercise and Physical Activity Recommendations

Expert consensus and best evidence support:

1. Strength training ≥ 2x/wk
2. Balance training **daily**
3. ≥ 30min/day aerobic physical activity
4. Exercises for back extensor muscles **daily**
5. Spine sparing strategies like hip hinge and step-to-turn can ↓ spine loads → how *to* move, rather than how *not* to move

Giangregorio LM, et al Too Fit To Fracture: outcomes of a Delphi consensus process on physical activity and exercise recommendations for adults with osteoporosis with or without vertebral fractures. Osteoporos Int. 2014 Dec 16. [Epub ahead of print]

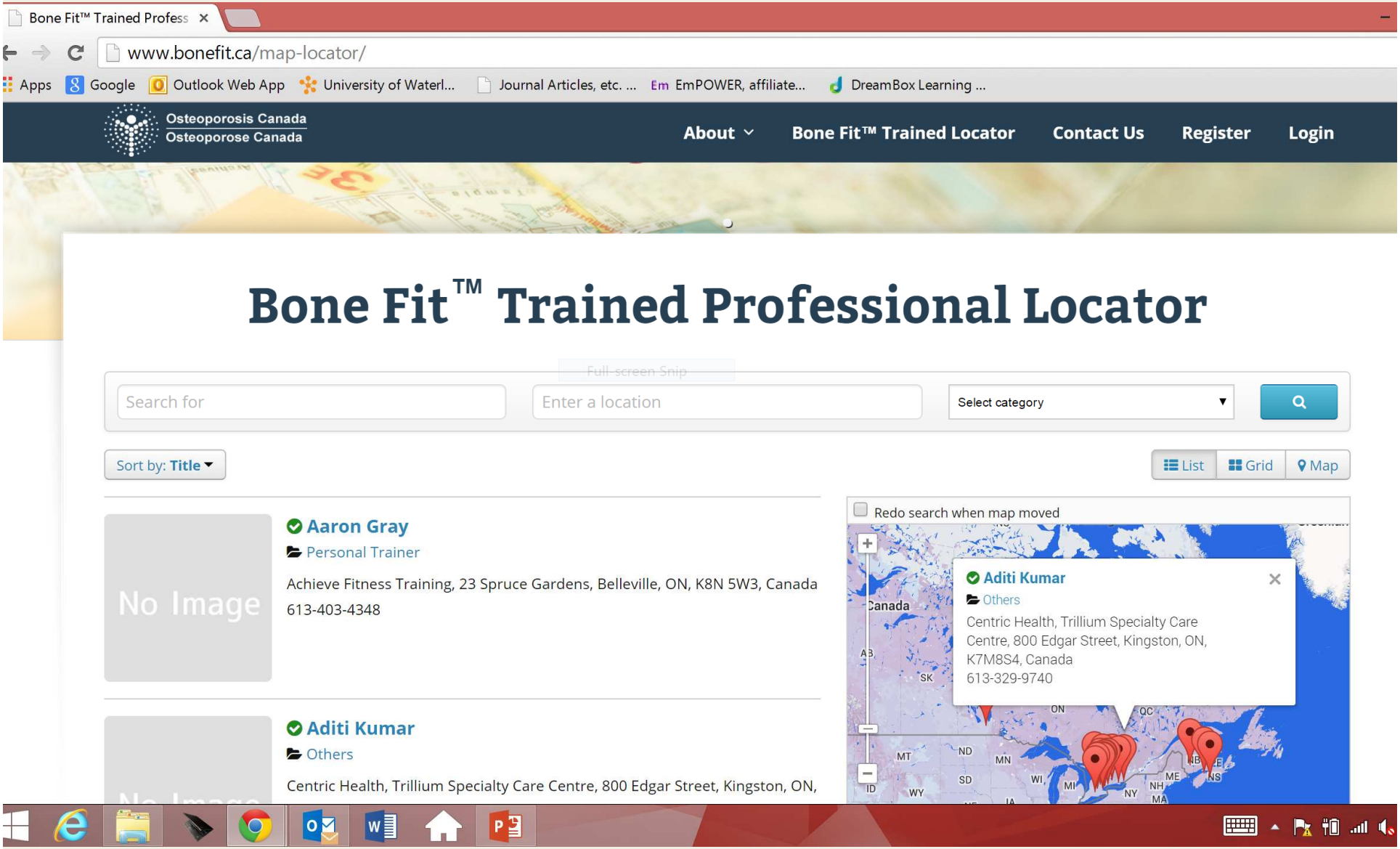
WOW! That sounds like a lot

- Recommend they start with a few strength exercises 2x/wk, 1 balance challenge daily
- Aerobic physical activity in 10 min bouts
- Combine activities:
  - 20 min walk + 5 min tandem walking + 5 min strength exercise (wall pushups, half squats)
  - Integrate in day: heel raises waiting for tea, sit-to-stand during commercials

What can a physician do?

- Provide the recommendations
  - Recommend they do balance exercises daily
  - Recommend they do strength exercises ≥ 2 week
  - Recommend they accumulate ≥ 30 min moderate to vigorous physical activity daily
- Refer to community programs/services, Bone Fit trained physio or kin
- Recommend spine sparing strategies, supine lying, getting up every 30 min

Resources: http://www.osteoporosis.ca/osteoporosis-and-you/too-fit-to-fracture/



Core activation in standing – see "Intro to theraband" video:
www.osteoporosis.ca/after-the-fracture/videos/

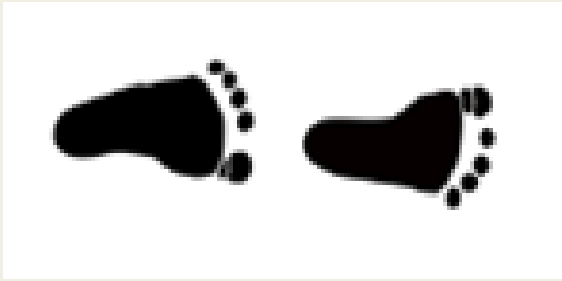
Strength Training: First-timers Fab Five

- Squats or sit-to-stand exercises or lunges for legs and buttock muscles
- Heel raises for lower legs
- Wall pushups for chest and triceps
- Bow and arrow “pulls” with an exercise band for upper back and biceps
- Diagonal shoulder raises with exercise band for shoulders and upper back.

Balance training exercises:

- Reduce base of support (e.g., feet together, tandem stance, one leg stance)
- Shift weight within limits of stability
- Remove other input needed for balance (e.g., eyes closed)
- Dynamic or 3D movements that challenge balance e.g., Tai Chi, dancing, lunges, tandem walk

Tandem stance – can progress to tandem walk



Grapevine

TANDEM STANCE WITH SUPPORT

Osteoporosis Canada
Ostéoporose Canada
UNIVERSITY OF WATERLOO

Stand with good posture while holding a sturdy chair. Imagine your torso is a box.

Your shoulders and hips are the corners. Keep the torso box straight.

Place the back of your right heel in front of the toes on your left foot.

- ☐ Put only two fingers on the chair or support object
- ☐ Do it without holding on to support object
- ☐ Do it with eyes closed (keep support object nearby)

HOLD FOR _____ SECONDS • REPEAT THE EXERCISE WITH THE OTHER LEG

WALKING IN A PATTERN

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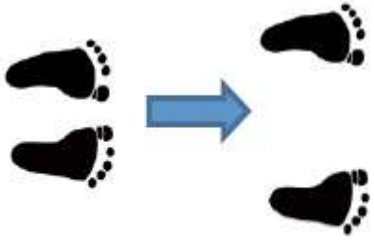
☐ HEEL TO TOE

☐ STEP AEROBICS –
TWO NARROW STEPS, THEN TWO WIDE STEPS



☐ SIDEWAYS OR GRAPEVINE

Try walking in an unusual pattern to challenge your balance.

Walk with this pattern for _____.

Here are some other ones you can try:

- ☐ Step over cones or cups
- ☐ Walk in a figure 8
- ☐ Walk forward or backward, and count forward by 6s
- ☐ Walk forward or backward, and count backward by 6s

Too Fit To Fracture: outcomes of a Delphi consensus process on physical activity and exercise recommendations for adults with osteoporosis with or without vertebral fractures
Giangregorio et al, 2014. Osteoporosis Int, in press, With kind permission of Springer Science+Business Media

Teach “spine sparing” during ADL and physical activity

Recommend that patient modify activities that apply *rapid, repetitive, weighted or end-range* **flexion** (forward bending) or **twisting** torque to the spine.

How?

Video tips on movement:
www.osteoporosis.ca/after-the-fracture/videos/

- Hip hinge
- Step-to-turn
- Avoid lifting from or lowering to the floor
- Slow, controlled twist, not to end of range of motion
- Support trunk when flexing
- Hold weight close to body, not overhead

Hip hinge, with knees bent, shifting bottom backward

HOW TO MOVE A BOX

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Note step-to-turn here!

Note hip hinge here!

Hold the item in front of and close to your body.

Step to turn around, do NOT simply twist, to place the object in another spot.

Once you have turned around, bend at the knees while keeping your back straight and place the item down.

Fit To Fracture: outcomes of a Delphi consensus process on physical activity and exercise recommendations for adults with osteoporosis with or without vertebral fractures Giangregorio et al, .4. Osteoporosis Int, in press, With kind permission of Springer Science+Business Media

Exercise and Activity Recommendations

Locate a Bone Fit trained instructor: **English: 1-800-463-6842 / French: 1-800-977-1778** or www.bonefit.ca

Exercise	Frequency	Examples/Comments
Strength Training	≥ 2x/week	• Exercises for legs, arms, chest, shoulders, back • Use body weight against gravity, bands, weights* • 8-12 repetitions maximum per exercise
Balance Training	~ 20mins daily	• Standing still: one-leg stand, semi-tandem stance, shift weight between heels and toes while standing • Dynamic movements: Tai Chi, tandem walking, dancing • Progress from standing still to dynamic
Aerobic physical activity	≥ 5x/week (30min/day)	• Do bouts of 10 min or more • Accumulate ≥ 30 min per day • Moderate- or vigorous-intensity (5-8 on 0-10 scale)*
Posture/ Back Extensor Training	5-10mins daily	• Lie face up on firm surface, knees bent, feet flat. Use pillow only if head doesn't reach floor. Do this 5-10 min/day. • Progressions 1) lying with gentle head press, without changing chin position, perform 3-5 seconds "holds"; 2) Core activation in standing (see intro to theraband: **Videos:** www.osteoporosis.ca/after-the-fracture/videos/)
Spine Sparing Strategies	During daily activities	• Learn a "hip hinge" and "step to turn" so that you can modify activities that flex (bending forward) or twist spine

**In presence of vertebral fracture, consult Bone Fit trained physiotherapist/kinesiologist, and emphasize good alignment, and moderate over vigorous intensity aerobic activity*

Giangregorio LM, et al. Osteoporos Int 2014; 25: 821-835

Exercise and Bone Health

- Strength and balance training
- Walking not adequate
- Exercises to strengthen back muscles
- Adjust activity for condition

Osteoporosis

Exercise Guide

Joyce Pan Mightis BSc (Kin), ACSM, OKA
Angela M. Cheung MD, PhD, FRCPC, CCD

A look at proper exercise techniques and safe posture for day to day activities

University Health Network

Existing Tools….

www.osteoporosis.ca

After the Fracture: Information about Pain and Practical Tips for Movement

Intro | General Info | What To Expect | Self-Help Guidelines | When the Pain Persists | Videos

- After The Fracture
- Table of Contents
- Introduction
- General Information about Pain after a Fracture
- What to Expect from Some Specific Types of Fracture
- Wrist And Shoulder Fractures
- Hip Fractures
- Spine Fractures
- A Few Self-Help Guidelines for Day-to-Day Activities After A Spine Fracture
- When the Pain Persists

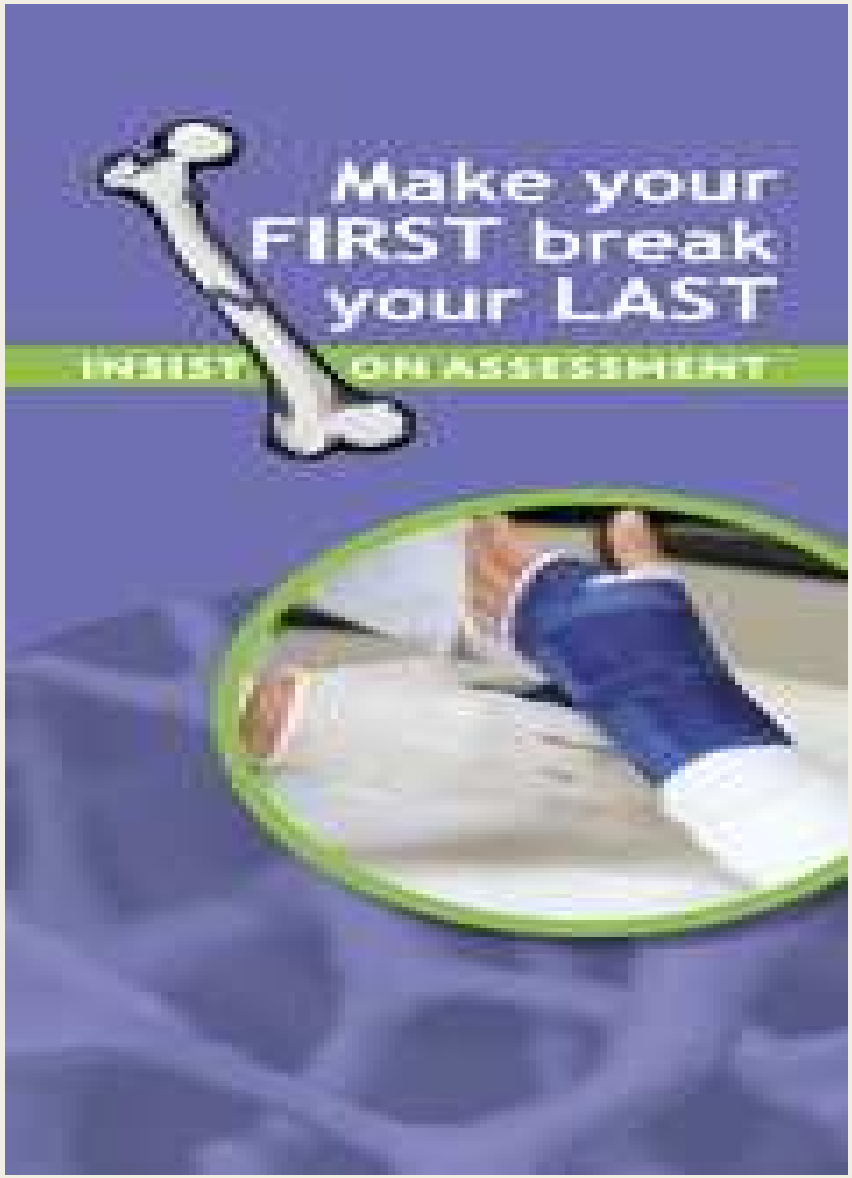
Spine Fractures

Broken bones in the spine are referred to as vertebral compression fractures or spine fractures. The spine is one of the most common sites of broken bones as a result of osteoporosis. Imagine each bone in your spine as a square block. When the bone breaks, it is like the "box" becomes squashed or compressed or flattened.

A spine fracture can happen very suddenly as a result of a fall, or something more minor such as sneezing, coughing, reaching, lifting or carrying. Some spine fractures do cause pain. The pain can vary from mild to excruciating pain in the back. This pain may bring about a visit to the hospital or doctor's office where an X-ray may confirm a broken bone in the spine.

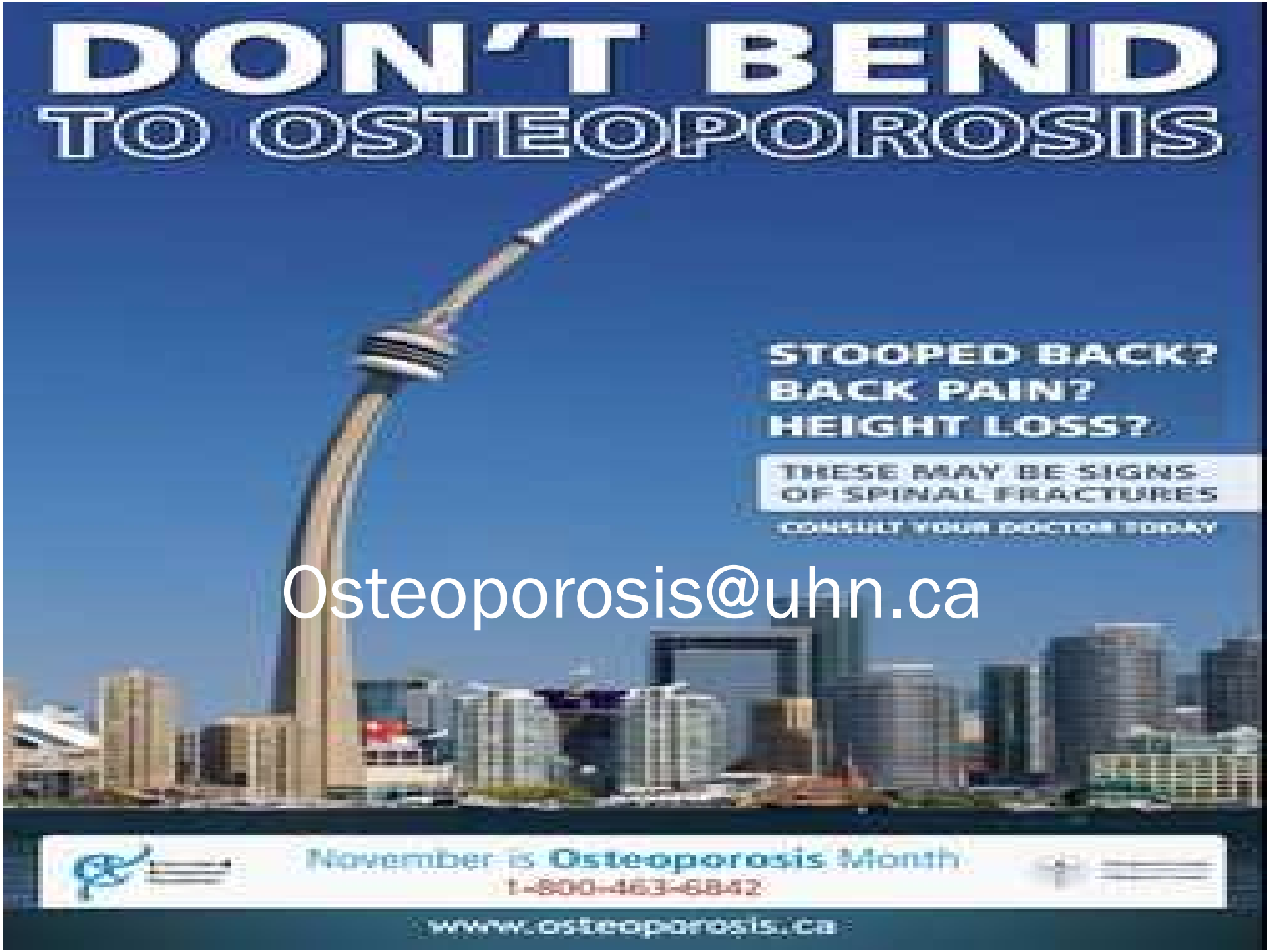
Two-thirds of broken bones in the spine happen without causing any pain at all and are found either:

- on an X-ray for another purpose, or
- because your healthcare provider



Stand Tall Canada

- **Height loss** can be a warning sign of a spine fracture (a broken bone in your back).
- A spine fracture may be caused by **osteoporosis**, a condition that causes bones to break easily.
- You may not be aware of a broken bone in your back because 66% are painless.
- If you have a spine fracture, **effective treatment** is available to reduce your risk of another broken bone.


DON'T BEND
TO OSTEOPOROSIS
STOOPED BACK?
BACK PAIN?
HEIGHT LOSS?
THESE MAY BE SIGNS OF SPINAL FRACTURES
CONSULT YOUR DOCTOR TODAY
Osteoporosis@uhn.ca
November is Osteoporosis Month
1-800-463-6842
www.osteoporosis.ca

THANK YOU!

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