

An update of the prevalence of osteoporosis, fracture risk factors, and medication use among community-dwelling older adults: results from the CLSA



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Osteoporosis

- Disease characterized by compromised bone strength and an increased risk for fractures
- Significant morbidity, mortality, and economic burden



Previous studies have estimated the prevalence of osteoporosis in Canada

- Rates range:
 - 15.8% of women, and 6.6% of men¹
 - 5.6 to 10.5% for ages 50+²
 - 10.1% for adults aged 40+³
- Administrative, clinical, and self-reported data
- These studies are now 10-20 years old
 - The aging population is rapidly growing, new estimates will ensure resource planning keeps pace with increasing aging population

1. Tenenhouse et al. Osteoporos Int J Establ Result Coop Eur Found Osteoporos Natl Osteoporos Found USA 11:897–904

2. O'Donnell et al. Arch Osteoporos 8:143.

3. O'Donnell Health Promot Chronic Dis Prev Can Res Policy Pract 38:445–454.



Fracture Risk

- How likely someone is to experience a major osteoporotic fracture in a specified time frame
- Assessed through tools such as FRAX®¹
- Many fractures happen in the absence of a diagnosis of osteoporosis through bone mineral density²
- Many people who are identified as high fracture risk are not offered pharmacological treatment³
- Recent work suggested it is important to understand the proportion of the general population that is at high fracture risk for proper surveillance and planning⁴

1. Kanis et al. Osteoporos Int 18:1033–1046.

2. Bliuc et al. J Bone Miner Res 30:637–646.

3. Papaioannou et al. CMAJ 182:1864–1873

4. Kendler et al. Osteoporos Int.



Established Fracture Risk Factors

Kanis et al. Osteoporos Int J Establ Result Coop Eur Found
Osteoporos Natl Osteoporos Found USA 19:385–397.

- Age
- Sex
- Low body mass
- Previous fracture
- Parental hip fracture
- Smoking
- Recent systemic glucocorticoid use
- Rheumatoid arthritis
- Diabetes mellitus (type 2)
- Premature menopause (<45 years)
- Alcohol use (3 or more units/day)
- Low femoral neck bone mineral density



Objectives

1. Within the CLSA, provide an up-to-date prevalence estimate of:
 - a) osteoporosis (self-reported and DXA confirmed)
 - b) Fracture risk
 - c) Fracture risk factors
 - d) Proportion of older Canadians at high fracture risk not taking osteoporosis medications



Method – Data Source and Sample

- CLSA participants from the baseline comprehensive interview and physical assessments
 - Completed between 2011-2015
 - Who had DXA data available (n=27,685)



Method – Data Source

Sampling Frames:

1. Subset of participants in Statistic Canada's Canadian Community Health Survey-Healthy Aging
2. Registries of provincial health care systems
3. Random digit dialing of landline phones

Comprehensive cohort:

- Participants lived within 25-50km of data collection site
- Excluded: living in an institution at baseline, full-time members of the Canadian Armed Forces, persons living on federal First Nations reserves and other First Nation settlements, in the three northern territories and some remote regions, those unable to respond in English or French, and those with cognitive impairment at baseline



Method – Data Analysis

Descriptive statistics of prevalence of:

1. Self-reported osteoporosis
2. DXA-confirmed (femoral neck) osteoporosis
 - WHO definition: osteoporosis (T-score ≤ -2.5), osteopenia (T-score between -1.0 and -2.5), normal bone density (T-score ≥ -1.0)
3. Each fracture risk factor within FRAX®
4. People at high risk according to FRAX® ($\geq 20\%$ fracture probability)
5. People who have osteoporosis and are at high fracture risk who are not taking osteoporosis medications
 - Defined via the DIN using the operation structure outlined by Public Health Agency of Canada
 - Did not include over the counter supplements like calcium or vitamin D



Method – Data Analysis

- Prevalence estimate – % and cases per 1000
- Stratified by age and sex
- Sampling weights, as defined by CLSA, were applied



Results

Mean age: 70.0 (SD 10.3)

52.5% female

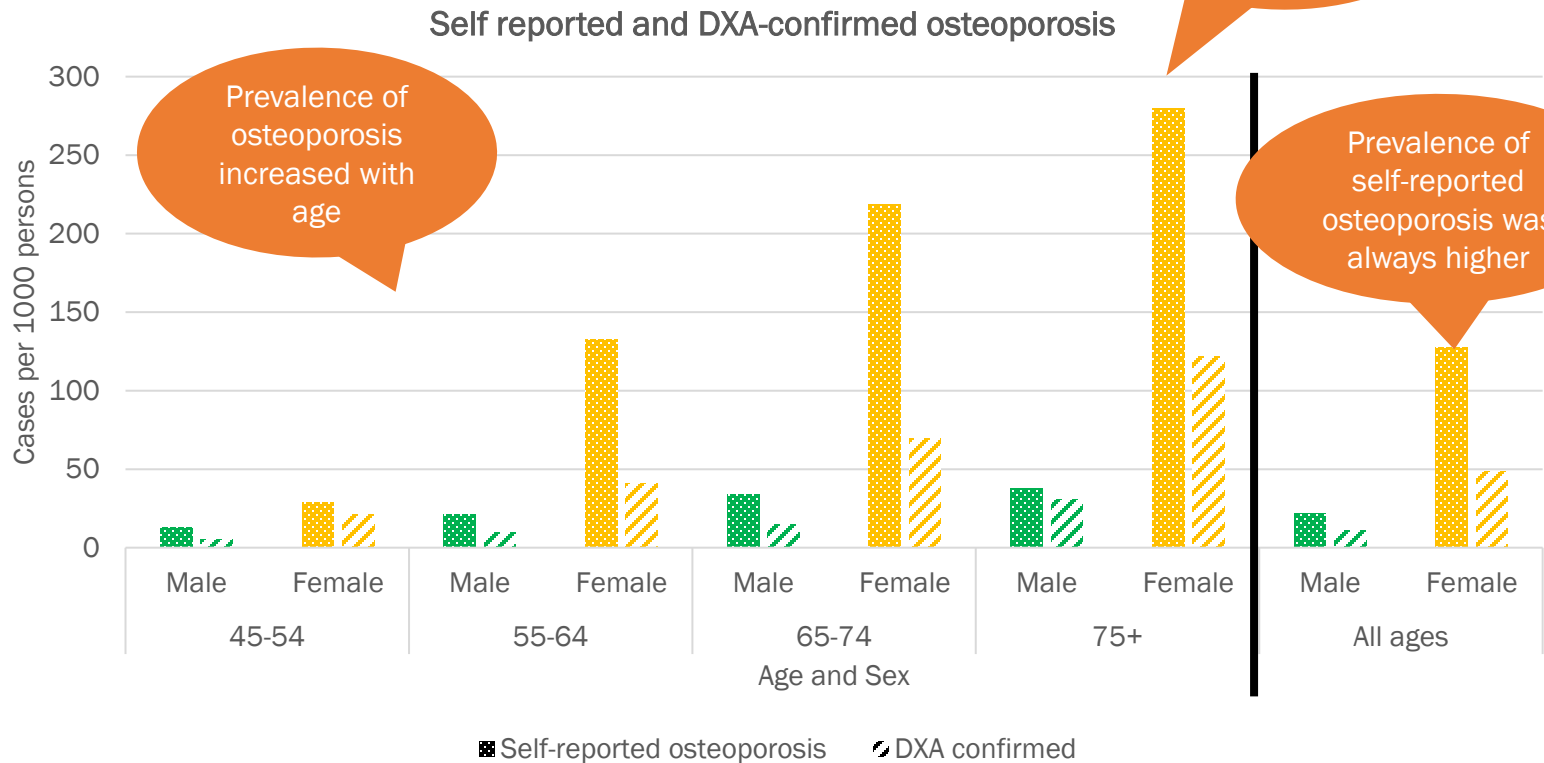
Self reported osteoporosis:
7.8% overall
2.2% males
12.7% females

DXA-confirmed osteoporosis:
3.6% overall
1.2% males
5.9% females

Self reported lifetime fracture history:
13.8% overall
10.2% males
17.1% females

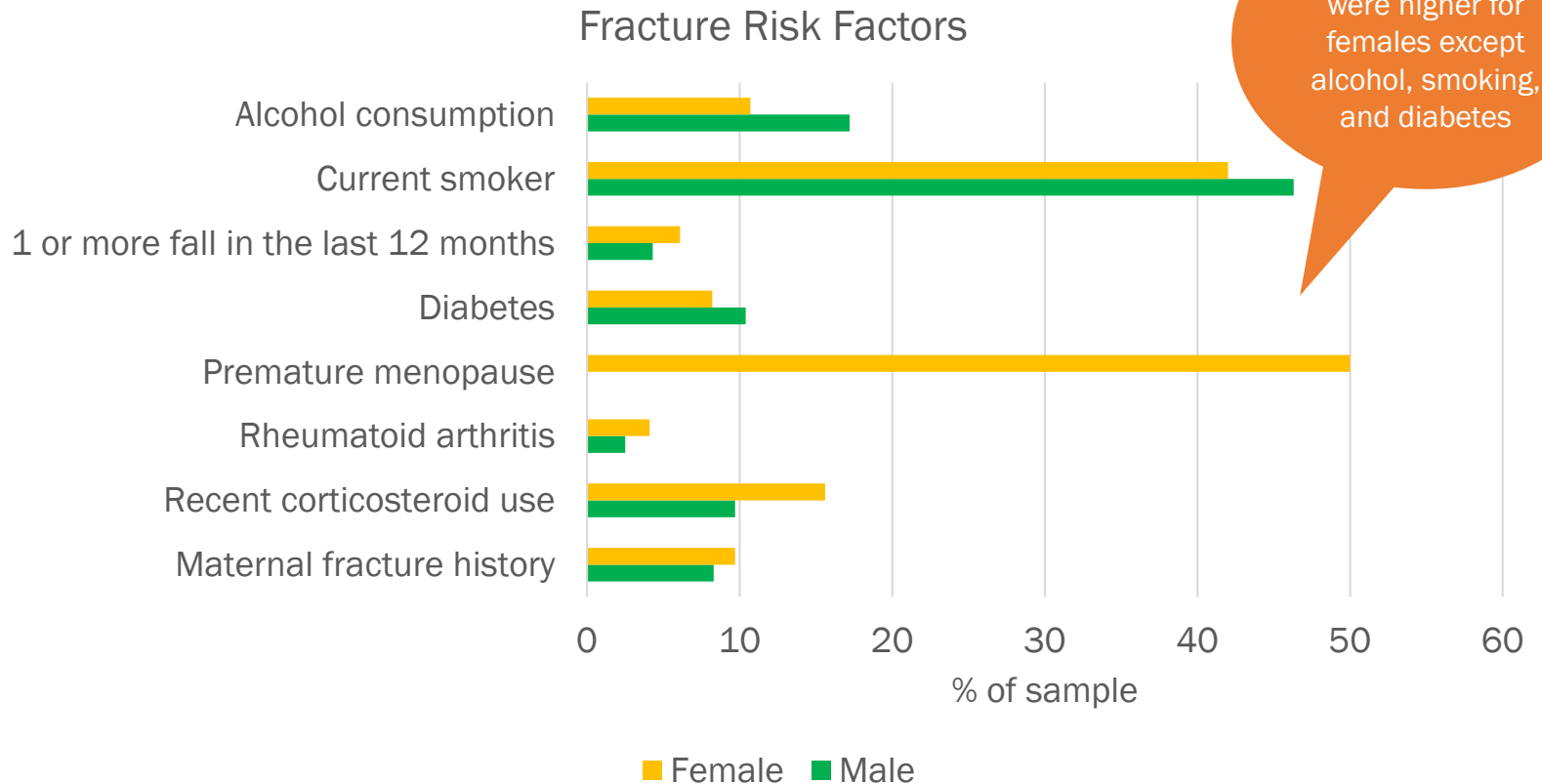


Results



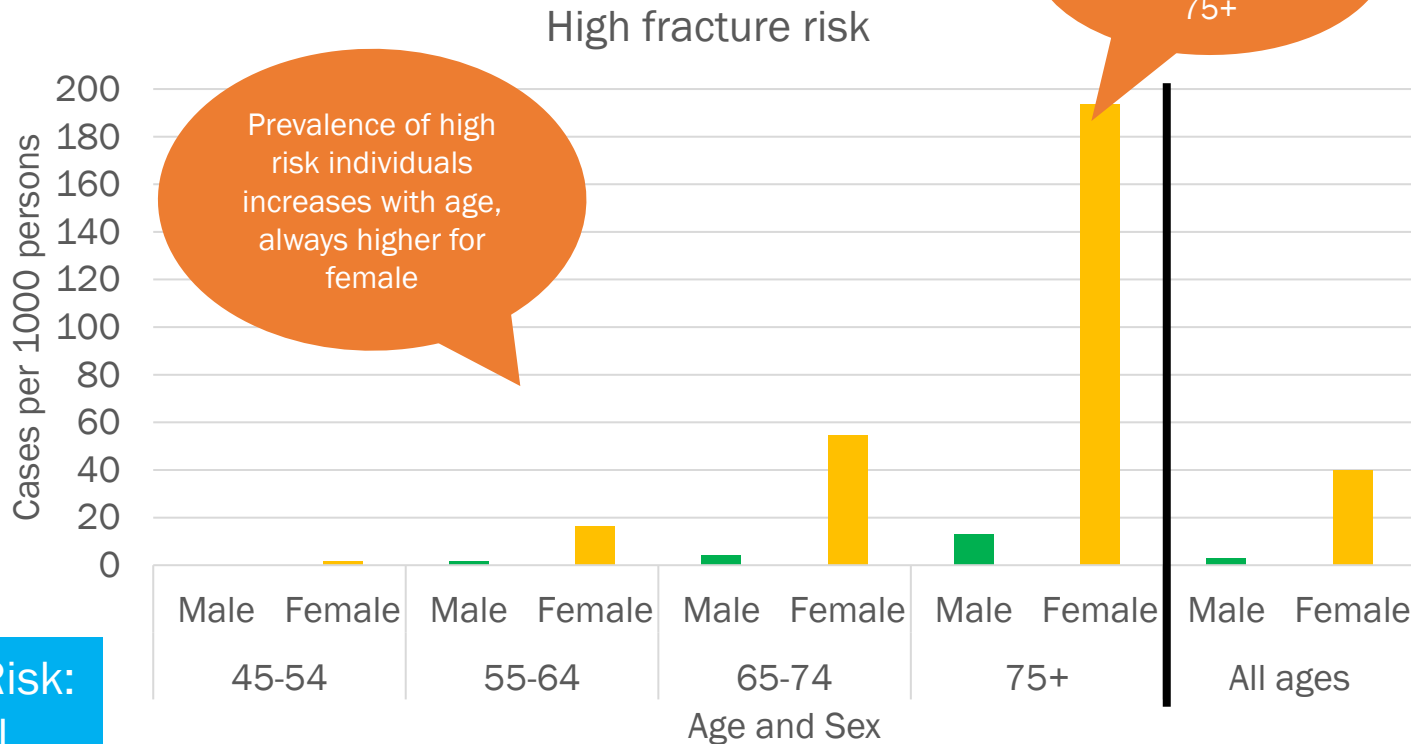


Results





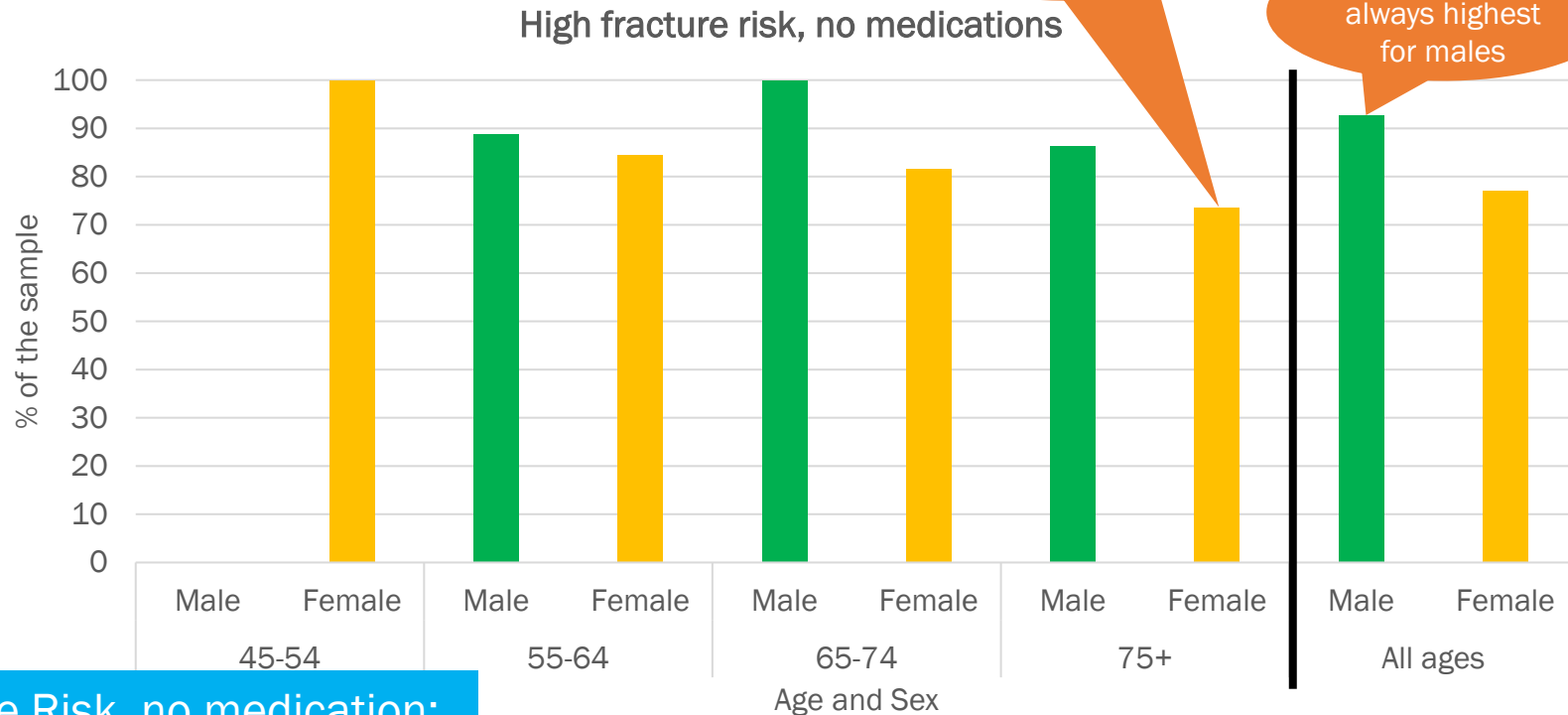
Results



High Fracture Risk:
2.8% overall
0.3% males
5.1% females



Results



High Fracture Risk, no medication:
92.7% overall
97.8% males
82.6% females



Discussion – lower prevalence than previously reported

- 3.6% compared with 6.6 to 15.8%^{1,2,3}
- We report DXA-confirmed compared with self-report or administrative data
 - We found self-report over-estimated prevalence
- BMD has increased and hip fracture rates have decreased⁴
 - Higher prevalence of obesity
 - Lower smoking rates
 - More osteoporosis treatment
- Healthier CLSA cohort

1. Tenenhouse et al. Osteoporos Int J Establ Result Coop Eur Found Osteoporos Natl Osteoporos Found USA 11:897–904

2. O'Donnell et al. Arch Osteoporos 8:143.

3. O'Donnell Health Promot Chronic Dis Prev Can Res Policy Pract 38:445–454.

4. Leslie & Morin SN Curr Opin Rheumatol 26:440–446.



Discussion – significant primary fracture prevention gap

- Similar gap across 27 European countries, mean 55% of postmenopausal women at moderate, high, and very high fracture risk being untreated with medication¹
- Reasons why they may not be taking medication:
 - Side effects, financial constraints, (perceived) lack of efficacy, inconvenience²
- Previous work suggests most prevention focuses on secondary prevention³
- Fractures result in substantial pain and disability and cost the healthcare system billions of dollars – so fracture prevention should be optimized

1. Fuggle et al. Bone 144:115833

2. Orimo et al. Osteoporos Sarcopenia 3:174–184

3. Leslie & Crandall. Curr Osteoporos Rep 17:483–490.



Discussion – prevalence of self-reported osteoporosis was higher

- Agrees with previous work
 - Only 62% of people with DXA-confirmed osteoporosis reported their results correctly¹
 - People report osteoporosis when they are osteopenic²
 - People confuse osteoporosis and osteoarthritis³
 - Poor communication of a diagnosis from health care providers⁴
 - Sex, race, BMI, poor health, history of fracture, and osteoporosis treatment are all associated with accurate reporting⁴
- Education about the disease may be needed for people who inaccurately report

1. Cadarette et al. J Clin Epidemiol 60:1306–1311.
2. Cunningham et al. Rheumatol Int 36:1633–1640.
3. Cummings. JAMA 296:2601–2610.
4. Bultink & Lems. Curr Rheumatol Rep 15:320–328.



Discussion – osteoporosis is undertreated in males more than females

- Osteoporosis is traditionally under-recognized in males¹
- Males are often not targeted for primary prevention – receive secondary prevention or treatment related to secondary osteoporosis
 - Factors associated with osteoporosis care in males: comorbidities, adjuvant hormonal therapy for prostate cancer, vertebral or hip fractures, and glucocorticoid treatment²
- Promotion of the importance of primary prevention for males is necessary

1. Adler RA Bone Res 2:1–8.

2. Adami et al. Arch Osteoporos 16:56.



Strengths

- CLSA is a population-based national cohort
- Stratified random sampling, and we applied sampling weights to minimize sampling bias



Limitations

- Did not examine reasons behind not taking medications
- We did not include lumbar spine t-scores
- Healthy cohort means our results are only generalizable to healthy, older population living in the community
 - Cognitive impairment and long-term care residents are at high fracture risk
- Could not establish clinical diagnosis of osteoporosis or high fracture risk based on fracture because we could not ascertain which were low trauma
- Cross-sectional – so we could not determine how many fractured after assessment



Conclusions

- We provide an updated prevalence estimate of osteoporosis for community-dwelling older adults aged 45 to 85 years
- Most community dwelling older adults at high fracture risk are not taking osteoporosis medications, especially males
- This presents an opportunity for primary fracture prevention in the community



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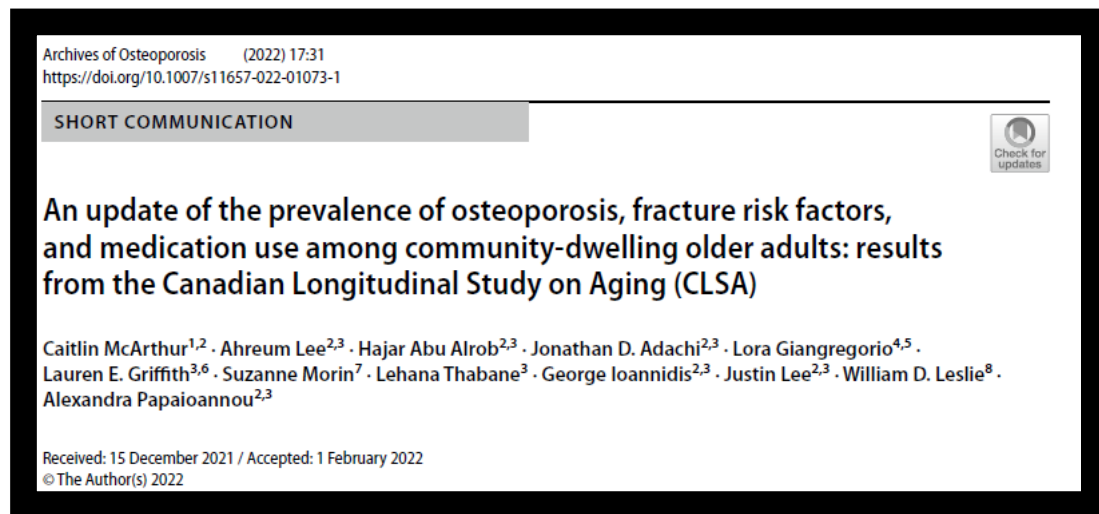
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Association among cognition, frailty, and falls and self-reported incident fractures: results from the Canadian Longitudinal Study on Aging (CLSA)

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Thank you!

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