

Patient vignettes in osteoporosis: Fracture prevention with bone formation (anabolic) therapy

This content was developed in concert with the scientific planning committee member:

Dr Aliya A. Khan, MD, FRCPC, FACP, FACE

Clinical Professor, Department of Medicine, McMaster University

Julie 73-year-old woman with a hip fracture sustained during anti-osteoporosis treatment

Age	75 y	Sex	Female	Weight	59.0 kg	Height	157.5 cm
Fracture history	<ul style="list-style-type: none"> Hip fracture (femoral neck), age 73 y; missed a bottom step at home Wrist fracture, age 70 y; fell from standing height 			Medications	Current Risedronate DR 35 mg qw (since age 65 y) Citalopram 20 mg qd Pantoprazole 40 mg qd Calcium (600 mg/d) and vitamin D (1000 IU/d) Prior Nothing significant		
BMD T-score	Lumbar spine -3.0	Femoral neck -2.8	Total hip -2.7	Comorbidities	GERD No DM, HTN, or dyslipidemia		
Fracture risk details	BMD assessment date <1 y ago <ul style="list-style-type: none"> Hip fracture/multiple fractures Age 75 y BMD \leq -3.0 GERD/PPIs Family history is unremarkable Physically active; walks daily for 1 hour No falls within past year Nonsmoker, infrequent alcohol intake 			Additional notes	<ul style="list-style-type: none"> Patient was referred for a specialist assessment due to long-term oral bisphosphonate therapy (~10 y) and a hip fracture sustained while on therapy Family doctor reports good adherence to bisphosphonates Normal initial blood tests ordered by GP: calcium (corrected for albumin), phosphate, creatinine (eGFR), alkaline phosphatase, thyroid-stimulating hormone, serum protein electrophoresis, and 25-hydroxyvitamin D 		

FRAX: 10-y fracture risk calculator based on Canadian data¹

Clinical FRAX without BMD^a

Questionnaire:

- Age (between 40 and 90 years) or Date of Birth: 75 y
- Sex: Male Female
- Weight (kg): 59
- Height (cm): 157.5
- Previous Fracture: No Yes
- Parent Fractured Hip: No Yes
- Current Smoking: No Yes
- Glucocorticoids: No Yes
- Rheumatoid arthritis: No Yes
- Secondary osteoporosis: No Yes
- Alcohol 3 or more units/day: No Yes
- Femoral neck BMD (g/cm²): [Select BMD]

Clear Calculate

BMI: 23.8
The ten year probability of fracture (%)

without BMD	
Major osteoporotic	24
Hip Fracture	8.2

Osteoporosis Canada, AACE, BHO, NAMS, and SOGC guidelines indicate that FRAX can be used without entering BMD when not available²⁻⁶; FRAX without BMD predicts a hip fracture with ~80% chance⁷

$\geq 20\%$ for MOF^{2-6,8} (i.e., hip, spine, humerus, or distal forearm fracture) or $\geq 3.0\%$ for hip fracture^{2-5,8} indicates **high** future fracture risk

FRAX with BMD^a

Questionnaire:

- Age (between 40 and 90 years) or Date of Birth: 75 y
- Sex: Male Female
- Weight (kg): 59
- Height (cm): 157.5
- Previous Fracture: No Yes
- Parent Fractured Hip: No Yes
- Current Smoking: No Yes
- Glucocorticoids: No Yes
- Rheumatoid arthritis: No Yes
- Secondary osteoporosis: No Yes
- Alcohol 3 or more units/day: No Yes
- Femoral neck BMD (g/cm²): [Select BMD]

T-Score: -2.8

Clear Calculate

BMI: 23.8
The ten year probability of fracture (%)

with BMD	
Major osteoporotic	26
Hip Fracture	8.8

If you have a TBS value, click here: [Adjust with TBS](#)

Julie: Clinical management based on recent North American guidelines^{2-6,8,9}

Osteoporosis and fracture risk

- Treatment failure: on-treatment fracture,^b treatment adherent, and no apparent secondary causes^{2,3,5,6,8}
- Recommended for BF therapy—very high risk: ≥ 2 fractures^{2,3,8,9} (also, ≤ -3.0 BMD T-score^{2,5} or hip fracture $> 4.5\%$ FRAX risk^{2,3})**
- Osteoporosis diagnosed ~10 y ago by GP based on BMD T-score ≤ -2.5 ⁴



After completing BF treatment, guidelines^{2-6,8,9} and product monograph¹⁰ recommend switching to antiresorptive therapy to preserve the achieved BMD gains.



What if this patient was a man with a similar risk factor profile? Per product monograph, romosozumab is not indicated in men and teriparatide may be considered after failure/intolerance to prior therapy.^{10,11}

Management

- Indicated for **romosozumab**: osteoporosis + fracture or ≥ 2 risk factors (≥ 2 fractures, age ≥ 75 y, and BMD ≤ -2.5); no hx of MI or stroke and no major CVD risk factors¹⁰
- Indicated for **teriparatide**: fracture hx or BMD T-score ≤ -2.5 ; no known risk factors for osteosarcoma¹¹
- DXA scan: not needed/recent BMD data available
- Vitamin D: continue supplementing 1000 IU/d; calcium: continue supplementing 600 mg/d
- Blood tests: reordered (prior tests ~4 mo ago) to exclude contraindications/hypocalcemia and secondary osteoporosis causes²⁻⁶
- Patient preferences: discussed treatment initiation with BF therapy (qd vs qm dosing) and follow-on antiresorptive treatment after completing BF treatment (bisphosphonates vs denosumab)

AACE, American Association of Clinical Endocrinology; BF, bone formation; BHO, Bone Health and Osteoporosis Foundation; BMD, bone mineral density; BMI, body mass index; DM, diabetes mellitus; CVD, cardiovascular disease; DR, delayed release; DXA, dual-energy x-ray absorptiometry; eGFR, estimated glomerular filtration rate; GERD, gastroesophageal reflux disease; GP, general practitioner; FRAX, fracture risk assessment tool; GP, general practitioner; HTN, hypertension; hx, history; MI, myocardial infarction; MOF, major osteoporotic fracture; NAMS, The North American Menopause Society; PPI, proton pump inhibitor; qw, weekly; qd, daily; qm, monthly; SOGC, Society of Obstetricians and Gynecologists of Canada; TBS, trabecular bone score.

^aAdditional details for the following FRAX entries: 5, adult fracture occurring with low trauma (excluding hands, feet, and cranium); 6, biological mother/father hip fracture; 7, currently smokes tobacco; 8, current/past oral glucocorticoid use, ≥ 5 mg qd or equivalent; 9, confirmed diagnosis of rheumatoid arthritis; 10, disorders strongly associated with osteoporosis (including type 1 diabetes, osteogenesis imperfecta in adults, untreated long-standing hyperthyroidism, hypogonadism, premature menopause/ <45 y, chronic malnutrition, malabsorption, and chronic liver disease); 11, ≥ 3 units of alcohol daily; 12, enter the T-score if BMD scan is unknown and leave BMD field blank if BMD results are not available.

^bConsider treatment failure if no secondary osteoporosis present and ≥ 2 on-treatment fractures (regardless of adherence) or ≥ 1 fracture, if adherent to therapy.^{2,3,5,8}

1. FRAX® Risk Assessment Tool, Canada. Accessed July 1, 2024. <https://frax.shef.ac.uk/FRAX/tool.aspx?country=19>; 2. Camacho PM, et al. *Endocr Pract*. 2020;26(Suppl 1):1-46; 3. Khan AA, et al. *J Obstet Gynaecol Can*. 2022;44(5):527-536.e5; 4. LeBoff MS, et al. *Osteoporos Int*. 2022;33:2049-2102; 5. The North American Menopause Society. *Menopause*. 2021;28:973-997; 6. Morin SN, et al. *CMAJ*. 2023;195(39):E1333-E1348; 7. Hoff M, et al. *Osteoporos Int*. 2017;28(10):2935-2944; 8. Shaback D, et al. *J Clin Endocrinol Metab*. 2020;105(3):dgaa048; 9. Qaseem A, et al. *Ann Intern Med*. 2023;178(2):224-238; 10. EVENITY® (romosozumab-aqqg). Product Monograph. Amgen Inc.; 2020; 11. Pr FORTEO® (teriparatide [DNA origin] injection). Product Monograph. Eli Lilly and Co; 2021.

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