

Understanding bone fragility: theoretical explanation to non-physician health professionals

The European League Against Rheumatism recently established timely and highly important recommendation for non-physician health professionals regarding the prevention and management of bone fractures among older adults.¹ To support the health professionals' understanding of skeletal fragility, I would like to provide a theoretical explanation.^{2 3}

First, non-physician health professionals are expected to play a role in the improvement of patient adherence to pharmacotherapy for osteoporosis.¹ Here, it should be paid attention that the effects of osteoporosis drugs except bisphosphonates with mineral binding capacity are lost rapidly after discontinuation,⁴ which can be reasonably explained by functional adaptation of bone to mechanical loading during physical activity.³ Second, the homeostatic system in the skeleton² can also explain why the small and transient effect of calcium supplementation on areal bone mineral density, measured by dual-energy X-ray absorptiometry, is lost after discontinuation.⁵ Finally, although vigorous-intensity exercise would improve bone fragility,⁶ the effect can be similarly lost after discontinuation, resulting from the skeletal adaptation to mechanical environment.⁷ Long-term continuation of exercise should be therefore given priority over the intensity; for example, rapid bone loss following stroke⁸ indicates the significance of even light-intensity physical activity.

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REFERENCES

- Adams J, Wilson N, Hurkmans E, *et al.* 2019 EULAR points to consider for non-physician health professionals to prevent and manage fragility fractures in adults 50 years or older. *Ann Rheum Dis* 2021;80:57–64.
- Sugiyama T. Vitamin D and calcium supplementation to prevent fractures in adults. *Ann Intern Med* 2013;159:856.
- Sugiyama T. Treatment of low bone density or osteoporosis to prevent fractures in men and women. *Ann Intern Med* 2017;167:899–900.
- Eastell R, Rosen CJ, Black DM, *et al.* Pharmacological management of osteoporosis in postmenopausal women: an Endocrine Society* clinical practice guideline. *J Clin Endocrinol Metab* 2019;104:1595–622.
- Willett WC, Ludwig DS. Milk and health. *N Engl J Med* 2020;382:644–54.
- Sugiyama T. Physical activity and bone health: understanding mechanical strain-related stimuli. *Int J Epidemiol* 2018;47:669–70.
- Sugiyama T. Letter to the Editor: "Exercise mitigates bone loss in women with severe obesity after Roux-en-Y gastric bypass: a randomized controlled trial". *J Clin Endocrinol Metab* 2020;105:e989–90.
- Sugiyama T. Letter by Sugiyama regarding article, "Screening and treatment for osteoporosis after stroke: results from the Ontario Stroke Registry. *Stroke* 2019;50:e307.