Could suppression of Gαq/11 signaling be a promising target for treating bone loss?

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Intermittent parathyroid hormone treatment (iPTH) and mechanical loading through exercise have both been shown to stimulate bone formation. These osteoanabolic stimuli are partially mediated by G protein-coupled receptors. Previous studies have suggested that enhanced signalling through the $G\alpha_{q/11}$ pathway inhibits the bone-building actions of PTH, however the influence of enhanced $G\alpha_{q/11}$ pathway on exercise has not been reported in vivo.

In a new study published in the journal 'Calcified Tissue International and Musculoskeletal Research', investigators used transgenic mice that specifically overexpress $G\alpha_{11}$ to compare in vivo the effects of intermittent PTH and treadmill exercise on bonearchitecture, strength and histology. They also investigated how osteoblastic elevation of $G\alpha_{11}$ (without constitutive $G\alpha_{q/11}$ activity) in these mice influences the skeletal response to anabolic bone therapies.

Professor Jane Mitchell, Associate Chair, Department of Pharmacology and Toxicology. University of Toronto, stated, "In summary, our studies demonstrate that elevated $G\alpha_{11}$ in osteoblast lineage cells inhibits the osteoanabolic effects of intermittent PTH and inclined treadmill exercise. That $G\alpha_{11}$ mediates these functions in the bone microenvironment may indicate that inhibition of $G\alpha_{11}$ signaling can augment the responses to PTH and exercise in increasing bone mass and strength, and may be a suitable candidate to target for treating bone loss ."

More information: Ariana Dela Cruz et al, Overexpression of Gα11 in Osteoblast Lineage Cells Suppresses the Osteoanabolic Response to Intermittent PTH and Exercise, *Calcified Tissue International* (2016). DOI: 10.1007/s00223-016-0158-y