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2007 Roger Melick Young Investigator Award Recipient

Winner of the Basic Research category: Mr Garry Williams

Abstract:

Adiponectin knock-out mice have increased trabecular number and bone volume at 14 weeks of age

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Adiponectin, a hormone secreted by adipocytes, regulates energy homeostasis and glucose and lipid metabolism. Plasma levels of adiponectin are negatively correlated with body fat mass. Adiponectin inhibits the formation and activity of osteoclasts and increases the proliferation and differentiation of osteoblasts *in vitro*. The aim of our study was to determine the bone phenotype of adiponectin knockout mice.

Male adiponectin-deficient (Ad-KO) and wild-type (WT) C57BL/6J mice were sacrificed at 8, 14 and 22 weeks of age. Body weights did not differ between Ad-KO and WT mice. We scanned the left proximal tibia using micro-CT at 5µm resolution and analysed bone microarchitecture by 3D analysis.

We found significant increases in trabecular bone volume (BV/TV) (15.9±1.63 vs 12.2±0.72%, p=0.02) and trabecular number (3.20±0.18mm^{-1} vs 2.32±0.12mm^{-1}, p=0.0009) in 14-week old Ad-KO mice compared to controls. Similar differences between WT and Ad-KO were present in 8 and 22-week old animals but these did not reach statistical significance. Trabecular thickness was significantly greater (0.053±0.001mm vs 0.048±0.002mm, p=0.04) in 22-week old Ad-KO mice compared to WT.

Ad-KO mice have increased number and volume of trabeculae at 14 weeks of age indicating that the net effect of adiponectin on bone accrual *in vivo* is inhibitory. These effects are age-dependent. Our data concur with the observations from epidemiological studies in humans that adiponectin negatively correlates with both fat mass and bone mass. Therefore, adiponectin may be a contributor to the link between fat and bone mass.