2007 ANZBMS ASM

17th Annual Meeting of the Australian & New Zealand Bone & Mineral Society

9-12 September 2007, Queenstown, New Zealand

www.anzbms.org.au/asm/asm2007

2007 Amgen/ANZBMS Outstanding Abstract Award Recipient

Winner: Dr Paul Baldock

Abstract:

Neuropeptide Y protects the skeleton from bone loss induced by stress

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Neuropeptide Y has anxiolytic actions, attenuating the psychological effects of stress. The Y2-receptor, which mediates these anti-stress actions, also regulates bone. We investigated whether NPY could modulate skeletal responses to stress.

Stress responses in $NPY^{-/-}$ mice were examined using established behavioral models and showed anxiety-related parameters were much greater in $NPY^{-/-}$ mice. Skeletal responses to stress were examined at 14 weeks in male $NPY^{-/-}$ and wildtype mice after 4 week low and high stress protocols. The "stress" protocol involved regular handling, including rectal temperature, glucose tolerance test, 24h fasting and metabolic cage studies.

In low stress groups whole body, femoral (53 ±2 mg/mm^2 vs 65 ±2, $p<0.05$) and tibial BMD was greater in $NPY^{-/-}$ than wild type mice, with greater cortical volume and thickness. Femoral cancellous bone volume (16.7 ±1.5% vs 11.6 ±0.9, $p<0.01$) and mineral apposition rate (2.8 ±0. μm/d vs11.9 ±0.1, $p<0.0005$) were greater in $NPY^{-/-}$ mice.

In the "stressed" groups, body weight was reduced in $NPY^{-/-}$ mice (30.1 ±1g vs 25.5 ±1, $p<0.0001$) with no decrease in wildtype. Trabecular number reduced in wildtype without significant loss of cancellous bone volume. Stress reduced bone volume in $NPY^{-/-}$ mice (16.7 ±1.5% vs 13.2 ±0.7, $p<0.01$) and mineral apposition rate (1.6 ±0.1 μm/d vs 2.4 ±0.1, $p<0.0001$), both remained greater than wildtype.

NPY plays a powerful role in increasing bone during times of plenty and may inhibit loss due to stress in times of famine. This may explain a mechanism for bone loss associated with stress in otherwise healthy individuals.