

Summary of: Effect of Leptin Deficiency on the Skeletal Response to Hindlimb Unloading in Adult Male Mice

Here is a summary of the research paper "Effect of Leptin Deficiency on the Skeletal Response to Hindlimb Unloading in Adult Male Mice" by Jessica A. Keune, Adam J. Branscum, Carmen P. Wong, Urszula T. Iwaniec, Russell T. Turner:

Methodology - **Animals**: Male C57BL/6J (WT) and B6.Lepob/ob (ob/ob) mice were housed at 32°C (thermoneutral) from 4 weeks to 16 weeks of age. - **Hindlimb Unloading (HU)**: Mice were unloaded for 2 weeks, with ob/ob HU mice pair-fed to WT HU mice. - **Data Collection**: Body weight, abdominal WAT weight, seminal vesicle weight, blood glucose, serum corticosterone, and osteocalcin levels were measured. Total femur and lumbar vertebra cancellous bone parameters were assessed using micro-CT and histomorphometry.

Results 1. **Cancellous Bone Response**: - **Ob/ob Mice**: Pair-fed to WT mice, had normal cancellous bone volume fraction (BV/TV) in distal femur, lower femur length, and total bone area, mineral content (BMC) and density (BMD), and higher cancellous bone volume fraction in lumbar vertebra (LV). - **Hindlimb Unloading (HU)**: Reduced BMC and BMD in total femur, and lower BV/TV in distal femur and LV in both genotypes. - **Cancellous Bone Loss**: Associated with increases in osteoclast-lined bone perimeter. HU resulted in lower BMC and BMD in total femur, and lower BV/TV in distal femur and LV in both genotypes.

2. **Bone Architecture**: - **Femur Diaphysis**: Cross-sectional volume and marrow volume were greater in ob/ob mice, but cortical volume and thickness were lower. - **Femur Metaphysis**: Bone volume fraction, connectivity density, structure model index, trabecular number, and trabecular spacing were not different between genotypes. - **Femur Epiphysis**: Bone volume fraction was not different, but ob/ob mice had greater connectivity density, structure model index, and trabecular number, and lower trabecular thickness and spacing.

3. **Bone Formation and Resorption**: - **Formation**: Osteoblast perimeter was lower in ob/ob mice, while osteoclast perimeter and declomycin label length did not differ between genotypes. - **Resorption**: Increased osteoclast-lined bone perimeter. Decreased cancellous bone volume fraction and fluorochrome label retention were observed.

4. **Bone Marrow Adipose Tissue (MAT)**: - **Levels**: MAT levels were approximately 10x greater in ob/ob mice compared to WT mice. - **Effect**: MAT did not alter HU-induced cancellous bone loss in lumbar vertebra.

Discussion - **Bone Loss**: HU resulted in cancellous bone loss in the distal femur metaphysis due to increased bone resorption. - **Leptin Deficiency**: Leptin deficiency did not attenuate HU-induced osteopenia in male mice, suggesting leptin is not required for bone loss induced by unweighting. - **Bone Marrow Adipose Tissue (MAT)**: High levels of MAT did not affect HU-induced cancellous bone loss, but high MAT levels did not impair the skeletal response to mechanical loading.

Conclusion - **Leptin Deficiency**: Does not attenuate HU-induced osteopenia in male mice, suggesting leptin is not essential for the skeletal response to unweighting.