

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Effect of Hind-Limb Suspension and X-Ray Irradiation on the Mechanical and Chemical Properties of Rat Femur and Tibia Bones<sup>1</sup>**

HAYLEY HEACOX, BRENT HILL, RAHUL MEHTA, JORDAN BARAJAS, SIDNEY FREYALDENHOVEN, University of Central Arkansas, MAX DOBRETSOV, PARIMAL CHOWDHURY, University of Arkansas for Medical Sciences — It is known that space conditions such as microgravity and cosmic radiation have detrimental effects on the skeletal system of humans, such as decreased bone mineral density. This research studies the changes in mechanical properties, elasticity, and chemical properties, calcium and phosphorus content, of rat femur and tibia bones when exposed to hind-limb suspension and x-ray irradiation, simulated microgravity and cosmic radiation. It is hypothesized that if microgravity and cosmic radiation lead to decreased bone mineral density, then these conditions will produce weakened bones, lower elastic moduli and abnormal concentrations of calcium and phosphorus, as compared to bones not subject to these conditions. A technique known as three-point bending was employed to estimate the Young's (elastic) modulus for the leg bones. To investigate the chemical nature of the bones, a Scanning Electron Microscope (SEM) was utilized to take cross-sectional images and to perform energy dispersive x-ray spectroscopy. Ultimately, the results produced by this research will aid in quantifying the effects of spaceflight and may be used in developing a treatment to counteract such effects.

<sup>1</sup>This work supported by a RID and CRP grant from Arkansas Space Grant Consortium.

Rahul Mehta  
University of Central Arkansas

Date submitted: 11 Nov 2016

Electronic form version 1.4