

Examining The Relationship Between Bone Reoxygenation and Bone Mineral Density Using Near Infrared Spectroscopy and Dual X-Ray Absorptiometry:

The research being presented is unique within its subject field because it is aimed at a specific and younger demographic than previous studies. The study aims to explore the relationship between bone reoxygenation and bone mineral density. It seeks to determine if it is possible to make conclusions about bone mineral density based on hemodynamic responses, measured using Near Infrared Spectroscopy (NIRS) and Dual X-Ray Absorptiometry (DXA).. This work is novel in its approach of using one method, NIRS, a non-invasive technology, to measure blood flow to the bone tissue. NIRS can measure the oxyhemoglobin and deoxyhemoglobin concentrations. It is able to track various variables surrounding the desaturation and reperfusion of oxygen (by measuring oxyhemoglobin concentrations) in the given tissue. Subjects undergo an occlusion protocol while wearing the NIRS probe on their right proximal tibia. The NIRS is able to record the occlusion, and analysis is conducted of the first three seconds post occlusion, as well as the maximum hyperemic response. The DXA scanner is used to scan the right proximal tibia of the participant and from there, a localized bone mineral density reading is recorded. The data analysis involves using results from the participant's intake demographic surveys, their NIRS results, and the bone density results. They are analyzed with a two-sample T-test. The hypotheses being explored look at the correlation of the reoxygenation rate of bone to the bone mineral density, then additionally from a sex-based perspective, as well as from an activity level perspective. Current results may be indicative of a positive trend for a sex-based correlation.