



Department of Biomedical Engineering

Driving Mesenchymal Stem Cell Fate by Low Intensity Mechanical Signals as a Non-Drug Treatment for Osteoporosis and Obesity

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Description

Encouraging results show that the application of extremely low level strains to animals and humans will increase bone formation, and thus may represent the much sought after "anabolic" stimulus in bone. More than 20 years of research into non-invasive, non-pharmacological intervention to control osteoporosis suggest that gentle vibrations on a regular basis will help strengthen the bones in osteoporosis sufferers and increase bone formation. In his study, adult female sheep treated with gentle vibration to their hind legs for 20 minutes daily showed almost 35% more bone density. Clinical trials have been completed on post-menopausal women, children with cerebral palsy, and young women with osteoporosis, all with encouraging results, including the anabolic nature of the signal to the musculoskeletal *system*, and improvement in posture and balance. In expanding the research platform into other physiologic systems, current work demonstrates that these low-level signals influence mesenchymal stem cell differentiation, such that their path to adipocytes is suppressed, and markedly reduces adipose tissue, providing the foundation for a non-drug strategy for the treatment of obesity and diabetes. These mechanical signals ultimately may represent a means of rescuing both mesenchymal (and their ability to regenerate tissue), and hematopoietic stem cell populations (and their ability to fight disease).