

Spring 2009 Seminar Series

Department of Biomedical Engineering

Wednesday, March 25th @ 3PM in Steinman T-402

J. Christopher Fritton, PhD

Research Instructor,

Mount Sinai School of Medicine

New York, NY.

Assessing the Adaptations of Bone to Environmental Stimuli Using Imaging Approaches

A patient's response to treatment for bone loss in diseases such as osteoporosis is currently characterized with x-ray imaging techniques (DEXA and pQCT) that provide no immediate information on cellular activity and have poor physical resolution. Therefore, they have low predictive ability for an individual's bone health. This is unfortunate because risk of death is significantly elevated when osteoporotic fracture is not avoided. While promising bone-building treatments with proven biological mechanisms are on the horizon, the enthusiasm for them is dampened by large variability in individual response. Additionally, many patients fail to complete treatment because of systemic side effects that may occur while waiting the 1-2 years before treatment effects can be ascertained by x-ray. Unfortunately, during this time a key window for strengthening bone can close. Many of the same technical hurdles for assessing treatment responses exist in the laboratory and are fueling the need for bioengineered innovations. I will present results demonstrating how perturbations of physiology in pre-clinical studies can produce small structural and tissue matrix-level alterations that have major consequences for the mechanical integrity of bone. Further, the variety of these perturbations illustrates how underlying or concurrent disease and aging processes, genetics, and drug-dosing issues may influence treatment responses at the cellular level.