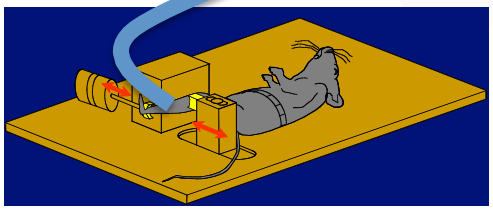
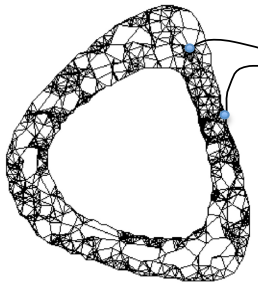
Bone deformation induced by loading

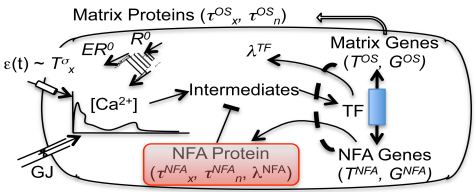


Mechanical loading of the murine tibia

ABM for Bone Adaptation



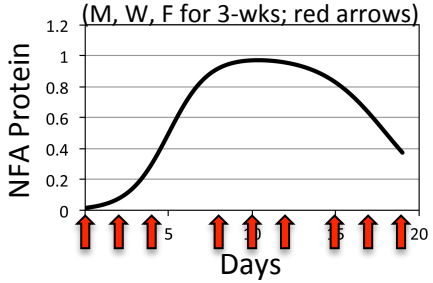
Bone cellular network



Model for Negative Feedback Autoregulation within Bone Cells

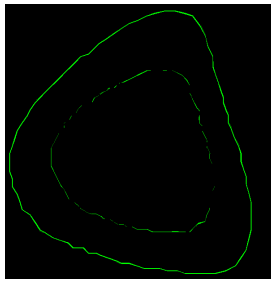
Standard Regimen (9-bouts)

(M, W, F for 3-wks; red arrows)



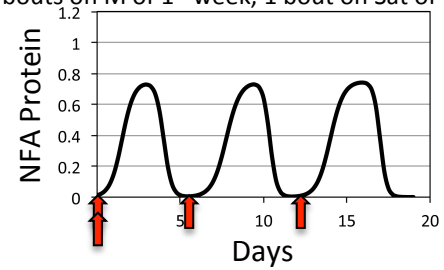
Reality

Standard Response



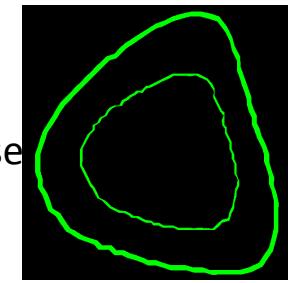
Optimized Regimen (4-bouts)

(e.g., 2 bouts on M of 1st week, 1 bout on Sat of 1st & 2nd week)



Goal

Optimized Response (4-fold greater)



Standard exercise (e.g., mechanical loading) results in the rapid saturation and cessation of bone growth due to negative feedback autoregulation (NFA). Our project will develop a model (ABM for bone adaptation), that will enable the design of loading regimens optimized to skirt negative autoregulation, require less effort (4 vs 9-bouts) but be capable of more robustly enhancing bone growth (4-fold greater than standard).