

Skeletal loading in animals

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Abstract:

A number of in vivo skeletal loading models have been developed to test specific hypotheses addressing the key mechanical and biochemical signals involved in bone's adaptive response to loading. Exercise protocols, osteotomy procedures, loading of surgically implanted pins, and force application through the soft tissues are common approaches to alter the mechanical environment of a bone. Although each animal overload model has a number of assets and limitations, models employing extrinsic forces allow greater control of the mechanical environment. Sham controls, for both surgical intervention (when performed) and loading, are required to unequivocally demonstrate that responses to loading are mechanically adaptive. Collectively, extrinsic loading models have fostered a greater understanding of the mechanical signals important for stimulating bone cells, and highlighted the roles of key signaling molecules in the adaptive response.

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