

**Division of Plastic Surgery  
Department of Surgery  
COLLEGE OF Medicine**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 1, 2014**

*The Division of Neonatology and Pulmonary Biology is pleased to offer the following research project for the summer of 2014. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.*

**PROJECT TITLE: A new approach for controlling gene expression and cell responses through biomechanical stimulation**

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**Project Description**

There is evidence that a disruption of the tissue-level growth of developing bone is generated by aberrant muscle and skeletal patterning during fetal development. Presently, we do not understand how the genetics controlling bone formation and deposition are influenced by the cellular-level strain dynamics that direct bone growth in either endochondral or intramembranous bone.

Currently, there are only limited ways of measuring cellular-level strain and these have limited *in vitro* capacities, and no *in vivo* applications exist. The objective of this research, therefore, is to develop an experimental system for a controlled strain application and biomechanical stimulation of osteoblastic cells. Specifically, we will develop and validate a sensor (Förster resonance energy transfer (FRET) cassettes) to quantify *in vitro* force experienced by biomechanically responsive cells under externally applied tensile deformation. Once developed, we will determine how specific strain magnitudes alter the expression of bone and cartilage genetic markers in pre-osteoblastic cell lineages.