

Department of Biomedical Engineering
COLLEGES OF ENGINEERING AND MEDICINE

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 1, 2007

The Department of Biomedical Engineering is pleased to offer the following research project for the summer of 2007. 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.

**THE EFFECTS OF MECHANICAL STIMULATION ON GENE EXPRESSION BY
MESENCHYMAL STEM CELLS**

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Project Description

Our laboratory is focused in the area of functional tissue engineering (FTE). We first establish the in vivo forces and deformations acting on tissues that might require repair using cell-based therapies. We then deliver aspects of these mechanical signals to tissue engineered constructs while still in culture to try and precondition and stiffen them before surgery. A major challenge that we are now addressing is how to speed up the process of identifying the most promising combinations of adult stem cells, collagen scaffolds and mechanical signals to use in these construct designs. In this regard, we have created doubly transgenic mice whose cells fluoresce green or blue depending on which collagen gene is expressed. We now seek to establish in near real time how mechanical signals delivered in culture influence expression of these genes. If we can find which combinations of mechanical signals result in the most appropriate gene expression and presumably protein production, we should be able to more rapidly synthesize cell-based constructs in culture that improve construct stiffness in culture and repair stiffness after surgery. Should a WISE student pick this project, she would work with a diverse team of geneticists, surgeons and bioengineers to conduct these studies in our laboratory.