

**CHILDRENS HOSPITAL
Department of Pediatrics**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 1, 2006

The Department of Department of Pediatrics is pleased to offer the following research project for the summer of 2006. 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.

MUSCULOSKELETAL DISORDERS OF CHILDHOOD AND ADOLESCENCE

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Project Description

Respiratory distress syndrome and bronchopulmonary dysplasia are major causes of morbidity and mortality in premature newborns. Both of these diseases occur because of problems with the Type II cells in the lung that produce pulmonary surfactant, a mixture of lipids and hydrophobic proteins that lower the surface tension in the airway to prevent the lung from collapsing upon exhalation. My laboratory investigates the molecular mechanisms regulating pulmonary Type II cell function, focusing on regulation of surfactant protein (SP) gene transcription in lung development and injury/repair. We study transcription factor interactions regulating lung epithelial cytodifferentiation during development and modulating TII cell phenotype in injury/repair. We use freshly isolated mouse Type II cells and immortalized cell lines to study transcription factor interactions *in vitro*. We recently developed mouse models with inducible expression of wild type or dominant negative Nuclear Factor-I transgenes to study the role of this family of transcription factors in lung development and lung cancer progression *in vivo*. A new project in my lab seeks to understand the role of Nuclear Factor I in regulation of the cell cycle and in progression of lung cancer. In developed countries the number of lung cancer deaths are greater than the combined mortality due to breast, prostate and colorectal cancers. The goal of this work is to understand the transcriptional mechanisms of neoplastic progression in lung cancer, which may lead to new strategies for treatment.

Potential projects for a 2006 summer student in the lab include:

- 1- **Role of NFI in cell cycle control.** Expression of NFIen, a dominant negative NFI transgene in the lung causes cell shape changes and increased proliferation. This project uses immunohistochemistry to detect cell proliferation and gene expression patterns in

lung tissue. Freshly isolated TII cell cultures from transgenic mice will be induced to express NF1en to determine how NF1en affects the cell cycle and/or extracellular matrix deposition in vitro.

- 2- **NFI-steroid hormone bound glucocorticoid receptor interactions in regulation of C/EBP alpha (a transcription factor required for Type II cell maturation)**. This is a molecular biology/ cell culture project to map the NFI binding sites in the C/EBP alpha promoter and to identify chromatin changes induced by ligand-bound glucocorticoid receptor and NFI.