

Summer Student Research Program  
Project Description

**FACULTY SPONSOR'S NAME AND DEGREE:** *Alicia M. Mohr, MD*

**PHONE:** (973) 972 - 8294

**DEPARTMENT AND INTERNAL MAILING ADDRESS:** *Surgery/MSB G-592*

**E-MAIL:** *mohr@umdnj.edu*

**PROJECT TITLE (200 Characters max):**

**Neuroendocrine regulation of erythropoiesis following trauma**

**HYPOTHESIS:**

The central hypothesis is that the early and persistent adrenergic stimulation following severe injury impacts the development of hematopoietic progenitor cells in the bone marrow and contributes to the subsequent neuroendocrine dysregulation leading to anemia and abnormal wound healing.

**PROJECT DESCRIPTION (Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)**

The long term goal of this proposal is to elucidate the role of the neuroendocrine system on bone marrow dysfunction following trauma/hemorrhagic shock (T/HS). Anemia occurs in critically injured patients and is one manifestation of end organ dysfunction. Understanding the pathophysiology of anemia following T/HS would facilitate the development of treatment strategies and would avoid the use of blood transfusions, which are known to be immunosuppressive. We have recent data showing that there is a dichotomous response of erythroid cells to adrenergic stimulation following trauma, although the mechanism involved has yet to be elucidated.

**Aim: What is the role of adrenergic receptor activation and the level of adrenergic stimulation within the bone marrow?**

Sympathetic stimulation is a complex process and its effects depend on the type of receptor activated, the cell type stimulated, and the duration of stimulation. Therefore, in rodents subjected to sham or pharmacologic models of reduced or increased sympathetic activation, we will examine both bone marrow hematopoietic progenitor cell growth over time following lung contusion and hemorrhagic shock. Sham represents our control animals. Reduced sympathetic activation is established via use of beta blockade and increased sympathetic activation will be established with the use of osmotic pumps containing norepinephrine.

Statistical evaluation of the results of experiments will be performed using t-tests and non-parametric tools (eg the Mann-Whitney U-test) to compare data. The criterion for statistical significance will be an alpha = 0.05

**SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:**

Shah S, Ulm J, Sifri ZC, **Mohr AM**, Livingston DH. (2009). Mobilization of bone marrow cells to the site of injury is necessary for wound healing. *J Trauma* 67, 315-322.

Summer Student Research Program  
Project Description

Penn A, Mohr AM, Shah SG, Sifri ZC, Rameshwar P, Livingston DH. (2008). Dose response relationship between NE and erythropoiesis: Evidence for a critical threshold. *J Trauma* (submitted for review)

Fonseca RB, Mohr AM, Wang L, Sifri ZC, Rameshwar P, Livingston DH. (2005). The impact of a hypercatalcholamine state on erythropoiesis following severe injury and the role of IL-6. *J Trauma*, 59, 884-890.

**IS THIS PROJECT SUPPORTED BY EXTRAMURAL FUNDS?**

Yes  or No

(IF YES, PLEASE SUPPLY THE GRANTING AGENCY'S NAME)

National Institute of Health

THIS PROJECT IS:  Clinical     Laboratory     Behavioral     Other

THIS PROJECT IS CANCER-RELATED

THIS PROJECT IS HEART, LUNG & BLOOD- RELATED

THIS PROJECT EMPLOYS RADIOISOTOPES

THIS PROJECT INVOLVES THE USE OF ANIMALS

PENDING

APPROVED

IACUC PROTOCOL #08068

**THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS**

PENDING

APPROVED

IRB PROTOCOL #

**THIS PROJECT IS SUITABLE FOR:**

UNDERGRADUATE STUDENTS

ENTERING FRESHMAN

SOPHOMORES

X

ALL STUDENTS

**WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?**

Begin an understanding of reviewing scientific literature; Learn basic science laboratory techniques, including cell culture, RIA, ELISA and northern analysis. Develop insight on how basic science research can be applied in the clinical arena; Interested students may participate in night call with trauma service (purely optional).