

## **FORMAT FOR BRIEF DESCRIPTION OF RESEARCH PROJECT FOR SUMMER 2016**

**TITLE:** Anemia and the Chronic Hyperadrenergic State following Major Trauma

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**RESEARCH PROJECT DESCRIPTION** (brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications -- SHOULD NOT EXCEED ~ 250 WORDS)

Injury-associated persistent anemia is a persistent anemia seen in the absence of acute blood loss and is one manifestation of bone marrow end organ dysfunction that occurs following severe trauma and prolonged critical illness. We have recent data showing that norepinephrine is a key regulator of erythroid progenitor cell growth and mobilization following trauma, although the exact mechanisms involved have yet to be elucidated. The central hypothesis is that chronic adrenergic stimulation following injury and hemorrhagic shock worsens BM dysfunction by further inhibiting the differentiation of hematopoietic progenitor cells (HPC) and exaggerating the mobilization of hematopoietic progenitor cells (HPC) from bone marrow (BM), thereby contributing to persistent injury-associated anemia. This research is supported by the NIH-NIGMS.

With regard to ongoing HPC mobilization from the BM, potential causative factors that will be studied include increased production or an abnormal response to mediators of HPC mobilization, increased proteolysis within the BM and alterations in the BM architecture. Increased proteolysis (MMP-2, MMP-9, neutrophil elastase) in whole BM as well as BM stroma will be assessed by ELISA and PCR.

The medical student will begin an understanding of reviewing scientific literature and learn basic science laboratory techniques, including cell culture, RT-PCR, ELISA and western blot. He/she will develop insight on how basic science research can be applied in the clinical arena. They will perform cell cultures, ELISAs, as well as assist with qRT-PCR. The medical student will also perform statistics and report the results from the experiments.

Alamo IG, Kannan KB, Ramos H, Loftus TJ, Efron PA, **Mohr AM.** (2016). Clonidine reduces norepinephrine and improves bone marrow function in a rodent model of lung contusion, hemorrhagic shock and chronic stress. *In press Surgery*

Alamo IG, Kannan KB, Smith MA, Efron PA, **Mohr AM.** (2016). Regulation of persistent injury-associated anemia and the roles of erythropoietin and hepcidin. *J Trauma Acute Care Surg epub Jul 8* PMID: 27398985

Bible LE, Pasupuleti LV, Gore AV, Sifri ZC, Kannan KB, **Mohr AM.** (2015). Daily propranolol prevents prolonged HPC mobilization in a chronic stress and polytrauma model. *Surgery Epub July 21* PMID: 26209570

Bible LE, Pasupuleti LV, Gore AV, Sifri ZC, Kannan KB, **Mohr AM.** (2015). Chronic restraint stress after injury and shock is associated with persistent anemia despite prolonged elevation in erythropoietin levels. *J Trauma Acute Care Surg* 79, 91-97. PMID: 26091320