

Summer Student Research Program

Project Description

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PROJECT TITLE:

Role of the gut and intestinal lymph in acute post-shock organ failure

HYPOTHESIS:

The global hypothesis being tested is that after trauma-shock, the gut releases factors into the intestinal lymphatics that leads to acute lung and other organ failure as well as systemic inflammation and acute immune system dysfunction. T

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

A trauma-hemorrhagic shock model (BP of 30 mm Hg x 90 minutes) in rodents is used to mimic major clinical trauma. Using this model, the effects of gut-derived factors on the immune system will be investigated by A) determining the rate of lymphocyte and macrophage apoptosis in the thymus and spleen (by quantitative immunohistochemistry) after trauma shock vs sham shock; B) secondly, the ability of lymph duct ligation (prevents gut-derived factors from reaching the systemic circulation) to prevent shock-induced immune cell apoptosis will be investigated and C) lastly the clinical relevance of limiting shock-induced immune cell dysfunction will be tested by comparing the survival rate of shocked rats with and without lymph duct ligation who are subjected to peritonitis (controls will include sham-shock rats).

It is anticipated that 6-8 rats per group will be needed to test experiments described in A and B and 15 rats per group for the survival studies in experiment C. Stats via ANOVA or t-test as appropriate.

All of the techniques and models are up and running the laboratory.

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

1) Machiedo GW, Zaets SB, Berezina TL, Xu DZ, Feketova E, Spolarics Z, Deitch EA.

[Trauma-hemorrhagic shock-induced red blood cell damage leads to decreased microcirculatory blood flow.](#) Crit Care Med. 2009 Mar;37(3):1000-10.

2) Barlos D, Deitch EA, Watkins AC, Caputo FJ, Lu Q, Abungu B, Colorado I, Xu DZ, Feinman R.

[Trauma-hemorrhagic shock-induced pulmonary epithelial and endothelial cell injury utilizes different programmed cell death signaling pathways.](#) Am J Physiol Lung Cell Mol Physiol. 2009 Mar;296(3):L404-17. Epub 2008 Dec 31.

IS THIS PROJECT SUPPORTED BY EXTRAMURAL FUNDS?

Yes or No

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

NIH

THIS PROJECT IS: Clinical Laboratory Behavioral Other

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THIS PROJECT IS CANCER-RELATED

Please explain Cancer relevance

THIS PROJECT IS HEART, LUNG & BLOOD- RELATED

Please explain Heart, Lung, Blood relevance: A portion of the study involves examining red blood cell characteristics after hemorrhagic shock and septic shock, such as: RBC deformability, RBC/Endothelial interactions. In addition, we will be examining end organ damage in multi-organ dysfunction syndrome in shock models.

THIS PROJECT EMPLOYS RADIOISOTOPES

THIS PROJECT INVOLVES THE USE OF ANIMALS xx

PENDING

APPROVED xx

IACUC PROTOCOL #09025D0512

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS

PENDING

APPROVED

IRB PROTOCOL # M

THIS PROJECT IS SUITABLE FOR:

UNDERGRADUATE STUDENTS

ENTERING FRESHMAN

SOPHOMORES

ALL STUDENTS

xx

THIS PROJECT IS WORK-STUDY: Yes or No **XX**

THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR

FOR INTERESTED VOLUNTEERS?: Yes or No **XX**

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?

The student will learn 1) how to carry out animal research, 2) principles of experimental design, 3) data analysis and 4) issues related to shock and sepsis