

**60th Medical Group (AMC), Travis AFB, CA**  
**INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC)**  
**FINAL REPORT SUMMARY**

(Please type all information. Use additional pages if necessary.)

**PROTOCOL #:** FDG20180006A

**DATE:** 7 Nov 2018

**PROTOCOL TITLE:** A Pilot Study of Molecular Neuroimaging of Cerebral Blood Flow Abnormalities due to Traumatic Brain Injury (TBI) in a Swine Model (*Sus scrofa*).

**PRINCIPAL INVESTIGATOR (PI) / TRAINING COORDINATOR (TC):** Maj David Douglas

**DEPARTMENT:** Radiology

**PHONE #:** 707-423-7448

**INITIAL APPROVAL DATE:** 17 Dec 15

**LAST TRIENNIAL REVISION DATE:** 14 Dec 17

**FUNDING SOURCE:** SG

**1. RECORD OF ANIMAL USAGE:**

<b>Animal Species:</b>	<b>Total # Approved</b>	<b># Used this FY</b>	<b>Total # Used to Date</b>
<i>Sus scrofa</i>	4	0	2

**2. PROTOCOL TYPE / CHARACTERISTICS:** (Check all applicable terms in **EACH** column)

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Training: Live Animal                     | <input type="checkbox"/> Medical Readiness  | <input type="checkbox"/> Prolonged Restraint       |
| <input type="checkbox"/> Training: non-Live Animal                 | <input type="checkbox"/> Health Promotion   | <input type="checkbox"/> Multiple Survival Surgery |
| <input type="checkbox"/> Research: Survival (chronic)              | <input type="checkbox"/> Prevention         | <input type="checkbox"/> Behavioral Study          |
| <input checked="" type="checkbox"/> Research: non-Survival (acute) | <input type="checkbox"/> Utilization Mgt.   | <input type="checkbox"/> Adjuvant Use              |
| <input type="checkbox"/> Other (            )                      | <input type="checkbox"/> Other (Treatment ) | <input type="checkbox"/> Biohazard                 |

**3. PROTOCOL PAIN CATEGORY (USDA):** (Check applicable)     C     D     E

**4. PROTOCOL STATUS:**

**\*Request Protocol Closure:**

- Inactive, protocol never initiated
- Inactive, protocol initiated but has not/will not be completed
- Completed, all approved procedures/animal uses have been completed

**5. Previous Amendments:**

List all amendments made to the protocol. **IF none occurred, state NONE. Do not use N/A.**

**For the Entire Study Chronologically**

<b>Amendment Number</b>	<b>Date of Approval</b>	<b>Summary of the Change</b>
1	30 Jun 16	Personnel
2	27 Jun 17	Personnel

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6. **FUNDING STATUS:** Funding allocated: \$22,654.00 Funds remaining: \$ 0.00

7. **PROTOCOL PERSONNEL CHANGES:**

Have there been any personnel/staffing changes (PI/CI/AI/TC/Instructor) since the last IACUC approval of protocol, or annual review?      \_\_\_ Yes      \_x\_ No

If yes, complete the following sections (Additions/Deletions). For additions, indicate whether or not the IACUC has approved this addition.

**ADDITIONS:** (Include Name, Protocol function - PI/CI/AI/TC/Instructor, IACUC approval - Yes/No)

<u>NAME</u>	<u>PROTOCOL FUNCTION</u>	<u>IACUC APPROVAL</u>

**DELETIONS:** (Include Name, Protocol function - PI/CI/AI/TC/Instructor, Effective date of deletion)

<u>NAME</u>	<u>PROTOCOL FUNCTION</u>	<u>DATE OF DELETION</u>

8. **PROBLEMS / ADVERSE EVENTS:** Identify any problems or adverse events that have affected study progress. Itemize adverse events that have led to unanticipated animal illness, distress, injury, or death; and indicate whether or not these events were reported to the IACUC.

None

9. **REDUCTION, REFINEMENT, OR REPLACEMENT OF ANIMAL USE:**

**REPLACEMENT (ALTERNATIVES):** Since the last IACUC approval, have alternatives to animal use become available that could be substituted in this protocol without adversely affecting study or training objectives?

N/A

**REFINEMENT:** Since the last IACUC approval, have any study refinements been implemented to reduce the degree of pain or distress experienced by study animals, or have animals of lower phylogenetic status or sentience been identified as potential study/training models in this protocol?

N/A

**REDUCTION:** Since the last IACUC approval, have any methods been identified to reduce the number of live animals used in this protocol?

N/A

10. **PUBLICATIONS / PRESENTATIONS:** (List any scientific publications and/or presentations that have resulted from this protocol. Include pending/scheduled publications or presentations).

Douglas DB, Chaudhari R, Zhao J, Gullo J, Kirkland J, Douglas PK, Wolin E, Walroth J, Wintermark M. 2017. Perfusion imaging in acute traumatic brain injury. Neuroimaging Clinics of North America.

11. **PROTOCOL OBJECTIVES:** (Were the protocol objectives met, and how will the outcome or training benefit the DoD/USAF?)

Yes, we found that SPECT-CT images showed perfusion changes in the acute setting. This constitutes a step forward in knowledge and provides evidence that an advanced neuroimaging technique (SPECT-CT) may provide information above and beyond structural imaging techniques of CT alone.

12. **PROTOCOL OUTCOME SUMMARY:** (Please provide, in "ABSTRACT" format, a summary of the protocol objectives, materials and methods, results - include tables/figures, and conclusions/applications.)

**Objective:** To determine whether there are changes in cerebral blood flow in the setting of acute traumatic brain injury.

**Materials and methods:** A dose of Tc-99m-HMPAO tracer was administered to one *sus scrofa*, without a controlled cortical impact (CCI) and this subject was imaged on SPECT-CT. A second dose of Tc-99m\_HMPAO tracer was administered in a subject with a CCI, which was then imaged with SPECT-CT.

**Results:** The subject without a CCI SPECT-CT demonstrated a normal CT appearance of the brain and symmetric blood flow. The subject with a CCI SPECT-CT demonstrated post-craniotomy changes and no structural changes (i.e., no intracranial hemorrhage) and asymmetrically decreased blood flow to the injured brain.

**Conclusions:** In this limited study, the traumatic brain injury was found to have decreased blood flow acutely, which can be imaged with SPECT-CT. This is consistent with the literature where decreased blood flow has been documented on CT Perfusion examinations. SPECT-CT represents a potential for improving diagnosis of blood flow changes in the setting of traumatic brain injury by capturing early blood flow changes post-TBI (i.e., via early administration of the radiotracer shortly after the TBI) or providing the potential to image certain patients who cannot have CTPerfusion (e.g., allergy) or MRI perfusion (e.g., contraindication to MRI).

(PI / TC-Signature)

2<sup>nd</sup> Jan 2019

(Date)

**Attachments:**

Attachment 1: Defense Technical Information Center (DTIC) Abstract Submission (**Mandatory**)

Attachment 1

Defense Technical Information Center (DTIC) Abstract Submission

This abstract requires a brief (no more than 200 words) factual summary of the most significant information in the following format: Objectives, Methods, Results, and Conclusion.

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Grant Number: \_\_\_\_\_

From: \_\_\_\_\_

**\*\*If you utilized an external grant, please provide Grant # and where the grant came from. Thank you.**