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 #: FDG20160008A **DATE:** 8 February 2017

PROTOCOL TITLE: : The Effect Of Supraphysiologic Blood Pressure On Traumatic Brain Injury And Proximal Tissue Beds During Resuscitative Balloon Occlusion Of The Aorta And Variable Aortic Control In A Porcine Model (*Sus Scrofa*) Of Polytrauma.

PRINCIPAL INVESTIGATOR (PI) / TRAINING COORDINATOR (TC): Lt Col Timothy Williams

DEPARTMENT: HLVC **PHONE #:** 423-2300

INITIAL APPROVAL DATE: 14 March 2016 **LAST TRIENNIAL REVISION DATE:** N/A

FUNDING SOURCE: SG

1. RECORD OF ANIMAL USAGE:

Animal Species:	Total # Approved	# Used this FY	Total # Used to Date
Sus scrofa	**32+3**	**0**	**35**

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

___ Training: Live Animal ___ Medical Readiness ___ Prolonged Restraint

___ Training: non-Live Animal ___ Health Promotion ___ Multiple Survival Surgery

___ Research: Survival (chronic) ___ Prevention ___ Behavioral Study

_X_ Research: non-Survival (acute) ___ Utilization Mgt. ___ Adjuvant Use

___ Other ( ) ___ Other (Treatment) ___ Biohazard

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

4. PROTOCOL STATUS:

***Request Protocol Closure:**

___ Inactive, protocol never initiated

___ Inactive, protocol initiated but has not/will not be completed

_X__ 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

Amendment Number	Date of Approval	Summary of the Change
1	21 April 2016	Biosample collection methods
2	26 May 2016	Animal Use

3	16 June 2016	Personnel
4	25 August 2016	Personnel

6. FUNDING STATUS: Funding allocated: $ Funds remaining: $

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? _X__ Yes ___ 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)

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

Maj Lucas Neff (AI) 16 June 2016

Col Rachel Hight (AI) 25 August 2016

Capt Rachel Russo (AI) 25 August 2016

Dr. Sarah Ashley-Ferencz (AI) 25 August 2016

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.

No issues or adverse events.

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?

No

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?

No

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

No

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

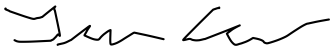
The below listed abstract was presented at the Eastern Society for the Surgery of Trauma meeting in Florida, Jan 2017.

The full manuscript was accepted for publication in the Journal of Trauma and Acute Care Surgery.

11. Were the protocol objectives met, and how will the outcome or training benefit the DoD/USAF?

Yes, the protocol objectives were met. This work informs how aortic occlusion impacts head-injured patients and can immediately be used to guide therapy on the battlefield.

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.)



(PI / TC Signature)

7Mar2017

(Date)

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

The Effect of REBOA, Partial Aortic Occlusion and Aggressive Blood Transfusion on Traumatic Brain Injury in a Swine Polytrauma Model

Objectives: Despite clinical reports of poor outcomes, the degree to which REBOA exacerbates traumatic brain injury (TBI) is not known. We hypothesized that combined effects of increased proximal mean arterial pressure (pMAP), carotid blood flow ($Q_{carotid}$), and intracranial pressure (ICP) from REBOA would lead to TBI progression compared to partial aortic occlusion (PAO) or no intervention.

Methods: 21 swine underwent a standardized TBI via computer controlled cortical impact followed by 25% total blood volume rapid hemorrhage. After 30 minutes of hypotension, animals were randomized to 60 minutes of continued hypotension (control), REBOA, or PAO. REBOA and PAO animals were then weaned from occlusion. All animals were resuscitated with shed blood via a rapid blood infuser. Physiologic parameters were recorded continuously and brain computed tomography obtained at specified intervals.

Results: There were no differences in baseline physiology or during the initial 30 minutes of hypotension. During the 60-minute intervention period, REBOA resulted in higher maximal pMAP (REBOA 105.3±8.8; PAO 92.7±9.2; control 48.9±7.7, p=0.02) and higher $Q_{carotid}$ (REBOA 673.1±57.9; PAO 464.2±53.0; control 170.3±29.4, p<0.01). Increases in ICP were greatest during blood resuscitation, with control animals demonstrating the largest peak ICP (control 12.8±1.2; REBOA 5.1±0.6; PAO 9.4±1.1, p<0.01). There were no differences in the percentage of animals with hemorrhage progression on CT (control 14.3%, 95%CI 3.6-57.9; REBOA 28.6%, 95%CI 3.7-71.0; and PAO 28.6%, 95%CI 3.7-71.0).

Conclusions: In an animal model of TBI and shock, REBOA increased carotid flow and pMAP, but did not exacerbate TBI progression. PAO resulted in physiology closer to baseline with smaller increases in ICP and pMAP. Rapid blood resuscitation, not REBOA, resulted in the largest increase in ICP after intervention, which occurred in control animals. Continued studies of the cerebral hemodynamics of aortic occlusion and blood transfusion are required to determine optimal resuscitation strategies for multi-injured patients.

Grant Number:
W81XWH-16-2-0043

From:
USA MED RESEARCH ACQ ACTIVITY, Joint Program Committee – 6, Combat Casualty Care Research Program

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