Award Number: W81XWH-12-2-0018

TITLE: NRC/AMRMC Resident Research Associateship Program

PRINCIPAL INVESTIGATOR: Howard R. Gamble

CONTRACTING ORGANIZATION: National Academy of Sciences/NAE/IOM
Washington, DC 20001

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Fort Detrick, Maryland 21702-5012

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6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
.National Academy of Sciences
500 – 5th Street, N.W.
Washington, DC 20001

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13. SUPPLEMENTARY NOTES
This same report is submitted for contracts W81XWH-12-2-0010; W81XWH-12-2-0015; W81XWH-12-2-003; and W81XWH-12-2-0033

14. ABSTRACT
During this reporting period, the NRC promoted research opportunities at AMRMC institutes through a broad outreach plan. A total of 8 applications were received during the period and of these, 8 were reviewed by NRC panels. A total of 3 award offers were made and 3 applicants accepted the award. A total of 6 Associates ended their tenure during the reporting period and of these 4 submitted final reports. The productivity of these Associates is listed in the technical report.

15. SUBJECT TERMS
Associateship program, post-doc, awards

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USAMRMC
U	U	U	UU	47	19b. TELEPHONE NUMBER *(include area code)*

National Research Council

RESEARCH ASSOCIATESHIP PROGRAM

with

U.S. Army Medical Research & Materiel Command

Annual Contract Technical Report

Contract No. W81XWH-12-2-0010
Contract Period: 02/06/2012-02/05/2017

Contract No. W81XWH-12-2-0015
Contract Period: 03/01/2012-02/28/2017

Contract No. W81XWH-12-2-0018
Contract Period: 03/15/2012-03/14/2017

Contract No. W81XWH-12-2-0030
Contract Period: 03/15/2012-03/14/2017

Contract No. W81XWH-12-2-0033
Contract Period: 05/01/2012-04/30/2017

Report Period: 05/01/2014-04/30/2015

During the reporting period, the NRC conducted the following activities in support of the subject contract:

Outreach and Promotion

The promotional schedule to advertise the National Research Council (NRC) Research Associateship Programs included the following: 1) attendance at meetings of major scientific and engineering professional societies; 2) advertising in programs and career centers for these and other professional society meetings; 3) direct mailing and emailing of announcements and program materials to presidents, graduate deans, and heads of appropriate science and engineering departments and minority-affairs offices of all academic degree-granting institutions in the United States; 4) posting announcements on internet job sites, electronic newsletters and professional society websites; 5) print advertising in high profile publications (e.g., Science magazine, the Chronicle of Higher Education); and, 6) maintaining a presence on social media sites such as Facebook.

The NRC attended a number of minority focused events in which we maintained exhibit booths, participated in workshops and advertised in meeting literature, newsletters and websites or submitted materials for distribution. In addition, ads were placed in a variety of minority publications (e.g., Affirmative Action, Black Collegian).

In advertising the Research Opportunities available to prospective applicants, the NRC maintained an up-to-date listing of all active Research Advisers, current Adviser contact information and details of each Research Opportunity.

Processing and Review of Applications

Applications to the Research Associateship Program were submitted via a web-based application system. Each of the four application cycles opened two months prior to the application deadline. NRC staff provided support to prospective applicants including providing application instructions, technical support and additional information as requested.

A summary of applications for the reporting period is shown in Table 1.

For each applicant, the NRC received and processed an application form, a research proposal, transcripts, a statement of previous and current research, and confidential reference reports. An application file check was made prior to the review and each applicant was notified if required documents were missing.

The NRC convened panels in five broad discipline areas for the competitive review of applications in the Research Associateship Programs. Results of the review were made available to Laboratory Program Representatives immediately following the conclusion of the each review.

A summary of the outcome of the review of applications for the reporting period is shown in Table 1.

Administration of Awards

The NRC made awards to applicants based on sponsor authorization. A summary of awards authorized and the acceptance or declination by the applicant during the current reporting period is shown in Table 1.

For Associates beginning or continuing tenure, the NRC provided the administrative functions described in the contract Statement of Work. These functions included stipend payments, management of a major medical benefits insurance program, and reimbursement for relocation and travel to professional meetings.

A summary of NRC Research Associates on tenure during the reporting period is shown in Table 2.

Outcomes Reporting

All NRC Associates who completed tenure were required to submit a final report that described the outcome of their Associateship award. Final reports received by the NRC during the current reporting period are attached to this technical report.

The activities of Associates submitting final reports during this reporting period, including publications, presentations and patents, as well as an assessment of their experience in the program, are summarized in Table 3. Specific research accomplishments of Associates completing tenure during the reporting period are summarized in Table 4.

Table 1. Applications and Awards

Table 2. Associates on Tenure

Table 3. Associates Activity

Table 4. Summary of Associate Research

Attachments: Associate Final Reports

U.S. Army Medical Research & Materiel Command

Table 1: Applications and Awards

	May 2014	Aug 2014	Nov 2014	Feb 2015	Total
TOTAL APPLICATIONS	5	9	5	7	26
Applications not reviewed	1	3	1	0	5
Applications reviewed	4	6	4	7	21
Not recommended	0	1	0	0	1
Recommended	4	5	4	7	20
Withdrawn	0	0	0	0	0
Lab decision pending	0	1	0	3	4
Awards offered	2	3	3	3	11
Applicant decision pending	0	0	0	0	0
Awards accepted	2	3	2	3	10
Awards declined	0	0	1	0	1
Not funded	2	1	1	1	5

Table 2: Associates on Tenure

Associate	Adviser	Tenure Dates		Final Report
U.S. Army Institute of Surgical Research				
Benov, Avi	Darlington, Daniel Norman	8/1/2014-7/31/2015		
Cheppudira, Bopaiah Pooviah	Clifford, John L	9/4/2012-9/3/2015		
Choi, Jae hyek	Wang, Heuy-Ching H.	11/15/2011-11/14/2015		
Greene, Whitney Ann	Wang, Heuy-Ching H.	4/25/2012-7/24/2015		
Hurtgen, Brady Joe	Wenke, Joseph C	12/3/2012-9/18/2014		Received
Kaini, Ramesh Raj	Wang, Heuy-Ching H.	1/3/2013-1/2/2016		
Karna, Sai Lakshmi Rajasekhar	Leung, Kai P	4/1/2013-4/13/2016		
Kreyer, Stefan Franz Xaver	Batchinsky, Andriy I	12/7/2012-5/31/2014		Received
Miller, Christine Lindsay	Leung, Kai P	2/4/2013-2/3/2016		
Nyland, Jennifer Elaine	Clifford, John L	2/1/2013-12/31/2014		Received
Olekson, Melissa Ann	Leung, Kai P	9/2/2014-9/1/2015		
Parida, Bijaya Kumar	Dubick, Michael A.	3/19/2012-3/18/2016		
Penn, Alexander Hayes	Torres, Ivo P	1/14/2015-1/13/2016		
Pilia, Marcello	Rathbone, Christopher R	9/4/2012-2/6/2015		Received
Rose, Lloyd Frederick	Leung, Kai P	11/1/2012-10/31/2015		
Salas, Margaux Marie	Clifford, John L	10/10/2012-10/9/2015		
Sanchez, Carlos Jose	Wenke, Joseph C	9/7/2011-9/6/2014		Received
Sosanya, Natasha	Gibbons, Robert V	4/20/2015-4/19/2016		
Van Laar, Tricia Annette	Leung, Kai P	4/9/2012-10/8/2015		
Ward, Catherine Lindsey	Wenke, Joseph C	8/22/2011-9/4/2014		Received
U.S. Army Medical Research Institute of Chemical Defense				
Hubbard, Kyle	McNutt, Patrick Michael	6/1/2012-5/31/2015		
U.S. Army Medical Research Institute of Infectious Diseases				
Bernhards, Robert Cory	Welkos, Susan Lee	7/11/2013-7/10/2015		
Cohen, Courtney Alicia	Glass, Pamela J	7/28/2014-7/27/2015		
DeWald, Lisa Marie	Glass, Pamela J	5/7/2012-5/6/2015		
Duy, Janice	Minogue, Timothy Devins	8/1/2013-7/31/2015		
Friedrich, Brian Michael	Hensley, Lisa E.	8/1/2011-6/18/2014		Not Recv'd
Haddow, Andrew Douglas	Turell, Michael J	4/15/2014-11/30/2014		Received
Harrell, William Ayers	Smith, Leonard Alan	3/29/2011-3/28/2015		Not Recv'd
Huse, Valerie	Minogue, Timothy Devins	9/29/2014-9/28/2015		
Maes, Piet	Hooper, Jay W.	12/3/2012-6/2/2014		Received
O'Hearn, Aileen E	Schoepp, Randal J.	4/1/2013-3/31/2016		
Rahman, Md. Mizanur	Ahmed, Syed Ashraf	3/1/2011-10/5/2014		Received
Smith, Jessica L	Ulrich, Robert Glenn	6/24/2013-6/23/2015		
Stefan, Christopher Patrick	Minogue, Timothy Devins	1/2/2014-1/1/2016		
Stojadinovic, Marija	Panchal, Rekha G.	12/1/2014-11/30/2015		
Stonier, Spencer William	Dye, John Michael	8/1/2011-6/30/2014		Received
Tursiella, Melissa Lynne	Schmaljohn, Connie	4/1/2014-3/31/2016		
Walter Reed Army Institute of Research, Silver Spring				
Anderson, Margery Diane	Yourick, Debra Lynn	3/11/2014-3/10/2016		
Caudle, Krista Layne	Tortella, Frank Casper	1/28/2013-7/13/2014		Received
Kobylinski, Kevin Conrad	Szumlas, Daniel Edward	10/17/2011-10/16/2015		
Linton, Yvonne-Marie	Clark, Jeffrey William	10/3/2011-10/2/2015		
McCracken, Michael Kevin	Jarman, Richard George	3/9/2015-3/8/2016		
Pichard, Luis Eduardo	Balkin, Thomas J.	7/24/2012-7/23/2014		Not Recv'd
Sambanthamoorthy, Karthik	Wagar, Eric James	3/1/2011-2/28/2015		Not Recv'd
Simonelli, Guido	Balkin, Thomas J.	10/6/2014-10/5/2015		
Tenenbaum, Laura Subbiah	Yourick, Debra Lynn	6/3/2013-6/2/2015		
Zarling, Stasya Nicole	Krzych, Urszula	2/7/2011-2/6/2016		

Table 3: Associates' Activities

15 Associates ended tenure during the report period
29 months was the average tenure length
48 months was the longest
7 months was the shortest
11 submitted final reports

In the final reports, Associates indicated the following scholarly activity while on tenure.

34 Articles published in refereed journals
1 Patent applications
4 International presentations
39 Domestic presentations
1 Awards

After ending their tenure, Associates indicated their future plans as follows:

1 Permanent position at the NRC host agency
6 Contract or temporary position at the NRC host agency
2 Research/administrative position with another U.S. government agency
0 Research/administrative position with foreign government agency
0 Research/teaching at US college/university
2 Research/teaching position at a foreign college or university
0 Research/administrative position in private industry in the U.S.
0 Research/administrative position in private industry outside of the U.S.
0 Research/administrative position with a non-profit
0 Self-employed/consulting
0 Postdoctoral Research
0 Other
0 No information provided

In their final reports, Associates were asked to evaluate certain aspects of their experiences on a scale of 1 (low) to 10 (high). The average rating for each item follows:

8.2 Short-term value (lab)-Development of knowledge, skills, and research productivity at lab
8.6 Long-term value (career)-How your Research Associateship affected your career to date
8.6 Laboratory Support-Equipment, funding, orientation, safety & health training, etc.
7.4 Adviser Mentoring-Quality of mentoring from the Research Adviser
9.5 LPR Support-Quality of administrative support from the LPR
9.8 NRC Support-Quality of administrative support from the NRC

Table 4: Summary of Associate Research

Associate	Tenure Dates	
Caudle, Krista	**1/28/2013-7/13/2014**	
1	Current literature review on preclinical investigations of drug treatments for traumatic brain injury shows that the majority of studies use only a single dose of the experimental drug within ~1 hour of the injury. Longer dosing regimens should be explored further.	
2	Three days of twice daily Levetiracetam (Keppra) treatment (50 mg/kg concentration) attenuates nonconvulsive seizures in our model (previous colleague's work), however three days is not sufficient to bring about neurofunctional improvements in motor and cognitive performance (completed dosing duration study).	
3	The findings from the dosing duration study establish that a ten day dosing regimen (50 mg/kg) is required for a significant therapeutic benefit in cognitive and motor performance after penetrating severe traumatic brain injury in the rat.	
4	Ten days of twice daily Keppra dosing will be used in the full dose response study; dose concentrations to be tested are 12.5 mg/kg, 25 mg/kg, 100 mg/kg, 200 mg/kg, and 800 mg/kg (currently underway).	
5	Given our positive results so far, Keppra is a prime target and qualifies for combination drug therapy with Minocycline or other drugs also showing therapeutic benefit in our model, i.e. Simvastatin.	
Hurtgen, Brady	**12/3/2012-9/18/2014**	
1	Determined Staphylococcus aureus biofilms induced osteoblast necrosis and apoptosis (See publication 1).	
2	Showed Dakin's solution reduced macrophage phagocytosis of fungal spores (See publication 2).	
3	Determined that osteotomy plus volumetric muscle loss resulted in increased collagen deposition in muscle tissue (See publication #3).	
4	Developed a rat model of polytrauma that is relevant to military trauma and characterized the ensuing immune response.	
5	Determined that fracture healing is delayed in the newly developed rat model of polytrauma (In progress).	
6	Showed heightened and prolonged innate and adaptive immune responses following complex musculoskeletal injury (osteotomy plus volumetric muscle loss; Manuscript in progress).	
7	Determined muscle autograft therapy reduced inflammation, which correlated with improved healing of both bone and muscle tissue following complex musculoskeletal injury (Manuscript in progress).	
8	Found that cells isolated from nine different anatomical locations on a pig could be cultured and differentiated into mesenchymal stem cells as determined by increased expression of CD90 and CD105 expression (Work in preparation for a figure in an upcoming manuscript).	
9	Identified optimal transfection conditions to knockdown Pax7 gene expression by shRNA in skeletal muscle tissue. Others will perform future studies to knockdown Pax7 following musculoskeletal injury.	
Kreyer, Stefan	**12/7/2012-5/31/2014**	
1	Until now only preliminary data of the project exist (see ADVISER/MENTOR SUPPORT)	
2	The use of a low-flow CO2 removal device enables to reduce the invasiveness of mechanical ventilation	
3	Recirculation of ultrafiltrate does not improve CO2 removal in a low-flow CO2 removal device (see 9)PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH)	
4	Acidification of blood entering a membrane lung can enhance CO2 removal (see 11)PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES)	
Maes, Piet	**12/3/2012-6/2/2014**	
1	There is no significant difference in genome organization between hantaviruses from a high hantavirus incidence region and a low incidence region	
2	Hamsters can be chronically infected with Hantaan virus and Puumala virus	
3	Immunosupressed hamsters infected with Puumala virus develop disease 21 dpi	
Nyland, Jennifer	**2/1/2013-12/31/2014**	
1	Developed collaborations with the BAMC Pain Management Clinic, focus on translational work from bench to bedside, clinical research involving opioid use and long term outcomes	
2	Developed collaborations with the USAISR Burn Center, clinical studies focused on psychological aspects of pain, opioid use, and long term outcomes	
3	Testing of novel analgesics in animal models of burn injury	
4	Tested the effects of opioid administration during recovery on later drug-seeking behaviors in a rat model	
5	Investigated stress as a pain generator, and possible interventions in a rat model	
Pilia, Marcello	**9/4/2012-2/6/2015**	
1	Successfully vascularized a Volumetric Muscle Loss defect using Microvascular fragments	
2	Proved that increase in vascularization in soft tissue does not increase healing without a myogenic cell source	

3	Successfully vascularized demineralized bone allografts using microvascular fragments both in an ectopic rat model and in a 6mm femoral defect.	
4	Again, without an appropriate cell source vascularization is not enough	
5	Started investigating the addition of satellite cells and/or minced muscle grafts to the microvascular fragments to determine functional outcome	
Rahman, Md. Mizanur	**3/1/2011-10/5/2014**	
1	Discovered that the C-terminus of Botulinum neurotoxin serotype A is involved in product removal and catalysis	
2	Developed enzymatic assay for BoNT/A catalytic domain	
3	Demonstrated that BoNT bound ions affect enzymatic activity	
4	Demonstrate that C-terminus of BoNT/A Lc interacts with BoNT/A belt affecting catalysis	
Sanchez, Carlos	**9/7/2011-9/6/2014**	
1	Developed in vitrobiofilm assays to test susceptibility to various antimicrobials (and antiseptics) as well as to evaluate the effectiveness of various biofilm dispersal agents utilizing a number of bacterial species as well as fungal isolates related to combat casualties.	
2	Reported through prospective studies, the importance and incidence of biofilm formation by clinical isolates associated with combat casualty and showing the relationship between this phenotype and the development of persistent infections in combat related wounds.	
3	Demonstrated the utility of combinations of biofilm dispersal agents and antimicrobials as an alternate therapy for targeting bacterial biofilms.	
4	Through collaborative efforts contributed to the development of biomaterials capable of delivering biofilm dispersal agents (alone or in combination with antimicrobials) to reduce infection in contaminated femoral segmental defects.	
5	Characterized host responses of osteoblasts, a bone cell line, to biofilms vs. planktonic (culture grown) bacteria, and identified those factors responsible for reducing cell viability and cell differentiation.	
6	Characterized temporal host responses during bacterial osteomyelitis infection in vivo and have begun o identify factors that may be responsible for host pathologies associated with orthopaedic infections, namely those involving S. aureus.	
Stonier, Spencer	**8/1/2011-6/30/2014**	
1	Antibody responses appear to be most acutely responsible for protection against filovirus infection after vaccination	
2	CD8 T cells may contribute to protection but it varies by mouse strain slightly	
3	Both CD4 and CD8 T cell responses to Ebola glycoprotein are detectable after VRP vaccination	
Ward, Catherine	**8/22/2011-9/4/2014**	
1	Utilized and optimized an injectable polyurethane (PUR) matrix for delivery of cells (bone marrow mesenchymal stem cells, BMSCs) and osteogenic agents (Lovastatin, LV) for a bone regeneration therapy in collaboration with Dr. Scott Guelcher (Vanderbilt University).	
2	Developed methods to encapsulate cells in alginate matrices for survivability during PUR curing.	
3	Analyzed cell fate within injectable scaffolds (PUR). In vitro analysis included determining viability, attachment and proliferation of cells onto the scaffolds in culture. In vivo analysis included determining cell survivability after injection in a rat calvarial defect.	
4	Investigated osteogenic potential of injectable cell delivery scaffolds with the addition of osteogenic agents in the system	

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Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Caudle	**Krista**	**L.**

3) *Today's Date*	*Dates of Tenure*
June 15, 2014	from **January 28, 2013** to **June 13, 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
WRAIR (e.g., AFRL)	**Center for Military Psychiatry and Neuroscience** (e.g., Wright Patterson AFB)	**Brain Trauma Neuroprotection and Neurorestoration Branch** (e.g., High-Speed Propulsion)

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Frank C. Tortella, PhD

6) *TITLE OF RESEARCH PROPOSAL*

Combination Drug Therapy for Traumatic Brain Injury: Keppra and Minocycline

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Current literature review on preclinical investigations of drug treatments for traumatic brain injury shows that the majority of studies use only a single dose of the experimental drug within ~1 hour of the injury. Longer dosing regimens should be explored further.**

2) **Three days of twice daily Levetiracetam (Keppra) treatment (50 mg/kg concentration) attenuates nonconvulsive seizures in our model (previous colleague's work), however three days is not sufficient to bring about neurofunctional improvements in motor and cognitive performance (completed dosing duration study).**

3) **The findings from the dosing duration study establish that a ten day dosing regimen (50 mg/kg) is required for a significant therapeutic benefit in cognitive and motor performance after penetrating severe traumatic brain injury in the rat.**

4) **Ten days of twice daily Keppra dosing will be used in the full dose response study; dose concentrations to be tested are 12.5 mg/kg, 25 mg/kg, 100 mg/kg, 200 mg/kg, and 800 mg/kg (currently underway).**

5) **Given our positive results so far, Keppra is a prime target and qualifies for combination drug therapy with Minocycline or other drugs also showing therapeutic benefit in our model, i.e. Simvastatin.**

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

NA

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

I am currently writing the manuscript for the first completed study establishing the optimal dosing duration for Levetiracetam (Keppra). I am in Phase 1A (Year 2) of the proposal currently performing the full dose-response study for Keppra.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

NA

b) Books, book chapters, other publications

NA

c) Manuscripts in preparation, manuscripts submitted

Krista Caudle, Deborah Shear, Andrea Mountney, Kara Schmid, Frank Tortella, Xi-Chun May Lu. Levetiracetam Treatment for Nonconvulsive Seizures and Neuroprotection in a Model of Penetrating Ballistic-Like Brain Injury in the Rat. in preparation for *J. Neurotrauma*

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

NA

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

NA

Domestic

Krista Caudle, Deborah Shear, Rebecca Pedersen, Justin Sun, William Flerlage, Julie Faden, Andrea Mountney, Kara Schmid, Frank Tortella, Xi-Chun May Lu (2014). Neuroprotective Effects of Levetiracetam Requires Extended Treatment in a Rat Model of Penetrating Ballistic-like Brain Injury. 32nd Annual Symposium of the National Neurotrauma Society, San Francisco, CA.

Krista Caudle, Rebecca Pedersen, Justin Sun, William Flerlage, Julie Faden, Andrea Mountney, Kara Schmid, Deborah Shear, Frank Tortella (2014). Evaluation of Levetiracetam in the WRAIR PBBI Model: Studies from the Operation Brain Trauma Therapy (OBTT) Consortium. 32nd Annual Symposium of the National Neurotrauma Society, San Francisco, CA.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

NA

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

NA

14) *POST-TENURE POSITION / JOB TITLE*

Research Biologist DB-03

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

Walter Reed Army Institute of Research, Center for Military Psychiatry and Neuroscience, Brain Trauma Neuroprotection and Neurorestoration Branch, 503 Robert Grant Ave. Silver Spring, MD 20910

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- **X** Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center WRAIR
- ☐ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DUIRNG TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1) **NA**

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

10 Development of knowledge, skills, and research productivity

Comments

LONG TERM VALUE

10 How the NRC Associateship award affected your career to date

Comments

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

ADVISER/MENTOR SUPPORT

10 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

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National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Haddow	**Andrew**	**D**

3) *Today's Date*	*Dates of Tenure*
12 December 2014	from **April 2014** to **November 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
MRMC	**USAMRIID**	**Virology**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Michael Turell

6) *TITLE OF RESEARCH PROPOSAL*

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **None**
2)
3)
4)
5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

None

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

None

b) Books, book chapters, other publications

None

c) Manuscripts in preparation, manuscripts submitted

None

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

None

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

None

Domestic

None

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

None

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

None

14) *POST-TENURE POSITION / JOB TITLE*

Research Entomologist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

Contractor with Ke`aki Technologies

United States Army Medical Research Institute of Infectious Diseases
1425 Porter Street, Fort Detrick
Frederick, MD, 21702-5011

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- **X** Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center ____
- ☐ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

1 Development of knowledge, skills, and research productivity
Comments

LONG TERM VALUE

5 How the NRC Associateship award affected your career to date
Comments

LAB SUPPORT

2 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
Comments

ADVISER/MENTOR SUPPORT

1 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)
Comments

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)
Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

I still do not have access to the facilities to perform the NRC research project that I was awarded. As such I have been unable to perform any research at USAMRIID.

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

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Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Hurtgen	**Brady**	**J**

3) *Today's Date*	*Dates of Tenure*
9-19-14	from **December 3, 2012** to **September 18, 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
AMRMC	**AISR**	**Extremity Trauma & Regenerative Medicine**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Dr. Joseph C. Wenke

6) *TITLE OF RESEARCH PROPOSAL*

Development and use of a rat model of polytrauma to evaluate therapies that reduce inflammation and restore normal wound healing

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

Note: These include finding from other research projects that I participated in during my postdoc studies.

1) **Determined Staphylococcus aureus biofilms induced osteoblast necrosis and apoptosis (See publication 1).**

2) **Showed Dakin's solution reduced macrophage phagocytosis of fungal spores (See publication 2).**

3) **Determined that osteotomy plus volumetric muscle loss resulted in increased collagen deposition in muscle tissue (See publication #3).**

4) **Developed a rat model of polytrauma that is relevant to military trauma and characterized the ensuing immune response.**

5) **Determined that fracture healing is delayed in the newly developed rat model of polytrauma *(In progress)*.**

6) **Showed heightened and prolonged innate and adaptive immune responses following complex musculoskeletal injury (osteotomy plus volumetric muscle loss; *Manuscript in progress*).**

7) **Determined muscle autograft therapy reduced inflammation, which correlated with improved healing of both bone and muscle tissue following complex musculoskeletal injury (*Manuscript in progress*).**

8) **Found that cells isolated from nine different anatomical locations on a pig could be cultured and differentiated into mesenchymal stem cells as determined by increased expression of CD90 and CD105 expression (*Work in preparation for a figure in an upcoming manuscript*).**

9) **Identified optimal transfection conditions to knockdown *Pax7* gene expression by shRNA in skeletal muscle tissue. Others will perform future studies to knockdown *Pax7* following musculoskeletal injury.**

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

NA

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

As I participated in multiple research projects, continuing research will involve the following:

1. **Confirming polytrauma delays wound healing in the developed rat model *(done by others)* and preparing a manuscript *(done by myself)*.**
2. **Analyze data to assess purity of porcine stem cells isolated from nine different anatomical locations. *(Figure in a manuscript)*.**
3. **Continued research in immunomodulation studies of complex musculoskeletal injury. This includes use of drugs and shRNA to target innate and adaptive immune cells as well as shRNA to target satellite cells. *(This will be performed by others, but I will participate in data interpretation and manuscript preparation)***

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1. Sanchez, C.J., Ward, C.L., Romano, D.R., **Hurtgen, B. J.**, Hardy, S. K., Woodbury, R.L.,Trevino, A.L., Rathbone, C.R., and J.C. Wenke. 2013. Staphylococcus aureus biofilms decrease osteoblast viability, inhibits osteogenesis and increases bone resorption in vitro. BMC Musculoskelet Disord. 14:187.

2. Cardile, A. P., Sanchez, C. J., Hardy, S. K., Romano, D.R., **Hurtgen, B. J.**, Wenke, J., Murray, C. K., and K. S. Akers. 2014. Dakin's Solution Alters Macrophage Viability and Function In Vitro. J Surg Res. (Epub ahead of print).

3. Garg, K., Ward, C. L., **Hurtgen, B. J.**, Wilken, J. M., Stinner, D. J., Wenke, J. C., Owens, J., and B. T. Corona. 2014. Volumetric muscle loss: persistent functional deficits beyond frank loss of tissue. J Orthop Res. *In Press*.

b) Books, book chapters, other publications

None

c) Manuscripts in preparation, manuscripts submitted

1. **Hurtgen, B. J.**, Garg, K., Ward, C. L., B. T. Corona. Concomitant musculoskeletal injury delays fracture healing and alters the immune response. In preparation for PNAS.

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*
Provide titles, inventors, and dates of applications.

NA

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

None

Domestic

Concomitant Musculoskeletal Injury Results in Delayed Healing and Altered Immune Response. **Hurtgen, B. J.**, Garg, K., Ward, C. L., Wenke, J. C., B. T. Corona. 2nd Annual San Antonio Postdoctoral Research Forum, San Antonio, TX.

Submitted abstracts for upcoming conferences:

Concomitant Musculoskeletal Injury Results in Delayed Fracture Healing and Heightened and Prolonged Immune Response**. Hurtgen, B. J.**, Garg, K., Ward, C. L., Wenke, J. C., B. T. Corona. Orthopaedic Research Society Annual Meeting, Las Vegas, NV.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

None

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

1st Place Poster Presentation at the 2nd Annual San Antonio Postdoctoral Research Forum (September 16, 2014)

14) *POST-TENURE POSITION / JOB TITLE*

Immunologist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

Joint Inflammatory Modulation of Trauma Research Program/ US Air Force

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☐ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center ____
- ☒ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

7 Development of knowledge, skills, and research productivity

Comments

LONG TERM VALUE

8 How the NRC Associateship award affected your career to date

Comments

My training prepared me and allowed me to obtain the position I am moving onto.

LAB SUPPORT

8 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

ADVISER/MENTOR SUPPORT

7 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

Responsive

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

Very pro-active, timely, friendly, and responsive.

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Compare your metrics to other Postdoc agencies and see where NRC fits in.

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Kreyer	**Stefan**	**FX**

3) *Today's Date*	*Dates of Tenure*
05/04/2014	from **12/06/2012** to **05/31/2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
US Army	**ISR**	**CICR**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Michal Dubick **Andriy Batchinsky**

6) *TITLE OF RESEARCH PROPOSAL*

The effect of spontaneous breathing in combination with extracorporeal lung support in experimental lung injury

Changed to

Early usage of a low flow CO_2 – removal device (hemolung) in acute lung injury

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Until now only preliminary data of the project exist (see** ADVISER/MENTOR SUPPORT)

2) **The use of a low-flow CO_2 removal device enables to reduce the invasiveness of mechanical ventilation**

3) **Recirculation of ultrafiltrate does not improve CO_2-removal in a low-flow CO_2 removal device (see** 9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH)*

4) **Acidification of blood entering a membrane lung can enhance CO_2-removal (see** 11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES)*

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

At the moment I am calculating and deriving specific parameters of mechanical ventilation (e.g. tidal volume, minute ventilation, airway pressures). With these parameters I hope I am able to show if the low-flow CO_2 removal device (hemolung) is sufficient to reduce invasiveness of mechanical ventilation.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1) Title: Modular Extracorporeal Life Support: effects of ultrafiltrate recirculation on the performance of an extracorporeal carbon dioxide removal ($ECCO_2R$) device
Authors:
Vittorio Scaravilli, Stefan Kreyer, Katharina Linden, Slava Belenky, Bryan Jordan, Antonio Pesenti, Leopoldo C. Cancio, Andriy I. Batchinsky
ASAIO J. 2014 May-Jun;60(3):335-41. doi: 10.1097/MAT.0000000000000070.

2) Title: Extracorporeal blood purification in burns: A review
Authors: Katharina Linden, Ian J. Stewart, Stefan Kreyer, Vittorio Scaravilli, Jeremy W. Cannon, Leopoldo C. Cancio, Andriy I. Batchinsky, Kevin K. Chung
Burns. 2014 Feb 15. pii: S0305-4179(14)00026-6. doi: 10.1016/j.burns.2014.01.013. [Epub ahead of print] Review.

b) Books, book chapters, other publications

none

c) Manuscripts in preparation, manuscripts submitted

1) **Title:** Extracorporeal CO_2 removal: Effect of short time infusion of three different metabolic acids
Authors: Vittorio Scaravilli, Stefan Kreyer, Katharina Linden, Bryan Jordan, Antonio Pesenti, Christian Putensen, Leopoldo C.Cancio, Andriy I. Batchinsky
Abstract and Poster presented at SCAI (Society for Complexity in Acute Illness) international meeting. Undergoing submission to ASAIO (American Society for Artificial Internal Organs) journal

2) **Title:** Extracorporeal Membrane Oxygenation and mechanical ventilation
Review paper in progress.

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*
Provide titles, inventors, and dates of applications.

none

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

1) **Title:** Extracorporeal CO_2 removal: Effect of short time infusion of three different metabolic acids
Authors: Stefan Kreyer, Vittorio Scaravilli, Katharina Linden, Bryan Jordan, Antonio Pesenti, Christian Putensen, Leopoldo C.Cancio, Andriy I. Batchinsky
Abstract and Poster presented at SCAI (Society for Complexity in Acute Illness) international meeting, Budapest 2013.

2) **Title:** Modular Extracorporeal Life Support: effects of ultrafiltrate recirculation on the performance of an extracorporeal carbon dioxide removal ($ECCO_2R$) device
Authors:
Vittorio Scaravilli, Stefan Kreyer, Katharina Linden, Slava Belenky, Bryan Jordan, Antonio Pesenti, Leopoldo C. Cancio, Andriy I. Batchinsky
Abstract and Poster presented at SCAI (Society for Complexity in Acute Illness) international meeting, Budapest 2013.

Domestic

none

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

none

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

none

14) *POST-TENURE POSITION / JOB TITLE*

Anesthesiologist at the University hospital of Bonn, Germany

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

University hospital Bonn, Dept. for Anesthesiology and operative Intensive Care medicine, Sigmund-Freud-Str 25, 53127 Bonn, Germany

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☐ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center ____
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- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- X Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DUIRNG TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1) Everyone in the lab, co-researchers as well as technicians helped me getting to know a lot about American culture, ways of thinking and traditions. During lunchtime often political issues where discussed so that I got the possibility to understand the opinions of different people living in the USA. My colleagues took me to local events like Rodeo and Fiesta. They invited me to share American Holidays with them, like Thanksgiving, so that I had the possibility to experience traditions along with culinary specialties. Whenever I had questions regarding culture but also things concerning daily life in the USA everyone was always offering help.
2) In a lot of discussions regarding political issues and way of life I was able to offer a foreigner's perspective on things. I invited my colleagues to get to know German food. Interestingly, the part of Texas where I stayed was already influenced by German culture and I was able to tell my colleagues what of this was "real German" and what more American.
3)
4)
5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

7 Development of knowledge, skills, and research productivity

Comments

The program gave me the possibility to learn and improve my skills in animal research. I improved my skills in scientific writing by the review of co-workers and supervisors.

LONG TERM VALUE

5 How the NRC Associateship award affected your career to date

Comments

At this point, the NRC award did not influence my career very much. I think that this will change in the future if scientific papers will result out of my work. Furthermore, the experience of working in another country, together with improvements in the English language, will enable me to plan and structure my research better in the future.

LAB SUPPORT

5 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

The equipment of this laboratory was extraordinary and the possibilities that this laboratory could have offered are extremely good. In my opinion these incredible possibilities could not be used to full extent. The laboratory personnel were helpful and tried to fulfill the tasks that were given. This was sometimes complicated by a big workload on them due to simultaneously ongoing projects and the fact that research goals and working plans were not communicated in this lab, which I felt let to a certain frustration. The ISR has strict regulations about health guidelines and training before entering the laboratory. Although these regulations reduced the effectiveness of the laboratory and led to a delayed start of the experiments, I appreciate the required training in the beginning.

ADVISER/MENTOR SUPPORT

3 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

After I finished all the ISR specific requirements like training and in-processing, I was told that grants for the project I planned were canceled, so that I could not perform the study I applied with. This was especially disappointing because I started to prepare a smaller side-project to the original planned study here. After investing effort into the main- and the side-project it was very frustrating that this work was done for nothing. After speaking with my adviser and explaining my frustration the relationship got tense. Finally I was offered to work on another project that was already planned and funded. I did not have the possibility to influence this project like I would have liked to do and it did not exactly meet my goals for coming to this laboratory, but will hopefully lead to a publication in the end. I think that the communication about the planned projects and the goals of the laboratory was suboptimal. The changed project also led to a late start of experiments which results in the fact that I cannot finish my work while being in the USA.

Regarding my family situation (e.g. I became a father while being in the USA) my mentor was always understanding and offered help and support.

LPR SUPPORT

8 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

Whenever I needed help, Dr. Dubick was able to help me. Also contacting him was very easy. I had no need to contact him very often, therefore I can't go into further details.

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

I was very impressed and satisfied with the help and support by NRC. Thank you very much.

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required;
but you may upload a scanned
signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Maes	**Piet**	

3) *Today's Date*	*Dates of Tenure*
29 MAY 2014	from **1 DEC 2012** to **31 MAY 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
USAMRIID	**Molecular Virology**	**Virology**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

dr. Jay HOOPER

6) *TITLE OF RESEARCH PROPOSAL*

Manipulating the Syrian hamster model for use in developing medical countermeasures to HFRS

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **There is no significant difference in genome organization between hantaviruses from a high hantavirus incidence region and a low incidence region**

2) **Hamsters can be chronically infected with *Hantaan virus* and *Puumala virus***

3) **Immunosupressed hamsters infected with *Puumala virus* develop disease 21 dpi**

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

Both hamster models (i.e. *Hantaan virus* and *Puumala virus* disease models) need to be further refined to show that the disease observed is specifically caused by the infection with *Hantaan virus* or *Puumala virus*. Furthermore, it is important to minimize the immunosuppression therapy for the hamsters. Additional experiments need to be performed to examine which level of immune suppression needs to be reached to develop disease in the hamsters.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

none

b) Books, book chapters, other publications

none

c) Manuscripts in preparation, manuscripts submitted

none

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

none

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

none

Domestic

none

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

'Zoonotic viruses in Belgian wildlife'. September 25, 2013. Pasteur Institute, Brussels, Belgium

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

none

14) *POST-TENURE POSITION / JOB TITLE*

Research leader at the Zoonotic Infectious Diseases Unit

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION*

KU Leuven, Rega Institute, Minderbroedersstraat 10, BE3000 Leuven Belgium.

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☐ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center ____
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- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☒ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DUIRNG TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1) **I had the honor to enjoy the tradition of Thanksgiving twice with colleagues and had a lot of 'American style BBQs' in the Summer.**

2) **We had several 'cook-off' occasions in the lab with typical American and Belgian recipes.**

3) **For Belgians, it's all about foods and drinks. So we shared a lot of recipes for making typical Belgian foods and desserts. A real Belgian waffle for example, seems to be something completely different than what people are used to.**

4) **As a Belgian, I like to talk about politics. It has been very educational knowing about how politics work in the states. It has been very interesting to witness the election of an American president and to go and watch the inauguration speech in D.C.**

5) **I tried to educate people here that Belgium is more than just about chocolate, beers and waffles.**

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

10 Development of knowledge, skills, and research productivity
Comments

LONG TERM VALUE

10 How the NRC Associateship award affected your career to date
Comments

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
Comments

ADVISER/MENTOR SUPPORT

10 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)
Comments

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required;
but you may upload a scanned
signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Nyland	**Jennifer**	**E**

3) *Today's Date*	*Dates of Tenure*
December 19, 2014	from **February 1, 2013** to **December 31, 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
AMRMC	**USAISR**	**Pain Management**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

John Clifford

6) *TITLE OF RESEARCH PROPOSAL*

The Use of Glial Inhibitors to Increase the Efficacy of Opioid Analgesics while Eliminating the Propensity for Addiction

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Developed collaborations with the BAMC Pain Management Clinic, focus on translational work from bench to bedside, clinical research involving opioid use and long term outcomes**

2) **Developed collaborations with the USAISR Burn Center, clinical studies focused on psychological aspects of pain, opioid use, and long tem outcomes**

3) **Testing of novel analgesics in animal models of burn injury**

4) **Tested the effects of opioid administration during recovery on later drug-seeking behaviors in a rat model**

5) **Investigated stress as a pain generator, and possible interventions in a rat model**

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

All projects during tenure are currently in progress. I will continue to pursue this research in my new position.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

Clifford, J.L., Fowler, M., Hansen, J.J., Cheppudira, B., Nyland, J.E., Salas, M.M., McGhee, L.L., Petz, L.N. & Loyd, D.R. (2014). Advances in treating pain in wounded service members: A decade at war. Journal of Trauma and Acute Care Surgery, 77(3), S228-S236.

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

Nyland, J.E., McLean, S.A. & Averitt, D.R. (Submitted). Sub-chronic stress prior to injury intensifies pain associated with thermal burn injury. Journal of Pain.

Nyland, J.E., Escolas, S.M., Aden, J.K., Young, A.W., Chung, K.K. (In Preparation). Preparing for Disaster: Analgesic Needs for Mass Burn Casualties.

Linnstaedt, S.D., Riker, K.D., Nyland, J.E., Velilla, M.A., Pearson, C., O'Neil, B.J., Zimny, E., Lewandowski, C., Hendry, P.L., Barnes, S., Rosenberg, M., McLean, S.A. (In Preparation). microRNA 320a is a potential mediator of chronic widespread hyperalgesia development after stress exposure.

Nyland, J.E., Hoang, H.T., Alphonso, C., Guthmiller, K.B., Wilroy, G., Overbaugh, R., Ibarra, A., Goff, B.J., (In Preparation). A Viable Technique: Cervical Medial Branch Blocks in the Sitting Position

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*
Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Nyland, J.E., McLean, S.A., Clifford, J.L., Fowler, M., Petz, L.N. & Loyd, D.R. (2014). Prior Stress Exposure Increases Pain Behaviors in a Rat Model of Full Thickness Thermal Injury. Abstract for poster presentation, International Association for the Study of Pain World Congress, Buenos Aires, Argentina.

Domestic

Linnstaedt S.D., Riker K.D., Nyland J.E., Velilla M.A., Pearson C., O'Neil B.J., Zimny E., Lewandowski C., Hendry P.L., Barnes S., Rosenberg M. & McLean S.A. (2015). microRNA 320a is a potential mediator of chronic widespread hyperalgesia development after stress exposure. Abstract for the American Pain Society 34th Annual Meeting, Palm Springs, California.

Nyland, J.E., Mclean, S.A. & Averitt, D.L. (2015). Combined serotonin and norepinephrine reuptake inhibition reduces the effects of stress on post-injury pain behaviors in a rat model of burn injury. Abstract for the American Pain Society 34th Annual Meeting, Palm Springs, California.

Nyland, J.E., Escolas, S.M., Rauschendorfer, C.A., Aden, J.K., Young, A.W. & Chung, K.K. (2015). Preparing for disaster: analgesic needs for mass burn casualties. Abstract for the American Pain Society 34th Annual Meeting, Palm Springs, California.

Escolas, S.M., Rauschendorfer, C.A., Walker, S.L., Aden, J.K., Nyland, J.E. & Chung, K.K. (2015). Secure attachment associated with less pain in burn patients. Abstract for the American Burn Association 47th Annual Meeting, Chicago, Illinois.

Fowler, M., Hansen, J.J., Nyland, J.E., Gibbons, R.V. & McGhee, L. (2015).The relationships between opioids and intraoperative fluid administration in a burn operating room. Abstract for the American Academy of Pain Medicine's 31st Annual Meeting, National Harbor, Maryland.

Nyland, J.E., McLean, S.A., Clifford, J.L., Fowler, M., Petz, L.N. & Loyd, D.R. (2014). Prior Stress Exposure Increases Pain Behaviors in a Rat Model of Full Thickness Thermal Injury. Abstract for poster presentation, Military Health Systems Research Symposium, Fort Lauderdale, Florida.

Nyland, J.E., Garza, T.H., Slater, T.M., Clifford, J.L., Fowler, M., Eidson, L.N., Murphy, A.Z. & Averitt, D.L. (2013). Neurobiological mechanisms of tolerance-independent attenuation of morphine efficacy in a rat model of thermal injury. Abstract for oral breakout presentation, Military Health Systems Research Symposium, Fort Lauderdale, Florida.

Nyland, J.E., Garza, T.H., Slater, T.M., Fowler, M., Clifford, J.L., Petz, L.N., & Loyd, D.R. (2013). Development of opioid tolerance in a rat model of full thickness thermal injury. Abstract for poster presentation, Society for Neuroscience, San Diego, California.

Nyland, J.E., Garza, T.H., Slater, T.M., Clifford, J.L., Fowler, M., Eidson, L.N., Murphy, A.Z. & Averitt, D.L. (2013). Neurobiological mechanisms of tolerance-independent attenuation of morphine efficacy in a rat model of thermal injury. Abstract for oral breakout presentation, Military Health Systems Research Symposium, Fort Lauderdale, Florida.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

Substance Use in the Military, USAISR Seminar Series, August 13, 2014

Pain Meds for Algernon: What we can and cannot learn from animal models, USAISR Burns and Trauma Research Workgroup meeting, July 10, 2014

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *POST-TENURE POSITION / JOB TITLE*

Staff Scientist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

Battlefield Pain Management Task Area, US Army Institute of Surgical Research, 3698 Chambers Pass, Fort Sam Houston, TX 78234

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☒ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center USAISR
- ☐ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

10 Development of knowledge, skills, and research productivity

Comments

LONG TERM VALUE

10 How the NRC Associateship award affected your career to date

Comments

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

ADVISER/MENTOR SUPPORT

5 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

While I did not receive much support from John Clifford, I did not require much mentorship.

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

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No handwritten signature required; but you may upload a scanned signature file below:

Linda Sligh: lsligh@nas.edu
Asha Soutar: asoutar@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

Id# **Rev. December 2014** **Proj/Act ID#**

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Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Pilia	**Marcello**	

3) *Today's Date*	*Dates of Tenure*
January 29, 2015	from **September 4, 2012** to **February 6, 2015**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
AMRMC	**USAISR**	**ETRM**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Soft Tissue Regeneration Lab **Christopher** **Rathbone**

6) *TITLE OF RESEARCH PROPOSAL*

Composite pre-vascularized scaffolds for large bony defect reconstruction

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Successfully vascularized a Volumetric Muscle Loss defect using Microvascular Fragments**

2) **Proved that increase in vascularization in soft tissue does not increase healing without a myogenic cell source**

3) **Successfully vascularized demineralized bone allografts using Microvascular Fragments both in an ectopic rat model and in a 6mm femoral defect.**

4) **Again, without an appropriate cell source vascularization is not enough**

5) **Started investigating the addition of satellite cells and/or minced muscle grafts to the microvascular fragments to determine functional outcome**

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

Every project was finished and the manuscripts are being published right now. Started investigating addition of myogenic source to microvascular fragments but another PI will assess the outcome in 8 weeks

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1. Pilia M, McDaniel JS, Guda T, Chen XK, Rhoads RP, Allen RE, Corona BT, and Rathbone CR. Transplantation and perfusion of microvascular fragments in a rodent model of volumetric muscle loss injury. European Cell and Material; 28:11-14; 2014

2. McDaniel J, Pilia M, Ward CL, Pollot B, Rathbone CR. Characterization and multilineage potential of cells derived from isolated microvascular fragments. Journal of Surgical Research; E-Pub May 2014

b) Books, book chapters, other publications

1. Rathbone CR, McDaniel JS, Pilia M. Chapter 9. Cell Sources for Orthopaedic Defects. Biomaterials of Bone Grafts – Bench-top to Clinical Applications. Taylor & Francis Group. (In preparation).

c) Manuscripts in preparation, manuscripts submitted

1. Pilia M, McDaniel JS, Rathbone CR. Prevascularization of demineralized freeze-dried bone allograft in an ectopic model and its effect on segmental bone healing. Journal of Bone and Mineral Research – Part A; In preparation; planned submission February 2014

2. McDaniel JS, Pilia M, Raut V, Ledford J, Shiels SM, Wenke JC, Barnes BR, Rathbone CR. Currently available alternatives to autograft evaluated in a rabbit segmental bone defect. International Orthopedics; Submitted, January 2015

3. McDaniel JS, Pilia M, Hurtgen B, Belenkiy S, Necsoiu C, Batchinsky A, Rathbone CR. Porcine bone marrow aspirate characterization for the support of large animal studies. Research in Veterinary Science; In preparation, expected submission February 2015.

4. Walker JA, Pilia M, McDaniel JS, Wenke JC, Rathbone CR; Perfusion CT for Assessment of en bloc Implant Vascular Success. Journal of Vascular Surgery; In preparation; planned submission February 2015sadf

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

1 Pilia M*, McDaniel JS, Corona BT, Rathbone CR. Microvascular fragments improve vessel density of allograft bone in vivo; San Antonio Postdoc Research Forum, San Antonio TX, September 2014 – Poster Presentation

2 McDaniel JS, Pilia M*, Walker J, Corona BT, Rathbone CR. Use of microvascular fragments for improving regeneration in musculoskeletal defects; San Antonio Postdoc Research Forum, San Antonio TX, September 2014 – Poster Presentation

3 Pilia M*, McDaniel JS, Corona BT, Rathbone CR. Microvascular fragments improve vessel density of allograft bone in vivo; Military Health System Research Symposium, Ft. Lauderdale FL, August 2014 – Poster Presentation

4 McDaniel JS, Pilia M*, Walker J, Corona BT, Rathbone CR. Use of microvascular fragments for improving regeneration in musculoskeletal defects; Military Health System Research Symposium, Ft. Lauderdale FL, August 2014 – Poster Presentation

5 Rathbone CR*, Pilia M, McDaniel JS, Corona BT. Transplantation of Microvascular Fragments for Volumetric Muscle Loss; RegenMed SA, February 2014 – Oral Presentation 1 Pilia M*, McDaniel JS, Corona BT, Rathbone CR. Transplantation of Microvascular Fragments in an Experimental Volumetric Muscle Loss Model; Tissue Engineering and Regenerative Medicine International Society, Atlanta GA , November 2013 – Oral Presentation

6 Walker JA*, Pilia M, Walters TJ, McDaniel JS, Wenke JC, Rathbone CR. Perfusion CT for Assessment of en bloc Implant Vascular Success; Tissue Engineering and Regenerative Medicine International Society, Atlant GA, November 2013 – Poster Presentation

7 Pilia M*, McDaniel JS, Corona BT, Rathbone CR. Transplantation and Perfusion of Microvascular Constructs in an Experimental Volumetric Muscle Loss Model; Military Health System Research Symposium, Ft. Lauderdale FL, August 2013 – Oral Presentation

8 Pilia M*, McDaniel JS, Corona BT, Rathbone CR. Transplantation and Perfusion of Microvascular Constructs in an Experimental Volumetric Muscle Loss Model; Military Health System Research Symposium, Ft. Lauderdale FL, August 2013 – Poster Presentation

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *POST-TENURE POSITION / JOB TITLE*

Special Assistant, Intra- & Extramural Research Prog.

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

Combat Casualty Care, Fort Detrick, MD - Job through Capitol IT Solutions, 13907 Carlson Farm Drive, Germantown, MD 20874

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☐ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center ____
- ☒ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

10 Development of knowledge, skills, and research productivity

Comments

LONG TERM VALUE

10 How the NRC Associateship award affected your career to date

Comments

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

ADVISER/MENTOR SUPPORT

10 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

LPR SUPPORT

10 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

Special thanks to Peggy and Jason for making our lives so much easier. I really want to thank the entire institution, it has been an amazing experience. Thank you!

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Linda Sligh: lsligh@nas.edu
Asha Soutar: asoutar@nas.edu
Melanie Suydam: msuydam@nas.edu

Peggy Wilson: pwilson@nas.edu

Id# **Rev. December 2014** **Proj/Act ID#**

THE NATIONAL ACADEMIES
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National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
RAHMAN	**Md. Mizanur**	

3) *Today's Date*	*Dates of Tenure*
10/01/2014	from **03/01/2011** to **11/30/2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
AMRMC	**USAMRIID**	**MTS**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Biochemistry Dr. S. Ashraf Ahmed

6) *TITLE OF RESEARCH PROPOSAL*

Effects of Botulinum neurotoxin derived peptides and post-translational modification on the structure, function and biology of BoNT

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Discovered that the C-terminus of Botulinum neurotoxin serotype A is involved in product removal and catalysis**

2) **Developed enzymatic assay for BoNT/A catalytic domain**

3) **Demonstrated that BoNT bound ions affect enzymatic activity**

4) **Demonstrate that C-terminus of BoNT/A Lc interacts with BoNT/A belt affecting catalysis**

5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

I have been working on to determine the extended role of C-terminus of BoNT/A Lc on the stability and catalytic activity of the enzyme.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1. **Rahman M Mizanur**, Robert Stafford, and S. Ashraf Ahmed. Cleavage of SNAP25 and its shorter version by the protease domain of serotype A Botulinum neurotoxin. ***PLoS One***, 9(4):e95188, **2014.**
2. **Rahman M Mizanur**, Verna Frasca, Subramanyam Swaminathan, Sina Bavari, Robert G. Webb, Leonard A. Smith and S. Ashraf Ahmed. C-Terminal region of the catalytic domain of type A botulinum neurotoxin stimulate catalysis by facilitating product release. ***J. Biol. Chem.*** 288, 24223-24233, **2013.**
3. **Rahman M. Mizanur**, John Gorbet, Subramanyam Swaminathan, and S. Ashraf Ahmed. Inhibition of catalytic activities of botulinum neurotoxin protease domains of serotypes A, B and E by acetate, sulfate and calcium. ***Int. J. Biochem. Mol. Biol***. 3, 313-21, **2012.**

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

1. **Rahman M. Mizanur**, and S. Ashraf Ahmed[1]The Belt Sequence Mimics the Role of Substrate SNAP25 Upstream Sequence in the Catalysis of type A Botulinum Neurotoxin

2. Vicki A. Montgomery, S. Ashraf Ahmed, Mark A. Olson, **Rahman M Mizanur**, Virginia I. Roxas-Duncan, and Leonard A. Smith: *Ex vivo* inhibition of *C. botulinum* neurotoxins types B, C, E, and F by Small Molecular Weight Inhibitors (Manuscript prepared for Toxicon)

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*
Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

1. **May 2013: The C-Terminus of the Catalytic Domain of Type A Botulinum Neurotoxin May Facilitate Product Release From the Active Site, NIH, Frederick, Maryland**
2. **September 2012: Roles of Acetate, Sulfate and Calcium on the Catalytic Activities of Botulinum Neurotoxin Protease Domains of Serotypes A, B and E. IBRCC, Baltimore, Maryland**

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

1. **March 2013: Botulinum Neurotoxin: Structure and Mechanism of Action, University of Maryland, College Park.**
2. **May 2014: Botulinum Neurotoxin: Structure and Mechanism of Action, University of Maryland, College Park**

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *POST-TENURE POSITION / JOB TITLE*

Microbiologist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

USAMRIID, 1425 Porter St, Fort Detrick, Frederick

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

X Permanent position at the NRC host agency
☐ Contract or temporary position at the NRC host Agency
Abbreviate Host Laboratory/Center ____
☐ Research/Administrative position with another U.S.-government agency
☐ Research/Administrative position with a foreign-government agency
☐ Research/teaching position at a U.S. college or university
☐ Research/teaching position at a foreign college or university
☐ Research/administration position in private industry in the U.S.
☐ Research/administration position in private industry outside of the U.S.
☐ Research/administration position with a non profit
☐ Self-employed/consulting
☐ Postdoctoral research
☐ Other **(Please specify, possible)** ____
☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DURING TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)
2)
3)
4)
5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*
On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE
☐ Development of knowledge, skills, and research productivity

Comments
Excellent (10)

LONG TERM VALUE

How the NRC Associateship award affected your career to date
Comments
Excellent (10)

LAB SUPPORT

Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
Comments
Excellent (10)

ADVISER/MENTOR SUPPORT

Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)
Comments
Excellent (10)

LPR SUPPORT

Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)
Comments
Excellent (10)

NRC SUPPORT

Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)
Comments
Excellent (10)

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

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Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

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National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Sanchez Jr	**Carlos**	**J**

3) *Today's Date*	*Dates of Tenure*
26 August 2014	from **07 Sept 2011** to **06 Sept 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
ARMC	**US Army Institute of Surgical Research, JBSA San Antonio TX**	**Combat Casualty Care/Extremity Trauma and Regenerative Medicine**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Joseph C Wenke, PhD

6) *TITLE OF RESEARCH PROPOSAL*

Improving Outcomes of Extremity Trauma through Infection Control and Bone Regeneration

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Developed *in vitro* biofilm assays to test susceptibility to various antimicrobials (and antiseptics) as well as to evaluate the effectiveness of various biofilm dispersal agents utilizing a number of bacterial species as well as fungal isolates related to combat casualties**

2) **Reported through prospective studies, the importance and incidence of biofilm formation by clinical isolates associated with combat casualty and showing the relationship between this phenotype and the development of persistent infections in combat related wounds**

3) **Demonstrated the utility of combinations of biofilm dispersal agents and antimicrobials as an alternative therapy for targeting bacterial biofilms**

4) **Through collaborative efforts contributed to the development of biomaterials capable of delivering biofilm dispersal agents (alone or in combination with antimicrobials) to reduce infection in contaminated femoral segmental defects**

5) **Characterized host responses of osteoblasts, a bone cell line, to biofilms vs planktonic (culture grown) bacteria, and identified those factors responsible for reducing cell viability and cell differentiation**

6) **Characterized temporal host responses during bacterial osteomyelitis infection in vivo and have begun to identify factors that may be responsible for host pathologies associated with orthopaedic infections, namely those involving *S. aureus***

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

The primary focus of my research has been to develop and/or optimize treatment strategies to reduce infectious complications associated with open fractures, sustained during combat trauma. Based on previous work completed at ISR, we have identified a number of currently FDA approved antimicrobials, as well as novel agents capable of specifically targeting and disrupting biofilms, that have shown great efficacy as a treatment option for a number of microbial agents predominately responsible for infection in combat related injuries; moreover which have also been shown to specifically target/disrupt microbial biofilms. We are currently in the process of translating these findings into potential therapies to reduce infection using an established contaminated segmental defect model. Additionally we are testing the application of various materials, loaded with idea agents, to evaluate sustained release of single and multiple compounds

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

Sanchez CJ, Mende K, Beckius ML, Akers KS, Romano DR, Wenke JC, Murray CK. (2013). *Biofilm formation by clinical isolates and the implications in chronic infections.* BMC Infect Dis. Jan 29;13:47. doi: 10.1186/1471-2334-13-47.

Sanchez CJ, Ward CL, Romano DR, Hurtgen BJ, Hardy SK, Woodbury RL, Trevino AV, Rathbone CR, Wenke JC. (2013). *Staphylococcus aureus biofilms decrease osteoblast viability, inhibits osteogenic differentiation, and increases bone resorption in vitro.* BMC Musculoskeletal Disorders. 14:187

Sanchez CJ, Prieto EM, Krueger CA, Zienkiewicz KJ, Romano DR, Ward CL, Akers KS, Guelcher SA, Wenke JC. (2013). *Effects of local delivery of d-amino acids from biofilm-dispersive scaffolds on infection in contaminated rat segmental defects. Biomaterials*. Jul 4. doi:pii: S0142-9612(13)00712-6.

Barsoumian A, **Sanchez CJ**, Mende K, Tully CC, Beckius ML, Akers KS, Wenke JC, Murray CK. (2013). *In Vitro Toxicity and Activity of Dakin's Solution, Mafenide Acetate, and Amphotericin B on Filamentous Fungi and Human Cells.* J Orthop Trauma. 2013 Jan 2.

Sanchez CJ, Akers KS, Romano DR, Woodbury RL, Hardy SK, Murray CK, Wenke JC. (2014) D-Amino Acids Enhance the Activity of Antimicrobials Against Biofilms of Clinical Wound Isolates of Staphylococcus aureus and Pseudomonas aeruginosa. Antimicrob Agents Chemother. May 19. pii: AAC.02468-14. [Epub ahead of print]

Akers KS, Mende K, Cheatle KA, Zera WC, Yu X, Beckius ML, Aggarwal D, Li P, **Sanchez CJ**, Wenke JC, Weintrob AC, Tribble DR, Murray CK; Infectious Disease Clinical Research Program Trauma Infectious Disease Outcomes Study Group. (2014) Biofilms and persistent wound infections in United States military trauma patients: a case-control analysis. BMC Infect Dis. 2014 Apr 8;14:190. doi: 10.1186/1471-2334-14-190.

Cardile AP, **Sanchez CJ**, Samberg ME, Romano DR, Hardy SK, Wenke JC, Murray CK, Akers KS. Human plasma enhances the expression of Staphylococcal microbial surface components recognizing adhesive matrix molecules promoting biofilm formation and increases antimicrobial tolerance In Vitro. BMC Res Notes. 2014 Jul 17;7:457.

Cardille AP, **Sanchez CJ**, Hardy SK, Romano DR, Hurtgen BJ, Wenke JC, Murray CK and Akers KS. Dakin solution alters macrophage viability and function. J Surg Res. 2014 Jul 18. pii: S0022-4804(14)00656-8.

b) Books, book chapters, other publications

N/A

c) Manuscripts in preparation, manuscripts submitted

Homeyer D, **Sanchez CJ**, Mende K, Beckius ML, Akers KS, Wenke JC, Murray CK. In Vitro Toxicity and Activity of Tea Tree Oil on Filamentous Fungi and Human Cells. *(Manuscript In Revision, Journal of Medical Mycology,)*

Ward CL, **Sanchez CJ**, Pollet B, Romano DR, Becerra S, Hardy SK, Rathbone CR and Wenke JC. Biofilm-derived Soluble Factors of Wound Pathogens Modulate Human Bone Marrow-derived Stromal Cell Multi-lineage Differentiation, Migration, Angiogenesis, and Cytokine Secretion *(Manuscript In Revision PLoS One 2014)*

Harmata AJ, **Sanchez CJ**, Zienkiewicz KJ, Elefteriou F, Wenke JC and Guelcher SG. Local Delivery of D-Amino Acid Biofilm Dispersal Agents Does not Inhibit Bone Healing *In Vivo (Manuscript Submitted Clinical Orthopaedics and Related Research 2014)*

White B, **Sanchez CJ**, Mende K, Beckius ML, Akers KS, Wenke JC, and Murray CK. *In Vitro* Toxicity and Activity of Medical Grade Honey on Filamentous Fungi and Human Cells *(Manuscript in preparation for Journal of Orthopaedic Trauma)*

Sanchez CJ, Ward CL, Romano DR, Hardy SK, Becerra S, Guelcher SA, and Wenke JC. Local Delivery of D-Amino Acids from Hydrogels Disperses Biofilms In vitro and Reduces Bacterial Contamination in Wounds. *(Manuscript in Preparation for submission to Journal of Wound Repair and Regeneration)*

Hardy SK, Cardille AP, Akers KS, Murray CK, Wenke JC and **Sanchez CJ**. Preclinical evaluation of Rifamycins for Treatment of Staphylococcal aureus Biofilms *(Manuscript in Preparation for Clinical Orthopaedics and Related Research)*

Allen K, **Sanchez CJ**, Homeyer D, Romano DR, Hardy SK and Akers KS. Voriconazole Enhances Osteogenic Activity of Human Osteoblasts In vitro. (Manuscript in Preparation for Antimicrobial Agents and Chemotherapeutics)

Cardille AP, Woodbury RW, Hardy SK, Becerra S, Albach AM, Akers KS, Wenke JS and **Sanchez CJ**. Antibiofilm Activity of Norspermidine Against Clinical Orthopaedic Isolates. (Manuscript Submitted to BMC Microbiology)

Albach AM, Hardy SK, Chang DC, Garcia RG, Cardile AP, Wenke JC and **Sanchez CJ**. Antimicrobial Activity of Gallium and Zinc Meso- and Protoporphyrins against Biofilms of Clinical Isolates of *Staphylococcus aureus* (Manuscript In Progress)

Chang DC, Garcia RG, Hardy SK, Akers KS, Wenke JC and **Sanchez CJ**. Antimicrobial Activity of Gallium and Zinc Meso- and Protoporphyrins against Biofilms of Clinical Isolates of Multidrug-Resistant *Acinetobacter baumannii* (Manuscript In Progress)

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*
Provide titles, inventors, and dates of applications.

Composition with biofilm dispersal agents; Publication number W02014026052 A1 2013

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

N/A

Domestic

Carlos J. Sanchez Jr., Desiree R Romano , Kevin Akers , Ronald Woodbury , Catherine L. Ward, and Joseph C Wenke. *D-Amino Acids Enhance the Effect of Antibiotics on Bacterial Biofilms In Vitro.* American Society for Microbiology (ASM) General Meeting. San Francisco, CA. June 15-19, 2012.

Carlos J. Sanchez Jr. *Biofilm-Derived Factors Reduce Viability, Inhibit Mineralization, and Differentially Regulate OPG/RANK-L in Human Osteoblasts (Invited Speaker).* Military Health Research Science Symposium (formerly ATACC) Ft. Lauderdale, FL. August 13-16, 2012.

Carlos J. Sanchez Jr., Catherine L. Ward, Desiree R. Romano , Sharanda S. Hardy , Brady J. Hurtgen, Ronald Woodbury, Alex V. Trevino, Christopher R. Rathbone, and Joseph C. Wenke. *Biofilm-derived Soluble Factors Differentially Regulate RANK-L/OPG Gene Expression, Decrease Osteoblast Viability, and Inhibit Osteogenic Differentiation.* American Society for Microbiology (ASM) Conference on Biofilms. Miami, FL. September 29-October 4, 2012.

Carlos J. Sanchez Jr. *Anti-Biofilm Strategies for the Treatment of Chronic Orthopaedic Extremity Infections (Invited Speaker).* Extremity War Injuries VIII: Sequelae of Combat Injuries. February 11-13, 2013. Washington, DC

Carlos J. Sanchez Jr., Desiree R. Romano , Sharanda S. Hardy, Ronald Woodbury, and Joseph C. Wenke. Modulation of Angiogenesis by Biofilms of Clinical Wound Isolates. American Society for Microbiology (ASM) General Meeting. Denver, CO. May 18-21, 2013.

Carlos J Sanchez Jr, Edna M Prieto, Chad A Kruger, Katarina J Zienkiewicz, Desiree R. Romano, Scott A Guelcher, and Josh C Wenke. Development of a Biofilm Dispersive Graft for the Treatment of Contaminated Bone Defects. Gordon Research Conferences: Bones & Teeth-Translating Signaling Mechanisms into Therapy, January 26-31 2014Galveston, TX

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

NA

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

NA

14) *POST-TENURE POSITION / JOB TITLE*

Extension of Current position, through Oak Ridge National Laboratory (ORAU)

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION*

US ARMY Institute of Surgical Research
3698 Chambers Pass Ft. Sam Houston, TX 78234
Staff Scientist

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

☐ Permanent position at the NRC host agency
☒ Contract or temporary position at the NRC host Agency
Abbreviate Host Laboratory/Center ARMC-USAISR
☐ Research/Administrative position with another U.S.-government agency
☐ Research/Administrative position with a foreign-

government agency
☐ Research/teaching position at a U.S. college or university
☐ Research/teaching position at a foreign college or university
☐ Research/administration position in private industry in the U.S.
☐ Research/administration position in private industry outside of the U.S.
☐ Research/administration position with a non profit
☐ Self-employed/consulting
☐ Postdoctoral research
☐ Other **(Please specify, possible)** ____
☐ No information provided

17) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

7 Development of knowledge, skills, and research productivity

Comments:

In addition to expanding my research skill sets to include other bacterial agents and filamentous fungi, this opportunity has given me an appreciation and knowledge to conduct research in orthopaedics, using various animal and in vitro models, antimicrobial susceptibility testing, including a variety of antimicrobial and antiseptics, as well as an introduction into biomaterials.

LONG TERM VALUE

9 How the NRC Associateship award affected your career to date

Comments:

This opportunity has been a great experience overall that has introduced me to areas of research, in which I can apply my previous specialization into, and that I will likely further pursue upon the completion of this tenure.

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments:

Every effort was made to ensure that all necessary equipment and research reagents required for the completion of research projects were readily available. Additionally, there was tremendous support from the research staff and

ADVISER/MENTOR SUPPORT

8 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

My mentor had an open door policy and always made the best efforts to keep up with ongoing projects and provide support while not directly micro-managing research efforts.

LPR SUPPORT

9 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, coordinator, travel, etc.)

Comments

During my tenure the experiences in all aspects of the fellowship, in regards to the administrative support, was excellent. Everyone in on the support staff was always very helpful and worked extremely hard on our behalf to make this experience great.

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Maria Crocco: mcrocco@nas.edu
Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Peggy Wilson: pwilson@nas.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Stonier	**Spencer**	**W**

3) *Today's Date*	*Dates of Tenure*
27 June 2014	from **1 Aug 2011** to **30 June 2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
MRMC	**USAMRIID**	**Virology**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

John Dye

6) *TITLE OF RESEARCH PROPOSAL*

Determination of the requirements for B cell and CD8 T cell responses in protection against Ebolavirus infection after VRP-GP vaccination

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) **Antibody responses appear to be most acutely responsible for protection against filovirus infection after vaccination**

2) **CD8 T cells may contribute to protection but it varies by mouse strain slightly**

3) **Both CD4 and CD8 T cell responses to Ebola glycoprotein are detectable after VRP vaccination**

4)

5)

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

My current projects involve further describing VRP immune responses and components of the immune system that are involved. Additionally I am involved in a team that is evaluating memory immune responses in filovirus outbreak survivors in Uganda. Recently the lab was awarded an NIH grant to evaluate antibody therapeutics and I am involved in this effort as well.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

Herbert AS, Kuehne AI, Barth JF, Ortiz RA, Nichols DK, Zak SE, Stonier SW, Muhammad MA, Bakken RR, Prugar LI, Olinger GG, Groebner JL, Lee JS, Pratt WD, Custer M, Kamrud KI, Smith JF, Hart MK, and Dye JM. "Venezuelan equine encephalitis virus replicon particle vaccine protects nonhuman primates from intramuscular and aerosol challenge with ebolavirus." 2013. *J Virol*. 87: 4952-64.

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

Spencer W. Stonier, Andrew S. Herbert, Ariel Sobarzo, Ana I. Kuehne, Yael Eskira, Julius Lutwama, Leslie Lobel, and John M. Dye. T and B cell memory responses in 2012 filovirus outbreak survivors. American Association of Immunologists Annual Meeting. Pittsburgh, PA 2014.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

Antibody and memory T cell responses in *Ebolavirus* and *Marburgvirus* outbreak survivors. MD Anderson Cancer Center, April 2014

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *POST-TENURE POSITION / JOB TITLE*

Research Scientist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

USAMRIID
1425 Porter St
Ft Detrick, MD 21702

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☒ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center USAMRIID
- ☐ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DUIRNG TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

9 Development of knowledge, skills, and research productivity
Comments

LONG TERM VALUE

9 How the NRC Associateship award affected your career to date
Comments

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
Comments

ADVISER/MENTOR SUPPORT

9 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

LPR SUPPORT

9 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

NRC SUPPORT

10 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required; but you may upload a scanned signature file below:

Asha Davis: adavis@nas.edu
Linda Sligh: lsligh@nas.edu
Melanie Suydam: msuydam@nas.edu
Peggy Wilson: pwilson@nas.edu

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Research Council

Research Associateship Programs

FINAL REPORT

1) *Associate Last or Family Name*	*First Name*	*M.I.*
Ward	**Catherine**	**L**

3) *Today's Date*	*Dates of Tenure*
9/2/2014	from **8/23/2011** to **9/5/2014**

4) *Host Agency*	*Laboratory or Center*	*Division / Directorate / Department*
MRMC	**USAISR**	**ETRM**
(e.g., AFRL)	**(e.g., Wright Patterson AFB)**	**(e.g., High-Speed Propulsion)**

5) *Name of Laboratory NRC Adviser* **(and USMA Mentor, if applicable)**

Joseph C. Wenke

6) *TITLE OF RESEARCH PROPOSAL*

Improving Cellular Therapies for Osseous Trauma Using Injectable Scaffolds for Bone Regeneration

7) *SUMMARY OF RESEARCH DURING TENURE* **Itemize significant findings in concise form, utilizing key concepts/words.**

1) Utilized and optimized an injectable polyurethane (PUR) matrix for delivery of cells (bone marrow mesenchymal stem cells, BMSCs) and osteogenic agents (Lovastatin, LV) for a bone regeneration therapy in collaboration with Dr. Scott Guelcher (Vanderbilt University).

2) Developed methods to encapsulate cells in alginate matrices for survivability during PUR curing.

3) Analyzed cell fate within injectable scaffolds (PUR). *In vitro* analysis included determining viability, attachment and proliferation of cells onto the scaffolds in culture. *In vivo* analysis included determining cell survivability after injection in a rat calvarial defect.

4) Investigated osteogenic potential of injectable cell delivery scaffolds with the addition of osteogenic agents in the system.

(USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) *RESEARCH IN PROGRESS* **Describe in no more than 100 words.**

An optimized cell (BMSC) and osteogenic agent (Lovastatin) delivery system using an injectable polymer (polyurethane) will be tested in a rat femur segmental defect model to determine the ability to form new bone in a critical-size defect. BMSCs and Lovastatin within the injectable system have been optimized and tested *in vitro* to determine ideal concentrations to support osteogenic differentiation. This model will assess the ability of the system in a relevant model of bone regeneration.

9) *PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1) Garg K, **Ward CL**, Hurtgen BJ, Wilken JM, Stinner DJ, Wenke JC, Owens JG, Corona BT. Volumetric muscle loss: persistent functional deficits beyond frank loss of tissue. Journal of Orthopaedic Research, 2014
2) McDaniel JS, Pilia M, **Ward CL**, Pollot B, Rathbone CR. Characterization and multilineage potential of cells derived from isolated microvascular fragments. Journal of Surgical Research, 2014
3) Corona BT, Garg K, **Ward CL**, McDaniel J, Walters TJ, Rathbone CR. Autologous minced muscle grafts: A tissue engineering therapy for the volumetric loss of skeletal muscle. American Journal of Physiology – Cell Physiology, 2013.
4) Sanchez CJ, Prieto EM, Krueger CA, Zienkiewicz KJ, Romano DR, **Ward CL**, Akers KS, Guelcher SA, Wenke JC. Effects of local delivery of $_D$-Amino acids from biofilm-dispersive scaffolds on infection in contaminated rat segmental defects. Biomaterials, 2013.
5) Sanchez CJ*, **Ward CL***, Romano DR, Hurtgen BJ, Hardy SK, Woodbury RL, Rathbone CR, Wenke JC. Staphylococcus aureus biofilms decrease osteoblast viability, differentially regulate RANK-L/OPG gene expression, and inhibit osteogenic differentiation. BioMed Central Musculoskeletal Disorders, 2013.
6) Corona BT, Wu X, **Ward CL**, McDaniel JS, Rathbone CR, Walters TJ. The promotion of a functional fibrosis in skeletal muscle with volumetric muscle loss injury following the transplantation of muscle-ECM. Biomaterials, 2013.

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

1) **Ward CL***, Sanchez CJ*, Pollot BE Romano DR, Hardy SK, Becerra SC, Rathbone CR, Wenke JC. Biofilm-derived Soluble Factors of Wound Pathogens Modulate Human Bone Marrow-derived Stromal Cell Multi-lineage Differentiation, Migration, Angiogenesis, and Cytokine Secretion. *In Preparation*.
2) Guo R, **Ward CL**, Davidson JM, Duvall CL, Wenke JC, Guelcher SA. A Transient Cell-Shielding Method for Viable MSC Delivery within Hydrophobic Scaffolds Polymerized In Situ. Biomaterials, *In preparation.*
3) Garg K, **Ward CL,** Rathbone CR, Corona BT. Transplantation of devitalized muscle scaffolds is insufficient for appreciable de novo muscle fiber regeneration after volumetric muscle loss. Cell and Tissue Research, *Submitted*.

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

1) Guelcher SA, Guo R, Wenke JC, **Ward CL.** Modified Cell Delivery System. *Provisional Patent Filed*. 2014

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

1) **Ward CL,** Guo R, Guelcher SG, Wenke JC. Development of a Cell Delivery Scaffold for Tissue Regeneration. Military Health Systems Research Symposium, 2014, Ft. Lauderdale FL.
2) **Ward CL,** Ji L, Corona BT. Expanded Autologous Minced Muscle Grafts Promote *De Novo* Regeneration after Volumetric Muscle Loss. Military Health Systems Research Symposium, 2014, Ft. Lauderdale FL.
3) **Ward CL,** Wenke JC, Corona BT. Soft Tissue Therapies for Impaired Musculoskeletal Healing in a Rat Composite Injury Model. Orthopaedic Research Society, New Orleans, LA.
4) **Ward CL,** Guo R, Wenke JC, Guelcher, SA. Development of an Injectable and Settable Polyurethane Cell Delivery System for Tissue Regeneration. Tissue Engineering and Regenerative Medicine International Society Annual Meeting – Americas, 2013, Atlanta, GA.
5) **Ward CL**, Wenke JC, Corona BT. Impaired Musculoskeletal Healing in a Rat Composite Injury Model. Tissue Engineering and Regenerative Medicine International Society Annual Meeting – Americas, 2013, Atlanta, GA.
6) Scott J, Corona BT, **Ward CL**, Harrison BS, Saul J, Christ GJ. Development of a Novel Tissue Engineered Muscle Repair Contruct with potential for Enhanced Motor End Plate Formation and Function. Tissue Engineering and Regenerative Medicine International Society Annual Meeting – Americas, 2013, Atlanta, GA.
7) **Ward CL,** Sanchez CJ, Woodbury R, Rathbone C, Wenke JC. Soluble biofilm-derived factors of *S. aureus* and *P. aeruginosa* reduce the viability and multi-differential potential of human mesenchymal stem cells. Military Health Systems Research Symposium, 2012, Ft. Lauderdale FL.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* **Include dates, names and locations of seminars.**

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *POST-TENURE POSITION / JOB TITLE*

Staff Scientist

15) *NAME AND ADDRESS OF POST-TENURE POSITION / JOB 0RGANIZATION*

United States Army Institute of Surgical Research
3698 Chambers Pass
Fort Sam Houston TX 78234

16) *POST-TENURE POSITION STATUS / CATEGORY* **Please indicate only one.**

- ☐ Permanent position at the NRC host agency
- ☒ Contract or temporary position at the NRC host Agency
  Abbreviate Host Laboratory/Center USAISR
- ☐ Research/Administrative position with another U.S.-government agency
- ☐ Research/Administrative position with a foreign-government agency
- ☐ Research/teaching position at a U.S. college or university
- ☐ Research/teaching position at a foreign college or university
- ☐ Research/administration position in private industry in the U.S.
- ☐ Research/administration position in private industry outside of the U.S.
- ☐ Research/administration position with a non profit
- ☐ Self-employed/consulting
- ☐ Postdoctoral research
- ☐ Other **(Please specify, possible)** ____
- ☐ No information provided

17) (For J-1 visa holders only) *SUMMARY OF CULTURAL AND EDUCATIONAL EXCHANGE DUIRNG TENURE* **Itemize experiences that your laboratory (LPR and/or Adviser) has offered to you that facilitated your learning about American culture. Also itemize what you have done to share your culture with your colleagues and the community.**

1)

2)

3)

4)

5)

18) *APPRAISAL OF RESEARCH ASSOCIATESHIP PROGRAM*

On a scale of 1 – 10 (poor - excellent), please rate the following:

SHORT TERM VALUE

9 Development of knowledge, skills, and research productivity

Comments

As an NRC fellow, I was able to lead a project with the opportunity to contribute to grants on the project. I was also able to be involved in several other projects in the lab, which led to collaborations and publications.

LONG TERM VALUE

8 How the NRC Associateship award affected your career to date

Comments

The associateship has progressed my career through experience in the field and also through very valuable networking internally and externally.

LAB SUPPORT

10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.

Comments

Despite a learning curve with government laboratories (ordering, finances, etc.), the facilities were amazing and extremely helpful in accelerating the project.

ADVISER/MENTOR SUPPORT

8 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)

Comments

The NRC Advisor was always constructive and helpful. He aided in mentoring me through my project while also facilitating several opportunities for collaborations with other projects.

LPR SUPPORT

8 Quality of administrative support from the **L**aboratory (e.g., NIST, NRL, IWR, FHWA) NRC **P**rogram **R**epresentative (LPR)

Comments

The LPR was very helpful and supportive of my actions as an NRC fellow.

NRC SUPPORT

8 Quality of administrative support. Please assess respective NRC aspects (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

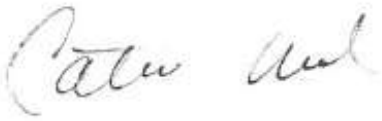
Comments

The NRC admin was very attentive to any issues I had.

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.*

Please do NOT scan to PDF. Send the Final Report as MSWord document via e-mail to your NRC Program Coordinator

No handwritten signature required;
but you may upload a scanned
signature file below:



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