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TITLE: AMRMC Resident Research Associateship Program

PRINCIPAL INVESTIGATOR: Dr. Ray Gamble

CONTRACTING ORGANIZATION: The National Academy of Sciences, Engineering and Medicine
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14. ABSTRACT The NRC Research Associateship Program provides postdoctoral and senior research fellowship awards to outstanding applicants who perform research supporting the mission of AMRMC laboratories. These awards provide opportunities that enable AMRMC/NRC Research Associates to increase their proficiency in conducting research, advance the research programs of AMRMC, and make AMRMC laboratory facilities, often including unique equipment, available to the scientific community. The program further provides a pool of talented researchers who may be retained as contractors or civilian employees, thereby contributing to scientific workforce development.					
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The National Academies of
SCIENCES • ENGINEERING • MEDICINE
RESEARCH ASSOCIATESHIP PROGRAM
with
AMRMC - Walter Reed Army Institute of Research

Annual Contract Technical Report

Contract No. W81XWH-17-2-0039
Contract Period: 09/01/2017-08/31/2022
Report Period: 09/01/2017-08/31/2018

During the reporting period, the National Academies of Sciences, Engineering, and Medicine (the Academies) NRC conducted the following activities in support of the subject contract:

Outreach and Promotion

The promotional schedule to advertise the 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 Academies 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 Academies 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 Programs were submitted via a web-based application system. Each application cycle opened two months prior to the application deadline. Academies 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 Academies 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 Academies convened panels in five broad discipline areas for the competitive review of applications in the NRC 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 Academies 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 NRC Research Associates beginning or continuing tenure, the Academies 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 Research Associates who completed tenure were requested to submit a final report that described the outcome of their Research Associateship award. A summary of the activities of NRC Research Associates who submitted 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 accomplishments of NRC Research Associates completing tenure during the reporting period are summarized in individual Final Reports (attached to annual technical reports).

Table 1. Summary of applications and awards

Table 2. NRC Research Associates on tenure during the reporting period

Table 3. Activities of NRC Research Associates who completed tenure during the reporting period

Attachments: NRC Research Associates Final Reports, including Research Accomplishments and Scholarly Productivity

AMRMC - Walter Reed Army Institute of Research

Table 1: Summary of applications and awards

	Applications			Lab Decision/Outcome		
	Submitted	Reviewed	Recommended	Awards Offered	Awards Accepted	No Offer
Nov 2017	2	1	1	1	1	0
Feb 2018	4	4	4	4	4	0
May 2018	3	2	2	1	1	0
Aug 2018	1	1	1	0	0	0
Total (All Reviews)	10	8	8	6	6	0

Table 2: NRC Research Associates on tenure during the reporting period

Associate	Adviser	Tenure Dates	Final Report
Walter Reed Army Institute of Research, Silver Spring			
Anderson, Margery Diane	Yourick, Debra Lynn	3/11/2014-3/10/2019	
Andrade Justi, Silvia	Clark, Jeffrey William	4/1/2018-3/31/2019	
Bailey, Zachary Stephen	Leung, Lai Yee	8/21/2017-7/8/2018	Received
Barasa, Sheila Ogoma	Mancuso, James D	5/5/2015-9/4/2017	Not Recv'd
Brown, Holly Kay	Yourick, Debra Lynn	1/18/2018-1/17/2019	
DIXIT, SAURABH	Krzych, Urszula	7/9/2018-7/8/2019	
Johnson, Warren Eliot	Linton, Yvonne Marie	8/9/2018-8/8/2019	
Kuehn, Emily Denise	Yourick, Debra Lynn	11/14/2016- 11/13/2018	
Livingstone, Merricka	Dutta, Sheetij	7/5/2018-7/4/2019	
Mantua, Janna	Capaldi, Vincent F	1/2/2018-1/1/2019	
Margulieux, Katie Rose	Swierczewski, Brett Edward	8/4/2016-5/3/2019	
McCracken, Michael Kevin	Jarman, Richard George	3/9/2015-4/2/2018	Received
McDermott, Emily Gray	Garver, Lindsey Susannah	1/9/2017-1/8/2019	
Morris, Kevin	Yourick, Debra Lynn	7/2/2018-7/1/2019	
Pollett, Simon	Jarman, Richard George	6/27/2016-3/31/2018	Not Recv'd
Simonelli, Guido	Capaldi, Vincent F	10/6/2014-10/5/2018	
Taylor, Rachel Marie	Moore, Nicole L.T.	5/15/2017-5/14/2019	
Tenenbaum, Laura Subbiah	Yourick, Debra Lynn	6/3/2013-2/28/2018	Received
Thangavelu, Bharani	Boutte, Angela M	9/21/2017-9/20/2019	
Waickman, Adam Tully	Currier, Jeffrey R	10/30/2017- 10/29/2018	

Table 3: Activities of NRC Research Associates who completed tenure during the reporting period

- 5 Associates ended tenure during the report period
- 30 months was the average tenure length
- 56 months was the longest
- 11 months was the shortest
- 3 submitted final reports

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

- 18 Articles published in refereed journals
- 0 Articles other (Proceedings, Book Chapters, other)
- 13 Domestic presentations
- 7 International presentations
- 0 Patent applications
- 4 Awards

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

- 1 Permanent position at the NRC host agency
- 2 Contract or temporary position at the NRC host agency
- 0 Research/administrative position with another U.S. government agency
- 0 Research/administrative position with foreign government agency
- 0 Research/teaching at US college/university
- 0 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:

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

Attachments: NRC Research Associates Final Reports, including Research Accomplishments and Scholarly Productivity, follow.

NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

Associate: Bailey, Zachary Stephen
Program: AMRMC - U.S. Army Medical Research & Materiel Command
Walter Reed Army Institute of Research
Psychiatry & Neurosciences-Military Psychiatry Branch
Silver Spring, MD 20910
Opportunity: B8360/Neurotherapeutic Resuscitation for Military-relevant Polytrauma Associated with Traumatic Brain Injury (TBI)
Adviser: Leung, Lai Yee
Research Proposal: Humoral and Inflammatory Mechanisms of Resuscitative Endovascular Balloon Occlusion of the Aorta in Traumatic Brain Injury
Tenure Dates: 08/21/2017-07/08/2018

RESEARCH ACCOMPLISHMENTS

1. REBOA causes significant increases in circulating lactic acid levels in the blood. The increase is accompanied by a corresponding decrease in blood pH levels. These changes were observed in both continuous and intermittent REBOA but are short-lived. The acidosis is resolved by 4 hours after aortic occlusion.
2. Zone I aortic occlusion triggers hyperglycemia following REBOA and PBBI. The increases in glucose levels are likely a result of poor liver perfusion and the changes are longer lasting following intermittent REBOA. This observation may be specifically important to cerebral edema following PBBI as hyperglycemia has been correlated to worsened edema.
3. Following brain injury, continuous REBOA causes an initial rise in intracranial pressure which is returned to sham levels by the completion of aortic occlusion. In contrast, intermittent REBOA leads to sustained cerebral hypertension.
4. While REBOA is effective in increasing common carotid artery blood pressure, there is minimal effect on cerebral blood flow. PBBI is accompanied by dramatic and sustained cerebral hypoperfusion which is not improved with REBOA. The effects may result from compromised cerebral vasculature.
5. Continuous REBOA is able to ameliorate the PBBI-induced brain tissue oxygen tension levels. However, the benefits are only observed during occlusion. Following the completion of REBOA, brain tissue oxygen tension levels remain lower than sham. No benefit was observed on the brain tissue oxygen levels following intermittent REBOA.

SCHOLARLY PRODUCTIVITY

ARTICLES - PEER REVIEWED

Bailey, Zachary; Cardiff, Katherine; Yang, Xiaofang; Gilsdorf, Janice; Shear, Deborah; Rasmussen, Todd; Leung, Lai Yee, 2018, The physiological changes induced by balloon occlusion of the aorta following traumatic brain injury,

ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

PRESENTATIONS - DOMESTIC

Bailey, Zachary; Cardiff, Katherine; Yang, Xiaofang; Gilsdorf, Janice; Shear, Deborah; Rasmussen, Todd; Leung, Lai Yee, 08/20/2018, Resuscitative endovascular balloon occlusion of the aorta improves intracranial pressure and brain tissue oxygen tension in a rat model of penetrating ballistic-like brain injury, Military Health System Research Symposium, FL, United States

PRESENTATIONS - INTERNATIONAL

Bailey, Zachary; Cardiff, Katherine; Yang, Xiaofang; Gilsdorf, Janice; Shear, Deborah; Rasmussen, Todd; Leung, Lai Yee, 08/11/2018, Resuscitative endovascular balloon occlusion of the aorta alters cerebral physiology and blood composition after brain injury, Neurotrauma, Toronto, Canada

PATENTS

AWARDS

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NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

Associate: McCracken, Michael Kevin
Program: AMRMC - U.S. Army Medical Research & Materiel Command
Walter Reed Army Institute of Research
Infectious Diseases-Viral Diseases Branch
Silver Spring, MD 20910
Opportunity: B7738/Molecular Epidemiology and Viral Evolution in a Translational Setting
Adviser: Jarman, Richard George
Research Proposal: Characterization of immune environment and viral kinetics in sites of dengue virus establishment as modulated by route of entry and vector exposure in a non-human primate model of dengue virus infection
Tenure Dates: 03/09/2015-04/02/2018

RESEARCH ACCOMPLISHMENTS

Mosquito delivery of dengue virus in a non-human primate model of infection is a viable and consistent technique.
Mosquito delivery of dengue virus in a non-human primate model of infection results in delayed and prolonged viremia relative to the field-standard subcutaneous needle-inoculation.
Mosquito delivery of dengue virus in a non-human primate model of infection results in virological factors that more closely resemble natural human infection dynamics.
Re-exposure of non-human primates with a homologous serotype of DENV did not result in productive infection.
Re-exposure of non-human primates with a heterologous serotype of DENV resulted in productive but diminished infection that logically correlates with the degree of cross-neutralization observed.

SCHOLARLY PRODUCTIVITY

ARTICLES - PEER REVIEWED

McCracken MK, Gromowski GD, Friberg HL, Lin X, Abbink P, De La Barrera R, Eckles KH, Garver LS, Boyd M, Jetton D, Barouch DH, Wise MC, Lewis BS, Currier JR, Modjarrad K, Liu M, Mullins AB, Putnak JR, Michael NL, Jarman RG, Thomas SJ, 2017, Impact of prior flavivirus immunity on ZIKV infection in rhesus macaques, PLoS Pathos, 2017 Aug 3; 13(8)
Walker, Kathrynne; McCracken, Michael; Gromowski, Gregory; Jarman, Richard; Putnak, Robert; Garver, Lindsey , 2017, Dengue virus expectoration titers and dissemination rates of Aedes aegypti Rockefeller mosquitoes and the use of restriction apparatus in animal exposures,
Peña-García VH, McCracken MK, Christofferson RC, 2017, Examining the potential for South American arboviruses to spread beyond the New World, Current Clinical Microbiology Reports, December 2017, Volume 4, Issue 4, pp208-217
McCracken MK; Gromowski GD; Garver LS; Goupil BA; Rutvisuttinunt W; Friberg HL; Currier JR; Christofferson RC; Mores CN; Hinton KL; Vaughn D; Lepine E; Lorin C; Malice M-P; Thomas SJ; Jarman RG; Putnak JR; Warter L, 2017, Route of inoculation and mosquito vector exposure modulates dengue virus infection kinetics in rhesus macaques,

ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

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PRESENTATIONS - DOMESTIC

McCracken MK; Gromowski GD; Garver LS; Goupil BA; Friberg HL; Currier JR; Mores CN; Hinton KL; Vaughn D; Lepine E; Lorin C; Malice M-P; Thomas SJ; Jarman RG; Putnak JR; Warter L , 11/08/2017, Route of inoculation and mosquito vector exposure modulates dengue virus infection kinetics in rhesus macaques, American Society of Tropical Medicine and Hygiene, Baltimore MD

PRESENTATIONS - INTERNATIONAL

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PATENTS

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AWARDS

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NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

Associate: Tenenbaum, Laura Subbiah
Program: AMRMC - U.S. Army Medical Research & Materiel Command
Walter Reed Army Institute of Research
Psychiatry & Neurosciences-Blast Induced Neurotrauma Branch
Silver Spring, MD 20910
Opportunity: B7820/Science Education Research
Adviser: Yourick, Debra Lynn
Research Proposal: GEMS Educational Outreach Research and Development
Tenure Dates: 06/03/2013-02/28/2018

RESEARCH ACCOMPLISHMENTS

Key accomplishments:

- SEPA Grant approval
- Implementation of school-based GEMS program in PGCPs
- Development of a science attitudes scale for high school students
- Article publications
- Development of near-peer mentor training program

Through my fellowship, I have had the opportunity to research STEM education outreach through the Gains in the Education of Math and Science (GEMS) Program. This program is a youth STEM education opportunity designed to offer innovative hands-on science experiences for children from backgrounds typically underrepresented in the sciences. These science experiences are taught by near-peer mentors, college students majoring in the sciences. The GEMS program has found significant success as a summer program, serving middle through high school students, but one of my major accomplishments through this fellowship was facilitating its dissemination into the school setting. Through a SEPA grant, the science education team was able to develop and implement a GEMS program at schools in Prince George's County. Initial findings demonstrate that students who received the GEMS enrichment report improved attitude toward science as well as higher science class grades and standardized test scores. Student self-reports revealed that participants thoroughly enjoyed the experience and connected with near-peer mentors. I feel grateful to have been a part of launching the GEMS program within schools. The research team is currently working on a new publication to share our recent findings and I hope to be able to continue with the team to help write this paper.

As part of my efforts on the GEMS Enrichment, I had the opportunity to spearhead the development of a science attitudes scale for high school students. This scale has been used during the entire program and has provided meaningful results each year. I hope to be able to continue working with this scale to validate it as a measure and publish it to make it available to other STEM education researchers.

Overall, my 4.5 years as an NRC fellow helped me develop as a researcher and I look forward to the next step in my career.

SCHOLARLY PRODUCTIVITY

ARTICLES - PEER REVIEWED

Tenenbaum, Laura S.; Anderson, Margery K.; Ramadorai, Swati; & Yourick, Debra. , 2017, Engaging high school students in the sciences through hands-on learning and near-peer mentorship: Students' experiences in their own words., Submitted to Journal of STEM Education: Innovations and Research
Anderson, Margery K.; Tenenbaum, Laura S.; Ramadorai, Swati B.; & Yourick, Debra L. , 2015, Near-peer mentor model; Synergy within mentoring, Mentoring and Tutoring, Partnership in Learning, 23(1) 1-17. doi: 10.1080/13611267.2015.1049017
Tenenbaum, Laura S.; Anderson, Margery K.; Jett, Marti; & Yourick, Debra L. , 2014, An Innovative Near-Peer Mentoring Model for Undergraduate and Secondary Students, Innovative Higher Education, (39)5 375-385. doi: 10.1007/s10755-014-9286-3

ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

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PRESENTATIONS - DOMESTIC

Tenenbaum, Laura S.; Anderson, Margery K.; Yourick, Debra, 07/13/2016, The near-peer mentor experience: Supporting early career scientists through a research and youth mentoring internship, The Accelerating Science Education Conference hosted by the Mobile Laboratory Coalition, Columbus, Ohio

Tenenbaum, Laura S.; Anderson, Margery K.; Yourick, Debra , 05/10/2016, In-classroom biology internships for students and teachers in underserved schools: Intervention year one, The National Institutes of Health Annual SciEd Conference, Rockville, Maryland.

Yourick, Debra; Anderson, Margery K.; Tenenbaum, Laura S. , 05/26/2015, In-Classroom Biology Internships for Students and Teachers in Underserved Schools, The National Institutes of Health Annual SciEd Conference, Washington, DC

PRESENTATIONS - INTERNATIONAL

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PATENTS

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AWARDS

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