Award Number: W81XWH-12-2-0010

TITLE: NRC/AMRMC Resident Research Associateship Program

PRINCIPAL INVESTIGATOR: Howard Gamble

CONTRACTING ORGANIZATION: NATIONAL ACADEMY OF SCIENCES
Washington, DC 20001

REPORT DATE: April 2016

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
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During this reporting period, the NRC promoted research opportunities at AMRMC institutes through a broad outreach plan. A total of 12 applications were received during the period and of these, 10 were reviewed by NRC panels. 8 awards were offered and all 8 were accepted. A total of 13 Associates ended their tenure during the reporting period and of these 9 submitted a final report. The productivity of these Associates is listed in the technical report.

SUBJECT TERMS:
Associateship program, post-doc, awards
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-12-2-0030
Contract Period: 03/15/2012-03/14/2017

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

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

Report Period: 05/01/2015-04/30/2016
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

<table>
<thead>
<tr>
<th></th>
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<td>TOTAL APPLICATIONS</td>
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<td>4</td>
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<td>4</td>
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<td>3</td>
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<td>4</td>
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<td>Withdrawn</td>
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<td>2</td>
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<td>2</td>
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<td>0</td>
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<td>0</td>
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## Table 2: Associates on Tenure

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<thead>
<tr>
<th>Associate</th>
<th>Adviser</th>
<th>Tenure Dates</th>
<th>Country of Citizenship</th>
<th>Final Report</th>
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<tbody>
<tr>
<td>Benov, Avi</td>
<td>Darlington, Daniel Norman</td>
<td>8/1/2014-7/31/2015</td>
<td>Israel</td>
<td>Not Recvd</td>
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<tr>
<td>Cheppudira, Bopaiah Pooviah</td>
<td>Christy, Robert John</td>
<td>9/4/2012-9/3/2016</td>
<td>India</td>
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<tr>
<td>Choi, Jae hyek</td>
<td>Wang, Heuy-Ching H.</td>
<td>11/15/2011-11/14/2015</td>
<td>Korea, South</td>
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<tr>
<td>Greene, Whitney Ann</td>
<td>Wang, Heuy-Ching H.</td>
<td>4/25/2012-4/24/2017</td>
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<td>Kaini, Ramesh Raj</td>
<td>Wang, Heuy-Ching H.</td>
<td>1/3/2013-1/2/2016</td>
<td>United States</td>
<td>Received</td>
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<td>Karna, Sai Lakshmi Rajasekhar</td>
<td>Leung, Kai P</td>
<td>4/1/2013-4/13/2017</td>
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<td>Miller, Christine Lindsay</td>
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<td>Olekson, Melissa Ann</td>
<td>Leung, Kai P</td>
<td>9/2/2014-9/1/2016</td>
<td>United States</td>
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<td>Parida, Bijaya Kumar</td>
<td>Dubick, Michael A.</td>
<td>3/19/2012-9/18/2016</td>
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<td>Penn, Alexander Hayes</td>
<td>Torres Filho, Ivo P</td>
<td>1/14/2015-1/13/2017</td>
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<td>Rose, Lloyd Frederick</td>
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<td>Salas, Margaux Marie</td>
<td>Clifford, John L</td>
<td>10/10/2012-10/1/2015</td>
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<td>Received</td>
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<td>Sosanya, Natasha</td>
<td>Christy, Robert John</td>
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<td>Van Laar, Tricia Annette</td>
<td>Leung, Kai P</td>
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<td>Beske, Phillip Howard</td>
<td>McNutt, Patrick Michael</td>
<td>8/29/2013-8/28/2016</td>
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<td>Hubbard, Kyle</td>
<td>McNutt, Patrick Michael</td>
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<td>Received</td>
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<td>Andrews, Elizabeth Susanne</td>
<td>Turell, Michael J</td>
<td>5/13/2013-2/26/2016</td>
<td>United States</td>
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<td>Bernhards, Robert Cory</td>
<td>Welkos, Susan Lee</td>
<td>7/11/2013-4/29/2016</td>
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<td>Coate, Eric Allan</td>
<td>Bozue, Joel A</td>
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<td>Cohen, Courtney Alicia</td>
<td>Glass, Pamela J</td>
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<td>DeWald, Lisa Marie</td>
<td>Glass, Pamela J</td>
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<td>Duy, Janice</td>
<td>Minogue, Timothy Devins</td>
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<td>Krishnamurthy, Malathy</td>
<td>Panchal, Rekha G.</td>
<td>10/5/2015-10/4/2016</td>
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<td>Mielech, Anna Maria</td>
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<td>O'Hearn, Aileen E</td>
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<td>Ricks, Keersten Michelle</td>
<td>Schoepf, Randal J.</td>
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<td>Shoemaker, Charles Jason</td>
<td>Schmaljohn, Connie</td>
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<td>Smith, Jessica L</td>
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<td>Stefan, Christopher Patrick</td>
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<td>Stojudinovic, Marija</td>
<td>Panchal, Rekha G.</td>
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<td>Zeng, Xiankun</td>
<td>Sun, Mei Guo</td>
<td>5/4/2015-8/3/2016</td>
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<td>Anderson, Margery Diane</td>
<td>Yourick, Debra Lynn</td>
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<td>DeDominicis, Kristen Elizabeth</td>
<td>Bryant, Ying Deng</td>
<td>9/8/2015-9/7/2016</td>
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<td>Kobylnski, Kevin Conrad</td>
<td>Davidson, Silas Andrew</td>
<td>10/17/2011-10/16/2016</td>
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<td>Linton, Yvonne-Marie</td>
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<td>McCracken, Michael Kevin</td>
<td>Jamian, Richard George</td>
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<td>Pichard, Luis Eduardo</td>
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<td>Simonelli, Guido</td>
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<td>Tennenbaum, Laura Subbiah</td>
<td>Yourick, Debra Lynn</td>
<td>6/3/2013-6/2/2016</td>
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<td>Zarling, Stasya Nicole</td>
<td>Krzych, Urszula</td>
<td>2/7/2011-8/6/2016</td>
<td>United States</td>
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</table>
Table 3: Associates’ Activities

13  Associates ended tenure during the report period
35  months was the average tenure length
48  months was the longest
11  months was the shortest
9   submitted final reports

In the final reports, Associates indicated the following scholarly activity while on tenure.
28  Articles published in refereed journals
  0   Patent applications
  2   International presentations
  52  Domestic presentations
  6   Awards

After ending their tenure, Associates indicated their future plans as follows:
  0   Permanent position at the NRC host agency
  3   Contract or temporary position at the NRC host agency
  3   Research/administrative position with another U.S. government agency
  0   Research/administrative position with foreign government agency
  2   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.
  1   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:

7.6  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
7.7  Laboratory Support—Equipment, funding, orientation, safety & health training, etc.
8.0  Adviser Mentoring—Quality of mentoring from the Research Adviser
7.7  LPR Support—Quality of administrative support from the LPR
8.6  NRC Support—Quality of administrative support from the NRC
Table 4: Summary of Associate Research

<table>
<thead>
<tr>
<th>Associate</th>
<th>Tenure Dates</th>
<th>Activity</th>
</tr>
</thead>
</table>
| Andrews, Elizabeth | 5/13/2013-2/26/2016 | 1 Examined the effect of Wolbachia infection in Culex tarsalis on infection, dissemination, and transmission of Rift Valley fever virus. Viral titers of blood fed mosquitoes were determined and correlated to Wolbachia density using quantitative PCR.  
2 Screened plasma containing different ApoL1 isofoms and recombinant ApoL1 protein isoforms against a range of pathogens that are endemic to West Africa to determine which ones are restricted by ApoL1.  
3 Conducted an ecological study of the mosquitoes of the Patuxent Research Refuge in Laurel, MD summer 2015. Identified species, analyzed bloodmals, and tested for viruses.  
4 Examined the effect of filarial nematodes in robins and grackles on the dissemination and transmission rates of West Nile virus by Culex pipiens. |
| Bernhards, Robert  | 7/11/2013-4/29/2016 | 1 New lipopolysaccharide (LPS) subtypes were discovered in Burkholderia pseudomallei.  
2 An LPS change was observed in Burkholderia mallei during the course of mouse infection.  
3 Discovered two stable variants of Burkholderia pseudomallei strain MSHR5848 that expressed broadly divergent in vitro phenotypes. |
| Hubbard, Kyle      | 6/1/2012-5/31/2015 | 1 Developed a protocol to generate synaptic activity in neurons derived from human induced pluripotent stem cells (ongoing).  
2 Used transcriptomics and differential gene expression analysis to define developmental milestones during mouse embryonic stem cell differentiation and neuronal maturation.  
3 Evaluated time- and dose-dependent progression of excitotoxic injury using mouse embryonic stem cell-derived neurons as a platform.  
4 Helped develop a medium-throughput assay for the functional evaluation of neuromodulatory biothreat agents.  
5 Utilized proteomics, transcriptomics and functional assays to investigate the cellular and molecular mechanisms underlying excitotoxicity in a physiologically relevant in vitro model. |
| Kaini, Ramesh      | 1/3/2013-1/2/2016 | 1 Optimize maintanance and propogation of human iP7S cells in a defined and xenofree condition.  
2 Xenofree differentiation of hiPS cells into neuro-retina  
3 Generation of photoreceptors like cells from human iPS cells  
4 Studied the dynamics of extracellular matrix remodeling during retinogenesis  
5 Formulate a research plan on using stem-cell released molecule as a therapy in blast-injured retina |
| Miller, Christine  | 2/4/2013-2/3/2016 | 1 Optimized protocol to isolate, identify, and categorize small RNAs (sRNAs) for the discovery of small regulatory RNAs.  
2 Utilized a custom RNA-sequencing method to unbiasedly capture the global transcriptome response of pathogens typically present in war wounds and which hinder healing.  
3 Used an in vitro model to investigate the interactions of P. aeruginosa and S. aureus in biofilm and planktonic cultures  
4 Discovered sRNAs that play a key role in modulating interspecies interactions in the biofilm, and required for the adaptive switch between acute and chronic infection phenotypes.  
5 Generated numerous protocols to genetically engineer P. aeruginosa and analyze phenotypes of various mutants. |
| O’Hearn, Aileen    | 4/1/2013-3/31/2016 | 1 Development of a pan-Flavivirus and pan-Alphavirus IgG test to be incorporated in a panel of African viral diagnostics  
2 Development of a multi-target serosurveillance test for identifying viral pathogens in West Africa  
3 Serosurvey of a Sierra Leonian population for the presence of viral pathogens, and identification of public health threats  
4 Development and testing of a Lassa virus diagnostic testing panel for identifying human Lassa Fever cases  
5 On-site support during the West African Ebola outbreak |
| Rose, Lloyd        | 11/1/2012-10/2/2015 | 1 Establishment of a porcine model of skin loss correlating thickness of autologous skin graft with amount of contraction after 120 days.  
2 Autologous skin grafts grafted onto fat (as opposed to grafting onto deeper tissues) resist contractile forces induced by myofibroblasts |
3 Burn wounds have increased inflammatory markers and have increased levels of wound contraction compared to skin loss by non-burn mechanisms.

4 Application of ultra-high dose gentamicin to the wound bed induces an anti-angiogenic gene expression profile in vivo as well as inducing genetic and phenotypic alterations in endothelial cells and macrophages in tissue culture.

**Salas, Margaux**  
10/10/2012-10/1/2015

| 1 | Tetrodotoxin Attenuates Thermal Hyperalgesia in a Rat Full Thickness Thermal Injury Pain Model |
| 2 | Curcumin is an Effective Analgesic for Burn Pain: Evidence from Animal and Human Tissue Based Experiments |
| 3 | Resiniferatoxin: A Potential Burn Analgesic for Point of Injury/Battlefield |

**Van Laar, Tricia**  
4/9/2012-7/29/2015

| 1 | Contributed to gene sequencing of multi-drug resistant Klebsiella pneumoniae. |
| 2 | Performed transcriptome analysis of multi-drug resistant K. pneumoniae and identified numerous genes for downstream analysis in combating multi-drug resistant K. pneumoniae. Also described molecular mechanisms for significant morphological changes. |
| 3 | Performed transcriptome analysis of mixed species biofilm and planktonic cultures of Staphylococcus aureus and Pseudomonas aeruginosa and identified numerous ORFs necessary for competition between these two species. |
| 4 | Performed transcriptome analysis of persister cells of P. aeruginosa to identify ORFs necessary for persister cell formation, and therefore lack of healing in P. aeruginosa infected wounds. |
Effect of environmental factors on the ability of North American mosquitoes to transmit Rift Valley fever virus

1) Associate Last or Family Name      First Name      M.I.
Andrews                        Elizabeth               S

2) FORWARDING Address (to which your tax statement will be mailed)
Residence or Institution Street
City, State Zip
FORWARDING Phone(s) and E-Mail (if known)
Home Phone:
Alt. Phone:
Preferred E-mail:

3) Today's Date
February 15, 2016

4) Host Agency
US Army (e.g., AFRL)

Laboratory or Center
USAMRIID (e.g., Wright Patterson AFB)

Division / Directorate / Department
Virology (e.g., High-Speed Propulsion)

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
Michael Turell

6) TITLE OF RESEARCH PROPOSAL
Effect of environmental factors on the ability of North American mosquitoes to transmit Rift Valley fever virus

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

1) Examined the effect of Wolbachia infection in Culex tarsalis on infection, dissemination, and transmission of Rift Valley fever virus. Viral titers of blood fed mosquitoes were determined and correlated to Wolbachia density using quantitative PCR.

2) Screened plasma containing different ApoL1 isoforms and recombinant ApoL1 protein isoforms against a range of pathogens that are endemic to West Africa to determine which ones are restricted by ApoL1.

3) Conducted an ecological study of the mosquitoes of the Patuxent Research Refuge in Laurel, MD summer 2015. Identified species, analyzed bloodmeals, and tested for viruses.

4) Examined the effect of filarial nematodes in robins and grackles on the dissemination and transmission rates of West Nile virus by Culex pipiens.

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

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

I am currently finishing up the ecological study of the mosquito fauna of the Patuxent Research Refuge in Laurel, MD. Blood meal analysis and viral isolation is being performed in the mosquitoes collected. This will be continued for me by the members of my laboratory.

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


b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

E. S. Andrews, B. L. Dodson, M. J. Turell, and J. L. Rasgon (in prep) Artificial Wolbachia infections in Culex tarsalis do not affect transmission of Rift Valley fever virus.

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

American Mosquito Control Association Annual Meeting. February 7-11, 2016, Savannah, GA: E. S. Andrews. Talk. Highlights in Vector Biology 2015. Reviewed in this presentation is a selection of the published literature on the biology of arthropod vectors of human disease from the 2015 calendar year. Manuscripts were chosen based on their potential impact to the field of vector biology. Several major groups of disease vectors, such as mosquitoes, ticks, sand flies, and lice will be discussed. Topics will be broadly reviewed and include species descriptions, phylogeny, genetics, behavior, physiology, ecology, and pathogen transmission. Emphasis will be placed on articles affecting control practices and the epidemiology of associated pathogens such as parasites, bacteria and viruses. The objective of this review is to synthesize the new literature across a breadth of vector biology topics into a manageable format for the listener.


Abstract: Emerging and re-emerging arboviruses continue to be a threat to global public health. With the recent introduction of chikungunya virus (CHIKV) into the Caribbean and its potential spread across the Americas, there will be a need to increase surveillance of mosquito populations for viruses. Due to the tropical climate of many of the affected areas, it will be difficult to maintain a cold chain as the samples travel from collection sites to laboratories for testing. We determined how suboptimal holding temperatures affected the ability to detect viruses in pools of mosquitoes. Adult female Aedes albopictus and Aedes taeniorynchus were inoculated with CHIKV or Venezuelan equine encephalitis virus (VEEV) suspensions, respectively, and placed at 26°C for 7 days. One infected mosquito was then added to a vial of 24 negative mosquitoes and then held at -70°C, -20°C, 4°C, 22°C, or 35°C for selected time intervals. Mosquito pools were triturated in cell culture media and processed for detection of CHIKV and VEEV. Samples were analyzed for both infectious virus by plaque assay and for viral RNA with real-time RT-PCR. At high temperatures the amount of infectious virus decreased rapidly, but virus in samples held at 4°C or lower remained relatively stable. In contrast, viral RNA was detectable from pools held at all temperatures and holding times by real-time RT-PCR, although Ct values increased as temperatures and holding times increased. These findings suggest that if viral RNA detection is the goal of surveillance efforts, then mosquito pools do not need to kept at 4°C. This enhances the feasibility of field-based arbovirus surveillance programs where maintaining a cold chain may not be a possibility.


Abstract: Classic control methods for mosquitoes involve habitat modification to prevent oviposition and larval development, chemical control with pesticides to reduce the densities of both immatures and adults and biological control with parasites, predators and pathogens. While sometimes effective, there are inherent issues associated with these control methods. Source reduction, chemical and biological control all require direct application to the targeted mosquito population. Many adult and larval populations can be difficult to access due to cryptic habitats and breeding sites. In some cases insecticide application is not cost-effective due to the vastness of targeted areas or beneficial for the environment, as multiple applications of insecticides can have detrimental effects on non-target insect populations. In addition, insecticide resistance has developed in major disease vectors, necessitating the development of new and sustainable mosquito control strategies. The utilization of bacteria within mosquitoes may be a potential avenue for the development of novel control approaches to offset these setbacks. Initial studies observed that alteration of the bacterial community affected Cx. quinquefasciatus susceptibility to Japanese encephalitis virus and reduced Plasmodium oocyst density in An. albimanus. In Ae. aegypti, the bacterial
community can affect the dynamics of dengue virus, in which the level of virus titer is dependent on the presence of specific bacterial taxa. Wolbachia, a maternally inherited bacterial endosymbiont observed in mosquitoes has received attention as a potential tool for mosquito-borne disease control. For example, bidirectional incompatibility can be induced in mosquito populations in which there is a Wolbachia infection already present. In these scenarios, releases of incompatible males are used to suppress the existing mosquito population via sterility resulting from incompatible crosses. Another series of Wolbachia-based control efforts focuses on the ability of the bacterium to spread itself into uninfected mosquito populations using the reproductive advantage afforded to it by unidirectional CI. In these applications, the focus is modification, rather than elimination of the vector population. Refractory phenotypes or transgenes that prevent disease transmission could be driven into a mosquito population using Wolbachia-mediated population replacement.

American Mosquito Control Association annual meeting, Feb. 2-6, 2014, Seattle, WA: E. S. Andrews and S. L. Dobson. Investigating dynamics of the bacterium Asaia, a potential paratransgenic disease control method, within Aedes albopictus. Asaia, an acetic acid bacterium, has gained interest as a potential novel method of paratransgenic mosquito-borne disease control due to its direct association with mosquitoes of medical importance. To determine if the bacterium is an associate of Ae. albopictus, Asaia infection dynamics were investigated. The microbial community within Ae. albopictus was compared between field-collected and laboratory-reared females and their eggs using DGGE. Asaia was detected within both types of females, but not within egg pools. Culturing Asaia from field-collected mosquitoes yielded two genetically different isolates, both of which are >99% identical with those isolated in previous studies. Field experiments involved collection of wild populations of Ae. albopictus and flowering plants as possible sources of Asaia. These experiments determined that there was seasonal and yearly variation in our ability to detect Asaia in the environment. Laboratory experiments observed that the bacterium was continuously associated with Ae. albopictus for the duration of its lifespan, although rates of infection within the population were not 100%. Asaia was present in midguts and testes, but rarely ovaries, possibly indicating a lack of vertical transmission routes. The results indicate that, although Asaia may associate with Ae. albopictus, it may not be a facultative symbiont, as observed in other mosquito species, and may be opportunistically acquired from the mosquito’s environment.

American Society of Tropical Medicine and Hygiene annual meeting, Nov. 13-16, 2013, Washington, DC: M. J. Turell, S. C. Britch, R. L. Aldridge, E. S. Andrews, B. D. Byrd, B. A. Harrison and K. J. Linthicum. An update on the potential for North American mosquitoes to transmit Rift Valley fever virus. The introduction of West Nile virus into the U.S. in 1999 and its subsequent spread across North America illustrates the potential for an exotic arbovirus to be introduced and become established in North America and to cause significant disease and economic disruption. Infection with Rift Valley fever virus (RVFV) can cause severe disease in cattle, goat, and sheep, with nearly 100% mortality in new-borne animals and nearly 100% abortion in pregnant ones. This mosquito-borne virus has been responsible for numerous outbreaks in domestic ruminants and humans in sub-Saharan Africa over the past 80 years and there is concern of what might happen if it were introduced into North America. Therefore, in order to identify potential mosquito vectors that should be prioritized for control, should it be introduced, we evaluated a number of North American mosquito species for their susceptibility to infection and their ability to transmit RVFV by bite. When exposed to hampsters infected with RVFV, at least some individuals in each of the 28 mosquito species tested became infected. Several species, including Cx. nigripalpus, Cx. quinquefasciatus, Cx. salinarius, and Ae. vexans (from the northwest), were barely susceptible to infection. Despite some species having high infection and dissemination rates, species with significant salivary gland barriers were essentially incompetent vectors in the laboratory. Species with a significant salivary gland barrier included Ae. aegypti, Ae. albopictus, Ae. dorsalis, Ae. infirmatus, An. crucians, An. quadrimaculatus, Cx. quinquefasciatus, Ps. ciliata and Ps. columbiae. Based on susceptibility to infection, viral dissemination, lack of salivary gland barrier, abundance, and feeding preference, the species that have the greatest potential to transmit RVFV in North America are Ae. canadensis, Ae. japonicus, Ae. sollicitans, Ae. taeniorhynchus, Cq. perturbans, Cx. tarsalis, and Ps. ferox and should be prioritized for control. Additional studies need to be conducted with other relevant mosquito species, different geographic populations and to determine how environmental factors, such as temperature and the presence of other pathogens, affect transmission.

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

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE
   National Interagency Confederation for Biological Research Collaborative Project Award. 2014. ApoL1 restrictive effects on West African pathogens. Ft. Detrick, MD, $20,000

14) POST-TENURE POSITION / JOB TITLE
   Associate Public Health Biologist

15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION
   California Department of Public Health. Vector-borne Disease Division
16) **POST-TENURE POSITION STATUS / CATEGORY**

Please indicate only one.

- Permanent position at the host agency
- Contract or temporary position at the host agency
- Research/Administrative position with another U.S.-government agency
- Research/teaching position at a U.S. 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 NRC 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**
  
  I gained excellent knowledge of how to conduct work with viruses in upper level containment, BSL-3 and BSL-4. The skills I gained I could not have received anywhere else. However, my research was not even close to how productive I would have liked it due to renovations, delays when receiving reagents, and personnel issues.

**LONG TERM VALUE**

- How the NRC Research Associateship award affected your career to date
  
  **Comments**
  
  The associateship has given me experience working internationally and with upper level containment viruses. It looks great on my resume. I wish I could have actually conducted publishable research.

**LAB SUPPORT**

- Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
  
  **Comments**
  
  The equipment was archaic and from 30 years ago. When I attempted to purchase new equipment with my funds, I was argued with the ultimately prevented from doing so by my advisor. I scrambled to beg other labs to use equipment and reagents. The ordering system took far too long to receive equipment. It took me close to a year to receive artificial bloodfeeders. 3 months was the minimum for reagents I would have received within a week at another institution.

**ADVISER/MENTOR SUPPORT**

- Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)
  
  **Comments**
  
  While my adviser was a very nice person, he was a terrible mentor. He constantly fought with me when I wanted to buy equipment and do cutting edge techniques. I had to follow his methods exactly. And he retired prior to the end of my tenure as a post doc.

**LPR SUPPORT**

- Quality of administrative support from the Laboratory Program Representative (LPR)
  
  **Comments**
  
  The administrative support was great. No complaints.

**NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT**

- Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)
  
  **Comments**
  
  No complaints. Everything was really efficient.

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

<table>
<thead>
<tr>
<th>Id#</th>
<th>Rev. October 2015</th>
<th>Proj/Act ID#</th>
</tr>
</thead>
</table>

| Leah Probst | lprobst@nas.edu |
| Linda Sligh | lsligh@nas.edu |
| Melanie Suydam | msuydam@nas.edu |
| Peggy Wilson | pwilson@nas.edu |
NRC Research Associateship Programs

FINAL REPORT

1) Associate Last or Family Name
   Bernhards

2) FORWARDING Address (to which your tax statement will be mailed)
   Residence or Institution
   Street
   City, State Zip

3) Today's Date
   April 13, 2016

4) Host Agency
   AMRMC (e.g., AFRL)

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
   Susan Welkos

6) TITLE OF RESEARCH PROPOSAL
   LPS diversity among Burkholderia mallei and Burkholderia pseudomallei and the association with acute and chronic infection

7) SUMMARY OF RESEARCH DURING TENURE
   Itemize significant findings in concise form, utilizing key concepts/words.
   1) New lipopolysaccharide (LPS) subtypes were discovered in Burkholderia pseudomallei.
   2) An LPS change was observed in Burkholderia mallei during the course of mouse infection.
   3) Discovered two stable variants of Burkholderia pseudomallei strain MSHR5848 that expressed broadly divergent in vitro phenotypes.
   4) 
   5) (USMA Davies Fellow: please add summary of teaching, including classes taught.)

8) RESEARCH IN PROGRESS
   Describe in no more than 100 words.
   We are currently developing a peptide mimotope vaccine that is cross-protective against Burkholderia pseudomallei and Burkholderia mallei using peptides that mimic Burkholderia lipopolysaccharide (LPS) and capsular polysaccharide (CPS). These peptides are being conjugated to carrier protein CRM197, and the conjugates will be tested for protection from Burkholderia infection in mice.

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
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


12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES

Include dates, names and locations of seminars.


13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

2015 National Interagency Confederation for Biological Research (NICBR) Collaborative Project Grant

Co-PI on Defense Threat Reduction Agency (DTRA) Grant: Development of vaccines protective against Burkholderia pseudomallei and Burkholderia mallei

Outstanding Presentation Award at the NICBR Scientific Symposium, May 2015

14) POST-TENURE POSITION / JOB TITLE

Research Microbiologist (PI, civilian-term)

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

US Army Edgewood Chemical Biological Center
AMSRD-ECB-PI-BP-CP/Kennedy   E3330
5183 Blackhawk RD
APG, MD 21010-5424

16) POST-TENURE POSITION STATUS / CATEGORY

Please indicate only one.

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

LONG TERM VALUE

☐ How the NRC Research Associateship award affected your career to date
Comments

Wouldn’t have been able to obtain new PI position without this associateship.
LAB SUPPORT
9 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
   Comments
   Very good funding.

ADVISER/MENTOR SUPPORT
8 Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)
   Comments

LPR SUPPORT
5 Quality of administrative support from the Laboratory Program Representative (LPR)
   Comments
   Both LPRs during my tenure were not very proactive in organizing meetings/seminars and did nothing to encourage fellow NRC associates to network or get to know one another.

NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT
10 Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)
   Comments
   Easy to communicate with and very efficient.

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 Program Coordinator

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

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

Id# Rev. October 2015 Proj/Act ID#
1) Associate Last or Family Name
   Hubbard

2) FORWARDING Address (to which your tax statement will be mailed)
   Residence or Institution: Street
   City, State Zip

3) Today's Date
   May 28, 2015

4) Host Agency
   AMRMC
   (e.g., AFRL)

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

6) TITLE OF RESEARCH PROPOSAL
   Transcriptome and functional analysis of excitotoxic mechanisms using embryonic stem cell-derived glutamatergic neurons

7) SUMMARY OF RESEARCH DURING TENURE
   Itemize significant findings in concise form, utilizing key concepts/words.
   1) Developed a protocol to generate synaptic activity in neurons derived from human induced pluripotent stem cells (ongoing).
   2) Used transcriptomics and differential gene expression analysis to define developmental milestones during mouse embryonic stem cell differentiation and neuronal maturation.
   3) Evaluated time- and dose-dependent progression of excitotoxic injury using mouse embryonic stem cell-derived neurons as a platform.
   4) Helped develop a medium-throughput assay for the functional evaluation of neuromodulatory biothreat agents.
   5) Utilized proteomics, transcriptomics and functional assays to investigate the cellular and molecular mechanisms underlying excitotoxicity in a physiologically relevant in vitro model.

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

8) RESEARCH IN PROGRESS
   Describe in no more than 100 words.
   Development of synaptic active, networked neurons derived from induced human pluripotent stem cells for toxin detection and therapeutic screening

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


b) Books, book chapters, other publications

N/A

c) Manuscripts in preparation, manuscripts submitted

Hubbard, K., Beske, P., Glotfelty, E., Lyman, M. and McNutt, P. Functional evaluation and longitudinal expression profiling of neuronal differentiation from murine embryonic stem cells.

10) PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide titles, inventors, and dates of applications.

N/A

11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES

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

International

N/A

Domestic


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

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE
   N/A

14) POST-TENURE POSITION / JOB TITLE
   Biologist IV

15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION
   Excelis, Inc., Information Systems Headquarters, 12975 Worldgate Drive, Herndon, VA 20170

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
   ☐ 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
   I learned many new skills and developed bases of knowledge in fields in which I was not previously educated. The McNutt lab was very prolific during my tenure, publishing and presenting frequently. We also explored and implemented many new routes of research which are currently ongoing.

LONG TERM VALUE
10 How the NRC Associateship award affected your career to date
   Comments
   Without the skills I obtained during my Associateship, I would not have landed this new job.

LAB SUPPORT
10 Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
   Comments
   The lab was well funded and equipment was easily accessible. This was overall a very positive experience.

ADVISER/MENTOR SUPPORT
10 Quality of mentoring from the Laboratory NRC Adviser (USMA Mentor, if applicable)
   Comments
   The mentorship of Dr. McNutt has been outstanding. He gives you every chance to succeed (publish, speak, patent, etc…)

LPR SUPPORT
6 Quality of administrative support from the Laboratory (e.g., NIST, NRL, IWR, FHWA) NRC Program Representative (LPR)
   Comments
I never really dealt with people at this level.

NRC SUPPORT

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

Comments

The travel approval process is a little circuitous, but all-in-all dealing with administrative support was relatively smooth.

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# |
NRC Research Associateship Programs

FINAL REPORT

1) Associate Last or Family Name

Kaini

2) FORWARDING Address (to which your tax statement will be mailed)
Residence or Institution

3) Today's Date

January 28, 2016

4) Host Agency
AMRMC (e.g., AFRL)

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
Wang Heuy-Ching

6) TITLE OF RESEARCH PROPOSAL

Transplantation of stem cells isolated from mouse iPSCs-derived self-formed optic cups in laser-injured retina

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

1) Optimize maintenance and propagation of human PiPS cells in a defined and xenofree condition.

2) Xenofree differentiation of hiPS cells into neuro-retina

3) Generation of photoreceptors like cells from human iPSCs

4) Studied the dynamics of extracellular matrix remodeling during retinogenesis

5) Formulate a research plan on using stem-cell released molecule as a therapy in blast-injured retina

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

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

1. To investigate SRM of the iPS-retinal EB under XF conditions by analyzing the growth factors, chemokines, matrix proteins and other factors in CdM, and ECM respectively.

2. To investigate the neuroprotective and neuro-regenerative effects of SRM of iPS-retinal EB and iPS-RPE under XF conditions in a retinal degeneration model using ex vivo retina explant model.

3. To compare the neuroprotective and neuro-regenerative effects of SRM (cell free therapy) and RPC (cell-based therapy) from iPS-cell-derivatives under XF conditions in a rat model of blast-induced retinal injury.

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


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

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 ORGANIZATION
Ocular Trauma, USAISR

16) POST-TENURE POSITION STATUS / CATEGORY Please indicate only one.
- Permanent position at the host agency
- Contract or temporary position at the host Agency
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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) ORISE
- 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.
18) APPRAISAL OF NRC RESEARCH ASSOCIATESHIP PROGRAM

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

SHORT TERM VALUE
5 Development of knowledge, skills, and research productivity
Comments

LONG TERM VALUE
7 How the NRC Research Associateship award affected your career to date
Comments

LAB SUPPORT
5 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 Adviser (USMA Mentor, if applicable)
Comments

LPR SUPPORT
5 Quality of administrative support from the Laboratory Program Representative (LPR)
Comments

NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT
10 Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)
Comments
You guys were awesome!

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 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

Id# Rev. October 2015 Proj/Act ID#
NRC Research Associateship Programs

**FINAL REPORT**

1) **Associate Last or Family Name**
   Miller

2) **FORWARDING Address** (to which your tax statement will be mailed)
   Residence or Institution
   Street
   City, State Zip

3) **Today's Date**
   Dates of Tenure
   from Feb 4, 2012 to February 3, 2016

4) **Host Agency**
   AISR (e.g., AFRL)

5) **Name of Laboratory Adviser** (and USMA Mentor, if applicable)
   Dr. Kai P Leung

6) **TITLE OF RESEARCH PROPOSAL**
   Identification of regulatory RNAs of mixed species biofilms associated with chronic war wounds

7) **SUMMARY OF RESEARCH DURING TENURE**
   Itemize significant findings in concise form, utilizing key concepts/words.
   1) Optimized protocol to isolate, identify, and categorize small RNAs (sRNAs) for the discovery of small regulatory RNAs.
   2) Utilized a custom RNA-sequencing method to unbiasedly capture the global transcriptome response of pathogens typically present in war wounds and which hinder healing.
   3) Used an in vitro model to investigate the interactions of P. aeruginosa and S. aureus in biofilm and planktonic cultures
   4) Discovered sRNAs that play a key role in modulating interspecies interactions in the biofilm, and required for the adaptive switch between acute and chronic infection phenotypes.
   5) Generated numerous protocols to genetically engineer P. aeruginosa and analyze phenotypes of various mutants.

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

8) **RESEARCH IN PROGRESS**
   Describe in no more than 100 words.
   All my tenure's work has been summarized and submitted to journals and I am awaiting response from the reviewers.

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

   b) Books, book chapters, other publications

   c) Manuscripts in preparation, manuscripts submitted

   Miller, CL, Chen T, Chen P, Leung KP. 2015. Genome sequence of a highly virulent Pseudomonas aeruginosa strain, VA-134, isolated from burn patient. Genome Announcements. manuscript accepted.


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

▪ 2nd Annual an Antonio Postdoctoral Research Forum, UTHSC San Antonio 2014
  Poster: Identification of novel small RNAs in Pseudomonas aeruginosa involved in biofilm formation, antibiotic tolerance, and mixed-species interactions using RNA sequencing

▪ 114th American Society for Microbiology, Boston Massachusetts 2014
  Poster: Identification of novel small RNAs in Pseudomonas aeruginosa involved in biofilm formation, antibiotic tolerance, and mixed-species interactions using RNA sequencing

12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES Include dates, names and locations of seminars.
  10 min talk for NRC Supporters- ISR
  ISR Seminar - Dec 9 2015- ISR

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

14) POST-TENURE POSITION / JOB TITLE
  Adjunct Faculty for Microbiology- St Philips College

15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION
  Address: 1801 Martin Luther King Dr, San Antonio, TX 78203
  Phone: (210) 486-2000

16) POST-TENURE POSITION STATUS / CATEGORY Please indicate only one.
  ☐ Permanent position at the host agency
  ☐ Contract or temporary position at the host Agency
  ☐ 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)
18) APPRAISAL OF NRC RESEARCH ASSOCIATESHIP PROGRAM

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

SHORT TERM VALUE
8 Development of knowledge, skills, and research productivity
   Comments

LONG TERM VALUE
8 How the NRC Research Associateship award affected your career to date
   Comments

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

ADVISER/MENTOR SUPPORT
8 Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)
   Comments

LPR SUPPORT
8 Quality of administrative support from the Laboratory Program Representative (LPR)
   Comments

NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT
8 Quality of administrative support. Please assess the support you received from the Fellowships Office (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 Program Coordinator
No handwritten signature required;
but you may upload a scanned signature file below:

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

Christine Lindsay Miller

Id# Rev. October 2015 Proj/Act ID#
NRC Research Associateship Programs

FINAL REPORT

1) Associate Last or Family Name
O’Hearn

2) FORWARDING Address (to which your tax statement will be mailed)
Residence or Institution Street
City, State Zip

3) Today's Date

4) Host Agency Laboratory or Center Division / Directorate / Department
AMRMC (e.g., AFRL) USAMRIID Diagnostic Systems Division
(e.g., Wright Patterson AFB)

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
Dr. Randall Schoepp

6) TITLE OF RESEARCH PROPOSAL

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

1) Development of a pan-Flavivirus and pan-Alphavirus IgG test to be incorporated in a panel of African viral diagnostics
2) Development of a multi-target serosurveillance test for identifying viral pathogens in West Africa
3) Serosurvey of a Sierra Leonian population for the presence of viral pathogens, and identification of public health threats
4) Development and testing of a Lassa virus diagnostic testing panel for identifying human Lassa Fever cases
5) On-site support during the West African Ebola outbreak

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

8) RESEARCH IN PROGRESS
Describe in no more than 100 words.
Preparing manuscripts for submission

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

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
   American Society of Tropical Medicine and Hygiene 63rd annual meeting, New Orleans, poster presentation: Development of advanced seroassays to broaden diagnostic and surveillance capability in West Africa.

12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES
   Include dates, names and locations of seminars.
   National Cancer Institute (NCI): Combating disease in the developing world: Diagnostics and surveillance in West Africa.

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

14) POST-TENURE POSITION / JOB TITLE
   Science Education Fellow

15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION
   Howard Hughes Medical Institute

16) POST-TENURE POSITION STATUS / CATEGORY
   Please indicate only one.
   ☐ Permanent position at the host agency
   ☐ Contract or temporary position at the host Agency
   ☐ 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 NRC 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
   LONG TERM VALUE
   ☐ How the NRC Research Associateship award affected your career to date
   Comments
   LAB SUPPORT
   ☐ Quality of support from the Laboratory--equipment, funding, orientation, safety and health guidelines, etc.
   Comments
   ADVISER/MENTOR SUPPORT
   ☐ Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable)
Comments

LPR SUPPORT
Quality of administrative support from the Laboratory Program Representative (LPR)
Comments
Did not interact with them much.

NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT
Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)
Comments
Usually very helpful with any aspect of tenure.

18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT.

Very much liked the NRC associateship program. I was happy with the benefits, and if the program develops further, maybe think about adding options for retirement savings. It is a heavy concern while doing a post-doc, being in your 30s, starting a family, and not having the ability to start a retirement plan.

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

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

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

Aileen E O'Hearn

Id# Rev. October 2015 Proj/Act ID#
The National Academies of
SCIENCES • ENGINEERING • MEDICINE

NRC Research Associateship Programs

FINAL REPORT

1) Associate Last or Family Name
Rose

2) FORWARDING Address (to which your tax statement will be mailed)
FORWARDING Phone(s) and E-Mail (if known)
Home Phone:
Alt. Phone:
Preferred E-Mail:

3) Today's Date

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

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
Kai P. Leung

6) TITLE OF RESEARCH PROPOSAL
Assessment of Wound Bed Modulation Prior to Skin Grafting in a Porcine Model

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

1) Establishment of a porcine model of skin loss correlating thickness of autologous skin graft with amount of contraction after 120 days.
2) Autologous skin grafts grafted onto fat (as opposed to grafting onto deeper tissues) resist contractile forces induced by myofibroblasts.
3) Burn wounds have increased inflammatory markers and have increased levels of wound contraction compared to skin loss by non-burn mechanisms.
4) Application of ultra-high dose gentamicin to the wound bed induces an anti-angiogenic gene expression profile in vivo as well as inducing genetic and phenotypic alterations in endothelial cells and macrophages in tissue culture.

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

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

Primary research project focuses on the use of pharmacologic agents to modulate the status of the wound bed prior to or during grafting. These agents are anti-inflammatories, antibiotics, other antimicrobials or other factors that might influence graft take, wound healing or final scar outcome. The hypothesis is that alteration of the wound microenvironment can alter the healing trajectory, resulting in reduced contraction or hypertrophic scar.

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


b) Books, book chapters, other publications
N/A

c) Manuscripts in preparation, manuscripts submitted


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

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

International
N/A

Domestic

Lloyd F. Rose, Melissa Oleksson, Kai P. Leung, Rodney K. Chan. High Dose Gentamicin Modulates Angiogenesis-Related Gene Expression Both In Vitro and In Vivo. Oral presentation @ the Military Health System Research Symposium, Ft Lauderdale, FL. August 2015


Lloyd F. Rose and Rodney K. Chan. The Role of Hypodermis in Contraction and Scarring. Oral presentation @ the Southern Region Burn Conference, Houston, TX. November 2014.


12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES
Include dates, names and locations of seminars.
Induction of Cytoskeletal Rearrangements Vaccinia Virus Host Range Gene K1L. Department of Biology Research Seminar. Trinity University. April 2015.


13) PROFESSIONAL AWARDS RECEIVED DURING TENURE
N/A
14) POST-TENURE POSITION / JOB TITLE

Assistant Portfolio Manager

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

U.S. Army Medical Research and Materiel Command
Clinical & Rehabilitative Medicine Research Program
810 Schreider Street, BLDG 722
Fort Detrick, MD 21702-5012

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

☐ Permanent position at the host agency
☐ Contract or temporary position at the host Agency
☐ Research/administrative position in private industry in the U.S.
☐ Research/administrative position in private industry outside of the U.S.
☐ Abbreviate Host Laboratory/Center AMRMC
☐ Research/administration position with a non profit
☐ Research/administrative position with another U.S.-government agency
☐ Research/administration 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
☐ 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 NRC 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

LONG TERM VALUE

☐ How the NRC Research Associateship award affected your career to date

Comments

There was a lot of opportunity to network and find connections that could lead to future employment, as happened in my circumstance. The position I am moving to was the direct result of attendance at the Military Health Systems Research Symposium in August 2015.

LAB SUPPORT

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

Comments

Could not have been better.

ADVISER/MENTOR SUPPORT

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

Comments

Many sources of mentoring were available, each with their own strengths and insight.

LPR SUPPORT

☐ Quality of administrative support from the Laboratory Program Representative (LPR)

Comments

NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT

☐ Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.)

Comments

I never had any significant problems with any of the administrative support. This is especially notable after seeing fellow postdocs with other funding organizations go through all sorts of administrative issues.
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 Program Coordinator
No handwritten signature required;
but you may upload a scanned signature file below:

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

| Id# | Rev. July 2015 | Proj/Act ID# |
NRC Research Associateship Programs

FINAL REPORT

1) Associate Last or Family Name
Salas

2) FORWARDING Address (to which your tax statement will be mailed)
Residence or Institution Street
City, State Zip

FORWARDING Phone(s) and E-Mail (if known)
Home Phone: 
Alt. Phone: 
Preferred E-mail: margaux.m.salas.vol@mail.mil

3) Today's Date
October 30, 2015

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

5) Name of Laboratory Adviser (and USMA Mentor, if applicable)
John Clifford, PhD

6) TITLE OF RESEARCH PROPOSAL
The role of curcumin in thermal injury-evoked hyperalgesia

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

1) Tetrodotoxin Attenuates Thermal Hyperalgesia in a Rat Full Thickness Thermal Injury Pain Model
2) Curcumin is an Effective Analgesic for Burn Pain: Evidence from Animal and Human Tissue Based Experiments
3) Resiniferatoxin: A Potential Burn Analgesic for Point of Injury/Battlefield
4) 
5) 

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

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

* Hemodynamic responses to analgesic for pain management in combat patients transported from POI to first MTF in Israel Defense Forces and U.S. Military
* Prospective, Randomized, Double-Blind Controlled Pilot Study to compare Topical Voriconazole to Placebo as a Pain Reducing Agent at Skin Donor Sites

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


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.
N/A

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

International
NONE

Domestic


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

2. Resiniferatoxin Attenuates Pain Behaviors in a Rat Model of Full Thickness Thermal Injury. MHSRS 2013, Ft. Lauderdale Florida
3. From Inflammation and Interactions to Blisters, Burns, and Analgesics. USAISR Seminar Series, 2013
4. Analgesic and Wound Healing Responses to Peripheral Analgesic Treatments in a Full Thickness Burn Model. National Research Council Site Visit, USAISR 2013
8. Curcumin: A Prototype Anti-inflammatory Therapeutic for Burn Pain and Wound Healing. Burn and Trauma Research Workgroup. BAMMC Burn Center 2014
9. Studies on a Novel Toxin-Based Analgesic: Tetrodotoxin. Burn and Trauma Research Workgroup. BAMMC Burn Center 2014

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

2015
Hemodynamic Responses to Analgesics for Pain Management in Combat Patients Transported from Point of Injury to First Medical Treatment Facility in Israel Defense Forces and U.S. Military
$462K/2 years- Associate Investigator
Defense Health Program/JPC6/Combat Casualty Care Research Program FY15 DHP 6.7 #DM150035

2015
Prospective, Randomized, Double-Blind Controlled Pilot Study to Compare Topical Voriconazole to Placebo as A Pain Reducing Agent at Skin Donor Sites.
$354K/2 years- Associate Investigator
FY15 DHP D6.7 #D6.7_15_C2_1_15_J9_1287

14) POST-TENURE POSITION / JOB TITLE
Clinical Research Scientist- Pain Clinic- BAMC

15) NAME AND ADDRESS OF POST-TENURE POSITION / JOB ORGANIZATION
Clinical Research Scientist
Integrative Pain Management Clinic
Brooke Army Medical Center
3551 Roger Brooke Drive
JBSA Fort Sam Houston, TX 78234

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

☐ Permanent position at the host agency
☐ Contract or temporary position at the host Agency
☐ 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 NRC 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: 8
  
  **Comments**
  Good for staying within the military sector, not sufficient if going back into academia.

**LONG TERM VALUE**
- How the NRC Research Associateship award affected your career to date: 8
  
  **Comments**
  Gave me the opportunity to understand the nature of military research and gave me the opportunity to begin a career within the military research sector.

**LAB SUPPORT**
- Quality of support from the Laboratory—equipment, funding, orientation, safety and health guidelines, etc.: 10
  
  **Comments**
  Excellent facilities in the USAISR.

**ADVISER/MENTOR SUPPORT**
- Quality of mentoring from the Laboratory Adviser (USMA Mentor, if applicable): 10
  
  **Comments**
  John Clifford was excellent in mentoring my growth and development as a Post-doc in terms of publications, presentations, and grant writing. He gave me the flexibility and freedom to express my scientific opinion and style.

**LPR SUPPORT**
- Quality of administrative support from the Laboratory Program Representative (LPR): 10
  
  **Comments**
  Dr. Dubick was an excellent and supportive mentor for me. He gave both guidance in NRC matters and in career paths and opportunities.

**NRC RESEARCH ASSOCIATESHIP PROGRAMS SUPPORT**
- Quality of administrative support. Please assess the support you received from the Fellowships Office (e.g., moving company, insurance, Omega, payroll, Program Coordinator, travel, etc.): 10
  
  **Comments**
  Administrative support was great. The only problem I ever had was receiving reimbursement for travel in a timely manner. Otherwise, NRC administrative support was easy to contact and quick to answer. Thank you for all your support.

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 Program Coordinator

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

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

Id#                      Rev. July 2015                      Proj/Act ID#
1) **Three Last or Family Name**  
Van Laar

2) **FORWARDING Address (to which your tax statement will be mailed)**  
Residence or Institution  
Street City, State Zip

3) **Today's Date**  
July 13, 2015

4) **Host Agency**  
AMRMC  
(e.g., AFRL)

**Laboratory or Center**  
JBSA Ft Sam Houston  
(e.g., Wright Patterson AFB)

**Division / Directorate / Department**  
ISR/DTRD  
(e.g., High-Speed Propulsion)

5) **Name of Laboratory NRC Adviser (and USMA Mentor, if applicable)**  
Dr. Kai Leung

6) **TITLE OF RESEARCH PROPOSAL**  
Transcriptome Analysis of War Wound Pathogens

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

1) Contributed to gene sequencing of multi-drug resistant Klebsiella pneumoniae

2) Performed transcriptome analysis of multi-drug resistant K. pneumoniae and identified numerous genes for downstream analysis in combating multi-drug resistant K. pneumoniae. Also described molecular mechanisms for significant morphological changes.

3) Performed transcriptome analysis of mixed species biofilm and planktonic cultures of Staphylococcus aureus and Pseudomonas aeruginosa and identified numerous ORFs necessary for competition between these two species.

4) Performed transcriptome analysis of persister cells of P. aeruginosa to identify ORFs necessary for persister cell formation, and therefore lack of healing in P. aeruginosa infected wounds.

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

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

Continued analysis of ORFs important for persister cell formation in Pseudomonas aeruginosa to identify targets for potential drug therapy to combat infections highly resistant to drug therapy.

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


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

Interscience Conference on Antimicrobial Agents and Chemotherapies, Denver, CO Sep 2013
The Effect of Imipenem on Biofilms of a Multi-Drug Resistant Clinical Isolate of Klebsiella pneumoniae

General Meeting of the American Society for Microbiology, Boston, MA May 2014
Transcriptome Analysis of Persister Cells of Pseudomonas aeruginosa
T. A. Van Laar, T. Chen, and K. P. Leung

Pseudomonas aeruginosa is a Gram-negative bacterium found ubiquitously in the environment. P. aeruginosa is also an important opportunistic human pathogen capable of causing extreme respiratory diseases and wound infections, leading to severe morbidity and mortality. Many P. aeruginosa infections are resistant to antibiotic therapy. This can be due to a number of factors, including inherent antibiotic resistance and the formation of biofilms in which the presence of persister cells contributes partly to the drug-resistant phenotype of biofilms. Persister cells are a subpopulation of cells which are genetically identical to the rest of the biofilm cell population, but experience a transiently antibiotic resistant phenotype. The mechanisms behind persister cell formation are poorly understood. Therefore we have performed RNA sequencing of persister cells of P. aeruginosa strain PAO1 in order to determine the genomic regulatory mechanism(s) responsible for transforming cells to the persister phenotype. We found that 238 open reading frames (ORFs) were upregulated while 428 ORFs were downregulated in the persister cell fraction when compared to stationary phase cells. Categories upregulated include genes involved in DNA repair, antibiotic resistance, peptidoglycan biosynthesis and pyocin production, while genes responsible for motility, metabolism, and biofilm formation were downregulated in persister cells. Quantitative real-time PCR (qRT-PCR) analysis confirmed selected hits. We are currently screening a PAO1 transposon mutant library in order to identify the ORFs that are essential for the development of the persister cell phenotype. We found a number of knockouts that could lead to differential persister cell formation. Understanding the mechanisms behind persister cell formation will allow for the more successful treatment of P. aeruginosa infections.

Military Health System Research Symposium, Fort Lauderdale, FL August 2014
Sublethal Concentrations of Carbapenems Change Cell Morphology and Genomic Expression in Klebsiella Pneumoniae
T.A. Van Laar, T. Chen, T. You, and K.P. Leung

Background: K. pneumoniae is an important nosocomial pathogen of surgical sites and combat wounds with many strains displaying multi-drug resistance. K. pneumoniae uses biofilm formation as a major virulence factor, contributing to increased antibiotic resistance and impaired clearance. A strain of K. pneumoniae isolated from a wound demonstrated resistance to commonly used antibiotics, but sensitivity to the broad-spectrum β-lactam class carbapenems. We were interested in determining how sublethal concentrations of carbapenems affect overall fitness of K. pneumoniae biofilms. We found that 238 open reading frames (ORFs) were upregulated while 428 ORFs were downregulated in the persister cell fraction when compared to stationary phase cells. Categories upregulated include genes involved in DNA repair, antibiotic resistance, peptidoglycan biosynthesis and pyocin production, while genes responsible for motility, metabolism, and biofilm formation were downregulated in persister cells. Quantitative real-time PCR (qRT-PCR) analysis confirmed selected hits. We are currently screening a PAO1 transposon mutant library in order to identify the ORFs that are essential for the development of the persister cell phenotype. We found a number of knockouts that could lead to differential persister cell formation. Understanding the mechanisms behind persister cell formation will allow for the more successful treatment of P. aeruginosa infections.
Sublethal Concentrations of Carbapenems Change Cell Morphology and Genomic Expression in Klebsiella Pneumoniae
T.A. Van Laar, T. Chen, T. You, and K.P. Leung

Background: K. pneumoniae is an important nosocomial pathogen of surgical sites and combat wounds with many strains displaying multi-drug resistance. K. pneumoniae uses biofilm formation as a major virulence factor, contributing to increased antibiotic resistance and impaired clearance. A strain of K. pneumoniae isolated from a wound demonstrated resistance to commonly used antibiotics, but sensitivity to the broad-spectrum β-lactam class carbapenems. We were interested in determining how sublethal concentrations of carbapenems affect overall fitness of K. pneumoniae biofilms.

Methods: K. pneumoniae biofilms were treated for 2 or 24 hours with sublethal concentrations of carbapenems. Scanning electron microscopy (SEM) of untreated and treated biofilms was used to observe phenotypic changes while RNA sequencing (RNAseq) was used to determine global gene expression and regulation of untreated and treated biofilms.

Results: SEM showed striking phenotypic changes in treated biofilms, including rounding, blebbing, and dimpling of treated cells. These changes are transient and dependent on continued antibiotic presence. Comparative transcriptome analysis using RNAseq technology identified a large number of ORFs differentially regulated in response to imipenem treatment. Some of the changes in gene expression are indicative of bacterial stress response, while other changes include motility, transport, and metabolism. qRT-PCR has validated the general trend of some of these differentially regulated ORFs.

Conclusions: Treating K. pneumoniae biofilms with sublethal concentrations of carbapenems induced wide-range phenotypic and gene expression changes. The understanding of how sublethal amounts of carbapenems alter fitness and pathogenic potential of K. pneumoniae biofilm cells highlights the importance of therapy compliance and investigation of possible drug combinations for infection eradication.

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

Assistant Professor of Microbiology

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

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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
- □ Research/Administrative position with another U.S. government agency
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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
I was able to be first author (or co-first author) on 3 manuscripts as well as a co-author on an additional manuscript. This exceeded my expectations of a 3.33 year post-doctoral position.

How the NRC Associateship award affected your career to date

I believe that my success at finding a tenure track position can be partially attributed to the successes I have had as an NRC fellow.

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

In-processing was slightly difficult and all of the regulations are confusing (particularly for those responsible for enforcing them), but I imagine this is par for the course at a military installation.

Dr. Leung gave me a great project to start with and allowed me to explore further interests that aligned with our core goals. He wrote kind letters of recommendation for me and has been supportive of my transition. He has provided timely feedback and given great advice for driving my projects forward.

Quality of administrative support from the Laboratory (e.g., NIST, NRL, IWR, FHWA) NRC Program Representative (LPR)

The only issue I have ever had with NRC is dealing with travel. Concur is not a user-friendly system and I can spend hours trying to input everything only to have my information kicked back without notice or payment.

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

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Id# Rev. December 2014 Proj/Act ID#