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TITLE: NRC/AMRMC Resident Research Associateship Program

PRINCIPAL INVESTIGATOR: Dr. Michael Dubick

CONTRACTING ORGANIZATION: National Academy of Sciences  
Washington, DC 20001

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TYPE OF REPORT: Annual

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

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| REPORT DOCUMENTATION PAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                  |                          |                                         | Form Approved<br>OMB No. 0704-0188          |                                              |
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| 1. REPORT DATE<br>March 2017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  | 2. REPORT TYPE<br>Annual |                                         | 3. DATES COVERED<br>1Mar2016 - 28Feb2017    |                                              |
| 4. TITLE AND SUBTITLE<br>NRC/AMRMC Resident Research Associateship Program                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                          |                                         | 5a. CONTRACT NUMBER                         |                                              |
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| 6. AUTHOR(S)<br>Dr. Michael Dubick<br><br>email: michael.a.dubick.civ@mail.mil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |                          |                                         | 5d. PROJECT NUMBER                          |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                          |                                         | 5e. TASK NUMBER                             |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                          |                                         | 5f. WORK UNIT NUMBER                        |                                              |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br>.National Academy of Sciences<br>500 – 5 <sup>th</sup> Street, N.W.<br>Washington, DC 20001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                          |                                         | 8. PERFORMING ORGANIZATION REPORT<br>NUMBER |                                              |
| 9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br>Dr. Michael Dubick<br>U.S. Army Medical Research and Materiel Command<br>U.S. Army Institute of Surgical Research<br>3698 Chambers Pass<br>JBSA Fort Sam Houston, Texas 78234-6315                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                          |                                         | 10. SPONSOR/MONITOR'S ACRONYM(S)            |                                              |
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| 13. SUPPLEMENTARY NOTES<br>This same report is submitted for contracts W81XWH-12-2-0010; W81XWH-12-2-0030; W81XWH-12-2-0018; and W81XWH-12-2-0033                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                          |                                         |                                             |                                              |
| 14. ABSTRACT<br>During this reporting period, the NRC promoted research opportunities at AMRMC/AISR institutes through a broad outreach plan. A total of 5 applications were received during the period and of these, 5 were reviewed by NRC panels. 4 award offers were made and 4 accepted. A total of 6 Associates ended their tenure during the reporting period and of these 6 submitted final reports. The productivity of these Associates is listed in the technical report.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                          |                                         |                                             |                                              |
| 15. SUBJECT TERMS-<br>Associateship program, post-doc, awards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                          |                                         |                                             |                                              |
| 16. SECURITY CLASSIFICATION OF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                          | 17. LIMITATION<br>OF ABSTRACT<br><br>UU | 18. NUMBER<br>OF PAGES<br><br>16            | 19a. NAME OF RESPONSIBLE PERSON<br>USAMRMC   |
| a. REPORT<br>U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | b. ABSTRACT<br>U | c. THIS PAGE<br>U        |                                         |                                             | 19b. TELEPHONE NUMBER (include area<br>code) |

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SCIENCES • ENGINEERING • MEDICINE  
**RESEARCH ASSOCIATESHIP PROGRAM**  
with  
**U.S. Army Institute of Surgical Research**  
**U.S. Army Medical Research & Materiel Command**

**Annual Contract Technical Report**

Contract No. W81XWH-12-2-0015  
Contract Period: 03/01/2012-02/28/2018  
Report Period: 05/01/2016-04/30/2017

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 required to submit a final report that described the outcome of their Research Associateship award. Final reports received by the Academies during the current reporting period are attached to this technical report.

The activities of NRC Research 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 accomplishments of NRC Research Associates completing tenure during the reporting period are summarized in individual Final Reports (attached).

**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

## U.S. Army Medical Research & Materiel Command

**Table 1: Summary of applications and awards**

|                            | May 2016 | Aug 2016 | Nov 2016 | Feb 2017 | Total |
|----------------------------|----------|----------|----------|----------|-------|
| TOTAL APPLICATIONS         | 6        | 3        | 4        | 4        | 17    |
| Applications not reviewed  | 0        | 0        | 0        | 1        | 1     |
| Applications reviewed      | 6        | 3        | 4        | 3        | 16    |
| Not recommended            | 0        | 0        | 0        | 0        | 0     |
| Recommended                | 6        | 3        | 4        | 3        | 16    |
| Withdrawn                  | 0        | 0        | 0        | 0        | 0     |
| Lab decision pending       | 0        | 0        | 0        | 1        | 1     |
| Awards offered             | 6        | 3        | 4        | 2        | 15    |
| Applicant decision pending | 0        | 1        | 0        | 0        | 1     |
| Awards accepted            | 5        | 2        | 4        | 2        | 13    |
| Awards declined            | 1        | 0        | 0        | 0        | 1     |
| Not funded                 | 0        | 0        | 0        | 0        | 0     |

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

| Associate                                                          | Adviser                    | Tenure Dates          |  | Final Report |
|--------------------------------------------------------------------|----------------------------|-----------------------|--|--------------|
| <b>Research Institute of Medical Sciences, Bangkok</b>             |                            |                       |  |              |
| Margulieux, Katie Rose                                             | Swierczewski, Brett Edward | 8/4/2016-8/3/2017     |  |              |
| <b>U.S. Army Institute of Surgical Research</b>                    |                            |                       |  |              |
| Cheppudira, Bopaiah Pooviah                                        | Christy, Robert John       | 9/4/2012-9/3/2017     |  |              |
| Greene, Whitney Ann                                                | Wang, Heuy-Ching H.        | 4/25/2012-7/24/2017   |  |              |
| Holt, Andrew Whyte                                                 | Wang, Heuy-Ching H.        | 2/13/2017-2/12/2018   |  |              |
| Karna, Sai Lakshmi Rajasekhar                                      | Leung, Kai P               | 4/1/2013-4/13/2017    |  | Received     |
| Nguyen, Jesse Quoc                                                 | Leung, Kai P               | 3/1/2017-2/28/2018    |  |              |
| Olekson, Melissa Ann                                               | Leung, Kai P               | 9/2/2014-9/1/2016     |  | Received     |
| Parida, Bijaya Kumar                                               | Dubick, Michael A.         | 3/19/2012-9/18/2016   |  | Received     |
| Penn, Alexander Hayes                                              | Torres Filho, Ivo P        | 1/14/2015-1/13/2018   |  |              |
| Sosanya, Natasha                                                   | Christy, Robert John       | 4/20/2015-2/28/2018   |  |              |
| <b>U.S. Army Medical Research Institute of Chemical Defense</b>    |                            |                       |  |              |
| Beske, Phillip Howard                                              | McNutt, Patrick Michael    | 8/29/2013-5/16/2017   |  |              |
| <b>U.S. Army Medical Research Institute of Infectious Diseases</b> |                            |                       |  |              |
| Bachert, Beth Alexandra                                            | Bozue, Joel A              | 1/3/2017-1/2/2018     |  |              |
| Bixler, Sandra Lynn                                                | Goff, Arthur James         | 8/18/2014-11/25/2016  |  | Received     |
| Coate, Eric Allan                                                  | Bozue, Joel A              | 12/30/2015-12/29/2017 |  |              |
| Cohen, Courtney Alicia                                             | Glass, Pamela J            | 7/28/2014-7/31/2016   |  | Received     |
| DeLaine-Elias, BreOnna C.                                          | Palacios, Gustavo F        | 3/1/2017-2/28/2018    |  |              |
| Duy, Janice                                                        | Minogue, Timothy Devins    | 8/1/2013-7/31/2017    |  |              |
| Hollidge, Bradley Sherman                                          | Schmaljohn, Connie         | 5/2/2016-2/28/2018    |  |              |
| Huse, Valerie                                                      | Minogue, Timothy Devins    | 9/29/2014-7/29/2016   |  | Received     |
| Kohler, Lara Juliette                                              | Cote, Christopher Kevin    | 1/17/2017-1/16/2018   |  |              |
| Krishnamurthy, Malathy                                             | Panchal, Rekha G.          | 10/5/2015-10/4/2017   |  |              |
| Maxson, Tucker                                                     | Minogue, Timothy Devins    | 2/1/2017-1/31/2018    |  |              |
| Mielech, Anna Maria                                                | Ulrich, Robert Glenn       | 2/2/2016-2/1/2018     |  |              |
| Ricks, Keersten Michelle                                           | Schoepp, Randal J.         | 12/7/2015-12/6/2017   |  |              |
| Shoemaker, Charles Jason                                           | Schmaljohn, Connie         | 2/3/2014-2/2/2017     |  | Received     |
| Smith, Jessica L                                                   | Ulrich, Robert Glenn       | 6/24/2013-2/28/2018   |  |              |
| Stefan, Christopher Patrick                                        | Minogue, Timothy Devins    | 1/2/2014-1/1/2018     |  |              |
| Stojadinovic, Marija                                               | Panchal, Rekha G.          | 12/1/2014-11/30/2017  |  |              |
| Tursiella, Melissa Lynne                                           | Schmaljohn, Connie         | 4/1/2014-1/31/2018    |  |              |
| Zeng, Xiankun                                                      | Sun, Mei Guo               | 5/4/2015-7/31/2016    |  | Received     |
| <b>Walter Reed Army Institute of Research, Silver Spring</b>       |                            |                       |  |              |
| Anderson, Margery Diane                                            | Yourick, Debra Lynn        | 3/11/2014-2/28/2018   |  |              |
| Barasa, Sheila Ogoma                                               | Mancuso, James D           | 5/5/2015-5/4/2017     |  |              |
| Brager, Allison J                                                  | Capaldi, Vincent F         | 7/18/2016-3/13/2017   |  | Received     |
| Crivat, Georgeta                                                   | Angov, Evelina             | 5/16/2016-5/15/2017   |  |              |
| DeDominicis, Kristen Elizabeth                                     | Boutte, Angela M           | 9/8/2015-3/31/2017    |  | Received     |
| Kobylnski, Kevin Conrad                                            | Davidson, Silas Andrew     | 10/17/2011-4/16/2017  |  | Received     |
| Kuehn, Emily Denise                                                | Yourick, Debra Lynn        | 11/14/2016-11/13/2017 |  |              |
| Linton, Yvonne-Marie                                               | Clark, Jeffrey William     | 10/3/2011-10/2/2016   |  | Not Recv'd   |
| McCracken, Michael Kevin                                           | Jarman, Richard George     | 3/9/2015-2/28/2018    |  |              |
| McDermott, Emily Gray                                              | Garver, Lindsey Susannah   | 1/9/2017-1/8/2018     |  |              |
| Pollett, Simon                                                     | Jarman, Richard George     | 6/27/2016-6/26/2017   |  |              |
| Simonelli, Guido                                                   | Capaldi, Vincent F         | 10/6/2014-10/5/2017   |  |              |
| Tenenbaum, Laura Subbiah                                           | Yourick, Debra Lynn        | 6/3/2013-6/2/2017     |  |              |
| Zarling, Stasya Nicole                                             | Krzych, Urszula            | 2/7/2011-5/15/2016    |  | Received     |

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

- 13 Associates ended tenure during the report period
- 35 months was the average tenure length
- 66 months was the longest
- 8 months was the shortest
- 12 submitted final reports

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

- 62 Articles published in refereed journals
- 16 Articles other (Proceedings, Book Chapters, other)
- 41 Domestic presentations
- 15 International presentations
- 0 Patent applications
- 9 Awards

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

- 0 Permanent position at the NRC host agency
- 8 Contract or temporary position at the NRC host agency
- 1 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.
- 1 Research/administrative position with a non-profit
- 0 Self-employed/consulting
- 0 Postdoctoral Research
- 1 Other
- 1 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:

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



### **Attachments**

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

## NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOICATE FINAL REPORT

**Associate:** Karna, Sai Lakshmi Rajasekhar  
**Program:** AMRMC - U.S. Army Medical Research & Materiel Command  
U.S. Army Institute of Surgical Research  
US Army Institute of Surgical Research  
Fort Sam Houston, TX 78234-6315  
**Opportunity:** B7471/Biofilms Impaired Wound Healing  
**Adviser:** Leung, Kai P  
**Research Proposal:** The Role of sRNAs of *Pseudomonas Aeruginosa* in Single Species and Polymicrobial Biofilms  
**Tenure Dates:** 04/01/2013-04/13/2017

### RESEARCH ACCOMPLISHMENTS

A)Successfully 1) established our biofilm animal model, 2) characterized the wounds for Bacteria counts (viable counts and total cell counts-qPCR), Biofilm morphology (SEM), Measurement of PMNs and macrophages infiltration (IHC)and Epithelialization (histomorphometry, 3) sequenced the transcriptomes (RNA-seq) of both bacteria and host, 4) analysis of the host transcriptome data was complete and identified a unique set of ncRNAs that play a key role in regulating changes between the cell states from a metabolically suppressed state of inflammation to the proliferation state phase of wound healing.

B) The bacterial transcriptomic data supports our original hypothesis in identifying the key genes of that might help in adapting *Pseudomonas aeruginosa* from planktonic to biofilm phenotype. These genes are part of alginate biosynthesis pathway, catalases, and transporters and also significant numbers of them were identified as hypothetical. The results we found until now suggested that we are in correct path to identify the pivotal pathways for *P. aeruginosa* to actively infect and establish biofilm infections. This study generates vast data on *P. aeruginosa* adaptations to the wound niche and also on host responses towards the infection. This data will be available to the research community for furthering investigation to prevent/treat *P. aeruginosa* wound infections.

C)Successfully sequenced the genome of virulent *P. aeruginosa* strain, 12-4-4(59), isolated from blood culture of a burn patient and published in ASM journal of Genome announcement.

D)Successfully sequenced the whole-genome of multidrug-resistant *P. aeruginosa* strain BAMCPA07-48, isolated from a combat injury wound and published in ASM journal of Genome announcement.

### SCHOLARLY PRODUCTIVITY

#### ARTICLES - PEER REVIEWED

|                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Karna, S. L. Rajasekhar; Chen, Tsute ; Chen, Ping; Peacock, Trent J; Abercrombie, Johnathan J; Leung, Kai P. , 2016, Genome Sequence of a Virulent <i>Pseudomonas aeruginosa</i> Strain, 12-4-4(59), Isolated from the Blood Culture of a Burn Patient, Genome Announc. 2016 Mar-Apr; 4(2): e00079-16.                                                      |
| Karna, S. L. Rajasekhar; D'Arpa, Peter; Chen, Tsute ; Qian, Li-Wu; Fourcaudot, Andrea B; Yamane, Kazuyoshi; Chen, Ping; Abercrombie, Johnathan J; You, Tao; Leung, Kai P, 2016, RNA-Seq Transcriptomic Responses of Full-Thickness Dermal Excision Wounds to <i>Pseudomonas aeruginosa</i> Acute and Biofilm Infection, PLoS One. 2016; 11(10): e0165312.   |
| Fatemeh, Sanjar; Karna, S. L. Rajasekhar; Chen, Tsute; Chen, Ping;Abercrombie, Johnathan J; Leung, Kai P , 2016, Whole-Genome Sequence of Multidrug-Resistant <i>Pseudomonas aeruginosa</i> Strain BAMCPA07-48, Isolated from a Combat Injury Wound, Genome Announc. 2016 Jul-Aug; 4(4): e00547-16.                                                         |
| Miller, Christine L; Romero, Manuel; Karna, S. L. Rajasekhar; Chen, Tsute;Heeb, Stephan; Leung, Kai P, 2016, RsmW, <i>Pseudomonas aeruginosa</i> small non-coding RsmA-binding RNA upregulated in biofilm versus planktonic growth conditions, BMC Microbiol. 2016; 16: 155.                                                                                |
| Miller, Christine L; VanLaar, Tricia A;Chen, Tsute;Karna, S. L. Rajasekhar;Chen, Ping;You, Tao; Leung, Kai P, 2016, Global transcriptome responses including small RNAs during mixed-species interactions with methicillin-resistant <i>Staphylococcus aureus</i> and <i>Pseudomonas aeruginosa</i> ., Microbiologyopen. 2016 Nov 21. doi: 10.1002/mbo3.427 |

#### ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

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#### PRESENTATIONS - DOMESTIC

|                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|
| Karna, S. L. Rajasekhar; D'Arpa, Peter; Chen, Tsute ; Qian, Li-Wu; Fourcaudot, Andrea B; Yamane, Kazuyoshi; Chen, Ping; |
|-------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Abercrombie, Johnathan J; You, Tao; Leung, Kai P, 09/21/2016, RNA-Seq Transcriptomic Responses of Full-thickness Dermal Excision Wounds to <i>Pseudomonas aeruginosa</i> Acute and Biofilm Infection , 4th Annual San Antonio Postdoctoral Research Forum 2016, San Antonio, TX, USA                                                |
| Karna, S. L. Rajasekhar; D'Arpa, Peter; Chen, Tsute ; Qian, Li-Wu; Fourcaudot, Andrea B; Yamane, Kazuyoshi; Chen, Ping; Abercrombie, Johnathan J; You, Tao; Leung, Kai P, 04/16/2016, Host Genomic Responses to <i>Pseudomonas aeruginosa</i> Wound Infections, Wound Healing Society Annual meeting 2016, Atlanta,GA,USA           |
| Karna, S. L. Rajasekhar; D'Arpa, Peter; Chen, Tsute ; Qian, Li-Wu; Fourcaudot, Andrea B; Yamane, Kazuyoshi; Chen, Ping; Abercrombie, Johnathan J; You, Tao; Leung, Kai P, 10/28/2015, Genomic Responses of <i>Pseudomonas aeruginosa</i> in Wounds, American Society for Microbiology conference on Biofilms 2015, Chicago, IL, USA |
| Karna, S. L. Rajasekhar; D'Arpa, Peter; Chen, Tsute ; Qian, Li-Wu; Fourcaudot, Andrea B; Yamane, Kazuyoshi; Chen, Ping; Abercrombie, Johnathan J; You, Tao; Leung, Kai P, 09/15/2015, Genomic Responses of <i>Pseudomonas aeruginosa</i> in Wounds, 3rd Annual San Antonio Postdoctoral Research Forum 2015, San Antonio, TX, USA   |

#### PRESENTATIONS - INTERNATIONAL

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#### PATENTS

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#### AWARDS

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**NRC Research Associateship Programs**

***FINAL REPORT***

|                                                                                          |                                                                                           |                                                                                     |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1) Associate Last or Family Name                                                         | First Name                                                                                | M.I.                                                                                |
| <b>Olekson</b>                                                                           | <b>Melissa</b>                                                                            | <b>A</b>                                                                            |
| 2) FORWARDING Address (to which your tax statement will be mailed)                       |                                                                                           |                                                                                     |
| Residence or Institution                                                                 | FORWARDING Phone(s) and E-Mail (if known) Home Phone:<br>Alt. Phone:<br>Preferred E-mail: |                                                                                     |
| 3) Today's Date                                                                          |                                                                                           |                                                                                     |
| <b>August 24, 2016</b>                                                                   | Dates of Tenure<br>from <b>September 2, 2014</b> to <b>September 1, 2016</b>              |                                                                                     |
| 4) Host Agency<br><b>AMRMC</b><br>(e.g., AFRL)                                           | Laboratory or Center<br><b>US AISR</b><br>(e.g., Wright Patterson AFB)                    | Division / Directorate / Department<br><b>DTRD</b><br>(e.g., High-Speed Propulsion) |
| 5) Name of Laboratory Adviser (and USMA Mentor, if applicable)<br><b>Dr. Kai P Leung</b> |                                                                                           |                                                                                     |

6) *TITLE OF RESEARCH PROPOSAL*

**High-throughput in vitro evaluation of stable anti-biofilm agents that promote wound healing**

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

- 1) Some antimicrobial peptide (AMP) mimics, ceragenins, inhibit bacterial cell viability, decrease matrix production, and impact cell diameter in a mixed species biofilm.
- 2) Some ceragenins improve keratinocyte wound healing in vitro at low concentrations (~10ng/mL). Some ceragenins also induce endothelial cell tube formation in vitro. For one ceragenin, CSA-13, VEGFR2 signaling mechanisms appear to be activated.
- 3) AMP dermaseptin S1(DRS1) has a higher affinity for artificial bacterial membranes than mammalian membranes. Utilizing a surfactant with DRS1 improves its antibiofilm activity than DRS1 alone. DRS1 improves wound healing and tube formation in vitro.
- 4) Replacing amino acids in some peptides with D-amino acids leads to improved antibacterial and anti-biofilm activity.
- 5) Using ultra-high doses of gentamicin in vitro leads to decreased tube formation through upregulation of the anti-angiogenics gene CXCL10. Similar treatments in macrophages also increased CXCL10 and pro-inflammatory cytokine expression.

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

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

**The benchwork for my projects has been completed. We are waiting on reviews from the submitted publications and I plan to submit the dermaseptin publication in the weeks following the completion of my NRC fellowship.**

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

**Olekson, MA; You, T; Savage, PB; Leung, KP. "Anti-biofilm ceragenin peptide-mimics induce wound healing functions in vitro". Submitted to J Applied Microbiology June 2016.**

Olekson, MA; Rose, LF; Carlsson, AH; Fletcher JL; Leung, KP; Chan, RK. "Ultrahigh dose gentamicin alters inflammation and angiogenesis in vivo and in vitro". Submitted to Angiogenesis August 2016.

Olekson, MA; Karna, SLR; Leung, KP. "Evaluation of dermaseptin S1 (DRS1) and DRS1-derived peptides for antimicrobial activity and wound healing in vitro". In preparation for submission to Peptides in September 2016.

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

Domestic

7<sup>th</sup> ASM Conference on Biofilms, Chicago, IL, October 2015

Poster "High-throughput in vitro evaluation of anti-biofilm treatments that promote wound healing

28<sup>th</sup> Annual Southern Regional Burn Conference, Dallas, TX, November 2015

Oral Presentation - "High dose gentamicin modulates the angiogenesis-related genes and phenotypes both in vitro and in vivo"

Wound Healing Society Annual Meeting, Atlanta, GA, April 2016

Oral Presentation - "Anti-biofilm peptides and peptide-mimics stimulate wound healing processes in vitro

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*

3rd Place, Fellow/Resident Oral Presentation, Southern Regional Burn Conference, 2015

14) *POST-TENURE POSITION / JOB TITLE*

N/A yet - I am currently applying to jobs in industry,

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

N/A

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

- |                                                                                               |                                                                                                   |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Permanent position at the host agency                                | <input type="checkbox"/> Research/administration position in private industry in the U.S.         |
| <input type="checkbox"/> Contract or temporary position at the host Agency                    | <input type="checkbox"/> Research/administration position in private industry outside of the U.S. |
| Abbreviate Host Laboratory/Center _____                                                       |                                                                                                   |
| <input type="checkbox"/> Research/Administrative position with another U.S.-government agency | <input type="checkbox"/> Research/administration position with a non profit                       |
| <input type="checkbox"/> Research/Administrative position with a foreign-government agency    | <input type="checkbox"/> Self-employed/consulting                                                 |
| <input type="checkbox"/> Research/teaching position at a U.S. college or university           | <input type="checkbox"/> Postdoctoral research                                                    |
| <input type="checkbox"/> Research/teaching position at a foreign college or university        | <input type="checkbox"/> Other (Please specify, possible) _____                                   |
|                                                                                               | <input checked="" type="checkbox"/> 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

**9** Development of knowledge, skills, and research productivity

**Comments**

The acquisition of new knowledge and skills during my time as an NRC fellow was very beneficial. Not only did I have the chance to sharpen my ability to create and perform cell-based assays, but I was also able to obtain a completely new skill set in microbiology (bacteria/biofilm culture) and PCR/gene expression analysis. Being in a research center so closely related to the burn clinic allowed me to gain even more knowledge on wound healing and models for human wounds.

LONG TERM VALUE

**8** How the NRC Research Associateship award affected your career to date

**Comments**

I am currently in a transition between my fellowship and my next position, which I hope will be in industry, but I do think my training here will be instrumental in my career going forward.

LAB SUPPORT

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

**Comments**

The Leung laboratory has state-of-the-art facilities, and the laboratory has supported my project in terms of supplies and funding since I first started my fellowship. I was embraced as part of the team. The US AISR also has very strict and up-to-date health and safety regulations.

ADVISER/MENTOR SUPPORT

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

**Comments**

It was a privilege to work for Dr. Leung for two years. As a PI, he is very enthusiastic about all areas of research in his laboratory. He is very accessible and always stayed engaged in my projects over the course of my fellowship. He does everything possible to help the project be a success by providing advice, funding, and contacts to potential collaborators.

LPR SUPPORT

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

**Comments**

Dr. Dubick was very friendly and helpful in providing support for NRC travel and award renewals.

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**

The quality of administrative support I received from the NRC program was excellent. Peggy and everyone in travel, payroll, and insurance that I dealt with responded promptly and were very friendly and knowledgeable. I especially want to point out Peggy who was such an immense help while transitioning into the program and also answering any questions that came up during my tenure as an NRC fellow. I really enjoyed being a part of this program.

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](mailto:lprobst@nas.edu)  
Linda Sligh: [lsligh@nas.edu](mailto:lsligh@nas.edu)  
Melanie Suydam: [msuydam@nas.edu](mailto:msuydam@nas.edu)  
Peggy Wilson: [pwilson@nas.edu](mailto:pwilson@nas.edu)

Id#

Rev. October 2015

Proj/Act ID#

## NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOICATE FINAL REPORT

**Associate:** Parida, Bijaya Kumar  
**Program:** AMRMC - U.S. Army Medical Research & Materiel Command  
U.S. Army Institute of Surgical Research  
US Army Institute of Surgical Research  
Fort Sam Houston, TX 78234-6315  
**Opportunity:** B4676/Hemostatic Function in Trauma  
**Adviser:** Dubick, Michael A.  
**Research Proposal:** Studies into the Relationship Between Microparticles and Trauma-induced Inflammation and Coagulopathy  
**Tenure Dates:** 03/19/2012-09/18/2016

### RESEARCH ACCOMPLISHMENTS

1. Characterization of cell-derived microparticles in plasma of trauma patients.
2. Evaluation of silica beads and its comparison to polystyrene beads as microparticle standards
3. A prospective study of the immunoinflammatory profiles of trauma and burn patients.
4. Evaluation of various pre-analytical and analytical conditions for microparticle analysis.
5. Participated in various collaborative projects within the department, institute and outside collaborators. Results from these projects were submitted as abstracts to scientific meetings.

### SCHOLARLY PRODUCTIVITY

#### ARTICLES - PEER REVIEWED

|                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parida, BK; McFaul, SJ; Cap, AP, 2016, Evaluation of liquid cold storage of platelet poor plasma for microparticle analysis,                                                                                                                                                                                                                                                                |
| Parida, BK; Meyer, ADJ; Aden, JK; Montgomery, RK; Garrastazu, H; Scherer, MR; Prat, N; McFaul, SJ; Pidcoke, HF; Cap, AP, 2016, Challenges in microvesicle analysis of clinical samples and optimization of methods,                                                                                                                                                                         |
| Parida, BK; McFaul, SJ; Prat, N; Pidcoke, HF; Aden, JK; Wade, CE; Holcomb, J; Cotton, BA; Cap, AP, 2016, Protein C Pathway-related Cellular Microvesicles in Plasma of Trauma Patients: No Association with Coagulopathy,                                                                                                                                                                   |
| Zaar, M; Fedyk, CG; Montgomery, RK; Prat, N; Parida, BK; Hinojosa-Laborde, C; Muniz, GW; Shade, RE; Bauer, C, Delacruz, W; Herzig, M; McFaul, SJ; Convertino, VA; Cap, AP; Pidcoke, HF, 2016, Hemostatic responses to controlled bleeding and simulated bleeding in baboons,                                                                                                                |
| Prat, NJ; Meyer, AD; Lange, r T; Montgomery, RK; Parida BK, Batchinsky, AI; Cap AP, 2015, Low dose heparin anti-coagulation during extracorporeal life support for acute respiratory distress syndrome in conscious sheep, Shock, 44/6/560-8.                                                                                                                                               |
| Parida, BK; Garrastazu, H; Aden, JK; Cap, AP; McFaul, SJ, 2015, Silica microvesicles are superior to polystyrene for microvesicle analysis by flow cytometry, Thrombosis Research, 135/5/1000-6                                                                                                                                                                                             |
| Ketter, PM; Guentzel, N; Schaffer, B; Herzig, M; Wu, X; Montgomery, RK, Parida, BK; Fedyk, CG; Yu, J; Jorgensen; J; Chambers, JP; Cap, AP; Arulanandam, BP, 2014, Severe Acinetobacter baumannii Sepsis Is Associated with Elevation of Pentraxin 3, Infection and Immunity, 82/9/3910-8                                                                                                    |
| Pidcoke, HF; McFaul, SJ; Ramasubramanian, AK; Parida, BK; Mora, AG; Fedyk, CG; Valdez-Delgado, KK; Montgomery, RK; Reddock, KM; Rodriguez, AC; Aden, JK; Jones, JA; Bryant, RS; Scherer, MR; Reddy, HL; Goodrich, RP; Cap, AP, 2013, Primary Hemostatic Capacity of Pathogen-Reduced Whole Blood: A Comprehensive Analysis after Storage at 4°C or 22°C, Transfusion, 53/Suppl 1/ 137S-149S |

#### ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

|                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Meyer, AD; Raghunath, A; Kamucheka, R; Rodriguez, A; Lafleur, C; Parida, BK; Scherer, M; Batchinsky, AI; Cancio, L; Cap, AP, 2016, Platelet-derived microparticles increase thrombin generation and clot formation in an ex-vivo ecls model using human blood, Poster, 32nd Annual Children's National Symposium: ECMO and the Advanced Therapies for Respiratory Failure |
| Meyer, AD; Raghunath, AD; Kamucheka, RM; Rodriguez, AC; Lafleur, CB; Parida, BK; Scherer, MR; Batchinsky, AI; Cancio, LC; Cap, AP, 2016, Platelet-Derived Microparticles Increase Thrombin Generation and Clot Formation In An Ex-Vivo ECLS Model Using Human Blood, 8th Symposium on Hemostasis, Chapel Hill, NC                                                         |
| Meyer, AD; Raghunath, A; Kamucheka, R; Rodriguez, A; Lafleur, C; Parida, BK; Scherer, M; Batchinsky, A; Cancio, L; Cap, AP, 2016, An Ex-Vivo ECMO Model Generates Pro-thrombotic Platelet-Derived Microparticles, Military Health System Research Symposium                                                                                                               |
| Parida, BK; Montgomery, RK; Wendorff, DS; Prat, NJ; Batchinsky, AI; Cap, AP, 2016, Propofol interferes with microparticle measurements in blood samples, Military Health System Research Symposium                                                                                                                                                                        |

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| Herzig, MC, Schaffer, BS, Montgomery, RK, Parida, BK, Fedyk, CG, Aden, JK, Pidcoke, HF, Cap, AP, 2016, Analysis of plasma proteins regulating coagulation balance and correlation with coagulation parameters during tissue debridement surgery mimicking traumatic coagulopathy., Military Health System Research Symposium                                               |
| Prat, NJ; Montgomery, RK; Herzig, MC; Parida, BK; Kreyer, S; Linden, K; Scaravilli, V; Cancio, LC; Batchinsky, AI; Cap, AP., 2016, Platelet and Coagulation Function Before and After Burn and Smoke Inhalation Injury in a Sheep Experimental Model, Military Health System Research Symposium                                                                            |
| Zaar, M; Delacruz, W; Fedyk, C; Montgomery, R; Prat, N; Parida, B; Hinojosa-Laborde, C; Muniz, G; Shade, R; Bauer, C; McFaul, S; Convertino, V; Cap, A; Pidcoke, H, 2015, Hemostatic responses to controlled bleeding and simulated bleeding in baboons, Poster, 3rd Annual San Antonio Postdoctoral Research Forum, UTHSCSA, 2015                                         |
| Li, Y; Batchinsky, AI; Herzig, MC; Montgomery, RK; Liu, B; Parida, BK; Cancio, LC; Cap, AP, 2015, Study of hemocompatibility of mesenchymal stem cells (MSCs) in a model of swine smoke inhalation and burns., Poster, Military Health System Research Conference, Ft. Lauderdale, August 2015.                                                                            |
| Andrew D.J. Meyer MD, MS, Robin Kamucheka, Prajeeda Nair, Kristin M. Reddoch MS, Robbie K. Montgomery MS, Bijaya K. Parida PhD, Andrew P. Cap MD, PhD, Nigel Mackman PhD, and Anand K. Ramasubramanian, PhD, 2014, ECLS device shear stresses induce prothrombotic microparticle formation, Military Health System Research Conference                                     |
| Andrew D Meyer, Robin M Kamucheka, Prajeeda Nair, Kristin M Reddoch, Robbie K Montgomery, Bijaya K Parida, Andrew P Cap, Nigel Mackman, Anand K Ramasubramanian, 2014, Device Relevant Dynamic and Constant Shear Stresses Induces Pro-thrombotic Platelet- and Monocyte-derived Microparticles. , Poster, Arteriosclerosis, Thrombosis, and Vascular Biology meeting 2014 |
| Bijaya K. Parida; Steve J. McFaul; Nicolas Prat; James K. Aden; Robbie K. Montgomery; Hiram Garrastazu; Charles Wade; John Holcomb; Andrew P. Cap, 2014, 5. Protein C pathway-related cellular microvesicles in plasma of trauma patients: no association with coagulopathy, Poster, AABB Annual meeting                                                                   |
| Pidcoke, H; Shade, R; Herzig, M; Schaffer, B; Stewart, K; Fedyk, C; Prat, N; Parida, B; Aden, J; Anderson, S; Reddick, R; Cap, A, 2013, Effects of a Third Generation Perfluorocarbon on Platelet Function and Hemostasis in Baboons With and Without Systemic Inflammation, American Society of Hematology Conference                                                     |
| BK Parida, H Garrastazu, AP Cap, SJ McFaul., 2013, Silica Beads are Superior to Polystyrene for Sizing Cellular Microparticles, Poster, AABB annual meeting                                                                                                                                                                                                                |
| BK Parida, AP Cap, SJ McFaul, 2012, 10. Centrifugation Effects on Plasma Microparticle Populations, AABB annual Meeting 2012                                                                                                                                                                                                                                               |

#### PRESENTATIONS - DOMESTIC

|                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parida, BK; Meyer, ADJ; Aden, JK; Montgomery, RK; Garrastazu, H; Scherer, MR; Prat, N; McFaul, SJ; Pidcoke, HF; Cap, AP, 02/11/2016, Challenges in microvesicle analysis in clinical samples and optimization of methods, FlowTex, Houston, TX |
| McFaul, SJ; Garrastazu, H, Rodriguez, A; Parida, BK; Cap, AP; Campbell, J, 08/13/2012, Inhibition of Platelet Aggregation in Blood Exposed to Arterial Shear by Supernate from Stored Red Blood Cells, MHSRS 2012                              |

#### PRESENTATIONS - INTERNATIONAL

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#### PATENTS

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#### AWARDS

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| 02/12/2016, Emerging Investigator award, FlowTex, Houston, TX |
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