

Award Number: W81XWH-17-2-0033

TITLE: AMRMC Resident Research Associateship Program

PRINCIPAL INVESTIGATOR: Dr. Ray Gamble

CONTRACTING ORGANIZATION: The National Academy of Sciences, Engineering and Medicine
Washington, DC 20001

REPORT DATE: Sept 2018

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;
Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

| | | | | | |
|--|---|--|---|---|---|
| 1. REPORT DATE Sept 2018 | | 2. REPORT TYPE Annual | | 3. DATES COVERED 1 Sep 2017 - 31 Aug 2018 | |
| 4. TITLE AND SUBTITLE AMRMC Resident Research Associateship Program | | | | 5a. CONTRACT NUMBER | |
| | | | | 5b. GRANT NUMBER W81XWH-17-2-0033 | |
| | | | | 5c. PROGRAM ELEMENT NUMBER | |
| 6. AUTHOR(S) Dr. Ray Gamble E-Mail: rgamble@nas.edu | | | | 5d. PROJECT NUMBER | |
| | | | | 5e. TASK NUMBER | |
| | | | | 5f. WORK UNIT NUMBER | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) The National Academy of Sciences, Engineering and Medicine 500 5th Street NW, Washington, DC 20001 | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012 | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | |
| 12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT The NRC Research Associateship Program provides postdoctoral and senior research fellowship awards to outstanding applicants who perform research supporting the mission of AMRMC laboratories. These awards provide opportunities that enable AMRMC/NRC Research Associates to increase their proficiency in conducting research, advance the research programs of AMRMC, and make AMRMC laboratory facilities, often including unique equipment, available to the scientific community. The program further provides a pool of talented researchers who may be retained as contractors or civilian employees, thereby contributing to scientific workforce development. | | | | | |
| 15. SUBJECT TERMS Postdoctoral fellowships research, bio-medical research, training, education | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT UU Unclassified | 18. NUMBER OF PAGES 14 | 19a. NAME OF RESPONSIBLE PERSON USAMRMC |
| a. REPORT U Unclassified | b. ABSTRACT U Unclassified | c. THIS PAGE U Unclassified | | | 19b. TELEPHONE NUMBER (include area code) |

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
RESEARCH ASSOCIATESHIP PROGRAM
with
AMRMC - U.S. Army Institute of Surgical Research

Annual Contract Technical Report

Contract No. W81XWH-17-2-0033
Contract Period: 09/01/2017-08/31/2022
Report Period: 09/01/2017-08/31/2018

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

Outreach and Promotion

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

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

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

Processing and Review of Applications

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

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

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

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

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

Administration of Awards

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

For NRC Research Associates beginning or continuing tenure, the Academies provided the administrative functions described in the contract Statement of Work. These functions included stipend payments,

management of a major medical benefits insurance program, and reimbursement for relocation and travel to professional meetings.

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

Outcomes Reporting

All NRC Research Associates who completed tenure were requested to submit a final report that described the outcome of their Research Associateship award. A summary of the activities of NRC Research Associates who submitted final reports during this reporting period, including publications, presentations and patents, as well as an assessment of their experience in the program, are summarized in Table 3. Specific accomplishments of NRC Research Associates completing tenure during the reporting period are summarized in individual Final Reports (attached to annual technical reports).

Table 1. Summary of applications and awards

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

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

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

AMRMC - U.S. Army Institute of Surgical Research

Table 1: Summary of applications and awards

| | Applications | | | Lab Decision/Outcome | | |
|----------------------------|--------------|----------|-------------|----------------------|-----------------|----------|
| | Submitted | Reviewed | Recommended | Awards Offered | Awards Accepted | No Offer |
| Nov 2017 | 1 | 1 | 1 | 1 | 1 | 0 |
| Feb 2018 | 1 | 1 | 1 | 1 | 0 | 0 |
| May 2018 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aug 2018 | 1 | 1 | 1 | 1 | 0 | 0 |
| Total (All Reviews) | 3 | 3 | 3 | 3 | 1 | 0 |

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

| Associate | Adviser | Tenure Dates | Country of Citizenship | Final Report |
|---|----------------------|----------------------|-------------------------------|---------------------|
| U.S. Army Institute of Surgical Research | | | | |
| Greene, Whitney Ann | Wang, Heuy-Ching H. | 4/25/2012-10/24/2017 | United States | Received |
| Nguyen, Jesse Quoc | Leung, Kai P | 3/1/2017-2/28/2019 | United States | |
| Rebeles, Jennifer | Wang, Heuy-Ching H. | 3/1/2018-7/26/2018 | United States | Received |
| Sosanya, Natasha | Christy, Robert John | 4/20/2015-3/20/2019 | United States | |

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

- 2 Associates ended tenure during the report period
- 35 months was the average tenure length
- 66 months was the longest
- 4 months was the shortest
- 2 submitted final reports

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

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

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

- 0 Permanent position at the NRC host agency
- 1 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.
- 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:

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

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

NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

Associate: Greene, Whitney Ann
Program: AMRMC - U.S. Army Medical Research & Materiel Command
U.S. Army Institute of Surgical Research
Laser Research
Fort Sam Houston, TX 78234-6315
Opportunity: B4117/Ocular Trauma Treatment
Adviser: Wang, Heuy-Ching H.
Research Proposal: Visualization of Retinal Pigment Epithelial Cells and Photoreceptors During Repair of Ocular Trauma
Tenure Dates: 04/25/2012-10/24/2017

RESEARCH ACCOMPLISHMENTS

1. I was very fortunate to be able to work on a project of great significance to military personnel who suffer from combat-induced ocular trauma. We were able to develop an accurate in vitro model of proliferative vitreoretinopathy that will facilitate the identification of effective therapeutics for this blinding disorder that occurs after ocular trauma.
2. I have been able to attend several national and international scientific meetings, where I was able to present my work to other researchers who also work on ocular trauma.
3. I was invited to speak at the Association for Research in Vision and Ophthalmology annual meeting.
4. Our findings that resulted from study of the in vitro model have been published in high impact, peer-reviewed scientific journals.
5. Data from our in vitro model was included in a competitive grant proposal for intramural funding. The proposal received an excellent score and was funded, leading to the funding for my current position as a staff scientist, which allow me to continue my work on ocular trauma.

SCHOLARLY PRODUCTIVITY

ARTICLES - PEER REVIEWED

| |
|---|
| Greene, Whitney; Burke, Teresa; Por, Elaine; Kaini, Ramesh; Wang, Heuy-Ching., 2017, Polarized Secretion of Matrix Metalloproteinases and Their Inhibitors by Retinal Pigment Epithelium Derived from Induced Pluripotent Stem Cells During Wound Healing. , J Ocul Pharmacol Ther. |
| Greene, Whitney; Sanchez-Diaz, Patricia; Burke, Teresa; Kaini, Ramesh; Wang, Heuy-Ching. , 2017, Retinal pigment epithelium derived from induced pluripotent stem cells express pro-fibrotic genes during wound healing, |
| Kaini, Ramesh; Shen-Gunther, Jane; Cleland, Jeffery; Greene, Whitney; Wang, Heuy-Ching. , 2016, Recombinant Xeno-Free Vitronectin Supports Self-Renewal and Pluripotency in Protein-Induced Pluripotent Stem Cells, Tissue Eng Part C Methods. 2016 Jan 15. |
| Por, Elaine; Greene, Whitney; Burke, Teresa; Wang, Heuy-Ching. , 2016, Trichostatin A Inhibits Retinal Pigmented Epithelium Activation in an In Vitro Model of Proliferative Vitreoretinopathy., J Ocul Pharmacol Ther. 2016 Sep;32(7):415-24. doi: 10.1089/jop.2016.0038. |
| Greene, Whitney; Burke, Teresa; Por, Elaine; Kaini, Ramesh; Wang, Heuy-Ching. , 2016, Secretion Profile of Induced Pluripotent Stem Cell-Derived Retinal Pigment Epithelium During Wound Healing. , Invest Ophthalmol Vis Sci. 2016 Aug 1;57(10):4428-4441. doi: 10.1167/iops.16-19192. |
| Choi, Jae Hyek; Greene, Whitney; Johnson, Anthony; Chavko, Mikulas Cleland, Jeffery; McCarron, Richard; Wang, Heuy-Ching. , 2015, Pathophysiology of blast-induced ocular trauma in rats after repeated exposure to low-level blast overpressure. , Clinical and Experimental Ophthalmology 43: 239–246 doi: 10.1111/ceo.12407 |
| Muñiz Alberto; Kaini, Ramesh; Greene, Whitney; Choi, Jae Hyek; Wang, Heuy-Ching. , 2015, Deriving retinal pigment epithelium (RPE) from induced pluripotent stem (iPS) cells by different sizes of embryoid bodies. , J Vis Exp. 2015 Feb 4;(96). doi: 10.3791/52262. |
| Wang,Heuy-Ching Hetty; Choi, Jae-Hyek; Greene, Whitney; Plamper, SPC Mark; Cortez, SGT Hector; Chavko, Mikulas; Li,Yansong; Dalle Luca, LTC Jurandir; Johnson, COL Anthony. , 2014, Pathophysiology of Blast-Induced Ocular Trauma With Apoptosis in the Retina and Optic Nerve, Military Medicine, 179,8:34, 34-40 |

| |
|---|
| Muniz,Alberto; Greene, Whitney; Plamper, Mark; Choi, Jae Hyek; Johnson, Anthony; Tsin, Andrew; Wang, Heuy-Ching. , 2014, Retinoid Uptake, Processing, and Secretion in Human iPS-RPE Support the Visual Cycle, Investigative Ophthalmology and Visual Science 55:1 198-209. |
| Greene, Whitney; Muñiz, Alberto; Plamper, Mark; Kaini, Ramesh; Wang, Heuy-Ching., 2014, MicroRNA Expression Profiles of Human iPS Cells, Retinal Pigment Epithelium Derived From iPS, and Fetal Retinal Pigment Epithelium., Journal of Visualized Experiments 88. e51589 |
| Wang, Heuy-Ching; Greene, Whitney; Kaini, Ramesh; Shen-Gunther, Jane; Chen, Hung-I H; Cai, Hong; Wang, Yufeng. , 2014, Profiling the microRNA Expression in Human iPS and iPS-derived Retinal Pigment Epithelium. , Cancer Informatics 2014:13(S5) 25-35. |

ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

| |
|---|
| Cornell, Lauren; Greene, Whitney., 2017, Proceedings of the 4th Annual United States Army Institute of Surgical Research Summer Undergraduate Research Internship Program 2016. , Journal of Translational Medicine |
|---|

PRESENTATIONS - DOMESTIC

| |
|--|
| Greene, Whitney; Sanchez-Diaz, Patricia; Burke, Teresa; Kaini, Ramesh; Por, Elaine; Wang, Heuy-Ching, 02/16/2017, Expression of pro-fibrotic genes in an in vitro model of Proliferative Vitreoretinopathy, 3rd RegenMed SA conference on Stem Cell Research & Regenerative Medicine. San Antonio, TX USA |
| Greene, Whitney; Wang, Heuy-Ching., 12/12/2016, An in vitro model of ocular fibrosis using stem cell-derived retinal pigment epithelium. , Tissue Engineering and Regenerative Medicine International Society Annual Meeting, San Diego, CA USA |
| Greene, Whitney, 09/21/2016, A Wound Healing Model Using Stem Cell-Derived Retinal Pigment Epithelium. , San Antonio Post-doctoral Research Forum, San Antonio TX USA |
| Greene, Whitney; Burke, Teresa; . Kaini, Ramesh; Por, Elaine; Wang, Heuy-Ching, 08/16/2016, Polarized Secretion of Matrix Metalloproteinases and Their Inhibitors by Retinal Pigment Epithelium Derived from Induced Pluripotent Stem Cells during Wound Healing. , Military Health System Research Symposium, Orlando, FL USA |
| Greene, Whitney; Por, Elaine; Wang, Heuy-Ching, 05/04/2016, Polarized Secretion of MMPs and TIMPs by Retinal Pigment Epithelium during Wound Healing. , Association for Research in Vision and Ophthalmology Annual International Conference. Seattle WA USA |
| Greene, Whitney; Por, Elaine; Wang, Heuy-Ching, 02/09/2016, Screening pharmacological compounds using an in vitro model of proliferative vitreoretinopathy, Fibrosis: From Basic Mechanisms to Targeted Therapies. Keystone, Colorado USA |
| Greene, Whitney; Por, Elaine; Wang, Heuy-Ching, 09/15/2015, Screening pharmacological compounds using an in vitro model of proliferative vitreoretinopathy, San Antonio Post-doctoral Research Forum, San Antonio TX USA |
| Greene, Whitney; Por, Elaine; Wang, Heuy-Ching, 08/18/2015, Screening pharmacological compounds using an in vitro model of proliferative vitreoretinopathy, Military Health System Research Symposium, Ft. Lauderdale, FL USA |
| Greene, Whitney; Por, Elaine; Johnson, Anthony; Wang, Heuy-Ching, 03/01/2015, Screening Pharmacological Compounds Using an in vitro Model of Proliferative Vitreoretinopathy. , Association for Ocular Pharmacology and Therapeutics Biennial Meeting, Charleston SC USA |
| Greene, Whitney; Muniz, Alberto; Johnson, Anthony; Wang, Heuy-Ching , 09/16/2014, Development of an in vitro Model of Proliferative Vitreoretinopathy Using Retinal Pigment Epithelium Derived from Induced Pluripotent Stem Cells. , San Antonio Post-doctoral Research Forum, San Antonio TX USA |
| Greene, Whitney; Muniz, Alberto; Johnson, Anthony; Wang, Heuy-Ching , 08/19/2014, Development of an in vitro Model of Proliferative Vitreoretinopathy Using Retinal Pigment Epithelium Derived from Induced Pluripotent Stem Cells, Military Health System Research Symposium, Fort Lauderdale, FL |
| Greene, Whitney; Muniz, Alberto; Johnson, Anthony; Wang, Heuy-Ching , 05/04/2014, Development of an in vitro Model of Proliferative Vitreoretinopathy Using Retinal Pigment Epithelium Derived from Induced Pluripotent Stem Cells, Association for Research in Vision and Ophthalmology Annual International Conference. Orlando FL USA |
| Greene, Whitney; Muñiz, Alberto; Plamper, Mark; Choi, Jae-Hyek; Wang, Heuy-Ching, 02/13/2014, MicroRNA Expression Profiles of Retinal Pigment Epithelium derived from iPS, Human iPS cells, and Fetal Retinal Pigment Epithelium, First Annual San Antonio Conference on Stem Cell Research and Regenerative Medicine San Antonio Texas |
| Greene, Whitney; Muñiz, Alberto; Plamper, Mark; Choi, Jae-Hyek; Wang, Heuy-Ching, 06/12/2013, MicroRNA Expression Profiles of Retinal Pigment Epithelium derived from iPS, Human iPS cells, and Fetal Retinal Pigment Epithelium, International Society of Stem Cell Research Annual Meeting Boston MA |
| Choi, Jae-Hyek; Greene, Whitney; Johnson, Anthony; Cleland, Jeffery; Wang, Heuy-Ching., 05/09/2013, The effects of repeated exposure to low level blast overpressure on rat ocular tissues. , Association for Research in Vision and Ophthalmology Annual International Conference. Seattle WA |

Wang, Heuy-Ching; Muñiz, Alberto; Plamper, Mark; Choi, Jae-Hyek; Greene, Whitney., 05/07/2013, Differential miRNA expression profile of early passage iPS-RPE compared to later passage iPS-RPE , Association for Research in Vision and Ophthalmology Annual International Conference. Seattle WA

Muñiz, Alberto; Plamper, Mark; Choi, Jae Hyek; Greene, Whitney; Johnson, Anthony; Tsin, Andrew; Wang, Heuy-Ching. , 05/06/2013, Human iPS-RPE Synthesize and Release 11-cis Retinaldehyde from Exogenous All-trans Retinol. , Association for Research in Vision and Ophthalmology Annual International Conference. Seattle WA

Choi , J-H. ; Greene, Whitney; Chavko, Mikulas; Li, Yansong; Dalle Lucca, Jurandir; Wang, Heuy-Ching. , 09/23/2012, Pathophysiological Damage in Ocular Tissues from Rats Exposed to Blast Overpressure., Military Vision Research Symposium, Schepen's Eye Institute, Boston, MA

PRESENTATIONS - INTERNATIONAL

PATENTS

AWARDS

NRC RESEARCH ASSOCIATESHIP PROGRAM ASSOCIATE FINAL REPORT

Associate: Rebeles, Jennifer
Program: AMRMC - U.S. Army Medical Research & Materiel Command
U.S. Army Institute of Surgical Research
Laser Research
Fort Sam Houston, TX 78234-6315
Opportunity: B4117/Ocular Trauma Treatment
Adviser: Wang, Heuy-Ching H.
Research Proposal: Exosomes from Induced Pluripotent Derived Retinal Pigment Epithelium: Characterization and Efficacy of Retinal Regeneration
Tenure Dates: 03/01/2018-07/26/2018

RESEARCH ACCOMPLISHMENTS

During my tenure working in the lab at the Institute of Surgical Research (ISR), I was limited in the bench work I was allowed to participate in. My sole responsibilities were practicing culturing induced pluripotent stem cells for some months before I could learn differentiation to retinal progenitor cells. I offered suggestions in the optimization of the protocol used to differentiate the stem cells, but my cells have not been used in experiments, so I do not have any significant findings to report. Additionally, I do not have significant accomplishments to report.

SCHOLARLY PRODUCTIVITY

ARTICLES - PEER REVIEWED

Jennifer Rebeles, PhD; Jennifer S. McDaniel, PhD; Andrew W. Holt, PhD; Gregory T. Bramblett, MD, PhD; Elof E. Eriksson, MD, PhD; Anthony J. Johnson, MD; Gina L. Griffith, PhD, 2018, Treating Corneal Infections Utilizing an Ocular Wound Chamber,

ARTICLES - OTHER (PROCEEDINGS, BOOK CHAPTERS, OTHER)

PRESENTATIONS - DOMESTIC

PRESENTATIONS - INTERNATIONAL

PATENTS

AWARDS