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14. ABSTRACT The Roswell Park/Howard University Prostate Cancer Scholars Program is designed to encourage students from under-represented minority groups to enter graduate training and ultimately careers in prostate cancer research. The three-phased program combines elements of pre-internship tele-mentoring, mentored summer research experience and post-internship mentoring activities in order to: (1) inform a student's decisions regarding graduate training, (2) motivate the pursuit of prostate cancer research with an emphasis in cancer health disparities and (3) support successful entry, transition and retention into graduate training. Two Howard University Honors Sophomore students and two Howard University Junior students were accepted and enrolled in the program in PGY3. Both Sophomore students are currently progressing through the preparatory tele-mentoring phase of the program. One of these, optioned to conduct a summer experience at the end of their Sophomore year in addition to the required summer experience following her junior year as a result of available funding and to maximize her research productivity. Four students completed the 10 week summer experience in 2017 at Roswell Park Cancer Institute. Three of the four students are scheduled to attend and present their summer's research at the Society for Basic Urologic Research (SBUR) scientific conference in November.					
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Table of Contents

	<u>Page</u>
1. Introduction.....	4
2. Keywords.....	4
3. Accomplishments.....	4
4. Impact.....	16
5. Changes/Problems.....	16
6. Products.....	19
7. Participants & Other Collaborating Organizations.....	19
8. Special Reporting Requirements.....	22
9. Appendices.....	22

1. Introduction:

There is an abundance of evidence that prostate cancer occurs at an earlier age and at a more aggressive form in African-American men versus the rest of the population. This disproportionate burden is due in part to biological, educational, socio-economic and healthcare disparities. Concomitant to these health disparities is the under-representation of minority healthcare and research professionals to address such challenges. The Roswell Park/Howard University Prostate Cancer Scholars Program (RHPCS) aims to encourage students from under-represented minority groups to enter graduate training, and ultimately, careers in prostate cancer research. The RHPCS program expands the pre-existing academic partnership between Roswell Park Cancer Institute (RPCI) and Howard University (HU) to immerse students in a mentor supported comprehensive prostate cancer research experience which integrates three elements of training activities- (1) pre-internship tele-mentored Directed Readings, (2) a core summer research experience internship and (3) post-internship mentored professional activities. Pre-internship tele-mentored Directed Readings provide scholars with knowledge in basic prostate cancer biology and familiarizes them with the research mentor's area of research in order to formulate a summer research project and facilitate a smooth transition into a productive summer research experience. Central to the training program is the ten week summer research experience during which time scholars will work on their research project, attend accompanying co-curricular activities and present a capstone talk and poster of their research results. Scholars receive extended mentoring and advisement in preparation for presenting their research at a national conference and entry into graduate school. The value of RHPCS Program for encouraging and preparing minority students for a career in prostate cancer research will be measured in the short term by the number of RHPCS participants entering graduate training and the in the long term by the number entering professions related to prostate cancer.

- 2. Keywords:** Howard University, Roswell Park Cancer Institute, prostate cancer, tele-mentored directed readings, undergraduate summer research experience

3. Accomplishments:

What were the major goals of the project?

The following are major goals for the project per the approved SOW:

SOW-Specific aim 1: Encourage undergraduate students at Howard University to pursue graduate training in prostate cancer research.

SOW-Specific aim 2: Prepare Prostate Cancer Scholars for mentored research experiences at RPCI.

SOW-Specific aim 3: Provide mentored research, scholarly and professional development experiences.

SOW-Specific Aim 4: Test value of RHPCS Program to encourage interns to enter graduate training and careers in prostate cancer research.

Completion dates for activities and progress on milestones:

The components of the approved statement-of-work (SOW) are listed in chronological order. Scheduled activity completion dates and milestones per the SOW are shown in *italics*. The scheduled completion dates use the same convention on the SOW for defining the project year and months in which the tasks will be completed- *Project Year: starting month-ending month*. Actual completion dates and percentage of progress on milestone completion accomplished during this reporting period are in bold.

SOW-Specific aim 1: Encourage undergraduate students at Howard University to pursue graduate training in prostate cancer research.

SOW-Major task 1: Promote RHPCS Program to Howard University undergraduate students.

SOW-Task 1a. RHPCS program brochure and promotional materials are disseminated to Howard University biology students. The Project Director and Faculty Advisor coordinate a recruitment visit to Howard University by RPCI's project leadership team and an RHPCS mentor. The mentor presents a prostate cancer research seminar and the leadership team and mentor conduct informational sessions on the RHPCS program and graduate training at RPCI.

- *Scheduled completion – Recruitment trip and promotion: Trip 1: PGY1:1-2; Trip 2: PGY2:13-14; Trip 3: PGY:25-26*
- Actual completion (**100% complete**): Recruitment trip 1: **10-07-14** & Recruitment trip2: **9-9-15 (PGY1)***Recruitment trip 3: **8/31/16 (PGY 2)**

*Note: The second recruitment trip was planned earlier and within the same program year as the first trip.

SOW-Task 1b. HU students apply to RHPCS program. Applications are reviewed for eligibility and applicants are matched with mentors.

- *Scheduled completion, PGY 1:3-4*
- Actual completion, **11-29-14**
- *Scheduled completion, PGY 2:15-16*
- Actual completion, **11-25-15**
- *Scheduled completion, PGY 3:*
- Actual completion, **11-23-16**

SOW-Milestone 1: Enrollment of 5 Howard University students into RHPCS Program per project year

Target total of 15 enrollments for three years:

5 students in PGY1, 2014 cohort juniors (1 semester tele-mentored readings, Summer internship PGY1)

5 students in PGY1, 2014 cohort honors sophomores (3 semester tele-mentored readings, Summer internship PGY2)

5 students in PGY2, 2015 cohort honors sophomores (3 semester tele-mentored readings, Summer internship PGY3)

If necessary to make up for loss to attrition:

Up to 5 students in PGY3, 2016 cohort juniors (1 spring semester tele-mentored readings, Summer internship PGY3)

Actual PGY1:

4 students enrolled in the 2014 cohort juniors

4 students enrolled in the 2014 cohort honors sophomores

Actual PGY 2:

2 students enrolled in the 2015 cohort honors sophomores

Actual PGY 3:

1 student enrolled in the 2017 cohort sophomore (no tele-mentoring)

1 student enrolled in the 2017 cohort junior (no tele-mentoring)

Progress toward overall project Milestone 1: **80.0%** completed

SOW-Specific aim 2: Prepare Prostate Cancer Scholars for mentored research experiences at RPCI

SOW-Major task 2: Arrange pre-internship tele-mentorships between mentors and Prostate Cancer Scholars

SOW- Task 2a. The Project Director and Faculty Advisor arrange connections between RPCI mentors and Prostate Cancer Scholars on the existing RPCI web conference software and monitor progression of tele-mentorships. The Faculty Advisor conducts an informational session with RPCI mentors via web conference on the “Directed Readings” course syllabus, format, assessment and expectations. The Directed Readings Course is offered to Honors Sophomores and spans three semesters (1 fall and 2 springs) prior to the summer research experience. Non-honors juniors will conduct 1 spring semester of tele-mentorship prior to their summer research experience.

- *Scheduled completion,PGY1: 5-8 spring 2015*
- *Actual completion, **4-23-15***
- *Scheduled completion,PGY2:13-16 fall 2015,17-20 spring 2016*
- *Actual completion, **4-22-16***
- *Scheduled completion, PGY3:25-28 fall 2016,29-32 spring 2017*
- *Actual completion, **4-25-17***

SOW-Milestone 2: *Howard Prostate Cancer Scholars learn prostate cancer biology, become familiar with mentor's publications and research goals, develop pre-internship relationship with mentors and lab staff and formulate initial scope of summer research work.*

Target total of 35 semesters of tele-mentored scientific readings for 3 years
One semester tele-mentored readings by non-honors juniors: 5 juniors x 1 Semester = 5 semesters and three semester tele-mentored Directed Readings course by Honors Sophomores: 10 sophomores x 3 semesters= 30 semesters

Actual:

- **8 semesters=** (4 2014 cohort juniors x 1 semester)+ (4 2014 cohort honors sophomores x 1 semester)
- **10 semesters=** (4 2014 cohort honors sophomores x 2 semesters) + (2 2015 cohort honors sophomores x 1 semester)
- **6 semesters=** (2 2015 cohort honors sophomores x 2 semesters) + (2 2016 cohort honors sophomores x 1 semester)

Progress toward overall project Milestone 2- **68.6%** completed.

SOW-Specific aim 3: *Provide mentored research, scholarly and professional development experiences.*

Major task 3: *Howard Prostate Cancer Scholars conduct 10-week mentored prostate cancer research experience at RPCI.*

3a RPCI mentors supervise Prostate Cancer Scholars in summer research projects. The Project Director provides administrative support for internship enrollment, lodging arrangements, co-curricular activities, research project deadlines, and research symposium and pre/post program assessments.

- *Scheduled Completion- PGY1:9-12*
- *Actual completion: **8-7-15***
- *Scheduled Completion- PGY2: 21-24*
- *Actual completion: **8-12-16***
- *Scheduled Completion-PGY3: 33-36*
- *Actual completion: **8-11-17***

SOW- Milestone 3: Prostate Cancer Scholars obtain an immersive experience in prostate cancer research, produce a summer research project and present their research project in poster and oral formats

Target total of 15 Prostate Cancer Scholars receive immersive research experiences over three years:

5 students in PGY1, 2014 cohort juniors

5 students in PGY2, 2014 cohort honors sophomores

5 students in PGY3, 2015 cohort honors sophomores

If necessary to make up internships due to attrition:

Up to 5 students, PGY3, 2016 cohort juniors

Actual:

- 3 students in 2014 cohort juniors completed summer research experiences in PGY1
- 5 students= 4 students in 2014 cohort Honors Sophomores and 1 student in 2015 cohort Honors Sophomores completed summer research experiences in PGY2
- 4 students= 1 student in 2015 cohort Honors Sophomores, 1 student in 2016 cohort Honors Sophomores and two non-tele-mentored students (1 cohort junior and 1 cohort Sophomore) completed summer research experiences in PGY3

Progress toward overall project Milestone 3- **80.0%** completed

SOW-Specific Aim 4: Test value of RHPCS Program to encourage interns to enter graduate training and careers in prostate cancer research.

SOW-Major Task 4: Track Prostate Cancer Scholar professional activities.

4a Attendance and research presentation at conferences are arranged for Scholars and either PI, Faculty Advisor or mentor.

Actual

- 3 students in 2014 cohort juniors traveled to the Society for Basic Urologic Research (SBUR) meeting and presented their research (Fort Lauderdale, FL, November 12-15, 2015)
- 4 students in 2014 cohort Honors Sophomores traveled to the Society for Basic Urologic Research (SBUR) meeting and presented their research (Scottsdale, AR, November 10-13, 2016)

SOW-Task 4b-The Faculty Advisor obtains Prostate Cancer Scholar's retrospective evaluation of RHPCS program and post-graduate education pursuits and reports to the Project Director.

Actual

- 3 students (100%) in the 2014 cohort juniors evaluated their experience in the *Prostate Cancer Scholars Program* and reported on intended post-graduate education pursuits
- 4 students (80%) in the 2014 cohort sophomores evaluated their experience in the *Prostate Cancer Scholars Program* and reported on intended post-graduate education pursuits

*Note, the approved SOW shows that this task would be accomplished in month seven of Project Year 1; this is an error and needs to be amended since the timing of this activity would have occurred before the summer internship phase of the program. Reporting on academic pursuits and retrospective evaluation took place in the April following the program phase sequence for each cohort.

SOW-Task 4c-The Project Director administers the “Alumni Achievement” surveys to alumni and track short term (1 year) and long term (2-3 year) education and career attainment.

- 3 students (100%) in the 2014 cohort juniors reported on their post-graduate education or career plans by responding to a survey administered in April, 2015
- 4 students (80%) in the 2014 cohort sophomores reported on their post-graduate education or career plans by responding to a survey administered in April, 2016

SOW-Milestone 4- *The education attainment, career progress and professional achievements of program alumni are tracked.* Progress toward overall project milestone 4: **47%** completed.

What was accomplished under these goals?

Two HU students were selected from an applicant pool of four students and confirmed their acceptance as *Prostate Cancer Scholars* into the RHPCS program to comprise the 2016 cohort honors sophomores in PGY3. Four students completed a ten week research experience. This class was comprised of one 2015 cohort honor sophomore, one 2016 cohort honor sophomore and two HU students who did not conduct a tele-mentoring as part of the approved adjusted SOW. The student from the 2016 cohort honors sophomores conducted a summer research experience after one semester of tele-mentored readings as part of the modified program sequence which allows a student to conduct two subsequent summer research experiences with the goal of enhancing the productivity of their experience and utilizing an excess of stipend funds resulting from program attrition. Two students in the 2016 cohort honors sophomores are currently progressing through the second sequence of the three-semester tele-mentored Directed Readings course. The table below summarizes the recruitment of students into the program and their progression as cohorts through the three phases of the program:

	PGY1-3 (2014-2017)			
	Applied	Offers	Tele-Mentored	Summer Internships
2014 cohort juniors	4	4	4	3
2014 cohort honors sophomores	7	5	4	4
2015 cohort honors sophomores	3	2	2	2
2016 cohort Honors Sophomores	4	2	2	1*
2016 cohort Juniors	2	2	0	2
Year Totals		15	12	12
				7

Table 1: Progression of Prostate Cancer Scholars through the RHPCS program

Prostate Cancer Scholar progression is tracked through the phases of the program. Students are defined by cohort year and honors program status: *cohort honors sophomores* refers to Howard students enrolled in the Honors program and beginning the first of their two year-long program in which they will receive three semesters of tele-mentored Directed Readings prior to a summer research experience in their junior year followed by a presentation at a scientific conference. *Cohort juniors* refers to juniors with no honors requirement, who were accepted into an abbreviated one year long version of the program in which they receive one spring semester of tele-mentored readings or did not conduct tele-mentorships as part of approved adjusted SOW, followed by a summer internship and a presentation at a science conference. This abbreviated program offering served open the program to more students and expand the applicant pool. The asterisk(*) denotes an honors sophomore who conducted a summer research experience following one semester of tele-mentored readings after their sophomore year as part of a modified program sequence which includes two subsequent funded summer research experiences.

Specific objectives, major activities, significant results and key outcomes.

The specific aims and major tasks from the SOW are restated below (in italics) with the corresponding major activities, significant results and key outcomes covered under the first project year reporting period.

SOW-Specific aim 1: Encourage undergraduate students at Howard University to pursue graduate training in prostate cancer research.

SOW-Major task 1: Promote RHPCS Program to Howard University undergraduate students.

Task 1a.- RHPCS program brochure and promotional materials are disseminated to HU biology students. The Project Director and Faculty Advisor coordinate a recruitment visit to Howard University by RPCI's project leadership team and an RHPCS mentor. The mentor presents a prostate cancer research seminar and the leadership team and

mentor conduct informational sessions on the RHPCS program and graduate training at RPCI.

Major activities- Recruitment trips occur in August or early September and therefore by consequence of the annual reporting period dates, “lag” one project year behind their corresponding application cycle. Therefore, the recruitment trip reported on in PGY2 corresponds with the application cycle for the following project year-PGY3 *Prostate Cancer Scholar class* and the cohort class for PGY3 described below is the result of recruitment efforts in PGY1. A schematic of the activities covered in the current reporting period is provided in *Appendix D* for further clarification.

Significant results and key outcomes- Students received a seminar from a prostate cancer research mentor and informational sessions about the RHPCS program.

SOW-Task 1b. *Howard University students apply to RHPCS program. Applications are reviewed for eligibility and applicants are matched with mentors.*

Major Activities- Applicants to the 2016 RHPCS program in PGY2 reviewed a catalogue of research projects made available RPCI faculty members participating as mentors. They selected four projects based on their scientific interests. Applicants were validated for eligibility requirements. Following this initial screening process, RPCI faculty reviewed and scored applications of those students who chose their particular research offering on the application. Applicants were rated on two factors- (1) fit for the mentor’s particular research and (2) overall quality of fit for the RHPCS. Mentors and *Prostate Cancer Scholars* were matched based on their mutual rankings of each other.

Key outcomes and results- Four applications were received from HU Biology students. The applicant pool was comprised of four honors sophomores. Two HU students were accepted and matched with RPCI prostate research faculty mentors. Two HU non-honors juniors applied through a special solicitation and were matched with RPCI prostate research faculty members. All four students confirmed their acceptance in the program and were enrolled in the *2016 honors sophomore and juniors cohort respectively* (see table 1.)

SOW-Specific aim 2: Prepare Prostate Cancer Scholars for mentored research experiences at RPCI

SOW-Major task 2: *Arrange pre-internship tele-mentorships between mentors and Prostate Cancer Scholars*

SOW- Task 2a. *The Project Director and Faculty Advisor arrange connections between RPCI mentors and Prostate Cancer Scholars on the existing RPCI web conference software and monitor progression of tele-mentorships. The Faculty Advisor conducts an informational session with RPCI mentors via web conference on the “Directed Readings” course syllabus, format, assessment and expectations.*

Major activities-The tele-mentoring of *Prostate Cancer Scholars* currently in the program continued throughout the fall and spring semester. For this new cohort, the Project Director and Faculty Advisor at HU conducted an orientation on tele-mentorship via web conference for Roswell Park mentors and Howard University students. This orientation covered the following topics: tele-mentoring schedule, expectations of mentor & mentee, academic objectives, expectations and academic objectives of Directed Readings course sequence. RPCI mentors and Prostate Cancer Scholars

convened weekly or bi-weekly web-conference-supported meetings to critically dissect and discuss prostate cancer research papers.

Key outcomes and results- Two students in the *2015 honors sophomore cohort* completed the last two sequences of the tele-mentored directed readings in the fall (Directed Readings II) and spring semester (Directed Readings III.) These students submitted a bibliography of scientific papers and a proposal of their summer research project. The two newly enrolled Prostate Cancer Scholars comprising the *2016 honors sophomore cohort* completed the initial spring semester (Directed Readings I) of the tele-mentored readings and submitted a bibliography of the literature reviewed in their research area. The 2017 fall semester tele-mentored readings are currently in progress.

SOW-Specific aim 3: Provide mentored research, scholarly and professional development experiences.

SOW-Major task 3: *Howard Prostate Cancer Scholars conduct 10-week mentored prostate cancer research experience at RPCI.*

SOW-Task 3a *RPCI mentors supervise Prostate Cancer Scholars in summer research projects. The Project Director provides administrative support for internship enrollment, lodging arrangements, co-curricular activities, research project deadlines, and research symposium and pre/post program assessments.*

Major activities- HU Prostate Cancer Scholars received a ten week immersive research experience in their mentor's research laboratory. Prostate Cancer Scholars were registered as interns in the *Summer Research Internship Program at RPCI*. Dormitory housing arrangements were made at Census College. They were on-boarded with RPCI and receive ID badge swipe access and email/IT logon accounts. *Prostate Cancer Scholars* received a summer program orientation and schedule of program required activities to familiarize and inform them of program expectations, deadlines and RPCI policies. Students received training in responsible conduct of research, chemical safety and, where appropriate, radiation safety training. Students received training certificates to document completion. *Prostate Cancer Scholars* attended and participated scheduled and required co-curricular learning and professional development activities. They attended and participated in weekly Lunch n' Learn seminars, the 2017 RPCI Science Retreat, a field trip to Athenex® (a local biotechnology company), and near-peer cross-training activities. The *Lunch n' Learn* seminar series represents a renaming and retiming of the Thursday afternoon seminars. This seminar series was held at lunchtime as a response to previous student feedback that they felt less alert for lectures in the later afternoon. The seminar series consisted of trending topics in translational research, responsible conduct of research and principles in presenting scientific communication. Specific to the RHPCS program, *Prostate Cancer Scholars* were invited to attend the Genitourinary Program seminar series. In addition, mentors involved students in laboratory meetings. Students presented both 3 minute lay science talks (Elevator Pitches) and ten minute technical talks of their research projects held at a capstone summer program symposium. They were judged by a panel of post-doctoral scientists and graduate students to be considered for an "Outstanding Scientific Talk" award. They also attended Buffalo Biomedical Research Day (August 4, 2017) an extramural conference of undergraduate research experience programs. Here they

presented posters along with peers participating in summer research programs hosted at academic and research centers in the Buffalo area. Students participated in organized social activities to bond with their peers in the program and to explore Buffalo, NY. Students reported on program satisfaction, career/education intentions and skills-attainment by responding to a pre-/post-internship program survey.

Significant results and key outcomes- Four Howard University Prostate Cancer Scholars completed a mentored summer research experience. One of these was a student in the *2015 honors sophomore cohort* who completed the three semester sequence of tele-mentored readings. One student was part of the *2016 honors sophomore cohort*. She completed a spring semester of tele-mentored readings and participated in an early summer research experience following her sophomore year in addition to her scheduled summer research experience following her junior as part of a modified program to conduct consecutive research experiences. Two other Howard students conducted summer research experiences without pre-requisite tele-mentored directed readings. This was accomplished through an adjusted statement of work, in an effort to meet the internship placement goal. *Prostate Cancer Scholars* reported their summer research results in a lay-audience level three-minute talk, as a ten-minute scientific talk and as a scientific poster presentation. Their presentations took place at an extramural conference with students from other undergraduate summer research programs and as part of a program-specific research symposium for students participating in summer research experiences at RPCI.

The following are research projects presented by Prostate Cancer Scholars:

- 1.) **Diamonds Banks**, S. Shah, B. Foster, *Dept. of Pharmacology and Therapeutics*, "Identification of Androgen Receptor Anomalies between different preclinical models of Prostate Cancer"
- 2.) **Taylor Boyd**, J. Walczyk, B. Pflug, *Dept. of Urology*, "Omega-3 Fatty Acid Regulation of Metabolism through Pyruvate Dehydrogenase in Prostate Cancer"
- 3.) **Chioma Bush**, C. Consiglio, S. Gollnick, *Dept. of Cell Stress Biology*, "The Effects of Androgen Receptor on the Metabolism of M1 Macrophages"
- 4.) **Breanna Hodges**, J. Inigo, D. Chandra, *Dept. of Pharmacology and Therapeutics*, "The Role of HSP60 in Mito UPR During Hypoxia."

SOW-Specific aim 4: Test the value of RHPCS Program to encourage interns to enter graduate training and careers in prostate cancer research.

SOW-Major task 4: Track Prostate Cancer Scholar professional activities

SOW-Task 4a Attendance and research presentation at conferences are arranged for Scholars and either PI, Faculty Advisor or mentor. **Note: Conference attendance will be at IMPaCT and another scientific meeting in PGY2

SOW-Task 4b *The Faculty Advisor obtains Prostate Cancer Scholar's retrospective evaluation of RHPCS program and post-graduate education pursuits and reports to the Project Director.*

SOW- Task 4c *The Project Director administers the "Alumni Achievement" surveys to alumni and track short term (1 year) and long term (2 -3 year) education and career attainment.*

Major activities- Travel was arranged for the four students in the 2014 honors sophomore cohort to present their summer research at the 2016 SBUR Conference in Scottsdale, Arizona. The project director surveyed this cohort in April of 2017 to obtain information on formalized education or career pursuits.

Significant results and key outcomes- The following posters were presented by Prostate Cancer Scholars of their summer research at the 2016 SBUR Fall Symposium in Scottsdale, Arizona:

- 1.) **Mia Broughton**, X. Zhang, D. Goodrich, *Dept. Pharmacology and Therapeutics*, "Hypoxia facilitates neuroendocrine prostate cancer trans-differentiation"
- 2.) **Dometria Gilbert**, D. Chandra, *Dept. Pharmacology and Therapeutics* "The Role of Prostate Cancer-derived Exosomes in Metabolism"
- 3.) **Destini Goodly**, K. Gangavarapu, W. Huss, "Role of PI3K/AKT Signaling Pathway in Regulation of Expression of Androgen Receptor in ABCG2+ CWR-R1 Prostate Cancer Cells"
- 4.) **Morenike Olu**, K. Miller, I. Gelman, *Dept. Cancer Genetics*, "Characterizing Models of Indolent and Aggressive Prostate Cancer"

Three (75%) of the 2014 Honors sophomore cohort alumnus responded to the one year follow-up survey to report their enrollment in advanced training programs or employment. Three of the responding Scholars (100%) are enrolled in graduate or graduate medical programs.

Mia Broughton is pursuing a MS in Biomedical and Health Sciences at the University of Alabama.

Destiny Goodly is pursuing an MD at Morehouse State University.

Morenike Olu is pursuing a MD at Howard University Medical Center.

Goals not met.

For PGY3, we had targeted completion of fifteen summer internships of which we had satisfied twelve. We allowed applications from non-honors juniors and non-honors sophomores once again to satisfy this shortfall. Our targeted recruitment for PGY3 was five honors sophomores to fulfill five summer internships in PGY 3. We accepted and placed two honors sophomores out of our targeted five and did not accept or place non-

honors juniors. In a further effort to satisfy summer internship placements, we extended the opportunity to the honors sophomores to conduct an additional summer research experience following their sophomore year. One of the sophomores conducted this research experience.

What opportunities for training and professional development has the project provided? Prostate Cancer Scholars engaged in professional development activities throughout the different phases of the program to date. They participated in tele-mentoring activities in which they received one-on-one mentoring to develop a knowledge base in their particular field and developed skills in critical review of literature, identifying gaps in scientific knowledge and developing hypotheses and projects to address these gaps. During the summer program, students received training in managing, leading and reporting results in a formal manner on a research project. They developed scientific communication skills by receiving advisement in preparing and delivering oral and poster presentations to different audiences. They also attended the Witness Project National Conference held at RPCI on July 13th-14th. This conference assembled than 100 women from across the nation that implements the Witness Project program in their communities. Roswell Park doctors and researchers gave presentations on the status of African American women and cancer screening rates, new research and findings and ways to educate more women in the community about breast and cervical cancer. In the Fall semester following their summer research program, students attend a national scientific conference (SBUR Fall Symposium) where they present their research in a formal scientific setting and exchange information with other students and faculty in the field of urologic research including prostate cancer research. During the Fall, Prostate Cancer Scholar mentors provide guidance to students on their honors thesis which is based upon their summer research.

How were the results disseminated to communities of interest?

Nothing to report.

What do you plan to do during the next reporting period to accomplish the goals?

Below are stated the goals for the next reporting period and the accompanying to meet the goals of enrolling and progressing students through the phases of the research experience program.

SOW-Specific aim 3: Provide mentored research, scholarly and professional development experiences. Prostate Cancer Scholars in the 2016 cohort honors sophomores will complete their third semester of tele-mentored readings in the spring 2018 semester and will participate in the summer research experience. Students will receive a mentored research experience and attend a required schedule of co-curricular activities.

SOW-Specific Aim 4: Test value of RHPCS Program to encourage interns to enter graduate training and careers in prostate cancer research. In November, students in the 2015 sophomore Honors cohort and 2016 non-honors Juniors cohort will attend and

present at the *2017 Society for Basic Urology Research Conference in Tampa Bay, Florida*. To test the value of the RHPCS program and measure the effectiveness in meeting the objective of encouraging entry into graduate training, the PD will coordinate the administration of a survey with the HU faculty advisor Howard University Faculty Advisor to have students in the *2015 sophomore honors* and *2016 non-honors juniors cohort* report on confirmed education plans and the past academic year's mentored professional activities in April 2018.

4. Impact:

Twelve students from URM populations have received experience, knowledge and skill development in various stages of formulating and conducting a prostate cancer research project.

What was the impact on the development of the principal discipline(s) of the project?

Nothing to report

What was the impact on other disciplines?

Nothing to report.

What was the impact on technology transfer?

Nothing to report.

What was the impact on society beyond science and technology?

Nothing to report.

5. Changes/Problems.

Changes in approach and reasons for change

Nothing to report.

Actual or anticipated problems or delays and actions or plans to resolve them.

We placed four of the five targeted summer internships for PGY3. Overall, this results in fulfilling twelve of the targeted fifteen summer internship placements for the project. This shortage is due to program attrition and smaller than anticipated applicant pools throughout the course of the project. We adjusted our SOW previously to correct the shortage by allowing honors sophomores accepted into the 2015 cohort to conduct a modified program which included an additional summer of research after their sophomore year. One of the two students in the *2016 honors sophomore cohort* conducted a research experience after her sophomore year which will be in addition to the regularly scheduled summer research experience after junior year. We also received permission to accept non-honors students who did not participate in the pre-requisite distance mentored activities to conduct a summer research experience. This allowed us to place two such students in summer experiences in PGY3. For the total project, we currently have a shortfall of three summer internship placements.

We have requested an extension without funds for the project to fulfill these three placements in the 2017/2018 calendar year.

Below is our proposed plan in chronological order:

1.) Two HU students from the 2016 Honors Sophomore cohort are scheduled to conduct their summer research experience in 2018.

2.) We will allow a non-honors juniors the opportunity to conduct a summer internship opportunity with a Prostate Cancer Scholar mentor without the requirement of a pre-internship tele-mentorship.

A table of the cohort classes and their progression through the program is below and includes our projections with the proposed changes.

One of the Prostate Cancer Scholars scheduled to attend and present her poster at the SBUR Conference encountered technical issues with registering her abstract. The Project Director is working with conference management to correct this issue so that she is able to present. A second student also was not given permission to present results by her mentor because of the sensitive nature of the unpublished research. Students derive valuable professional networking opportunities from this conference, so attendance is still being arranged for the student.

	Grant Year 1 (2014-2015)			Grant Year 2 (2015-2016)			Grant Year 3 (2016-2017)			Grant Extension Year (2017-2018)	
	Offers/ Applied	Tele- Mentored	Internships & Conference Presentation	Offers/ Applied	Tele- Mentored	Internships & Conference Presentation	Offers/ Applied	Tele- Mentored	Internships & Conference Presentation	Tele- mentored	Internships & Conference Presentation
2014 cohort honors sophomores	5/7	4	n/a	4	4						
2014 cohort juniors	4/4	4	3								
2015 cohort honors sophomores				2/2	2	1	2	1			
2015 cohort juniors				0/1	0	0					
2015 cohort non-honors sophomores				0	0	0					
2016 cohort honors sophomores							2/4	2	1	2 proj.	2 proj.
2016 cohort juniors							2/2		2		
2017 cohort juniors											1 proj.
Year Totals	9/11	8	3	2/3	6	5	5/7	4	4	2 proj.	3 proj.
Cumulative Multi-Year Totals	9/11	8	3	11/14	14	8	16/21	18	12	20 proj.	15 proj.

Changes that had a significant impact on expenditures.

Nothing to report.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals.

Nothing to report.

Significant changes in use of biohazards and/or select agents

Nothing to report.

6. Products:

Publications, conference papers, and presentations

Journal publications.

Nothing to report.

Books or other non-periodical, one-time publications.

Nothing to report.

Other publications, conference papers, and presentations.

Kisailus A. Evaluating Pre-Internship Distance Mentoring Activities as a Strategy to Enhance Summer Cancer Research Experiences for Minority Students. Poster presented at: International Cancer Education Conference; Sept 14, 2017; Cleveland, OH.

Website(s) or other Internet site(s)

Nothing to report.

Technologies or techniques

Nothing to report.

Inventions, patent applications, and/or licenses

Nothing to report.

Other Products

Nothing to report.

7. Participants & Other Collaborating Organizations.

What individuals have worked on the project?

Name:	Wendy Huss, PhD
Project Role:	PI
Researcher Identifier (eRA Commons)	WENDYHUSS
Nearest person month worked:	.6
Contribution to Project:	Dr. Huss provided oversight to program recruitment and operations with the Co-PI, Program Director and Faculty Advisor. She promoted the program through recruitment trips to Howard University. She mentored a Prostate Cancer Scholar for 1 spring semester tele-mentorship and

	<i>hosted her for the summer research project. Mentored through fall semester for senior thesis. Also kept in communication with Christian for advice on advance degree programs and letters of recommendation. Dr. Huss participated in the review of applicants and their selection the program to ensure that the applicant pools and admitted Prostate Cancer Scholars meet DOD Summer Research Prostate Cancer Training grant goals. She is working with the Faculty Advisor to arrange for Prostate Cancer Scholars to submit abstracts and attend the Society for Basic Urologic Research.</i>
Funding Support:	

Name:	<i>Richard Hershberger, PhD</i>
Project Role:	<i>Co-PI</i>
Researcher Identifier (eRA Commons):	<i>Hershberger RP</i>
Nearest person month worked:	<i>.6</i>
Contribution to Project:	<i>Dr. Hershberger managed his department's resources to provide necessary staff and institutional support for the operation of the RHPCS program to achieve its year one goals. He provided supervision to the PD in operations of the program: recruitment, application and summer program operations. He also shared roles with the PI to conduct recruitment visits.</i>
Funding Support:	<i>No support requested.</i>

Name:	<i>Adam Kisailus, PhD</i>
Project Role:	<i>Project Director</i>
Researcher Identifier :	<i>KISAILUS</i>
Nearest person month worked:	<i>.6</i>
Contribution to Project:	<i>Dr. Kisailus maintained the program web presence, advertised the program and conducted program informational sessions at recruitment visits. He manages logistics and provides training for web conferencing software used in tele-mentoring. He scheduled planned</i>

	<i>and executed day-to-day operations of the summer research experience program.</i>
Funding Support:	

Name:	<i>Anna Allen, PhD</i>
Project Role:	<i>Faculty Advisor</i>
Researcher Identifier :	<i>AKALLEN10</i>
Nearest person month worked:	<i>.6</i>
Contribution to Project:	<i>Dr. Allen assisted in coordination of recruitment activities, directed the tele-mentored Directed Readings course, assisted in promotion of the program which included coordinating the annual visits the RPCI project leadership team and an RPCI prostate cancer researcher to give a lecture and information sessions on the program to target undergraduate audiences at Howard University. She arranged and conducted an informational webinar with RPCI mentors to review the Directed Readings course syllabus, assessment and student expectations. She assisted the PD in monitoring progress of the tele-mentorships and ensured students were evaluated at the end of the course by their RPCI mentors.</i>
Funding Support:	

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

No changes to report.

What other organizations were involved as partners?

Organization Name: Howard University
Location of Organization: Washington D.C.

Partner's contribution to the project:

Facilities: N/A

Collaboration: Dr. Anna Allen, a faculty member at Howard University, serves as Faculty Advisor for the RHPCS program and assists the PD in coordinating recruitment visits, program promotion amongst Howard University students and orientation for the tele-mentoring. She advised students and RPCI faculty mentors

on the requirements of the Directed Readings course and registered submission of course grades and monitors student progress.

Personnel exchanges: The program exclusively recruited from Howard University biology students which generated the applicant pool for the RHPCS program.

Other. N/A

8. Special Reporting Requirements

COLLABORATIVE AWARDS: N/A

QUAD CHARTS: N/A

9. Appendices:

APPENDIX A, List of Abbreviations Used.....	23
APPENDIX B, Other Support.....	24
APPENDIX C, Diagram of Activities Covered Under Reporting Period...	28

APPENDIX A

List of abbreviations used:

Department of Defense- **DOD**

Historically Black College or University- **HBCU**

Howard University- **HU**

International Cancer Education Conference- **ICEC**

Project Director- **PD**

Project Year- **PGY**

Principal Investigator- **PI**

Roswell Park/Howard University Prostate Cancer Scholars Program- **RHPCS**

Society of Basic Urologic Research- **SBUR**

Statement of Work- **SOW**

Under-represented Minority- **URM**

APPENDIX B

OTHER SUPPORT – Huss, Wendy

Active Support (New Support is Italicized):

Title: ***Differentiation Therapy Targeting Prostate Cancer Stem Cells in Advanced Prostate Cancer***

Time Commitment: 1.2 calendar months/years (PI)

Supporting Agency: Alliance Foundation

Funding Agency's Procuring contracting/Grants Officer: Judith Epstein;

judith.epstein@roswellpark.org

Performance Period: 4/01/17 – 3/31/18

Overlap: There is no overlap with the current DoD

project Level of Funding:

1. Project Goals: The major goal of this award is to test if differentiation therapy can eliminate the cancer stem cell population in advanced prostate cancer to increase the effectiveness of androgen deprivation therapy.
2. Specific Aims: Aim 1: Determine differentiation potential of PCSCs in tumor specimens before and after ADT. Aim 2: Determine differentiation potential of PCSCs in CRPC

Title: ***Bladder Cancer Stem Cells and Gender Disparity***

Time Commitment: 1.2 calendar months/years (PI)

Supporting Agency: Alliance Foundation

Funding Agency's Procuring contracting/Grants Officer: Judith Epstein;

judith.epstein@roswellpark.org

Performance Period: 10/1/17-9/30/18

Overlap: There is no overlap with the current DoD

project Level of Funding:

1. Project Goals: The major goal of this award is to test if hormone signaling contributes to gender disparity observed in the incidence and aggressiveness of bladder cancer.
2. Specific Aims: Aim 1: Determine the impact of the sex steroid signaling on BICSC properties using spheroids. Aim 2: Determine the impact of sex steroids signaling on cell differentiation and cellular distribution using organoids.

OTHER SUPPORT – Hershberger, Richard P.

Active Support (New Support is Italicized):

Title: **Roswell Park Summer Internship Programs in Cancer Sciences and Oncology**

Time Commitment: 1.2 calendar months/years (PI)

Supporting Agency: National Cancer Institute (application number 1 R25 CA181003-01)

Funding Agency's Procuring contracting/Grants Officer: Jeannette Korczak, korczakj@mail.nih.gov

Performance Period: 9/01/14 – 8/31/19

Overlap: Dr. Hershberger will oversee, both the general internship programs (Summer Research Experience Program in Cancer Science, Howard Cancer Scholars Program, for undergraduates in fields throughout cancer) and the proposed Howard/Roswell Park Prostate Cancer Scholars Program (matching Howard students interested in prostate research selectively with prostate researchers, with additional prostate-specific programming). Some aspects of program administration: (maintenance of online application portal, alumni assessment, planning and delivery of summer co-curricular lectures) will be shared between the NCI- and DoD-funded programs. Students supported under this DoD grant would not receive support under the NCI R25 grant (if funded), but would instead represent an increase in the number of available funded undergraduate internship slots at RPCI.

Level of Funding:

3. Project Goals:

4. The overall objective of this project is to provide the cancer workforce of the future by encouraging students at key career decision points to pursue careers in cancer research, oncology, and academic medicine. This is done through three project components:
- Summer Research Experience Program in Oncology, an eight-week internship open to medical, dental, and physician assistant students.
 - Summer Research Experience Program in Cancer Science, a ten-week internship open to undergraduate students entering their senior year.
 - Howard/Roswell Park Cancer Scholars Program, a tele-mentoring program that pairs Howard University Biology Department Honors Program students with Roswell Park faculty for web-based tele-mentoring within their required Directed Readings courses.

5. Specific Aims:

Aim 1: Encourage students in medical, dental, and physician assistant programs to pursue a career within oncology and academic medicine.

Aim 2: Encourage undergraduate students to pursue graduate training in cancer biology or other biomedical sciences or professional training in clinical oncology.

Aim 3: Introduce future clinicians and researchers to the continuum of translational cancer research through near-peer mentorship.

Aim 4: Test the value of in-depth pre-internship reading and mentorship on the success and productivity of a summer undergraduate internship via the Howard/Roswell Park Cancer Scholars Program.

Title: Roswell Park Cancer Institute CURE Supplement

Time commitment: 0.6 calendar months/years (Chief Academic Officer)

Supporting Agency: National Cancer Institute (supplement to CCSG application P30 CA016056)

Funding Agency's Procuring contracting/Grants Officer: Alison Lin, alison.lin@nih.gov

Performance Period: 07/01/2014 – 04/31/2019

Level of funding:

Overlap: Dr. Hershberger will oversee, both the general internship programs (Summer Research Experience Program in Cancer Science, CURE Program, Howard Cancer Scholars Program, for undergraduates in fields throughout cancer) and the proposed Howard/Roswell Park Prostate Cancer Scholars Program (matching Howard students interested in prostate research selectively with prostate researchers, with additional prostate-specific programming). Some aspects of program administration: (maintenance of online application portal, alumni assessment, planning and delivery of summer co-curricular lectures) will be shared between the NCI- and DoD-funded programs. Students supported under this DoD grant would not receive support under the CURE Supplement grant (if funded), but would instead represent an increase in the number of available funded undergraduate internship slots at RPCI.

Project goals: The major goals of this project are to enhance minority access to transformative research experiences by providing paid summer research internships for minority and disadvantaged undergraduates and high school students, and ultimately increasing minority representation in cancer research careers. This is accomplished through the following aims:

Aim 1: Educate students about cancer biology, cancer medicine, and cancer health disparities.

Aim 2: Equip students with research, critical thinking, and science communication skills.

Aim 3: Encourage entry and retention into undergraduate and graduate biomedical training programs and cancer careers.

COMPLETED

None in past five years

PENDING

Title: Roswell Park Cancer CURE Entry Program

Time Commitment: 1.2 calendar months/years (PI)

Supporting Agency: National Cancer Institute (response to PAR-17-059)

Funding Agency's Procuring contracting/Grants Officer: Alison Lin, alison.lin@nih.gov

Performance Period: 9/01/18 – 8/31/23

Overlap: Dr. Hershberger will oversee, both the general internship programs (Summer Research Experience Program in Cancer Science, Howard Cancer Scholars Program, for undergraduates in fields throughout cancer) and the proposed Howard/Roswell Park Prostate Cancer Scholars Program (matching Howard students interested in prostate research selectively with prostate researchers, with additional prostate-specific programming). Students supported under this DoD grant would not receive support

under the NCI R25 YES grant (if funded) since the mechanism targets an exclusive student audience of middle and high school students.

Level of Funding:

Project Goals: The overall goal of the *Roswell Park Cancer CURE Entry Pathway* program is to encourage students from underrepresented and disadvantaged populations to pursue and succeed in further education and careers in the scientific disciplines important to the cancer research workforce. This goal supports the National Cancer Institute's mission to reduce the unequal burden of cancer by developing healthcare and research professionals by feeding the pipeline of subsequent college science graduates poised to enter graduate training in the biomedical and health sciences.

Specific Aims:

Aim 1: Inform and stimulate interest in cancer research in middle and high school students.

Aim 2: Immerse high school students and high school teachers in mentored cancer research experiences.

Aim 3: Develop high-school level curricular assets to support research experiences and broaden classroom exposure to cancer science.

Aim 4: Promote cancer literacy, inform on cancer risks and preventative behaviors, and raise appreciation for the importance of cancer research among parents and within relevant communities.

OTHER SUPPORT – Kisailus, Adam E.

ACTIVE (New support is italicized)

Title: **Roswell Park Summer Internship Programs in Cancer Sciences and Oncology**

Time Commitment: 3.0 calendar months/year (Co-PI and Project Director)

Supporting Agency: National Cancer Institute (application number 1 R25 CA181003-01)

Funding Agency's Procuring contracting/Grants Officer: Jeannette Korczak, korczakj@mail.nih.gov

Performance Period: 9/01/14 – 8/31/19

Overlap: Dr. Kisailus will administer, in parallel, both the general internship programs (Summer Research Experience Program in Cancer Science, CURE Program, Howard Cancer Scholars Program, for undergraduates in fields throughout cancer) and the proposed Howard/Roswell Park Prostate Cancer Scholars Program (matching Howard students interested in prostate research selectively with prostate researchers, with additional prostate-specific programming). Some aspects of program administration: (maintenance of online application portal, alumni assessment, planning and delivery of summer co-curricular lectures) will be shared between the NCI- and DoD-funded programs. Students supported under this DoD grant would not receive support under the NCI R25 grant (if funded), but would instead represent an increase in the number of available funded undergraduate internship slots at RPCI.

Project Goals:

The overall objective of this project is to provide the cancer workforce of the future by encouraging students at key career decision points to pursue careers in cancer research, oncology, and academic medicine. This is done through three project components:

- Summer Research Experience Program in Oncology, an eight-week internship open to medical, dental, and physician assistant students.
- Summer Research Experience Program in Cancer Science, a ten-week internship open to undergraduate students entering their senior year.
- Howard/Roswell Park Cancer Scholars Program, a tele-mentoring program that pairs Howard University Biology Department Honors Program students with Roswell Park faculty for web-based tele-mentoring within their required Directed Readings courses.

Specific Aims:

Aim 1: Encourage students in medical, dental, and physician assistant programs to pursue a career within oncology and academic medicine.

Aim 2: Encourage undergraduate students to pursue graduate training in cancer biology or other biomedical sciences or professional training in clinical oncology.

Aim 3: Introduce future clinicians and researchers to the continuum of translational cancer research through near-peer mentorship.

Aim 4: Test the value of in-depth pre-internship reading and mentorship on the success and productivity of a summer undergraduate internship via the Howard/Roswell Park Cancer Scholars Program.

Title: Roswell Park Cancer Institute CURE Supplement

Time commitment: 1.2 calendar months/years (Assistant Dean)

Supporting Agency: National Cancer Institute (supplement to CCSG application P30 CA016056)

Funding Agency's Procuring contracting/Grants Officer: Alison Lin, alison.lin@nih.gov

Performance Period: 07/01/2014 – 04/30/2019

Overlap: Dr. Kisailus will administer, in parallel, both the general internship programs (Summer Research Experience Program in Cancer Science, CURE Program, Howard Cancer Scholars Program, for undergraduates in fields throughout cancer) and the proposed Howard/Roswell Park Prostate Cancer Scholars Program (matching Howard students interested in prostate research selectively with prostate researchers, with additional prostate-specific programming). Some aspects of program administration: (maintenance of online application portal, alumni assessment, planning and delivery of summer co-curricular lectures) will be shared between the NCI- and DoD-funded programs. Students supported under this DoD grant would not receive support under the NCI CURE supplement grant (if funded), but would instead represent an increase in the number of available funded undergraduate internship slots at RPCI.

Project goals: The major goals of this project are to enhance minority access to transformative research experiences by providing paid summer research internships for minority and disadvantaged undergraduates and high school students, and ultimately increasing minority representation in cancer research careers. This is accomplished through the following aims:

Aim 1: Educate students about cancer biology, cancer medicine, and cancer health disparities.

Aim 2: Equip students with research, critical thinking, and science communication skills.

Aim 3: Encourage entry and retention into undergraduate and graduate biomedical training programs and cancer careers.

COMPLETED

None in past five years

PENDING

Title: Roswell Park Cancer CURE Entry Program

Time Commitment: 3 calendar months/years (Project Coordinator)

Supporting Agency: National Cancer Institute (response to PAR-17-059)

Funding Agency's Procuring contracting/Grants Officer: Alison Lin, alison.lin@nih.gov

Performance Period: 9/01/18 – 8/31/23

Overlap: There is no overlap because students supported under this DoD grant would not receive funding from the NCI R25 YES grant (if funded) since the mechanism serves middle and high school students.

Level of Funding:

Project Goals: The overall goal of the *Roswell Park Cancer CURE Entry Pathway* program is to encourage students from underrepresented and disadvantaged populations to pursue and succeed in further education and careers in the scientific disciplines important to the cancer research workforce. This goal supports the National Cancer Institute's mission to reduce the unequal burden of cancer by developing healthcare and research professionals by feeding the pipeline of subsequent college science graduates poised to enter graduate training in the biomedical and health sciences.

Specific Aims:

Aim 1: Inform and stimulate interest in cancer research in middle and high school students.

Aim 2: Immerse high school students and high school teachers in mentored cancer research experiences.

Aim 3: Develop high-school level curricular assets to support research experiences and broaden classroom exposure to cancer science.

Aim 4: Promote cancer literacy, inform on cancer risks and preventative behaviors, and raise appreciation for the importance of cancer research among parents and within relevant communities.

APPENDIX C

Tasks and Activities Covered by PGY 3

