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PRINCIPAL INVESTIGATOR:
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CONTRACTING ORGANIZATION:
University of Iowa
Iowa City, IA 52242

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14. ABSTRACT The HBCU Summer Research Training Program accepted a total of 8 students from Lincoln University for each of the eight week sessions during the summers of 2016, 2017, 2018, & 2020. Each student was assigned to a laboratory of a participating mentor and also paired with a member of the mentor's laboratory. This laboratory member assisted with day to day aspects of the research project. During the summer the students work diligently on their research project, participate in meetings of the mentor's laboratory, attend workshops and seminars associated with our and other summer programs, and attend a special course in prostate cancer. We integrate the Lincoln students into social programs held throughout the campus for summer interns. At the end of the summer sessions the students present a poster of the research results from the summer experience. They also present the results of their research in the fall at Lincoln University. Of the students that have graduated from Lincoln, 58.3% are attending, or have attended, postgraduate programs.					
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Introduction:

In our initial award (W81XWH-06-1-0266), begun in 2006, we were funded for five students from Lincoln University of Pennsylvania. Because of a large number of qualified student applicants we were funded for additional three students in 2007 (W81XWH-07-1-0241), allowing our program to support a total of eight Lincoln students each summer. We applied for, and were awarded; additional grants (W81XWH-09-1-0270), W81XWH-10-1-0459, W81XWH-12-1-0117), W81XWH-13-1-0178, and this award W81XWH-16-1-0549 after the original grants had been completed. For the year reported here we had the following faculty participants: David M. Lubaroff, PhD, Principal Investigator, Paul Heidger, PhD, University of Iowa Faculty Advisor, Karen Baskerville, PhD, and Whelton Miller, PhD, Lincoln University Faculty Advisors, and the following University of Iowa mentors: James Brown, MD; Frederick Domann, PhD; Paloma Giangrande, PhD; Prabhat Goswami, PhD; Yi Luo, PhD; Susan Lutgendorf, PhD; Lyse Norian, PhD; Aliasger Salem, PhD; Michel Schultz, PhD; Andrean Simons-Burnett, PhD; Douglas Spitz, PhD; Chad Tracy, MD; George Weiner, MD; Michael Wright, PhD; and Nicholas Zavazava, MD.

Body:

Recruitment and Admission:

Brochures, application forms, and posters were designed and printed and sent to Drs. Baskerville and Miller at Lincoln. Thirteen applications were received for 2014, twenty for 2015, twenty-three for 2016, fourteen for 2017, and seventeen for 2018. The applications were reviewed by the Admissions Committee whose membership consisted of Dr. Lubaroff, Dr. Heidger, Dr. Simons-Burnett, Dr. Baskerville, and Dr. Miller. Admission was offered to a total of 8 students for 2016 4 students for 2017, and four students for 2018 since only one grant was active in the last two years. The CDMRP chose to discontinue the Undergraduate HBCU Summer Research Training Program so we are only working on one grant to support 4 students..

Students accepted for the 2016 Program

Kimoni Driver
Nonye Ibik
Ayana McLaren
Chinonso Obidike
Prisca Obidike
Siani Snaith
Destiney Taylor

Students accepted for the 2017 Program

Jane-Frances Aruma
Ceryce Collie
Nile Garner
Ime Nkanta

Students accepted for the 2018 Program

Emmanuella Ikechukwu
Sarina Murray
Oreoluwa Oladimeji
Cieara Rouse

Students accepted for the 2019 Program

Ky-Mani Miller
Ayomide Ogunsakin
Merilyn Palmer
Tarik Tsegaye

Advance Preparation and Information Distribution:

Following acceptance of the students into the program we assigned each student a mentor based upon his/her choices listed in their applications. Each mentor then assigned a member of the lab as a “big brother/big sister,” a person that partners with the student during the 8 week summer session. The mentor also prepared a portfolio of articles covering the area of research the student would be working on, including published papers by the mentor. These materials were sent to the students in advance of their arrival at the University of Iowa.

A six-week course on Prostate Cancer was organized with six faculty assigned to deliver lectures. The following represents the course schedule with lecturers:

**Iowa-Lincoln Summer Research Training Program - 2016
Prostate Cancer Course
Room – 2156 MERF***

Lecture	Date	Time	Subject	Lecturer
Week 1	June 14	9:00 am	Introduction to cancer	Spitz
Week 2	June 21	9:00 am	Epidemiology of prostate cancer	Gupta
Week 3	June 28	9:00 am	Pathology of prostate cancer	Dahmouh
Week 4	July 5*	9:00 am	Genetics of prostate cancer	Qi
Week 5	July 12	9:00 am	Clinical treatment of prostate cancer	Nepple
Week 6	July 19	9:00 am	Immunotherapy of prostate cancer	Lubaroff

**Summer Research Training Program - 2017
Course on Cancer**

Lecture	Date	Time	Subject	Lecturer
Week 1	June 12	9:00 am	Introduction to prostate cancer	Spitz
Week 2	June 20	9:00 am	Epidemiology of prostate cancer	McDowell & West
Week 3	June 27	9:00 am	Pathology of prostate cancer	Dahmouh
Week 4	July 5	9:00 am	Genetics of prostate cancer	Qi
Week 5	July 10	8:00 am	Clinical treatment of prostate cancer	Nepple
Week 6	July 18	9:00 am	Immunotherapy of prostate cancer	David Lubaroff

**Summer Research Training Program - 2018
Course on Cancer**

Lecture	Date	Time	Subject	Lecturer
Week 1	June 12	9:00 am	Introduction to cancer	Spitz
Week 2	June 19	9:00 am	Epidemiology of cancer	McDowell & West
Week 3	June 26	9:00 am	Pathology of cancer	Dahmouh
Week 4	July 3	9:00 am	Genetics of cancer	Spies
Week 5	July 10	9:00 am	Clinical treatment of cancer	Nepple
Week 6	July 17	9:00 am	Immunotherapy of cancer	Lubaroff

**Summer Research Training Program - 2019
Course on Cancer
Room 2166 MERF**

Lecture	Date	Time	Subject	Lecturer
Week 1	June 11	9:00 am	Introduction to cancer	Spitz
Week 2	June 18	9:00 am	Pathology of cancer	Dahmouh
Week 3	June 25	9:00 am	Epidemiology of cancer	McDowell & West
Week 4	July 2	9:00 am	Genetics of cancer	Spies
Week 5	July 9	9:00 am	Clinical treatment of cancer	Nepple
Week 6	July 16	9:00 am	Immunotherapy of cancer	Lubaroff

Key Research Accomplishments

Each of the students worked on research projects that were part of an overall program within the laboratory of their mentors. As such, it is difficult to identify key research accomplishments for each student research project. Continuation of the research program by each mentor will certainly produce important research findings, aided in part by the summer research of the Lincoln University students. What is key is the mentoring and counseling of the students to aid in their future as scientists in the area of prostate cancer research. The high percentage of the students that are graduate programs or medical schools is an outstanding accomplishment as these future scientists will most certainly provide key research accomplishments in the years to come.

Reportable Outcomes:

The students have reported their findings to the University of Iowa faculty, to the faculty and students at Lincoln University, and at national competitions and conferences. The student's research resulted in her being an author on publications.

Grisanzio C, Werner L, Takeda D, **Awoyemi BC**, et al. Proc Natl Acad Sci U S A. 2012 109: 11252-7

Simons, AL, Parsons, AD, **Foster, KA**, Orcutt, KP, Fath, MA, Spitz, DR. J Oncol, 2009 Article ID 519563

Chen, C, Bales, P, **Greenfield, J**, Heselpoth, RD, Nelson, DC, Herzberg, O. PLoS One. 2014 Mar 26;9(3):e93156. doi: 10.1371/journal.pone.0093156. eCollection 2014.

Wang, F, Gomez-Escudero, A, Ramireddy, RR, **Murage, G**, Tahyumanavan, S, Vachet, RW. J Am Chem Soc, 2013 ePub ahead of print.

Griffith, TS, **Stokes, B**, Kucaba, TA, Earel, JK, Jr, VanOosten, RL, Brincks, EL, Norian, LA. Curr Gene Ther. 2009 Feb;9(1):9-19.

Dahm, JL, Cook, E, **Baugh, K**, Wileyto, EP, Pinto, A, et al. J Natl Med Assoc, 2009, 10:450-455

Curry, SR, Schlackman, JL, Hamilton, TM, Henderson, TK, **Brown, NT**, et al. J Clin Microbiol 2011 49:3788-3793

Schurtz, EA, **Markes, J**, Newton, MR, Brown, JA. Curr Urol, 2013, 7:145-148.

Sobhakumari A1, Schickling BM, Love-Homan L, **Raeburn A**, Fletcher EV, Case AJ, Domann FE, Miller FJ Jr, Simons AL. Toxicol Appl Pharmacol. 2013 272:736-745

Eric J. Devor, Henry D. Reyes, Donna A. Santillan, Mark K. Santillan, **Chinenye Onukwugha**, Michael J. Goodheart, Kimberly K. Leslie. Obstet Gynecol Int. 2014; Epub 2014 Mar 17.

Stanam A, Gibson-Corley KN, Love-Homan L, **Ihejirika N**, Simons AL. Oncotarget. 2016 Oct 12. doi: 10.18632/oncotarget.12590. [Epub ahead of print]

Devor EJ, Schickling BM, Reyes HD, Warriar A, **Lindsay B**, Goodheart MJ, Santillan DA, Leslie KK. Oncol Rep. 2016 Apr;35(4):2461-5. doi: 10.3892/or.2016.4605. Epub 2016 Feb 1.

Eric J. Devor, Jesus Gonzalez-Bosquet, Akshaya Warriar, Henry D. Reyes, **Nonye V. Ibik**, Brandon M. Schickling, Andreea Newton, Michael J. Goodheart and Kimberly K. International Journal of Oncology 50: 1721-1728, 2017

Eric J. Devor, PhD, Henry D. Reyes, MD, Jesus Gonzalez-Bosquet, MD, PhD, Akshaya Warriar, Susan A. Kenzie, **Nonye V. Ibik**, Marina D. Miller, MD, Brandon M. Schickling, Michael J. Goodheart, MD, Kristina W. Thiel, MD, and Kimberly K. Leslie, MD. Int J Gynecol Cancer 2017;27: 784-790

Espinosa-Cotton MM, Dahl R, Fertig E, Jensen I, **McLaren AJ**, Miller K, Rodman SN, Schmitz S, Simons AL. Cancer Res, July 2018

Smith, Rasheid; Duan, Wenqi; Quarterman, Juliana; Morris, Angie; **Collie, Ceryce**; Black, Marcie; Toor, Fatima; Salem, Aliasger K. Surface Modifying Doped Silicon Nanowire Based Solar Cells for Applications in Biosensing. Oct 2018. *Advanced Materials Technologies*

Lincoln Student Follow-Up

Name	Year	Outcome	School	Current Status
Oluwaseun Adekanye	2006	medical school	U. Michigan	Physician
Shaynah Browne	2006	graduate school	U. Mass	research scientist at Mt. Sinai Med. Ctr.
Nikesha Haynes	2006	graduate school	U. Rochester	research scientist at the Univ. of Rochester
Shivaughn Johnson	2006	medical school	Ross University Medical School	working
Briquel Sherman	2006	medical school	University of West Indies	Physician
Shaan Spence	2006	graduate school	U. South Florida	graduate school
Bisola Awoyemi	2007	graduate school	Univ. of the District of Columbia	research associate at Dana Farber
Seme Diallo	2007	graduate school	Drexel University	Research scientist at Medimmune
Caroline Dias	2007	working	none at this time	working
Titilope Idowu	2007	working	Morehouse College	Consultant
Patrick Ndungu	2007	graduate school	University of Iowa	research scientist at Catalyst, Inc
Elizabeth Okyne	2007	nursing school	U. Iowa	nursing
Katrina Proberbs	2007	graduate school	Adelphi University	working in healthcare
Bukola Fatunmbi (Now Kole Fatunmbi)	2008	graduate school	U. Mass	working in science industry
Katherine Foster	2008	laboratory research	Fox Chase Cancer Center	research assistant in science
Theon Francis	2008	teaching science	none at this time	teaching science
Michelle Gray	2008	graduate school	Johns Hopkins	graduate school
Julia Greenfield	2008	graduate school	U. Maryland	graduate school
Gladys Murage	2008	graduate school	U. Mass	graduate school
Brittany Stokes	2008	working in healthcare	none at this time	working in healthcare
Stacy-Ann Wright	2008	medical school	Ross University Medical School	medical school
Kaylene Baugh	2009	nursing school	Duke Univ.	nursing school
Christina Chisolm	2009	graduate school	U. Mass	graduate school
Seme Diallo	2009		see 2007	
Elizabeth Okyne	2009		see 2007	
Stephen Sangster	2009	teaching science	none at this time	teaching science
Keyana Tyree	2009	graduate school	Delaware State U./Nebraska	graduate school
Neja White	2009	working in healthcare	none at this time	working in healthcare

Akede, Theresa	2010	graduate school	U. Maryland Baltimore	research scientist
Awoyemi, Christiana	2010	graduate school	U Texas-Dallas	graduate school
Sangster, Stephen	2010		see 2009	
Rand, Stephanie	2010	medical school	Thomas Jefferson	resident physician
McKnight, Danielle	2010	working	none at this time	working
Markes, Jhanelle	2010	graduate school	U. of Iowa	research associate
Holsey, Danielle	2010	graduate school	Xiamen Univ.	graduate school
Diallo, Chalwe	2010	laboratory research	Penn State	research assistant in science
Brown, Nakita	2010	post baccalaureate	U. Pittsburgh	working in healthcare
Baugh, Kaylene	2010		see 2009	
Cooper, Jhoneil	2011	graduate school	Drexel University	graduate school
Doubt-Swinton, Darah	2011	working in healthcare	none at this time	research assistant in science
Foster, Jodi-Ann	2011	working in science	none at this time	research assistant in science
Ihejirika, Patrick	2011	graduate school	univ of Delaware	graduate school
Lynch, Candice	2011	graduate school	Nova Southeastern Univ	graduate school
Raeburn, Ayanna	2011	nursing school	Lincoln	nursing
Sangster, Nathaniel	2011	teaching science	none at this time	research assistant in science
Davis, Lauri-Ann	2012	teaching science	Lincoln	working in science
Diallo, Chalwe	2012		see 2010	
Ebanks, Shauna	2012	graduate school	Penn State	graduate school
Ellis, Ashley	2012	nursing school	Lincoln	nursing school
Jones, Shakeema	2012		???	unknown
Lynch, Candice	2012		see 2011	
Markes, Jhanelle	2012		see 2010	
Smith, Rasheid	2012	graduate school	U of Iowa	graduate school
Appeah, Daniel	2013	medical school	St. George's & Northumbria	medical school
Cummings, Precious	2013	graduate school	U of South Florida & U of Iowa	graduate school
Foster, Jodi-Ann	2013		see 2011	
Linkins, Jehnae	2013	graduate school	U. of Delaware	graduate school
Onukwhuga, Chinenye	2013		Lincoln	not yet graduated
Raeburn, Ayanna	2013		see 2011	
Sangster, Nathaniel	2013		see 2011	
Wahome, Josphat	2013	post baccalaureate	Fox Chase Cancer Center	post baccalaureate
Brower, Jasmine	2014	graduate school	Wilmington University	graduate school

Frimpong, Kojo	2014	graduate school	Thomas Jefferson	graduate school
Joseph, Tisha	2014		Lincoln	not yet graduated
Lindsay, Brittany	2014	medical school	UK	medical school
Onukwhuga, Chinenye	2014		Lincoln	not yet graduated
Payne, Cashel	2014	teaching science	Lincoln	teaching science
Smith, Rasheid	2014	graduate school	U of Iowa	graduate school
Edi, Seighe	2015	graduate school	Lincoln	graduate school
Endoni, Benney	2015	graduate school	U of Delaware & U of Iowa	graduate school
Hason, Lai Quannah	2015	graduate school	Drexel University	graduate school
Ihejirika, Nnamdi	2015	medical school	Lincoln	U Pitt
Little, Abreah	2015	graduate school	Drexel University	graduate school
Mwanza, Lisa	2015	working in science		working in science
Slater, Hasan	2015	medical school	Lincoln	not yet graduated
Yakie, Joy	2015	research chemist; graduate school	CDC; Univ. of Michigan	working; now graduate school
Driver, Kimoni	2016	medical transcrip	Lincoln	working
Ibik, Nonye	2016	med school	Foot & ankle center	Penn State
McLaren, Ayanna	2016	working in healthcare		applying to medical school
Obidike, Chinonso	2016		Lincoln	not yet graduated
Obidike, Prisca	2016	med school	Lincoln	Penn State
Snaith, Siani	2016		Lincoln	not yet graduated
Taylor, Destiney	2016	medical transcrip	Lincoln	working
Aruma, Jane-Frances	2017	med school	Lincoln	Penn State
Collie, Ceryce	2017	graduate school	Lincoln	Univ of Sussex
Garner, Nile	2017		Lincoln	not yet graduated
Nkanta, Ime	2017		Lincoln	not yet graduated
Rouse, Cieara	2018		Lincoln	not yet graduated
Oladimeji, Oreoluwa	2018		Lincoln	not yet graduated
Murray, Sarina	2018	applying to graduate school	Lincoln	applying to graduate school
Ikechukwu, Emmanuela	2018		Lincoln	not yet graduated
Miller, Ky-Mani	2019		Clafin University	not yet graduated
Ogunsakin, Ayomide	2019		Lincoln	not yet graduated
Palmer, Merilyn	2019		Winthrop University	not yet graduated
Tsegaye, Tarik	2019		Lincoln	not yet graduated

As is evident from the table, of the 77 students that have graduated from Lincoln, 12 (15.6%) are, or have, attended medical schools; 33 (42.9%) are, or have, attended graduate schools; the great majority of the remaining students are in some aspects of science and healthcare (22 or 28.6%). These latter include nursing school, laboratory research, post baccalaureate programs, teaching science, or working in the healthcare environment. Only a relatively few have not continued in science (2 or 2.5%). We are proud of the fact that 58.5% of the graduated students entered medical or graduate schools and overall greater than 97.5% have moved into a medical science career.

It should be noted that all of the students do graduate from Lincoln University. We are basing our calculations on those that have finished matriculating at the school.

Conclusion

This award was highly successful as evidenced by the amount of work accomplished by each student and by their motivation to continue in a science career. The PI applied, and received funding, for an additional HBCU training grant that will enable us to continue accepting students for a number of years, thus increasing the number of African American scientists in the area of prostate cancer.

Appendices: Brochures for 2016, 2017, 2018, 2019