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14. ABSTRACT

We conducted an integrated training and educational program for improving the participation of HBCU undergraduate students in prostate cancer research. Dr. Feng Li and his team selected five undergraduate students (Ciera Woodard, Starr Shands, Andrea Vincent, My'Chelle Latta, and Danielle Irby) in STEM majors from Hampton University**.** These students had 8-week hands-on research training in laboratories of the PI and Co-Is (Mahato, Batra, Datta, and Garrison). Students in this training learned basics about prostate cancer disease. Specifically, they got training for basic cell culture techniques (Ciera), polymer synthesis and nanomedicine development (Starr and Andrea), the effect of drug treatment on prostate cancer cells (My'Chelle), and peptide synthesis (Danielle). Students also attended seminars on prostate cancer at the UNMC. They also learned about responsible conduct of research and career options in science. This training program has created a sustainable pipeline of HBCU undergraduate students pursuing a research career in the field of prostate cancer.

15. SUBJECT TERMS					
Prostate cancer, co-polymer, anti-androgen, peptide-based targeting, nanomedicine					
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1. Introduction

We conducted an integrated training and educational program for improving the participation of HBCU undergraduate students in prostate cancer research. Dr. Li and his team selected five undergraduate students Ciera Woodard, Starr Shands, Andrea Vincent, My'Chelle Latta, and Danielle Irby in the STEM majors from Hampton University. At the beginning of this training, students learned the basics of scientific research, laboratory safety, and importance of Ethics in Research. These students had 8-week hands-on research trainings in laboratories of the PI and Co-Is (Mahato, Batra, Datta, and Garrison). Students in this training learnt basics of prostate cancer disease and treatment options. Specifically, they got training for basic cell culture techniques (Ciera), polymer synthesis and nanomedicine development (Starr and Andrea), effect of drug treatment on prostate cancer cells (My'Chelle), and peptide synthesis (Danielle). Students also attended seminars at the University of Nebraska Medical Center. They also learned about responsible conduct of research and career options in science. This training program has created an interest in HBCU undergraduate students pursuing research career in prostate cancer research and nanomedicine. At the end of their training, students presented their research findings through a poster or oral presentation at annual HUSOP Summer Scholars Research Day.

2. Keywords

Prostate cancer, co-polymer, anti-androgen, peptide based targeting, nanomedicine

3. Accomplishments

3.1 Major goal

The main aim of the project was to provide 8-week hands-on research trainings to HBCU students on prostate cancer and nanomedicine. In addition, one sub aim was to make aware students for basics of scientific research, laboratory safety, and importance of Ethics in Research.

3.2 Research training opportunity for selected students

For this purpose, following five students got training in PI, and Co-IS laboratories:

Ciera Woodard

Ciera Woodard worked in the lab of Dr. Kaustubh Datta, Department of Biochemistry and Molecular Biology at the University of Nebraska Medical Center. During that time, Ciera was trained under the supervision of Dr. Arup Bag, a post-doctoral research fellow in the lab. She learned about the background of Prostate Cancer, factors regulating its growth and distant metastasis to various organs, predominantly to the bone. As part of her training, Ciera also gained hands-on experience in a variety of laboratory techniques, for example, culturing and maintaining different prostate cancer cell lines. Since the lab focuses on factors crucial for prostate cancer bone metastasis, she learned the technique of isolation of bone marrow-derived cells from murine femur and tibia and their differentiation to osteoblasts and osteoclasts *ex vivo*. She also learned different analytical techniques like, isolation of RNA from cells and analyze the gene expression by real-time RT-PCR as well as identify the expression of different proteins using Western blot analysis.

Starr Shands

Starr Shands worked in Dr. Mahato's lab, Department of Pharmaceutical Sciences at the University of Nebraska Medical Center. Starr worked with Dr. Vinod Kumar, a postdoc fellow in Dr. Mahato's lab. While on her training, Starr learned about prostate cancer, factor affecting drug resistant and prostate cancer stem cells. She also learned cell culture techniques for prostate cancer cells like LNCaP, DU-145, and PC-3. She learned about cell counting, passaging, drug treatment, RNA and protein extraction, real-time RT-PCR, and Western blot analysis.

Andrea Vincent

Andrea Vincent worked in Dr. Mahato's lab, Department of Pharmaceutical Sciences at the University of Nebraska Medical Center. Dr. Goutam Mondal a postdoc fellow in Dr. Mahato's lab trained Andrea for prostate cancer research. Andrea learned about the formulation of polymeric micelles containing anticancer drug Paclitaxel for the treatment of prostate cancer. Andrea learned the synthesis and characterization of copolymer methoxy poly (ethylene glycol)-block-poly (2-methyl-2-carboxyl-propylene carbonate graft-dodecanol) (PEG-PCC-DC). She also learned some common techniques of micelles preparation including nanoprecipitation, film hydration, and emulsion and characterization like size and zeta potential measurement, drug loading and release study.

During their training, Starr and Andrea gained experience of using several lab instruments like UV-VIS plate reader, RT- PCR, lyophilizer, centrifuge, rota-vapor, microscope, pH meter, and HPLC.

My'Chelle Latta

My'Chelle Latta worked in the lab of Dr. Surinder Batra's, Department of Biochemistry and Molecular Biology, College of Medicine, at University of Nebraska Medical Center. My'Chelle worked with Dr. Sakthivel Muniyan Ph.D., a postdoc in the lab. She worked on a prostate cancer treatment project. She learned about the biology of prostate cancer initiation and progression. She learned basic the techniques for cell culture and her studies were focused on the cell cycle regulatory potential of the Withaferin-A on prostate cancer cells LNCaP and 22Rv1. She also learned the cell viability assay using MTT and cell cycle analysis using flow cytometry.

Danielle Irby

Danielle Irby worked in Dr. Jered Garrison's laboratory, Department of Pharmaceutical Sciences at the University of Nebraska Medical Center. She worked with Dr. Wei Fan, a postdoc fellow in the lab. During her summer training, Danielle learned about prostate cancer targeted peptide synthesis using solid-phase synthesis (Boc Fmos Chemistry) and purified peptides using directed protocols. She learned how to analyze crude peptides by HPLC and interpret generated MS data. She also got familiarized with synthesis of HPMA polymer and conjugation of targeted peptide to the polymer. During her training, she also gained experience on specific equipment like pH meter, HPLC-analytical, HPLC-preparative, scales/balance, rotary evaporator, mas-spectrometer, and lyophilizer.

3.3 Results dissemination to communities of interests

All student trainees were required to present their research findings through a poster or oral presentation at annual HUSOP Summer Scholars Research Day.

3.4 Plans for the next reporting period

We plan to select more HBCU students majoring in STEM for education and training in prostate cancer research.

4. Impact

This training program will create a sustainable pipeline of HBCU undergraduate students pursuing research career in prostate cancer research and will serve as a catalyst to promote collaboration between UNMC and HU in training HBCU students in biomedical research.

5. Changes and problems

Nothing to report

6. Products

Nothing to report

7. Participants & Other Collaborating Organizations

7.1 Participant PI and CO-Is

1. Name: Ram I. Mahato, PhD
   Project role: PI
   Nearest person month worked: 2
   Contribution to project: Supervision
   Funding support: none

2. Name: Surinder K Batra, PhD
   Project role: Co-I
   Nearest person month worked: 2
   Contribution to project: Supervision
   Funding support: none

3. Name: Kaustubh Datta, PhD
   Project role: Co-I
   Nearest person month worked: 2
   Contribution to project: Supervision
   Funding support: none

4. Name: Jered Garrison, PhD
   Project role: Co-I
   Nearest person month worked: 2
   Contribution to project: Supervision
   Funding support: none

5. Name: Jered Garrison, PhD
   Project role: Co-I
   Nearest person month worked: 2
   Contribution to project: Supervision
   Funding support: none

6. Name: Feng Li, PhD

Project role: Co-I
Nearest person month worked: 2
Contribution to project: Selection of students

7. Name: Ricks-Santi, PhD
Project role: Co-I
Nearest person month worked: 2
Contribution to project: Selection of students

7.2 Participating postdoc fellows

1. Name: Arup Bag, PhD
Project role: instructor
Nearest person month worked: 2
Contribution to project: trainer of students

2. Name: Wei Fan, PhD
Project role: Instructor
Nearest person month worked: 2
Contribution to project: trainer of students

3. Name: Vinod Kumar, PhD
Project role: Instructor
Nearest person month worked: 2
Contribution to project: trainer of students

4. Name: Goutam Mondal, PhD
Project role: Instructor
Nearest person month worked: 2
Contribution to project: trainer of students

5. Name: Sakthivel Muniyan, PhD
Project role: Instructor
Nearest person month worked: 2
Contribution to project: trainer of students

7.3 Participating students

1. Name: Ciera Woodard
Project role: trainee
Nearest person month worked: 2
Contribution to project: participating students

2. Name: Starr Shands
Project role: trainee
Nearest person month worked: 2
Contribution to project: participating students
3. Name: Andrea Vincent
Project role: trainee
Nearest person month worked: 2
Contribution to project: participating students

4. Name: My'Chelle Latta
   Project role: trainee
   Nearest person month worked: 2
   Contribution to project: participating students

5. Name: Danielle Irby
   Project role: trainee
   Nearest person month worked: 2
   Contribution to project: participating students

7.4 Collaborating Organizations

1. University of Nebraska Medical Center (UNMC), 986025 Nebraska Medical Center Omaha, NE 68198-6025

2. Hampton University (HU), 100 E Queen St, Hampton, VA 23668

8. Special Reporting Requirements

None

9. Appendices

None