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“Nebraska Prostate Cancer Research Program”

PRINCIPAL INVESTIGATOR:
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CONTRACTING ORGANIZATION:
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14. ABSTRACT

Prostate cancer (PCa) is one of the major cancers threatening US males' life. Especially, PCa has a high incidence in American African. For improving PCa treatments, better understanding the basic mechanism of this cancer is needed, which would depend on the training of more PCa researchers. This proposal is thus to train HBCU undergraduates with science major in PCa research, a joint effort between the University of Nebraska Medical Center (UNMC), Omaha, NE, and Clark Atlanta University (CAU), Atlanta, GA. Dr. Ming-Fong Lin of UNMC and Dr. Shafiq Khan of CAU have ongoing research collaborations. They will identify interested undergraduates at CAU and institute a summer research program at UNMC where the students will learn basic science for translational application in a lab. Students will spend the majority of their time working at the bench on a research project. They will also participate in a seminar series that will introduce them to different areas of scientific investigation and advanced technological tools used in scientific discovery. After the summer, students will continue their scientific development at CAU and prepare for a graduate career in biomedical sciences or medical school.

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Annual Summary

INTRODUCTION:

The subject of this training grant is to train potential prostate cancer (PCa) researchers via a collaborative effort between University of Nebraska Medical Center (UNMC) at Omaha, NE, and Clark Atlanta University (CAU) at Atlanta, GA. The conception of this Program is based on interactions and collaborations between Dr. Ming-Fong Lin, the PI and a faculty mentor at UNMC, and Dr. Shafiq Khan, a faculty mentor at CAU, since March 2004 (1). The purpose of this proposal is to train undergraduate HBCU students from CAU to gain hand-on experience in performing research on PCa, a high incidence cancer in Africa American males (2), in UNMC, a research-intensive environment. The scope of training grant is to train CAU undergraduate students to gain hand-on experience in PCa research at UNMC Nebraska Prostate Cancer Research Program (NPCRP). These students will receive training not only in the lab but also in the class room in the format of seminars and visiting biotechnology companies. The goal is to encourage and to prepare HBCU students for academic career, i.e., they will either enter graduate school or medical school with training in, and understand of, PCa research or enter medical school. This will increase the number of PCa researcher at both basic science and clinical science levels.

BODY:

This report serves as the final annual report from the no-cost extension of funding support from CDMRP. For the past one year (5/2013 – 4/2014), under this no-cost extension support, we had trained **one** CAU undergraduate student. This student joined other 4 CAU students who were supported by another CDMRP funding and had gained hand-on experience in PCa research and made significant accomplishments. There were no technical or unexpected difficulties encountered and/or any deviations from the original Statement of Work. Per Instruction, our training and research accomplishments following each task outlined in the approved Statement of Work are listed as follows:

(**Task 1 - 6 reported in May 2011 Annual Report**)

Task 1: Announcement of the Year 1 Research Program (months 1-3)

Done. Per approved SOW, upon receiving the award notice, Drs. Khan and Odero-Marah at CAU announced the opportunity of conducting PCa research at UNMC, including verbal announcements in their classes during his lectures and also campus-wide posters by Dr. Khan's office. Ms. Priscilla Bakari, the Office Manager, helped prepared all the necessary documents and answered to all questions related to this opportunity. The announcements included the criteria of eligibility, the requirement of documents, and the due date of application.

Task 2: Selection of Trainees (month 4-6)

Done. Drs. Khan and Odero-Marah and Ms. Bakari at CAU went through all application files to ensure all application documents are complete and in place. Due to a short time period between the awarding letter and the student recruitment process, many communications were made possible through phone calls and e-mails. Subsequently, Drs. Lin and Chaney visited CAU, met with Drs. Khan and Odero-Marah, discussed application files and interviewed some eligible student candidates on March 17, 2010. The successful applicants were notified by e-mails and posted the list on board in CAU Prostate Cancer Research Center. The students were given a due date for replying of their acceptance, and all students accepted the offer by April 13, 2010.

In lab assignments, to avoid any potential of conflict of interest, upon request by Dr. Lin, Dr. Chaney coordinated with Dr. Odero-Marah considering students' interests with their priorities in lab selection and made the final matches as follows: Ms. Kiedra Bryant – Dr. MacDonald, Ms. NeChelle Jack – Dr. Lin, Ms. Lynnette Leffall – Dr. Mehta and Ms. Brittany Jones – Dr. Batra. In the mean time, Dr. Chaney also worked out the Housing for students and coordinated with Ms. Jennifer Pace, the BMB Office Personnel, preparing all necessary documents for students.

Task 3: Summer Research (month 7-9)

Done. All students arrived on May 31, 2010, and Dr. Chaney picked them up at airport, went grocery shopping and settled down in the dorm. Drs. Chaney and Lin had dinner together with all students and provided them with the up-dated information and guidelines for the Program. Dr. Chaney attended students' Monday seminars, which were in conjunction with Idea Networks of Biomedical Research Excellence (**INBRE**) program, and both Drs. Chaney and Lin met with students weekly.

Upon arrival, the students were encouraged to set up a web for the Program. With the support of Jennifer and the UNMC Public Affair Office, the web for NPCRP was finalized and posted in BMB Department web by the end of June 2010. The link is as follows: (http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84). (**Appendix #1**).

Dr. Odero-Marah was invited to visit UNMC on July 6. She gave a scientific presentation on her research project entitled "Snail Transcription Factor Contributes to Prostate Cancer Tumor Progression via Reactive Oxygen Species", which was excellent and well received by audience. She then met with CAU students and had a lunch together to learn their progresses and to discuss any potential problem during their stays. Subsequently, Dr. Odero-Marah met with Drs. Lin and Chaney for an executive meeting discussing students' issues. While there was one suggestion regarding the payment method for housing; overall, all four students were very happy, enjoyed their stays and had obtained the hand-on experience in their research projects.

The efforts of NPCRP received attention. Dr. Chaney coordinated the efforts and the UNMC Public Affair Office interviewed all four CAU students and reported our Program with Ms. Lynnette Leffall in Dr. Mehta's lab as an example for the story (**Appendix #2**). All students prepared their posters and gave presentations in the UNMC Summer Undergraduate Research Program (**SURP**) poster section on Thursday of Aug. 5, 2010. The abstracts of posters are attached (**Appendix #3**).

Task 4: Evaluation of the Program (month 10-12)

Done. Prior to their departure, all four students met with Drs. Chaney and Lin and other faculty mentors, including Drs. Batra, MacDonald and Mehta, for a final lunch-meeting on Friday of August 6, 2010. We discussed any problem that occurred during their stays and any suggestions that may improve the training by the Program. In the meeting, all students received a certificate for their hard working with the completion of training, cosigned by Drs. Chaney and Lin. The anonymous evaluations that were made by students one week ahead are attached (**Appendix #4**).

Drs. Khan and Odero-Marah and Ms. Bakari met with students at CAU on September 2, 2010, the beginning of Fall semester. The students are very excited by the opportunity of training at UNMC. A Minute taken by Ms. Bakari is attached (**Appendix #5**).

Dr. Chaney met with Dr. Jim Turpen, a member of Executive Committee for NPCRP and the PI of the INBRE program, regarding the results of NPCRP training program during their INBRE Retreat. With Dr. Turpen's approval, the support from the INBRE program to NPCRP is highly appreciated. We expect continued interactions for the up-coming years.

Drs. Chaney and Lin met and discussed the questions raised by the students and the potential improvement for new students in the summer of 2011.

Task 5: Announcement of the Year 2 Research Program (months 13-15)

Done. Per approved SOW, Drs. Khan and Odero-Marah at CAU announced the opportunity of conducting PCa research at UNMC, including verbal announcements in their classes and also campus-wide posters by Dr. Khan's office in Feb 2011. Ms. Bakari, the office manager, prepared all the necessary paper works and answered to all questions related to this opportunity. The announcements included the criteria of eligibility, the requirement of documents, and the due date of application. For this cycle, the final due date was set as by March 31, 2011.

Task 6: Selection of Trainees (month 16-18)

Done. Drs. Chaney visited CAU on March 29, 2011. He went alone, met with several student candidates and discussed with Dr. Odero-Marah and Ms. Bakari for student recruitment processes. Drs. Odero-Marah sent all information by March 31, 2011, the due date of application to Dr. Chaney. This year, we had 8 students completed their applications. Drs. Odero-Marah and Chaney discussed all the applicants' qualification and made offers to 4 students. All four students accepted the offer. Drs. Odero-Marah and Chaney have worked together and matched these students with mentors in NPCRP at UNMC. Dr. Chaney has also coordinated the Housing issue, and Ms. Pace had mailed the first batch of documents including Housing to students for their attention.

With the support of Dr. Turpen, the NPCRP will again interact with the INBRE program for student training in seminars and site visiting to various research facilities and biotech companies. Currently, we are waiting for the arrival of the new students.

(**Task 7 - 10 for 2012 Annual Report**)

Task 7: Summer Research (month 19-21)

Done. Based on their research interests, four sophomore undergraduate students, including Ms. Shawna Battle (Mentor: Dr. Rakesh Singh), Celeste Scott (Mentor: Dr. Kaustubh Datta), LaTayia Aaron (Mentor: Dr. John Davis) and Hilary Kirwan (Mentor: Dr. Ming-Fong Lin), were matched to the labs in UNMC NPCRP. All four students arrived on May 30, 2011, and Dr. Chaney picked them up at airport, settled down in the dorm and went for grocery shopping. Dr. Chaney also provided them with the up-dated information and guidelines for the Program, including information for the Idea Networks of Biomedical Research Excellence (**INBRE**) and the UNMC Summer Undergraduate Research Program (**SURP**) (**Appendix #6**). Dr. Chaney attended students' Monday seminars, which were in conjunction with the **INBRE** program, and both Drs. Chaney and Lin met with students weekly.

With the support of Ms. Jennifer Pace at BMB and Ms. Lisa Spellman at the UNMC Public Relations Office, the information for 4 new students in NPCRP on BMB Department web was up-dated and posted by the end of June 2011. The link is as follows: (http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84). (**Appendix #7**).

Dr. Khan visited UNMC on July 6, 2011. He met with CAU students and had a lunch-meeting together to learn their progresses. Drs. Lin and Chaney and also mentors including Drs. Singh, Davis and Datta all attended the lunch-meeting. Dr. Khan had a private meeting with students discussing any potential problem during their stays. Subsequently, Dr. Khan met with Drs. Lin and Chaney for an executive meeting discussing students' issues. Overall, all four students were very happy, enjoyed their stays and had obtained the hand-on experience in their research projects. They were very pleased with the research environment. Dr. Khan then gave a scientific presentation on his research project and a brief introduction of research environment at the Clark Atlanta University to the UNMC community. His presentation was entitled "Prostate Cancer Research and Education at Clark Atlanta University" (**Appendix #8**), which was excellent and well received by audience including faculty members, post-doctoral fellows and graduate students. Dr. Khan also had a meeting with mentors and other faculty members with research interests in prostate cancer to discuss the potential of collaborations.

The efforts of NPCRP received attention. Dr. Chaney coordinated the efforts and the UNMC Public Relations Office interviewed Drs. Lin and Chaney and reported our NPCRP Program in INBRE IN ROADS, a UNMC INBRE communication (**Appendix #9**). In the last week of training, all students prepared their posters and gave presentations in the UNMC SURP poster section on Aug. 5, 2011. The abstracts of 4 posters are attached (**Appendix #10**).

Prior to their departure, all four students met with Drs. Chaney and Lin for a final lunch-meeting. We discussed any problem that occurred during their stays and any suggestions that may improve the training by the Program. The students in general were very happy for their training and no comment was raised. They were strongly encouraged to continue their research in CAU faculty members' labs. Dr. Chaney provided all necessary transportation and supports back to the airport.

Task 8: Evaluation of the Program (month 22-24)

Done. Drs. Khan and Odero-Marah and Ms. Bakari met with students at CAU after the beginning of Fall semester. The students were happy with the opportunity of training at UNMC. Again, no issue was raised.

Dr. Chaney met with Dr. Jim Turpen, the PI of the INBRE program and a member of Executive Committee for NPCRP, regarding the results of NPCRP training program during their INBRE Retreat. With Dr. Turpen's approval and supports, we appreciate very much for the support from the INBRE program to NPCRP because the students can expose more to different technologies applicable toward research and career development. We expect the continuing interaction in the up-coming years. Drs. Chaney and Lin met and discussed the potential improvement for new students in the summer of 2012.

Task 9: Announcement of the Year 3 Research Program (months 25-27)

Done. Per approved SOW, on Jan 11, 2012, Drs. Khan and Odero-Marah at CAU and Drs. Lin and Chaney at UNMC started to up-date the flier announcing the opportunity of conducting PCa research at UNMC. The wording in the flier was finalized by the end of January, and Drs. Khan and Odero-Marah immediately announced the opportunity by distributing the flier and verbal announcements in their classes and also campus-wide posters by Dr. Khan's office in Feb 2012. The announcements included the criteria of eligibility, the requirement of documents, and the due date of application. Ms. Bakari, the office manager,

prepared all the necessary paper works and answered to all questions related to this opportunity. For this cycle, the final due date was set as by March 31, 2012.

Task 10: **Selection of Trainees (month 28-30)**

Done. Drs. Chaney and Lin visited CAU on March 18, 2012, discussed with Drs. Khan and Odero-Marah for student recruitment processes, and also met with four student candidates on March 19, 2012. Drs. Odero-Marah sent all applicants' information to Dr. Chaney in the early April of 2012, after the due date of application. This year, we had 10 students who filed their applications. With the inputs of Dr. Odero-Marah, Drs. Chaney and Lin discussed all the applicants' qualification. Four successful applicants were identified and notified by e-mails from Dr. Chaney and also contacted by a secretary at CAU Cancer Research Center. The students were given a due date for replying of their acceptance. Nevertheless, one student could not make the trip to UNMC for joining the training program. Due to the late of the selection & notification process, Drs. Lin, Chaney, Khan and Odero-Marah decided to have three students for this summer program. Dr. Chaney discussed with Dr. Odero-Marah and matched these three students to the labs in NPCRP at UNMC: Ms. Alexandra M. White (Mentor: Dr. Mehta), Alexus S. Devine (Mentor: Dr. Lin) and Sierra R. Coleman (Mentor: Dr. Datta). Dr. Chaney also coordinated the Housing issue, and Ms. Jennifer Pace at Department of Biochemistry and Molecular Biology, UNMC, mailed the first batch of documents including Housing to students for their attention.

With the support of Dr. Turpen, the NPCRP would continuously interact with the INBRE program for student training including attending the seminars and site visiting to various research facilities and biotech companies. We also registered those students for the UNMC SURP program.

It should be noted that our 2011 trainees continued their research in CAU cancer center faculty members' labs. Importantly, two of trainees gave poster presentation in the 8th Annual National Symposium on Prostate Cancer organized by CCRTD, CAU, March 18-20, 2012. The three abstracts were attached (**Appendix #11**).

(**Task 11 - 12 for 2013 Annual Report**)

Task 11: Summer Research (month 31-33)

Done. Three students arrived on Monday of May 28, 2012, the Memorial Day weekend. Drs. Chaney and Lin welcome them and had dinner with them. They started their orientation on Tuesday of May 29 and continued on Wednesday of May 30. The INBRE Program had a Welcome Barbeque reception in the evening of May 29 and CAU students were also invited (**Appendix #12**). In the afternoon of May 30, students reported to the matched lab and began their summer research in prostate cancer.

The importance of NPCRP received UNMC attention. Dr. Chaney coordinated the efforts with the INBRE Program and the UNMC Public Relations Office and reported our NPCRP Program in INBRE IN ROADS, a UNMC INBRE communication (**Appendix #13**).

Drs. Khan and Odero-Marah, CAU mentors, visited UNMC on July 30, 2012 (**Appendix #14**). They met with CAU students and had a lunch-meeting together to learn their progresses. Drs. Lin and Chaney and also mentors Drs. Mehta and Datta all attended the lunch-meeting.

After the lunch, Drs. Khan and Odero-Marah had a private meeting with students discussing any potential problem during their stays. Subsequently, Drs. Khan and Odero-Marah met with Drs. Lin and Chaney for an executive meeting discussing students' issues. Overall, all

four students were very happy, enjoyed their stays and had obtained the hand-on experience in their research projects. They were very pleased with the research environment.

Drs. Khan and Odero-Marah gave scientific presentations on their research projects and also a brief introduction of research environment at the Clark Atlanta University to the UNMC community (**Appendix #14**). Their presentations were well received by audience, including faculty members, post-doctoral fellows and graduate students. Drs. Khan and Odero-Marah also had meetings with mentors and other faculty members with research interests in prostate cancer to discuss the potential of collaborations.

In the last week of training, all students prepared their posters. Due to their departure on Saturday of August 4, they were unable to present their posters in the UNMC Undergraduate Summer Research Program in August 9. Nevertheless, they learned how to present their data by preparing scientific posters, and these posters would also allow them to give presentations in future meetings, for example, 2013 Prostate Cancer Annual Symposium at CAU. The 3 posters are attached (**Appendix #15**).

Task 12: Evaluation of the Program (month 34-36)

Done. Prior to their departure, all three students met with Drs. Chaney and Lin and other faculty mentors for a final lunch-meeting. We discussed any problem that occurred during their stays and any suggestion that will improve the training in future. The students were also asked to prepare the anonymous evaluations which are attached (**Appendix #16**). From these evaluation and comments, we understand the issues raised by the students. We will implement these suggestions and improve our processes for a better training program.

Dr. Chaney met with Dr. Turpen and discussed the results of NPCRP training program during their INBRE Retreat. We would like to emphasize that the 2012 CAU summer students were considered as "**the Best Memorable Friends**" by INBRE students in their evaluation during the Retreat.

We appreciated very much for the strong supports from Dr. Turpen and the INBRE program to NPCRP. With such a cooperating effort, the CAU students could expose to different technologies applicable toward research and career development and also meeting with student peers for social events. We expect the continuing interactions in the up-coming years. Drs. Chaney and Lin met and discussed the potential improvement for the Training Program per students' comments.

Drs. Khan and Odero-Marah and Ms. Bakari met with three students at CAU and discussed the evaluation and concerns at the beginning of Fall semester. While there was a minor concern regarding a little confusing about the Program activity at UNMC initially; those CAU students in general were very impressed and happy with the opportunity of training at UNMC, Omaha, NE. There was no other issue raised. The success of the training program is clearly shown that our NPCRP-CAU trainees were eagerly participating to various scientific meetings, gave posters and received award (**Appendices #17&18 and Key Accomplishments**). We are very pleased with the success of our Training Program, a joint effort by our colleagues and stuff member.

(**Task 13 - 16 for 2014 Annual Report**)

Task 13: Announcement of the Year 4 Research Program (months 37-39)

Done. As described, this report serves as the final annual report of the support from a no-cost extension of funding support from CDMRP. For the past one year (5/2013 – 4/2014), under

this support, we trained **1** CAU undergraduate student. This student joined other **4** CAU students who were supported by another CDMRP funding and had gained hand-on experience in PCa research and made significant accomplishments.

Per approved SOW, in January 2013, Drs. Khan and Odero-Marah at CAU and Drs. Lin and Chaney at UNMC started to up-date the flier announcing the opportunity of conducting PCa research at UNMC. The wording in the flier was finalized by the end of January, and Drs. Khan and Odero-Marah immediately announced the opportunity by distributing the flier and verbal announcements in their classes and also campus-wide posters by Dr. Khan's office in Feb 2013. The announcements included the criteria of eligibility, the requirement of documents, and the due date of application. Ms. Bakari, the office manager, prepared all the necessary paper works and answered to all questions related to this opportunity. For this cycle, the final due date was set as by March 31, 2013.

Task 14: **Selection of Trainees (month 40-42)**

Done. Drs. Chaney and Lin visited CAU on March 17, 2013, discussed with Drs. Khan and Odero-Marah for student recruitment processes, and also met with four student candidates on March 19-20, 2013. Drs. Odero-Marah sent all applicants' information to Dr. Chaney in the early April of 2013, after the due date of application. This year, we had 12 students who filed their applications. With the inputs of Dr. Odero-Marah, Drs. Chaney and Lin discussed all the applicants' qualification. Five (one plus four) successful applicants were identified and notified by e-mails from Dr. Chaney and also contacted by a secretary at CAU Cancer Research Center. The students were given a due date for replying of their acceptance. Dr. Chaney discussed with Dr. Odero-Marah and matched one student Ms. Marisha Morris whom was considered to be supported by the no-cost extension funding to Dr. Lin's lab. Dr. Chaney also coordinated the Housing issue, and Ms. Karen at Department of Biochemistry and Molecular Biology, UNMC, mailed the first batch of documents including Housing to students for their attention.

With the support of Dr. Turpen, the NPCRP would continuously interact with the INBRE program for student training including attending the seminars and site visiting to various research facilities and biotech companies. We also registered those students for the UNMC SURP program.

Task 15: Summer Research (month 43-45)

Done. All students arrived on Monday of May 27, 2013. Drs. Chaney and Lin welcome them and had dinner with them. They started their orientation on Tuesday of May 28 and continued on Wednesday of May 29. The INBRE Program had a Welcome Barbeque reception in the evening of May 29 and CAU students were also invited. In the afternoon of May 30, students reported to the matched lab and began their summer research in prostate cancer.

Dr. Khan visited UNMC on July 7, 2013 (**Appendix #19**). He met with CAU students and had a lunch-meeting together to learn their progresses. Drs. Lin and Chaney and also all mentors Drs. Batra, Cheng, Datta and Mehta all attended the lunch-meeting.

After the lunch, Dr. Khan had a private meeting with students discussing any potential problem during their stays. Subsequently, Dr. Khan met with Drs. Lin and Chaney for an executive meeting discussing students' issues. Overall, all four students were very happy, enjoyed their stays and had obtained the hand-on experience in their research projects. They were very pleased with the research environment.

Dr. Khan gave scientific presentations on their research projects and also a brief introduction of research environment at the Clark Atlanta University to the UNMC community (**Appendix #19**). Their presentations were well received by audience, including faculty members, post-doctoral fellows and graduate students. Dr. Khan also had meetings with mentors and other faculty members with research interests in prostate cancer to discuss the potential of collaborations.

In the last week of training, all students prepared their posters. Due to their departure on Saturday of August 3, they were unable to present their posters in the UNMC Undergraduate Summer Research Program in August 9. Nevertheless, they learned how to present their data by preparing scientific posters, and these posters would also allow them to give presentations in future meetings, for example, 2013 ABRCMS and 2014 Prostate Cancer Annual Symposium at CAU. The posters are attached (**Appendices #20 & 21**).

Task 16: Evaluation of the Program (month 46-48)

Done. Prior to their departure, all CAU students either supported by the current funding or the other funding met with Drs. Chaney and Lin and other faculty mentors for a final lunch-meeting. We discussed any problem that occurred during their stays and any suggestion that will improve the training in future. The students were also asked to prepare the anonymous evaluations. From these evaluation and comments, we understand the issues raised by the students. We will implement these suggestions and improve our processes for a better training program.

Dr. Chaney met with Dr. Turpen and discussed the results of NPCRP training program during their INBRE Retreat. We appreciated very much for the strong supports from Dr. Turpen and the INBRE program to NPCRP. With such a cooperating effort, the CAU students could expose to different technologies applicable toward research and career development and also meeting with student peers for social events. We expect the continuing interactions in the up-coming years. Drs. Chaney and Lin met and discussed the potential improvement for the Training Program per students' comments.

Drs. Khan and Odero-Marah and Ms. Bakari met with all five CAU students at CAU and discussed the evaluation and concerns at the beginning of Fall semester. All CAU students in general were very impressed and happy with the opportunity of training at UNMC, Omaha, NE. There was no other issue raised. The success of the training program is clearly shown that our NPCRP-CAU trainees were eagerly participating to various scientific meetings, gave posters and received award (**Appendices #20&21 and Key Accomplishments**). We are very pleased with the success of our Training Program, a joint effort by our colleagues and stuff member.

KEY RESEARCH ACCOMPLISHMENTS:

(**Reported in May 2011 Annual Report**)

- We successfully recruited 4 excellent HBCU undergraduate students from CAU in the first year of award for summer 2010.
- Based on their research interests, these four students were assigned to different labs with matched expertise in prostate cancer research for their respective prostate cancer research training.

- All four students attended the Monday seminar jointly with the INBRE program through the entire period.
- The students also visited different research institutions and BioPharm companies locally to expand their knowledge and scopes in future career developments.
- These CAU students also attended the seminars set by the UNMC SURP every Tuesday at noon through the entire training period.
- By attending the INBRE and the UNMC SURP activities, the students expand their view and social activities to different student communities.
- The students actively worked together with BMB Personnel and with the support of UNMC Public Affair Office, a web for our NPCRP training program was prepared and posted on the BMB at UNMC web in July 2010. The link is as follows: (http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84).
- UNMC Public Affairs reported the NPCRP program with one student as the story in August 2010.
- As a part of training and requirement, all four students prepared their results and gave poster presentations jointly in the UNMC SURP poster section, the last Thursday of their training, August 5, 2010.
- All four students submitted their abstracts to the DOD PCa IMPaCT meeting at Orlando, FL, March 9-12, 2011.
- Dr. Lin attended the Undergraduate Student Luncheon and Networking Session in the IMPaCT meeting on March 11, 2011, interacting with other program leaders and students to learn more about the potential significance of this training program.

(**For 2012 Annual Report**)

- For 2011 summer training program, we successfully recruited 4 excellent HBCU undergraduate students from CAU.
- These four students were matched to different labs based on their research interests.
- All four students attended the Monday seminar offered by the INBRE program through the entire period.
- These students also visited regional universities and local BioPharm companies to expand their knowledge and scopes in future career developments.
- The students actively worked together with Ms. Jennifer Pace, the administrator for NPCRP and with the support of UNMC Public Relations Office, the web for our NPCRP training program was updated and posted on the BMB web within UNMC web by the end of June 2011. The link is as follows: (http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84).
- The UNMC INBRE IN ROADS, an INBRE communication reported the NPCRP efforts and the interaction between two programs.
- All four students prepared their results and gave poster presentations jointly in the UNMC SURP poster section, the last Thursday of their training, August 5, 2011.
- The success of the training program is strongly supported by the fact that the CAU trainees of 2011 UNMC NPCRP continue their junior year research in the CAU Cancer Center faculty members' labs.

- Ms. Celeste Scott as the first author gave a poster presentation with up-dated data in the 8th Annual National Symposium on Prostate Cancer organized by CCRTD, CAU, March 18-20, 2012.
- Ms. LaTayia Aaron continues her research in prostate cancer research in Dr. Joann Powell's lab at CAU. She is the first author of one poster and 2nd co-author of another poster in the 8th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 18-20, 2012.
- For 2012 summer training program, we successfully recruited 3 excellent HBCU undergraduate students from CAU.

(**For 2013 Annual Report**)

- The three CAU students for the 2012 summer training program were matched to labs based on their research interests by Drs. Odero and Chaney.
- All three students attended the Monday seminar offered by the INBRE program through the entire period.
- All three students attended Tuesday noon seminar offered by the UNMC Summer Undergraduate Research Program through the entire period.
- These students also visited regional universities and local BioPharm companies to expand their knowledge and scopes in future career developments.
- The UNMC INBRE IN ROADS, an INBRE communication, introduced the CAU students and reported the NPCRP efforts and the interactions between two programs.
- All three students prepared their results in posters.
- The success of the training program is strongly supported by the fact that the CAU trainees of 2012 UNMC NPCRP continue their research in the CAU Cancer Center faculty members' labs.
- Our 2012 trainee **Ms. Alexandra White** gave a poster presentation in the 9th Annual National Symposium on Prostate Cancer March, 17-20, 2013. Her outstanding performance received **the 2nd Place award**. Congratulation!

(**For 2014 Annual Report**)

- All CAU students attended the Monday seminar offered by the INBRE program through the entire period.
- All CAU students attended Tuesday noon seminar offered by the UNMC Summer Undergraduate Research Program through the entire period.
- These students also visited regional universities and local BioPharm companies to expand their knowledge and scopes in future career developments.
- The UNMC INBRE IN ROADS, an INBRE communication, introduced the CAU students and reported the NPCRP efforts and the interactions between two programs.
- All CAU students prepared their results in posters.
- Our trainee **Ms. Marisha Morris** gave a poster presentation in the Annual Biomedical Research Conference for Minority Students (ABRCMS), November 15, 2013.
- Our trainee **Ms. Marisha Morris** gave a poster presentation in the 10th Annual National Symposium on Prostate Cancer March, 16-19, 2014.

REPORTABLE OUTCOMES: (Names for NPCRP Trainees are in bold.)

(**Reported in May 2011 Annual Report**)

- **Brittany T. Jones**, Poomy Pandey, Srustidhar Das, and Surinder K. Batra. (2010). Therapeutic Potential of Curcumin: Inhibition of MIC-1/GDF-15 Expression in Prostate Cancer Cells Exposed to Heavy Metal Carcinogen. UNMC Summer Undergraduate Research Program, August 2010.
- **Keidra A. Bryant**, Joseph R. Wheeler, Michelle A. Montgomery, and Richard G. MacDonald. (2010). Effect of Metal Ion Chelators on Mannose 6-Phosphate/Insulin-like Growth Factor II Receptor in DU145 Prostate Cancer Cells. UNMC Summer Undergraduate Research Program, August 2010.
- **Lynnette Leffall**, Kristen E. Johnson, Parul Katoch, Linda Kelsey, and Parmender Mehta. (2010). Aspects of Gap Junction Assembly and Disassembly in Prostate Cancer Progression. UNMC Summer Undergraduate Research Program, August 2010.
- **NeChelle L. Jack**, Yu Wei Chou, Laurenee London, Xiu R. Bu, and Ming-Fong Lin. (2010). The Effect of 4'-Bis-Thiosemicarbazide, a New Ribonucleotide Reductase Inhibitor, on Prostate Cancer Cell Proliferation. UNMC Summer Undergraduate Research Program, August 2010.

(**For 2012 Annual Report**)

- **Hilary Kirwan**, Yu Wei Chou, Sakthivel Muniyan, Ming-Fong Lin. (2011). Growth suppression of new ribonucleotide reductase inhibitors in prostate cancer cells. UNMC Summer Undergraduate Research Program, August 5, 2011.
- **LaTayia Aaron**, Chao Jiang, and John S. Davis. (2011). Effects of TGFβ1 and PGE2 on Cellular Signaling in Bovine Corpora Luteal Fibroblasts. UNMC Summer Undergraduate Research Program, August 5, 2011.
- **Celeste Scott**, Marissa Stanton, Samikshan Dutta, Heyu Zhang, Kaustubh Datta. (2011). VEGF-C Promotes Autophagy and Survival in Prostate Cancer Cells Following Chemotherapeutic Stress. UNMC Summer Undergraduate Research Program, August 5, 2011.
- **Shawna Battle**, Michelle L. Varney, Mitsuru Futakuchi, Rakesh K. Singh. (2011). Upregulation of matrix metalloproteinase (MMP) 13 expression at the tumor-bone in prostate cancer. UNMC Summer Undergraduate Research Program, August 5, 2011.
- **LaTayia Aaron** and Joann Powell. (2012). Dioxin exposure enhances nuclear localization of androgen receptor. The 8th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 18-20, 2012.
- Cindy Tran, **LaTayia Aaron** and Joann Powell (2012). The aryl hydrocarbon receptor sustains androgen receptor signalling in androgen independent prostate cancer cells. The 8th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 18-20, 2012.
- **Celeste Scott**, Marissa Stanton, Samikshan Dutta, Heyu Zhang and Kaustubh Datta. (2012). VEGF-C Promotes Autophagy and Survival in Prostate Cancer Cells Following Chemotherapeutic Stress. The 8th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 18-20, 2012.

(**For 2013 Annual Report**)

- **Alexus Devine,** Xiu Bu, Sakthivel Muniyan and Ming-Fong Lin (2012). Effects of AMD and DME on prostate cancer LNCaP C-81 cell proliferation in steroid-reduced conditions. The Annual Biomedical Research Conference for Minority Students (ABRCMS), November 10, 2012.
- **LaTayia Aaron,** Cindy D. Tran, Danielle N. McKeithen and Joann B Powell (2013). Aryl hydrocarbon receptor signalling in prostate cancer cells. Poster # U1, the 9th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 17-20, 2013.
- **Alexus Devine,** Xiu Bu, Sakthivel Muniyan and Ming-Fong Lin (2013). Effects of AMD and DME on LNCaP C-81 cell proliferation in steroid-reduced conditions. Poster # U6, the 9th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 17-20, 2013.
- **Alexandra White,** Parul Katoch, Linda Kelsey and Parmender Mehta (2013). Gap junction assembly and chemoprevention of prostate cancer. Poster # U17, the 9th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 17-20, 2013.

(**For 2014 Annual Report**)

- **Marisha Morris**, Sakthivel Muniyan, Jennifer G. Dwyer, Xiu Bu, Ming-Fong Lin (2013). Novel imidazopyridine derivatives inhibit androgen-independent PCa cell proliferation. The Annual Biomedical Research Conference for Minority Students Annual National Symposium, November 15, 2013.
- **Marisha Morris**, Sakthivel Muniyan, Jennifer G. Dwyer, Xiu Bu, Ming-Fong Lin (2014). Novel imidazopyridine derivatives inhibit androgen-independent PCa cell proliferation. The 10th Annual National Symposium on Prostate Cancer March, 16-19, 2014.

CONCLUSION:

The purpose of this award is to train HBCU undergraduate students from CAU to gain hand-on experience in performing PCa research in a research-intensive focus group, the UNMC Nebraska Prostate Cancer Research Program (NPCRP). We are very pleased with the outcomes for the continuing success of the forth year training at UNMC. These students have received training not only in the lab but also in the class room in the format of seminars and visiting biotechnology companies. Our goals of training are to encourage and to prepare HBCU undergraduate students for academic career in graduate school or medical school with training in, and understand of, prostate cancer research. We propose that by this way, we can increase the number of PCa researcher from the minority group at both the basic science and the clinical science levels. With this three-year award support from the DOD PCa Research Program, as evidenced by the scientific outcomes of student posters and student comments, we are very excited by the success of our training program. It is clearly evidenced by students who are eagerly participating various scientific meetings, gave posters and received award in accomplishments (**Appendices #17&18 and Key Accomplishments**). We are expecting that more exciting results will be done in the up-coming years.

REFERENCES:

1. Dillard, P.R., **Lin, M.F.**, and **Khan, S.A.** (2008). Androgen-independent prostate cancer cells acquire the complete steroidogenic potential of synthesizing testosterone from cholesterol. Mol. Cellu. Endo. 295:115-120.

2. Siegel, R., Naishadham, D., and Jemal, A. (2012). Cancer Statistics, 2012. CA Cancer J Clin 62: 10-29.

APPENDICES:

(**For 2011 Annual Report**)

1. Appendix #1: The web information for 2010 NPCRP posted on the BMB at UNMC web is attached.
2. Appendix #2: UNMC Public Affairs reported 2010 NPCRP student.
3. Appendix #3: Four abstracts prepared by 2010 four CAU students are attached.
4. Appendix #4: Evaluation by 2010 CAU students upon their completion of training at UNMC prior to their departure.
5. Appendix #5: A Minute taken by Ms. Bakari at CAU for students' evaluation and comments during the meeting after their return to CAU in September 2010.

(**For 2012 Annual Report**)

6. Appendix #6: The schedules for UNMC INBRE and UNMC SURP programs.
7. Appendix #7: The up-dated web information for 2011 NPCRP trainees posted on the BMB at UNMC web.
8. Appendix #8: Announcement by BMB for Dr. Shafiq Khan's presentation at UNMC.
9. Appendix #9: UNMC INBRE IN ROADS reported CAU students in NPCRP training.
10. Appendix #10: Four abstracts for the posters prepared by 2011 four CAU students in the UNMC SURP poster section.
11. Appendix #11: Three abstracts for UNMC-CAU trainees' posters in the 8th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 18-20, 2012.

(**For 2013 Annual Report**)

12. Appendix #12: The schedules for the UNMC INBRE program.
13. Appendix #13: The UNMC INBRE IN ROADS reported that three CAU students are training in NPCRP at UNMC.
14. Appendix #14: Announcement by BMB for Drs. Shafiq Khan's and Valerie Odero-Marah's presentations at UNMC.
15. Appendix #15: Three posters were prepared by 2012 three CAU students.
16. Appendix #16: Evaluation by 2012 CAU students upon their completion of training at UNMC prior to their departure.
17. Appendix #17: Poster presentation by Ms. Alexus Devine at the Annual Biomedical Research Conference for Minority Students (ABRCMS), November 10, 2012.
18. Appendix #18: NPCRP students gave poster presentations in the 9th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 17-20, 2013.

(**For 2014 Annual Report**)

19. Appendix #19: Announcement by BMB for Dr. Shafiq Khan's scientific presentations and meeting with faculty members at UNMC.
20. Appendix #20: Poster presentation by Ms. Marisha Morris at the Annual Biomedical Research Conference for Minority Students (ABRCMS), November 10, 2012.
21. Appendix #21: Poster presentations by Ms. Marisha Morris in the 10th Annual National Symposium on Prostate Cancer by CCRTD, CAU, March 16-19, 2014.

Appendix #1

http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84

Nebraska Prostate Cancer Research Program (NPCRP)

This program is supported by the Department of Defense Prostate Cancer Research Program - Grant PC094595

Overview of NPCRP

Nearly 200,000 men in the U.S. will be diagnosed with prostate cancer and over 30,000 will die of this disease annually. While surgery and chemotherapy can cure the disease, in many cases it will spread and kill the patient. Better basic scientific understanding of this disease is needed to enable the development of more effective preventive and therapeutic treatments toward this cancer.

The development of better prostate cancer treatments depends on the training of prostate cancer researchers. This program is designed to train undergraduate science majors in prostate cancer research. It is a collaborative effort between the University of Nebraska Medical Center (UNMC), Omaha, NE and Clark Atlanta University (CAU), Atlanta, GA. Dr. Ming-Fong Lin of UNMC and Dr. Shafiq Khan of CAU have ongoing research collaborations. They will identify interested undergraduates at CAU for summer research at UNMC where the students will do basic science or translational research in a laboratory. Students will spend the great majority of their time working at the bench on a research project. They will also participate in a seminar series that will introduce them to different areas of scientific investigation and advanced technological tools used in scientific discovery.

After the summer, the students will continue research in a prostate cancer lab at CAU. They will thus continue their scientific development throughout the academic year in preparation for a graduate career in the biomedical sciences or for medical school.

Mission Statement of NPCRP

This Program will train undergraduate students to perform prostate cancer research in a research-intensive environment. They will continue to perform research during their undergraduate academic career. After graduation, the student participants will be prepared to enter graduate school or medical school with training in, and understanding of, prostate cancer research. This will increase the number of prostate cancer researchers in both the basic and the clinical sciences.

Focus Areas of Research in NPCRP

Since our faculty members are engaged in a variety of research projects, students will have the opportunity to be trained in different areas of prostate cancer research. For example, the focus areas or research include Biomarkers, Therapy, Genetics, and Tumor Biology as outlined by the laboratory research descriptions in the table below.

NPCRP: Program Director, Staff Members and Mentors

Dr. Ming-Fong Lin, PD/PI of NPCRP, has served as the Coordinator/Leader of the UNMC Eppley Cancer Center Prostate Cancer Research Focus Group since 1997. Dr. Lin is a veteran in prostate cancer research for over twenty years. He was initially involved in the early investigation on the potential of prostate-specific antigen (PSA) as a surrogate marker for prostate cancer, comparing with the classical marker, circulating prostate acid phosphatase (PAcP). For investigating the molecular mechanism of hormone-refractory prostate cancer progression, Dr. Lin has established clinic-relevant, U.S. patent-awarded prostate cancer cell lines, which are well accepted by scientists in the field. Dr. Lin has also made the seminal discovery on the novel role of cellar PAcP in prostate cancer progression, corroborating clinic phenomena. Since 1995, he has served in various study sections for National Institutes of Health, Department of Defense Congressionally Directed Prostate Cancer Research Program, American Cancer Society and others.

The concept of training of undergraduate HBCU students from CAU is based on long-term interactions between Dr. Lin and Dr. Shafiq Khan, the faculty mentor at CAU. Dr. Lin has been a member of the Executive Advisory Committee for the NIH Research Center in Minority Institute (RCMI) at CAU and Dr. Khan is the Director of the Center since March 2004. Recently, Dr. Khan's Center, with Dr. Lin's inputs, was awarded a grant from NIH National Center on Minority Health and Health Disparities (NCMHD) for establishing a Center of Excellence for Prostate Cancer Research, Education and Services at CAU. To strengthen the research efforts in prostate cancer at CAU, Dr. Lin has provided necessary expertise and reagents to Dr. Khan and his faculty members. Dr. Lin and Dr. Khan have research collaborations as well; Dr. Lin is a consultant in Dr. Khan's DOD PCa Idea Award which has resulted in a co-authored publication in 2008 and additional collaborative articles are under construction or pending reviewing.

Dr. William Chaney serves as the Program Coordinator organizing orientation sessions and a summer seminar series for the students. He has over fifteen years of experience with undergraduate summer programs, having organized the first one provided by the College of Medicine at UNMC. He currently is the Program Coordinator of the NIH-supported Nebraska Center for Functional Genomics INBRE grant (The P.I. of the grant is Dr. James Turpen of UNMC). In this role, he organizes summer orientation and seminar presentations for undergraduate students. The concept is supported by Dr. Turpen, and the CAU students will also attend the INBRE activity during their summer research at UNMC. Thus, Dr. Chaney brings a tremendous amount of experience and activities to the CAU students in the NPCRP.

In NPCRP, fourteen faculty members from Creighton University (CU) in Omaha; University of Nebraska – Lincoln (UNL) and University of Nebraska Medical Center (UNMC) have agreed to serve as potential research mentors for this proposal. Their research areas cover a wide range of expertise and interest in cancer research including prostate cancer (the detail of research activity is described in the table below). Thus, a student entering this program can find a research mentor who is working in an area of interest to that student.

Faculty Advisors at CAU

Dr. Shafiq Khan, Professor of Biological Sciences at CAU, will serve as the faculty advisor for the undergraduate students participating in this program. He currently coordinates undergraduate research efforts at CAU and is extensively involved in their research experiences. Dr. Khan is the Director of Research Center in Minority Institute (RCMI) program and also is the PI of the Prostate Cancer Research Center at CAU supported by NCMHD, NIH. Dr. Khan has an active research lab and is funded externally including the DOD Prostate Cancer Research Program Idea award. To strengthen the effort of this training program, upon discussion with Dr. Lin, Dr. Khan recruited Dr. Valerie Odero-Marah, Assistant Professor of Biology at CAU, who is also funded by the DOD Prostate Cancer Research Program to serve as the Program Coordinator supporting Dr. Khan in student recruitment and mentoring at CAU.

Research Mentors and Projects

Investigator	Institution	Project
S. Batra	UNMC	Genetic Alterations in Prostate Cancer Progression
J. Christman	UNMC	Regulation of DNA Methylation in Prostate Cancer
W. Chaney	UNMC	Glycobiology in Prostate Cancer
P. Cheng	UNMC	Glycomics in Prostate Cancer Metastasis and Gene Therapy
J. Davis	UNMC	Hormone Regulation of Tumor Cell Development
R. Lewis	UNMC	IGF Receptors in Prostate Cancer
M.-F. Lin	UNMC	Androgen Regulation of Prostate Cancer Growth and Development
R. MacDonald	UNMC	IGF Axis in Prostate Cancer Growth
P. Mehta	UNMC	Gap Junction Proteins in Prostate Cancer Metastasis
E. Rogan	UNMC	Metabolism of Dietary and Environmental Chemicals to Mutagenic and Genotoxic Species
M. Simpson	UNL	The Role of Hylauronate in Prostate Cancer Development

R. Singh	UNMC	Prostate Cancer Metastasis and Immunology
Y. Tu	CU	Regulation of G-Protein-Coupled Receptors in Prostate Cancer
D. Wang	UNMC	Targeted Therapies for Prostate Cancer Bone Metastasis

2010 INBRE-BRIN Scholars First Week Schedule

Michael Sorrell Center Room 2010
UNMC

Tuesday-June 1

8:00	Welcome and Introductions	J. Turpen P. Davis
9:00	Use of Animals in Research	J. Turpen
9:45	Laboratory Safety	W. Chaney
10:45	Introduction to Bioinformatics	H. Ali
12:00	Lunch	
1:00	Library Access	M. Helms
1:45	Responsible Conduct in Research	D. Crouse
2:30	Sequence Analysis Tools	D. Bastola
3:45	Radiation Safety Usage and Video	W. Chaney
4:45	Wrap-up and Questions	
5:30	Barbeque Welcome Banquet	J. Turpen

Wednesday-June 2

9:00	Science as a Career	D. Crouse
9:50	Graduate Studies at UNMC	A. Schlueter
10:30	MD/PhD Program at UNMC	S. Smith
10:50	Graduate Studies at Creighton	R. Murphy
11:20	Graduate Studies at UNL	J. Morris
12:00	Lunch	
	Go meet mentors and labs.	

2010 INBRE Weekly Seminar Schedule
(all on Mondays)

June	7	UNL	9:00	J. Morris	Beadle Center
June	14	UNMC	9:00	P. Ciborowski	UNMC Proteomics Core
			10:30	K. Bayles	Control of Clinically Important *Staphylococcus* Infections
June	21	CU	9:00	S. Lovas	Structural Proteomics and Bioinformatics Research
			10:15		Lab Tours
			11:00	L. Bruce	Evolution of Brain Development
June	28	Lincoln Biotech	9:00	Ian Davis	Drug Development/Analysis at Celerion Corp. (MDS-Pharma)
July	5	No Seminar			
July	12	Omaha Biotech	9:00	M. Dixon	Patent Development at UNEMED
			10:30	T. Wasmoen	Vaccine Research/Development at Intervet/Schering-Plough
July	19	UNMC	9:00	J. Eudy	UNMC DNA Analysis Core
			10:30	D. Romberger	Pulmonary Disease and Research
July	26	UNL	9:00	J. Morris	Morrison Center
Aug	2	CU	9:00	G. Soukup	MicroRNA Function in Neurosensory Development
			10:15		Lab Tours
			11:00	R. Hallworth	The Life and Death of Hair Cells

2010 Summer Undergraduate Research Program

Date	Title and Speaker	Location	Time
Wednesday, June 2nd	**Welcome Reception** Speaker: Dr. Rubens Pamies	DRC I 1002 Auditorium	11:00 am
Wednesday, June 2nd	**Compliance Training** Registration begins at 12:30 pm	DRC I 1002 Auditorium	1:00 pm
Tuesday, June 8th	**Luncheon Seminar** Speaker: Dr. Paul Dunman	ESH 3010 Auditorium	12:00 pm
Tuesday, June 15th	**Luncheon Seminar** Speaker: Dr. Steven Caplan	ESH 3010 Auditorium	12:00 pm
Tuesday, June 22nd	**Luncheon Seminar** Speaker: Dr. James Haorah	ESH 3010 Auditorium	12:00 pm
Tuesday, June 29th	**Luncheon Seminar** Speaker: Dr. Jenny Wang	ESH 3010 Auditorium	12:00 pm
Tuesday, July 6th	**Luncheon Seminar** Speaker: Dr. Jennifer Larsen	ESH 3010 Auditorium	12:00 pm
Tuesday, July 13th	**Luncheon Seminar** Speaker: Dr. Tammy Kielian	ESH 3010 Auditorium	12:00 pm
Tuesday, July 20th	**Luncheon Seminar** Speaker: Dr. Howard Fox	ESH 3010 Auditorium	12:00 pm
Tuesday, July 27th	**Luncheon Seminar** Speaker: Dr. Joseph Vetro	ESH 3010 Auditorium	12:00 pm
Thursday, August 5th	**SURP Poster Presentation**	DRC I Atrium	10:00 am
	SURP Reception & Certificate Presentation	DRC II Commons Area	12:30 pm

UNIVERSITY OF Nebraska Medical Center

Clark Atlanta University Students

**We would like to acknowledge Lisa Spellman and the Public Relations Office for taking the photos below of the Clark Atlanta University Students (group photo and four head shots). We appreciate their support.

Lynnette, Leffall, Brittany Jones, Nechelle Jack, Keidra Bryant

Keidra Bryant

Senior Undergraduate Student majoring in Biology

After receiving her B.S. degree, she plans on obtaining an MD/PhD degree. She has a strong passion for research on prostate cancer and plans to continue her journey working with it. She is currently working in Dr. Richard MacDonald's lab, where her main focus is on DU145 cells and trying to see if IGFII is important in prostate cancer and if it will maintain cell growth. She plans on continuing her work on prostate cancer while at Clark Atlanta University.

Nechelle Jack

Senior Undergraduate Student majoring in Biology
She is interested in prostate cancer research.
After receiving her B.S., she plans on obtaining a MD/PhD degree or becoming a Physician's Assistant. She is currently working in Dr. Ming-Fong Lin's lab and the basis of her project is to observe "the effect of anti-cancer compounds in prostate cancer cells." She is excited to see the results of this project and feels very blessed and honored to be given such an amazing opportunity. She would like to thank Dr. Lin of UNMC and Dr. Khan of CAU - she would not be here without them!

Brittany Jones

Senior Undergraduate Honors Student majoring in Biology
After receiving her B.S., she plans on matriculating into a MD/PhD program. She has a strong passion for finding a cure for cancer. She enjoys doing research because research is to see what everybody else has seen and to think what nobody else has every thought. She's currently working in Dr. Surinder K. Batra's lab, where her research project is to monitor "What effect do Curcumin, $NiCl_2$, and $CoCl_2$ has on PC3M, LnCap, RWPE1, and PC3 cell lines." She plans on using the knowledge gained during this program and apply it when she returns to Clark Atlanta University.

Lynnette Leffall

Senior Undergraduate Student majoring in Biology
After receiving her B.S., she plans on obtaining an MD/PhD degree and concentrating on clinical research dealing with different forms of cancers as well as practicing medicine. She is currently working in Dr. Parmender Mehta's lab looking at the trafficking of Cx26 in BxLx26 Z-3 pancreatic cancer cell lines comparative to LNCaP26 prostate cancer cell lines. At the end of this summer, she hopes to understand the importance that Cx26 plays in both cancer cells.

Kristen Johnson and Lynnette Leffall, Mehta Lab

Poomy Pandey and Brittany Jones, Batra Lab

Keidra Bryant and Joe Miller, MacDonald Lab

Nechelle Jack and Yu-Wei Chou, Lin Lab

Nebraska Prostate Cancer Research Program (NPCRP)

http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84

Funding:
Department of Defense
Prostate Cancer Research Program,
the Office of the Congressionally Directed Medical Research Programs (CDMRP)
(***Grant #: PC094594***)

Collaborations:
Dr. Ming-Fong Lin and Dr. William Chaney,
University of Nebraska Medical Center (UNMC),
and
Dr. Shafiq Khan and Dr. Valerie Odero-Marah,
Clark Atlanta University (CAU)

Supported by
Department of Biochemistry & Molecular Biology, UNMC
Nebraska Center for Functional Genomics
NIH INBRE Program
Drs. Batra, Cowan, Pamies, and Turpen

Faculty members:
Creighton University (CU) at Omaha;
University of Nebraska – Lincoln (UNL) and
University of Nebraska Medical Center (UNMC)

University of Nebraska Medical Center

Department of Biochemistry &
Molecular Biology

Seminar Series

"Snail Transcription Factor Contributes to Prostate Cancer Tumor Progression via Reactive Oxygen Species"

Presented by

Valerie Odero-Marah, PhD
Assistant Professor
Department of Biology
Clark Atlanta University

****Supported by the Department of Biochemistry & Molecular Biology and the Nebraska Prostate Cancer Research Program****

Tuesday, July 6, 2010

3:00 p.m.

DRC1 Room1004

Acknowledgements:

CAU students:
Keidra Bryant:
Joe Miller in Dr. MacDonald's Lab

Nechelle Jack:
Dr. Yu-Wei Chou in Dr. Lin's Lab

Brittany Jones:
Poomy Pandey and Srustidhar Das in
Dr. Batra's Lab

Lynnette Leffall:
Kristen Johnson in Dr. Mehta's Lab

Supports:
BMB, UNMC
Ms. Amy Dodson, MBA
Ms. Jennifer Pace

CCRTD/RCMI Program, CAU
Ms. Priscilla Bakari, MA

DOD CDMRP PCa Program
Grant #: PC094594

Only@UNMC with Lynnette Lefall

You know them when you have them.

Maybe you're busy with a patient, working with a student or learning from a professor.

Immersed completely in the moment, it hits you, "This is where I'm supposed to be and this is what I'm supposed to be doing."

Lynnette Lefall

They are "Only@UNMC" moments -- born from the combination of people, place and purpose that exists only at UNMC.

Lynnette Leffall, a biology major from Clark Atlanta University who was one of four students to spend eight weeks at UNMC this summer working with investigators in the Nebraska Prostate Cancer Training Program, describes an Only@UNMC moment.

"This is my first year doing research, so when I came to UNMC I was a little intimidated. At Clark, I study biology but have never worked in a lab before. The other girls I came here with have all been in a lab. I felt like I had to step up my game just to keep up with them.

"All of that changed the day I learned how to split a cell line. I was so excited. Just seeing the cells come off the plate, seeing them grow and knowing I could take living cells and keep them alive. That was cool. I felt empowered, like I could do anything."

Share your "Only@UNMC" moments.

Date Published: Friday, August 6, 2010

Keidra Bryant – Abstract

Effect of Metal Ion Chelators on Mannose 6-Phosphate/Insulin-like Growth Factor II Receptor in DU145 Prostate Cancer Cells

Keidra A. Bryant, Clark Atlanta University
Joseph R. Wheeler, Michelle A. Montgomery, Richard G. MacDonald

The M6P/IGF2R is a multifunctional transmembrane receptor. The major function is to transport lysosome enzymes from where they are processed in the Golgi apparatus to the lysosomes.It is important for cells to maintain receptor expression on the cell surface for proper growth control and to prevent cancer. This includes prostate cancer. Prior work in the MacDonald laboratory showed that the receptor's ectodomain is cleaved at the cell surface by a protease that is inhibited by metal ion chelators. This work was done in a human embryonic kidney cell line. The goal of my project was to determine if this process also occurs in prostate cancer cells.
To address this question, we investigated whether metal ion chelators would inhibit this process in the insulin-like growth factor-responsive human prostate cancer cell line DU145. Cells were grown to 70-80% confluences and switched to serum-free medium for one day. Then, the cells were exposed to different concentrations of the chelators for 18-24 hours, scraped and processed for preparation of cell lysates and conditioned medium, which were analyzed for receptor amount by immunoblotting.
Immunoblot analysis indicated a concentration-dependent effect of the chelators 1,10-ortho-phenanthroline (OPA), Ethylenediaminetetraacetic acid (EDTA), Ethylene glycol tetraacetic acid (EGTA) to increase recovery of M6P/IGF2R in cell lysates. Of these reagents, OPA seemed to be the most effective, consistent with the hypothesis that metalloprotease responsible for cleaving the M6P/IGF2R ecodomain is Zn^{2+} -dependent.

NeChelle Jack - Abstract

The Effect of 4'-Bis-Thiosemicarbazide, a New Ribonucleotide Reductase Inhibitor, on Prostate Cancer Cell Proliferation

NeChelle L. Jack[1 & 2], Yu Wei Chou[2], Laurenee London[1], Xiu R. Bu[1], Ming-Fong Lin [2]

[1]Department of Chemistry, Clark Atlanta University
[2]Department of Biochemistry and Molecular Biology, University of Nebraska Medical Center

Background: Although several approaches, including surgery and radiation therapy, provide physicians with options for treating patients with early stages of prostate cancer, no effective therapeutic treatment option for the advanced castration-resistant cancer is currently available. The development of new highly potent with low toxic chemotherapeutic agents as an effective treatment for prostate cancer with the castration-resistant phenotype is immediately needed. In this project, a new ribonucleotide reductase (RR) inhibitor, 4'-Bis-Thiosemicarbazide, was synthesized and tested to examine its effect on prostate cancer cell proliferation using the US Patent-awarded LNCaP cell model system.
Methods: The effect of 4'-Bis-Thiosemicarbazide on the proliferation of androgen-sensitive LNCaP C-33 and androgen-independent LNCaP C-81 prostate cancer cells was examined. C-81 cells exhibit many biochemical properties of prostate cancer cells at the castration-resistant stage. Cells were cultured in regular medium and also steroid-reduced condition, mimicking androgen-ablation therapy in clinics. The effect of 4'-Bis-Thiosemicarbazide at 1 and 10 µM concentrations on cell growth was analyzed by cell number counting, and the solvent DMSO was used as a control. The expression of cell proliferation markers including cellular prostatic acid phosphatase (cPAcP), an authentic protein tyrosine phosphatase functioning as a negative growth regulator, was also analyzed by western blot analyses.
Results: Upon 4'-Bis-Thiosemicarbazide treatment, the growth of LNCaP C-81 cells significantly diminished, followed a dose-dependent phenomenon under both regular and steroid-reduced conditions. In 4'-Bis-Thiosemicarbazide-treated LNCaP C-81 cells, cPAcP protein levels were elevated, inversely correlating with growth suppression. Interestingly, 4'-Bis-Thiosemicarbazide also reduced LNCaP C-33 cell growth in regular medium, while the expression level of cPAcP protein was not significantly altered.
Conclusion: Our results clearly show that 4'-Bis-Thiosemicarbazide exhibits an inhibitory effect on the proliferation of LNCaP C-81 prostate cancer cells, following a dose-dependent fashion. In those treated C-81 cells, cPAcP expression level is up-regulated. Further studies shall be continued to clarify the molecular mechanism of growth suppression and the potential of 4'-Bis-Thiosemicarbazide as a therapeutic agent on advanced castration-resistant prostate cancer.
(This project is supported in part by DOD PC094594 and NCI CA88184.)

Brittany Jones – Abstract

Therapeutic Potential of Curcumin: Inhibition of MIC-1/GDF-15 Expression in Prostate Cancer Cells Exposed to Heavy Metal Carcinogen

***Brittany T. Jones*, Poomy Pandey, Srustidhar Das and Surinder K. Batra**
Department of Biochemistry and Molecular Biology, University of Nebraska Medical Center, Omaha, NE

Prostate cancer is one of the major cancer related deaths among American men. There is emerging evidence that prostate inflammation is one of the major factors contributing to prostatic carcinogenesis. Various proinflammatory cytokines, chemokines and other immune molecules are observed near tumor microenvironment and help in tumor proliferation. Macrophage inhibitory cytokine 1 (MIC-1) is a member of Transforming Growth Factor-β (TGF-β) family of cytokines and has been shown to inhibit the secretion of TNF-α by activated macrophages and thereby reduce the tumor killing activity of macrophages. MIC-1 has been shown to be overexpressed in prostate cancer and has been proposed to be used a prognostic and diagnostic marker of prostate cancer along with PSA (Prostate Specific Antigen). It has also been shown that MIC-1 is upregulated in response to hypoxia and anoxia. Promoter analysis of MIC-1 indicated the presence of putative consensus sequences for transcription factor binding elements such as NFkB. The role of NFkB in hypoxic stress has been demonstrated. At the same time Curcumin has been shown to inhibit the NFkB pathway in various cancer models. Therefore, we hypothesized that Curcumin can be used as a potential therapeutic agent in prostate cancer where it can downregulate MIC-1 production. We looked at the MIC-1 mRNA expression in various prostate cancer cells (PC3, PC3M, LnCap35 and LnCap126) upon treatment with $NiCl_2$ and $CoCl_2$. RWPE1, a benign immortalized prostatic epithelial cells, was also used, but had least MIC-1 mRNA in comparison to the cancer cells. mRNA expression was verified by both RT-PCR as well as quantitative real-time PCR. Because MIC-1 is a secretory cytokine, culture supernatants were checked for the secretory MIC-1 in two cell models i.e. PC3M and LnCap126 cells, and a similar induction was observed upon treatment with $NiCl_2$ and $CoCl_2$. When cells were treated with Curcumin, we observed a decrease in the MIC-1 expression compared to controls as well as cells treated with heavy metals. In addition, $CoCl_2$-induced motility of PC3 cells was inhibited by Curcumin. $NiCl_2$ had no effect on motility of PC3 cells. Various sequential and combinatorial treatment of $NiCl_2$ and Curcumin demonstrates the potential of Curcumin as a therapeutic target to be used in prostate cancer. In conclusion, we demonstrate the potential of Curcumin in downregulating MIC-1 expression induced by hypoxic condition and thereby can be a potential agent for prostate cancer therapy.

Lynnette Leffall – Abstract

Aspects of Gap Junction Assembly and Disassembly in Prostate Cancer Progression

Lynnette Leffall, Kristen E. Johnson, Parul Katoch, Linda Kelsey, and Parmender Mehta
Department of Biochemistry and Molecular Biology, University of Nebraska Medical Center

The prostate is composed of epithelial cells, which line the ducts and acini, and the mesenchymal cells, which form the stroma. Androgen-regulated stromal-epithelial interactions govern the proliferation, differentiation and apoptotic death of normal and malignant prostate epithelial cells. Androgens either act directly on luminal cells and/or indirectly via stromal cells through the release of paracrine mediators, such as growth factors. The incidence of prostatic cancer increases with age and is characterized by progression from a slow-growing hormone (androgen)-sensitive state to a highly malignant, hormone-independent state. In the absence of androgens, luminal cells of normal prostate, and malignant cells of prostate tumors, die by apoptosis. Gap junctional cell-to-cell channels provides a direct intercellular communication pathway for the growth regulatory signaling molecules (˜ 1000 D) and hence may be important in regulating prostate morphogenesis and oncogenesis. The gap junctional channels are bicellular structures formed by the members of related proteins named connexin (Cx)s, which first assemble into connexons that align and join with connexons in adjacent cells to form channels. We previously showed that the normal luminal cells or prostate express Cx32 and Cx26 whereas basal cells express Cx43. We have also shown that the trafficking and assembly off Cxs is impaired during prostate cancer progression (Govindarajan et al. *J Biol Chem*, 2002). We have also shown that reintroduction of Cx32 and Cx43 into Cx-deficient, indolent PCA cell line, LNCaP, retards growth and induces differentiation, whereas re-introduction of the same Cxs into an invasive cell line, PC-3, results in intracellular accumulation due to impaired trafficking (Mehta et al. *Dev Genetics*, 1999; Govindarajan et al. *J Biol Chem*, 2002). Significantly, our recent studies document that androgens regulated the formation and degradation of gap junctions (Mitra et al. *Mol Biol Cell*, 2006). Hence, elucidation of the molecular mechanisms of how gap junctions form and degrade may open up a therapeutic window to modulate prostate cancer growth and progression.

Please fill out and return to Dr. Lin.

1. How satisfied are you with the Nebraska Prostate Cancer Research (NPCRP) Scholars program?

(Very satisfied) Satisfied Dissatisfied Very dissatisfied

2. How did you originally learn about the NPCRP Scholars program?

I originally ~~heard of this~~ learned about this opportunity from Dr. Odero-Marah in Genetics class.

3. Did you have a clear set of expectations of the NPCRP program when you first became a NPCRP Scholar?

Yes. I expected to learn more about Prostate cancer at the microscopic level as well as research experience.

4. Was the process matching you with your mentor/advisor a good one?

Yes!

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

I would rate my research experience increasingly high as it relates to making decisions career wise. I would honestly consider research & medicine as a career option. This summer has shown me the importance research experience has on the world.

6. **What do you consider to be the main benefit(s) of the NPCRP Scholars program?**

I consider research exposure as the main benefit of the NPCRP Scholars Progam, particularily Prostate Cancer research exposure.

7. **What suggestions would you give for the program for next summer?**

More seminars based on Prostate Cancer as well as an introductory seminar to Prostate Cancer.

Please fill out and return to Dr. Lin.

1. How satisfied are you with the Nebraska Prostate Cancer Research (NPCRP) Scholars program?

Very satisfied *Satisfied* *Dissatisfied* *Very dissatisfied*

2. How did you originally learn about the NPCRP Scholars program?

Dr. Khan from Chalk Alarm University

3. Did you have a clear set of expectations of the NPCRP program when you first became a NPCRP Scholar?

Yes

4. Was the process matching you with your mentor/advisor a good one?

Yes it was a good match for me

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

I would rate it on a scale of 10 an 9. It was very helpful in the decision about my education.

6. **What do you consider to be the main benefit(s) of the NPCRP Scholars program?**

The learning benefits that they had to offer.

7. **What suggestions would you give for the program for next summer?**

To let the student visit the lab ~~before and to in~~ when arriving and to also have a seminar about prostate cancer

Please fill out and return to Dr. Lin.

1. How satisfied are you with the Nebraska Prostate Cancer Research (NPCRP) Scholars program?

Very satisfied ***Satisfied*** ***Dissatisfied*** ***Very dissatisfied***

Satisfied.

2. How did you originally learn about the NPCRP Scholars program?

- I heard it from my institution at Clark Atlanta University.

3. Did you have a clear set of expectations of the NPCRP program when you first became a NPCRP Scholar?

At first, it wasn't vivid about the program. After coming here I gained insight about the expectation of the NPCRP.

4. Was the process matching you with your mentor/advisor a good one?

yes, I loved working with my mentor as well as my advisor.

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

I would rate it a 9 out of 10.

6. **What do you consider to be the main benefit(s) of the NPCRP Scholars program?** The main benefit of this program is to gain insight more about research and have a more hands on experience.

7. **What suggestions would you give for the program for next summer?**

My suggestion for the program is maybe have more activities throughout the week.

Please fill out and return to Dr. Lin.

1. How satisfied are you with the Nebraska Prostate Cancer Research (NPCRP) Scholars program?

Very satisfied (*Satisfied*) *Dissatisfied* *Very dissatisfied*

2. How did you originally learn about the NPCRP Scholars program?

At Clark Atlanta University. My advisor Dr. Bu informed me about the NPCRP Scholars Program along with Dr. Khan.

3. Did you have a clear set of expectations of the NPCRP program when you first became a NPCRP Scholar?

Yes and NO. I knew since the Program was new there would be some glitches that needed to be worked out. On the other hand, I had high expectations that the program would be a success, and that I would come out being a ~~better~~ Scientist and Scholar, then when I started.

4. Was the process matching you with your mentor/advisor a good one?

The ~~labs~~ participants should have been able to choose their labs once they get to UNMC.

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

After being a participant in the NPCRP Program I believe my research experience is at a higher level, and I should not have any problems getting into graduate school.

6. **What do you consider to be the main benefit(s) of the NPCRP Scholars program?**

- Research Experience
- Attending Seminars
- Social Networking
- Working in a Professional environment
- Being Advised by award-winning, Intelligent mentors,

7. **What suggestions would you give for the program for next summer?**

- Allowing more students to be involved in NPCRP Program.
- Have NPCRP Stand alone as its own Program, not combining it with the INBRE Program
- Making sure students know exactly what they will be doing and making sure they have a strong understanding of what Prostate Cancer is.

Meeting with UNMC Summer Students
September 2, 2010

- Minutes taken by Ms. Priscilla Bakari

Present:
Dr. Shafiq A. Khan
Dr. Valerie Odero-Marah
Ms. Priscilla Bakari
Ms. Nechelle Jack
Ms. Brittany Jones
Ms. Keidra Bryant
Absent: Ms. Lynnette Leffall

Dr. Khan told students that this meeting was scheduled to gain feedback from them regarding their experience during the summer in Omaha. He asked each to delineate their thoughts on interactions with faculty and research staff in the perspective research laboratory and to give a summary of the highlights of their stay in Omaha. Below is a synopsis of their responses:

- All students said they had a great experience and would definitely recommend the program to other fellow students.
- All students said at first it was a difficult adjustment culturally, but everyone was very helpful and once they adjusted, they had a good time; they worked hard and learned a lot.
- All students said that they are able to continue their research from Omaha in the laboratories of CCRTD investigators at Clark Atlanta University.
- All students are applying to UNMC for the MD/PhD program.

Dr. Khan asked students to help recruit 4 new students for next summer and they agreed to help.

NOTE: Ms. Lynnette Leffall was not able to attend the initial meeting because of her class schedule however she met with Dr. Khan at a later time.

2011 INBRE Weekly Seminar Schedule
(all on Mondays)

June	6	UNMC 1005 DRC	9:00	James Eudy Robert Boissy	DNA Sequencing Core and Genomic Analysis
			10:30	Vimla Band	Breast Cancer
June	13	UNL	9:00	Arrival at Morrison Virology Building	
			9:15	Jack Morris – Welcome and outline of today's program	
			9:30	Deb Brown – Biological Sciences	
			10:30	TBA	
			11:30	Tour of Nebraska Center for Virology	
June	20	CU	9:00		
June	27	Lincoln Biotech	9:00	Doc Chavez, Li-Cor	
July	4	No Seminar			
July	11	Omaha Biotech 1005 DRC	9:00	M. Dixon, UNEMED	
			10:30	T. Wasmoen, Schering-Plough Invertis	
July	18	UNMC 1005 DRC	9:00	Charles Kuszynski	Flow Cytometric Analysis Of Cells
			10:30	Kenneth Bayles	*Staphlococcus aureus* Research at UNMC
July	25	UNL	9:00	Arrive at Beadle Center	
			9:15	Jack Morris – Welcome	
			9:30	Rick Bevins – Dept of Psychology	
			10:30	Karrie Weber – Biological Sciences	
			11:00	Joe Zhou, Rik Barrera—Tours of Microscopy facility and Beadle Center	
Aug	1	CU	9:00		

2011 INBRE-BRIN Scholars First Week Schedule

Michael Sorrell Center Room 4053
UNMC

Tuesday-May 31

8:00	Welcome and Introductions	J. Turpen P. Davis
9:00	Use of Animals in Research	J. Turpen
9:45	Laboratory Safety	W. Chaney
10:45	Introduction to Bioinformatics	D. Bastola
12:00	Lunch	
1:00	Library Access	M. Helms
1:45	Responsible Conduct in Research	D. Crouse
2:30	Proteomic Analysis Tools	P. Ciborowski
3:45	Radiation Safety Usage and Video	W. Chaney
4:45	Wrap-up and Questions	
5:30	Barbeque Welcome Banquet	J. Turpen

Wednesday-June 1

9:00	Science as a Career	D. Crouse
9:50	Graduate Studies at UNMC	J. Zheng
10:30	MD/PhD Program at UNMC	S. Smith
10:50	Graduate Studies at Creighton	R. Hallworth
11:20	Graduate Studies at UNL	J. Morris
12:00	Lunch	

Go meet mentors and labs.

Denise M Chapman to: 05/24/2011 12:57 PM

Cc: Diane C Torrey, Sonja A Cox, Myrna Newland, Janine M Wilson, Olivia R McGregor, Leticia A Tran, Selaba Travis, Jennifer Pace, Tuire Cechin, Erin M Plouzek, Mary McNamee, Rebecca McCaw,

SURP Students:

Welcome to the 2011 Summer Undergraduate Research Program. There were almost 500 applicants this year so this is a great accomplishment for you all. This year our Program will run from June 6st - August 5th.

Please join us at the Orientation on June 6th at 10:00 am in the Durham Research Center, Room 1002. Dr. David Crouse, Vice Chancellor of Academic Affairs, will be there to welcome everyone and you will also have the opportunity to meet the other students. Breakfast will be served at 9:30am.

Compliance Training will also be held on June 6th at 1:00 pm in the Sorrell Center room 3002. Registration begins at 12:30 pm. This session is mandatory and every student must attend, even if you were here last year. Attached you will find a copy of the Agenda for the Orientation Session

Luncheon Seminars are held every Tuesday from 12:00-1:00 in Eppley Science Hall, Room 3010. There will be guest speakers from all over campus and lunch will be provided on a first come, first serve basis. Any student who attends 6 out of 7 Luncheon Seminars will receive a certificate of completion from Academic Affairs. This certificate is in addition to any other certificate you may receive from your Department.

If you are interested in additional volunteer opportunities at the Hospital, please visit the Nebraska Medical Center's website and contact Patty Ostronic directly at postronic@nebraskamed.com. Please note: You must contact Patty by June 1st in order to register.

If you have any questions, please let the SURP Office or the coordinators in your department know. We are looking forward to a great summer!

Thank you,

Denise Chapman BA, MFA
Coordinator- Office of Postdoctoral Education
Community Liaison
University of Nebraska Medical Center
987810 Nebraska Medical Center
Omaha, NE 68198-7810
(402) 559-3662 Phone

Summer Undergraduate Research Program Orientation Agenda.docx

Summer Undergraduate Research Program Orientation
Monday June 6, 2011
DRC 1 Room 1002

9:30-10:00

Breakfast/Registration

10:00-10:10 am

Welcome-Dr. Crouse, Interim Vice Chancellor for Academic Affairs

10:10-10:35

Overview of SURP Program

Luncheon Seminars

Poster Session

Free summer events in Omaha

10:40-11:00

Networking Activity/Icebreaker

11:00-12:30

Lunch on your own (Vendor available in DRC 2 Commons or Cafeteria across the street)

12:30-1:00

Sign in for Compliance Training Begins

Sorrell Center Room 3002

1:00-3:00-

Compliance Training

Text Version

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Nebraska Prostate Cancer Research Program (NPCRP)
- 2011 Clark Atlanta University Students
Prostate Cancer Research
Summer Undergraduate Program
Core Facilities

Nebraska Prostate Cancer Research Program (NPCRP)

This program is supported by the Department of Defense Prostate Cancer Research Program - Grant PC094595

Overview of NPCRP

Nearly 200,000 men in the U.S. will be diagnosed with prostate cancer and over 30,000 will die of this disease annually. While surgery and chemotherapy can cure the disease, in many cases it will spread and kill the patient. Better basic scientific understanding of this disease is needed to enable the development of more effective preventive and therapeutic treatments toward this cancer.

The development of better prostate cancer treatments depends on the training of prostate cancer researchers. This program is designed to train undergraduate science majors in prostate cancer research. It is a collaborative effort between the University of Nebraska Medical Center (UNMC), Omaha, NE and Clark Atlanta University (CAU), Atlanta, GA. Dr. Ming-Fong Lin of UNMC and Dr. Shafiq Khan of CAU have ongoing research collaborations. They will identify interested undergraduates at CAU for summer research at UNMC where the students will do basic science or translational research in a laboratory. Students will spend the great majority of their time working at the bench on a research project. They will also participate in a seminar series that will introduce them to different areas of scientific investigation and advanced technological tools used in scientific discovery.

After the summer, the students will continue research in a prostate cancer lab at CAU. They will thus continue their scientific development throughout the academic year in preparation for a graduate career in the biomedical sciences or for medical school.

Mission Statement of NPCRP

This Program will train undergraduate students to perform prostate cancer research in a research-

intensive environment. They will continue to perform research during their undergraduate academic career. After graduation, the student participants will be prepared to enter graduate school or medical school with training in, and understanding of, prostate cancer research. This will increase the number of prostate cancer researchers in both the basic and the clinical sciences.

Focus Areas of Research in NPCRP

Since our faculty members are engaged in a variety of research projects, students will have the opportunity to be trained in different areas of prostate cancer research. For example, the focus areas or research include Biomarkers, Therapy, Genetics, and Tumor Biology as outlined by the laboratory research descriptions in the table below.

NPCRP: Program Director, Staff Members and Mentors

Dr. Ming-Fong Lin, PD/PI of NPCRP, has served as the Coordinator/Leader of the UNMC Eppley Cancer Center Prostate Cancer Research Focus Group since 1997. Dr. Lin is a veteran in prostate cancer research for over twenty years. He was initially involved in the early investigation on the potential of prostate-specific antigen (PSA) as a surrogate marker for prostate cancer, comparing with the classical marker, circulating prostate acid phosphatase (PAcP). For investigating the molecular mechanism of hormone-refractory prostate cancer progression, Dr. Lin has established clinic-relevant, U.S. patent-awarded prostate cancer cell lines, which are well accepted by scientists in the field. Dr. Lin has also made the seminal discovery on the novel role of cellar PAcP in prostate cancer progression, corroborating clinic phenomena. Since 1995, he has served in various study sections for National Institutes of Health, Department of Defense Congressionally Directed Prostate Cancer Research Program, American Cancer Society and others.

The concept of training of undergraduate HBCU students from CAU is based on long-term interactions between Dr. Lin and Dr. Shafiq Khan, the faculty mentor at CAU. Dr. Lin has been a member of the Executive Advisory Committee for the NIH Research Center in Minority Institute (RCMI) at CAU and Dr. Khan is the Director of the Center since March 2004. Recently, Dr. Khan's Center, with Dr. Lin's inputs, was awarded a grant from NIH National Center on Minority Health and Health Disparities (NCMHD) for establishing a Center of Excellence for Prostate Cancer Research, Education and Services at CAU. To strengthen the research efforts in prostate cancer at CAU, Dr. Lin has provided necessary expertise and reagents to Dr. Khan and his faculty members. Dr. Lin and Dr. Khan have research collaborations as well; Dr. Lin is a consultant in Dr. Khan's DOD PCa Idea Award which has resulted in a co-authored publication in 2008 and additional collaborative articles are under construction or pending reviewing.

Dr. William Chaney serves as the Program Coordinator organizing orientation sessions and a summer seminar series for the students. He has over fifteen years of experience with undergraduate summer programs, having organized the first one provided by the College of Medicine at UNMC. He currently is the Program Coordinator of the NIH-supported Nebraska Center for Functional Genomics INBRE grant (The P.I. of the grant is Dr. James Turpen of UNMC). In this role, he organizes summer orientation and seminar presentations for undergraduate students. The concept is supported by Dr. Turpen, and the CAU students will also attend the INBRE activity during their summer research at UNMC. Thus, Dr. Chaney brings a tremendous amount of experience and activities to the CAU students in the NPCRP.

In NPCRP, fourteen faculty members from Creighton University (CU) in Omaha; University of Nebraska – Lincoln (UNL) and University of Nebraska Medical Center (UNMC) have agreed to serve as potential research mentors for this proposal. Their research areas cover a wide range of expertise and interest in cancer research including prostate cancer (the detail of research activity is described in the table below). Thus, a student entering this program can find a research mentor who is working in an area of interest to that student.

Faculty Advisors at CAU

Dr. Shafiq Khan, Professor of Biological Sciences at CAU, will serve as the faculty advisor for the undergraduate students participating in this program. He currently coordinates undergraduate research efforts at CAU and is extensively involved in their research experiences. Dr. Khan is the Director of Research Center in Minority Institute (RCMI) program and also is the PI of the Prostate Cancer Research Center at CAU supported by NCMHD, NIH. Dr. Khan has an active research lab and is funded externally including the DOD Prostate Cancer Research Program Idea award. To strengthen the effort of this training program, upon discussion with Dr. Lin, Dr. Khan recruited Dr. Valerie Odero-Marah, Assistant Professor of Biology at CAU, who is also funded by the DOD Prostate Cancer Research Program to serve as the Program Coordinator supporting Dr. Khan in student recruitment and mentoring at CAU.

Research Mentors and Projects

Investigator	Institution	Project
S. Batra	UNMC	Genetic Alterations in Prostate Cancer Progression
J. Christman	UNMC	Regulation of DNA Methylation in Prostate Cancer
W. Chaney	UNMC	Glycobiology in Prostate Cancer
P. Cheng	UNMC	Glycomics in Prostate Cancer Metastasis and Gene Therapy
J. Davis	UNMC	Hormone Regulation of Tumor Cell Development
R. Lewis	UNMC	IGF Receptors in Prostate Cancer
M.-F. Lin	UNMC	Androgen Regulation of Prostate Cancer Growth and Development
R. MacDonald	UNMC	IGF Axis in Prostate Cancer Growth
P. Mehta	UNMC	Gap Junction Proteins in Prostate Cancer Metastasis
E. Rogan	UNMC	Metabolism of Dietary and Environmental Chemicals to Mutagenic and Genotoxic Species
M. Simpson	UNL	The Role of Hylauronate in Prostate Cancer Development
R. Singh	UNMC	Prostate Cancer Metastasis and Immunology
Y. Tu	CU	Regulation of G-Protein-Coupled Receptors in Prostate Cancer
D. Wang	UNMC	Targeted Therapies for Prostate Cancer Bone Metastasis

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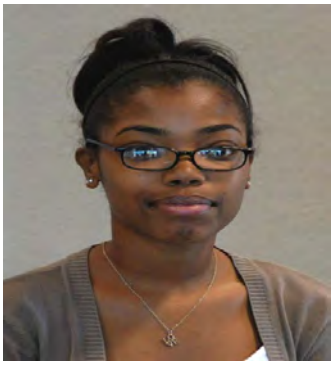
2011 Clark Atlanta University Students

**We would like to acknowledge Lisa Spellman and the Public Relations Office for taking the photos below of the Clark Atlanta University Students (group photo). We would also like to acknowledge Jim Turpen for taking the individual headshots of the students below We appreciate their support.

Dr. Ming-Fong Lin, Shawna Battle, Celeste Scott, LaTayia Aaron, Hilary Kirwan, Dr. Bill Chaney



LaTayia Aaron

Shawna Battle

Hilary Kirwan

Celeste Scott

University of Nebraska Medical Center

Department of Biochemistry & Molecular Biology

Seminar Series

"Prostate Cancer Research and Education at Clark Atlanta University"

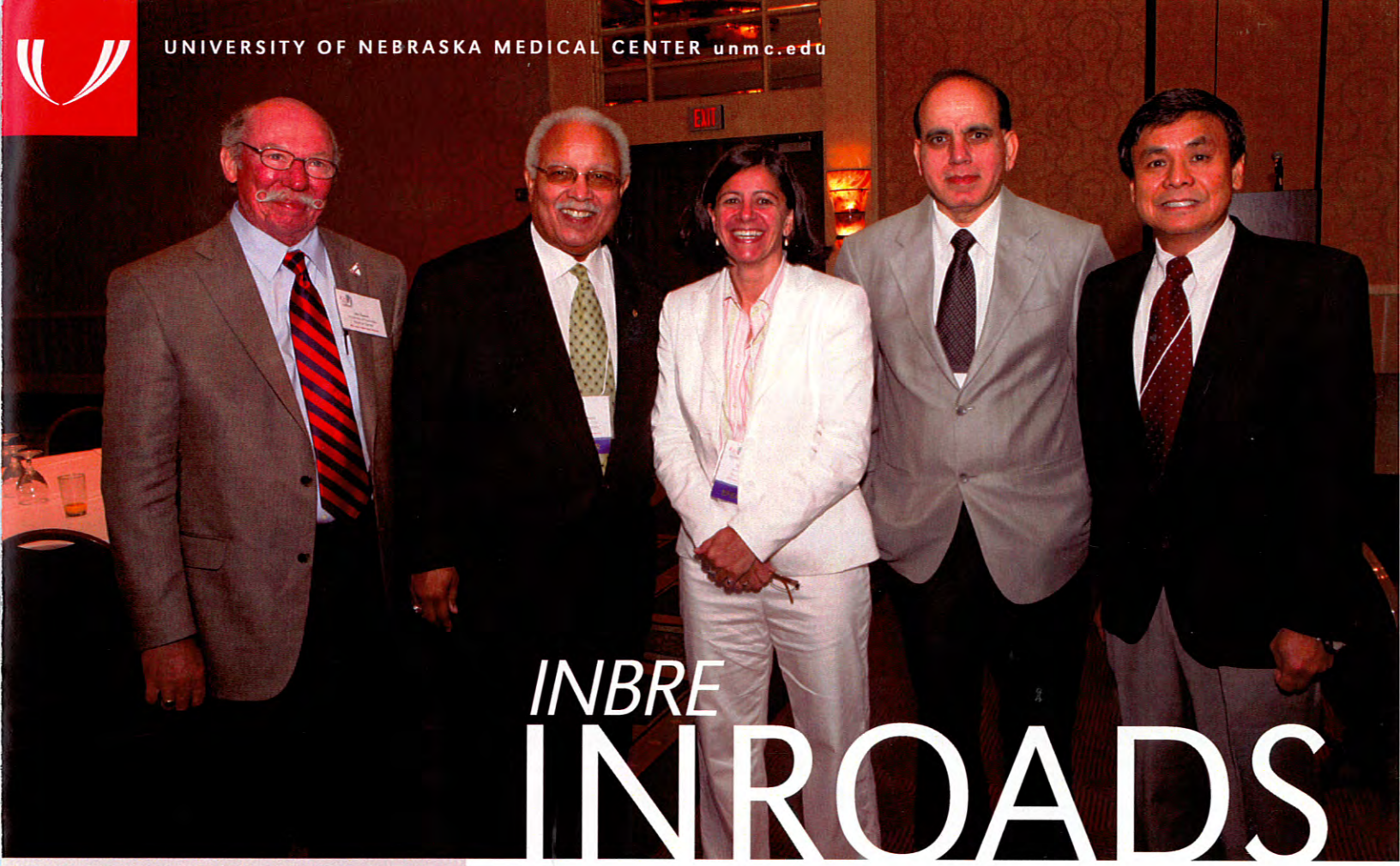
Shafiq Khan, PhD
Professor
Dept of Biological Sciences
Clark Atlanta University

Wednesday, July 6, 2011

3:00 p.m.

DRC1 1004

UNIVERSITY OF NEBRASKA MEDICAL CENTER unmc.edu



INBRE INROADS

Sidney McNairy, Jr., Ph.D., D.Sc., Division Director of the research infrastructure at the National Center for Research Resources, gave an overview of the NCRR at the 2011 Central Region IDeA conference in Omaha in May. Pictured from left to right are: James Turpen, Ph.D., Nebraska INBRE Principal Investigator, Dr. McNairy, Sheila Caldwell, Ph.D., Health Scientist Administrator (NCRR), Krishan Arora, Ph.D., INBRE Program Officer (NCRR), and Charles Woods, Ph.D., director of the Center for Virology at the University of Nebraska-Lincoln.

IDeA conference showcases best of regional science

You believe in your programs.

You know the value of them and you know the impact.

The IDeA program is magnificent and you are the reason it works so well.

Those were the key messages Sidney McNairy Jr., Ph.D., left with attendees at the Central Region IDeA Networks of Biomedical Research Excellence conference held in Omaha in May.

"I am proud to say that in the heartland there is great science," said the director of the division of research infrastructure with the National Center for Research Resources, a division of the National Institutes of Health, which funds the IDeA program.

More than 200 people attended the three-day conference which featured 100 poster presentations, 28 oral presentations, and faculty and students representing colleges and universities in five states.

"It's great to come and see the work being done around the region," said Narayanaganesh Balasubramanian, a graduate student from North Dakota State University.

Although he studies chemistry, Balsubramanian said seeing the work being done in the various fields reveals a lot about how interconnected science really is.

"It's good to see how the different areas of science complement each other," he said.

A highlight of the conference was a regional multi-user core facility marketplace that featured 16 different facilities in North Dakota, Nebraska and Kansas.

"I would like to personally thank-you, commend you and salute you for what you've been able to do," Dr. McNairy Jr. told attendees.

Volume 9, Issue 2 | July 2011

INBRE INROADS

A newsletter of Nebraska's Institutional Development Awards (IDeA) Networks of Biomedical Research Excellence (INBRE)

The Nebraska INBRE is funded through a grant from the National Center for Research Resources, a division of the National Institutes of Health.

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Creighton University College of Arts and Science; College of Saint Mary's, Doane College; Little Priest Tribal College; Nebraska Wesleyan University; the University of Nebraska at Kearney; the University of Nebraska at Omaha; the University of Nebraska-Lincoln; Wayne State College; Chadron State College; Western Nebraska Community College.

From the director

This is always an exciting time of the year as we welcome a new class of INBRE Scholars to our program. As usual, we have some outstanding students joining us as Scholars. I am especially pleased to welcome Melina Baeza-Villa to our program since she is the first in her family to go to college.

I am partial to first generation college students, both my wife and I were the first in our families to go to college and we both loved it so much we stayed there for the rest of our lives. It is also rewarding to welcome the new Clark-Atlanta students to our program. The Scholars program is all about opportunity and it is gratifying that we are extending opportunity to such a diverse group of students and will be able to highlight your success in future issues of INROADS.

Our Central Region IDeA Conference was a success beyond our expectations. We had initially projected around 150 attendees and significantly exceeded that projection with 207 attendees. Our projection of 50 poster presentations mushroomed to over 100 and we met our goal of booking 75 rooms at the hotel.

More importantly, around 40 percent of our attendees were students, which bodes very well for our scientific future. Thanks to all of you for attending and providing such a warm welcome to Dr. Sidney McNary.

As most of you know, Dr. McNary has been the architect of and driving force behind the IDeA program since its inception. He had never been to Omaha before and was genuinely impressed with all that he saw in Nebraska and the Central Region.

A special thanks goes to our organizing committee and especially Penni Davis for all the work she did in putting the Conference together. We are looking forward seeing you all at to the Grand Island Conference in August. Have a productive and fun summer.

Q&A with UNK's Kim Carlson, Ph.D.

Q. What is your lab working on right now?

A. We are looking at characterization of differential gene regulation during natural aging using large populations of Drosophila melanogaster with my INBRE mentor, Dr. Larry Harshman, from UNL. Our interest is in the factors that may perturb gene expression during aging and contribute to the aging process as a whole. From one of our earlier studies, we hypothesized that the frass (feces) of D. melanogaster (fruit fly) might contain micro-organisms that can affect aging. Therefore, we set out to characterize these micro-organisms. In doing so, we uncovered a novel RNA virus, Nora Virus that is largely uncharacterized. We are working in collaboration with Dr. Dan Hultmark's lab in Sweden, who first discovered Nora Virus, to work on characterizing it.

Q. How has being a part of the INBRE program helped your research and your students?

A. It has made the research possible. Without INBRE, we would not have the space, equipment, or connections with other faculty and core facilities to carry out our research. Also, the students get to travel with INBRE faculty to national meetings and meet the scientists whose work they've only read in research papers. I doubt without INBRE we would have ever gotten to the point of finding the Nora Virus and establishing a collaboration with Dr. Hultmark.

Q. What is the best part about the INBRE program?

A. The best part of the program is the ability to incorporate undergraduate research in my teaching and have student collaborators. These high motivated students are able to work on large projects in the lab and feel a sense of ownership. The support from UNMC is phenomenal and so are the connections with UNL and Creighton. I have talked to faculty in other departments at UNK and they are surprised by the connection we have with the other campuses and the resources allotted to us.

Exploring careers in biomedical research

Kelvin Chin isn't sure what he wants to do in science, but knows that he needs more experience before he can decide on a career.

"How do you decide on a career without exploring it first?" Chin asks.

This summer the computer science major joins 30 students from throughout the state of Nebraska immersed in research labs at the University of Nebraska Medical Center, Creighton University and the University of Nebraska-Lincoln.

He is a part of the latest class of INBRE Scholars who spend 10 weeks every year exploring the world of biomedical sciences. Chin is curious to see how his talent for computer science can enhance research through the use of bioinformatics.

He will work alongside graduate students in the lab of Elena Batrakova, Ph.D., an associate professor in the UNMC College of Pharmacy, who studies the development of polymer-based drug delivery systems for chemotherapy and disorders of the central nervous system.

"I'm excited to learn how bioinformatics is used and applied to laboratory research," Chin said.

His enthusiasm mirrors that of fellow INBRE Scholar Melina Baeza-Villa, who will spend the summer working with Joseph Vetro, Ph.D., an assistant professor in the UNMC College of Pharmacy, who studies nanomedicine.

Baeza-Villa is an undergraduate student at the College of Saint Mary and the first in her family to go to college. She was 10 years old when her family moved to the United States from Mexico. Baeza-Villa said she struggled with English concepts but excelled in math and science and enjoyed taking extra courses in high school.

"I decided to major in biology and chemistry in college and am planning to go to medical school. I would like to be a pediatrician," she said.

Baeza-Villa hopes her experience in the INBRE program will enhance her education and laboratory skills.

"Just the experience of working in a lab and all the people I will meet in the INBRE program is going to help me later on," she said.

Clark Atlanta University students Celeste Scott, Hilary Kirwan, Shawna Battle and LaTayia Aaron.

Longtime collaboration opens door to new undergraduate opportunities

An ongoing collaboration between two cancer researchers has opened a world of opportunities for four young undergraduate students from Clark Atlanta University (CAU), a well-respected, historically black college in Georgia.

LaTayia Aaron, Hilary Kirwan, Celeste Scott and Shawna Battle, are spending the summer conducting research at the University of Nebraska Medical Center through the Nebraska Prostate Cancer Training Program.

The program, which is supported by a three-year, $200,000 department of defense grant, also collaborates with the successful INBRE scholar program at UNMC to provide training for the Clark Atlanta students. This is the second year for the undergraduate training program. To date eight students, including those listed above, have participated.

Program director, Ming-Fong Lin, Ph.D., a prostate cancer researcher at UNMC, and Shafiq Khan, Ph.D., director of the Prostate Cancer Research Center at CAU, developed the program.

Inspiring undergraduate students to consider a career in biomedical research specifically targeting prostate cancer is the goal of the program, Dr. Lin said.

"The incidence of prostate cancer is 65 percent higher and the mortality rate is more than double in African-American men compared to Caucasians," he said.

It's also important for students to get a good foundation in laboratory research whether they plan to go into medicine or become a scientist, Aaron said.

The junior biology major is interested in pursuing a career in pediatrics, but applied to the training program for exactly that reason.

"Discovering what causes disease and the science behind it gives you valuable insight," Aaron said.

University of Nebraska Medical Center

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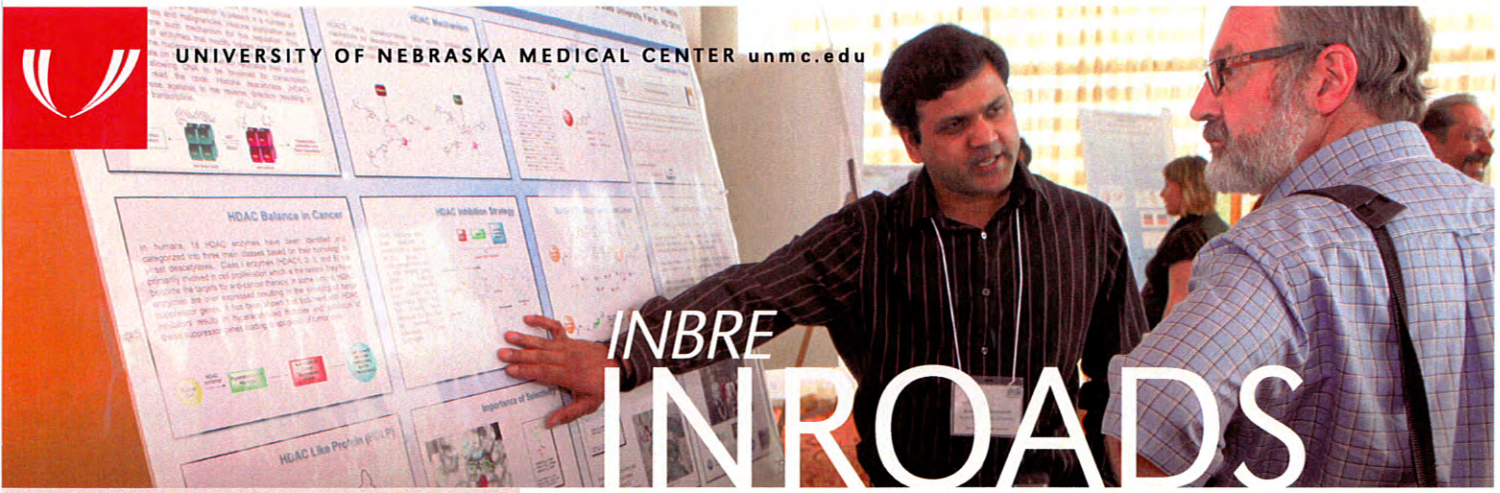
John Karanicolas, Ph.D., a researcher from The University of Kansas, kicked off the genomics, proteomics and bioinformatics symposium during the 2001 Central Region IDeA conference in May, with a talk on building biomolecular switches by chemical rescue.

Ming-Fong Lin
University of Nebraska Medical Center
Dept. of Biochemistry & Molecular Biology
zip 5870



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The INBRE program is funded by the National Center for Research Resources. NCRR is part of the National Institutes of Health, U.S. Department of Health and Human Services.

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Growth suppression of new ribonucleotide reductase inhibitors in prostate cancer cells

Hilary Kirwan[1,2], Yu Wei Chou[2], Sakthivel Muniyan[2] , Ming-Fong Lin[2]

[1]Department of Biology, Clark Atlanta University, Atlanta, GA
[2]Department of Biochemistry and Molecular Biology, University of Nebraska Medical Center, Omaha, NE

Background:
Many approaches have been utilized in the treatment of early stage prostate cancer (PCa), including surgery and radiation therapy; the treatment for the advanced castration-resistant PCa is limited. It is very important to develop new effective treatments for castration-resistant PCa. The ribonucleotide reductase (RR) plays a important role in cell growth and tumor progression. The new synthesized RR inhibitors, thiosemicarbonzones, have been tested for growth suppression on cancer cells. We examined new compounds from this family on PCa cells.

Methods:
The four new RR inhibitors (4-Bis, AMN, AMD, PHE) were investigated on the cell growth inhibition in androgen-independent PCa cells (LNCaP C-81) in regular medium. We also examined the dosage effect of 4-Bis compound in LNCaP C-81 cells.

Results:
In four RR inhibitors treated PCa cells, growth suppression was seen for 4-Bis, AMD and PHE. In 4-Bis treated PCa cells, the cell growth inhibition followed a dose-dependent fashion.

Conclusion:
These findings suggest that the newly synthesized RR inhibitors, thiosemicarbonzones, exhibit the efficacy on cell growth suppression and follow the dosage effect in LNCaP C-81 cells.

Effects of TGFβ1 and PGE2 on Cellular Signaling in Bovine Corpora Luteal Fibroblasts

LaTayia Aaron[2], Chao Jiang[3], and John S. Davis[1,3,4]

[1]Biochemistry and Molecular Biology, University of Nebraska Medical Center, Omaha, NE; [2]Clark Atlanta University, Atlanta, GA;
[3]Department of Obstetrics and Gynecology University of Nebraska Medical Center, Omaha, NE;
[4]Veterans Affairs Medical Center, Omaha, NE

Objective

The purpose of this study was to determine if PGE2 inhibits the actions of TGFβ1 in corpora luteal fibroblast cells. For this experiment, fibroblasts cells were isolated from the bovine corpus luteum. After preliminary experiments to find out if PGE2 was present in the fibroblast cells and to see if PGE2 inhibits TGFβ1 action, we sought out to determine which specific EP receptor caused this inhibition. By doing RT-PCR we found that almost all EP receptors were present in the fibroblast cells isolated. Due to time constraints, we were only able to test for EP2. We conducted a test that inhibited as well as promoted EP2 function using its agonist, butaprost, and its antagonist, AH6809.

Conclusions

- **Corpora luteal fibroblast cells expressed PGE2 receptors.**
- **TGFβ1 stimulated phosphorylation of SMAD2 and P38MAPK.**
- **PGE2 stimulated phosphorylation of PKA substrates.**
- **Immunofluorescence staining shows that the addition of PGE2 or butaprost and TGFβ1 alters cell morphology.**

VEGF-C Promotes Autophagy and Survival in Prostate Cancer Cells Following Chemotherapeutic Stress

Celeste Scott[1], Marissa Stanton[2], Samikshan Dutta[2], Heyu Zhang[3], Kaustubh Datta[2]

[1] Clark Atlanta University, Atlanta, GA;
[2] University of Nebraska Medical Center, Omaha, NE ;[3] The Mayo Clinic, Rochester, MN

Introduction

About 218,000 men in the United States were diagnosed with prostate cancer. From this number, about 32,000 men died from prostate cancer in the United States. The primary cause of prostate cancer death is a failure to treat metastatic disease. The expression of VEGF family members, VEGF-C in particular, has been linked to radiation and chemotherapy resistance.

Summary

Based on the collected data, we conclude that VEGF-C promotes the survival of prostate cancer cells following nutrient and chemotherapeutic stress.

UPREGULATION OF MATRIX METALLOPROTEINASE (MMP)13 EXPRESSION AT THE TUMOR-BONE IN PROSTATE CANCER

SHAWNA BATTLE[1], MICHELLE L. VARNEY[2], MITSURU FUTAKUCHI[2], RAKESH K. SINGH[2]

[1] Clark Atlanta University, Atlanta, GA;
[2]Department of Pathology & Microbiology, University of Nebraska Medical Center, Omaha, NE 68198

ABSTRACT

According to the American Cancer society, prostate cancer is the second leading cause of cancer death in American men, only behind lung cancer. In the year of 2011, it is estimated that about 240,890 new cases of prostate cancer will be diagnosed and about 33,720 of these men will die from prostate cancer. Bone is one of the most common sites of metastasis, in human prostate cancer. The tropism of prostate cancer cells for bone and their tendency to induce osteolytic/osteoblastic phenotype is a result of interactions between malignant cells and stromal cells, and is of paramount importance for bone metastasis of prostate cancer. However, the underlying molecular mechanisms remain poorly understood. The capacity of prostate cancer cells to collaborate with bone stromal cells is likely to be specific and also critical for the formation of bone metastases.

In this report, we examined whether interaction between prostate cancer cells and stromal cells in the bone microenvironment play a critical role in the formation of bone metastases determine the molecular mechanism of this regulation. We have developed a rat model to examine tumor-stromal interactions in osteolytic/osteoblastic bone metastasis. Using this model, we analyzed whether tumor-bone (TB) microenvironment regulates expression of proteases. We used microarray analysis for gene expression profiling at the TB interface versus the tumor alone area from syngenic rat injected with malignant prostate cancer cells.

We observed the up-regulation of matrix metalloproteinase (MMP)-3, 7, 9 and -13 at the TB interface. Our data suggests that MMP-13 expression is specifically upregulated at the tumor bone in prostate cancer suggesting its importance in determining the molecular mechanism of bone metastases regulation.

U1

DIOXIN EXPOSURE ENHANCES NUCLEAR LOCALIZATION OF ANDROGEN RECEPTOR, ***LaTayia Aaron***, *and Joann Powell, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta, Georgia, USA.*

Androgen receptor (AR) signaling is involved in a number of developmental and physiological processes. AR is localized in the cytoplasm of stromal and secretory epithelial cells. Upon binding with androgens, AR enters the nucleus and regulates transcription of genes involved in diverse biological process such as proliferation, differentiation and apoptosis. Androgens are especially important in male sexual development and growth of the prostate gland. Early stage prostate cancers are dependent on androgens for growth. Therefore, androgen deprivation therapy is the predominant form of treatment. However, when prostate cancers progress following androgen depletion therapy, the cells gain the ability to thrive despite low levels of circulating androgens. Treatment options for androgen-independent prostate cancer are scarce with docetaxel being the only agent shown to prolong survival. Previously, 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD/Dioxin) has been shown to inhibit growth of androgen dependent prostate cancer cell line, LNCAP. Dioxin, is the most potent agonist for the aryl hydrocarbon receptor (AhR). AhR, has been shown to interact with multiple signaling pathways during prostate development and may provide a new target to regulate androgen signaling. The objective of this study is to establish dioxin's ability to regulate androgen receptor localization in androgen-dependent cell lines. We hypothesize that dioxin increases AR nuclear localization. Dioxin activity may regulate androgen receptor signaling by direct heterodimerization with AhR.
Androgen-dependent prostate cancer cell line (LNCaP), as well as, androgen-independent prostate cancer cell lines (C-42) was grown on coverslips and treated with TCDD alone and in combination with an androgen derivative, R1881. Immunofluorescence staining was used to label AhR and AR within the cells. Fluorescence microscopy was utilized to determine location of both AhR and AR following exposure to TCDD and R1881. In addition to inducing nuclear localization of AhR, TCDD treatment also enhanced nuclear localization of AR.

Acknowledgements: This work was supported by the NIH/NIGMS MBRS RISE Grant #5R25GM060414 and RCMI grant 2G12RR003062-22.

U2

THE SYNTHESIS OF METAL ORGANIC FRAMEWORKS (MOFs), ***Brandon Dennis***, *Conrad W. Ingram, Esmerelda Castaneda and Liang Liao, Clark Atlanta University, Department of Chemistry, Atlanta, GA.*

Metal organic frameworks (MOFs) are crystalline compounds that are formed by the binding of metals to organic compounds known as ligands. The metal ion and ligand chosen, the ratio of metal to ligand, temperature, and solvent used for the reaction all affect the ability of the reaction to form a MOF. These factors also affect the structure and properties of these coordination polymers. The purpose of this study was to synthesize MOFs using transition and lanthanide metal ions in combination with 3, 6-dimethylpyrazine-2, 5-dicarboxylic acid as the organic linker. The first experiment involved the use of lanthanum (III) nitrate hexahydrate in two ratios of ligand to metal: 1:3 and 1:2. The second experiment used which was cobalt (II) nitrate hexahydrate was in the same ratios as experiment one. The reactions are being monitored for the formation of crystalline MOFs. The porous structures of MOFs will be studied for their use in gas storage, absorption, gas separation, and catalysis.

Acknowledgements: This study was supported by the NIH/NIGMS, MBRS RISE Grant #2R25GM060414.

Acknowledgements: Supported by the MBRS RISE Interdisciplinary Early Inquiry-Based Research Training Program, NIH/NIGMS Grant #2R25GM060414. The Pure Cocoa Powder was generously provided by Mr. Emmanuel Frimpong of Cocoa Gold, Atlanta, GA.

U7

INHIBITION OF CONSTITUTIVELY ACTIVE ARYL HYDROCARBON RECEPTOR (AhR) SIGNALING REDUCES PROLIFERATION OF C4-2 PROSTATE CANCER CELLS, ***Oliver Richmond****, Cindy Tran and Joann Powell, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta, Georgia, USA.*

The aryl hydrocarbon receptor is a member of the basic helix loop helix family of transcription factors. AhR is known to mediate the biochemical and toxic effects of a number of polyaromatic hydrocarbons such as 2,3,7,8, tetrachloro-dibenzo-dioxin (TCDD). AhR is widely known for regulating transcription of drug metabolizing enzymes, such as cytochrome P450 1A1 (CYP1A1), involved in the xenobiotic metabolism of carcinogens and therapeutic agents. AhR has also been shown to play a role in cell cycle regulation and proliferation of a number of cancers. AhR has two binding sites for retinoblastoma tumor suppressor protein (pRb) which controls cell cycle progression through G1. This interaction has been shown to regulate proliferation in human skin, neuronal (neural) and breast cancer cells. Activation of the receptor by TCDD inhibits androgen dependent proliferation in prostate cancer cells. However, the effect of AhR signaling on androgen independent proliferation has not been studied. Here we investigate the effect of AhR signaling on the androgen independent growth of prostate cancer cells. Immunoblot analysis shows that AhR expression is increased in androgen independent (C4-2) prostate cancer cells. RT-PCR studies revealed enhanced AhR activity in C4-2 cells without ligand activation. Reduction of AhR activity by pharmacologic inhibitors or short RNA mediated silencing reduces proliferation of C4-2 cells in an androgen depleted environment. This data indicates that AhR is essential to maintain androgen independent growth and may provide insight into the molecular mechanisms responsible for the hormone refractory phenotype.

Acknowledgements: These studies were supported by the RCMI grant 2G12RR003062-22.

U8

VEGF-C PROMOTES AUTOPHAGY AND SURVIVAL IN PROSTATE CANCER CELLS FOLLOWING CHEMOTHERAPEUTIC STRESS, ***Celeste Scott****[1], Marissa Stanton[2], Samikshan Dutta[2], Heyu Zhang[3], Kaustubh Datta[2] [1] Clark Atlanta University, Department of Biological Sciences, Atlanta, GA;[2] University of Nebraska Medical Center, Omaha, NE ;[3] The Mayo Clinic, Rochester, MN.*

In 2010, about 218,000 men in the United States were diagnosed with prostate cancer. From this number, about 32,000 men died from prostate cancer in the United States The primary cause of prostate cancer death is a failure to treat metastatic disease. The expression of VEGF family members, VEGF-C in particular, has been linked to radiation and chemotherapy resistance. VEGF family proteins are closely related cytokines that exert critical functions in vasculogenesis, pathological and physiological angiogenesis and lymphangiogenesis. Based on data from tumors that overexpress VEGF-C but do not promote lymphangiogeneis, we hypothesize that VEGF-C has non-lymhangiogenic functions that promote tumor cell survival and metastatic spread. Our goal for this research project is to determine the role VEGF-C plays in the survival of tumor cells following therapy. In order to test our hypothesis, we took sets of PC3 cells, transfected one of the sets of PC3 cells with scrambled siRNA, and transfected the second set with VEGF-C siRNA. We also conducted

other tests in order to obtain the rest of our data results such as a clonogenic assay test following γ-irradiation, microarray studies to determine the differential expression of genes followed by validation via quantitative, real-time PCR, western blots, and cell death assay tests. The results of this analysis can be used to find whether or not VEGF-C promotes the survival of prostate cancer cells following nutrient and chemotherapeutic stress. The findings from this research may be useful in creating a new prostate cancer drug that will eliminate VEGF-C and stop the survival of prostate cancer tumor cells.

Acknowledgements: This research was funded by Public Health Center Grant CA140432 (K.D.).

U9

THE UNIQUE EXPRESSION OF NEURAL REGULATION FROM IMMOBILIZATION STRESS, ***Elena Washington***[1], *Mary I. Smith*[2], *J.Shead*[2], *B. Winston*[1], *L. French*[2] *and T. O. Moore*[1], *Department of Psychology*[1], *Department of Biological Sciences*[2], *Clark Atlanta University, Atlanta, Georgia.*

In this study a gaseous neurotransmitter known as nitric oxide was the unique neural substrate that was studied in our immobilization stress experiment. The presence of nitric oxide synthase (NOS) was used in combination with cFOS, a genetic marker for neural activity. It was hypothesized that there would be a positive relationship between the presence of neural nitric oxide synthase (nNOS) in relation to cFOS expression. The nNOS and cFOS were measured in hypothalamic regions of the brain. Immobilized stress occurred by placing the rats into a small tube. There were four groups tested in this study: 1. control; 2. 1 hour; 3. 3 hour; and 4. 6 hour group. The stains that were used were diaminobenzidine (DAB) and NADPH to measure the neural structure of nNOS and cFOS. We have found the control and the one hour group appeared to not release large amounts of nNOS and cFOS. However, the three hour group released the highest levels. In the six hour group, the cFOS and nNOS appeared to be less prominent than the three hour group. This study is currently being continued by using different stains to investigate neural changes. This study could possibly aid in future treatment of stress related disorders and diseases.

Acknowledgements: This study is supported by the NIH/NIGMS, MBRS/RISE Grant #2R25GM060414.

G10

OUTPATIENT FOLLOW-UP AND RE-HOSPITALIZATION RATES OF SICKLE CELL DISEASE PATIENTS FOLLOWING INDEX HOSPITALIZATION FOR PAIN CRISIS, 2006-2007, ***Benjamin Ansa,*** *Adamkiewicz Thomas, Yvonne Fry-Johnson, Barbara Moore, George Rust, Morehouse School of Medicine, Atlanta, Georgia.*

Sickle cell disease (SCD) affects 80,000-100,000 Americans. Acute pain is the most common reason for hospitalization among SCD patients. The cost of hospital care and the burden of the disease on the patients, their families and the community are enormous. Most chronic diseases currently have measures for quality of care assessment, but SCD does not. Re-hospitalization within thirty days after index hospitalization for SCD was developed by the National Association of Children's Hospitals (NACHRI) as a way to drive internal hospital quality improvement. However, there are very few studies to validate this marker and debate remains as to its value. Several factors may influence re-hospitalization rates among SCD patients, and outpatient follow-up after index hospitalization is considered as one of those factors. We aimed to examine the rates of re-hospitalization and out-patient follow-up visits among children and adults with SCD, and to determine any association between out-patient follow-up visit and re-hospitalization in this group of individuals. We analyzed the Medicaid

S59

THE ARYL HYDROCARBON RECEPTOR SUSTAINS ANDROGEN RECEPTOR SIGNALING IN ANDROGEN INDEPENDENT PROSTATE CANCER CELLS, ***Cindy Tran,*** *LaTayia Aaron and Joann Powell, Center for Cancer Research and Therapeutic Development and Department, Clark Atlanta University, Atlanta, Georgia.*

The aryl hydrocarbon receptor (AhR) is a basic helix-loop-helix (bHLH) transcription factor that is well characterized for mediating the carcinogenic responses to environmental polyaromatic hydrocarbons (PAH), such as 2,3,7,8-tetrachloro-dibenzo-*p*-dioxin (TCDD). Traditionally, AhR has been studied for its transcriptional regulation of metabolizing enzymes such as cytochrome P450-1A1 (CYP1A1). However, AhR has also been shown to interact with multiple signaling pathways during prostate development and may provide a new target to regulate androgen signaling. Early stage prostate cancers are dependent on androgens for growth. Therefore, androgen deprivation therapy is the predominant form of treatment. However, more advanced forms of prostate cancer are hormone refractory and do not rely on the presence of androgens for growth. The molecular mechanisms responsible for the sustained androgen receptor (AR) signaling during androgen deprivation therapy are not clearly understood. The objective of this study is to determine the ability of AhR to enhance AR signaling in prostate cancer cells. For these experiments, androgen independent C4-2 and androgen dependent LNCaP cell lines were treated with TCDD. AhR and AR expression, activity and localization were accessed by RT-PCR, Western immunoblotting and immunofluorescence. AhR was found to be overexpressed in the castration independent cell lines. In addition, AhR and AR are localized in the nucleus without ligand treatment in the androgen independent cell line. In contrast, the LNCaP cells required ligand activation for translocation of AhR and AR to the nucleus. Also, CYP1A1 was found to be expressed independent of ligand treatment in C4-2 cells while activation of AhR with TCDD was needed for expression of both CYP1A1 and PSA in LNCaP cells. These results indicate the presence of a constitutively active AhR as well as cross-talk with AR in castration independent prostate cancer cell lines.

Acknowledgements: These studies were supported by the RCMI grant 2G12RR003062-22.

S60

STRESS AND APOPTOTIC PROTEINS EXPRESSION IN ARSENIC TRIOXIDE-TREATED BREAST AND LUNG CANCER CELLS, ***Alice M.Walker,*** *Laurin Paris, Jacqueline J. Stevens, and Paul B Tchounwou, Jackson State University, Environmental Science Program, Center for Environmental Health and Murrah High School, Jackson, MS.*

Breast cancer is a malignant tumor that starts in the cells of the breast. It is second to lung cancer among estimated cancer deaths and first overall in estimated diagnosed cases in women. Hence, lung cancer has the highest number of cases and death in both women and men. Arsenic trioxide (ATO) has been used in the treatment of relapsed/refractory acute promyelocytic leukemias. However, its effects on breast and lung cancer are not known. We hypothesize that ATO may also have a bioactivity against breast cancer, and its mechanisms of action may involve changes in stress-related proteins and apoptosis in breast and lung cancer cells. Using breast (MCF-7) and lung (A549) cancer cells as test model, the effects of ATO were examined by western blot analysis for stress related proteins (*Hsp70 and cfos*) and apoptotic protein (*Bcl-2*, and *cytochrome c*) expressions. MCF-7 and A549 cells were treated with arsenic trioxide at 0, 2, and 4 μg/ml for 48 hr. There was a decreased in *Hsp70* and *cfos* expressions at 4μg/ml in MCF-7. In A549 cells, *Hsp70* increased and cfos decrease in expression. However, there was a slight increase in the *Bcl-2* expression at 4μg/ml of ATO in both MCF-7 and

2012 INBRE-BRIN-NPCRP Scholars First Week Schedule

Michael Sorrell Center Room 4053
UNMC

Tuesday-May 29

8:00	Welcome and Introductions	J. Turpen P. Davis
9:00	Use of Animals in Research	T. Rosenquist
9:45	Laboratory Safety	W. Chaney
10:45	Introduction to Bioinformatics	H. Ali
12:00	Lunch	
1:00	Library Access	M. Helms
1:45	Responsible Conduct in Research	D. Crouse
2:30	Biotech Ideas to Products	M. Dixon
3:45	Radiation Safety Usage and Video	W. Chaney
4:45	Wrap-up and Questions	
5:30	Barbeque Welcome Banquet	J. Turpen

Wednesday-May 30

9:00	Science as a Career	D. Crouse
9:50	Graduate Studies at UNMC	D. Crouse
10:30	MD/PhD Program at UNMC	S. Smith
10:50	Graduate Studies at Creighton	R. Hallworth
11:20	Graduate Studies at UNL	J. Morris
12:00	Lunch	
	Go meet mentors and labs.	

2012 INBRE - NPCRP Weekly Seminar Schedule
(all on Mondays)

June	4	UNMC	9:00	C. Kuscysnki	Single Cell Flow Analysis
			10:30	Deb Romberger	Pulmonary Research at UNMC
June	11	UNL	9:15	Jack Morris	Morrison Center Introduction
			9:30	Clint Jones	Herpesvirus
			10:30	Shi-hua Xiang	HIV Vaccine Development
			11:15	Matt Wiebe	Poxviruses
June	18	CUMC	9:00		
June	25	Omaha Biotech	9:00	Terri Wasmoen Invertis-Merck	Vaccine Development
July	2	Lincoln Biotech	9:15	Susan Lynch	Welcome and Introductions
			9:30	Michelle Combs	Tour of the Celerion Clinical Pharmacology Sciences Operations
			10:30	Curtis Sheldon	Tour of the Bioanalytical Services
			11:30	Julie Saathoff	Q&A Session with Clinical Site Director
Susan Lynch		New Drug Testing		Celerion Corp.	
July	9	UNMC	9:00	J. Eudy	DNA Sequencing and Analysis
			10:30	K. Bayles	Infectious Disease Research at UNMC
July	16	UNL	9:15	Jack Morris	Beadle Center Introduction
			9:30	Tony Zera	
			10:30	Nicole Buan	
			11:00	Joe Zhou	Beadle Center/Microscopy Center Tours
July	23	CUMC	9:00		

University of Nebraska Medical Center

[redacted]

College of Saint Mary is one of the 12 participating institutions in the Nebraska INBRE program. It's a private women's Catholic university located in central Omaha. Currently there are four undergraduate students from the College of Saint Mary in the INBRE scholars program.

INBRE INROADS

in this issue

The INBRE program is funded by the National Institute of General Medical Sciences. NIGMS is part of the National Institutes of Health, U.S. Department of Health and Human Services.

Volume 10, Issue 2 | July 2012

UNIVERSITY OF NEBRASKA MEDICAL CENTER unmc.edu

INBRE INROADS

Goldwater scholars exemplify grant qualifications

The Goldwater Scholarship is for the most academically gifted students who show great promise for a career in science.

Rachel Coburn and Alexander Stock exemplify this perfectly.

These INBRE scholars are two of 282 undergraduates from across the country who received a Goldwater Scholarship this year. The scholarship was established in 1986 to honor the late U.S. Sen. Barry M. Goldwater.

It's an accomplishment neither of them expected.

"When I applied I thought 'if I don't get it this year, I will try again next year' and was surprised when I found out I was chosen," said Coburn, a junior at the University of Nebraska-Lincoln, majoring in biological chemistry.

see GOLDWATER pg 2

Clark Atlanta University students relish hands-on training opportunity

Alexus Devine, Alexandra White and Sierra Coleman have three things in common. All three want to be a doctor.

All three are from one of the most well-respected, historically black colleges in the U.S., Clark Atlanta University in Georgia.

And all three are spending the summer conducting research at the University of Nebraska Medical Center through the Nebraska Prostate Cancer Training Program.

The program, which is supported by a three-year, $200,000 department of defense grant, also collaborates with the successful INBRE scholar program at UNMC to provide training for the Clark Atlanta students. This is the third year for the undergraduate training program. To date 11 students have participated.

Program director, Ming-Fong Lin, Ph.D., a prostate cancer researcher at UNMC and Shafiq Khan, Ph.D., director of the Prostate Cancer Research Center at Clark Atlanta, developed the program.

Inspiring undergraduate students to consider a career in biomedical research specifically targeting prostate cancer is the goal of the program, Dr. Lin said.

It also allows the students to learn more about research, themselves and the expanse of opportunities in science.

"Programs like this help people like me really discover what I want to do for the rest of my life. I have been able to see the things that I read in my science textbooks unfold right before my eyes," Alexandra White said.

Sierra Coleman agrees.

"It's giving us unforgettable hands-on experience that will help us make decisions about graduate school," Coleman said.

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INBRE INSIDER

A newsletter of Nebraska's Institutional Development Awards (IDeA) Networks of Biomedical Research Excellence (INBRE)

The Nebraska INBRE is funded by the National Institute of General Medical Sciences. NIGMS is part of the National Institutes of Health, U.S. Department of Health and Human Services.

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unmc.edu/inbre

From the director

The reorganization at NIH is now complete and the IDeA program has moved into its new home in the National Institute of General Medical Sciences (NIGMS). Within that institute, IDeA is part of the new NIH Division of Training and Workforce Development.

I recently attended the first meeting of this division which was held in San Antonio, Texas. I can report that our INBRE program fits quite well within this new division. As its name implies, the division of training and workforce development focuses on both undergraduate and graduate programs.

There are a number of programs funded by this division but the common theme is developing pipelines and providing training opportunities for students at all levels. Of particular note were two workshops at the conference, one in developing summer undergraduate research experiences and another on developing relationships between research campuses and undergraduate campuses.

I come away from the conference with the impression that our INBRE Program here in Nebraska will be making meaningful contributions to the division in these areas.

The initiatives we are pursuing with our INBRE Scholars Program and our support for research on our undergraduate campuses are clearly at the forefront of the programs in this division.

Overall, our interactions with the leadership of NIGMS has been very welcoming and positive and I am looking forward to working with our program leaders and officers who come over from NCRR, as well as developing new relationships within the institute.

Our future looks bright.

Goldwater cont...

Stock, a junior majoring in chemistry at Creighton University, felt the same way.

When Stock arrived at Creighton in 2010 he immediately began looking for a lab to work in. He found a place in Dr. Julie Soukup's lab and quickly learned the ropes.

Since then he has been involved in her research on riboswitches and how they function in bacterial cells.

"Riboswitches help keep bacterial cell walls intact," Stock explained. "Our goal is to find a molecule that can 'turn-off' the riboswitch, which will help the human immune system destroy the bacteria."

It's exciting research that he hopes will lead to a new generation of antibiotics.

"Alex has really grown in his scientific skills and thinking over the past two years," Dr. Soukup said. "I have rarely seen this level of understanding at his age."

"It's a lot of fun but a lot of work too," Stock said. "I see science as a puzzle and each answer is a piece of that puzzle that makes you feel more triumphant as you put it together."

Coburn agrees.

"Working in Dr. Stacey Smith's research lab at UNL allows me to combine my interests in plants and genetics," she said.

Like Stock, Coburn joined Dr. Smith's evolutionary genetics lab as a freshman.

There she studies the flavonoid pathway in the lochroma plant, which produces substrates that contribute to UV light protection and the purple and red pigments. She hopes to find out how genetic changes in the structural genes of the pathway give rise to phenotypic differences across populations and species.

It's a slow process but one that Coburn has remained steadfast in.

Which is why Dr. Smith is not surprised her student received the scholarship.

"Rachel is bright, curious, highly motivated, detailed-oriented and dedicated," Dr. Smith said. "This sort of perseverance is what makes for a successful scientist."

UNO Bioinformatics Core Facility: from data generation to data analysis

By Hesham Ali, Ph.D., Bioinformatics Core Facility director

The availability of massive biological and medical data continues to be the source of major opportunities and challenges in biomedical research.

New advances in medical technologies promise to produce even more data in the near future and the main question in biomedical research has been how to extract useful knowledge from the wealth of raw data.

The Bioinformatics Core Facility at the University of Nebraska at Omaha has been focusing on developing innovative computational tools to integrate, analyze and mine information from the various sources of biological and clinical data.

The focus on data analysis and data visualization in biomedical research reflects the current state of research in key areas such as bioinformatics, medical informatics, public health informatics and biomedical imaging.

Mining valuable information from the currently available heaps of heterogeneous datasets is no easy task though. It requires a complete support environment with a substantial infrastructure in terms of advanced computational facilities, as well as personnel with a wide range of computational and biological expertise.

With the continuous support of INBRE, the core facility maintains a state-of-the-art cluster computing facility with massive storage and huge computational power.

In addition, being housed in an IT college, the facility has access to a large number of researchers in key computational areas critical to the success of advancing biomedical informatics including: algorithms, graph modeling, high performance computing, software development, data security/privacy, database management, data mining, text mining, statistics and biomedical informatics.

INBRE provides support for funding students and a systems administrator which is essential to run the facility and keep the hardware and the software systems up to date.

Hesham Ali stands in front of just one of the many computer clusters used to run the core facility.

The partnerships between the core facility and many biomedical research groups in Nebraska have already resulted in significant results in key medical projects, including cancer research, aging and several infectious diseases.

These partnerships continue to grow and expand in a way that makes Nebraska an ideal place for conducting biomedical informatics research.

Nebraska Prostate Cancer Research Program (NPCRP)

http://www.unmc.edu/biochemistry/index.cfm?L1_ID=48&CONREF=84

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University of Nebraska Medical Center

Department of Biochemistry & Molecular Biology

Seminar Series

Presented by Clark Atlanta University Faculty Members

"TGF-β Signaling During Different Stages of Prostate Cancer"

Shafiq Khan, PhD – Professor
Department of Biological Sciences

"Targeting Snail Transcription Factor Signaling with Natural Products"

Valerie Odero-Marah, PhD – Asst Professor
Department of Biological Sciences

Supported by DOD Grant #: PC094594

Monday, July 30, 2012

11:00 a.m.

DRC1 1002

Gap Junction Assembly and Chemoprevention of Prostate Cancer

Alexandra White, Parul Katoch, Linda Kelsey, and Parmender P. Mehta

Department of Biochemistry and Molecular Biology University of Nebraska Medical Center, Omaha, Nebraska

INTRODUCTION

The prostate is composed of epithelial cells, which line the ducts and acini, and the mesenchymal cells, which form the stroma. Androgen-regulated stromal-epithelial interactions govern the proliferation, differentiation and apoptotic death of normal and malignant prostate epithelial cells. Androgens either act directly on luminal cells and/or indirectly via stromal cells via the release of paracrine mediators, such as growth factors (Figure 1). The incidence of prostatic cancer increases with age and is characterized by progression from a slow-growing hormone (androgen)-sensitive state to a highly malignant, hormone-independent state. In the absence of androgens, luminal cells of normal prostate, and malignant cells of prostate tumors, die by apoptosis (Figure 2). Gap junctional cell-to-cell channels (Figure 3) provide a direct intercellular communication pathway for the growth regulatory signaling molecules (<1000 D) and hence may be important in regulating prostate morphogenesis and oncogenesis. Gap junction (GJ)s are bicellular structures formed by the members of related proteins named connexin (Cx)s, which first assemble into connexons that align and join with connexons in adjacent cells to form channels (Figure 3). We previously showed that the normal luminal cells of prostate express Cx32 and Cx26 whereas basal cells express Cx43 (Figure 4) and that the trafficking and assembly of connexins is impaired during prostate cancer progression (Figure 5). We have also shown that reintroduction of Cx32 and Cx43 into Cx-deficient, indolent PCA cell line, LNCaP, retards growth and induces differentiation, whereas re-introduction of the same Cxs into an invasive cell line, PC-3, results in intracellular accumulation due to impaired trafficking (Mehta et al. *Dev Genetics*, 1999; Govindarajan et al. *J Biol Chem*, 2002). Significantly, our recent studies document that androgens regulated the formation and degradation of gap junctions (Mitra et al. *Mol Biol Cell*, 2006).

FIGURE 1

ANDROGEN-REGULATED STROMAL-EPITHELIAL INTERACTIONS CONTORL PROSTATE GROWTH AND CANCER

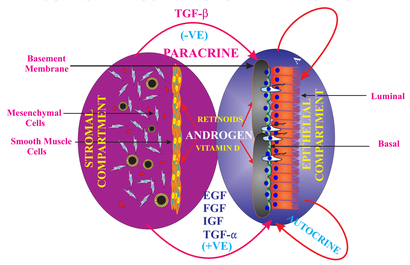


FIGURE 2

LUMINAL NORMAL PROSTATE AND TUMOR CELLS APOPTOSE AND DE-DIFFERENTIATE UPON ANDROGEN ABLATION

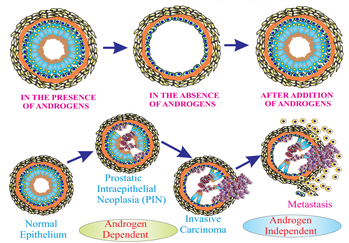


FIGURE 3

BIOGENESIS OF GAP JUNCTIONS

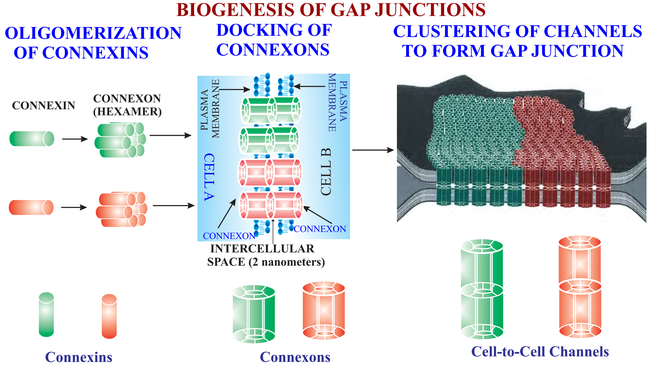


FIGURE 4

PROSTATIC CONNEXINS

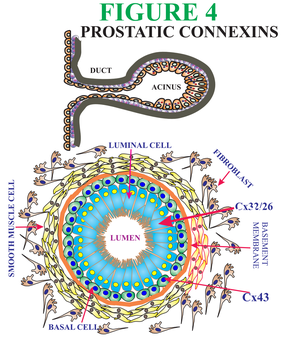
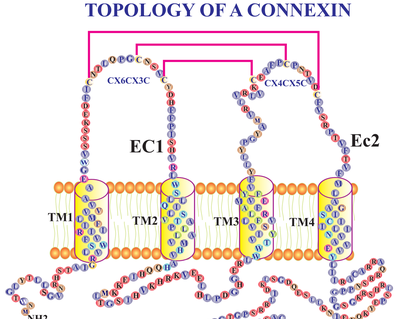


FIGURE 5

TOPOLOGY OF A CONNEXIN



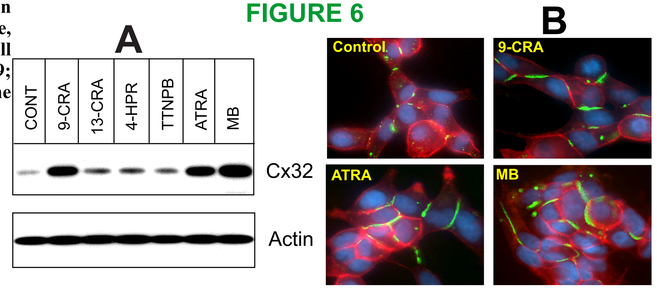
RETINOIDS AND VITAMIN D

(Although it is well-established that the chemopreventive effects of the retinoids and vitamin D_3 are related to their ability to influence the differentiation, proliferation, and apoptotic death of tumor cells, the molecular mechanisms have remained equivocal. Based on the hypothesis, we addressed the following 2 questions: Will treatment with these agents enhance the assembly of connexins into gap junctions? Will these agents prevent degradation of gap junctions upon androgen ablation? We used all-trans-retinoic acid (ATRA), which activates both RARs and RXRs and 9-cis-retinoic acid (9-CRA), which activates only RXRs, and 1,25-dihydroxyvitamin D_3(1,25 D), which is an active hormonal form of vitamin D. We found that: Treatment with 9-CRA, ATRA and 1,25 D increased the number of gap junctions as judged immunocytochemically. Degradation of Cx32 under androgen-ablated conditions was prevented by 9-CRA, ATRA and 1,25 D. Moreover, combined treatment with the androgens and 9-Cis-retinoic acid is more effective in increasing the size and number of gap junctions (Figures 6-8).

HYPOTHESIS

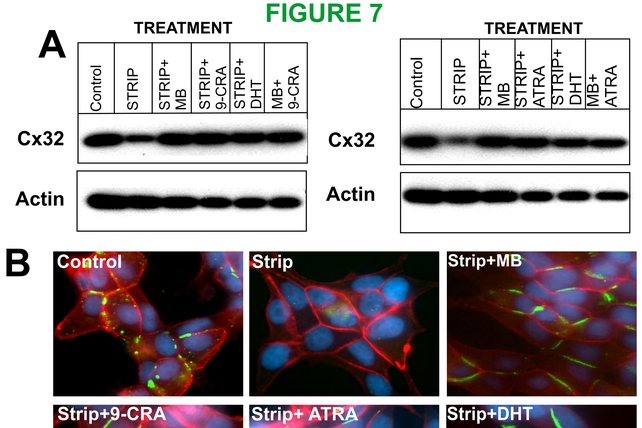
We hypothesize that a homeostatic mechanism mediated by gap junctional communication regulates the proliferation, differentiation, and apoptotic death (tissue homeostasis) of prostate epithelial cells and that this mechanism is gradually weakened and eventually breached during the development of prostate cancer. We further hypothesize that the androgens— and chemopreventive agents such as all-trans- and 9-Cis-retinoic acids and 1,25 (OH)2 D3 — modulate prostate growth and cancer by regulating the function as well as formation and dissolution of gap junctions.

FIGURE 6



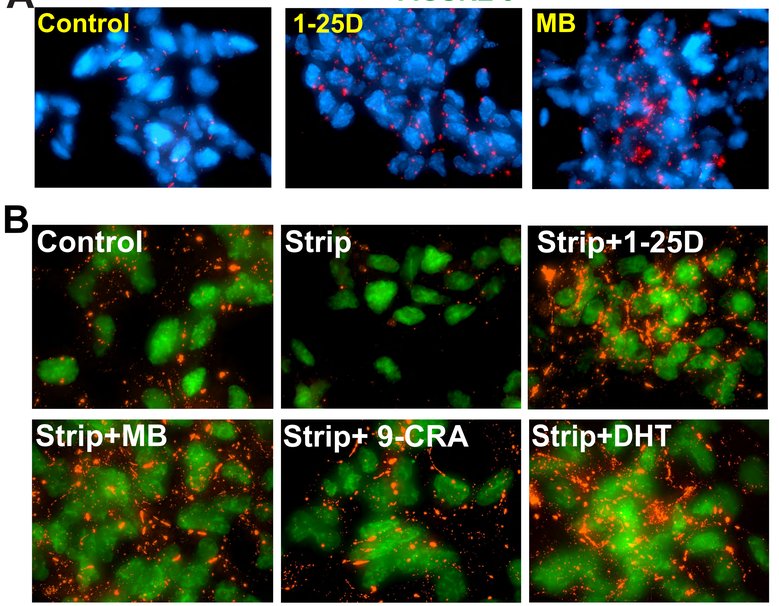
Retinoids increase Cx32 expression level and GJ formation. A. Cx32-expressing LNCaP-32 cells were treated with the 9-CRA, ATRA, and synthetic androgen, mobolerone (MB) and other retinoids as indicated. Note that only RXR-specific retinoids increase expression level and GJ formation. RAR-specific retinoids, TTNPB (tetrahydrotetramethyl-nepthalenylpropanylbenzoic acid), and 13-CRA (13-cis-retinoic acid) and the other unrelated retinoid,4-HPR, are ineffective. Note also that MB (2.5 nM) is at least 300-500 times more potent than 9-CRA and ATRA on equimolar basis. B. LNCaP-32 cells, grown in six well clusters, were treated with 9-CRA and ATRA for 48 h. Assembly of Cx32 (green) into GJs was assessed immunocytochemically. E-cadherin is shown in red. Note that GJ formation was enhanced with 9-CRA and ATRA and MB treatment.

FIGURE 7



Retinoids block androgen-regulated formation and degradation of gap junctions. LNCaP-32 cells, grown to 70 % confluence either in six well clusters or 10-cm dishes, were switched to charcoal-stripped, androgen-depleted (Strip) medium. Expression level of Cx32 and formation of GJs were analyzed by Western blot (A) and immunocytochemical analysis (B) after 48 h in the presence and absence of 9-CRA and ATRA (1 μM) and MB (2.5 nM) and DHT (10 nM). Note that Cx32 and GJs are degraded in androgen-depleted medium and degradation is blocked upon replenishment with 9-CRA, ATRA, MB and DHT. In (B), the nuclei (blue) were stained with DAPI.

FIGURE 8



1-25D enhances gap junction formation and blocks androgen-regulated formation and degradation of gap junctions. A. LNCaP-32 cells, grown to 70 % confluence in six well clusters were treated with 1-25D and GJ formation was examined after 48 h immunocytochemically. Note that 1-25D treatment increased the number of GJs. Treatment with MB was used as a control. B. LNCaP-32 cells, grown to 70 % confluence in six well clusters, were switched to charcoal-stripped, androgen-depleted (Strip) medium. Formation of GJs was analyzed by immunocytochemical analysis after 48 h in the presence and absence of 1-25D (10 nM), 9-CRA (1 μM) and MB (2.5 nM) and DHT (10 nM). C. Formation of GJs was also analyzed by Western blot analysis of total, detergent-soluble and -insoluble fractions as described. Note that Cx32 and GJs are degraded in androgen-depleted medium and degradation is blocked upon replenishment with 1-25D, 9-CRA, MB and DHT. In (A), Cx32 is in red and the nuclei blue and in (B) Cx32 is in red and the nuclei are (green).

PUTATIVE CONLUSIONS

1. Retinoids and Vitamin D3 enhance assembly of Cxs into gap junctions.
2. Retinoids and Vitamin D3 prevent androgen-regulated degradationo of gap junctions.
3. Chemopreventive effects of Retinoids and Vitamin D3 may be related to their ability to modulate the formation and degradation of gap junctions.

University of Nebraska Medical Center

Effects of AMD & DME on LNCaP C-81 cell proliferation in SR conditions

Alexus Devine[1], Xiu Bu[1], Sakthivel Muniyan[2], Ming-Fong Lin[2]

[1] Department of Chemistry, Clark Atlanta University, Atlanta, GA

[2] Department of Biochemistry & Molecular Biology, University of Nebraska Medical Center, Omaha, NE

Abstract

LNCaP C-81 is a model prostate cancer (PCa) cell line that represents the majority of advanced PCa population in clinic. There is increased interest in LNCaP C-81 cells due to their ability to express a functional androgen receptor (AR), secrete prostate-specific antigen (PSA) under androgen-deprived conditions and exhibit intracrine ability. In this study, we investigated ribonucleotide reductase (RR) inhibitors, AMD and DME, for their growth inhibitory activity on LNCaP C-81 cells in steroid-reduced condition. Our results showed that both AMD and DME can inhibit the growth of LNCaP C-81 cells under regular and androgen-deprived conditions.

Introduction

Prostate cancer is the second leading cause of male cancer mortality in the United States [1]. While androgen ablation therapy delivers the first line of treatment for metastatic PCa, effective therapy is limited for advanced castration-resistant (CR) PCa patients. The challenge is finding therapy that is effective after these patients have relapsed. This study focuses on ribonucleotide reductase inhibitors (RRi), AMD and DME, as potential treatments for CR PCa in clinic. The compounds AMD and DME belong to the fused heterocyclic family, where pyridine and imidazole are fused together. (Fig.1) These compounds possess the ability to deprive iron from cells. Since, iron is one of the essential nutrients for cell growth, the depletion of iron may inhibit the RR, stopping DNA synthesis and hence inhibiting cell proliferation [2].

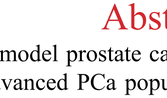
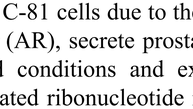
IMP-AMD	Formula Weight 286.33	
IMP-DME	Formula Weight 314. 38	

Fig. 1 Structure of AMD and DME

Hypothesis

Ribonucleotide reductase inhibitors, AMD and its derivative DME, will inhibit the growth of LNCaP C-81 cells under androgen-deprived conditions.

Methods & Materials

Briefly, LNCaP-C-81 cells were maintained as described previously [3,4]. For cell growth and immunoblot analyses, subconfluent cells were harvested and the experiments were performed as described [5,6]. All experiments were repeated in at least two sets of independent experiments in duplicates. The protein level by western blotting was semiquantified by densitometric analyses of autoradiograms. The relative protein level was then normalized to the corresponding loading control protein level.

Results

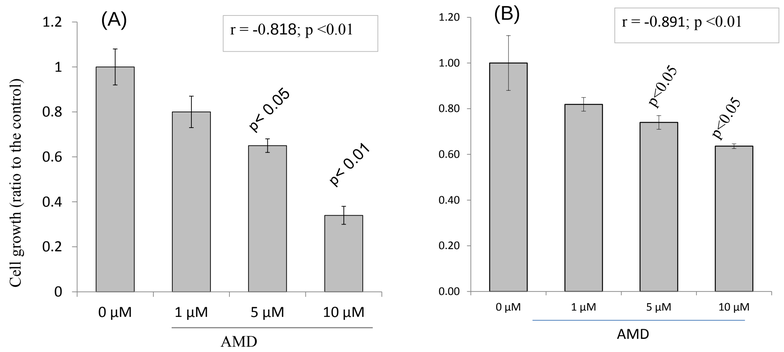


Fig. 2. The effect of AMD on LNCaP C-81 cell growth in regular culture medium (A) and steroid-reduced medium (B). The results presented were mean ± SE. $p<0.05$ is statistically significant with controls.

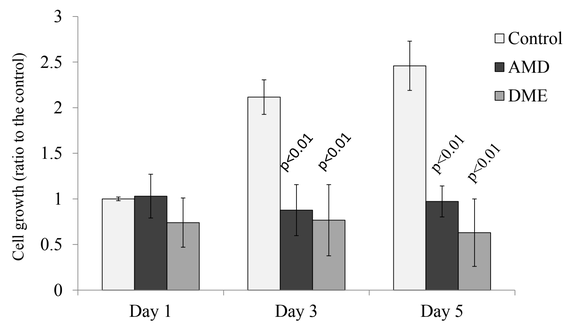


Fig. 3. The effects of AMD & DME on LNCaP C-81 cell growth in a steroid-reduced condition on a time dependent manner. The cells were plated in regular medium for three days, then steroid starved for 48 hours followed by treatment with AMD or DME at 10 µM. Cell numbers wee determined at different time points. The results presented were mean ± SE. * $p<0.05$ is statistically significant to controls.

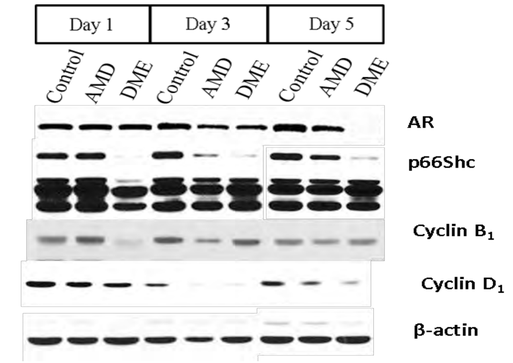


Fig. 4. The effects of AMD and DME on AR, p66Shc and cell cycle protein expression. β-Actin was detected as a loading control. The data shown is a representative from three sets of independent experiments.

Conclusion

Both AMD and DME showed an inhibitory effect on the growth of LNCaP C-81 cells following the dosage and kinetic responses in regular medium and androgen-deprived condition. Western blot analyses confirmed the inhibitory effect. AMD serves as an important lead compound for improving CR PCa therapy. Further studies are necessary in order to determine their mode of action in cell growth inhibition as well as the mechanism for these compounds.

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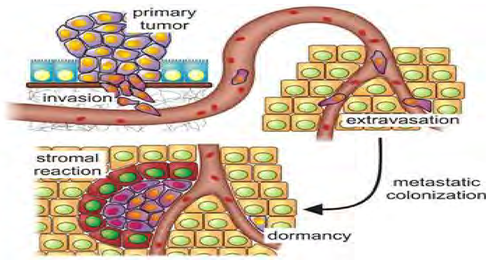
The role of VEGF-C in Prostate Cancer

Sierra R. Coleman[Ω], Samikshan Dutta*, Kaustubh Datta*, Marissa Stanton*

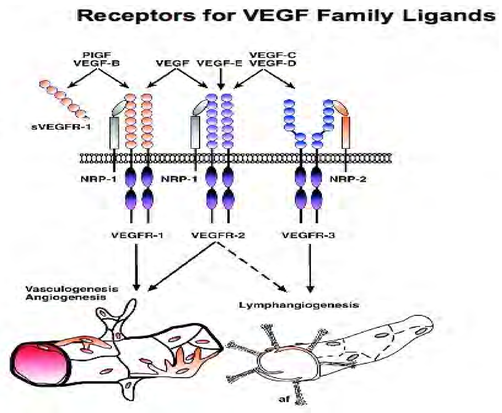
Clark Atlanta University, Atlanta, GA[Ω] and University of Nebraska Medical Center, Omaha, NE*

Introduction

- Cancer is an invasive growth of tumors that can metastasize to different locations throughout the body.
- Metastasis usually occurs when cancer cells spread from their primary location to a distant site via the blood stream or the lymphatic system.
- Metastasis is responsible for much of the mortality involved with cancer because metastatic cells are generally aggressive and resistant to therapies.
- Current studies have suggested that Vascular endothelial growth factor-C (VEGF-C) plays an important role in prostate cancer progression, metastasis, and therapy resistance.



- VEGF-C is a member of the VEGF family proteins which are mainly involved in lymphatic and vascular angiogenesis.
- VEGF-C binds to and activates membrane bound receptors, such as VEGFR-3, VEGFR-2, and NRP-2.



The Non-canonical function of VEGF-C

Recently, it was established that VEGF-C/NRP-2 may have functions which are independent of lymphangiogenesis.

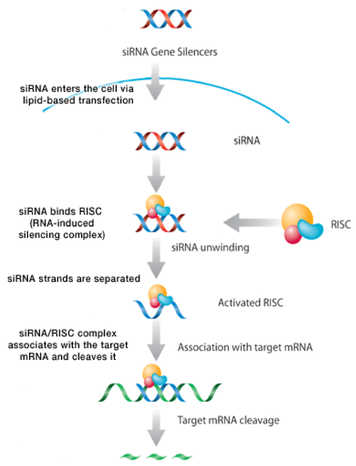
- VEGF-C and its receptor NRP-2 are expressed in significantly elevated levels in advanced prostate cancer. Tumors in these patients are also not responsive to current therapies.

- **We therefore hypothesized that the VEGF-C /NRP-2 axis protects prostate cancer cells from chemotherapy.**

Experimental Approach

To address this hypothesis, our aim was to study the cell survival mechanisms in the absence of VEGF-C and NRP-2 in prostate cancer.

To achieve this, we knocked down VEGF-C and NRP-2 in prostate cancer cells by siRNA technique and determined the survival of prostate cancer cells in the presence of docetaxel.



What Is siRNA?

Small interfering RNAs are a class of double-stranded RNA molecules with a length of 20-25 nucleotides. They are involved in the RNA interference (RNAi) pathway. An siRNA molecule interferes with the expression of a specific gene.

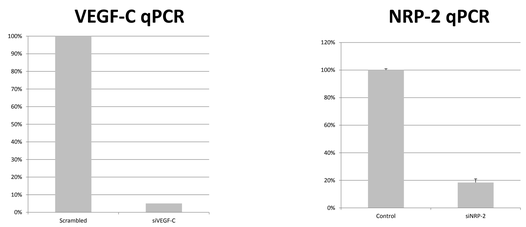
How Does RNAi Work?

First, an RNA endonuclease, Dicer, cuts dsRNA into shorter segments (siRNAs) which are 21-23 nucleotides in length.

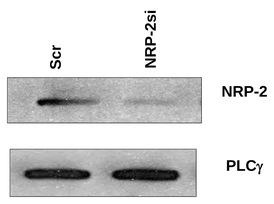
The antisense (guide) strand of the siRNA joins the RNA-induced silencing complex (RISC). After the antisense strand of the siRNA anneals to the matching mRNA molecule, the RISC degrades the mRNA. An enzyme called "Slicer" is involved in this degradation process. This causes the gene to be "knocked down."

Results

Reverse-transcription polymerase chain reaction to evaluate the VEGF-C and NRP-2 mRNA expression

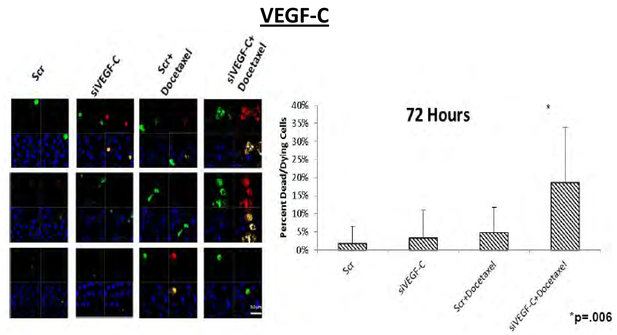


Western Blot Analysis to validate NRP-2 protein expression

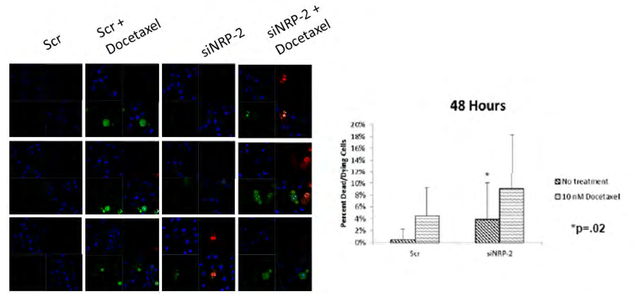


Cell Viability

VEGF-C



NRP-2



Summary

We have been able to knock down both VEGF-C and NRP-2 in prostate cancer cells using siRNA technique.

- Prostate cancer cells become sensitive to docetaxel following the depletion of VEGF-C and NRP-2.
- Targeting VEGF-C/NRP-2 axis could increase the efficacy of docetaxel therapy for patients with advanced prostate cancer.

Future Studies

Elucidate the mechanisms through which VEGF-C and NRP-2 promote cancer cell survival.

Produce a lentivirus expressing VEGF-C and NRP-2 shRNAs.

Develop stable VEGF-C and NRP-2 shRNA expressing prostate cancer cell lines for experiments using xenograft tumors.

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2012 Nebraska Prostate Cancer Research Scholars Program Evaluation

Please fill out and return to Jennifer Pace in the envelope provided.

1. **How satisfied are you with the Nebraska Prostate Cancer Research (NPCR) Scholars Program?**

   Very Satisfied (Satisfied) **Dissatisfied** **Very Dissatisfied**

2. **How did you originally learn about the NPCR Scholars Program?**

   From flyers posted on the bulletin boards around the campus.

3. **Did you have a clear set of expectations of the NPCR when you first became a NPCR Scholar?**

   For the most part, I envisioned it being research from 9:00am - 5:00pm Monday - Friday.

4. **Was the process matching yhou with your mentor/advisor a good one?**

   There wasn't really a process, we were moreso assigned a mentor.

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

I had a good overall experience, it helped me decide if research would become a part of my future career goals.

6. **What do you consider the main benefit(s) of the NPCR Scholars Program?**

1 – The research experience
2 – The interaction with the INBRE students
3 – The seminars at the different research facilities (i.e. Merck & Celerion

7. **What suggestions would you give for the program for next summer?**

1 – Give earlier notice about acceptance
2 – Provide food & housing stipend if possible, if not then forewarn the students that they pay out of pocket
3 – Make it clear that there is no set time when doing research
4 – Make sure someone is available to give proper attention to student
5 – Assign projects early on, not last minute
6 – Overall just make sure the students are informed an aware of all the expenses they need to pay

2012 Nebraska Prostate Cancer Research Scholars Program Evaluation

Please fill out and return to Jennifer Pace in the envelope provided.

1. **How satisfied are you with the Nebraska Prostate Cancer Research (NPCR) Scholars Program?**

   (Very Satisfied) **Satisfied** **Dissatisfied** **Very Dissatisfied**

2. **How did you originally learn about the NPCR Scholars Program?**

   I learned about the NPCR Scholar Program from my Biology professor. He recommended that I apply to gain more knowledge in an area that fits my interest.

3. **Did you have a clear set of expectations of the NPCR when you first became a NPCR Scholar?**

   Yes, I expected to work with Post Docs and graduate students while learning Biomedical Techniques and gain research experience to do my own project.

4. **Was the process matching yhou with your mentor/advisor a good one?**

   Yes. The match up for my lab and mentor was absolutely perfect. I was welcomed with open, caring arms. Joining the NPCR program has been the most amazing experience in my life.

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

Biomedical Research is definately interesting, I've gained extensive knowledge that I plan on using everyday from August 3, 2012. Prior to joining this program I was only (Very interested) but since I have joined, I know this is what I would like to do. I plan to get my Ph.d and continue as a researcher.

6. **What do you consider the main benefit(s) of the NPCR Scholars Program?**

There is never a dull moment in a lab, so the main benefits were becoming associates with soon to be doctors and scientist. I was able to learn new techniques and use them in lab. The greatest benefit was giving my time to the program to help my lab meet some of their goals. I now have a little experience to pursue my degree.

7. **What suggestions would you give for the program for next summer?**

The NPCR Program is very organized. Everything was precise and the seminars were scheduled at a timely manner. However, I do think the (Tuesday & Thursday) weekly seminar should me mandatory, not voluntary. ☺ Overall, everything was perfect.

2012 Nebraska Prostate Cancer Research Scholars Program Evaluation

Please fill out and return to Jennifer Pace in the envelope provided.

1. **How satisfied are you with the Nebraska Prostate Cancer Research (NPCR) Scholars Program?**

   Very Satisfied **Satisfied** **Dissatisfied** **Very Dissatisfied**

2. **How did you originally learn about the NPCR Scholars Program?**

   From a professor at school.

3. **Did you have a clear set of expectations of the NPCR when you first became a NPCR Scholar?**

   No not really, I just expected to do research.

4. **Was the process matching yhou with your mentor/advisor a good one?**

   Yes. I really loved my mentor. This was a great experience.

5. **How would you rate your research experience as it relates to helping you make decisions related to your education and career plans?**

On a scale of 1-10, I rate it a ten. Between the seminars and my lab I got a much better idea of what I want to do.

6. **What do you consider the main benefit(s) of the NPCR Scholars Program?**

The seminars were very beneficial as well as being a part of the INBRE Program.

7. **What suggestions would you give for the program for next summer?**

A couple of us did not have money when we got here, but we still needed groceries. So I would suggest a stipend for food in the beginning and also letting the students know up front that they will need money for school.

I didn't have a project to work on until the last few weeks of the summer which was kind of a bummer. So maybe asking the mentors to have an idea of what they want their student to do would be nice.

From: abrcms@abstractsonline.com
To: Lin, Ming-Fong
Subject: ABRCMS Co-Author/Program Director eNotification (Devine)
Date: Wednesday, September 26, 2012 1:25:04 PM

Dear Ming-Fong Lin:

Alexus Devine submitted an abstract for presentation at the 2012 Annual Biomedical Research Conference for Minority Students (ABRCMS) and listed you as a co-author or program director.

This email is to inform you that the abstract entitled, "Effects Of Amd & Dme On Lncap C-81 Cell Proliferation In Steroid-reduced Conditions" has been **accepted** and is scheduled to present on 11/10/12 9:45 AM.

If you have any questions regarding this submission or presentation, please contact the primary author at alexus.devine@students.cau.edu.

Respectfully,

Clifford W. Houston, Ph.D.
Chair, Steering Committee
Annual Biomedical Research Conference for Minority Students (ABRCMS)

Acknowledgements: *Supported by grants P20MD002285-01 & grant number 8 G12 MD007590 from the NIH/National Institute on Minority Health and Health Disparities (NIMHD), formerly NIH/NCRR Grant Number 5 G12 RR003062.*

U16

AP-1 AND TGFβ1 INTERACTION IN DIFFERENT HUMAN CANCER CELL LINES. ***Tori Phillips,*** *Cachétne Barrett, Ana Cecilia Millena and Dr. Shafiq Khan, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta Georgia*

AP-1 is a family of proteins consisting of three Jun proteins, (c-Jun, JunB and JunD), and four Fos proteins, (c-Fos, FosB, Fra1 and Fra2). These proteins form Jun: Jun homodimers and Jun: Fos heterodimers and bind to TPA-response element (TRE: TGACTCA) in the promoters of target genes which regulate proliferation and other biological effects. The comparative roles of individual proteins in cell proliferation are not well understood. Our recent studies in prostate cancer (PCa) cells show distinct effects of three Jun isoforms on cell proliferation. These studies also indicate that TGFβ1effects on cell proliferation involve down-regulation of JunD. In the present study, we attempted to investigate the interaction between JunD and TGFβ1 signaling in cell lines derived from several human cancers which includes, HeLa (cervical), HEY (ovarian), and MCF7 (breast) cells. The cultured cell lines were treated with varying concentrations of TGFβ1 (1, 5, 10 ng/ml) to study the effects on proliferation using MTT (3-(4, 5-Dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide, a yellow tetrazole) assay. TGFβ1 had an inhibitory effect on the proliferation of HeLa cells but showed no marked effects on proliferation in HEY and MCF7 cell lines. The three cell lines were treated with 5.0 ng/ml of TGFβ1 for 2 and 8 hours, cells were harvested and cells lysate collected and JunD expression analyzed using western blots. The results indicated that JunD protein was down regulated in both HEY and HeLa cell lines where as TGFβ1 effect on JunD levels in MCF7 is still inconclusive. These results indicate that JunD may be involved in proliferation in all three cell lines. They also implicate JunD in TGFβ1 signaling, however, further studies are needed to elucidate JunD specific role in cell proliferation.

Acknowledgements: *These studies were supported by Clark Atlanta University Department of Biological Sciences, grant # G12MD007590 from the NIH/National Institute on Minority Health and Health Disparities (NIMHD), formerly NIH/NCRR Grant Number 5 G12 RR003062, NIH/NIMHD grant #5P20MD002285 and NIH/RISE grant # 5R25GM060414-10.*

U17

GAP JUNCTION ASSEMBLY AND CHEMOPREVENTION OF PROSTATE CANCER. ***Alexandra White,*** *Parul Katoch, Linda Kelsey, and Parmender Mehta, Department of Biochemistry and Molecular Biology University of Nebraska Medical Center, Omaha, Nebraska*

Gap junctional cell-to-cell channels provide a direct intercellular communication pathway for the growth regulatory signaling molecules (<1000 D) and hence may be important in regulating prostate morphogenesis and oncogenesis. Gap junction(GJ)s are bicellular structures formed by the members of related proteins named connexin(Cx)s, which first assemble into connexons that align and join with connexons in adjacent cells to form channels. We previously showed that the normal luminal cells of

prostate express Cx32 and Cx26 whereas basal cells express Cx43 and that the trafficking and assembly of connexons is impaired during prostate cancer progression. We hypothesize that a homeostatic mechanism mediated by gap junctional communication regulates the proliferation, differentiation, and apoptotic death (tissue) homeostasis of prostate epithelial cells and that this mechanism is gradually weakened and eventually breached during the development of prostate cancer. We further hypothesize that the androgens- and chemopreventative agents such as all-trans- and 9-Cis-retanoic acids and 1,2 (OH)2 D3- modulate prostate growth and cancer by regulating the function as the well as formation and dissolution of gap junctions. We wanted to see if treatment with retinoids and vitamin D will enhance the assembly of connexons into gap junctions. LNCaP-32 cells, grown to 70% confluence in six-well clusters were treated with 1-25D and GJ formation was examined after 48 hours immunocytochemically. Our results showed that, retinoids and vitamin D3 regulate the formation and degradation of gap junctions. The chemo-preventative effects of retinoids and vitamin D3 may be related to their ability to enhance gap junction assembly. Additionally, their effects on gap junction formation may be related to their ability to maintain the polarized state of normal (luminal) and malignant prostate epithelial cells.

Acknowledgements: *These studies were supported by the DOD grant # W81XWH-10-1-0271.*

G18

C-FOS AS A POTENTIAL TRANSCRIPTION PARTNER FOR JUND IN REGULATION OF PROSTATE CANCER CELL PROLIFERATION. ***Cachétne Barrett***, *Tori Phillips, Ana Cecilia Millena, and Dr. Shafiq Khan, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta Georgia*

JunD is a member of the Jun family of proteins, which are primary components of the activator protein 1 (AP-1) transcription factor. Jun proteins (JunB, c-Jun, JunD) can form either AP-1 homo or heterodimers among themselves or with Fos family members (c-Fos, FosB, Fra1, Fra2) and directly bind to their target promoters at specific DNA elements such as TGAGTCA (classical AP-1 site) and TGACGTCAT. The AP-1 dimers exhibit similar DNA binding specificities; however, they differ in their transactivation efficiencies. AP-1 has been shown in prostate cancer to cause disease recurrence and more aggressive clinical outcome. Previously, our *in vitro* studies using knockdown and overexpression of Jun family members, JunD was identified as an essential protein for cell proliferation in prostate cancer cells. However, it is still unclear whether JunD binds with another Jun protein or a Fos family protein to induce its effects on regulation of cell proliferation. In this study, we attempted to identify the partner of JunD and determine their role in proliferation of prostate cancer cells. First, we determined the basal expression and the effects of TGF-β1 on the Fos family members in prostate cancer cells (PC3 and DU145) using RT-PCR and Western Blot analyses. PC3 and DU145 cells were transfected with c-Fos siRNA to determine the effects of TGF-β1 on cell proliferation. We found that TGF-β1 induced c-Fos expression but had no effect on Fra1/2 and FosB expression in DU145 cell lines. However, TGF-β1 induced FosB and Fra2 expression, but reduced the expression of c-Fos and Fra1 in PC3 cell lines. Knockdown of endogenous c-Fos resulted in marked decrease in cell proliferation of both PC3 and DU145 cell lines. These results indicate that c-Fos protein may be involved in cell proliferation of prostate cancer cells and also in TGF-β signaling pathway. Further

(NOS) activity but whether the VPL and PVT contain NOS or how they are altered by stress is unknown. Taken together, these results lead to the hypothesis that stress will activate NOS in the PVT and VPL thalamus as a part of the brain's stress response mechanism. In this study, male Wistar rats were placed under stress by restraint for 1 hour, 3 hours, or 6 hours and control rats were unrestrained and in their home cages. The rats were then sacrificed and the brains were harvested and studied. Analysis in progress will examine the involvement of thalamic nitrergic system in a functionally-relevant context in the thalamus. The findings will provide much-needed evidence about the role of the thalamus as a sensory information relay center and elucidate the impact of the thalamic nitrergic system in signal processing during whole animal response to acute stress exposure.

Acknowledgement: *This study was supported by the NIH/NIGMS, MBRS RISE Grant 2R25GM060414.*

U6

THE SYNTHESIS OF METAL ORGANIC FRAMEWORKS (MOFs). ***Brandon Dennis***, *Conrad W. Ingram, Esmerelda Castaneda and Liang Liao, Clark Atlanta University, Department of Chemistry, Atlanta, GA*

Metal organic frameworks (MOF) or are crystalline compounds that are formed by the binding of metals to organic compounds known as ligands. The metal ion and ligand chosen, the ratio of metal to ligand, temperature, and solvent used for the reaction all affect the ability of the reaction to form a MOF. These factors also affect the structure and properties of these coordination polymers. The purpose of this study was to synthesize MOFs using transition and lanthanide metal ions in combination with 3, 6-dimethylpyrazine-2, 5-dicarboxylic acid as the organic linker. The first experiment involved the use of lanthanum (III) nitrate hexahydrate in two ratios of ligand to metal: 1:3 and 1:2. The second experiment used which was cobalt (II) nitrate hexahydrate was in the same ratios as experiment one. The reactions are being monitored for the formation of crystalline MOFS. The porous structures of MOFs will be studied for their use in gas storage, absorption, gas separation, and catalysis.

Acknowledgement: *This study was supported by the NIH/NIGMS, MBRS RISE Grant #2R25GM060414.*

U7

EFFECTS OF AMD & DME ON LNCAP C-81 CELL PROLIFERATION IN STEROID-REDUCED CONDITIONS. ***Alexus Devine***[1], *Xiu Bu*[1], *Sakthivel Muniyan*[2], *and Ming-Fong Lin*[2], [1]*Department of Chemistry, Clark Atlanta University, Atlanta, GA,* [2]*Department of Biochemistry & Molecular Biology, University of Nebraska Medical Center, Omaha, NE*

LNCaP C-81 is a model prostate cancer (PCa) cell line that represents the majority of advanced PCa population in clinic. There is increased interest in LNCaP C-81 cells due to their ability to express a functional androgen receptor (AR), secrete prostate-specific antigen (PSA) under androgen-deprived conditions and exhibit intracrine ability. We hypothesized that ribonucleotide reductase (RR) inhibitors, AMD and its derivative DME, will inhibit the growth of LNCaP C-81 cells under androgen-deprived conditions. LNCaP-C-81 cells were plated in regular medium for three days, then steroid

starved for 48 hours followed by treatment with AMD or DME at 10 μM. Cell numbers were determined at different time points. For cell growth and immunoblot analysis, subconfluent cells were harvested and the experiments were performed as described. All experiments were repeated in at least two sets of independent experiments in duplicates. The protein level by western blotting was semiquantified by densitometric analysis of autoradiograms. The relative protein level was then normalized to the corresponding loading control protein level. Both AMD and DME showed an inhibitory effect on the growth of LNCaP C-81 cells following the dosage and kinetic responses in regular medium and androgen-deprived conditions. Western blot analysis confirmed the inhibitory effect. AMD serves as an important lead compound for improving castration resistant (CR) PCa therapy. Our results showed that both AMD and DME can inhibit the growth of LNCaP C-81 cells under regular and androgen-deprived conditions. Further studies are necessary in order to determine their mode of action in cell growth inhibition as well as the mechanism for these compounds.

Acknowledgements: *These studies were supported by the DOD Grant #PC094594, #PC074289 and NIH Grant #CA88184. Special thanks to NIH/NIGMS, MBRS-RISE Program.*

U8

VASOPRESSIN AND THE CHANGES IN SOCIAL BEHAVIOR AMONG MALE AND FEMALE HAMSTERS. ***Jasmine Franklin,*** *Timothy Moore, Clark Atlanta University, Atlanta, Georgia*

This study was performed to determine the effect of the hormone vasopressin on hamster's social behavior. The function of Amino Vasopressin (AVP) can include thermoregulation, cardiovascular functions, social recognition memory, sexual behavior and aggressive behavior. When released into the brain, however, the hormone can alter social behavior and the way subjects bond toward one another. It is hypothesized that male hamsters will show characteristics of dominance. The hormone was measured within different subjects, which included both male and female to determine the role of AVP in the animal's social behavior. It was found that out of 8 male hamsters, half of them displayed dominant behavior when exposed to vasopressin, 3 displayed submissive behaviors, and 1 was controlled. In the female hamster, out of 5 that were exposed to AVP, 3 displayed dominant behavior and 2 displayed submissive behavior. The differences between the both male and female animals were the amounts of AVP they were exposed to . Therefore, this study showed that vasopressin acts similar in both male and female subjects by determining their social behavior.

Acknowledgements: *These studies were supported by MBRS/RISE*

U9

ARYL HYDROCARBON RECEPTOR (AhR) EXPRESSION INHIBITS MIGRATION OF PROSTATE CANCER CELLS. ***Loquayan French,*** *Alice Walker and Joann B. Powell, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta, Georgia*

The aryl hydrocarbon receptor (AhR) is a ligand-activated transcription factor that controls the expression of a diverse set of genes. Recent studies have suggested a role for the aryl hydrocarbon receptor (AhR) in adhesion and migration. Collectively, studies indicate that AhR's role in migration depends on the cell phenotype. These observations prompted us to investigate whether AhR expression

U1

ARYL HYDROCARBON RECEPTOR SIGNALING IN PROSTATE CANCER CELLS

LaTayia M Aaron, *Cindy D Tran, Danielle N McKeithen, Joann B Powell, Center for Cancer Research and Therapeutic Development, Department of Biological Sciences at Clark Atlanta University, Atlanta, Georgia 30314*

The Aryl hydrocarbon receptor (AhR), a basic helix-loop-helix (bHLH) transcription factor, mediates carcinogenic responses to environmental polyaromatic hydrocarbons (PAH), e.g. 2,3,7,8-tetrachloro-dibenzo-*p*-dioxin (TCDD). Binding of PAHs leads to AhR translocation into the nucleus where it regulates transcription of metabolizing enzymes, such as cytochrome P450-1A1 (CYP1A1). Studies have demonstrated that TCDD inhibits androgen induced cell proliferation. Reversely, studies also show AhR transcriptional activity is inhibited by exposure to androgens, indicating inhibitory crosstalk between the pathways. However, evidence is emerging that AhR may have intrinsic functions that promote prostate carcinogenesis. Experiments utilizing constitutively active recombinant AhR constructs demonstrated AhR's ability to act as a co-regulator for unliganded androgen receptor (AR). Previous studies have not considered the presence of a constitutively active AhR in prostate cancer (PCa) or its ability to promote PCa progression. The objective of this study is to determine the expression and level of AhR activity in PCa cell lines. For these experiments, androgen independent C4-2 and androgen dependent LNCaP cell lines were treated with TCDD. AhR expression, activity, and, localization were accessed by RT-PCR, Western immunoblotting, and, immunofluorescence. Compared to LNCaP cells, AhR was overexpressed in C4-2 cells. C4-2 cells immunofluorescence analysis revealed AhR nuclear localization without ligand treatment. LNCaP cells required ligand activation for AhR nuclear translocation. C4-2 cells expressed CYP1A1 independently of ligand treatment. These results suggest a constitutively active AhR in castration independent PCa cell line. The aberrant AhR signaling may be responsible for sustained AR signaling in hormone refractory prostate cancer.

ACKNOWLEDGEMENTS: *This work was funded by Grant Number 8 G12 MD007590 from the NIH/National Institute on Minority Health and Health Disparities (NIMHD), formerly NIH/NCRR Grant Number 5 G12 RR003062 and NIH/NIGMS RISE Grant Number 5R25GM060414.*

U2

CXCR4/SDF1α SIGNALING AXIS REGULATES NOX2 AND AKT EXPRESSION AND LOCALIZATION.

***Vanessa Adams**, Kia J. Jones, Mahandranauth A. Chetram, Danaya A. Bethea, Ayesha S. Don-Salu-Hewage, and Cimona V. Hinton, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta, Georgia.*

Chemically reactive oxygen molecules, known as reactive oxygen species (ROS), interact with different biomolecules including inorganic molecules, proteins, lipids, carbohydrates, and nucleic acids. Examples of ROS molecules are oxygen ions and peroxides. ROS molecules possess important roles in cell signaling and homeostasis. One of the sources of ROS, NOX, is a family of NADPH (nicotinamide adenine dinucleotide phosphate-oxidases) oxidases. They are transmembrane proteins that transfer electrons across biological membranes. Specifically, NOX2 (Cytochrome b-245, beta

Lin, Ming-Fong

From: Hankins, Karen L
Sent: Monday, July 08, 2013 10:38 AM
To: Batra, Surinder K; Caplan, Steven H; Chaney, William G; Cheng, Pi-Wan; Christman, Judith K; Cox, G Stanley; Datta, Kaustubh; Jain, Maneesh; Klinkebiel, David L; Lin, Ming-Fong; MacDonald, Richard G; Mehta, Parmender P; Mott, Justin L; Naslavsky, Naava; Palanimuthu Ponnusamy, Moorthy; Ramaley, Robert F; Sorgen, Paul L; Steinke, Laurey A; Teoh-Fitzgerald, Melissa M; Agarwal, Ekta; Al-Mugotir, Mona H; Bahl, Kriti; Cai, Bishuang; Chugh, Seema; Cruz, Eric; Das, Srustidhar; Gupta, Suprit; Haridas, Dhanya; Heimann, Nicholas B; Huang, Huocong; Ji, Weike; Joshi, Suhasini; Katoch, Parul; Krishn, Shiv Ram; Li, Hanjun; Lu, Sizhao; Mohapatra, Bhopal C; Pai, Priya; Panapakkam Giri Dhar, Sai Srinivas; Rajbhandari, Nirakar; Ray, Anuttoma; Reinecke, James B; Remmers, Neeley A; Roy, Sohini; Saxena, Sugandha; Souchek, Joshua J; Struble, Lucas R; Suresh, Anand; Talbott, Heather A; Tom, Eric C; Vaz, Arokiapriyanka; Wehrkamp, Cody J; Wiest, Edwin J; Xie, Shuwei; Zavorka, Megan E; Zhang, Yinbo; Dodson, Amy L; Fontaine, Michele; Gardner, Jeanette L; Jones, Atiim D; Hankins, Karen L; Katafiasz, Dawn M; Kelsey, Linda S; Klima, Susan; Mallya, Kavita; Polavaram, Navatha Shree; Smith, Mary A; Talaska, James R; Taylor, Janice; Zach, Sydney J
Subject: BMB Seminar TODAY

Importance: High

Please join the Biochemistry and Molecular Biology department as they welcome **Dr. Shafiq A. Khan.**

Dr. Khan is a Professor in the Department of Biological Sciences at Clark Atlanta University. Presenting a seminar entitled **"Signaling Transduction in Prostate Cancer and the Effort of Biodepository of Minority Specimens."**

July 8, 2013
DRC… Room 1004
12:00 pm - 1:00 pm

Karen L. Hankins
Office Associate I
Department of Biochemistry & Molecular Biology
University of Nebraska Medical Center
985870 Nebraska Medical Center
Omaha, NE 68198-**5870**
P: 402-559-4417
F: 402-559-6650
E-mail:karen.hankins@unmc.edu
****

Itinerary for Drs. Shafiq Khan
Clark Atlanta University

Sunday, July 7, 2013

3:10 p.m.	Arrive on Southwest Flight 3500 (Departure at 12:15pm). Dr. Ming-Fong Lin will pick you up from the airport and drive you to the hotel.
Hotel Reservations:	Courtyard Omaha Downtown 101 South 10th Street Omaha, NE 68102 402-346-2200 Confirmation #89697004
	Dinner with Drs. Chaney, Lin and Khan

Monday, July 8, 2013

8:30 a.m.	Dr. Lin will pick you up and drive you to UNMC for breakfast with faculty mentors.
9:00 a.m.	Continental breakfast with faculty mentors – DRC 7003 Faculty mentors: Drs. Surinder Batra, John Davis, Pi-wan Cheng, Kaustubh Datta, William Chaney, Ming-Fong Lin and Yaping Tu (Creighton University)
10:00 a.m.	Dr. Yaping Tu, Creighton University – DRC 7003
10:45 a.m.	Dr. Batra, 7005 DRC1
11:45 a.m.	Prepare for seminar presentation
12:00 p.m.	Seminar presentations – DRC 1004 (room is only reserved until 1:00pm)
1:15 p.m.	Meeting with CAU students – DRC1 7003
2:30 p.m.	Meeting with Dr. Davis – DRC1 7003
3:15 p.m.	Meeting with Dr. Datta – DRC1 7003
4:00 p.m.	Meeting with Dr. Cheng – DRC1 7003
4:45 p.m.	Dr. Lin
5:30 p.m.	Return to hotel.
6:00 p.m.	Dinner with Dr. Davis.

Tuesday, July 9, 2013

9:45 a.m.	Depart on Southwest Flight #539.

Lin, Ming-Fong

From: abrcms@abstractsonline.com
Sent: Tuesday, September 24, 2013 9:02 AM
To: Lin, Ming-Fong
Subject: ABRCMS Co-Author/Program Director eNotification (Morris)

Dear Ming-Fong Lin:

Marisha Morris submitted an abstract for presentation at the 2013 Annual Biomedical Research Conference for Minority Students (ABRCMS) and listed you as a co-author or program director.

This email is to inform you that the abstract entitled, "Novel Imidazopyridine Derivatives Inhibit Androgen-independent Pca Cell Proliferation." has been **accepted** and is scheduled to present on Nov 15 2013 3:45PM.

If you have any questions regarding this submission or presentation, please contact the primary author at marishamorris16@yahoo.com.

Respectfully,

Clifford W. Houston, Ph.D.
Chair, Steering Committee
Annual Biomedical Research Conference for Minority Students (ABRCMS)

Undergraduate
Poster #15

NOVEL IMIDAZOPYRIDINE DERIVATIVES INHIBIT ANDROGEN-INDEPENDENT PROSTATE CANCER CELL PROLIFERATION

Marisha Morris[1], Sakthivel Muniyan[2], Jennifer G. Dwyer[2], Xiu Bu[3], Ming-Fong Lin[2] Department of Biology, Clark Atlanta University, Atlanta, GA Department of Biochemistry & Molecular Biology, University of Nebraska Medical Center, Omaha, NE Department of Chemistry, Clark Atlanta University, Atlanta, GA.

In the present study, we determined the antiproliferative efficacy of novel imidazopyridine derivatives in androgen-independent prostate cancer cell lines: LNCaP C-81 and MDA PCa2b AI PCa cells. Our preliminary cell growth analysis showed that at least three of these novel derivatives significantly inhibited the proliferation in both the cell lines examined. Further Western blot analyses confirm the PCa cell growth inhibition with a significant reduction of cell cycle proteins cyclin D1, cyclin B1 and PCNA. Further, in all the treated groups, PCa cell growth inhibition is accompanied by a significant reduction of either pAkt and/or pStat5 inhibition. Collectively, the present data suggest that these imidazopyridine derivatives exhibit potential anticancer activity in PCa by targeting both PIK3/Akt and pStat5 pathway.

Acknowledgement: This research was supported by funding from DOD grant # PCPC121645.

Graduate
Poster #42

ID4 ACTS AS A TUMOR SUPPRESSOR BY REGULATING THE TRANSCRIPTIONAL ACTIVITY OF p53

Derrick Morton, Ashley Evans Knowell, Divya Patel, Pankaj Sharma, Shanora Glymph Brown and Jaideep Chaudhary, Department of Biological Sciences, Center for Cancer Research and Therapeutic Development, Clark Atlanta University, Atlanta, GA.

The physiological mechanisms that can restore biological activity of mutant p53 is an area of high interest given that mutant p53 expression is observed in one third of prostate cancer and more than 50% of all cancers. Here we demonstrate that Id4 (inhibitor of differentiation-4) a dominant negative regulator of bHLH transcription factors can restore the mutant p53 transcriptional activity in prostate cancer cells. Id4 is highly expressed in the normal prostate and decreased in prostate cancer due to promoter hypermethylation. Prostate cancer cell lines: DU145 harbors mutant p53 also lack Id4 expression, and LNCaP cells with wild type p53 express Id4, whereas PC3 cells are null for p53 and express low levels of Id4. The p53 mutants (P223L and V274F) in DU145 cells are within the DNA binding domain and abrogate p53 transcriptional activity due structural de-stabilization and/or DNA interactions. Ectopic expression of Id4 in DU145 cells resulted in increased apoptosis and expression of BAX, PUMA and p21, the transcriptional targets of p53. DNA binding, p53 luciferase reporter studies and ChIP analysis demonstrated that mutant p53 gains Id4 dependent DNA binding and transcriptional activity in part due to CBP/p300 dependent acetylation of p53 at lysine 373. Loss of Id4 in LNCaP cells also abrogated wild type p53 DNA binding and transcriptional activity with concomitant loss of CBP/p300 requirement and decreased acetylation of p53. To further elucidate Id4 dependent restoration of biological activity of p53 we stably transfected p53-null cell line PC3, which has endogenous Id4 with mutant p53 mimicking DU145 cells. mRNA, protein levels and apoptosis assays were used to determine the effects on cell death and to determine if mutant p53 had the ability to transactivate upstream/downstream targets (MDM2, PUMA, and p21). Our results indicate that