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TITLE: "Georgetown University and Hampton University Prostate Cancer Undergraduate Fellowship Program

PRINCIPAL INVESTIGATOR: Anatoly Dritschilo, MD

CONTRACTING ORGANIZATION: Georgetown University
Washington, DC 20057

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14. ABSTRACT
The training program had two goals. The first was to integrate the students from Hampton University (HU) into the Prostate Cancer Center at Georgetown University through research, lectures, seminars, and clinical exposure. The second was to attract talented HU students into the graduate prostate cancer programs at GU and elsewhere. The training program was of two parts. Part I (8-12 weeks) consisted of a mentored summer research experience at GU in a laboratory and didactic lectures and seminars. Attendance at clinical conferences relevant to prostate cancer allowed trainees to learn about prostate cancer patient diagnosis and treatment issues. Trainees participated in weekly graduate record exam study sessions for the GRE general and subject tests. At Hampton University, during the academic year, Part II consisted of an educational and research component to enhance prostate cancer research training of the students through participation in HU BIO408 – Research Problems. Students from HU conducted research on the mechanism of action of novel drugs that sensitize prostate tumors to radiation treatment; on the role of metals in the activation of the androgen receptor; differences in protein signatures of prostate cancer cells from African and European Americans; and Metabolomic profiles from cells derived from AA vs Caucasians that were treated with chemotherapeutic agents in vitro. All student trainees registered to take the GRE exam.
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INTRODUCTION

The Lombardi Comprehensive Cancer Center (LCCC) at Georgetown University (GU) is a National Cancer Institute designated Comprehensive Cancer Center. The Prostate Center at LCCC has a multidisciplinary clinic where physicians and scientists interact to advance state-of-the-art treatment of patients with the goal of curing prostate cancer and maximizing quality of life. Urological surgeons, radiation oncologists, population scientists, medical oncologists, patient advocates, and basic scientists work together to develop clinical protocols that translate laboratory and technical discoveries to the clinic. Scientists at the Prostate Center are working to discover the molecular causes of prostate cancer and the population-wide impact of the disease. Their research is grouped into several thematic areas including prevention, detection and diagnosis, advancing treatment, and survivorship. Hampton University (HU), founded in 1869, is a dynamic, progressive institution of higher education that is a privately endowed, non-profit, non-sectarian, co-educational, Historically Black Colleges and Universities (HBCUs). The Department of Biological Sciences at HU has over 400 students and offers B.Sc. and M.Sc. degrees. The Department is ranked as 5th among HBCU’s in the quality the B.Sc. program and boasts a retention rate of close to 100%. The DOD HU/GU Prostate Cancer training program had two goals. The first goal was to integrate upper level undergraduate students from Hampton University into the Georgetown Lombardi Comprehensive Cancer Center Prostate Center through research, lectures, seminars, and clinical exposure through a summer research experience. The second goal was to attract talented HU students into the graduate prostate cancer program, particularly at Georgetown University. To achieve these goals, the training program was divided into two parts. Part I (8-12 weeks) consisted of a mentored summer research experience at GU in the laboratory of a training faculty member and attendance at lectures, seminars, and journal clubs that provided a comprehensive scientific foundation in prevention, etiology, and initiation, and treatment options in prostate cancer. Attendance at clinical grand rounds and clinical conferences concerning prostate cancer allowed the trainees to gain an understanding of factors in prostate cancer diagnosis and treatment. Also, during the summer session, trainees attend a weekly graduate school preparation session and were scheduled to take the GRE exam. The students all successfully completed the Research Problems course at Hampton University and registered to take the GRE exam this semester if this goal has not already been accomplished.

KEY WORDS: prostate cancer, undergraduate training, underrepresented minorities

OVERALL PROJECT SUMMARY

Throughout the years of funding, we successfully recruited four very talented upper level undergraduate Biology and Biochemistry Majors from Hampton University to work throughout the summer participating in prostate cancer research at Georgetown University. In addition to working on mentored research projects, the students participated in seminars, lectures and clinically oriented meetings. They participated in practice sessions to prepare for the GRE exam. The students all successfully completed the Research Problems course at Hampton University and registered to take the GRE exam this semester if this goal has not already been accomplished.

KEY RESEARCH ACCOMPLISHMENTS September 2015 to September 2017
Aim 1 – Foster collaborations between Georgetown University and Hampton University that will lead to the recruitment of Hampton University undergraduate students into the prostate cancer training program at Georgetown University Medical Center.

Task 1. Recruitment of Hampton University undergraduate students:

A. Recruitment:
1. Dr. Ricks-Santi recruited a third year student for the summer of 2017 Nadia Holness (Dr. Christopher Albanese) and four third year undergraduate students from the Department of Biological Sciences at Hampton University for the summer of 2016. The students included Ms. Marissa (Dr. Vicente Notario), Ms. Jelissa Washington (Dr. Jan Blancato), Ms. Tanisha Maitre (Dr. MaryBeth Martin), and Mr. Tyler Dickerson (Dr. Christopher Albanese). Dr. Ricks Santi recruited Ms. Shannon Anderson, MS. Fiona Lewis, Mr. Myron Gilbert, and Mr. Ashton Green for the summer of 2015, and Ms. Tamara Miller, Tyanna Gray, Ms. Jasmine Hatcher-Moorman, and Mr. Isaih Brown.

Georgetown University faculty and graduate school staff visited Hampton U early each Spring for a seminar aimed to describe and answer questions about the Summer Prostate cancer research program.

B. Selection:
1. The students were selected based on their research interests, overall and science GPA, and letters of recommendation.

Task 2a. Placement of Hampton University undergraduate students in Georgetown University mentor’s laboratory:

1. Based on their research interest, the Hampton students indentified potential mentors in the GUMC prostate program.

2. Potential Georgetown University mentors were then contacted. Hampton University students were provided the contact information of undergraduate, graduate, and postdoctoral trainees in the mentor’s laboratory and encouraged to contact the mentor’s trainees.

Task 2b. Provide Hampton University students with rigorous coursework in cancer biology methods during the academic year:

Course coordinator:
Luisel Ricks-Santi, PhD
Associate Professor
Department of Biological Sciences
Director, Cancer Research Center
Hampton University
Hampton, VA 23668

Academic Catalog Course Description- BIO 423 Cancer Biology Laboratory. This Laboratory course is based on principles of cancer biology and fundamental techniques by which to investigate biochemical and molecular end-point responses of normal and cancer cells. The course is designed to provide hands-on laboratory research experience that will strengthen the ability of students to develop testable scientific hypotheses and skills in data analysis. Prerequisite: BIO 105 and consent of instructor.

Applied Course Description – The goal of this course to identify the differences between normal cells and cancer cells using techniques commonly used in molecular biology. This
course will effectively train students to identify the appropriate technique for a given research question with a focus on some of the hallmarks of cancer. Those hallmarks are: (1) cancer cells stimulate their own growth; (2) they resist inhibitory signals that might otherwise stop their growth; (3) they resist their own programmed cell death (apoptosis); (4) they stimulate the growth of blood vessels to supply nutrients to tumors (angiogenesis); (5) they can multiply forever; (6) they invade local tissue and spread to distant sites (metastasis); (7) abnormal metabolic pathways; (8) evading the immune system; (9) chromosome abnormalities and unstable DNA; and (10) inflammation.1,2

This lab experience will also reinforce understanding of the central dogma (Figure 1) – the flow of information from DNA to RNA to protein to phenotype, through comparing the phenotype of lung cancer cells from a smoker and a patient who never smoked. The lab will address basic principles in cell and molecular biology, including chemistry, cell structure and function, transcription and translation, enzymes, and principles of cell cycle regulation. The lab will also provide an opportunity to discuss relevant issues in society today (e.g., prostate cancer prevention and treatment, health care disparities) and why prostate cancer is so difficult to treat (e.g. not just one disease, as illustrated by the different genetic changes in the two cancer cell lines that are investigated).

**Lab theme: Prostate Cancer**

Prostate cancer (PCa) is the most common non-skin cancer and the second leading cause of cancer death among men in the United States (US) [1]. Although there are three well-established risk factors for prostate cancer, age, ethnicity, and family history [2], the molecular mechanisms underlying its development and progression remain poorly understood. Additionally, the factors influencing disparities of PCa in African American (AA) men also remain poorly understood as AA men have the highest mortality rate for PCa of any racial or ethnic group in US. The wide variation observed in the incidence of PCa and mortality rates in AA men are suggested to be multifactorial, with varying effects of genetic predisposition, diet, and other environmental factors. One approach that can help improve characterization of PCa tumors is to identify the molecular mechanisms that drive the aggressive phenotype and to identify the genes associated with aggressive, high Gleason grade PCa. So far, molecular analysis of PCa tumors have resulted in the identification of genomic markers associated with adverse outcomes and several groups have attempted to develop genomic profiles that can predict PCa aggressiveness [3-10].

Required Textbook(s) and materials- This course will use the publications and informational pamphlets:


- 3-ring binder to place lab guides in.
- Composition notebook to be used as a lab notebook. If you prefer, you can use Microsoft OneNote as an eLab notebook to write up your labs and keep your notes.

Recommended Reading (as cited in Lab Theme):


Specific Intended Student Learning Outcome(s) - By the end of this course, students will be able to describe, compare, select, and perform, appropriate molecular methods for cancer research using Scientific Reasoning and Critical Thinking core competencies.

General Instructional Objectives (Goals)

• Define basic terminology and describes concepts in molecular genetics that provide the foundation for implementing and adapting new techniques and assays in cancer research; this will be assessed through lab reports and final exam.

• Determine the difference between normal and cancer cells; this will be assessed through lab reports and final exam.

• Describe the principles of nucleic acid isolation and successfully perform isolations; this will be assessed through successful performance of the lab and the final exam.

• Describe the principles of polymerase chain reaction (PCR), reverse transcriptase PCR and other amplification techniques; this will be assessed through successful performance of the lab and the final exam.

• Describe the principles of nucleic acid electrophoresis and hybridization including Southern and Northern blots; this will be assessed through the final exam.
• Define SNPs and explain the principle of RFLP in genotyping; this will be assessed through successful performance of the lab and the final exam.
• Describe the principles of cytogenetics and fluorescent in situ hybridization (FISH); this will be assessed through successful performance of the lab and the final exam.
• Describe the principles of Immunohistochemistry, ELISA, and Western blot; this will be assessed through successful performance of the lab and the final exam.
• Interpret results in context of other laboratory data; this will be assessed through lab reports.
• Record and communicate cancer research results in a professional manner; this will be assessed through lab reports.

Week of Topic Assignment Due
15-January Introduction to course, syllabus, and lab safety
22-January Lab 1. Measurements and Micropipetting
29-January Lab 2. Microscopy and cell culture lab Lab notebook due
5-February Lab 2. Microscopy and cell culture lab
12-February Lab 3. Protein extraction lab Lab notebook due
19-February Lab 3. Coomassie blue staining
26-February Lab 3. Western Blot lab Lab notebook due
5-March Lab 4. Solutions and Dilutions Lab notebook due
19-March Lab 4. DNA isolation lab
26-March Lab 4. PCR lab
2-April Lab 4. Agarose gel electrophoresis lab
9-April Lab 5. Gene Expression Lab notebook due
16-April Presentations
TBD Final Presentations

Print Self-Evaluation Complete assignment in notebook Virtual Lab
sign up http://amrita.vlab.co.in/index.php?pg=bindex&bsub=login_page
√ √ Light Microscope
http://amrita.vlab.co.in/index.php?sub=3&brch=187&sim=323&cnt=1
√ √ Preparation of Buffer stocks (TBE, TE and TAE)
http://amrita.vlab.co.in/index.php?sub=3&brch=77&sim=1322&cnt=1
√ √ Western Blotting
http://amrita.vlab.co.in/index.php?sub=3&brch=187&sim=1331&cnt=1
√ √ Polyacrylamide Gel Electrophoresis
http://amrita.vlab.co.in/index.php?sub=3&brch=186&sim=319&cnt=1

√ √ Maintenance of Mamallian Cell Lines
http://amrita.vlab.co.in/index.php?sub=3&brch=188&sim=331&cnt=1
√ √ Cell Proliferation
http://amrita.vlab.co.in/index.php?sub=3&brch=188&sim=1101&cnt=1
√ √ Hemocytometer (Counting of Cells)
http://amrita.vlab.co.in/index.php?sub=3&brch=188&sim=336&cnt=1

√ √ Extraction of DNA from Fish Fins
http://amrita.vlab.co.in/index.php?sub=3&brch=77&sim=218&cnt=1
√ √ Agarose Gel Electrophoresis (AGE)
http://amrita.vlab.co.in/index.php?sub=3&brch=77&sim=1375&cnt=1
√ √ Polymerase Chain Reaction (PCR)
http://amrita.vlab.co.in/index.php?sub=3&brch=186&sim=321&cnt=1
Task 3. Georgetown University provided a summer research and training program for Hampton University undergraduate students:

1. The Hampton University undergraduates conducted prostate cancer research for (8 - 12 weeks) in the laboratory of a Georgetown University mentor (Drs. Notario, Blancato, Martin Albanese, Rosen, and Dritschilo. In Dr. Notario's laboratory, research project focused on the study of the molecular mechanisms of oncogenesis and involved the investigation of the effects of environmental carcinogens such as ionizing radiation on prostate cancer cells with regard to the expression and activity of cancer genes and their protein products. Dr. Notario's research group isolated and investigates the role of a novel oncogene, termed PCPH, which is conserved in eukaryotic cells from yeast to humans, and cooperates with other oncogenes such as H-ras in the neoplastic transformation of mammalian cells. Ms. Willis studied the effect of NTPDase inhibition on the malignant phenotype of human prostate cancer cells expressing the mt-PCPH oncogene.

Dr. Albanese is the Director of the Urogenital Program in the Center for Cellular Reprogramming at LCCC Dr. Albanese's research focuses on the role of oncogenes and tumor suppressor proteins in the induction and maintenance of genito-urinary and other cancers. Tyler Dickerson and Nadia Holness studied aspects of the in vitro differentiation of conditionally reprogrammed primary prostate cells in the study of prostate cancer.

Dr. Martin’s lab has identified the environmental hormones referred to as metallo-hormones. In Dr. Martin’s laboratory, Myron Gilbert, Jasmine Moorman, and Tanisha Maitre studied the role of metals in the development of prostate cancer to define the mechanisms by which metals activate the androgen receptor.

Dr. Blancato’s laboratory is studying health disparities and differential responses to prostate cancer treatments. Shannon Anderson worked on a project investigating PTEN and TMPSS translocations in normal and prostate cancer cells during summer 2014. While in Dr. Blancato’s laboratory, Jelissa Washington treated prostate cells derived from an African American patient and a Caucasian patient with three chemotherapeutic drugs with different properties used in prostate cancer and compared the metabolomic profiles to determine differences in responses. The analysis of these data is being evaluated for a larger follow-up study.

2. Hampton University trainees participated in weekly laboratory research data meetings where they were able to discuss their research findings.

3. Hampton University trainees attended a seminar and discussion at the local prostate research non-profit, ZERO, The End of Prostate Cancer, in Alexandria, Virginia.

4. The trainees met with Dr. Sean Collins, a Radiation Oncologist at Georgetown who discussed prostate therapy and provided a tour of the facility including the CyberKnife suite.

5. The trainees attended the weekly Brown Bag Lunch Lecture. (Schedule with topics in Appendix)
6. The trainees also attended Oncology Grand Rounds, the weekly Oncology Journal Club and Seminar, and the weekly Oncology Faculty Seminar. (Schedule with topics in Appendix)

7. Trainees attended a weekly graduate school preparation session and are scheduled to take the GRE general and subject tests in the Fall of each year.

**Task 4. The Hampton University undergraduate course HU BIO408 Research Problems: was offered to all student trainees**

1. Hampton University undergraduate students who participated in the summers enrolled in HU BIO423 Cancer Biology Laboratory. Dr. Ricks-Santi’s HU423 course presents various aspects of clinical and basic cancer research in a lecture format (50 minutes) which is detailed in this report under Task 2B.

**Task 5. Hampton University faculty advisors provided prostate cancer research opportunities for the undergraduate trainees:**

1. The Hampton University faculty advisors are providing *in vitro* and genomic research opportunities in prostate cancer during the academic year for the undergraduate trainees via enrollment in HU BIO408 Research Problems.

**Task 6. Georgetown University tracked the career progress of the Hampton University undergraduate students:**

The career progress of the Hampton University students was tracked by the Office of Cancer Research Education of the Lombardi Comprehensive Cancer Center of Georgetown University. Currently, the students from the summer of 2016 are seniors at Hampton University and are expected to graduate in May 2017. Several students from the summer of 2014 are also graduating in May 2016. A number of these students are in the process of applying to graduate programs. Shannon Anderson, a student from the summer of 2014 graduated in May of 2015 from Hampton University and is currently enrolled in the Georgetown University/George Mason University joint program in Physiology.

**PUBLICATIONS, ABSTRACTS, AND PRESENTATIONS**

**Presentations:**
Shannon Anderson presented a poster describing her research at the National Association of African American Honors Programs (NAAAHP) Conference, Jackson, MS on Oct 9-11, 2014. Analysis of TMPRSS2:ERG fusion in conditionally reprogrammed prostate cancer cells; Shannon Anderson*, Jun Yeb Nam, Nancy Palechor-Ceron, Uttam Rasaily, Anil KC, Charlene Valdez, Jan K Blanchato, *Department of Biological Sciences, Hampton University, Hampton, VA, 23668 and the Department of Oncology, Georgetown University Medical Center, Washington DC, 20057

The students presented their research at the Student Research Day at Hampton University which is held each Spring. Each student prepared and presented a poster based on their summer research project.

All participating Hampton U faculty and students were invited to present their research at the Student Research Day at Georgetown University at the end of the Spring term at Georgetown.
University, but the travel distance between Hampton and Georgetown precluded their ability to participate during the regular semester.

**INVENTIONS, PATENTS AND LICENSES** - nothing to report

**REPORTABLE OUTCOMES** – nothing to report

**Task 7:** The career progress of the Hampton University students was tracked by the Office of Cancer Research Education of the Lombardi Comprehensive Cancer Center of Georgetown University

**Status of Hampton University DOD Prostate Training Program Summer Students**

LCCC and HU Fellowship Program Students 2004-2017

<table>
<thead>
<tr>
<th>Student of 9/09</th>
<th>HU-GU Fellow or Volunteer</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shannon Anderson</td>
<td>HU-GU Fellow Summer 2014 (Blancato lab)</td>
<td>Georgetown U M.S Physiology 2016 Medical student at Howard U Medical School</td>
</tr>
<tr>
<td>Myron Gilbert</td>
<td>HU-GU Fellow Summer 2014 (Martin)</td>
<td>B.A. Molecular Biology Hampton U, 2015 Medical Technologist, NIH</td>
</tr>
<tr>
<td>Ashton Green</td>
<td>HU-GU Fellow Summer 2014 (Albanese lab)</td>
<td>B.A. Biology Hampton U, 2016</td>
</tr>
<tr>
<td>Fionna Davis</td>
<td>HU-GU Fellow Summer 2014 (Dritschilo lab)</td>
<td>B.A. Molecular Biology Hampton U, 2016</td>
</tr>
<tr>
<td>Damara Miller</td>
<td>HU-GU Fellow Summer 2015 (Rosen lab)</td>
<td>B.S. Biochemistry Hampton U, 2016 Post-Bac Research Fellow, NIH, NINDS</td>
</tr>
<tr>
<td>Myron Gilbert</td>
<td>HU-GU Fellow Summer 2015 (Martin lab)</td>
<td>B.S. Biology Hampton U 2016 PhD Student in Molecular Biology at UVA</td>
</tr>
<tr>
<td>Tyanna J Gray</td>
<td>HU-GU Fellow Summer 2015 (Notario lab)</td>
<td>B.S Biology Hampton U, 2016 Medical Student at Ross U</td>
</tr>
<tr>
<td>Isiah Brown</td>
<td>HU-GU Fellow Summer 2015 (Dritschilo lab)</td>
<td>B.A. Biology Hampton U, 2016 Re-Applying to Post Bac and Medical schools</td>
</tr>
<tr>
<td>Jasmine Hatcher-Moorman</td>
<td>HU-GU Fellow Summer 2015 (Martin lab)</td>
<td>B.S. Biology Hampton U, 2016 Lab Technician at Northwestern U and applying to Medical Schools</td>
</tr>
<tr>
<td>Name</td>
<td>Fellowship Year</td>
<td>Lab/Department</td>
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</tbody>
</table>
| Tanisha Maitre     | HU-GU Fellow Summer 2016 | (Martin) | Biology Major Hampton University, class of 2018  
Volunteer at Hampton U Cancer Research Center |
| Jelissa Washington | HU-GU Fellow Summer 2016 | (Blancato lab) | Biology Major Hampton University, class of 2018, Medical volunteer in Dominican Republic summer 2017 |
| Marissa Willis     | HU-GU Fellow Summer 2016 | (Notario lab) | Biology Major Hampton University, class of 2018, Math and science tutor |
| Tyler Dickerson    | HU-GU Fellow Summer 2016 | (Albanese lab) | B.S. Biology Hampton University, 2017  
High school Biology Teacher, Prince Williams County, VA.  
Applying to NIH Prep Program |
| Nadia Holness      | HU-GU Fellow Summer 2017 | (Albanese lab) | Biology Major, Hampton University, class of 2019 |
APPENDIX

Topics of Brown Bag Lunch Seminars for Summers 2015-2017. Student trainees attended this educational offering as part of the training program.

Topics and Speakers of Oncology Grand Rounds
CANCER BIOLOGY & CANCER SYSTEMS BIOLOGY SEMINAR SERIES SCHEDULE: 
Location: GA 2/4, Preclinical Science Building  
Time: Tuesdays – Noon - 1:00 pm  
June 1

CANCER BIOLOGY & CANCER SYSTEMS BIOLOGY SEMINAR SERIES SCHEDULE: SUMMER 2015
Location: GA 2/4, Preclinical Science Building  
Time: Tuesdays – Noon - 1:00 pm

June 16 Overview of Cancer 
Louis Weiner, M.D.  
Director of Lombardi Cancer Center 

June 23 Overview of Cancer Systems Biology 
Robert Clarke, Ph.D.  
Dean for Research 

June 30 Viruses and Cancer 
Hang Yuan, Ph.D.  
Associate Professor of Oncology 

July 7 Metabolomics as a new tool in cancer systems biology 
Amrita Cheema, Ph.D.  
Associate Professor of Oncology 

July 14 Cancer Prevention 
Leena Hilakivi-Clarke, Ph.D.  
Professor of Oncology 

July 21 Cancer Drug discovery 
Milton Brown, M.D./Ph.D.  
Director of Drug Discovery 

July 28 Vaccine Development 
Richard Schlegel, M.D./Ph.D.  
Chairman of Pathology 

August 4 Career paths in science and medicine that lead to novel (potential)  
therapeutics 
Jeffrey Toretsky, M.D.  
Professor of Oncology
CANCER BIOLOGY SEMINAR SERIES

SCHEDULE: SUMMER 2016

Location: CA 2/4, Preclinical Science Building
Time: Tuesdays – Noon - 1:30 pm

June 14    Introduction of Cancer Biology
           MaryBeth Martin, Ph.D.
           Professor of Oncology

June 21    Overview of Cancer
           Louis Weiner, M.D.
           Director of Lombardi Cancer Center

June 28    Viruses and Cancer
           Hang Yuan, Ph.D.
           Associate Professor of Oncology

July 5     Metabolomics: a powerful approach for basic and translational cancer research
           Amrita Cheema, Ph.D.
           Associate Professor of Oncology

July 12    Cancer Prevention: Obstacles, Challenges, and the Road Ahead
           Leena Hilakivi-Clarke, Ph.D.
           Professor of Oncology

July 19    Cancer Drug Discovery
           Milton Brown, M.D./Ph.D.
           Director of Drug Discovery

July 26    Cancer & Carcinogenesis
           Fung-Lung Chung, Ph.D.
           Professor of Oncology

August 2   Career paths in science and medicine that lead to novel (potential) therapeutics
           Jeffrey Toretsky, M.D.
           Professor of Oncology

Coordinator: Mira Jung, Ph.D. (jungm@georgetown.edu)
CANCER BIOLOGY SEMINAR SERIES
SCHEDULE: SUMMER 2017
Location: GA 2/4, Preclinical Science Building
Time: Tuesdays – Noon - 1:00 pm

June 13 Introduction of Cancer Biology
Mary Beth Martin, Ph.D.
Professor of Oncology

June 20 Cancer Prevention: Obstacles, Challenges, and the Road Ahead
Leena Hilakivi-Clarke, Ph.D.
Professor of Oncology

June 27 Cancer Immunotherapy
Geeta Upadhyay, Ph.D.
Assistant Professor of Oncology

July 11 Hormones in Cancer
Anna Riegel, Ph.D.
Professor of Oncology

July 18 Metabolomics as a tool for basic and translational cancer research
Amrita Cheema, Ph.D.
Professor of Oncology

July 25 Cancer Therapy
Keith Unger, M.D.
Director of Radiation Oncology Resident Program

August 1 Career paths in science and medicine that lead to novel (potential) therapeutics
Jeffrey Toretsky, M.D.
Professor of Oncology
# Fall 2015

<table>
<thead>
<tr>
<th>DATE</th>
<th>SPEAKERS</th>
<th>TITLE</th>
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</table>
| September 4, 2015   | Dr. Thomas Gajewski  
                      Professor, The Ben May Department for Cancer Research,  
                      Departments of Pathology & Medicine  
                      University of Chicago | Molecular mechanisms of the T-cell inflamed tumor microenvironment:  
                      implications for cancer immunotherapy                               |
| September 11, 2015  | Dr. Ronald B. Gartenhaus  
                      Professor of Medicine  
                      University of Maryland | MNKs Modulate Oncogenic Translation in Diffuse Large B- 
                      Cell Lymphoma                                                         |
| September 18, 2015  | Dr. Vilhelm Bohr  
                      Chief, Laboratory of Molecular Genetics  
                      National Institute on Aging, National Institute of Health | DNA repair defects and mitochondrial dysfunction in cancer and aging   |
| September 25, 2015  | Dr. Benjamin Neel  
                      Director, Laura And Isaac Perlmutter Cancer Center | Emergent vulnerabilities in breast cancer                             |
| October 2, 2015     | Dr. Maureen Murphy  
                      Program Leader and Professor, Molecular and Cellular Oncogenesis  
                      The Wistar Institute | An African specific polymorphism in p53 tumor suppressor impairs its tumor suppressor function |
| October 23, 2015    | Dr. Roger Abounader  
                      Professor, Microbiology, Immunology & Cancer Biology and Neurology  
                      University of Virginia School of Medicine | Identification and exploitation of master regulatory microRNAs in glioblastoma |
| October 30, 2015    | Dr. Amato Giaccia  
                      Jack, Lulu and Sam Willson Professor of Cancer Biology  
                      Stanford University School of Medicine | Eradicating metastases with targeted therapy and immune therapy        |
| November 13, 2015   | Dr. Lisa Carey  
                      Physician-in-Chief  
                      North Carolina Cancer Hospital | Trails and tribulations of neoadjuvant systemic therapy for breast cancer |
| December 4, 2015    | Dr. Giulio Draetta MD, PhD  
                      Director, Institute for Applied Cancer Science  
                      The University of Texas MD Anderson Cancer Center | Driving towards a better understanding of cancer complexity and therapeutic options |
| December 11, 2015   | Dr. Timothy Rebbeck  
                      Professor of Epidemiology  
                      Dana Farber Cancer Institute and the TH Chan School of Public Health | BRCA 1/2: A paradigm for precision medicine                               |
| December 18, 2015   | Dr. David Salomon  
                      Chief, Tumor Growth Factor Section, Mouse Cancer Genetics Program  
                      National Cancer Institute | Cripto-1: An embryonic stem cell gene that is reexpressed in multiple types of human cancers and represents a novel diagnostic and therapeutic target |
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<tr>
<th>Date</th>
<th>Speaker</th>
<th>Topic</th>
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<tbody>
<tr>
<td>January 15, 2016</td>
<td>Dr. Rachel Stolzenberg-Solomon (NIH)</td>
<td>The etiology of pancreatic cancer: nutrition and beyond</td>
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<td>Senior Investigator, Division of Cancer Epidemiology &amp; Genetics</td>
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<td>National Cancer Institute</td>
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<td>January 29, 2016</td>
<td>Dr. Daniel Hayes</td>
<td>Circulating tumor cells and cell free DNA: liquid biopsies</td>
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<td>Stuart B. Padnos Professor of Breast Cancer Research University of Michigan Comprehensive Cancer Center</td>
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<td>February 5, 2016</td>
<td>Dr. Michael Hogarty</td>
<td>A novel mitochondrial mechanism of cancer therapy resistance</td>
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<td>Associate Professor, Department of Pediatrics</td>
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<td>Perelman School of Medicine at the University of Pennsylvania</td>
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<td>February 12, 2016</td>
<td>Dr. Jordan Winter</td>
<td>Pancreatic cancer, are we on the right path?</td>
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<td>Associate Professor, Department of Surgery</td>
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<td>Thomas Jefferson University Hospital</td>
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<td>February 19, 2016</td>
<td>Dr. David Perlin</td>
<td>Multidrug resistant fungal infections in cancer and other high risk patients</td>
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<td></td>
<td>Executive Director &amp; Professor, Public Health Research Institute &amp; Rutgers Regional Biocontainment Laboratory</td>
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<td>New Jersey Medical School-Rutgers</td>
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<td>February 26, 2016</td>
<td>Dr. William Regine</td>
<td>Proton radiotherapy clinical trials: challenges and hope for the future</td>
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<td>Isadore and Fannie Schneider Foxman Chair and</td>
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<td></td>
<td>Professor of Radiation Oncology, Executive Director</td>
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<td>Maryland Proton Treatment Center</td>
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<td></td>
<td>University of Maryland</td>
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<td>March 4, 2016</td>
<td>Dr. David Solit</td>
<td>Defining the actionable genome</td>
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<td></td>
<td>Director, Marie-Josée &amp; Henry R. Kravis Center for Molecular Oncology Memorial Sloan Kettering Cancer Center</td>
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<td>March 11, 2016</td>
<td>Dr. Timothy Greten</td>
<td>Immunology and immunotherapy of hepatocellular carcinoma</td>
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<td>Senior Investigator, Thoracic and Gastrointestinal Oncology Branch National Institute of Health</td>
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<td>March 18, 2016</td>
<td>Dr. Matthias Gromeier</td>
<td>Oncolytic immunotherapy with recombinant poliovirus</td>
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<tr>
<td></td>
<td>Associate Professor, Department of Neurosurgery, Department of Genetics &amp; Microbiology Duke University Medical Center</td>
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<td>April 1, 2016</td>
<td>Dr. Robert Gatenby</td>
<td>Evolutionary dynamics in cancer biology and treatment</td>
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<td>Chair, Department of Integrative Mathematical Oncology and Department of Diagnostic Imaging Moffitt Cancer Center</td>
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<td>April 8, 2016</td>
<td>Dr. Lisa Henske</td>
<td>Tuberous sclerosis complex:</td>
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<td>April 22, 2016</td>
<td>Dr. Thomas Delaney</td>
<td>Lessons for sporadic malignancies with mTOR hyperactivism</td>
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<td>Andrea Soriano</td>
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<td>April 29, 2016</td>
<td>Dr. Eileen White</td>
<td>The integration of proton radiation therapy in clinical practice</td>
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<td>May 6, 2016</td>
<td>Dr. George Calin</td>
<td>Role of autophagy in metabolism and cancer</td>
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<td>May 13, 2016</td>
<td>Dr. Meenhard Herlyn</td>
<td>About Chomsky, patterns, non-coding RNAs and cancer patients</td>
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<td>Understanding the biology of melanoma to develop new strategies for therapy</td>
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