ROSWELL PARK CANCER INSTITUTE

2018 Internship Directory: High School Summer Research Experience Program in Cancer Science (10 pages)

Mentor	Research area(s)	Internship category	Internship description
Boyko Atanassov *Dept. of* ***Pharmacology and Therapeutics*** **www.roswellpark.org /Boyko-Atanassov**	Cancer genetics; Cancer molecular and cellular biology	Scientific Research	**Defining the functions of Ubiquitin Specific Proteases in the regulation of Receptor Tyrosine Kinase Signaling Pathways in Cancer** Abnormal expression of receptor tyrosine kinases (RTKs) has been recognized as a key factor driving tumor progression of several cancers. Work in our laboratory is focused on elucidating the molecular mechanisms by which ubiquitin-specific proteases (USPs) are involved in RTK stabilization in cancer cells and hence potentiate tumor growth.
Joseph Barbi *Dept. of* ***Immunology*** **www.roswellpark.org /Joseph-Barbi**	Tumor immunology & immunotherapy	Scientific Research	**Exploring the mechanisms and therapeutic potential of novel factors capable of modulating immune responses.** The immune system's destructive potential is regulated by numerous regulatory mechanisms. By understanding these we can devise novel therapies to unleash optimal anti-tumor responses in cancer patients. These studies will utilize in vitro assays of immune cell function, in vivo (mouse) tumor models, and fluorescence-based techniques for visualizing immune cells.
David Bellnier *Dept. of* ***Cell Stress Biology*** **www.roswellpark.org /David-Bellnier**	Photodynamic Therapy	Scientific Research	**Photodynamic Therapy of Locally Advanced Tumors**

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Dhyan Chandra *Dept. of* ***Pharmacology and Therapeutics*** **www.roswellpark.org /Dhyan-Chandra**	Cancer molecular and cellular biology; Cancer pharmacology and therapeutics	Scientific Research	**Role of Mitochondria in Cancer Prevention and Therapy** The main focus of our research is to understand the molecular basis of therapy resistance in multiple cancer types including in prostate, breast, and colon cancers. To accomplish our goals, we are investigating two different, but complementary projects. The first project delineates how mitochondria-mediated cell death signaling is defective in cancer cells and cancer stem cells. The second project defines the role of heat-shock proteins in cancer cell survival and death. We are also characterizing the role of mitochondria in health disparities among prostate and breast cancer patients. Our research suggests that protein complexes are important regulators of cancer cell death and survival. We use multiple biochemical, genetic, cellular, and molecular approaches to identify and characterize protein complexes in subcellular compartments including in the mitochondrion. Detailed understanding of protein complexes will lay a foundation for targeting cell death and survival machinery for cancer therapy. Our model system includes both laboratory cell culture and mouse model of cancer to examine cellular signaling in response to anticancer agents. Our ultimate goal is to target mitochondria and cell death for prevention and therapy of multiple types of cancer.
Gokul Das *Dept. of* ***Pharmacology and Therapeutics*** **www.roswellpark.org /Gokul-Das**	Cancer genetics; Cancer molecular and cellular biology; Cancer pharmacology and therapeutics	Scientific Research	**Mechanisms by which Hormone Receptors and Tumor Suppressors Impact Cancer** The research in Das lab focuses on understanding the cellular and molecular mechanisms of cancer, especially breast ,lung, and ovarian cancers. For example, we are analyzing the role of hormone receptors (such as the estrogen receptor) and tumor suppressors (such as the p53 protein) in cancer onset and progression using cell culture and mouse genetic models. Summer projects will involve modern cellular and molecular biological techniques.

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Subhamoy Dasgupta *Dept. of* ***Cell Stress Biology*** **www.roswellpark.org /Subhamoy-Dasgupta**	Cancer genetics; Cancer molecular and cellular biology; Cancer pharmacology and therapeutics; Tumor immunology & immunotherapy	Scientific Research	**Metabolic Control of Tumor Progression and Metastasis** Metabolic reprogramming is an essential hallmark of tumor progression and metastasis. Cancer cells use altered metabolic pathways to sustain rapid growth and to overcome enormous stress encountered in tumor microenvironment. Tumor cells constantly alter their metabolic state in response to oncogenic stimuli, nutrient availability, and interaction with immune cells however the precise regulation that precedes the metabolic alteration is poorly understood. Our lab uses state-of-art facilities such as metabolomics, proteomics, and genomics along with molecular biology techniques to investigate the crosstalk between metabolic signaling and transcriptional networks. Multiple animal model systems including genetically engineered mouse models (GEMMs), patient-derived xenograft (PDX), and syngeneic tumor models are used to investigate metabolic adaptations that tumor progression and metastasis. Projects: (1) Metabolic adaptations driving castration resistant prostate cancer, (2) Oncogenic drivers of bone metastatic prostate cancer, (3) Mechanisms of breast tumor recurrence and metastasis.
Michael Feigin *Dept. of* ***Pharmacology and Therapeutics*** **www.roswellpark.org /Michael-Feigin**	Cancer bioinformatics; Cancer genetics; Cancer molecular and cellular biology; Cancer pharmacology and therapeutics	Scientific Research	**G-protein Coupled Receptors In Cancer Progression** Our lab seeks to understand the molecular causes of cancer in order to develop better therapies and improve patient outcome. We employ a variety of methods, from computational analysis to biochemistry, 3D cell culture and mouse models. We are looking for motivated and enthusiastic students to join a new and growing lab.
Irwin Gelman *Dept. of* ***Cancer Genetics*** **www.roswellpark.org /Irwin-Gelman**	Cancer genetics; Cancer molecular and cellular biology	Scientific Research	**The role of SIK2 in promoting PTEN-negative prostate cancer progression** The intern will test how the AKT2-specific substrate, SIK2, controls aggressiveness using mouse and human prostate cancer cell lines that vary in their PTEN status. This will involve cell culture, transfection, protein staining, fluorescence microscopy and signaling analysis (e.g.- immunoblots).

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Maciej Goniewicz *Dept. of* ***Cancer Prevention and Population Sciences*** **www.roswellpark.org/Maciej-Goniewicz**	Cancer prevention and epidemiology; Public Health	Scientific Research	**Safety of electronic cigarettes** Research projects are focused on new nicotine-containing products and alternative forms of tobacco. We examine safety and efficacy of electronic nicotine delivery devices, commonly called e-cigarettes. These studies include the laboratory evaluation of the products, pharmacological and toxicological assessment, surveys among their users, and their potential application in harm reduction, cancer prevention and smoking cessation.

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Katerina Gurova *Dept. of* ***Cell Stress Biology*** **www.roswellpark.org /Katerina-Gurova**	Cancer molecular and cellular biology; Cancer pharmacology and therapeutics	Scientific Research	**Control of chromatin stability in normal and cancer cells** Control of integrity of genetic information in cells includes activation of DNA damage response, DNA-repair pathways and elimination of cells with damaged DNA[1]. The control of the integrity of epigenetic information is equally important and critical for the development and function of multicellular organisms, but far less studied. Epigenetic information is stored as chromatin, the highly organized complex of DNA, histone proteins and their chemical modifications[2]. Accelerated replication and transcription during early embryogenesis and in cancer, resulting in more frequent nucleosome disassembly and enhanced histone turnover, may cause intermixing of histones bearing epigenetic marks and loss of epigenetic information. In cancer, this should lead to the dissolution of original cell identity. However, transcriptome analysis clearly demonstrates that tumors, including cell lines propagated for years in culture, bear easily identifiable traits of tissue of origin in their transcriptional program (TCGA data), which suggests that factors ensuring chromatin stability during early development are activated in cancer to support increased chromatin dynamics. To test this hypothesis, we will optimize methods, used to study of chromatin structure/organization, to measure and compare chromatin stability in normal and tumor cells and to identify factors responsible for the maintenance of epigenetic integrity. These factors may be a source of novel cancer targets. Our data suggest that histone chaperone FACT (FAcilitates Chromatin Transcription) is one such factor[3-7]. We will validate FACT as a chromatin stabilizing factor and cancer treatment target. To understand how epigenetic integrity is preserved, we will use novel tools (small molecules and FACT genetic inhibitors) to controllably disassemble chromatin in cells to study consequences and cell response to chromatin destabilization. Our studies will build a foundation for understanding various phenomena, including the stability of the cell differentiation state, low rate of reprogramming and high sensitivity of tumor cells to chromatin desilencing agents.

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Lalith Kumaraswamy *Dept. of* ***Radiation Medicine*** **www.roswellpark.org /Lalith-Kumaraswamy**	Radiation Oncology; Other (please specify); Medical Physics	Scientific Research	**Assessing the Quality of Treatement Plans Through Benchmarking** Patient imaging plays a crucial role in Radiation therapy. Using an Electronic Portal Imaging Device to capture images during treatments permits clinicians not only to track tumor motion, but also could be utilized to modify subsequent treatments (adaptive radiation therapy). My research interest involves utilizing these imaging techniques to achieve maximum therapeutic effect. Students will be helping to analyze patient specific data to optimize dose metrics to provide more realistic measure of treatment outcome.
Harish Malhotra *Dept. of* ***Radiation Medicine*** **www.roswellpark.org /Harish-Malhotra**	Radiation Oncology	Scientific Research	**Evaluation of the accuracy of various dose computation algorithms for lung Stereotactic Body Radiotherapy** Treatment planning in radiotherapy is a process which lets a clinician preview the radiation dose distribution in a patient using various mathematical models. The accuracy of these dose computation algorithms depend on various factors and are often inversely related to the needed computation needed. However, computation power of the computers has increased significantly in recent times and hence it is now possible to employ more sophisticated algorithms. In this study, we will use different algorithms for a number of lung patients and evaluate their differences in estimating dose to the tumor and organs at risk.
Richard O'Connor *Dept. of* ***Cancer Prevention and Population Sciences*** **www.roswellpark.org /Richard-O'Connor**	Cancer prevention and epidemiology; Regulatory Science	Scientific Research	**Consumer responses to alternative tobacco products** Students will have the opportunity to assist with data processing from several studies examining consumer response to various tobacco products, including cigarettes, heat-not-burn products, and electronic cigarettes. Activities would include secondary analysis of existing datasets, observing data collection from ongoing studies, and helping to prepare materials for upcoming research studies.

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Santosh Patnaik *Dept. of* ***Surgical Oncology*** **www.roswellpark.org /Santosh-Patnaik**	Cancer bioinformatics; Cancer biostatistics; Cancer genetics; Cancer molecular epidemiology; Cancer pharmacology and therapeutics; Tumor immunology & immunotherapy; Surgical Oncology; Cancer molecular and cellular biology; Radiation Oncology; Cancer exper	Scientific Research	**Experimental and computational examination of genes in cancer and immunology** We are interested in genetics (gene mutations, gene expression, etc.) and epigenetics (microRNAs, RNA editing, etc.) as it pertains to cancer and the human body's immunological response to it. This is a very broad area, and allows for a visiting student to contribute their ideas to develop an exciting yet feasible project to carry out during their stay. The project work will involve one or more of the following: (1) Cell biology: cell culture, genetic engineering of cells, etc. (2) Molecular biology: various DNA, RNA, and protein assays, including their development. (3) Animal biology: growing foreign tissue/cells in the mouse, analysis of DNA/RNA/proteins of mouse, etc. (4) Patient biology: various assays of diseased tissues, including association with clinical parameters; (5) Computation: large-scale data analysis, data visualization, bioinformatics, software programming, etc. As a mentor, my goal will be to help the visiting student attain the following: (1) Experience these aspects of scientific research: collate facts from published knowledge and knowledgeable individuals; use facts and imagination to generate hypotheses and exploratory ideas; design, prepare for, and execute experiments; collect, analyze, and present data; set forth a future direction. (2) Learn some common biomedical or computational research techniques. (3) Bring to completion during the student's stay a small but independent project that the student helps with the design, execution, and analysis of.
Matthew Podgorsak *Dept. of* ***Radiation Medicine*** **www.roswellpark.org /Matthew-Podgorsak**	Radiation Oncology; Medical Physics	Scientific Research	**Medical Physics applications** A student intern will study clinical aspects of medical physics. Medical physics is the branch of physics that combines physics with medical applications. Our group is primarily involved in the treatment of cancer patients with radiation, so a student intern would learn basic clinical approaches to the application of radiation in the treatment of cancer.

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Mukund Seshadri *Dept. of* ***Oral Medicine/Head and Neck Surgery*** **www.roswellpark.org /Mukund-Seshadri**	Cancer biophysics; Cancer pharmacology and therapeutics; Radiation Oncology; Cancer experimental diagnostics; Cancer prevention and epidemiology	Scientific Research	**Multi-modal Imaging of Cancer** Research in my laboratory is focused on three main areas: (i) understanding the vascular biology of head and neck cancers and exploiting them for therapeutic benefit, (ii) development of safe and effective bio-adjuvant approaches for the prevention of oral cancers and, (iii) the use of advanced imaging methods such as MRI, CT in preclinical models and in patients to study response of head and neck tumors to chemotherapy and radiation. The work is interdisciplinary in nature and draws on concepts from biophysics, cancer biology, pharmacology and molecular biology. Given my clinical background, I feel strongly about pursuing a research program that addresses clinically-relevant questions in the laboratory setting and potentially translates the knowledge gained into meaningful outcomes for patients.
Gal Shafirstein *Dept. of* ***Cell Stress Biology*** **www.roswellpark.org /Gal-Shafirstein**	Photodynamic Therapy	Scientific Research	**Treatment Planning and Light Dosimetry in Photodynamic Therapy (PDT)** My research team is focused on the development and implementation of treatment planning and light dosimetry in PDT. My group includes, 2 engineers, 2 research scholars and 2 pre-doctoral student. We do preclinical and clinical studies, and investigate combination therapies.
Xinjiang Wang *Dept. of* ***Pharmacology and Therapeutics*** **www.roswellpark.org /Xinjiang-Wang**	Cancer genetics; Cancer pharmacology and therapeutics	Scientific Research	**Development of Novel Targeted Therapies for Leukemia Treatment** The goal of this study is to evaluate the antitumor effect of newly identified small molecule inhibitors for Mdm2-MdmX E3 in leukemia cells. Single or combination treatment will be tested. Cell proliferation and cell death will be analyzed. Cell culture, cell growth assay, Western blotting analysis of target proteins and biochemical events of apoptosis will be performed.

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Eunice Wang *Dept. of* ***Medicine*** **www.roswellpark.org /Eunice-Wang**	Cancer pharmacology and therapeutics; Medical Oncology; Cancer molecular and cellular biology; Tumor immunology & immunotherapy	Scientific Research	**Novel Biological Therapies for Acute Leukemia** Our research focuses on the preclinical assessment and development of novel therapeutic strategies for acute leukemia. We are specifically interested in how interactions between tumor cells and other elements of the host marrow microenvironment contribute to cancer cell survival and therapeutic resistance. Current projects in the lab are focused on optimizing immunotherapy for acute myeloid leukemia and evaluation of antibody drug conjugates targeting CD33 and CD123 expressed on leukemia cells. Students will gain experience in sterile cell culture, proliferation assays, colony formation assays using primary leukemia patient samples, flow cytometry, and bioluminescent mouse models. The goal of our translational laboratory research is to identify immunotherapeutic and biological agents for translation into early stage clinical trials.
Yue Wu *Dept. of* ***Urology*** **www.roswellpark.org /Yue-Wu**	Cancer molecular and cellular biology; Cancer molecular epidemiology; Cancer pharmacology and therapeutics; Cancer prevention and epidemiology; Cancer bioinformatics; Cancer genetics; Urology; Medical Oncology	Scientific Research	**Understanding Progression of Prostate Cancer to Castration Re-Current Disease** My research interest is in microenvironment of cancer - how cancer cells, endothelial cells and stromal cells interact with each other, and how the interactions affect cancer cell growth. Prostate cancer models are used primarily in my lab. The ultimate goal is to delineate mechanisms that drive progression of androgen-stimulated prostate cancer to castration-resistant prostate cancer, and to identify novel modalities to prevent or treat castration-resistant prostate cancer.

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Sai Yendamuri *Dept. of* ***Thoracic Surgery*** **www.roswellpark.org /Sai-Yendamuri**	Surgical Oncology	Scientific Research Clinical Research	**Does post-operative pneumonia impact oncological outcomes?** Goal: The goal of the project is to examine the association of postoperative pneumonia on overall survival and cancer specific survival in patients undergoing surgery for cancer. Work involved includes collating data from various institutional databases, retrospective chart review and writing an abstract for presentation at a national meeting. **Does post-operative pneumonia impact oncological outcomes?** Goal: The goal of the project is to examine the association of postoperative pneumonia on overall survival and cancer specific survival in patients undergoing surgery for cancer. Work involved includes collating data from various institutional databases, retrospective chart review and writing an abstract for presentation at a national meeting.
Jianmin Zhang *Dept. of* ***Cancer Genetics*** **www.roswellpark.org /Jianmin-Zhang**	Cancer genetics; Cancer molecular and cellular biology	Scientific Research	**Dysregulation of Hippo pathway signaling in breast cancer** Using molecular, cellular and biochemical approaches as well as the 3-D cell culture system and mouse models, we are intensively investigating the roles of EMT and the Hippo signaling pathway in the initiation and progression of solid carcinomas, e.g., breast cancer.