Last Name	First Name	Mentor	Project Title	Lay summary (no more than 150 words)
Ali	Saim	Conor O'Neill, MD	Development of a Patient-Specific Dosing Methodology for HIPEC Based on Peritoneal Surface Area Using Edge-Detected Radiologic Imaging	HIPEC, or hyperthermic intraperitoneal chemotherapy, is a perioperative method of delivering heated chemotherapy directly to the peritoneal cavity. It is indicated for multiple malignancies including peritoneal carcinomatosis and ovarian cancer. The therapy includes initial removal of gross malignancies from the peritoneal cavity, followed by intraperitoneal perfusion. Currently, the dosing strategy is not standardized across institutions and is most often based on total body surface area, a characteristic estimated from body mass index. Our research project looks to create a new dosing scheme based on the precise calculation of the patient's peritoneal surface area, the cavity in contact with the perfusate. We will train a model with contoured radiologic images to isolate and calculate the peritoneal surface area. To contour the organs and structures we will use edge-detection, a step in image analysis that allows us to parse out key features of any image, for example the borders of a flower.
Boisoneau	Jaime	Frances Carr, PhD	LSD1 modulates TRβ -mediated tumor suppression in anaplastic thyroid cancer.	Thyroid hormone receptor beta (TRβ) has been previously identified as a potent tumor suppressor driven by ligand-dependent interactions with coregulator proteins and chromatin remodelers. Understanding the functional significance of these interactions holds promise as a therapeutic strategy to enhance tumor suppression for the treatment of anaplastic thyroid cancer (ATC), for which there are no enduring treatments. This project focuses on lysine-specific demethylase 1 (LSD1/KDM1A), a known protein interactor of TRβ and explores its potential for targeted therapy. The chromatin occupancy of LSD1 and TRβ was analyzed by CUT&RUN to determine genomic binding sites in ATC cells, followed by RNA-sequencing to uncover LSD1-mediated genes at thyroid response elements. This data suggests LSD1 contributes to aberrant gene expression profiles and altered TRβ-mediated tumor suppression. These findings are supported by cell proliferation and viability studies that show a decrease in the malignant phenotype when LSD1 is either knocked down or pharmacologically inhibited.

Brooks	Laura	Steven Roberts, PhD	Determining the molecular etiology of transcription-associated tandem duplications	Topoisomerase 1 (TOP1), an enzyme that relaxes DNA supercoiling during transcription, can become trapped such that it is bound to DNA, creating a TOP1 cleavage complex (TOP1cc). We observed large insertion and deletion mutations when TOP1ccs are induced in cells. Removal of TOP1ccs, along with the processing of RNA/DNA hybrids (R-loops) that form during transcription, can form double-stranded DNA breaks. We hypothesize that the observed insertion/deletion mutations are generated by Pol theta acting on these transcription-associated double-stranded breaks. To determine if Pol theta is responsible for these mutations, I will generate mutation spectra for cell lines in the presence of a Pol theta inhibitor. Additionally, I am creating cell lines with knockouts of genes involved in processing R-loops, which we expect will decrease insertion/deletion mutations, and DNA end-resection at double strand breaks, which should not affect the formation of these mutation types.
Esposito	Kyla	Melissa Scheiber, PhD	Identification and characterization of the cancer stem cell-like population from STK11-null, KRAS-driven LUAD multicellular tumor spheroids	Lung cancer is the leading cause of cancer death worldwide. 10-15% of lung adenocarcinoma cases have mutations in both *KRAS* and *serine-threonine kinase 11 (STK11)*. Our lab is focused on *STK11* since a loss of function results in increased cell motility, invasiveness, and decreased therapeutic response to cancer therapy. Cancer stem(-like) cells (CSCs) are a type of cancer cell that have an increased ability to survive after conventional cancer treatments, have the potential to self-renew, and can regenerate and initiate tumors. While CSCs make up less than 1% of cells of the tumor, they significantly affect the development of cancers. Using a 3-dimensional spheroid culture method, we demonstrate that loss of *STK11* promotes a significant increase in the expression of CSCs markers. We hypothesize that loss of STK11 enriches the cancer stem cell-like population in the spheroids leading to increased metastasis and we aim to identify and characterize these cells.

Geaghan-Breiner	Julia	Jessica Cintolo-Gonzalez, MD	Utility of point-of-care ultrasound in detection of locoregional recurrences in stage II and III melanoma	Locoregional recurrence is a relatively common event in melanoma that poses significant risk to the patient. There is no single consensus on how to detect locoregional recurrence of melanoma. For patients with stage IA-IIA melanoma, there are no specific imaging guidelines. Ultrasound surveillance may be an efficient and affordable method of surveillance for stage II and III melanoma patients, and studies have demonstrated ultrasound to be a highly sensitive method of detection. All melanoma surgeons at UVM are certified in point-of-care ultrasound. Our project aims to assess the utility of ultrasound in detection of locoregional recurrence. We will investigate rates of recurrence of stage II and III melanoma and examine how these recurrences were detected (clinical exam, ultrasound, or axial imaging).
Goebel	Clara	Mark Plante, MD	The emerging role of PSMA PET as an adjunct to established diagnostic measures in prostate cancer: Insights from a large single-center retrospective study (working title)	Our study, titled "The emerging role of PSMA PET as an adjunct to established diagnostic measures in prostate cancer: Insights from a large single-center retrospective study," focuses on comparing several advanced techniques for detecting and monitoring prostate cancer. We will compare PSMA PET scan and prostate MRI to see if PSMA PET may be more helpful in diagnostic and treatment decision-making when used alongside traditional prostate biopsy. These imaging methods are crucial in guiding treatment decisions, such as surgery or radiation therapy, by providing detailed information about the size and spread of the cancer. Our research aims to identify the potential benefit of adding PSMA PET to established diagnostic approaches, which in turn might offer better clarity and precision for patients with suspected or diagnosed prostate cancer as well as their treating physicians.

Joos	Greta	Jessica Heath, MD	Access to non-FDA approved therapeutics for pediatric oncology patients at the University of Vermont Medical Center	As part of the UVMCC Summer Fellowship, we are working to investigate the potential impact of social determinants of health on access to non-FDA approved cancer therapies for pediatric patients. While groundbreaking advances have been made in the treatment of pediatric cancers, numerous challenges remain, especially for patients with rare, relapsed, and/or refractory disease. For these patients, non-FDA approved therapies harbor important therapeutic potential. We seek to understand whether factors such as cost, lack of industry sponsorship, regulatory requirements, or logistical challenges provide barriers to access to such treatments.
Khodadad	Thomas	Alissa Thomas, MD	Retrospective quality review of survival outcomes and treatment paradigms for patients with brain metastases	This project aims to conduct a retrospective analysis of treatment and survival for patients with brain metastases, with a primary focus on determining overall survival stratified by updated recursive partitioning analysis (U-RPA) classification. The relevance of this research lies in its potential to provide critical insights into the management and prognosis of patients with brain metastases, a population facing significant clinical challenges.
Kilas	Sulekha	Christopher Brennan, MD		
Lefevre	Clara	Trishnee Bhurosy, PhD	A Meta-Analysis and Systematic Review of Nutrition Programs for Lung Cancer Patients	Lung cancer patients have the highest rates of malnutrition. Past reviews on nutrition programs for lung cancer patients had small sample sizes and outdated data, and lacked rigorous trials, often taking a narrative approach. This systematic review and meta-analysis will examine the efficacy of nutrition programs on dietary outcomes and quality of life among lung cancer patients. A study will need to meet the following criteria to be included: it assessed the effectiveness of a nutrition intervention (e.g. dietary counseling and education, medical nutrition therapy, nutritional supplements, specific nutrient interventions, hydration management) among adult lung cancer patients; it used a comparison group that was a no-treatment or minimal-treatment condition, and it measured at least one outcome of interest, i.e., nutritional status and quality of life. Findings will be crucial for improving clinical practice and enhancing health outcomes and quality of life in the context of lung cancer treatment.

Medeiros	Stasha	Elise Tarbi, PhD, APRN	Identifying Communication Factors Influencing Connection in Telehealth Serious Illness Conversations with Rural Cancer Patients	We are exploring how communication elements influence connection during telehealth appointments with rural cancer patients. More specifically, we are interested in the barriers and facilitators to establishing a human connection with providers during patient conversations in this context. Using a qualitative approach, we will be conducting interviews to understand the perspectives of both those currently undergoing cancer treatment and individuals who have recently completed their treatment.
Reed	Kristin	Randall Holcombe, MD, MBA	Delayed cholestatic hepatotoxicity associated with checkpoint inhibitor durvalumab - Case report and review of the literature	For the summer project, we are writing a case report about a patient who developed delayed hepatotoxicity after receiving treatment for cholangiocarcinoma with the checkpoint inhibitor, durvalumab. This project will involve review of the literature related to delayed liver toxicity from checkpoint inhibitors in patients with cancer, and description of the case focusing on delayed hepatotoxicity characterized by elevated bile acids. Upon completion of the project, a manuscript will be submitted for publication consideration.
Remington	Sydney	David Seward, MD, PhD	Using Precision-cut Lung Slices (PCLS) to Study Early Tumorigenic Events in KRAS-Driven Lung Adenocarcinoma	Lung cancer is the leading cause of cancer-related mortality worldwide, largely attributed to late diagnosis and therapy resistance. Notably, lung cancers lacking a protein known as STK11 face a poor prognosis due to immunotherapy resistance. Why STK11 loss correlates with immunotherapy resistance remains unclear. To address this question, we and others have created genetically engineered mice that develop lung cancer lacking STK11. These models, however, result in mice that acquire innumerable independent tumors simultaneously and this does not recapitulate human lung cancer physiology. To address this limitation, we are developing a Precision-cut Lung Slice (PCLS) model to study early tumorigenic events in vitro. This model will offer a more accurate representation of human lung cancer allowing us to study the development of lung cancer *ex vivo*. We aim to leverage this model to improve lung cancer patient outcomes by determining why STK11 loss correlates with immunotherapy resistance and testing interventions to restore therapy sensitivity

Schiefen	Daniel	Steven Roberts, PhD	Identifying Protein-Protein Interactions of APOBEC3A	APOBEC3A is a cytidine deaminase which causes genetic mutations through the conversion of cytosine bases into uracil. My project involves the identification of novel protein-protein interactions with A3A through a Yeast Two-Hybrid Screen. The Yeast Two-Hybrid Screen involves the mating of two haploid yeast cell lines, each containing a plasmid carrying either the A3A gene or a gene of interest. If an interaction occurs between these genes, they bring together two halves of a transcription factor required for histidine synthesis which acts as a selective marker. Once identified, these protein-protein interactions will be characterized through additional Yeast Two-Hybrid testing and cellular localization to determine how each interaction contributes to the regulation of A3A induced mutagenesis.
Seals	Shane	Nancy Gell, PT, PhD, MPH	Motivating Factors and Strength Training in Cancer Survivors and Adults Without a Cancer History & An Investigation on the Feasibility of a Hybrid Cancer Prehabilitation Exercise Program	Our summer research project is focused on investigating motivation relating to strength training in populations both with and without a cancer history and comparing differences in motivation and strength training levels between the groups. This research will use data acquired from the Health Information National Trends Survey, an annual cross-sectional, nationally representative survey that is administered both online and through the mail. Findings from this study could provide insight on how to support strength training in cancer survivors, which is important for increasing and maintaining bone density, increasing muscle mass, improving balance, aiding fall prevention, and reducing cancer-related fatigue. Simultaneously, we are developing a new study to investigate the feasibility of exercise-based prehabilitation for patients awaiting surgery and/or receiving chemotherapy for cancer. The goals for this study are to determine whether cancer prehabilitation is feasible and to gather perceptions about the experience of participation in a structured exercise program during cancer treatment.

Syeda	Zaymee	Trishnee Bhurosy, PhD	A Meta-Analysis and Systematic Review of Nutrition Programs for Lung Cancer Patients	Lung cancer patients have the highest rates of malnutrition. Past reviews on nutrition programs for lung cancer patients had small sample sizes and outdated data, and lacked rigorous trials, often taking a narrative approach. This systematic review and meta-analysis will examine the efficacy of nutrition programs on dietary outcomes and quality of life among lung cancer patients. A study will need to meet the following criteria to be included: it assessed the effectiveness of a nutrition intervention (e.g. dietary counseling and education, medical nutrition therapy, nutritional supplements, specific nutrient interventions, hydration management) among adult lung cancer patients; it used a comparison group that was a no-treatment or minimal-treatment condition, and it measured at least one outcome of interest, i.e., nutritional status and quality of life. Findings will be crucial for improving clinical practice and enhancing health outcomes and quality of life in the context of lung cancer treatment.
Thomas	Isabel	Kara Landry, MD	Adherence to gene-specific surveillance or prevention strategies in patients with Lynch syndrome	Lynch syndrome is a hereditary syndrome that increases risk for colorectal and endometrial cancer in addition to other primary cancers, including those of the stomach, ovaries, biliary tract, and pancreas. This project seeks to 1) determine adherence rates to cancer prevention and surveillance strategies for patients with Lynch syndrome living in Vermont and New York over the past 10 years and 2) assess those adherence rates by patient factors including sex, age, Lynch syndrome gene, and residential rurality. This is an essential step to identifying potential interventions to improve outcomes for this patient population.

Trout	Margaret	James Stafford, PhD	Combining ONC201 treatment with inhibition of mitochondrial ROS scavenging in DMG.	Pediatric brain tumors classified as diffuse midline glioma (DMG) are almost universally fatal, with less than 1 in 10 individuals surviving two years past diagnosis. Better treatment options are desperately needed, as DMG is often impossible to remove surgically, and available chemotherapies are widely ineffective. ONC201, a drug currently in clinical trials for DMG, shows promise at improving survival and quality of life. This drug acts on the mitochondria, and our lab has shown it increases mitochondrial reactive oxygen species (mROS). However, some individuals do not respond as well to ONC201, and eventual resistance to the drug is common. Therefore, we aim to test if we can make ONC201 more effective by combining it with other chemotherapeutics. We are currently testing the antibiotic thiostrepton, which inhibits the mitochondrial antioxidant enzyme PRX3, sensitizing cells to mROS. We hope that combining this drug with Onc201 can make them collectively more effective.
Verma	Serena	Elise Tarbi, PhD, APRN	Identifying Communication Factors Influencing Connection in Telehealth Serious Illness Conversations with Rural Cancer Patients	We are exploring how communication elements influence connection during telehealth appointments with rural cancer patients. More specifically, we are interested in the barriers and facilitators to establishing a human connection with providers during patient conversations in this context. Using a qualitative approach, we will be conducting interviews to understand the perspectives of both those currently undergoing cancer treatment and individuals who have recently completed their treatment.

Victor	Joshua	Nimrat Chatterjee, PhD	The Role of REV1 in Viral Induced Carcinogenesis	Viral induced carcinogenesis impacts up to 15% of infected patients, yet no effective drug has been developed to prevent this. Previously, it has been shown that REV1, a member of the mutagenic translesion synthesis (TLS) system, plays an important role in RNA virus propagation and survival, and is hypothesized to be a contributing factor in oncovirus induced carcinogenesis. My goal is to uncover the mechanism(s) of action between REV1 and RNA virus survival and pathogenesis. This will provide the necessary foundation to confirm the role and therapeutic utility of the host DNA damage bypass pathway in oncovirus-induced cancers.