

Project Description

A MaineHealth Member

Research Mentor Name:	Aaron Brown PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	Understanding how fat tissue burns energy to reveal new therapeutic avenues directed at reversal of obesity-related diseases such as type 2 diabetes, stroke and heart disease.
Description of possible project(s) an intern might work on this summer:	The rapid increase in obesity is a major economic burden on our health care system. Current therapies available to fight complications associated with obesity are insufficient, costly and entail risks. Our research aims to understand how fat tissue burns energy to reveal new therapeutic avenues directed at reversal of obesity-related diseases such as type 2 diabetes, stroke and heart disease. In particular, we are generating a special type of fat in the laboratory called beige fat that can burn off calories, rather than store them. By supplementing patients with additional beige fat, we may be able to help them lose weight and reverse obesity-related diseases. Beige fat is typically activated by exposure to cold, which helps to keep patients warm to prevent hypothermia, but this is a very uncomfortable method to burn excess energy and lose weight. The project this summer will revolve around testing new ways to keep beige fat activated without exposure to cold.
Description of Research Environment	We are located at the MMCRI campus and have a large laboratory space that houses 4 laboratory technicians, temporary students and the PI.
Skills the research intern might learn during an internship:	Basic laboratory techniques including pipetting, centrifugation, cell culture, RNA extractions, qPCR, flow cytometry, microscopy and immunostaining.
Skills that might be helpful for a student to have when they enter the internship:	Basic knowledge of biology, biochemistry and molecular biology a plus.
Examples of past research intern projects:	Photo-inducible energy expenditure as a treatment for metabolic disease

Project Description

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Research Mentor Name:	Jeffrey Florman, MD
Department:	Neurosurgery (MMP Neurosurgery and Spine, 49 Spring St, Scarborough and MMC, 22 Bramhall St. Portland ME)
Description of Research Interests	Our large team has a number of active research efforts in clinical neurosurgery including spinal and cranial neurosurgery.
Description of possible project(s) an intern might work on this summer:	Depending on the student's interests and aptitudes, we have opportunities that can include database building and populating, reviewing data and manuscript writing. Currently active topics include prion disease and spine surgery outcomes as related to depression.
Description of Research Environment	Splitting time in neurosurgery office and at the hospital.
Skills the research intern might learn during an internship:	RedCap database. EPIC chart review. Clinical paper writing, editing and review.
Skills that might be helpful for a student to have when they enter the internship:	We can tailor the experience to the skill set. Prior medical writing experience will lend itself to different opportunities.
Examples of past research intern projects:	Study of hemodynamics during cranial surgery for tumor Efficacy of seizure prophylaxis after tumor resection Variations in technique and outcome related to upper cervical spine instrumentation

Project Description

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Research Mentor Name:	Paul Han, MD, MA, MPH
Department:	Center for Outcomes Research and Evaluation (509 Forest Ave, Portland ME)
Description of Research Interests	Understanding how providers can address vaccine hesitancy by analyzing video recordings of pediatric vaccine discussions.
Description of possible project(s) an intern might work on this summer:	The World Health Organization recently named vaccine hesitancy as a top ten health threat to humanity. Receiving a vaccine recommendation from a clinician is the strongest predictor of whether or not a parent will vaccinate. Yet, only one project has analyzed actual interactions between clinicians and vaccine hesitant parents. We therefore know very little about what communication strategies clinicians successfully use to encourage vaccination. Anny Fenton, PhD in sociology, will be collecting and analyzing video-recordings of pediatric encounters to understand the concerns vaccine hesitant parents raise, how clinicians address them, and what communication strategies do and don't work. Student researchers will help with recruitment, analysis, and have co-authorship on papers.
Description of Research Environment	Pediatric offices in southern Maine
Skills the research intern might learn during an internship:	study design, recruitment of patients, qualitative analysis, academic article writing, translating research to general audiences
Skills that might be helpful for a student to have when they enter the internship:	Interest in the project and in learning about qualitative analysis
Examples of past research intern projects:	

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Research Mentor Name:	Arturo Hernandez, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	We use mostly mouse models to study the effects of thyroid hormone overexposure on pathiophysiology and disease and on the epigenetic information of the germ line and the consequences for future generations. We are particularly interested in outcomes related to congenital abnormalities, endocrine function, brain development and behavior
Description of possible project(s) an intern might work on this summer:	Potential projects may include: Analyzing parameters of inflammation and/or vascularization in tissues of mouse fetuses overexposed to thyroid hormones; using primary cell cultures of transgenic preadipocytes to analyse the functional role of a Dio3 gene enhancer; analyzes parameters of neurogenesis and/or neuronal migration in mouse fetuses overexposed to thyroid hormones; use available web tools and lab RNA sequencing datasets to analyze common and divergent pathways influenced by thyroid hormone in different tissues and developmental ages.
Description of Research Environment	The lab is located at main MMCRI building in 81 Research Drive, Scarborough. research team currently includes two Staff scientist, a technology manger and a research assistant
Skills the research intern might learn during an internship:	Transgenic mouse models, RNA/DNA isolation, PCR, qPCR, ELISAS, Enzymatic assays, molecular cloning, behavioral tests, literature search, gene expression profiling analyses tools, DNA methylation analyses, primary cell culture, others.
Skills that might be helpful for a student to have when they enter the internship:	Good background in math/stats, genetics, molecular biology, biochemistry, neuroscience, endocrinology
Examples of past research intern projects:	Gene expression regulation in the DLK1-Dio3 imprint locus, Thyroid hormone effect on markes of Alzheimer's

Project Description

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Research Mentor Name:	Becca Hutchinson, MD, MPH
Department:	Palliative Medicine and Center for Outcomes Research and Evaluation (509 Forest Ave, Portland ME)
Description of Research Interests	My interests are in palliative and end-of-life care for patients with advanced heart failure. I am also interested in studying communication and identifying the best ways to communicate with patients in the face of serious illness.
Description of possible project(s) an intern might work on this summer:	Possible projects this summer might include work related to provision of palliative care consultations over telehealth, understanding the relationship between personality traits and heart failure outcomes and chart reviews to evaluate frequency and timing of goals of care conversations and assisting with a needs assessment project to better understand the gaps in care for patients with advanced heart failure living in rural environments.
Description of Research Environment	My research work is located at CORE and I work closely with collaborators including Paul Han and Eric Anderson.
Skills the research intern might learn during an internship:	qualitative research skills, basic analysis.
Skills that might be helpful for a student to have when they enter the internship:	Some general knowledge about healthcare is helpful.
Examples of past research intern projects:	Previous projects have included research regarding palliative care consultations over telehealth, understanding the relationship between personality traits and heart failure outcomes and chart reviews to evaluate frequency and timing of goals of care conversations.

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Research Mentor Name:	Rob Koza PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	Our studies are focused on understanding the metabolic basis of human disease.
Description of possible project(s) an intern might work on this summer:	Characterization of pathways involved in the generation of heat in mice that are deficient in uncoupling protein 1.
Description of Research Environment	Our laboratory is located within the Center for Molecular Medicine at the Maine Medical Research Institute on the Scarborough campus. This location is full of basic and translational research laboratories, and houses our animal facility, administrative support services, and is the location of the weekly workshops and seminars. Our laboratory group currently consists of a senior level scientist and a laboratory manager
Skills the research intern might learn during an internship:	Skills and techniques that students may learn include isolation, purification, quantification and characterization of DNA, RNA and protein as well as genotyping mutant mouse models via PCR and measuring gene expression via quantitative RT-PCR.
Skills that might be helpful for a student to have when they enter the internship:	Students are expected to have a strong background in biology, molecular biology, genetics and biochemistry and have at least a basic understanding of laboratory math. They should also be able to work well in both a team environment and independently. Students will be expected to contribute to the development of their projects by communicating with their mentor and laboratory members as well as by reading relevant literature.
Examples of past research intern projects:	<ul style="list-style-type: none"> Identification of mechanisms of UCP1-independent thermogenesis in mice Determination of the biological consequences of abnormal Mest expression Characterization of newly developed mice with conditional transgenic expression of Mest Estrous cycle effects on uterine and adipose tissue mesoderm specific transcript Bone morphogenetic protein 3 and the development of adiposity in mice Effects of dietary rapamycin on the development of cardiomyopathy in BKS db/db mice Regulation of miR-335 in mice with a targeted deletion of Mest

Project Description

A MaineHealth Member

Research Mentor Name:	Christine Lary PhD
Department:	Center for Outcomes Research and Evaluation (509 Forest Ave, Portland ME)
Description of Research Interests	I am interested in studying pharmacological and pharmacogenetic effects on bone and investigating underlying molecular mechanisms using the analysis of big data.
Description of possible project(s) an intern might work on this summer:	A couple of projects are available: one would be an epidemiological analysis looking at the effects of beta blocker use on bone outcomes, another project would involve analysis of genetic or microRNA/mRNA data underlying bone phenotypes. Both would involve the Framingham Heart Study/Osteoporosis substudy.
Description of Research Environment	We are a group of statisticians and analysts doing programming in R, SAS, and other languages and accessing data sets from claims, EMR, or custom data sets.
Skills the research intern might learn during an internship:	You will become a proficient R programmer; will gain basic understanding of statistical modeling, epidemiology, genetics and bioinformatics
Skills that might be helpful for a student to have when they enter the internship:	programming, preferably in R; some statistics or epidemiology skills, understanding of genetics and bioinformatics for those interested in those projects
Examples of past research intern projects:	Association of ADRB1/ADRB2 variants with beta blocker response in bone, analysis of RNA-seq data related to a mouse model of thyroid deficiency

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Research Mentor Name:	Lucy Liaw, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	Our research addresses the link between adipose tissue and cells of the blood vessel wall in cardiovascular disease. The approach is to understand how adipose tissue surrounding blood vessels can change susceptibility to vascular disease, and we use mouse models and human tissues to study this.
Description of possible project(s) an intern might work on this summer:	For mouse studies, potential projects include analysis of adipose tissue and blood vessel phenotype in different genetic backgrounds, with dietary modification to induce obesity or a lean phenotype. We also have opportunities to work with human samples derived from patients undergoing open heart or open abdomen surgery in patients with cardiovascular disease. Finally, there are opportunities to have more of a computational based project to study proteomic datasets that derive from our mouse or human studies.
Description of Research Environment	Our laboratory is located within the Center for Molecular Medicine at the Research Institute on the Scarborough campus. This location is full of basic and translational research laboratories, and houses our animal facility, administrative support services, and is the location of most of the weekly workshops and seminars. Our lab group (13 members), currently consists of one senior level scientist/lab manager, a mouse model specialist, one postdoctoral fellow, three research staff members, a vascular surgeon, four graduate students, and a medical student intern.
Skills the research intern might learn during an internship:	All interns learn good laboratory practice, experimental design, data analysis, and have practice presenting research at weekly lab meetings. Projects may utilize cell culture, analysis of DNA, RNA, or protein (PCR, qRT-PCR, immunoblot, immunostaining), work with mouse models (tissue collection and analysis from mouse genetic models), or work with human tissues (surgical specimens from patients with cardiovascular disease).
Skills that might be helpful for a student to have when they enter the internship:	Students are expected to have a solid background in the biological sciences (cell and molecular) and have a good grasp of laboratory math. They will be asked to read and integrate primary scientific literature, into their supervised research project. Students should be willing to learn, receive feedback, and work as part of a team. Interns in our lab are required to generate a final written document of the project, modeled after a research paper.
Examples of past research intern projects:	<ol style="list-style-type: none"> 1. Characterization of mouse perivascular adipose tissue in models of increased health span 2. Development of novel mouse alleles of Rab27a 3. Characterization of a new global Rab27a null mouse strain 4. Effects of methionine restriction on adipocyte differentiation 5. Differentiation potential of human preadipocytes derived from patients with cardiovascular disease 6. Defining genes involved in whitening of adipose tissue 7. Comparison of secreted factors for multiple adipose depots 8. Interaction of adipocytes and endothelial cells

Project Description

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Research Mentor Name:	Volkhard Lindner, MD, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	The lab studies CTHRC1, an endocrine factor involved in regulation of cellular metabolism. A major focus is to determine the underlying signaling mechanism using cell biology, molecular biology, and in vivo mouse genetic approaches.
Description of possible project(s) an intern might work on this summer:	characterize CTHRC1 binding to cellular receptors, assess interaction of CTHRC1 with TGF-beta signaling in vivo and in vitro
Description of Research Environment	2nd floor MMCRI, 81 Research Dr, Scarborough. Yong-Ri Jin: Staff Scientist; Armie Mangoba: Histology Core Manager; Qiaozeng Wang: Research Associate
Skills the research intern might learn during an internship:	ELISA, Western blotting, PCR, genotyping, cloning, histology, microscopy
Skills that might be helpful for a student to have when they enter the internship:	some wet lab laboratory skill, computer skills
Examples of past research intern projects:	proteolytic processing of CTHRC1

Project Description

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Research Mentor Name:	Katherine Motyl, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	The Motyl lab investigates the how the nervous system regulates bone density. This is especially important for elderly individuals at risk for osteoporosis that are also treated with drugs affecting the nervous system.
Description of possible project(s) an intern might work on this summer:	Summer student would work on projects testing how components of the sensory and sympathetic nervous system influence bone using a variety of models, including genetic, pharmacologic and environmental models. Ongoing projects relate to mechanisms of bone loss from opioids and altered thermoregulation, and how bone loss then signals back to the nervous system to modulate efferent pathways. For example, the student may test bone density in a specific mouse strain with a protein deleted that is important for thermoregulation, or the student may treat bone cells with a specific pharmacologic agent that mimics or inhibits sympathetic signaling. The exact project will be more clearly defined as the time draws nearer.
Description of Research Environment	The Motyl laboratory is located at 81 Research Drive, in Scarborough, ME. We have a wet lab that uses mouse and cell culture models to test hypotheses related to neural control of bone density. We currently have one postdoc, one research associate, and two research assistants in the lab. Each summer student will be assigned a laboratory mentor, which could be any of these people with experience in the summer student's assigned project. Although this will be the student's primary contact, the other lab members are extremely collaborative and helpful. Dr. Motyl will meet weekly with the summer student and laboratory mentor to address progress. Each student will participate in experimental design, data collection, analysis and interpretations, and have dedicated laboratory bench and computer/office space. Although exact project directions will ultimately be decided by Dr. Motyl, we welcome input as to the student's particular needs with regards to research experience. Students will also participate in bi-weekly bone journal clubs.
Skills the research intern might learn during an internship:	Student may learn bone cell tissue culture, mRNA isolation, PCR, western blot, mouse handling, behavior testing, bone density testing, bone microarchitecture data interpretation.
Skills that might be helpful for a student to have when they enter the internship:	Skills that are very helpful include pipetting, general understanding of stoichiometry and solution making, proficiency in excel and powerpoint, experience reading primary literature, and excellent organization and note-taking skills.
Examples of past research intern projects:	2019 intern projects: 1) Testing the effects of morphine on osteoclast differentiation, 2) Testing the role of beta 1 adrenergic receptor in osteoclasts, and 3) Testing how sensory neurons respond to acute changes in bone resorption.

Project Description

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Research Mentor Name:	Ilka Pinz, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	The role of caveolin proteins in cellular signal transduction in the heart.
Description of possible project(s) an intern might work on this summer:	We have several mutated caveolin-3 proteins for which we would like to know how they are expressed in cells and whether they locate to the plasma membrane. In cases where the mutated protein localizes to the plasma membrane, we would like to analyze whether normal cell signaling is possible.
Description of Research Environment	Work can be performed either at the University of Southern Maine or at MMCRI. Work at both locations will be under the direct guidance of Dr. Pinz.
Skills the research intern might learn during an internship:	cell culture, cell transfections, western blotting, confocal microscopy
Skills that might be helpful for a student to have when they enter the internship:	pipetting skills, some knowledge of cell culture techniques
Examples of past research intern projects:	

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A MaineHealth Member

Research Mentor Name:	Igor Prudovsky PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	Understanding the molecular mechanisms of obesity suppression
Description of possible project(s) an intern might work on this summer:	We found that the secreted protein CTHRC1 suppresses fat cells differentiation. We study the molecular mechanisms underlying this effect.
Description of Research Environment	The laboratory is using the methods of cell and molecular biology. Besides myself, a graduate student and a research associate are working on the project. The project is performed in collaboration with the Lindner lab.
Skills the research intern might learn during an internship:	Cell culture, electrophoresis, immunoblotting, qPCR, confocal microscopy
Skills that might be helpful for a student to have when they enter the internship:	Know how to work with pipettes in sterile conditions. Be able to calculate molar and percent concentrations.
Examples of past research intern projects:	In the past years, I have had a total of about 20 summer students in my lab. Some of them became co-authors of journal publications.

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Research Mentor Name:	Richard Riker MD
Department:	Critical Care Medicine (MMC Bramhall Critical Care, 22 Bramhall St, Portland ME)
Description of Research Interests	Cardiac arrest survivors require intensive therapies to support recovery and improve outcome. Early risk stratification is required to better match patient needs with available therapies.
Description of possible project(s) an intern might work on this summer:	Emergency resuscitation research requires specific forms of consent which have been understudied. We will evaluate subjects enrolled or not enrolled in several emergency studies to better understand specific reasons and perspectives of patients and surrogates to help guide future approaches
Description of Research Environment	Physicians (Riker, Seder, May), Nurse coordinators, pharmacists, CORE personnel
Skills the research intern might learn during an internship:	Human research protection rules, data verification, statistical analysis, abstract preparation and submission for national conferences
Skills that might be helpful for a student to have when they enter the internship:	CITI training, Excel, stats (R or other)
Examples of past research intern projects:	Pupillometry as Early risk Predictor after cardiac arrest, Processed EEG after Cardiac arrest

Project Description

A MaineHealth Member

Research Mentor Name:	Sergey Ryzhov, MD, PhD
Department:	Center for Molecular Medicine (81 Research Drive Scarborough ME 04074)
Description of Research Interests	Heart repair and regeneration after ischemic myocardial injury. Effect of global hypoxia on cardiovascular system
Description of possible project(s) an intern might work on this summer:	Immune response in patients with cardiac arrest
Description of Research Environment	Trainee will have an individual bench space to perform independent mentored research and full access (after safety training and under supervision from senior lab member) to all lab equipment. We are working in close collaboration with physicians from Cardiovascular Research (CARE) Institute and departments of Neurocritical care (NCC) at Maine Medical Center, Portland. This provides excellent opportunities to participate in real time discussions focused on translational approaches in cardiovascular area and improvement of patient care. We have a great team of lab members which include Research Assistant, Research Associate, Postdoctoral research fellow, Technology manager, Physician-scientist, two senior scientists and community lab member.
Skills the research intern might learn during an internship:	cell culture, enzyme-linked immunosorbent assay (ELISA), flow cytometry
Skills that might be helpful for a student to have when they enter the internship:	Meticulous attention to detail, good teamworking skills, time management
Examples of past research intern projects:	Title: NRG-1/ErbB signaling in immune-endothelial cell interaction. Here, we hypothesize that monocytes promote the release of the extracellular “active” domain of NRG-1, which in turn, prevents their pro-inflammatory activation via ErbB mediated intracellular signaling.; Title: Role of NRG-1 in neuroprotection after resuscitation from cardiac arrest. Each year, more than 600,000 Americans suffer cardiac arrest, and despite improved cardiopulmonary resuscitation (CPR), post-resuscitation therapy, and cardiovascular support care overall outcomes remain poor. We investigated the role of NRG-1 in the prevention of additional brain cell damage mediated by the post-cardiac arrest inflammatory response.; Title: Monocytes activation to in vitro inflammatory challenge in the prediction of cardiovascular disease. This project was focused on measurement of the production of proinflammatory cytokines such as IL-6 and IL-8 in patients with coronary artery disease.

Project Description

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Research Mentor Name:	David B. Seder MD
Department:	Critical Care Services (MMC Bramhall Critical Care & MMC Library, 22 Bramhall St, Portland ME)
Description of Research Interests	Neuroprotection and Critical Care after Stroke and Cardiac Arrest
Description of possible project(s) an intern might work on this summer:	Describing the experience of administering intraventricular tPA to patients with subarachnoid hemorrhage complicated by intraventricular hemorrhage.
Description of Research Environment	ICU service, database/medical records/research office
Skills the research intern might learn during an internship:	Data analysis, medical writing, chart review
Skills that might be helpful for a student to have when they enter the internship:	Some knowledge of stroke, cardiac arrest, etc - in the past, students with a nursing or EMT background have done well.
Examples of past research intern projects:	<ul style="list-style-type: none"> • Earliest available processed EEG data accurately stratifies risk after cardiac arrest • Incidence and Characteristics of Opioid-Related Cardiac Arrests at Maine Medical Center • Neurological Injury After Cardiac Arrest: Associations of No-flow, Low-flow, and Total Ischemic Time with Neuron Specific Enolase Level and Outcomes

Project Description

A MaineHealth Member

Research Mentor Name:	Elizabeth V. Seiverling MD
Department:	Medicine, Dermatology Division (MMP Dermatology, 265 Western Ave, South Portland ME)
Description of Research Interests	My research focuses on Skin Cancer/Dermatology/Populations Health~The interns will work on studying the Impact of Widespread Dermoscopy Training for a Health System: Development of a Biopsy and Skin Tumor Database Skin Cancer/Dermatology/Populations Health~Title:Impact of Widespread Dermoscopy Training for a Health System: Development of a Biopsy and Skin Tumor Database
Description of possible project(s) an intern might work on this summer:	Project goal: Develop a skin biopsy database to evaluate the impact of widespread dermoscopy training for a health system. The database will analyze skin biopsies prior to and after the dermoscopy training intervention. We aim to track the following: 1) total number of biopsies, 2) benign : malignant biopsy ratios, 3) melanoma stage & thickness at diagnosis. The interns will be entering biopsy data into RedCap. They will also have the opportunity to shadow in dermatology clinic and aid with the creation of dermoscopy educational content for primary care.
Description of Research Environment	. MMP Dermatology. South Portland. Co-Mentor is Kay Stevens NP. She is the research coordinator. PI is Dr. Elizabeth V. Seiverling, MMC Dermatology Division Director. Other team members Greg Dorr in Quality Improvement, Peg Cyr MD Family Medicine.
Skills the research intern might learn during an internship:	Gain understanding of a complex electronic medical record, learn about data entry and data analysis, gain a basic understanding of skin cancer and skin cancer detection using dermoscopy
Skills that might be helpful for a student to have when they enter the internship:	1. Able to use power point 2. Willing to participate in abstract and poster preparations and presentations 3. Detail oriented and willing to spend 4+ hour blocks on data entry
Examples of past research intern projects:	Dissemination and Implementation of Multi-Modal Dermoscopy Curriculum for Primary Care. This was a 2019 MMCRI summer intern project. The intern presented the research as a poster at a national conference and won the research competition. He had this to say about his summer internship "I was able to work in an environment where I knew that the research I was doing was making an impact on people's lives. As much as I enjoyed doing the research, my favorite part of the entire summer was everything in between the data that we collected. Although the research was very interesting and the findings were significant, my favorite part of the summer was the ability to observe clinical interactions and procedures. Throughout my time at MMP Dermatology, I was able to shadow Dr. Seiverling and the MMP Dermatology team on their clinical days. Watching procedures, interacting with the patients, and learning crucial clinical information were by far my favorite and most valued aspects of this summer. I was able to observe and assist in any way that I was medically-cleared to do. Being able to interact with the patients was what I most looked forward to each day, and I feel lucky to have had such an experience. Although contributing to the literature is very rewarding, observing procedures at both MMP Dermatology and Maine Medical Center will be the lasting imprint that I will most cherish about this summer. I cannot thank the MMP Dermatology team enough for giving me the opportunity to experience such an incredible summer; one in which has affirmed my strong interest in medicine. " Tyler, pre-med.

Project Description

A MaineHealth Member

Research Mentor Name:	Matthew Siegel, MD
Department:	Center for Psychiatric Research (Spring Harbor Hospital, 123 Andover Rd, Westbrook)
Description of Research Interests	Our team leads the Autism and Development Disorders Inpatient Research Collaborative (ADDIRC), a multi-site study of the genetic and phenotypic characteristics of youth severely affected by Autism.
Description of possible project(s) an intern might work on this summer:	The student will help support data collection with children diagnosed with Autism and their family members, and utilize collected data to study a question of particular interest to the student. Suggested areas of focus include examining: developmental factors and adaptive functioning impairments in the pre-school age sample within our cohort; age and utilization of outpatient services prior to first hospitalization.
Description of Research Environment	The student would work in the research office at Spring Harbor Hospital working closely with the Research Coordinator and Research Assistant. The student would spend time on the Developmental Disorders Unit (DDU) and in the Spring Harbor Academy (SHA) classrooms, observing patients/students and collecting data. The student would attend weekly research team meetings led by Dr. Siegel and monthly staff meetings held at CORE.
Skills the research intern might learn during an internship:	Research study consenting and data collection procedures. Administration and scoring of research surveys. Data entry using a secure multi-site data entry platform (REDCap). Examining data sets, developing hypotheses, and analyzing data to answer research questions of interest to the student. Facilitating research blood draws (done by NORDx) and conducting saliva collections with participants. Observing and recording child participant behaviors on the inpatient unit and in classrooms. Data checks and data cleaning procedures. Collaborating with a team including PI, Project Manager, RC, and RA in many aspects of the research.
Skills that might be helpful for a student to have when they enter the internship:	Well organized, good interpersonal communication, comfortable speaking with parents of children with special needs, observation and/or experience working closely with children who have autism or other developmental disorders. Attention to detail and some basic computer skills.
Examples of past research intern projects:	Student 1 - analyzed significant medical conditions typical of our inpatient ASD cohort, finding high rates of GI and endocrine disorders, eventually published in a peer-reviewed journal. Student 2 - examined utilization of outpatient genetic testing for ASD children presenting to the inpatient unit for psychiatric care. The student identified a very low rate of seeking genetic testing despite this being a best practices recommendation for children with autism. Resulted in a poster presentation at the student's university.

Project Description

<p>Research Mentor Name:</p>	<p>Robert Smith, MD</p>
<p>Department:</p>	<p>Vector-borne Disease Laboratory (81 Research Drive Scarborough ME 04074)</p>
<p>Description of Research Interests</p>	<p>The Vector-borne Disease Lab is dedicated to the control of emerging tick & mosquito-borne diseases and translating our findings to the general public. We seek to: understand the environmental interactions of vectors, hosts, habitats, and climate, monitor the geography of risk, and increase public awareness of the threat of tick and mosquito-borne diseases.</p>
<p>Description of possible project(s) an intern might work on this summer:</p>	<p>1. Environmental and molecular regulators of diapause in the deer tick, <i>Ixodes scapularis</i>. Most animals living in temperate regions have programmed behavioral and physiological changes that allow them to survive the adverse environmental conditions of winter. This programmed arrested development (diapause) is typically triggered by short daylength and low temperature that occur in the fall, which signals the animal to prepare for winter. Heat shock proteins (HSP) are a family of proteins that are expressed by cells in response to stressful conditions, such as heat, cold, and UV light. HSPs function to stabilize, refold, or restructure proteins that might have been damaged by cell stress. Many insects, such as the flesh fly <i>Sarcophaga crassipalpis</i>, upregulate certain heat shock proteins prior to entering diapause, which helps protect the insect's cells from the upcoming harsh environmental conditions. Other HSPs can be "turned on" during diapause, in response to rapid drops in temperature. HSPs are well-described in animals, and are expressed in most living organisms in response to stress.</p> <p>Since very little is known about the diapause response in the primary vector of Lyme disease, <i>Ixodes scapularis</i>, we will use colony ticks from this species for our study. We first seek to determine the basic environmental factors (e.g. photoperiod, temperature, and relative humidity) that are triggering the diapause response in the deer tick, <i>I. scapularis</i> by rearing different tick stages under varying environmental conditions. We also seek to determine whether or not HSP mRNA (i.e. HSP23, HSP60, HSP70, and HSP90) is upregulated as a component of the pre-diapause response in <i>I. scapularis</i>, as well as in response to rapid changes in temperature that may typically occur throughout the winter. Students working on this project will be trained in tick rearing techniques, molecular skills (DNA/RNA extraction and PCR), data entry and analysis, physiological and behavioral studies, and much more.</p> <p>2. Determine strain diversity of <i>Borrelia burgdorferi</i> in <i>Ixodes scapularis</i> from a mainland site (Wells National Estuarine Research Reserve).</p> <p>In the northeastern United States, strain diversity of the agent of Lyme disease, <i>Borrelia burgdorferi</i>, has been attributed to host (wildlife) biodiversity at sites where <i>Ixodes scapularis</i> ticks are present. The maintenance of this strain diversity is potentially due to balanced selection based on adaptive advantages for particular strains in particular reservoir hosts, indicating that some hosts, such as rodents, may affect the prevalence of pathogenic strains on the landscape.</p> <p>Students will examine questing <i>I. scapularis</i> nymphs for different strains of <i>B. burgdorferi</i>, comparing 2019 and 2020 cohorts. These nymphs, as larvae in 2018 and 2019 respectively, would have been active in years with very high small mammal abundance (2018) vs a year with low small mammal abundance (2019). Despite a decrease in rodents such as white-footed mice and eastern chipmunks, abundance of possible avian reservoirs, such as common yellowthroats, at Wells have remained consistent. Data could also be</p>

	<p>collected from hosts themselves in 2020, via small mammal trapping and assisting with live bird mist-netting surveys</p> <p>3. Ecological aspects of the transmission of Powassan virus (lineage II) at the Wells National Estuarine Research Reserve.</p> <p>Powassan (POW) virus is a pathogen within the tick-borne encephalitis complex which exists in two serologically indistinguishable lineages in North America. The second lineage, lineage II, is the most prevalent and exists in a zoonotic cycle between white footed mice and the prominent tick species <i>Ixodes scapularis</i> (deer tick) and is appropriately named deer tick virus (DTV). Incidence of human infection with POW is on the rise: Only 27 cases between 1958-1998 and 86 cases between 2003-2019 (this may be due to rising deer tick populations in North America).</p> <p>Our current research suggests POWV may exhibit nidality, meaning it exists in small microhabitats (foci) consisting of just the right mixture of environmental factors for the virus to propagate. Students working on this project will be collecting ticks from the vegetation and birds and mammals at the Wells National Estuarine Research Reserve. Ticks will be brought back into the laboratory and tested for the presence of POW RNA. Students will learn field collection techniques, laboratory skills such as DNA/RNA extraction, PCR, and genetic analysis, lab safety, data recording and analysis, etc.</p>
<p>Description of Research Environment</p>	<p>Students will conduct research in the Vector-borne Disease Laboratory at Maine Medical Center Research Institute. Our research team is comprised of six individuals with various backgrounds in vector-borne diseases. Dr. Smith, the PI of our lab, is an infectious disease physician with research interests in molecular epidemiology and ecology of emergent vector-borne diseases (Lyme disease, babesiosis, anaplasmosis, Powassan encephalitis, eastern equine encephalitis), as well as clinical recognition and diagnosis of emergent vector-borne diseases. Other team members include: Susan Elias (data guru and statistician), Charles Lubelczyk (field ecologist), Rebecca Robich (molecular biologist), Danielle Cosenza (molecular biologist), and Elizabeth Henderson (field biologist).</p>
<p>Skills the research intern might learn during an internship:</p>	<ul style="list-style-type: none"> -Field collection techniques (e.g. tick flagging and/or mosquito trapping) -Tick (to species) and/or mosquito (to genus) identification -RNA/DNA extraction -PCR -Cloning, sequencing, and other genetic analysis -Proper data collection, entry, and statistical analysis -How to maintain a laboratory notebook -Laboratory safety -How to give a good presentation (poster and/or oral)
<p>Skills that might be helpful for a student to have when they enter the internship:</p>	<ul style="list-style-type: none"> -Basic coursework in biology, microbiology, ecology, and genetics -an interest in infectious diseases, including vector-borne diseases -a willingness to work in the field, as well as the laboratory -works well independently, as well as part of a team -Basic knowledge of molecular techniques (PCR, DNA/RNA extraction, etc.)
<p>Examples of past research intern projects:</p>	<p>1. Focal Transmission of Powassan virus (lineage II) at the Wells National Estuarine Research Reserve.</p> <p>This project sought to determine whether or not Powassan virus (POWv), which is transmitted by the bite of a deer tick, exists in small pockets in nature, dependent on habitat type. Students tested 5 different habitat types: shrub, forest with invasive plant species in the understory, forest with native species in the understory, open field, and edge (i.e. where open field meets forest). Students collected ticks on a weekly basis by the flagging technique and tested the ticks for the presence of POWv RNA by PCR. Students learned both field and laboratory techniques, and also had an opportunity to analyze and present their data to other scientists.</p>

2. Pesticide Resistance Monitoring in Mosquitoes Collected from Southern Maine, 2019 using the CDC Bottle Bioassay.

Over time and through repeated use of an insecticide, insecticide resistance can occur in mosquito populations, resulting in an overall reduction in the effectiveness of the mosquito control efforts. It is expected that resistance will be greatest in areas where spraying is common. The Maine Center for Disease Control (CDC) has contracted with the Vector-borne Disease Laboratory (VBDL) at MMCRI to trap and test mosquitoes for resistance to certain insecticides. Students collected mosquito eggs from sites where spraying is known to have occurred as well as from sites where spraying is thought not to have occurred. Mosquito eggs were brought back to the laboratory, reared to adults in the insectary, and then tested for pesticide resistance using the the Centers for Disease Control and Prevention's Bottle Bioassay. Insecticides tested were: sumethrin, permethrin, and bifenthrin. Students recorded testing data, and analyzed and reported diagnostic dose testing results to the Maine CDC.

Project Description

A MaineHealth Member

Research Mentor Name:	Kristen Woodberry PhD
Department:	Center for Psychiatric Research (66 Bramhall Street, Portland, ME - 2nd floor)
Description of Research Interests	My research examines the dynamics of daily affect, thoughts, and social context in adolescents and young adults with psychotic-spectrum symptoms. We work closely with the Portland Identification and Early Referral Program (PIER).
Description of possible project(s) an intern might work on this summer:	A student would have the opportunity to examine some aspect of the relationship between social context, stress, sleep, substance use, and mental health experiences in young people with and without psychotic-spectrum symptoms.
Description of Research Environment	The student would spend most of their time within an outpatient psychiatric clinic setting where they would have the opportunity to observe the functioning of a specialized clinical team providing early intervention services for young people with symptoms of serious mental illness. They would also have the opportunity to interact with a research team, including clinical interviewers, a postdoctoral fellow and research assistants, learning many aspects of psychiatric research and sitting in on interviews and groups as scheduling allows.
Skills the research intern might learn during an internship:	data entry, statistical analyses, and preparation of a scientific presentation and poster focused on early intervention in psychiatry; exposure to the statistical software packages and languages (R and SPSS); preparation of scientific tables, graphs, and other visual representations of findings consistent with psychology and psychiatry standards; exposure to cognitive behavioral therapy for psychosis (CBT-p), social skills training (SST) or cognitive enhancement therapy (CET) for schizophrenia, multifamily group psychoeducation, and possibly other evidence-based treatments.
Skills that might be helpful for a student to have when they enter the internship:	maturity, exposure to own or others' experiences with mental health challenges, ability to accept instruction and feedback, to work independently, to attend to details, to maintain confidentiality, and to problem-solve challenges. Coursework in Abnormal Psychology or the equivalent, experience conducting scientific literature reviews, facility with MS Word, Excel, and Powerpoint are ideal.
Examples of past research intern projects:	Differential diagnosis of autism and psychosis; Patterns of cannabis use in psychotic-spectrum youth.