

***UNIVERSITY OF MASSACHUSETTS
MEDICAL SCHOOL
OFFICE OF MEDICAL EDUCATION***



***MEDICAL STUDENT
SUMMER RESEARCH FELLOWSHIPS***

***CATALOGUE
2008***

Directors:

Michael Godkin, PhD

Family and Community Medicine

Anthony Poteete, PhD

Molecular Genetics and Microbiology

Program Coordinator:

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Office of Medical Education

TABLE OF CONTENTS

<u>Subject Area</u>	<u>Project Number</u>
Cancer	1 – 5
Cardiovascular	6 – 12
Cell Biology	13 – 14
Genetics	15 – 16
Immunology	17 – 19
Infectious Disease	20-21
Medical Education	22
Neuro/Psych	23 - 26
Public Health	27 - 36
Public Health	28 – 36
Radiology	37
Surgery	38 - 41

1. Cancer

TITLE: Visualizing Cancer Development at Subcellular Resolution in Time Lapse

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UMMHC
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Description: In spite of years of progress, the diagnosis of cancer still requires a pathologist to examine a biopsy under the microscope. All of the highly varied criteria that pathologists use for diagnosis of the various types of cancer are based on “snap-shot” images of fixed (dead) cells. Surprisingly, almost nothing is known about how or why cancer cells are structured differently from normal cells! My lab has shown that the genes that cause cancer also directly cause the particular changes in cell structure that are diagnostic of the type of cancer that they produce. We recently have shown that the tyrosine kinases RET/PTC and TRK/PTC induce a loss of histone H3 methylation, and that this loss is associated with a diagnostic dispersal of heterochromatin, and to the development of diagnostic nuclear envelop irregularity. This summer research project will allow the dynamics of irregularity of nuclear shape to be studied in time lapse, in cells’ native microenvironment, and correlated with the histone modification. Students will learn about the cell biology of cancer with a high likelihood of contributing to a published study. An ideal student will bring some computer expertise to allow the confocal microscopy images to be converted to 3-d images, strung into a movie, and analyzed to relate the dynamics of the nuclear lamina to particular phases of the cell cycle, to down-stream signaling pathways, and to particular cytoskeletal elements.

Student’s Role: Assistance with procuring human tissue samples and culturing human cells; adenoviral or retroviral infections to introduce a green-fluorescent protein conjugated to lamin A and tyrosine kinase constructs into the human tissue sample to allow the nuclear envelope to be visualized; assisting with confocal microscopy and manipulating and analyzing the confocal images. An optional project is to help develop a rapid flow cytometric assay for the histone modification induced by RET/PTC.

Interview: Required

Location: Tissue will be procured at Memorial or University campuses. Tissue culture work will be performed at Biotech 3. Confocal microscopy, flow cytometry and computing stations are in the Medical School.

2. Cancer

TITLE: Under-utilization of Surgical Therapy in Hepatocellular Carcinoma

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University Campus
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Description: With the world-wide epidemic of hepatitis C and migration of individuals from endemic countries to North America, the incidence of hepatocellular carcinoma (HCC) is increasing. With treatment options of liver transplantation, resection, ablation, the optimal management for HCC remains controversial. For selected patients, liver transplantation offers superior results, but the prolonged time on the waiting list may negate this apparent survival advantage. Resection and ablation are potentially curative options in patients with small tumors and adequate liver reserve. Although significant advances in the diagnosis, management and surgical approach to HCC have been made in the last 15 years, a large majority of patients with HCC in the United States (US) do not undergo curative treatment for their cancer (1). Furthermore, significant regional, socioeconomic and racial differences in access to definitive treatment and care for HCC exist in the US. The explanation for this is not quite clear, but represents an important dilemma facing cancer care in the coming years due to the rising rates of HCC. *Using population based data, we propose to determine if these differences exist in the current era and if this variation and under-utilization may contribute to the poor outcomes after diagnosis of HCC.*

Studies will be conducted using administrative databases such as Nationwide Inpatient Sample, state discharge registries from New York and Florida and Surveillance, Epidemiology, and End Results (SEER). These registries allow unbiased analysis free of referral patterns and patient selection inherent with single-center studies.

Student's Role: Initiate and create database for analysis. Construct hypothesis for investigation and carry out study with supervision.

Required Skills: Computer programming and basic statistics. Advanced computer skills with understanding of Word, Excel and potentially SAS or SPSS would be recommended.

Interview: Required

Location: Department of Surgery and Surgical Outcomes Analysis and Research Offices.

3. Cancer

TITLE: Identification and Characterization of a Plant Preparation on Tumor Cell Selective Cytotoxicity and Apoptosis Induction

Jason J. Chen, PhD
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UMass Medical School
Department of Medicine
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Project Description: The project is designed to identify and characterize novel therapeutic treatment against HPV-associated malignancies. Our preliminary studies have demonstrated a tumor specific growth inhibition and apoptosis induction in cervical cancer cells by plant *B. javanica*. Next, we plan to (1) To purify bioactive ingredients from an aqueous extract of *B. javanica* using LC/MS. (2) To identify bioactive ingredients from *B. javanica* using a combination of techniques including nuclear magnetic resonance (NMR) and MS. (3) To characterize bioactive ingredients from *B. javanica* for ability to induce apoptosis in cervical cancer cells and inhibit tumor growth in an animal model.

Student's Role: To characterize bioactive ingredients from *B. javanica* for ability to induce apoptosis in cervical cancer cells.

Required Skills: Basic molecular biology

Location: 360A, LRB

4. Cancer

TITLE: Pancreatic Neuroendocrine Tumors: A National Survey

**Jennifer F. Tseng, MD, MPH
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UMMC

University Campus

Department of Surgery, Clinical & Population Sciences, Cancer Biology

55 Lake Avenue, North, S3-752

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Description: The SEER-Medicare linked databases are powerful, complex databases that link cancer diagnoses from the Surveillance, Epidemiology and End Results database with Medicare claims data. We plan to query the SEER-Medicare databases to assess the epidemiology of Pancreatic Neuroendocrine Tumors (PNETs), including incidence, geographic distribution, stage, and other patient factors; treatment, including surgical resection, chemotherapy, and radiation therapy; and outcomes, including complications of treatment and overall survival.

Student's Role: Perform an extensive literature review of PNETs (single institution and national surveys), including our own ongoing research. Form preliminary hypotheses regarding the surgical and medical treatment of patients with PNETs and perform elementary statistical programming and analysis to prove or disprove these hypotheses

Required Skills: Basic statistics and computers knowledge

Location: UMass, S3-752

5. Cancer

TITLE: Breast and Cervical Cancer Screening in a Population of Immigrant Albanian Women

**Becky Briesacher, PhD
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**UMMC
Department of Medicine
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Description: Disparities in breast and cervical cancer screening have been documented in several subpopulations. This study examined screening rates in adult Albanian women who receive care at a federally qualified community health center. Based on an initial assessment, it appeared that overall, Albanian women 20-70 years old (n=298) were less likely than a comparison group (n=578) to be adherent to the site's cervical cancer screening guidelines, i.e., Pap smear test within one year of first visit ($p < .0001$); almost one-fifth aged 30-39 years had an abnormal Pap smear; compared to study site women aged 50-70 years, the proportion of same aged Albanian women demonstrated significantly lower adherence to breast cancer screening guidelines ($p < .0001$), i.e., mammogram within two years of first visit if 40-49 years old and within one year if over 50 years old.

Implications: Cancer screening monitoring should include population figures disaggregated by ethnicity and country of origin, particularly for women who have immigrated to the United States from countries where prevention screening is not the norm.

Proposed study: The purpose of this study is to deepen our understanding of their perceived barriers and facilitators to obtaining cancer screening tests. Work will build on a completed chart audit, verify abstracted information and add additional variables determined relevant through conducting a literature review. There is also potential to add a qualitative element through a series of focus group interviews with Albanian women.

Student's Role: Complete chart abstraction, develop data analysis plan, analyze data and contribute to writing results.

Required Skills: Spreadsheet and writing skills

Location: Fallon Community Health Plan

6. Cardiovascular

TITLE: Regulation of Transmembrane Signaling in the Heart

James Dobson, PhD

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University of Massachusetts Medical School

Department of Physiology

55 Lake Avenue, North

Worcester, MA. 01655

Description: Student would carry out a project involving the determination of how left ventricular function is affected by cardioactive agents in intact and genetically modified mouse hearts.

Student's Role: Student would carry out a project involving the determination of how left ventricular function is affected by cardioactive agents in intact and genetically modified mouse hearts .

Required Skills: None in particular, but perhaps an interest in small animal surgery.

Interview: Required

Location: UMass Medical School

7. Cardiovascular

TITLE: Regulation of Intracellular Signaling in the Heart

James Dobson, PhD

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University of Massachusetts Medical School

Department of Physiology

55 Lake Avenue, North

Worcester, MA. 01655

Description: Student would carry out a project involving the determination of how protein kinases and phosphates are affected by cardioactive agents in normal and genetically modified mouse hearts.

Student's Role: Student would carry out a project involving the determination of how protein kinases and phosphates are affected by cardioactive agents in normal and genetically modified mouse hearts.

Required Skills: None in particular, but perhaps an interest in cellular biochemistry.

Interview: Required

Location: UMass Medical School

8. Cardiovascular

TITLE: Platelet Reactivity in ED Chest Pain Patients

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Description: Emergency medicine physicians currently utilize a combination of history, physical exam, electrocardiographic (EKG) changes and cardiac markers of myocardial necrosis (i.e., presence of CK-MB and troponin-I) to risk-stratify patients presenting to the emergency department (ED) with chest pain and/or suspected acute coronary syndromes (ACS). However, early and accurate identification of patients with acute myocardial infarction *versus* stable or unstable coronary disease *versus* non-cardiac chest pain remains problematic, particularly in patients displaying atypical or inconclusive symptoms. Platelets are activated early on in the process of heart attack before myocardial damage is detectable using CK or Troponin lab testing. Various point-of-care devices have been developed to evaluate various components of primary hemostasis/platelet activity and some of these devices have been used to test whole blood samples of chest pain patients to see if they are able to distinguish the acuity of coronary disease. The Platelet Function Analyzer (PFA)-100[®] is one such device. It exposes citrated whole blood to shear forces similar to those found in stenotic arteries (44), and stimulates platelet activation/aggregation by aspirating anticoagulated blood (<1ml) through an aperture (150 μ m) on a membrane coated with collagen and either ADP or epinephrine. As the blood is drawn through the aperture a platelet plug forms which ultimately occludes the aperture and results in the reporting of a closure time (CT) (measured in seconds). This ongoing IRB approved study measures whole blood platelet activity in ED patients presenting with chest pain or suspected ACS and then follows patient outcomes to see if the measured activity correlates with outcome (i.e. presence of absence of ACS).

Student's Role: Students would be involved in patient enrollment in the ED; follow-up of in hospital patient outcomes (Requires Meditech access); Data analysis and management; and would learn the techniques for blood sample handling and using the PFA machine.

Required Skills: Basic patient interview skills, basic pipette skills for running samples.

Interview: Required

Location: University campus ED

9. Cardiovascular

TITLE: Comparison of Effects of Propofol and Methohexital Anesthesia on Blood Pressure in Electro-convulsive Therapy (ECT) and Use of Antihypertensive Medication during ECT Treatment

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**Tatyana Shteinlukht, MD, PhD, Department of Psychiatry
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**University of Massachusetts Medical School
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Description:

AIMS OF THE STUDY

1. Investigate the impact of methohexital vs. propofol on pulse and blood pressure response to ECT.
2. Identify the amount of anti-hypertensive medications required to control the cardiovascular response (pulse and blood pressure changes) in subjects treated with methohexital vs. propofol.
3. Study impact of methohexital vs. propofol on the seizure duration and seizure threshold.

BACKGROUND AND RATIONALE

Electroconvulsive therapy (ECT) is an effective treatment of such prevalent psychiatric illnesses as major depression, bipolar illness, schizoaffective disorder among others.

Cardiovascular response to ECT consists of four stages:

1. Initial parasympathetic (secondary to direct stimulation of brainstem nuclei) with decreased blood pressure and transient sinus bradycardia or asystole.
2. Sympathetic activation with significant raise of heart rate and blood pressure.
3. Parasympathetic reactivation which follows the end of the seizure.
4. Second phase of sympathetic hyperactivity upon awakening.

Hypertension and tachycardia could be more significant in patients with underlying cardiovascular disease.

Several anesthetic agents are used for anesthesia induction. One of them - methohexital is considered the drug of choice for ECT secondary its low cardiac toxicity (compared with other barbiturates), rapid action and low incidence of postanesthesia confusion (Mokriski et al, 1992). Propofol - the newer nonbarbiturate agent with even shorter half-life less cardiac toxicity (Villalonga et al, 1993).

Unfortunately propofol shortens seizure duration approximately by 40% in comparison with methohexital (Nettlebladt, 1988; Avramov et al, 1995).

There have been some studies comparing the abovementioned induction agents for ECT (Geretsegger et al, 1997; Rampton et al, 1989; Dwyer et al, 1988) in terms of their influence on blood pressure and pulse. We didn't find any literature data so far that comments on utilization of anti-hypertensive medications in patients who had methohexital vs. propofol induction.

We decided to perform a retrospective chart review to investigate the following:

1. Do methohexital and propofol differ in their impact on pulse and blood pressure response to ECT?
2. Does amount of anti-hypertensive medications required to control those changes vary in subjects treated with methohexital vs. propofol?

Compare influence of methohexital vs. propofol on the seizure duration and seizure threshold.

3) Design

This is retrospective study with review of appropriate number of patient charts who have had ECT treatment for major psychiatric disease. Usually these patients receive several treatments over a period of time. If there is enough number of patients with comparable results of treatment with propofol versus methohexital anesthesia, we will restrict our study to these group and if not we will compare all the patients who underwent ECT treatment over a similar period of time with either propofol or methohexital.

Student's Role:

1. Chart review
2. Data entrance into Microsoft XL
3. Statistical analysis using Microsoft XL
4. Preparation of manuscript for publication
5. Communication with other research team members

Required Skills:

1. Familiarity with Microsoft XL
2. Good communication and writing skills

Interview: Required

Location: 55 Lake Avenue, North, Worcester, MA 01655

10. Cardiovascular

TITLE: Evaluation of Patient Flow and Hypertension Planned Care Model at Hahnemann Family Health Center

**Gerry Gleich, MD
Jeanne McBride, RN, BSN, MM
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**UMass Medical School
Department of Family Medicine and Community Health
Hahnemann Family Health Center
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Worcester, MA 01605**

Description/Student Role: Hahnemann Family Health Center is looking for a medical student to take the lead in the development of a planned care intervention model for chronic disease with a focus on hypertension and to coordinate work on the patient flow improvement project. The aim is to collect information and data to identify opportunities and interventions which lead to significant improvements patient care, outcomes, and staff work life. The student, under supervision of the Hahnemann Quality Director and Family Medicine Quality Project Manager will assist in the design and implementation of a planned care model approach for hypertension care including a registry tracking system for The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure report 7 guideline measures such as lab work, medications, co-morbidities, blood pressure screening, patient education and MD follow up visits. Additional measures for other chronic illnesses may be included as determined by the Hahnemann Quality Leadership Team. The Hahnemann Quality Leadership team (Medical Director, Resident champion, Nurse Manager and Office Manager) and the student will establish quality goals for each measure and report to the Hahnemann leadership team on these outcome measures and trends. The student will work with the Hahnemann Quality Leadership team to establish a system for maintaining the planned care model beyond the summer start up phase.

Required Skills: Strong interest in improving patient care outcomes, an ability to work independently, good analytical skills, excellent communication skills, and Excel spreadsheet and/or Access competency.

Interview: Required

Location: Hahnemann Family Health Center

11. Cardiovascular

TITLE: Role of microRNAs in Angiogenesis

Nathan D. Lawson, PhD

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University of Massachusetts Medical School

Program in Gene Function and Expression

LRB617

Worcester, MA 01605

Description: Project involves identifying novel microRNAs that are expressed in endothelial cells followed by functional characterization using the zebrafish as a model system. Entails microinjection of zebrafish embryos with oligonucleotides that block miRNA function followed by analysis of vascular morphology and function in transgenic zebrafish. Also involves assay of miRNA expression via Northern blot and in situ analysis.

Student's Role: Work with post-doc to perform microinjections and characterization of resulting vascular defects, as well as expression analysis.

Required Skills: Basic laboratory skills, use of pipetman, some molecular biology skills would be preferred.

Interview: Required

Location: LRB670 P/Q

12. Cardiovascular

TITLE: Evaluation of the Effectiveness of a Rapid Response Team in Reducing IN-Hospital Cardiac Arrest, Hospital Mortality, and ICU Transfers at UMass Memorial Medical Center

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Family Medicine and Community Health
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Description: Under the leadership of Dr Luckmann in his role as a Physician Quality Officer, a Rapid Response Team (RRT) is being developed for implementation at both the University and Memorial campus hospitals. The team will consist of a hospitalist, a house officer, a primary nurse, a critical care nurse and a respiratory therapist as needed. It will respond to calls about patients outside of the ICU setting who are experiencing significant clinical deterioration that could lead to serious problems if not addressed promptly. The goal of the RRT is to reduce cardiac arrests on the floors, unanticipated admissions to the Intensive Care Unit (ICU) and overall hospital mortality. A pilot RRT is being planned for the early spring. To better understand the impact of this intervention, data will be collected and analyzed regarding changes in number of code calls to the floor, cardiac and respiratory arrests on the floors, ICU transfers, over all hospital mortality and patient and staff satisfaction. Currently baseline data is being collected and future measurement tools are being developed to determine the effectiveness of the intervention.

Student's Role: The student would participate in multiple areas of the intervention development as well as the research associated with it. Their main role would be in developing and managing databases containing current code call data, ICU transfer data, and mortality data. They would also be involved in analyzing the data and reviewing medical records as needed to supplement data that is available in structured form. They would attend all meetings of the RRT work group and would have the opportunity to learn about the implementation of an important quality assurance program and related medical quality theory and practice.

Required skills: Required skills include a basic understanding of descriptive statistics and either knowledge of statistical software or the willingness to learn.

Interview: Required

Location: UMass Memorial Medical Center

13. Cell Biology

TITLE: Insulin Signal Transduction and Mitochondrial Energy Metabolism

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University of Massachusetts Medical School

Program in Molecular Medicine

Biotech 2, Suite 107

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Description: We have recently discovered that adipose cells have a large number of mitochondria. These may be necessary to provide energy necessary for metabolic functions, such as lipid storage, adiponectin secretion, or glucose metabolism. The number of mitochondria in adipocytes from obese or diabetic mice and humans is decreased, but we don't know if decrease mitochondrial levels are a cause or a consequence of the disease. To address this question, we used siRNA to knockdown a transcription factor (tfam) that is necessary for the replication of mitochondrial DNA, and that encodes for proteins in the respiratory chain. In this way, we generated adipocytes that have decreased mitochondrial function. Interestingly, we find that insulin stimulation of glucose transport is impaired in these cells, indicating that mitochondrial deficiencies might cause insulin resistance, rather than be a consequence of it. Surprisingly, however, signal transduction by insulin, measured by Akt2 phosphorylation is actually increased in Tfam knockdown cells. Therefore, decreased mitochondrial function specifically impairs the link between Akt2 and GLUT4 trafficking.

The summer project will consist in further elucidating the connection between mitochondrial function, insulin signaling and GLUT4 trafficking. Students will perform knockdown of Tfam in adipocytes, and analyze the diverse signaling branches activated by insulin, such as the mTOR and MAP kinase pathways. The trafficking of GLUT4 in these cells will also be studied using Total Internal Reflection Fluorescence, an imaging technique that allows visualization of fluorescent molecules at the plasma membrane.

Student's Role: The student will learn and perform all experimental procedures involved. These include adipocyte culture, siRNA knockdowns, transfections, imaging and western blotting assays. Data will be analyzed jointly between the student, a graduate student supervisor and the PI (SC).

Required Skills: Interest in the project

Interview: Required

Location: Biotech 2, suite 107

14. Cell Biology

TITLE: The Role of Endoplasmic Reticulum (ER stress) in the Aging Process and Age-related Human Disorders

Fumihiko Urano, MD, PhD & Heidi Tissenbaum, PhD
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University of Massachusetts Medical School
Program in Gene Function and Expression
LRB 522 (Dr. Urano)
LRB 615 (Dr. Tissenbaum)
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Description: Proteins, which are synthesized in our cells, form the basic building blocks of cells, tissues, enzymes, and organs. However, newly made proteins cannot immediately fulfill this role. To become functional, the newly synthesized proteins must first mature inside a special compartment in the cell known as the endoplasmic reticulum (ER). Within the ER, the newly produced proteins obtain their proper three-dimensional form and mature so that the proteins can now carry out their functions; this process is known as protein folding. The ER has an essential function in this process, especially for secreted proteins and receptors such as insulin, amyloid beta, and serotonin transporter. Defects in these three proteins, respectively, cause diabetes, Alzheimer's disease, and bipolar disorder. Many studies suggest that many of the age-associated diseases are linked to defects in protein folding and hence ER function.

In humans, protein folding in the ER is crucial for proper health, growth and metabolism. However, the sensitive environment of the ER can be perturbed by pathological processes such as viral infections, environmental toxins as well as by physiological processes such as aging. In these conditions, there is increased demand on the ER such that proteins enter the ER at a rate faster than the ER can handle. Our cells have generated an adaptive response to combat the ER stress termed the unfolded protein response (UPR). Therefore, under normal conditions there is a tight balance in our cells between ER stress the UPR. However, when ER stress levels are too high or there is a defect in the UPR, cells cannot maintain ER homeostasis, leading to cell dysfunction and cell death. Importantly, human diseases associated with high levels of chronic ER include Alzheimer's disease, Parkinson's disease, and diabetes mellitus.

We seek to define the age associated component of both ER stress and the UPR. Our ultimate goal is to understand the relationship between ER stress and age-related human disorders, especially Alzheimer's disease and to develop a novel therapeutic modality for Alzheimer's disease.

Student's Role: To study the function of ER stress in aging using *C.elegans*.
To study the function of ER stress in age-related human disorders using tissue culture system.

Required Skills: Tissue culture
C.elegans genetics

Interview: Required

Location: LRB 5th and 6th floors

15. Genetics

TITLE: Molecular Mechanism of Gene Amplification

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University of Massachusetts Medical School

Department of Molecular Genetics and Microbiology

Room S6-119

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Description: Gene amplification is a well-known and biologically widespread mechanism in which a small portion of an organism's genome is selectively and repeatedly replicated, out of synchrony with the rest of the genome. The result is a cell that has many copies of one or a few genes, but only one or two copies of all the others. The amplified genes are typically expressed at elevated levels, commensurate with their elevated copy numbers. Gene amplification is known to play an important role in three key processes: (1) In the development of many animals, gene amplification is employed transiently to supply the products of particular genes at very high levels when needed. (2) Over-expression through gene amplification is one of the processes by which normal genes become cancer genes in tumorigenesis. (3) Amplification of genes conferring weak resistance to chemotherapeutic agents is a well-known mechanism by which both infectious agents and cancer cells can develop effective drug resistance.

Employing genetic engineering techniques, we have recently constructed a variant strain of the common laboratory bacterium *E.coli*, with a duplication of a weakly functional gene, called *lacIZ33*, in its chromosome. Placed under conditions which demand the function of *lacIZ33*, this strain exhibits a remarkably high frequency of amplification—higher than any chromosomal mutation event we know of in a cell with normal DNA replication and repair functions. It appears to be an ideal system for learning more about the molecular mechanisms underlying gene amplification.

The specific aims of the research are designed to answer two key questions: (1) Which of the cells many DNA recombination/repair functions are necessary for amplification? (2) How does variation in the structure of the amplified unit affect the efficiency of amplification?

The experimental approach will be based on genetics. Mutant strains lacking DNA recombination/repair functions will be constructed and tested for their ability to undergo amplification. Similarly, strains with structurally different precursor duplications will be constructed and tested. In constructing these strains, we will be making extensive use of chromosomal engineering techniques originally developed in our lab.

Student's Role: Working with the principal investigator on all aspects of the research.

Required Skills: Keeping good notes.

Location: UMMS, Room S6-110.

16. Genetics

TITLE: Targeted RNAi Delivery as Encapsulated Nanoplexes

Gary R. Ostroff, PhD

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University of Massachusetts Medical School

Program in Molecular Medicine

Biotech 2, Suite 113

373 Plantation St.

Worcester, MA 01605

Description: Our recent work in collaboration with Mike Czech has demonstrated that Glucan encapsulated siRNA Particles (GeRP) are an efficient oral delivery system for siRNA in vivo. Using this method we discovered that Mitogen Activated Protein 4 Kinase 4 (MAP4K4) is a novel mediator of murine macrophage inflammatory responses. Oral or systemic delivery of as little as 10 ug/kg MAP4K4 siRNA silenced MAP4K4 expression in macrophages recovered from the peritoneum, and spleen, liver and lung tissues in mice. Importantly, MAP4K4 knockdown inhibited the induction of the TNF α and IL-1 α inflammatory factor storm in response to lipopolysaccharide, and protected mice from lethality. These results provide a novel strategy for oral delivery of siRNA to sites of inflammation and attenuate inflammatory responses in a wide range of human diseases.

GeRP siRNA formulations are multi-layered nanocomplexes encapsulated inside hollow porous glucan shells. The proposed project will address the impact of positioning fluorescently-labeled siRNA in the central core versus as an outermost layer of a GeRP formulation. Model GeRP formulations will be synthesized and assessed for the kinetics of siRNA release in vitro, as well as release and distribution within the cell by microscopically tracking the fluorescent siRNA. The impact of controlling the kinetics of siRNA release on green fluorescent protein expression will be tested in an in vitro system.

These studies will test a synthesis strategy to control the timing of siRNA delivery.

Student's Role: The student will prepare the model GeRP formulations and carry out the experimental assessments under the direction of the PI.

Required Skills: Basic chemistry and biology laboratory experience
Sterile technique
Cell culture experience preferred

Interview: Required

Location: Biotech 2

17. Immunology

TITLE: How Recognition of Mannose and Beta-glucans Affects Immune Responses to Pathogenic Fungi

Stuart M. Levitz, MD
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Department of Medicine and Molecular Genetics & Microbiology
364 Plantation Street, LRB 317
Worcester, MA 01605

Description: To be supplied upon student request and after discussion with the student. The actual project would depend upon the student's interests and what is current in the lab.

Student's Role: The student will be given his/her project and will be supervised by a postdoctoral scientist.

Required Skills: Some experience with basic research would be a plus, but mainly enthusiasm and a willingness to learn

Interview: Required.

Location: LRB3

18. Immunology

TITLE: Innate Immune Signaling in Drosophila

Neal Silverman, PhD

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University of Massachusetts Medical School

Infectious Diseases

LRB 313

Worcester, MA 01655

Description: Innate Immune signaling in the fruit fly *Drosophila melanogaster* involves the detection of microbes, and the subsequent activation signal transduction cascades that culminate in the activation of NFkB transcription factors.

The summer project will involve the genetic characterization of a possible new component in this pathway.

Techniques to be used include RNAi, analysis of gene expression and possibly *Drosophila* genetics.

Student's Role: Solely responsible for this project.

Required Skills: Will train, but basic molecular biology would be a plus.

Interview: Required

Location: LRB

19. Immunology

TITLE: CFTR Gene Expression in Myeloid Cells and its Contribution to the CFTRdependent Hyper-IgE Allergy Mouse Model

**Terence Flotte, MD and Christian Mueller, PhD
(508) 856-4358**

**University of Massachusetts Medical School
Department of Pediatrics
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Worcester, MA. 01605**

Description: Cystic fibrosis (CF), the most common lethal, single-gene disorder affecting Northern Europeans and North Americans, is caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. CFTR is a chloride channel and a regulator of other ion channels, and many aspects of the CF phenotype are directly related to ion channel abnormalities attributable to CFTR mutation. What remains less clear, however, is how CFTR mutation leads to persistent endobronchial infection with *Pseudomonas aeruginosa* and severe airway inflammation which are the hallmarks of the lung pathology in CF. One theory, which remains controversial, contends that CFTR mutation primes CF cells to release greater quantities of pro-inflammatory cytokines than non-CF cells. One line of evidence in support of this theory is a *Pseudomonas* agarose bead airway infection model, in which CFTR knockout mice demonstrate greater weight loss and mortality and higher levels of pro-inflammatory cytokines than control mice. One of the limitations of this model has been its technical complexity and a wide variability of responses among individual animals.

Because of the need for a technically simpler mouse model for inflammatory lung disease in CF, our laboratory has recently developed a new approach based on *Aspergillus fumigatus* (Af) sensitization and challenge. This model reproduces certain key immunologic and pathologic aspects of allergic bronchopulmonary aspergillosis (ABPA) an inflammatory lung phenotype that is much more common in CF patients than in any other clinical context. In the animal model studies, CFTR knockout mice demonstrated up-regulated levels of IL4 prior to sensitization, and subsequent to sensitization developed a hyper-IgE response and markedly divergent cytokine expression (including increased IL13, IL4, IL2, IL10, and KC; and decreased IL5 and GM-CSF) as compared with non-CF mice (either littermates or strain background controls). While this CFTR-dependent inflammatory phenotype is potentially very promising, it has raised more questions than it answered. In particular, the divergence of expression of cytokines that are predominantly produced within lymphocytes, macrophages and other non-epithelial cells raises the possibility of an important role of CFTR itself in non-epithelial cells. The goal of this project is, therefore, to address the following question: Does knocking out CFTR in myeloid cells only contribute to the CF-dependent inflammatory lung disease phenotype in *Aspergillus*-sensitized CF mice? What pathways or other mechanisms might be aberrantly regulated in affected cells?

Student's Role: The student will be working alongside Dr. Mueller and under the guidance of Dr. Flotte and will be trained on modeling ABPA in CFTR^{-/-} mice. The student will also be involved in running IgE ELISA and cytokine assays as well as investigating gene expression in inflammatory pathways with quantitative Rt-PCR to help determine the role of myeloid cells in CF pathology.

Required Skills: The student will learn most of the necessary skills while working in the lab. The student has expressed previous experience with ELISA assays thus it is expected that the student will pick up the other skills quite easily.

Location: This research will be conducted in Dr. Flotte's laboratory in Biotech V.

20. Infectious Disease

TITLE: Phase II Randomized, Double Blind, Placebo Controlled Study of the Clinical Effectiveness of Human Monoclonal Antibodies to C. difficile Toxin A and Toxin B in Patients Being Treated for C. difficile Associated Diarrhea

Deborah C Molrine, MD
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Massachusetts Biologic Laboratories
University of Massachusetts Medical School
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Description: Clinical Affairs at MBL is responsible for managing phase I and II studies with monoclonal antibodies discovered and manufactured by MBL. In the role of the sponsor of the clinical trials, Clinical Affairs oversees the conduct of the trial at study sites. MBL designs the study protocol, prepares the clinical operation manual for the sites, designs the Case Report Forms and performs the data management activities for the trials. Clinical Affairs monitors the conduct of the study at each study site through site visits, teleconferences and internal tracking forms. Recruitment/enrollment tracking, safety data (adverse events), protocol deviations, medical coding and data queries are reviewed on an on-going basis by senior management in the department.

During the June - August 2008 time period, one phase II and two phase I studies should be active. Depending upon the status of those 3 studies during this time, the student will be assigned to work one on one with a Director overseeing that specific study. Specific tasks will be assigned to the student with the goal of increasing their knowledge about Good Clinical Practice to conduct clinical trials.

Student's Role: The student will be responsible for tracking study progress, compiling safety data, assisting with data review, attending study meetings and participating in study site visits and/or teleconferences.

Required Skills: No specific skills required.

Interview: Required

Location: Day to day activities will be at MBL located in Jamaica Plain (Boston)

21. Infectious Disease

TITLE: Enterococcal Bacteremia in the Era of Restricted Access to Gram Positive Antibiotics

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UMMC
Department of Medicine
Division of Infectious Diseases
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Description: Enterococcal bacteremia is a growing problem in the hospital setting. The emergence of vancomycin resistance has limited treatment options to newer antimicrobials that are expensive and have unclear efficacy. Bacterial resistance to these agents would severely limit the capacity of physicians to treat these infections. To prevent the development of resistance and to limit the cost of therapy three antibiotics (quinupristin/dalfopristin, linezolid, daptomycin) that have activity against vancomycin-resistant enterococcus have been restricted from use by general inpatient physicians unless approved by the Infectious Disease Service. It is possible that this restriction adversely affects patient outcomes if definitive therapy is delayed and if prolonged bacteremia is a result of this delay. We propose to perform a retrospective review of enterococcal bacteremic patients to address these concerns.

We propose a retrospective case-control study in which patients with vancomycin-resistant enterococcal (VRE) bacteremia are compared with vancomycin-susceptible enterococcal (VSE) bacteremia to assess 1) if definitive therapy for VRE is delayed as compared to VSE; 2) if patients with VRE have a prolonged duration of bacteremia; 3) if in hospital mortality differs between the two groups. We also feel that our institutions experience with treatment of VRE in the age of newer antimicrobials will be of general interest and worth reporting. Related to this we hope to describe patient associated factors such as disease condition, prior antibiotic use, and location within the hospital that might guide clinicians in the use of empiric therapy when enterococcal therapy is suspected.

Student's Role: The student would review medical records, both chart and electronic records, to gather data points to be analyzed in the study. The student would be required to take a short computer based course on research in human subjects prior to beginning the work.

Required Skills: Familiarity with basic clinical medicine including nomenclature. Analytical skills commiserate with completion of one year of medical school to assess the relevance of various data points. The student should have some familiarity with basic word processing and spreadsheets in order to enter data. All of these skills will be enhanced by direct tutoring from the principle investigator.

Interview: Required

Location: University Hospital and UMass records on Plantation Street

22. Medical Education

TITLE: Patient Decision-making and Personalized, Multifactorial Risk Information

Barry Saver, MD, MPH

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Barry.saver@umassmed.edu

UMass Medical School

Department of Family Medicine and Community Health

Benedict Building, A3-146

55 Lake Avenue, North

Worcester, MA 01655

Description: We have received funding from the Robert Wood Johnson Foundation for an exploratory study seeking to help patients with diabetes and other cardiovascular risks understand their multiple health risks, multiple risk reduction options, and the potential outcomes of these options and to evaluate if/how these persons use this information in prioritizing their personal risk reduction efforts. We are attempting to evaluate the different multivariate risk estimation models for diabetes-related outcomes to decide which we will use. Outcomes will be used to help guide further development of patient-orientated, personal risk communication efforts to improve patient-centered, informed decision making in diabetes care.

Student's Role: Work with subjects to explore understanding of their diabetes- and cardiovascular-related risks, present and evaluate personalized risk information, and interview subjects about their understanding of this information and how it affects their intentions for risk reduction activities. Learn basic qualitative analysis skills and participate in qualitative analysis of interviews.

Required Skills: Ability to speak with people in clear, simple language. Bilingual in Spanish would be a huge plus. Basic computer skills – Word, Excel

Interview: Required

Location: UMass Medical School and Family Health Center of Worcester

23. Neuro/Psych

TITLE: Face Processing in Typical, Autistic, and Down Syndrome Children

Teresa V. Mitchell, PhD

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University of Massachusetts Medical School

Eunice Kennedy Shriver Center

200 Trapelo Road

Waltham, MA 02452

Project Description: This project is designed to characterize how children diagnosed with autism or Down syndrome process human faces. Participants will complete a series of tasks in which they discriminate between individual faces, identify emotional expressions, or simply observe face stimuli. We will measure reaction time and accuracy in most tasks, eye gaze behavior in some tasks, and brainwave data in others. All participants will be between the ages of 8 and 14 years and a contrast group of typically developing children will be examined, as well. This is part of a larger project in which auditory perception and categorization behaviors will also be examined in the same subjects.

Student's Role: Assisting with data collection, data analysis, stimulus development, recruitment.

Required Skills: Familiarity with Excel and other spreadsheet packages, skills interacting with typically and atypically developing children and their families.

Interview: Required

Location: Shriver Center
Waltham, MA

24. Neuro/Psych

TITLE: Studying MS and Epilepsy

William Tosches, MD, FAAN

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WATMD1945@aol.com

UMASS

Department of Neurology

54 Hopedale Street

Hopedale, MA 01747

Description: *Seizures are associated with MS in <5% of MS patients. Recent pathology studies have shown a similarity in pathological and immunological findings between patients with temporal lobe epilepsy and similarly in patients with multiple sclerosis. The purpose of the project is to assess the frequency of seizures in a general population of MS patients (UMASS and MILFORD) as well as thru a literature search, to correlate the underlying pathology with the clinical presence of seizures in MS patients, and to utilize recent MRI research that identifies the axonal damage in MS with a putative etiology of the seizures. * *If possible, the potential neuroprotective effect of immunomodulating therapy in MS will be reviewed as a possible treatment for seizures.*

**

The purpose of this research is to familiarize the student with medical literature review, meta-analysis, and retrospective chart review of clinical data.

25. Neuro/Psych

TITLE: The Role of Dopamine Transporter Trafficking in Psychostimulant Addiction

Haley E, Melikian, PhD

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Brudnick Neuropsychiatric Research Institute

Department of Psychiatry

University of Massachusetts Medical School

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Description: Over the past decade, addiction to psychostimulants, such as cocaine and amphetamines, has reached epidemic proportions in the U.S. Despite focused efforts aimed at understanding the underlying mechanisms that contribute to the addictive process, much remains to be understood. In the brain, the primary site of action for psychostimulants is the plasma membrane dopamine (DA) transporter (DAT). DAT mediates presynaptic DA reuptake from the synaptic cleft, and DAT activity is critical in controlling dopaminergic signaling in the brain.

Psychostimulants bind to DAT and directly block DA reuptake, leading to increased extracellular DA levels. Moreover, psychostimulant binding to DAT is absolutely requisite for addictive behaviors. In addition to blocking DAT function, amphetamine has pronounced effects on DAT trafficking to and from the plasma membrane. However, it is not known whether amphetamine-induced DAT trafficking plays a central role in psychostimulant addiction. The current project will test this possibility by generating transgenic mice that express trafficking-defective DATs.

These mice will be used in a variety of biochemical, imaging and behavior studies to directly test the physiological role of DAT trafficking in synaptic transmission and the addictive process.

Student's Role: The student will generate targeting constructs to introduce trafficking-defective DATs into mouse ES stem cell lines. Students will gain experience in PCR, DNA sequence analysis and a wide variety of molecular biology approaches.

Required Skills: Prior coursework in biochemistry and molecular biology. Prior molecular biology experience a plus, but not required.

Interview: Required

Location: BRNI

26. Neuro/Psych

TITLE: Correlation Between Olfactory Loss and Mood Disturbances in Parkinson's Disease

**Julie G. Pilitsis MD, PhD
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**UMass Medical School
Department of Surgery, S2-855
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Worcester, MA 01655**

Description: The diagnosis of Parkinson's Disease remains a clinical diagnosis and up to 40% of patients are initially misdiagnosed. Furthermore, patients and their families report that subtle symptoms are often present from 2-5 years before this diagnosis is reached. By the time motor complications of the disorder present, neuropathological studies reveal that an eighty percent reduction of striatal dopamine has already occurred. Thus, in order to evaluate the potential efficacy of neuroprotective strategies, early disease recognition is essential. It has become increasingly recognized that olfactory loss occurs during the pre-motor stages of Parkinson's Disease. However as a diagnostic test, olfactory loss lacks the sensitivity to be useful in clinical diagnosis as a stand alone test; however the use of quantitative olfactory loss in combination with other objective data has not been documented. Another well-recognized prodromal symptom of Parkinson's Disease is changes in mood. In fact, subtle mood disturbances are noted in up to 40% of patients in early Parkinson's Disease. Neuropsychological testing however is not routinely employed as a clinical diagnostic tool. The purpose of this study is to assess the frequency and severity of mood disorders in patients with early Parkinson's Disease using a battery of tests and to determine whether there is any correlation between the development of mood disturbances and olfactory loss. Changes in olfactory perception has been reported previously in patients with depressive disorders. In order to evaluate the relationship between olfactory loss, mood disorders and Parkinson's Disease, three groups of patients will be recruited: 1. patients with early Parkinson's Disease (Hoehn and Yahr Stage 2 or less), 2. patients with motor complications of Parkinson's disease (Hoehn and Yahr Stage 3 or greater), and 3. age matched controls. All patients will undergo olfactory testing using the University of Pennsylvania Smell Identification Test. Mood disturbances will be evaluated using the non-motor symptoms questionnaire, apathy evaluation scale, frontal systems behavioral scale, and Beck Depression Inventory. Correlations between olfactory loss and mood and cognitive changes will be assessed. Ideally, the use of olfactory testing combined with limited neuropsychological testing will provide an increasingly sensitive means of diagnosing patients with early Parkinson's Disease.

Student's Role: The student will be involved in patient recruitment for this study in collaboration with the Clinical Trials Unit, will be trained on the administration of the above neuropsychology testing/olfactory testing under the guidance of the established multidisciplinary Parkinson's Disease team (myself, Dr. Paula Ravin, Dr. Peter Novak, Dr. Joan Swearer), will be responsible for data collection, and will assist in data analysis.

Required Skills: Excel, SPSS

Location: University Campus

27. Public Health

TITLE: Lawrence Latino Diabetes Prevention Project (LLDPP)

Barbara Olendzki, RD MPH, LDN; Yunsheng Ma, MD, PhD;

Ira S. Ockene, MD and Phil Merriam, MSPH

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**University of Massachusetts Medical School
Division of Preventive & Behavioral Medicine;
and the Division of Cardiovascular Medicine
Shaw Building
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Project Description: The LLDPP is a translational research project supported by NIDDK for the prevention of type 2 diabetes among Latinos at high risk for the development of diabetes. Individuals at elevated risk for diabetes (based on the Stern predictive equation) were identified, screened for study participation, and randomized to either a usual care or intervention condition. The intervention is a modified group-based Diabetes Prevention Program (DPP) protocol tailored to the Latino culture and low-literacy. Participant measures include demographics, Stern equation components (age, gender, ethnicity, fasting glucose, systolic blood pressure, HDL-cholesterol, BMI, and family history), glycosylated hemoglobin, diet, physical activity, depression, social support, quality of life, cost, and medication use. Weight is measured at baseline, 6-months and one-year; and all others assessed at baseline and one-year. Survey measures were adapted for oral administration in Spanish.

Student's Role: The student project will categorize medication data collected from LLDPP study participants at baseline and one-year. Examinations will include categorizing frequency of top therapy classes (behavioral, analgesics, gastric acid secretion inhibitors, etc), and the top drugs by frequency within the population, number of participants taking any medication, and mean number of medications taken by participants. Possible medication categories include: lipid-lowering medications, antihypertensive medications, hyperglycemic agents, antidepressant medications, weight loss medications or supplements, stool softeners/laxatives, analgesics, narcotics, antipsychotics, gastric acid secretion reducers, antivirals and protease inhibitors. We also plan to look at vitamin and mineral supplements, herbs and other medicinal preparations. We will examine the frequency of each medication and medication category by Stern formula, demographic characteristics, and other variables of interest, both cross-sectionally and longitudinally by control and intervention groups.

Required Skills: Interest in learning about diabetes prevention. Completed pharmacology courses, and basic understanding of statistics and epidemiology are preferred. Spanish speaking a plus.

Interview: Required

Location: UMMS Shaw Bldg, 2nd floor

28. Public Health

TITLE: Evaluation of the YWCA/YMCA-Family Health Center Exercise Program

Lucy Candib, MD

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Family Health Center of Worcester

Department of Family Medicine and Community Health

26 Queen Street

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Description: Why do some low-income patients from Family Health Center (FHC) make physical activity a part of their routine once offered open access to the YWCA and YMCA facilities while others with the same exposure and opportunities do not? Using visit data gathered from four years of patient exercise activity, the student will help the study team analyze and identify patterns of physical activity. In addition, building on a small pilot series of interviews with several patients who do and others who do not exercise frequently at the Y facilities, the student will have the opportunity to expand on these guided discussions related to patients' views of barriers and facilitators to incorporating exercise into their weekly routines. This qualitative data will help us understand the "story" behind the quantitative data. With three years of exercise data already entered into a database, the student will also have the opportunity to become acquainted with database development and management by entering the final year of exercise activity into the current database.

Student's Role: Conduct interviews, enter and analyze data, participate in team meetings, write report and contribute to development of a manuscript for publication.

Required Skills: Good interpersonal, interview and writing skills; database development and maintenance, data analysis.

Interview: Required

Location: Family Health Center, YWCA, YMCA

29. Public Health

TITLE: Injury Prevention

Michael Hirsh, MD

Contact Person: Carol Carpenter

(508) 793-6016

UMass

Department of Surgery/Division of Pediatric Surgery

55 Lake Avenue North

Worcester, MA 01655

Project Description: While research determines where most injuries take place and which ones most prevalent and severe, most of the injuries addressed occur in urban environments, and injury prevention team members work to empower the diverse populations who live there. They do so by helping people to make their communities safer and they do it in a manner that is respectful of various cultures, beliefs, and lifestyles. Current Projects include: Teen driving safety, elder fall prevention, car seat safety, gun safety, home safety, playground safety and bicycle safety.

Student's Role: Student will oversee a project from start to finish including: Literature review, needs assessment, program design and implementation and program evaluation.

Required Skills: Must be able to work independently and exhibit strong initiative and self-starting skills. Must have an interest in preventing childhood injury.

Interview: Required

Location: University and Hahnemann Campus, Community at Large

30. Public Health

TITLE: Identification of Inpatients Appropriate for a Hospice Conversation

**Mary A. Valliere, MD & Julia Gallagher, MD
(508) 334-8630**

**UMMMC
Department of Medicine
Division of Palliative Medicine
119 Belmont Street
Worcester, MA 01605**

Description: Hospice services are available to patients of all ages with a limited life expectancy, usually of six months or less. Multiple studies have shown however that less than 30% of all patients dying receive this state of the art, comprehensive care at the end of their life. Many barriers have been identified that may contribute to this percentage, but no study has been conducted that looks at what the appropriate or ideal percentage should be if the service was offered to all patients who meet criteria for admission. Barriers have been believed to interfere at all steps in the process of identification of appropriate patients, referral and subsequent enrollment in the service, but no study has been conducted to breakdown the steps of the process and analyze the barriers for inpatients. Patients admitted to a hospital are particularly likely to have a chronic and progressive illness and are likely to have at least one admission in the last year of their life. The focus of this study is: Are these patients being identified as appropriate for a conversation about hospice by their inpatient physicians, and if so, is that conversation taking place before discharge decisions and planning are carried out?

This study will attempt to use a standardized chart review screening tool to identify patients likely to qualify for hospice services and compare the patients identified by this tool with the inpatient physician's evaluation of the appropriateness for referral to hospice of that patient. Our opinion is that this step in the hospice evaluation process is a key determinant of referral rates and could represent a step where intervention and education may significantly improve the referral rates to hospice.

Student's Role: The student will be trained to apply the screening tool to a selected group of admitted charts for this quality improvement process. They will also facilitate the administration of a questionnaire to the inpatient physician responsible for those patients and will then compare results of charts screened with the responses from the hospitalists. The next level of evaluation could involve chart review to see if there is documentation of the topic of hospice being discussed with the patient and/or family prior to discharge/ discharge planning.

Student's Skills The ideal student would have experience in/or knowledge of hospice and end stage diseases, but will be trained if no experience. Attention to detail, independent time management, and reliability are important skills. An interview will be conducted with the student to assess their interest and past experience with hospice type of care.

Interview: An interview will be conducted with the student to assess their interest and past experience with hospice type of care.

Location: The student will spend most of their time on the inpatient units at both campuses of the UMMC, as well as in the division offices of Palliative Medicine.

31. Public Health

TITLE: Promoting Influenza Vaccination in Medical School

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UMass Medical School

Department of Family Medicine and Community Health

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Description: Despite the evidence supporting influenza vaccination, many eligible individuals do not receive vaccinations. Rates of immunization among health care providers are ~65% nationally. Physician rates are similar. What are we doing to encourage doctors to take this step? In a single, site specific study, medical students appear to receive influenza vaccines at similar rates – despite the reality that medical students are at higher risk than the general population due to exposures in longitudinal clinics and clinical clerkships. Furthermore, medical school may be an opportunity to influence their future patterns of receiving and counseling on influenza vaccination.

We propose to study: what are the rates of influenza immunization nationally among US medical students? What are US medical schools doing to promote influenza immunization for their students? By administering a survey to student health directors at all US medical schools.

Student's Role: Student will develop a brief pilot survey, run a small focus group to test the survey and revise accordingly. Student will identify appropriate contacts for survey respondents and seek to maximize response rates. Student will share in data entry and analysis, with opportunity to submit abstract to local and national meeting. Estimate a small amount of pre-work and 4 weeks of more focused effort.

Required Skills: Interest and perseverance

Interview: Required

Location: UMass campus

32. Public Health

TITLE: Relationship Between Early Use of Magnetic Resonance Imaging (MRI) for Acute Occupational Low Back Pain (LBP) and Length of Disability, Medical Costs, Surgery and Late Opioid Use

**Glenn Pransky, MD
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(Webster, Barbara (PI), Cifuentes, Manuel)**

**Liberty Mutual Research Institute for Safety
Center for Disability Research
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Description: Background

Magnetic resonance imaging (MRI) for acute low back pain (LBP) may reveal abnormalities that are poorly correlated with symptoms; with disc herniations found in approximately 30% of asymptomatic subjects (Boden et al.; Jensen et al.; Jarvik and Deyo). For most patients with disc herniation and radiculopathy, the natural history is for improvement within the first month with conservative management (Vrooman et al.) and there is no evidence that routine imaging should alter treatment decisions nor improve outcomes (Gilbert et al.; Modic et al.). There is evidence that obtaining an early MRI could lead providers to order additional and possibly unnecessary interventions and also lead to prolonged disability (Jarvik et al.; Lurie et al.; Mahmud MA, et al.).

Evidence based clinical practice guidelines for the management of acute LBP therefore suggest that magnetic resonance image (MRI) may be considered, in the absence of “red flags” and following four weeks of conservative care, in patients with sciatica with persistent activity limitations and physiologic evidence of neurological dysfunction (Bigos et al.; Chou et al.). MRIs are then indicated if surgery is being considered to provide anatomic definition of a suspected herniated disc.

Despite the guideline recommendations, there is evidence that MRIs are frequently ordered prematurely or without a clear indication, particularly in workers compensation populations (Mahmud MA, et al.; Carragee et al.). A recent prospective study of subjects with baseline and post-LBP MRI monitoring, reported that those with compensation claims (both WC and personal injury claims) were more likely to have an MRI, have it sooner, and have a second scan, but the scans were unlikely to demonstrate significant new findings (Carragee et al.). An analysis of an existing workers compensation administrative data set of acute, disabling LBP claims found that over 20% of the claimants had an MRI in the first four weeks of care and over 40% had at least one MRI during the two-year study period – far exceeding what would be expected based on guideline recommendations.

The purpose of the study is two-fold, first to describe the epidemiology of MRI diagnostic testing for workers’ compensation population with acute LBP including timing of the testing in relation to time of LBP episode, repeated MRI testing, and possibly the geographic variation of MRI testing. Secondly, to test the null hypothesis that early use of MRI diagnostic testing in workers’ compensation population for acute LBP is not a significant risk factor for increased length of disability, higher medical costs, receipt of surgery, and receipt of late opioids after controlling for other factors.

Supervision by Principle Investigator (PI): Initially daily to orient student to the project, then transitioning to weekly. PI will generally be available daily to answer any questions.

Student's role on the study team:

- Updating literature review, searching for new, relevant references
- Search for and abstract MRI reports from Liberty Mutual's electronic claims files and categorize MRI findings
- May include basic data entry and data analysis

LMRIS Orientation:

- If the student has not already visited LMRIC, they will be given an introduction to the Institute and a tour of the facilities.
- Orientation will include a brief overview regarding the project proposal and development process at the Research Institute (Director's proposal, technical and human subject review).
- IRB Approval: The study will have LMRIS's Institutional Review Board (IRB) approval prior to student's arrival. U Mass IRB approval is not necessary.
- IRB Training: If the medical student has not already undergone IRB training at their institution, they will be required to take an on-line training course the first day at LMRIS before accessing or looking at personally identifiable claims data. If the student has undergone IRB training, they are required to provide a copy of their completion certificate.
- The student will read and sign a LMRIS Internship Agreement

Training:

- Accessing ExPRS (active workers compensation electronic claim files including narrative claims management files and medical reports) - including training on accessing MRI data from electronic data files
- Accessing BOCOMP (another workers compensation electronic claim file that has medical billing information)
- Categorizing MRI findings based on radiology reports

Computer and access requirements (provided by LMRIS):

- Computer with Internet access to access ExPRS and BOCOMP
- RACF ID for ExPRS (including EDM approval) and BOCOMP (including approval to access individual medical billing information)

Interview: Required

Location: Liberty Mutual Research Institute for Safety (LMRIS)
71 Frankland Road
Hopkinton, MA

33. Public Health

TITLE: Effectiveness of Low Back Pain Health Maintenance Treatment Strategies (PI Radek Wasiak)

**Glenn Pransky, MD
(508) 497-0234**

**Liberty Mutual Research Institute for Safety
Center for Disability Research
71 Frankland Road
Hopkinton, MA 01748**

Description: The objective of this retrospective cohort study is to examine effectiveness of chiropractic care aimed at maintaining achieved health outcomes in comparison with physical therapy and physician-directed care. The proposed investigation builds upon our past research which focused on utilization, timing, and duration of chiropractic care among individuals with work-related low back pain and their association with return-to-work outcomes. In this study, using existing data on health care utilization and time away from work, we will examine the extent of health care utilization after the first return to work is attempted and the relative effectiveness of various types of care in preventing further lost work time. As chiropractic care is a common mode of treatment for low back pain, developing new information about effectiveness is a high priority.

Supervision by Principle Investigator (PI): Initially daily to orient student to the project, then transitioning to weekly. PI will generally be available daily to answer any questions.

Time Commitment: Mon. – Fri., 6/2 – 7/25 (8 weeks total) from 8:30 – 4:45

Study type: Retrospective cohort study of workers' compensation (WC) claims using administrative claims data. The study does not involve human subject interaction.

Student's role on the study team:

- Updating literature review, searching for new, relevant references
- Refine and implement data abstraction from Liberty Mutual's electronic claims files in order to correctly classify physical medicine cases
- May include basic data entry, coding, and data analysis

LMRIS Orientation:

- If the student has not already visited LMRIS, they will be given an introduction to the Institute and a tour of the facilities.
- Orientation will include a brief overview regarding the project proposal and development process at the Research Institute (Director's proposal, technical and human subject review).
- The study will have LMRIS's Institutional Review Board (IRB) approval prior to student's arrival. If the medical student has not already undergone IRB training at their institution, they will be required to take an on-line training course the first day at LMRIS before accessing or looking at personally identifiable claims data. If the student has undergone IRB training, they are required to provide a copy of their completion certificate.
- The student will read and sign a LMRIS Internship Agreement

Training:

- Accessing ExPRS (active workers compensation electronic claim files including narrative claims management files and medical reports)
- Accessing BOCOMP (another workers compensation electronic claim file that has medical billing information)
- Examining billing data for medical care.

Computer and access requirements (provided by LMRIS):

- Computer with Internet access in order to get data from internal claims file systems (ExPRS and BOCOMP)
- RACF ID for ExPRS (including EDM approval) and BOCOMP (including approval to access individual medical billing information) - approvals needed to access this data

Interview: Required

Location: Liberty Mutual Research Institute for Safety (LMRIS)
71 Frankland Road
Hopkinton, MA

34. Public Health

TITLE: Racial and Socioeconomic Disparities in Colorectal Cancer

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University of Massachusetts Medical School

Family Medicine and Community Health

Biotech IV

Worcester, MA 01605

Description: This is a multifaceted project involving the use of national databases and National Cancer Institute trial data to study the mechanisms of racial-ethnic and socioeconomic disparities in colorectal cancer. The data sources include the National Health Interview Survey, Medicare Current Beneficiary Survey, The Prostate, Lung, Colorectal and Ovarian cancer screening trial, the NIH-AARP study and data from the HMO Cancer Research Network (a collaborative project with the NCI). The project also involves projects using community-based participatory research approaches with local health care providers and community groups. These efforts involve the design of fundable research projects with the community partners as full partners using mixed (qualitative and quantitative) methods.

My portfolio also included research on youth tobacco access that is performed in collaboration with Dr. Joseph DiFranza - a renowned youth tobacco control researcher.

Student's Role: It is envisioned that the student will be involved in developing study protocol, data management and in coordinating collaborative work with the community. The student will be expected to participate in community meetings and may be involved in collecting data for projects that are currently under review. There are also multiple opportunities for involvement in developing manuscripts related to cancer screening behavior and youth smoking. The student will be exposed to advanced epidemiologic and analytic techniques for understanding complex public health problems.

Required Skills: Writing and organizational skills

Interview: Required

Location: Biotech IV and Benedict buildings

35. Public Health

TITLE: Health Status and Perinatal History of Young Children with Behavior Issues in Preschool

**Carole Upshur, EdD
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55 Lake Avenue, North
Worcester, MA 01655**

Description: Student will use data collected from an ongoing NIMH study investigating a primary prevention intervention for young children's behavioral issues in preschool programs to examine health-related correlates of behavior issues. Data will be extracted from baseline parent questionnaires about prenatal and perinatal risks (preterm, LBW, birth complications) and current health status and medications of 3-5 year olds enrolled in the Kidsteps project. Student will also participate in various project activities, visits to the preschool classrooms and potentially do individual work to gather data from parents and teachers.

Required Skills: CITI course completion.

Location: Benedict Building 3rd floor and in the community settings

36. Public Health

TITLE: Nicotine Dependence

Joseph DiFranza, MD

**UMass Medical School
Department of Family Medicine and Community Health
Benedict Building, A3-235
55 Lake Avenue, North
Worcester, MA 01655**

Description: Student will be assisting us in collecting case histories by interviewing smokers about their nicotine dependence.

Student's Role: Student will be interviewing subjects.

Required Skills: Interviewing skills

Location: Community locations

37. Radiology

TITLE: Retrospective Assessment of the Role of MR for Acute Gastrointestinal Pathology

Ajay Singh, MD

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UMMC

Department of Radiology

55 Lake Avenue North

Worcester, MA 01655

Description: Abstract: US and CT have are the front line tools in early diagnosis of patients with acute abdomen. In general MR has not been a frontline test in the assessment of acute abdomen. There is limited literature available about the utilization of MR in the acute abdomen and pelvic pathologies.

In this study we aim to evaluate the role of MRI in the diagnosis of acute lower abdominal and pelvic pathologies in pregnant as well as non-pregnant patients, using dedicated sequences without the use of oral contrast.

Patients who had MR of the lower abdomen and/or pelvis for acute abdomen will be retrospectively evaluated in the study. We will evaluate indication, type of MR, sequences and efficacy in diagnosing the disease for which the MR was performed. A four sequence protocol using T2 SS-FSE, T2 FSE, STIR and post-gadolinium sequences will be utilized. The positive predictive value and sensitivity for appendicitis and other pathologies will be calculated.

Student's role - Would be involved in data collection and writing of the manuscript. The student will be a coauthor in an invited review paper manuscript to be submitted to Contemporary Diagnostic Radiology provided he or she shows reasonable interest and contributes to it.

Required skills: Knowledge of Microsoft word

Interview: Required

Location: University and Memorial Campuses

38. Surgery

TITLE: Evaluation of Various Bone Screws for Rigid, Plate Fixation Following Sterotomy

Raymond M. Dunn, MD and Janice F. Lalikos, MD
Contact Person: Ronald Ignatz, PhD (508) 334-7692

UMMHC
Department of Surgery
Room S4-751
55 Lake Avenue North
Worcester, MA 01655

Description: Repair of sterna following sternotomy can be accomplished with a variety of wire or rigid plate fixation methods. However, with osteoporotic bone of elderly individuals a significant issue is that wire closures can cut through the bone making that approach less desirable. With rigid plate fixation, the screws used for plate fixation may pull out of the sterna as natural movement occurs. We believe that the weak point in rigid fixation is with the type of screw used to anchor the plates especially in weakened bone. Thus, we propose a study to evaluate various screw types in a “pull-out” assay using fresh human sterna.

Sterna will be purchased from the UMASS Anatomic Gifts program. Different configurations of screws that are currently used for fixation of plates or implants to bone will be inserted into the bony portions of the sterna followed by “pulling out” the screws using a force measuring device. In some cases, sterna will be split lengthwise, reassembled with plates and screws, subjected to motions that would occur in an individual and then the “pull-out” assay preformed. From this, we will determine whether slight movements in bisected and reassembled sterna have significant impact on the stability of the screws.

Once such information is collected, it will be used to configure new screws that may yield more stable integration with the bone.

Student Role: Obtain sternae from the Anatomic Gifts Program, clean sternae of soft tissue and cut into appropriate sizes. Apply sternal plates with a variety of bone screws. Working with Dr. Kris Billiar of WPI, install sternum-plate combinations onto cycling tension device to evaluate how well the different screw styles maintain integration. Evaluate force required to “pull” screws from bone following defined series of tension cycles.

Required Skills: Some interest in biomedical engineering would be desirable.

Interview: Required.

Location: 4th floor, S4-740 and S4-752

39. Surgery

TITLE: CMCJ Dislocation, Outcomes Study

John Shufflebarger, MD

(508) 334-5952

shufflej@ummhc.org

UMMHC

Hahnemann Hand Center

55 Lake Avenue North

Worcester, MA 01655

Project Description: To determine outcome of this injury. This involves placing data on computer spread sheet, administering DASH outcome study and running stats.

Student's Role: Will need to complete IRB form.

Interview: Required

Location: UMass/Memorial

40. Surgery

TITLE: Electrospun Nanofiber Meshes for Synthetic Cartilage and Periosteum

Jie Song, Ph.D

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**University of Massachusetts Medical School
Department of Orthopedics and Cell Biology
55 Lake Avenue, North, Room S4-719
Worcester, MA. 01655**

Description: The project encompasses the development of synthetic two-dimensional fiber meshes to serve as critical structural component of synthetic periosteum and artificial cartilage construct. These meshes consist of ultra-thin fibers prepared by electrospinning. This project will fabricate, characterize and compare the in vitro biocompatibility of a class of electrospun biodegradable polysaccharides and hydroxylated polymers engineered with defined biological properties.

Student's Role: The student will actively participate in the following components of the project: 1) fabrication and characterization of the fiber meshes; 2) evaluation of the meshes' biocompatibility, particularly their ability to support the proliferation and differentiation of rat and human bone marrow derived mesenchymal stem cells. The student will acquire skills in electrospinning, primary cell culture, and histological and biochemical techniques, and gain understanding of the principles and approaches of regenerative medicine.

Required Skills: None required

Interview: Required

Location: S4-853

41. Surgery

TITLE: Regionalization and Volume in Laparoscopic Cholecystectomy

Shimul A. Shah, MD

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(508) 334-2023

UMMC

University Campus

Department of Surgery, Division of Organ Transplantation

55 Lake Avenue, North, S3-838

Worcester, MA 01655

Description: Cholecystectomy has been the definitive treatment for acute cholecystitis (AC) in the United States. Since the advent of laparoscopic cholecystectomy (LC), surgeons have incorporated this less morbid alternative to open cholecystectomy (OC) as the treatment of choice for most gallbladder disorders, including AC. Despite being considered as the optimal treatment for AC, LC is not always first line therapy in selected patients with numerous comorbid factors or tenuous prognosis due to the inflammatory state. In these instances, many surgeons have resorted to OC from the outset. Numerous reports in the 1990s pointed to a learning curve of laparoscopic cholecystectomy (LC) critical in achieving acceptable outcomes defined by open conversion, bile duct injury and mortality. As LC is now becoming standard therapy for acute cholecystitis (AC), we aimed to determine if surgeon volume is still vital to patient outcomes.

Using the Nationwide Inpatient Sample, New York and Florida State Discharge Records and UMass Memorial data, we hope to address some specific issues regarding surgeon experience and volume, patient factors and socioeconomic status and how these variables interplay in the management of AC.

Student's Role: Initiate and create database for analysis. Construct hypothesis for investigation and carry out study.

Required Skills: Computer programming and basic statistics. Ability to use a computer is necessary.

Location: Department of Surgery and Surgical Outcomes Analysis and Research Offices.