Summer Student Research Program
Project List 2019

List updated: January 21, 2019

***Please keep checking the website as this list may be added to until the deadline***

Projects:

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRP-Lynd-01</td>
<td>The impact of a genetic diagnosis on the health outcomes of patients with suspected genetic disorders: A systematic review</td>
<td>2</td>
</tr>
<tr>
<td>SSRP-Page-01</td>
<td>Developing new anti-cancer therapies using state of the art chemical biology techniques</td>
<td>4</td>
</tr>
<tr>
<td>SSRP-Harrison-01</td>
<td>Rheumatologists' Perceptions Regarding Barriers in the Implementation of Preventative Therapies in Rheumatoid Arthritis</td>
<td>5-6</td>
</tr>
<tr>
<td>SSRP-Pachev-01</td>
<td>“Learning Scripts” in Pharmacy Education Settings</td>
<td>7-8</td>
</tr>
</tbody>
</table>
Summer Student Research Program Project Description
SSRP-Lynd-01

Supervisor(s): Dr. Larry Lynd (Director, Collaboration for Outcomes Research and Evaluation; Professor, Faculty of Pharmaceutical Sciences)

Project Title: The impact of a genetic diagnosis on the health outcomes of patients with suspected genetic disorders: A systematic review

Project Description: Genetic diseases affect approximately 5% of the population, and include an estimated 6,000 – 8,000 rare single-gene disorders. While some conditions have a distinctive clinical presentation and are best diagnosed with targeted testing, the majority of genetic disorders can be difficult to diagnose because many share common clinical features. For example, intellectual disability (prevalence of 1-2%) has been linked to mutations in more than 700 different genes. Broad-based genomic tests, including chromosomal microarray analysis (CMA), exome sequencing (ES), and whole-genome sequencing (WGS), which interrogate genetic variants across the whole genome, are increasingly being used to facilitate etiologic diagnosis of suspected genetic disorders. These powerful new technologies yield a much higher rate of diagnosis than alternative diagnostic tests, but are also more costly than existing tests. Moreover, the impact on health outcomes for patients who received a diagnosis is difficult to quantify due to the heterogeneity of the cohorts who receive these tests and the paucity of causal treatments for rare diseases. To inform ongoing economic evaluations of diagnostic genome-wide sequencing tests, we will conduct a systematic literature review of studies reporting on the impacts on patient care and health outcomes of receiving a genetic diagnosis via broad-based genomic tests.

Project Objectives: This systematic review will identify and evaluate all existing publications that report on the consequences for patient care and impact on health outcomes of diagnosis by CMA, ES, and WGS. The goal of the review is to summarize the evidence on health impacts, including changes in drug utilization, the rate of treatable conditions, treatment modalities, effects on mortality, morbidity, or quality of life, and other changes to patient care.

Project Activities: The project will involve: 1) conducting background research to identify appropriate literature and data sources; 2) developing a search strategy; 3) designing the search terms used in queries; 4) screening individual studies for inclusion; 5) summarizing and abstracting included studies; 5) evaluating the quality of included studies; 6) documenting the methodology used to conduct the reviews; and 7) outlining a manuscript reporting on the systematic review. The student will provide input at all stages of the project, and will work closely with the study team to design a search and evaluation strategy. Once the methodological approach for the reviews is established, the student should be able to work with minimal direct supervision under these guidelines while exercising sound judgment on when to refer problems to the supervisor. The student will be offered co-authorship on the publication that reports the results of the systematic review.
Supervisor: Dr. Larry Lynd (Director, Collaboration for Outcomes Research and Evaluation; Professor, Faculty of Pharmaceutical Sciences)

Project Title: Economic Evaluation of Gene Therapy Products: A Systematic Review

Project Description: Gene therapies use a diverse range of methods to modify gene expression or repair pathogenic genes in an individual patient. To date, at least 13 gene therapies have received marketing authorization worldwide, including five in the United States and one in Canada. They include treatments for ultra-rare single-gene disorders like adenosine deaminase deficiency–severe combined immunodeficiency (ADA-SCID) as well as oncolytic virus and chimeric antigen receptor T-cell (CAR-T) therapies for advanced cancers. A large number of additional gene therapies are being developed, including gene therapies for common diseases (e.g., age-related macular degeneration). While the cost of gene therapies is high (more than $1,000,000 per patient in some cases), leading to concerns about the budgetary impact of gene therapies for Canadian health systems, proponents of gene therapies have argued that a high-cost one-time treatment may be more cost-effective than existing drug therapies (e.g., enzyme replacement) that require ongoing treatment for life. However, economic evaluation of gene therapy products poses distinct challenges, such as small clinical trial sample size, uncertainty about the durability of the gene therapy’s effect, and costing the ancillary healthcare services required for the safe delivery of genetically modified cell-based therapies. To inform the rigorous evaluation of gene therapies in a Canadian context, we will be conducting a systematic literature review of existing economic evaluations of gene therapy products.

Project Objectives: This systematic review will identify and evaluate all existing publications that report on the cost-effectiveness and budgetary impact of gene therapy products. The goal of the review is to summarize the evidence on the cost-effectiveness of gene therapies as well as to identify common methodological weaknesses and challenges encountered when evaluating gene therapy products.

Project Activities: The project will involve: 1) conducting background research to identify appropriate literature and data sources; 2) developing a search strategy; 3) designing the search terms used in queries; 4) screening individual studies for inclusion; 5) summarizing and abstracting included studies; 5) evaluating the quality of included studies; 6) documenting the methodology used to conduct the reviews; and 7) outlining a manuscript reporting on the systematic review. The student will provide input at all stages of the project, and will work closely with the study team to design a search and evaluation strategy. Once the methodological approach for the reviews is established, the student should be able to work with minimal direct supervision under these guidelines while exercising sound judgment on when to refer problems to the supervisor. The student will be offered co-authorship on the publication that reports the results of the systematic review.
Summer Student Research Program Project Description
SSRP-Page-01

Supervisor: Brent Page

Project Title: Developing new anti-cancer therapies using state of the art chemical biology techniques

Project Description: Two projects are available that are focused on the design, synthesis and preliminary testing of novel chemical compounds to target dysfunctional signaling networks in cancer cells. Both projects have evolved from high-throughput screening campaigns and have employed state of the art chemical biology techniques including cellular thermal shift assays (CETSA), thermal proteome profiling (TPP), fluorescence tagging and others. Compounds that are synthesized within this project will be analyzed for their ability to bind specific targets in cancer cells and for their ability to halt the growth and proliferation of cancer cells using the latest models and technologies.

Summer students will gain exposure to a breadth of topics in drug discovery and development within these projects and will learn the basics of medicinal and organic chemistry (including synthesis and characterization of new compounds), chemical and cell biology techniques (including CETSA and cell proliferation assays), and will interact with a network of collaborators who will further assess the anti-cancer activity of newly synthesized compounds.

Up to 2 positions are available.
Project Title: Rheumatologists' Perceptions Regarding Barriers in the Implementation of Preventative Therapies in Rheumatoid Arthritis

Supervisor: Dr. Mark Harrison

Background: Rheumatoid arthritis (RA) is thought to develop through a process of “multiple hits”, involving genetic and environmental risk factors, followed by antibodies such as rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPA), that accumulate during an “at-risk” pre-clinical phase. Increasingly, it is thought that the pre-clinical phases of the disease might offer a window of opportunity to identify those at risk and to offer potential preventive treatment. It is unclear whether rheumatologists would offer preventative treatment to asymptomatic patients highlighting a need to understand physicians’ perceptions of particular barriers in the implementation of preventative therapies in RA, that would need to be overcome before such therapies could be implemented.

Project Overview: The proposed SSRP project is part of a research program on acceptability and preferences of preventative treatment for RA in patients and rheumatologists. The objective of this project is to examine rheumatologists’ perceptions of barriers in the implementation of preventive therapies for RA. Prior work on this topic conducted a quantitative assessment of associations between perceptions of potential barriers and respondents’ characteristics, such as age, sex, ethnicity, years in practice, type of medical practice, and province. Building on this prior work, the objective of this project is to 1) conduct condensed literature reviews on the existing evidence on the most frequently cited barriers, and 2) obtain a deeper understanding of rheumatologists’ perspectives of these barriers by applying a qualitative research approach to previously conducted focus group interviews.

Project activities: This project will involve the student in the following activities:
1) Condensed literature review:
   • Perform literature searches and reviews pertaining to each perceived barrier
   • Assist with developing a synthesis strategy of the scientific evidence
   • Assist with summarizing and abstracting relevant literature
2) Qualitative content analysis of focus group transcripts:
   • Assist with conducting analysis of transcribed physician focus group interviews
   • Code and/or label concepts related to perceived barriers
   • Assist with constructing categories and subcategories or groupings and organize codes into higher level themes
   • Abstract themes and/or interpret relationships between constructed categories
   • Summarize constructed themes and categories into appropriate tables and where relevant, figures, with supporting quotes
**Expected outcome:** This project will contribute an overview of the evidence and a better understanding of physicians’ perceptions of barriers relating to the implementation of preventative therapies in RA. Results have direct implications for knowledge translation and program planning as the paradigm of RA changes from treating to preventing the disease over the next decade.

**Role of the Summer Student:** The summer student will work closely with the supervisor and research team to complete the project. The summer student will be responsible for conducting condensed literature reviews, qualitative content analyses of transcribed focus group data, and reporting of results. Excellent verbal and written and inter-personal communication skills are a prerequisite. Coursework in research methods and/or previous experience with qualitative data analysis is an asset. Must be detail-oriented, organized and self-motivated. The student will be offered co-authorship on publications of the results of the project.
Project Title: “Learning Scripts” in Pharmacy Education Settings

Supervisor: George S Pachev, Natalie E LeBlanc, Office of Educational Assessment

Project Description:

Goal
This study is to identify, through individual and group interviews with pharmacy students, the routine events and actions related to effective learning and to compare them to the “learning scripts” in experiential education settings, identified in a previous study.

Background
The notion of “script”, as introduced by Schank & Abelson\(^1\), denotes mental representations of routine everyday events, consisting of actions leading to a goal and related through spatial and temporal relations, rather than logic category relations. The presence of such representation helps understand everyday situations and provides “cognitive economy” by guiding expectations and actions.

In a recent study\(^2\) of pharmacy students’ learning during practicum, a script-like structure seemed to underlie the descriptions of learning situations. Common elements of this script included: a “trigger”, which could be a preceptor assigned task, or independently set goal by the student; an iterative process of “practice” involving preparation, looking up necessary information, application of the skill, reflection-in-action, self-assessment and looking for feedback or assessment; in some cases there is “follow up” and/or “reflection-on-action”. Conditions for effective learning when enacting this script include preceptor’s support, clear delineation (and acceptance by the student) of responsibilities, sense of independence, initiative and involvement in interaction with patients.

It is not clear whether “learning scripts” could be found in descriptions of learning in academic settings, and if similar structures were identified, how do they compare to the scripts in practicum settings. The study will explore these issues, guided by the research questions below.

---


Research questions
How do pharmacy students describe the situations, events, and action routines when they learn most effectively in academic settings? What are the associated conditions necessary for learning to occur? What are the preparation and/or follow-up activities needed to consolidate learning, if any?

Project activities
This project will involve the student in the following activities:
1. Literature review: searching the scholarly literature on the “script” concept and it’s application to education and in health sciences. Complete a written review of the literature.
2. Data collection: design data collection protocols; pilot the instruments. The successful candidate will gain experience in the development and administration of qualitative interviews and analyses of qualitative data.
3. Ethics approval: preparing documentation for submission to the Institutional Research Ethics Board, including letters of initial contact and consent forms.
4. Dissemination of results: creating and developing a poster and seminar for presentation to the Faculty and other audiences, and participating in the preparation of a manuscript suitable for publication.

The student undertaking this project will be expected to work effectively within general guidelines but with minimal direct supervision and to have excellent verbal and written communication skills.