women & children's health research institute

10 years

2016 Graduate Studentship BOOKLET

The Power of Partnership

UNIVERSITY OF ALBERTA

Alberta Health Services

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

LOIS HOLE HOSPITAL FOR WOMEN

Acknowledgements

We thank...

The Women and Children's Health Research Institute (WCHRI) is a partnership between the University of Alberta and Alberta Health Services and is generously supported by the Stollery Children's Hospital Foundation and supporters of the Lois Hole Hospital for Women.

The University of Alberta and the Faculty of Medicine & Dentistry

The University of Alberta strives to create and promote an environment of research excellence across the university to fuel knowledge advancement, discovery and innovation; all of which provide significant contributions to society provincially, nationally and globally. The University of Alberta's Faculty of Medicine & Dentistry (FoMD) is the home to many of WCHRI's academic members and entire administrative staff. Its continued and generous support makes possible the training of our future scientists and physicians. The FoMD also provides partial funding for WCHRI's operating expenses, without which WCHRI would not be able to manage its many grants programs and research support initiatives.

Alberta Health Services

Alberta Health Services (AHS) is a strong and active supporter of WCHRI. Their guidance has been invaluable in ensuring that women and children's health and AHS standards in the delivery of clinical care, wellness and prevention remain a focus of WCHRI's mandate.

The Stollery Children's Hospital Foundation

The Stollery Children's Hospital Foundation raises funds in support of advancing excellence and transforming children's health at the Stollery Children's Hospital. As part of this goal, the Foundation supports evidence-based pediatric research by funding research programs and initiatives through WCHRI. In 2016, the Foundation committed to the largest gift in the University of Alberta's history – $40 million to WCHRI over ten years to continue furthering discoveries and innovations in children's health. The Foundation congratulates WCHRI's graduate students, and is grateful to its generous donors who contribute to the next generation of researchers.

The Royal Alexandra Hospital Foundation and the Lois Hole Hospital for Women

It is the vision of the Royal Alexandra Hospital Foundation to create the very best women's hospital in Canada at the Lois Hole Hospital for Women, and the partnership that we have created with WCHRI is critical to that vision. Our foundation knows that funding research today means improved health practices tomorrow. Research today also addresses the glaring disparities that have existed for generations, in the treatment protocols for women. Our sincere thanks to all of the graduate students; you are making a true difference for the future of women's health care and it is our honour to fund your important work.

Message from the Executive Director

WCHRI is proud to introduce the following students who have been awarded WCHRI Graduate Studentships in 2014 and 2015. This program provides a competitive opportunity to graduate students currently pursuing Master's or PhD degrees in a program of study related to the health and well-being of women and children.

In the following pages, you will see the work of these outstanding students dedicated to furthering women and children's health research. I'm pleased to announce that many of these students also received prestigious external awards, allowing them to leverage their graduate studentship grant even further. We are very proud of these students' achievements and look forward to seeing the ongoing results of their work.

We would like to thank the Stollery Children's Hospital Foundation and supporters of the Lois Hole Hospital for Women for their financial commitment to this program. Their funding helps us to ensure that this invaluable research opportunity continues to be available to the next generation of researchers at the University of Alberta.

I am always inspired by the passion and imagination of our young researchers and very much look forward to seeing what they accomplish in the future.

Sincerely,

Sandra Davidge, PhD
Executive Director
Women and Children's Health Research Institute

women & children's health research institute 10 years

The Graduate Studentship Program

The WCHRI Graduate Studentship program offers competitively funded trainee support to outstanding students who are engaged in a full-time, thesis-based graduate level program of study at the University of Alberta.

These projects span disciplines, research pillars and methodologies, but all contribute toward the advancement of research excellence in women and children's health.

Graduate Studentship Advisory Committee

WCHRI would like to acknowledge the outstanding contributions made by the Graduate Studentship Advisory Committee and commend their dedication to the development of the trainee and research environment as evidenced in their service to this panel.

Members of the 2014 Graduate Studentship Advisory Committee

Gregory Funk, PhD (Chair)
Medicine & Dentistry – Physiology

Geoff Ball, PhD
Medicine & Dentistry – Pediatrics

Christian Beaulieu, PhD
Medicine & Dentistry – Biomedical Engineering

Fred B. Berry, PhD
Medicine & Dentistry – Medical Genetics

Lisa K. Hornberger, MD
Medicine & Dentistry – Obstetrics & Gynecology

Dawn Kingston, PhD
Nursing

Gary Lopaschuk, PhD
Medicine & Dentistry – Alberta Diabetes Institute

Edmond Lou, PhD
Medicine & Dentistry – Biomedical Engineering

Arto Ohinmaa, PhD
School of Public Health

Jacqueline Pei, PhD
Education – Educational Psychology

Andrew Simmonds, PhD
Medicine & Dentistry – Cell Biology

Kate Storey, PhD
School of Public Health

Hasan Uludag, PhD
Engineering – Chemical & Materials Engineering

Andrew J. Waskieiwicz, PhD
Science – Biological Sciences

Toshifumi Yokota, PhD
Medicine & Dentistry – Medical Genetics

Members of the 2015 Graduate Studentship Advisory Committee

Gregory Funk, PhD (Chair)
Medicine & Dentistry – Physiology

Geoff Ball, PhD
Medicine & Dentistry – Pediatrics

Fred B. Berry, PhD
Medicine & Dentistry – Medical Genetics

Lisa K. Hornberger, MD
Medicine & Dentistry – Obstetrics & Gynecology

Dawn Kingston, PhD
Nursing

Gary Lopaschuk, PhD
Medicine & Dentistry – Alberta Diabetes Institute

Edmond Lou, PhD
Medicine & Dentistry – Biomedical Engineering

Arto Ohinmaa, PhD
School of Public Health

Andrew Simmonds, PhD
Medicine & Dentistry – Cell Biology

Veronica Smith, PhD
Education – Educational Psychology

Kate Storey, PhD
School of Public Health

Hasan Uludag, PhD
Engineering – Chemical & Materials Engineering

Andrew J. Waskieiwicz, PhD
Science – Biological Sciences

Toshifumi Yokota, PhD
Medicine & Dentistry – Medical Genetics

2014 Successful Awardees
Graduate Studentship Program

Student	Supervisor / Co-supervisor	Project title	Faculty Department
Carias, Karin Vanessa	Wevrick, Rachel	Studies of MAGEL2, an autism, childhood obesity and Prader-Willi syndrome candidate gene	Medicine & Dentistry Medical Genetics
Crick, Katelynn	Hartling, Lisa	Enhancing the usability and uptake of systematic reviews in clinical practice: Examining the ratio of means as an alternative summary measure to standardized mean differences in meta-analyses	School of Public Health
Flynn, Rachel	Scott, Shannon	Evaluating the sustainability of Lean as a quality improvement program for pediatric health care	Nursing
Klinger, Christen	Dacks, Joel	Comparative genomic and functional analysis of invasion-related trafficking machinery in apicomplexan parasites	Medicine & Dentistry Cell Biology
Lim, David W.	Turner, Justine	Towards the understanding and advancement of trophic peptide factors glucagon-like peptide 2 and epidermal growth factor in promoting intestinal adaptation in intestinal failure: Actions and mechanisms studied in neonatal piglet models of surgical short bowel syndrome	Medicine & Dentistry Surgery
Lukasewich, Megan	Cindy Jardine	The impact of participatory approaches to research on Aboriginal youth's health and wellness	School of Public Health
Parmar, Manoj	Uludag, Hasan & Löbenberg, Raimar	siRNA delivery using lipid-substituted polymers in Breast Cancer therapy	Pharmacy and Pharmaceutical Sciences
Soleymani Abyaneh, Hoda	Lavasanifar, Afsaneh	Nanotechnology for enhanced chemotherapy in triple negative Breast Cancer	Pharmacy and Pharmaceutical Sciences
Toosi, Ameneh (Amy)	Richter, Solina	Disparities in early development between children from international migrant and Canadian-born families	Nursing
Venkateswaran, Geetha	Persad, Sujata	Osteosarcoma progression: Role of beta-catenin/active beta-catenin	Medicine & Dentistry Pediatrics
Widen, Sonya	Waskiewicz, Andrew	The role of WNT signaling in pediatric blinding disorders	Science Biological Sciences
Yee, Tamara	Zwaigenbaum, Lonnie & Magill-Evans, Joyce	Development and content validity of Autism Social Participation Classification System (ASPCS) for preschool children with Autism Spectrum Disorder	Medicine & Dentistry Pediatrics
Zaidi, Deenaz	Wine, Eytan	Alterations in intestinal epithelial cell extrusion and microbial virulence in pediatric inflammatory bowel diseases	Medicine & Dentistry Pediatrics
Ziegler, Kirby	Underhill, Darrell Alan	Defining PAX3 target gene networks and their dysregulation in pediatric cancer	Medicine & Dentistry Oncology

2015 Successful Awardees
Graduate Studentship Program

Student	Supervisor / Co-supervisor	Project title	Faculty Department
Albrecht, Lauren	Hartling, Lisa & Scott, Shannon	Evaluating parental knowledge translation tools for pediatric acute gastroenteritis	Medicine & Dentistry Pediatrics
Aljunaidy, Mais	Davidge, Sandra	The effect of the antioxidant MitoQ on fetal programming of cardiovascular disease in a pre-clinical model of fetal growth restriction	Medicine & Dentistry Obstetrics & Gynecology
Chan, Brandon	Schulz, Richard	The role of intracellular matrix metalloproteinase-2 in doxorubicin-induced cardiotoxicity and its sex-related differences	Medicine & Dentistry Pharmacology
Faught, Erin	Veugelers, Paul	Health behaviours and academic performance in the era of the childhood obesity epidemic	School of Public Health
Hunter, Stephen	Carson, Valerie	Examining the effectiveness of school-based initiatives to increase student physical activity participation in a sample of Ontario and Alberta secondary schools in the COMPASS study	Physical Education and Recreation
Kawaguchi, Atsushi	Yasui, Yutaka	Development of evidence-informed pediatric retrieval system for Alberta	School of Public Health
Khanpour Ardestani, Samaneh	Vohra, Sunita	Evaluation of effectiveness and safety of probiotics in prevention of antibiotic-associated diarrhea in the pediatric population	Medicine & Dentistry Pediatric
Leimert, Kelycia	Olson, David	PGF2α promotes uterine transformation for parturition through positive feedback, synergy and amplification with 1L-1β in human myometrium smooth muscle cells (HMSMC)	Medicine & Dentistry Physiology
MacDonald, Krista	Haqq, Andrea & Mager, Diana	Vitamin D status influences markers of insulin resistance, liver function, cardiometabolic disease risk and body composition in obese children with PWS and NAFLD	Medicine & Dentistry Pediatrics

2015 Successful Awardees
Graduate Studentship Program (continued)

Student	ervisor / Co-supervisor	Project title	Faculty Department
Ngwezi, Deliwe	Hornberger, Lisa	Mapping Congential Heart Disease and the emission of developmental toxicants in Alberta, Canada: A geographic information systems (GIS) based framework for supporting interdisciplinary research	Medicine & Dentistry Pediatrics
Pohlman, Katherine	Carroll, Linda & Vohra, Sunita	Improving the assessment of safety in pediatric chiropractic manual therapy: A RCT evaluating passive versus active surveillance assessing pediatric adverse events after chiropractic care	School of Public Health
Prowse, Rachel	Raine, Kim	Evaluating the state of food and beverage marketing to children in recreational sport settings: A cross-sectional assessment and investigation of parents' perceptions	School of Public Health
Radomski, Ashley	Newton, Amanda (Mandi)	Pilot randomized controlled trial of an internet-based anxiety treatment program for adolescents	Medicine & Dentistry Pediatrics
Reardon, Anthony	Martin, Jonathan	Maternal co-exposure to perfluoroalkyl acids (PFAAs) and methylmercury (MeHg) and their impact on neurodevelopment	Medicine & Dentistry Laboratory Medicine & Pathology
Sivananthajothy, Priatharsini	Mumtaz, Zubia	Exploring the differential rates of caesarean sections in Canadian born and newcomer women in Edmonton, Alberta – a comparative analysis	School of Public Health
Skow, Rachel	Steinback, Craig & Davenport, Margie	Sympathetic neurovascular regulation in normal and preeclamptic pregnancy	Physical Education and Recreation
Touznik, Aleksander	Yokota, Toshifumi	Novel antisense oligonucleotides for the treatment of spinal muscular atrophy	Medicine & Dentistry Medical Genetics
Wiebe, Shane	Alexander, Todd	The role of NHE8 in the regulation of renal proximal tubule calcium reabsorption	Medicine & Dentistry Physiology
Wine, Osnat	Osornio Vargas, Alvaro	Exploring integrated knowledge translation in the complex context of environmental health research: A case study	Medicine & Dentistry Pediatrics

Awardee

Lauren Albrecht

Supervisors

Lisa Hartling and Shannon Scott

Research project

Evaluating parental knowledge translation tools for pediatric acute gastroenteritis

Diarrhea and vomiting in children is a common reason to visit the emergency department and is a leading cause of death among children worldwide. There has been a lot of research on how best to treat children with diarrhea and vomiting who visit the emergency department; however, the care children receive varies by health care provider and across hospitals. This indicates that there is an urgent need for knowledge translation, that is, efforts that bridge the gap between what we know and what we do. Actively involving parents in health care decisions has the potential to fill this gap; however, there is little research on the best ways to communicate complex health information to parents.

In 2013, a national needs assessment was conducted with child health providers and families seeking care for their kids in general emergency departments through the Translating Emergency Knowledge for Kids project. In this survey, we learned that 39 per cent of parents look for information about their child's health prior to coming into an emergency department and that 44 per cent of these parents searched for this information online. This means the development and evaluation of digital tools to provide parents with timely and effective child health information has the potential to reduce unnecessary emergency department utilization, empower parents in health decision-making, and ultimately improve child health outcomes. In this project, parents are actively involved in the evaluation of two arts-based educational tools designed to communicate the best research evidence on the treatment and management of vomiting and diarrhea in children. Effective tools will then be made widely available to parents and families on digital and social media platforms.

Career ambitions

I have gained an extensive depth and breadth of research experience which has prepared me as a competent researcher for qualitative, quantitative and knowledge synthesis projects. In addition, my supervisors have helped me to build key skills in other key areas of academic life (guest lectures, student supervision, conference presentations, etc.) to enhance my ability to successfully obtain a tenure-track faculty position.

Community outreach activities

Science & medical research: Learning about viruses

Westminster Junior High School

Additional support received from

- CBC Radio Media Fellowship, Alberta Innovates
- Graduate Studentship , Alberta Innovates
- Media Fellowship with CBC Radio, Alberta Innovates

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Mais Aljunaidy

Supervisor

Sandra Davidge

Research project

The effect of the antioxidant MitoQ on fetal programming of cardiovascular disease in a pre-clinical model of fetal growth restriction

Intrauterine growth restriction (IUGR), a pregnancy complication where the fetus does not reach its genetic growth potential, is a significant health concern in pregnancy. It remains a leading cause of fetal and newborn sickness and death and may lead to cardiovascular diseases in adult life.

IUGR is associated with low oxygen levels in the placenta, which in turn, can lead to placental oxidative stress leading to the release of factors that can damage the developing fetal heart. We are testing a new way to deliver an antioxidant so that we can treat the placenta without having the drug passing through the placenta, as this could affect the developing fetus. In our studies, we are using an antioxidant called MitoQ that targets the mitochondria which is the primary source of oxidants in the cell. MitoQ is loaded onto nanoparticles that prevents it from crossing the placenta to the fetus (generally, drugs that do not cross the placental barrier to the fetus are safer). We are determining its effectiveness in rescuing fetal growth restriction, improving heart development and preventing cardiovascular disease in later life in both male and female offspring in pre-clinical models.

Our findings show that using low oxygen to cause IUGR increases cardiac (heart) size and placental oxidative stress. MitoQ treatment prevented placental oxidative stress, normalized the heart weight in both sexes and prevented IUGR in female fetuses. In male fetuses only, relative cardiac cell size (normalized to heart weight) was increased in hypoxia and MitoQ treatment prevented this. In adult male offspring, MitoQ treatment rescued pulmonary (lung) artery function and prevented abnormal vascular responses which were affected by hypoxia. In conclusion, we observed sex-specific effects of low oxygen and MitoQ treatment on fetal growth, cardiomyocyte development and cardiovascular function in adult life. Preventing placental oxidative stress using nanoparticle delivery of MitoQ may be a novel approach to improve fetal growth, attenuate cardiomyocyte hypertrophy in IUGR offspring and prevent abnormal cardiovascular function in adult life.

Career ambitions

I like working on finding an intervention for pregnancy complications and my current project made me even more excited about continuing this in the future.

Community outreach activities

The effect of the antioxidant MitoQ on fetal programming of cardiovascular disease in a pre-clinical model of fetal growth restriction

W.P. Wagner High School

Honours and awards

- Science Exposed contest winner, Natural Sciences and Engineering Research Council of Canada (NSERC)
- Best Oral Presentation Award - People's Choice (first place), Department of Physiology Research Day
- Oral Presentation Award - Judges' Choice (second place), Department of Physiology Research Day
- Best Poster Presentation prize, biomedicine session within Global Health Symposium
- Conference travel award, Canadian National Perinatal Research Meeting
- Conference travel awards, University of Alberta
- Study excellence citation awarded on behalf of the University of Alberta by, Dr. David Turpin
- Membership within Golden Key International Honor Society, University of Alberta

Funding partner

Stollery Children's Hospital Foundation

Lois Hole Hospital for Women

Awardee

Karin Vanessa Carias

Supervisor

Rachel Wevrick

Research project

Studies of MAGEL2, an autism, childhood obesity and Prader-Willi syndrome candidate gene

Our lab studies genes inactivated in Prader-Willi Syndrome (PWS), a genetic disorder of the nervous and endocrine systems characterized by developmental disabilities, obesity, excessive daytime sleepiness and night-time wakening. This genetic disorder affects children and their development.

The main focus of my work is to determine the role of MAGEL2, a gene associated with the PWS phenotype (or observable characteristics associated with this disease). MAGEL2 is part of a family of proteins, the MAGE proteins that are thought to interact with and enhance the activity of another protein family called E3 ubiquitin ligases. E3 ligases are responsible for targeting other proteins to be broken down by the cell through cellular modifications called ubiquitination. Although MAGEL2 is implicated with PWS, not much is known about the function of this family of proteins.

In my project, I worked with several E3 ligases to determine the relationship between MAGEL2 and several E3 ligases. I have determined that the abundance of several E3 ligases is affected by MAGEL2 and that these proteins co-localize with MAGEL2 in human cell lines. Further work is necessary to determine the role MAGEL2 plays on the function E3 ligases and the downstream effects on target proteins. Understanding the role MAGEL2 has on the degradation pathway in the cell will shed light on the possible implications in protein break down that could cause abnormal cellular functions which could lead to disorders. A build-up of improperly degraded proteins could result in failure of certain cellular mechanisms. Symptoms seen in children with PWS and Autism Spectrum Disorder could be caused by these interrupted cellular pathways.

Career ambitions

I started the program as a Master's student in the Medical Genetics Department and have since transferred to the PhD program in October 2015. I enjoy working in Dr. Wevrick's lab and the support she has given me throughout the years has been tremendous. I decided I wanted to explore the project further and after discussions with my supervisor and committee, decided that a PhD would be something I would be interested in pursuing. The Medical Genetics Department provides us with great opportunities and I am excited to see what the future holds for my degree. When I finish my PhD I would like to pursue a job in medical research which will have a direct impact on the health care system or understanding genetic diseases. My career ambition is to be a supervisor or lab coordinator as well as do some teaching as I have always been interested in mentoring others.

Community outreach activities

Prader-Willi syndrome

Highlands Junior High School

Honours and awards

- Graduate Student Service Award, University of Alberta
- Graduate Citizenship Award, Government of Alberta
- Doctoral Recruitment Scholarship, University of Alberta
- Graduate Student Scholarship, Alberta Scholarship Program
- Dr. Diane Wilson Cox Graduate Award, University of Alberta

Funding partner

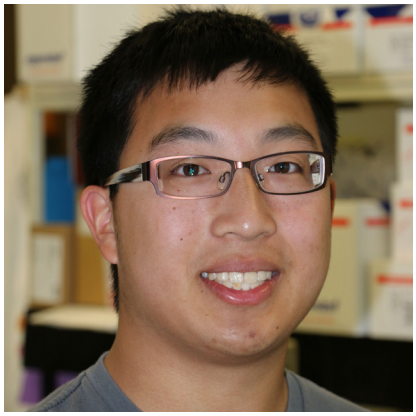
STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Brandon Chan

Supervisor

Richard Schulz



Research project

The role of intracellular matrix metalloproteinase-2 in doxorubicin-induced cardiotoxicity and its sex-related differences

Heart disease and cancer are the two leading causes of global mortality. Advances in cancer treatment have improved cancer survival rates and life expectancy. However, treatment often has serious adverse effects on the heart.

Doxorubicin is one of the most effective anticancer drugs, but is known to cause heart failure in some patients. Unfortunately, lowering the maximum lifetime dose compromises cancer therapy and fails to prevent heart injury. A better understanding of the mechanism of doxorubicin treatment side effects on the heart will help develop preventative therapies for cancer patients.

I have recently discovered that doxorubicin activates a protease, matrix metalloproteinase-2 (MMP-2). Inside heart muscle cells, MMP-2 is an enzyme that breaks down critical functional proteins that allow the heart to pump blood. Increased MMP-2 activity impaired the ability of the cell to pump calcium, which allows heart muscle cells to contract. Chemical inhibition of MMP-2 activity prevented doxorubicin from disrupting calcium signaling in heart muscle cells. We believe that pharmacological inhibition of MMP-2 could be the basis of preventative therapy for doxorubicin cardiotoxicity. To assess this, we investigate whether doxorubicin with MMP-2 inhibitors can prevent chemotherapy-induced heart failure.

This research will help develop new drugs to prevent heart failure and improve quality of life of cancer patients undergoing chemotherapy.

Career ambitions

As a scientist who has experienced the burden of cancer and heart disease first-hand on my immediate family, I strive to improve our understanding of these diseases and develop new therapeutic strategies. This award has given me the opportunity to contribute to the emerging field of cardio-oncology and develop the necessary skills to pursue an academic translational research career as a biomedical scientist. During this highly productive period, I have gained valuable experience in molecular biology, genomics and microscopy techniques, all essential skills to become an independent investigator.

Community outreach activities

Heart failure and anticancer drugs

W.P. Wagner High School

Honours and awards

- American Physiological Society Caroline tum Suden/Frances Hellebrandt Professional Opportunity Award for Meritorious Research
- Graduate Scholarship, Novartis Pharmaceuticals Canada Inc

Funding partner

Stollery Children's Hospital Foundation

Lois Hole Hospital for Women

Awardee

Katelynn Crick

Supervisor

Lisa Hartling

Research project

Enhancing the usability and uptake of systematic reviews in clinical practice: Examining the ratio of means as an alternative summary measure to standardized mean differences in meta-analyses

Patients, health care providers and policy makers rely on research evidence in order to make important medical treatment decisions. Systematic reviews are documents that identify all the existing studies on a particular topic and summarize the results of these studies as a whole. Meta-analysis is a method used in systematic reviews to numerically combine the results of different studies. A challenge is that studies often measure the same treatment outcome in different units. For example, several studies may measure the effectiveness of different treatments for reducing pain using different pain scales. Some use visual depiction of pain, such as a range of different faces from happy to sad, while others may use a scale from one to 10. Each of these results would need to be converted to the same units before we can combine and compare the different treatments. We need to compare apples to apples, not to oranges.

Standardized mean differences (SMDs) are a summary statistic used to convert the results of studies to a uniform scale. They are the tool we use to change an orange into an apple. A key issue is that they are measured in units of pooled standard deviations which are often hard for readers to understand. This makes it challenging for readers to know how to apply research results in practice. Ratio of means (RoM) is a relatively new summary measure for meta-analyses that offers an alternative to the SMD. If a SMD is a MacIntosh Apple, the RoM would be a Granny Smith. The RoM generates a unitless ratio similar to that of a relative risk, which is familiar and already used by clinicians. The goal of this research is to assess the validity of the RoM as an alternative to SMDs by comparing the two methods statistically, and to investigate whether health care providers understand and prefer the RoM method to SMDs. This will be achieved by the identification and recalculation of published meta-analyses using the RoM summary measure in place of the SMD, and through a survey of health care providers to assess their understanding and preference of the two measures.

This research has the potential to impact how meta-analysis is done and improve the clarity and effectiveness of the communication of research evidence in systematic reviews.

Career ambitions

My goal is to become an independent academic researcher in public health. This research experience has positively impacted my academic and career plans. I have successfully published two first authored papers, to date, and made invaluable connections through attending conferences and through this research experience as a whole.

Community outreach activities

Epidemiology: The study of the spread and causes of diseases in populations

Highlands Junior High School

Additional support received from

- Yvonne Freelove Graduate Scholarship in Public Health, University of Alberta

Honours and awards

- Yvonne Freelove Graduate Scholarship in Public Health, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Erin Faught

Supervisor

Paul Veugelers

Research project

Health behaviours and academic performance in the era of the childhood obesity epidemic

School based health programs have been shown to be an effective way to improve children's diet and physical activity and reduce childhood obesity in a school environment. However, schools are under pressure to improve children's exam scores while also dealing with budget cuts. As such, school health programs may not be prioritized to continue to focus efforts on helping children score well on exams. The goal of my research is to find out if children's diet, physical activity, sleep and screen time are associated with their academic achievement.

The evidence from my research will serve to answer the question: Are investments in children's health also investments in learning? Should our research show that children who have healthier behaviours do better in school, then our research could be used to support more school health programming throughout the province which would not only improve children's health, but also contribute to their success in school. Children who do better in school tend to be more competitive for better jobs when they finish school, have higher incomes and have better health across their lifetime.

Career ambitions

I am presently applying for post-doctoral fellowships and am interested in continuing in research! I feel passionate about the area of children's health, particularly about programs that take place in schools, and feel that even when I am finished my PhD I would like to continue to contribute in this area.

Community outreach activities

Children's lifestyle behaviours and the effects on their academic achievement

W.P. Wagner High School

Honours and awards

- Travel bursary, University of Alberta
- Travel awards, University of Alberta
- Travel award, WCHRI

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Rachel Flynn

Supervisor

Shannon Scott

Research project

Evaluating the sustainability of Lean as a quality improvement program for pediatric health care

Canadian health care systems currently face three major challenges: reducing health care costs, improving the quality of patient care and ensuring health care practice is based on the best research evidence. “Lean” is a quality improvement approach that aims to reduce health care waste, improve efficiency and increase customer value. “Lean” is gaining increasing attention across health care systems in Canada, yet the evidence to support the implementation of “Lean” is weak, with limited rigorous empirical studies. Interestingly, “Lean” has recently been applied throughout the 12 health regions of the Saskatchewan health care system. There is currently a large evaluation underway of “Lean” in adult health care settings across the province of Saskatchewan; however, there is no evaluation occurring of “Lean” implementation in child health care settings.

The primary goal of my doctoral research is therefore to evaluate “Lean” in the child health care setting. More specifically, I aim to understand how “Lean” does or does not work in these settings as well as the factors that hinder or facilitate sustainability. Acknowledging the reality that the provision of child health services is unique, given the added complexities such as parental involvement, communication and development care, the lack of evidence of “Lean” implementation in health care and the disproportionate lack of health services research in child health, my doctoral research is both relevant and significant.

Understanding how and why “Lean” does or does not work and the factors that influence the successful sustainability of “Lean” in child health care will help future quality improvement efforts and contribute to future decisions about the application of “Lean” initiatives in child health across Alberta and other Canadian provinces that have already shown an interest in the application of “Lean.” Alberta has already implemented “Lean” into its health care system across different clinical areas at a smaller scale than in Saskatchewan. Alberta’s health care system can therefore gain valuable insight from a realist evaluation of the “Lean” transformation in Saskatchewan.

Career ambitions

My career goal is to become a nursing clinician scientist in child health quality improvement (QI) and knowledge translation science in Alberta. I would like to position myself in a role that combines academic research at the Faculty of Nursing, University Alberta with QI and patient safety efforts at Alberta Health Services. My aim is to advance and integrate my clinical and research expertise to investigate clinically relevant QI problems that can improve patient care. My ongoing research experience, studentships with WCHRI and Knowledge Translation (KT) Canada, coupled with Dr. Scott and Dr. Rotter’s expert mentorship, will provide me with the optimal training to achieve my long term career goals.

Community outreach activities

A realist evaluation of “Lean” process improvement in pediatric health care

Edmonton Wolfe Tones Club

Additional support received from

- Graduate Fellowship, Knowledge Translation (KT) Canada STIHR
- Alberta Registered Nurses Educational Trust, University of Alberta

Honours and awards

- Seed Grant, Knowledge Translation (KT) Canada
- National, KT Canada (Dr.Scott, Co-PI)
- Graduate Fellowship, Knowledge Translation (KT) Canada STIHR
- Molly Spohn Research Travel Grant, University of Alberta
- Kathleen Cahill Memorial Scholarship, Alberta Registered Nurses Educational Trust
- Don Mazankowski Graduate Scholarship in Nursing, University of Alberta
- Clinician Fellowship, Alberta Innovates

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Stephen Hunter

Supervisor

Valerie Carson

Research project

Examining the effectiveness of school-based initiatives to increase student physical activity participation in a sample of Ontario and Alberta secondary schools in the COMPASS study

The *Canadian Physical Activity Guidelines* recommend that school-aged children and youth engage in at least 60 minutes of moderate to vigorous intensity physical activity per day. However very few Canadians are meeting this guideline. As a result, they are at increased risk for chronic disease and premature death.

One setting that has been identified as having the potential for promoting and establishing physical activity behaviours in children and youth, is the school. To date, I have looked at naturally occurring one-year physical activity changes that schools made and their resulting impact on student moderate to vigorous intensity physical activity. To do this, data was used from the cohort for obesity, marijuana use, physical activity, alcohol use, smoking and sedentary behaviour (COMPASS) study. Participants were 18,777 students and their 86 secondary schools located in Alberta and Ontario. The main exposure was changes to school physical activity policies, recreational programming, use of public health resources and facilities. These were measured by administrative surveys, and an audit of the school environment. The main outcome was change in student self-reported moderate to vigorous intensity physical activity over a one-year period, measured by a student questionnaire. Multilevel modeling was the advanced statistical technique used to achieve the main objective. The results showed that out of the 61 schools that made changes, only four resulted in increased student moderate to vigorous intensity physical activity. In terms of these four schools, it seemed that providing increased access to facilities and adding multiple recreational programs was effective in increasing student moderate to vigorous intensity physical activity over the one-year period. However, it appears that schools are complex settings, and while they do present an opportune setting for physical activity promotion, much thought is needed into developing initiatives to increase physical activity. For instance, even positive school changes that occurred in the remaining 57 schools, such as the addition of school clubs, equipment and improved quantity and condition of facilities yielded null or detrimental effects to student physical activity.

As a result of our work, it seems that schools would benefit from taking into consideration the resources available to them both within and surrounding the school to deliver tailored strategies aiming to increase student physical activity. Next steps include examining features within the surrounding community environment that can facilitate physical activity, as well as the level of school support students feel they receive to be physically active. Further steps in my PhD include identifying the barriers and facilitators that schools face when delivering physical activity programs and using this information to create tailored programs aiming to increase physical activity in students.

Career ambitions

My ultimate goal is to become an expert in population approaches to physical activity and health promotion.

Community outreach activities

What can schools do to increase physical activity among students

W.P. Wagner High School

Honours and awards

- Best Student Oral Presentation, International Society of Behavioral Nutrition and Physical Activity's annual meeting

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Atsushi Kawaguchi

Supervisor

Yutaka Yasui

Research project

Development of evidence-informed pediatric retrieval system for Alberta

Communities in Alberta are scattered over a large geographic area. Critically ill or injured children in Alberta and the Western Arctic are transferred to one of Alberta's two children's hospitals, either the Stollery Children's Hospital in Edmonton or the Alberta Children's Hospital in Calgary. A highly skilled and specialized Pediatric Critical Care (PICU) transport team is based in each of these children's hospitals, both of which have finite resources and capacity to accept transferred children (approximately 500-600 children annually together). The demand for the transport teams has been steadily increasing as the under-18 population of Alberta has grown. The majority of these transports are performed by a physician-less team, with the addition of a physician for very high acuity cases.

Advanced Life Support (ALS; paramedic) flight teams are based across the province, with the capacity to move more patients, but with less experience and expertise in caring for critically ill children than the PICU transport teams. Referral physicians call and consult PICU physicians in either Edmonton or Calgary concerning the stabilization of critically ill or injured pediatric patients and to ask for their assistance in arranging the transfer of these children to one of the two children's hospitals. PICU physicians have to decide, based on the information provided by the referral physicians, the most appropriate transport team to transport the individual pediatric patient in question. PICU physicians must also decide the optimal ultimate disposition (destination) for the patient. This triage decision is based upon patient information provided over the telephone by the referral physician as well as by the PICU transport team once it arrives at the referral centre. Triage decisions are currently made by PICU physicians without using a systematic process. Triage scoring system/criteria has been used in other centres or clinical settings to help provide a consistent approach to matching transport resources to patient care needs, but with limited success.

The ultimate goal of this project is to develop a pediatric triage decision-making tool that PICU physicians can use to help remotely assess critically ill or injured children, decide the patient's transport team needs and their optimal dispositions (in-patient destination).

We will analyze a currently available pediatric transport dataset in Northern Alberta as well as prospectively collect Alberta-wide population-based data on triage practices in two pediatric tertiary care centres. The existing pediatric triage scoring systems will be evaluated, and a new transport triage scoring system will be built with an aim of increasing the accuracy over the existing systems. Transport triage decisions will be prospectively studied and independently reviewed after the completion of the introduction of the new pediatric transport triage decision-making tool.

The evidence and knowledge accumulated will be integrated to use as a triage decision-making tool in the PICU transport. A successful implementation of the transport triage decision-making tool we will develop should lead to improved patient care for critically ill or injured children, as well as cost savings to the health care system.

Career ambitions

My ultimate goal is to contribute to the progress of child health care. I would like to approach pediatric acute care, my practical field in medicine, from the point of view of the health care system. I would like to create a path in research through sharing a purpose with other researchers and stakeholders. I would also like to continue my education. In other words, I am hoping to build my career as a physician epidemiologist in a relevant field, while keeping a clinician mindset.

Honours and awards

- The 2015 Garner King Award (Best Clinical or Quality Improvement Study), Canadian Critical Care Society

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Samaneh Khanpour Ardestani

Supervisor

Sunita Vohra

Research project

Evaluation of effectiveness and safety of probiotics in prevention of antibiotic-associated diarrhea in the pediatric population

A healthy gut is home to billions of bacteria that help digestion, fight against harmful microbes and enhance our immune system. Probiotics are considered healthy bacteria. They can be found in fermented foods, such as yogurt, or taken as supplements, in a powder or capsule form. Probiotics are thought to improve the health of individuals by creating the right balance of gut bacteria. Antibiotics are medicines that help the body fight infection and kill dangerous bacteria. The problem is that when we take antibiotics, a large number of the good bacteria that are living in our gut may also be killed. This leads to unbalanced gut microbes, causing diarrhea. Diarrhea is one of the most common complications of antibiotic treatment in children. Six to 62 per cent of children may develop diarrhea after taking antibiotics. Some studies have shown that probiotics may prevent antibiotic-associated diarrhea in children. However, as these studies have used different probiotic products and have some limitations in their methodology, conducting further research studies is necessary.

Our main objective, therefore, is to conduct a large study (called clinical trial) to confirm if probiotics are effective and safe to prevent diarrhea in children who take antibiotics. Before going forward, we needed to clarify some definitions used in research, for example: What would be considered a successful benefit during the probiotic use? To clarify this question, we obtained parents'/guardians' opinions about the benefit they would expect from probiotics in reducing diarrhea before considering giving it to their children. This information helped us to calculate the number of subjects needed for our clinical trial. In the second phase of the study, we developed an appropriate tool to measure antibiotic associated diarrhea in children. This tool will help us to accurately measure if diarrhea occurs or improves in children. In the final stage, we will conduct a high quality clinical trial in children to see if probiotics (good bacteria) are safe and beneficial in the prevention of diarrhea caused by antibiotics.

Community outreach activities

Probiotics to prevent antibiotic-associated diarrhea

Highlands Junior High School

Additional support received from

- 75th Anniversary Graduate Studentship Award, University of Alberta

Honours and awards

- Travel Award, INCAM Research Symposium 2016

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Christen Klinger

Supervisor

Joel Dacks

Research project

Comparative genomic and functional analysis of invasion-related trafficking machinery in apicomplexan parasites

Apicomplexa are a group of parasitic organisms including causative agents of Malaria and Congenital Toxoplasmosis, among others. Given their global distribution and ability to cause significant morbidity and mortality, it is critical to understand their biology and the mechanisms underlying pathogenesis — the way in which they cause disease.

Apicomplexan cells contain compartments known as "organelles." Each organelle acts like a miniature shipping centre, where cargo can be stored, sorted and sent to other centres via mobile carriers. This fundamental process is referred to as "membrane trafficking," and it requires specific machinery to be properly carried out. Apicomplexa possess specialized compartments colloquially referred to as "invasion" organelles, which mediate host cell invasion. Much like a harpoon, the parasite uses these organelles to penetrate and enter a susceptible host cell, but also much like a harpoon, these organelles are spent during invasion and must be re-made using membrane-trafficking machinery. Hence, the goal of our project is to understand the organization and function of the membrane-trafficking system of apicomplexan parasites. To date we have identified trafficking machinery unique to the parasites, machinery that is shared only with their close (non-parasitic) relatives, and other machinery that is ubiquitous, being present in almost all other unicellular organisms. The novel factors identified are very likely involved in trafficking events underlying pathogenesis, and our work now is aimed at dissecting these factors using detailed genetic studies.

Christen Klinger is now a visiting scientist at the Welcome Trust Centre for Molecular Parasitology in Glasgow.

Career ambitions

I would like to continue to pursue my work on parasites of both human and veterinary importance, with a focus on developing skills necessary to translate this work into either direct deliverables and/or patient care.

Community outreach activities

A journey from free-living predators to the Malaria parasite

Highlands Junior High School

Honours and awards

- Award for an exceptional presentation in the area of parasitology, British Society for Parasitology

Additional support received from

- Doctoral Recruitment Scholarship, University of Alberta
- Graduate Studentship, Alberta Innovates, awarded provincially by the Alberta Heritage Foundation for Medical Research (AHFMR)
- President's Doctoral Prize of Distinction, University of Alberta
- Doctoral Recruitment Scholarship, University of Alberta
- Walter H. John's Graduate Fellowship, University of Alberta
- Graduate Scholarship, Vanier Canada

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Kelycia Leimert

Supervisor

David Olson

Research project

PGF2α promotes uterine transformation for parturition through positive feedback, synergy and amplification with 1L-1β in human myometrium smooth muscle cells (HMSMC)

Our research is focused on delaying preterm birth and prolonging pregnancy. Preterm birth (birth before 37 weeks of pregnancy) is the biggest health problem in pregnancy and for the newborn baby, and costs societies hundreds of billions of dollars per year globally. Preterm birth is the leading cause of newborn death and the second greatest cause of death in children under the age of five worldwide.

Fifteen million babies are born preterm each year worldwide, and 1.1 million do not survive. In Alberta the rate is 8.8 per cent – higher than the Canadian average of 7.8 per cent. A better understanding of preterm and term labour physiology, especially the role of inflammatory mechanisms, is crucial for the development of effective drug therapies.

The immune system has a significant role in birth, even without the presence of infection. We are studying the prostaglandin F2α receptor, FP, as a potential target for a future preterm labour drug. It is a hormone that not only participates in stimulating uterine contractions during labour, but it works through its receptor to amplify the inflammatory response, which is an important earlier stage of the labour process. IL-1β is a pro-inflammatory cytokine that turns on many pro-labour genes in addition to having an essential role in many immune responses. Our work shows that PGF2α interacts extensively with inflammatory mediator IL-1β to transform the uterus of pregnancy into the active, contractile uterus required for delivery.

Our group studies uterine transformation by measuring outputs of live cultures of uterine smooth muscle cells, isolated from uterine biopsies (collected from women undergoing caesarean sections at the Royal Alexandra Hospital in Edmonton, AB). Recently, we have developed and optimized a novel “co-culture” model that enables us, for the first time, to study interactions occurring between maternal and fetal gestational tissues during the uterine transformation process.

By growing uterine smooth muscle cells in the same compartment as fetal membrane tissue explants, we can simultaneously stimulate both tissues with PGF2α /IL-1β and study how the maternal and fetal tissue components influence one another, and how that relationship contributes to uterine transformation.

This new culture system also has great potential value in the future for the testing of new therapeutics candidates. As PGF2α and IL-1β interact with several different labour processes, we expect that blocking their action will significantly decrease events leading to labour, thereby prolonging pregnancy and preventing preterm birth. We are developing innovative new drugs that prevent the transformation of the uterus for labour and inhibit contractions of the uterine muscle that expel the baby. Our novel CAR10 (targets FP receptor) and rytvela (targets IL-1 receptor system) compounds effectively block infection-induced preterm birth in a study model. They are selective and have no known side effects.

My studies will prove that they work as they should and will comprise the body of evidence that will allow us to enter into important human trials testing their safety and effectiveness in maintaining pregnancy. These studies will lead to commercialization/ availability of drug therapy for women everywhere.

Career ambitions

I would like to continue to work to improve health outcomes of women and children, first through the pursuit of a postdoctoral fellowship after my PhD.

Community outreach activities

The physiology of pregnancy and birth

Strathcona High School

Additional support received from

- 75th Anniversary Graduate Student Award, University of Alberta
- Queen Elizabeth II Graduate Scholarship, University of Alberta

Honours and awards

- Best Oral Presentation Award, Canadian National Perinatal Research Meeting (CNPRM) 2016 meeting
- Travel Award for Top Trainee Presentations, Reproductive Immunology: Inflammation in Reproduction, Pregnancy and Development (IRPD) Meeting

Funding partner

Stollery Children's Hospital Foundation

Lois Hole Hospital for Women

Awardee

David W. Lim

Supervisor

Justine M. Turner

Research project

Towards the understanding and advancement of trophic peptide factors glucagon-like peptide 2 and epidermal growth factor in promoting intestinal adaptation in intestinal failure: Actions and mechanisms studied in neonatal piglet models of surgical short bowel syndrome

Short bowel syndrome (SBS) occurs when a significant amount of intestine has been surgically removed for various diseases. In infants and children, SBS is the most common cause of intestinal failure, the state of being unable to absorb enough nutrition to grow and be healthy. In turn, they are nourished with long-term intravenous (or parenteral) nutrition (PN). However, PN is associated with many complications (line infections, liver disease), from which 25-50 per cent will die. In Canada, two-thirds of all intestinal transplants are done in babies with SBS and the five-year survival is only 50 per cent. To avoid death or transplantation, children with SBS must be weaned from PN but this requires intestinal adaptation, a process marked by changes in the remaining intestine that allows nutrient absorption to improve.

At this time, there have been very few new advances in managing babies with SBS and therefore many babies and children with SBS die. Babies and children with SBS also require a huge amount of costly medical resources, including intensive care, home PN and specialty nursing care. These circumstances highlight the need to develop new treatments for babies with SBS. A host of growth factors are known to promote intestinal adaptation, with the recent spotlight on glucagon-like peptide 2 (GLP-2). GLP-2 is made in the ileum which is often removed in babies with SBS. Recently, the U.S. Food and Drug Administration approved a commercial form of GLP-2 (Teduglutide) for treating adult SBS. However, GLP-2 has not been studied in babies and children. To this effect, we studied GLP-2 treatment of SBS in an appropriate neonatal model. In addition, we studied the potential effect of epidermal growth factor (EGF), a second hormone found in high concentrations in breast milk, suggesting an important role in gut health. The actions of EGF are synergistic with GLP-2 but this paired treatment has never been assessed for intestinal adaptation. We found that combined treatment with GLP-2 and EGF results in both intestinal lengthening and improved intestinal histology and permeability. Longer intestine and better histology suggests a greater surface area available for nutrient absorption, while better permeability means less likelihood for bacteria to cross the intestine and cause infection. These important effects illustrate the potential benefit of novel combined GLP-2 and EGF treatment for infants with short bowel syndrome.

Career ambitions

My ambition is to become an academic surgeon-scientist in pediatric surgery. This WCHRI Graduate Studentship supported my PhD studies in Experimental Surgery, focusing on research in pediatric short bowel syndrome. In these last two years, I feel I have acquired the necessary skills and aptitudes to function as an independent investigator.

Additional support received from

- Frederick Banting and Charles Best Canada Graduate Scholarship - Doctoral, Canadian Institutes of Health Research
- Clinician Fellowship, Alberta Innovates
- Research Operating Awards, Edmonton Civic Employees Charitable Assistance Fund
- Queen Elizabeth II Graduate Scholarship, University of Alberta

Honours and awards

- Honorary Izaak Walton Killam Memorial Scholarship, University of Alberta
- Best Oral Presentation, Canadian Association of Pediatric Surgeons (CAPS) Annual Meeting
- First Prize in Basic Science Category, University of Alberta Division of General Surgery Research Day 2015 and 2016
- George R. Graham Postgraduate Memorial Bursary in Surgery, University of Alberta
- Graduate Student Rising Star Award, University of Alberta
- 2015 and 2016 Harry M. Vars Award, American Society for Parenteral and Enteral Nutrition
- Martha Piper Award, University of Alberta
- 2015 New Practitioner Award, American Society for Parenteral and Enteral Nutrition, Medical Practice Section
- President's Doctoral Prize of Distinction, University of Alberta
- Profiling Alberta's Graduate Students Award, University of Alberta
- 2015 Research Trainee Award, American Society for Parenteral and Enteral Nutrition
- Graduate Student Research Award, American Society for Nutrition

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Megan Lukasewich

Supervisor

Cindy Jardine

Research project

The impact of participatory approaches to research on Aboriginal youth's health and wellness

Community-based participatory research and arts-based research methods such as participatory video have proven to be effective in engaging youth in research projects. However, limited evidence exists on how participation in these research projects specifically impacts individuals' health. Assessment of research impact tends to focus on the intended intervention outcomes, and the experience of participating in the research process is overlooked. Moreover, youths' perspectives of being included in participatory research are rarely explored. Guided by community-based participatory research principles and Indigenous research methodologies, this project examined, from the perspectives of the research participants, the perceived impact of participation on their health and wellbeing. Situated within a larger participatory video study, this project with high school aged Aboriginal youth in grades nine to 12 and their schools (K'alemi Dene School, Northwest Territories and Queen Elizabeth High School, Alberta) to explore how engaging in a participatory video project on tobacco misuse impacted the youth participants. Using focused ethnography to guide the data generation strategies, 11 focus groups were conducted at three time points throughout the research project (March/April 2013, May/June 2013, and October/November 2013) with 28 youth. An additional 15 one-on-one interviews pre and post project (April/May 2013 and June/July 2013) were conducted with eight adult partners.

The research highlighted how engaging in participatory video can contribute to youths' journey of becoming empowered. The youth participants described how participating in the video project was an opportunity for them to act as health promoters within their school and wider communities. Through the participatory research process, youth increased their sense of belonging, purpose, and agency. These are all assets required for positive youth development. By comparing and contrasting two different locations, the results show how the context and mechanisms of the project influenced outcomes differently. Overall, the youth were positively impacted from participating in a research project focused on tobacco misuse. The findings provide evidence of how participation in participatory video projects has the potential to be a transformative experience for the participants.

This study contributes to our limited knowledge on how participatory methods and engaging in participatory research impacts participants during the research process, and extends beyond the intended outcomes. This work provides a starting point to begin understanding the potential impacts of participatory research on youths' development and empowerment.

Career ambitions

I gained invaluable experience in community-based research and knowledge translation through the Science Shop project and WCHRI graduate scholarship. These skills were helpful in pursing a career as a social policy advisor with the Government of Alberta.

Community outreach activities

We came out of our shells: Aboriginal youth's perspectives on health changes occurring through participatory research approaches

Northwest Territories

Additional support received from

- Graduate Studentship, WCHRI
- Community-Based Research Science Shop Summer Studentship, WCHRI & Community-University Partnerships, University of Alberta
- Alberta Graduate Scholarship, Alberta Ministry of Enterprise and Advanced Education
- Operating Grant Priority Announcement: First Nations, Inuit and Métis Health (Co-Investigator), CIHR
- Queen Elizabeth II Graduate Scholarship, University of Alberta
- Friends of the Faculty of Graduate Studies and Research Scholarship, University of Alberta
- Northern Scientific Training Program, Aboriginal Affairs and Northern Development Canada
- Grant in Aid Travel Award, Arctic Institute North America
- Anthony Fellowship in Human Nutrition, University of Alberta
- Peggy Roots Memorial Bursary, Canadian Federation of University Women

Honours and awards

- Profiling Alberta's Graduate Students Award, University of Alberta
- Trainee Travel Grant, WCHRI
- School of Public Health Travel Award, University of Alberta
- Best Graduate Student Poster Presentation, WCHRI Research Day
- Graduate Student Association Academically-Related Student Group Award (Co-Applicant), University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Krista MacDonald

Supervisors

Andrea Haqq and Diana Mager

Research project

Vitamin D status influences markers of insulin resistance, liver function, cardiometabolic disease risk and body composition in obese children with PWS and NAFLD

Vitamin D insufficiency/deficiency is highly prevalent in children in Alberta due to reduced sunlight exposure and low Vitamin D intake. Vitamin D insufficiency has been related to poor bone health, presence of liver disease, indices of muscle function and an increased risk for insulin resistance, inflammation and metabolic dysregulation, particularly in obese children. In Alberta, this is problematic as there is an increasing prevalence of the onset of chronic diseases such as diabetes, which has shown to be associated with Vitamin D insufficiency in obese children with abdominal obesity (visceral adiposity). It is unknown whether obese children who have predominantly subcutaneous fat deposition would also experience an increased risk for metabolic dysregulation due to Vitamin D insufficiency. We propose to study two populations of childhood obesity (Prader-Willi syndrome (PWS) – subcutaneous adiposity, and Nonalcoholic Fatty Liver Disease (NAFLD) – visceral adiposity) to assess the potential interrelationships between Vitamin D insufficiency/intake, insulin resistance, inflammation, muscle function and body composition (subcutaneous versus visceral adiposity). NAFLD is the most frequent liver disease in obese children and is a disease that spans from a simple fatty liver to inflammation and fibrosis, and ultimately cirrhosis. PWS is a genetic disorder where children experience hyperphagia (insatiable appetite) and obesity (subcutaneous). Study results will inform the need for Vitamin D supplementation in obese children with chronic disease.

Career ambitions

My goal is to become a pediatric dentist. About a year ago I attended the American Society for Parenteral and Enteral Nutrition (ASPEN) Clinical Nutrition Week to expand my knowledge in nutrition research. During this conference I took a nutrition-related physical exam workshop. Part of this workshop focused on detecting nutritional deficiencies through oral examination. I found this very interesting and I believe it helped me confirm that I wanted to become a dentist. My current nutrition related research study focuses on children with obesity and Vitamin D. I love working with the kids who participate in my study. I have realized that regardless of the health care field I end up in, it has to be in pediatrics.

Community outreach activities

Nutrition research and Vitamin D

Archbisop Joseph MacNeil School

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Deliwe Ngwezi

Supervisor

Lisa Hornberger

Research project

Mapping Congential Heart Disease and the emission of developmental toxicants in Alberta, Canada: A geographic information systems (GIS) based framework for supporting interdisciplinary research

Congenital Heart Disease (CHD) refers to children who are born with a defect in either the chambers of the heart and/ or the blood vessels that connect to the heart. It is the most common birth defect amongst all other types of defects and affects one out of 100 children. The causes of these defects are thought to be due to: genetic problems, diseases that a mother might have during pregnancy, or medication used during the pregnancy. For more than half of these babies, the cause of their defect is not known.

Recent studies show that industrial chemicals released from industry and traffic may be associated with some CHD. We undertook a study to investigate if there was a relationship between the chemical emissions released into the air from industrial facilities operating in Alberta from 2003 to 2010 and rates of CHD among children born in Alberta between 2004 and 2011. We found that there was a significant decreasing trend in the emission of a group of chemicals, known as volatile organic compounds, which was combined with some gases in the rural regions compared to urban areas. This trend coincided with a significant parallel decrease in the rates of CHD in rural regions. In the urban regions there was no sigificant decrease in the rates of CHD. There was also a statistically significant negative association between a group of heavy metals and CHD rates.

Career ambitions

I am still young in my research career, however I hope with time I will become more independent as I continue to get involved in other research initiatives.

Community outreach activities

Industrial pollution and development of heart defects among children in Alberta

Highlands Junior High School

Additional support received from

- Hamilton Naki Clinical Scholarship, South Africa

Honours and awards

- Quinlan Patric Baxter-Langen Award, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Manoj Parmar

Supervisors

Hasan Uludağ and Raimar Löbenberg

Research project

siRNA delivery using lipid-substituted polymers in Breast Cancer therapy

Conventional cancer treatments such as chemotherapy, radiation and surgery have significant limitations and side effects. Treating cancer with ribonucleic acid interference (RNAi) using small interfering RNA (siRNA) has been recognized as a promising approach since it allows great therapeutic specificity. siRNA is a double-stranded ribonucleic acid that is typically designed synthetically for RNAi, and binds to and destroys specific messages of a gene upon introduction to a cell. The objectives of this study were to find the best targets to silence specific protein expression by siRNA, and to select the best siRNA delivery system for its maximum effect, specifically for treating Breast Cancer.

Silencing a unique or a combination of unregulated proteins that are essential for cancer growth could lead to cancer cell death and, in turn, control tumor growth with less side effects. One of these unregulated proteins are cell cycle proteins, and we identified a few of them to decrease the growth of Breast Cancer cells. In an animal study, we were able to retard the growth of tumor by delivering siRNA against cell cycle protein. Another study was focused on tackling the spread of cancer from one site to another (metastasis), a major hurdle in the treatment of cancer. Several lines of evidence have confirmed the role of phosphatase proteins in metastasis. Phosphatase, therefore, may be suitable targets for siRNA therapy to decrease metastasis. We hypothesize that the dual siRNA therapy of a cell cycle protein (to decrease tumor growth) and a phosphatase (to decrease metastasis) may have a drastic impact in the treatment of metastatic Breast Cancer. We were successfully able to inhibit the migration of Breast Cancer cells by delivering siRNAs against cell cycle and phosphatase proteins. We are currently validating these initial research results.

Career ambitions

The funding from WCHRI has definitely provided me a flexibility and independence towards my research project as well as ability to work as a part of the team. I became more independent and was able to manage my project with little direction. Attending conferences and meeting other researchers has given me a real-world insights about the research field that i am working on. My long-term goal is to join a leading pharmaceutical company and contribute to their research programs. To further my career towards industry, I have done an internship at the Precision NanoSystem Inc., a leading Vancouver-based biotech company in nanoparticle formulations.

Community outreach activities

Gene therapy for Breast Cancer using SiRNA

3 Minute Thesis Competition, University of Alberta

Additional support received from

- Graduate Studentship, Alberta Innovates

Honours and awards

- Semi-finalist in 3-Minute Thesis Competition
- Mary Louise Imrie Graduate Student Travel Award, University of Alberta
- Dr. Leonard Wiebe Graduate Award in Pharmaceutical Sciences, University of Alberta
- Travel Award, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta
- Dorothy Whiteman Scholarship, University of Alberta

Funding partner

Lois Hole Hospital for Women

Awardee

Katherine Pohlman

Supervisors

Linda Carroll and Sunita Vohra

Research project

Improving the assessment of safety in pediatric chiropractic manual therapy: A RCT evaluating passive versus active surveillance assessing pediatric adverse events after chiropractic care

Chiropractic doctors are the most widely sought after complementary and integrative health care provider group that see children. On average, a chiropractic practice sees between 17 per cent to 39 per cent children. Care provided to children by chiropractors range from nutritional advice to exercises, but most commonly includes a hands-on treatment called manual therapy. This type of therapy usually affects the joints in the neck, back or limbs. Although the volume of children seen is high, there is very minimal information about the safety of chiropractic care in children. Harms related to pediatric chiropractic care identified in systematic reviews are largely based on retrospective case reports; these reviews have called for further high quality research on this topic. Currently, throughout Europe there is a passive surveillance reporting system to identify harms after chiropractic care, but minimal information about pediatric data is available from this source.

Our study conducts both a head-to-head comparison of active versus passive surveillance, while prospectively collecting safety information on the use of pediatric chiropractic care. This information may allow us to identify key issues or concerns for those who should seek this type of care, determine a more accurate risk estimate associated with pediatric chiropractic care, and provide better quality information for discussions regarding informed consent. Passive surveillance relies on patients to tell their doctor about any effect that occurred after their visit. It has been found that patients are sometimes not comfortable telling their doctor about adverse events, as they don't want to be seen as a "problem patient." Thus, the voluntary reporting system commonly under-reports the actual number of effects that can occur after treatment. Despite this, it is commonly utilized throughout health care to identify harms. In this study, passive surveillance will be compared with an active surveillance system, which gives every patient the opportunity to report the safety of the care they received, while still keeping all of the information confidential and anonymous. The information gained by comparing both these systems may be useful throughout health care and help inform future practice-based patient safety initiatives.

Career ambitions

After completing my PhD thesis, I intend to pursue post-graduate training to continue gaining research experience and skills in safety and effectiveness research. This will ideally lead me to a tenured position at a research intensive university. While my focus has been on the evaluation of manual therapy, especially among the pediatric population, the research skills that I have gained and continue to gain have given me the foundational skills needed to explore a range of health care patient safety research questions in the future.

Community outreach activities

Being a clinical research scientist

Hendrick Middle School

Additional support received from

- Educational fellowship, NCMIC, INC

Honours and awards

- Distinguished New Investigator Travel Scholarship, International Congress - Integrative Medicine & Health Organizing Committee

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Rachel Prowse

Supervisor

Kim Raine

Research project

Evaluating the state of food and beverage marketing to children in recreational sport settings: A cross-sectional assessment and investigation of parents' perceptions

Food and beverage marketing is a risk factor for childhood obesity. Recently, the federal government has mandated the introduction of new regulations on food marketing to children. To date, research in Canada has evaluated only a few media and settings in which children are exposed to food and beverage marketing, including on the television, on the internet, in public schools and in grocery stores. No research has looked at food marketing in recreation facilities, a place where the promotion of unhealthy food contradicts their mandate to promote health.

This project has developed a reliable observational audit to assess the nature and extent of food marketing in recreational facilities. Recreation facilities will be scored as to the expected impact of their food marketing environment on children's food preference and practices, considering the frequency of advertisements, foods advertised and the persuasive marketing techniques used. Scores will also be compared against food sales data to understand how marketing (at a facility level) impacts food sales (at a concession within a facility). Finally, parents will be engaged in a photo-interviewing qualitative study to understand their awareness and experiences of food marketing in and around their children's sport. This will help understand what type of marketing interventions may help to support parents in feeding their active kids a healthy diet.

This research is important to inform effective policy action to support healthy diets in Canadian children.

Career ambitions

I aspire to hold an academic appointment at a university and study population factors that impact diet and health. This research has given me the opportunity to study policy-relevant, community-engaged issues. Such an opportunity has increased my desire to become a engaged scholar and produce meaningful research. I look forward to being a researcher who collaborates with communities, policy makers, organizations and more.

Community outreach activities

Healthy eating for children: Influences in and out of the home

Annual General Meeting for the Canada Place Child Care Society

Additional support received from

- Queen Elizabeth II Graduate Scholarship, University of Alberta
- Doctoral Award, CIHR

Honours and awards

- President's Doctoral Prize of Distinction, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Ashley Radomski

Supervisor

Amanda (Mandi) Newton

Research project

Pilot randomized controlled trial of an internet-based anxiety treatment program for adolescents

Anxiety disorders are the most common mental health problem in adolescence. Cognitive behavioural therapy (CBT) is first-line treatment for anxiety, but often comes with individual, economic and geographical barriers. Online delivery of CBT is emerging as an acceptable alternative among adolescents for increasing access or timeliness of treatment. Recent reviews suggest more study is needed to establish the treatment effects of Internet-based CBT in adolescents.

This project is a pilot randomized controlled trial (pilot RCT) of Breathe, an Internet-based CBT program with eight interactive and educational modules, personalized homework assignments and telephone and email support, designed to reduce anxiety in adolescents. Preliminary findings indicate that adherence to this intervention was found to be low; however, satisfaction was considered high. This paradox of adherence and satisfaction is quite consistent with other findings in the literature. Those adolescents who completed the treatment program rated feeling “somewhat better” to “much better” in relation to changes in their anxiety symptoms.

The outcomes from the pilot RCT will inform refinements of the treatment program as well as other methodological aspects (such as the sample size, recruitment strategy) required for a larger trial. A larger trial will evaluate the effectiveness of Internet-based CBT (Breathe) in reducing anxiety disorder symptoms in adolescents with moderate to mild anxiety problems compared to treatment as usual.

Career ambitions

My ultimate career goal is to be a scientific director for an organization supporting the development, evaluation and implementation of publicly-available pediatric eHealth initiatives. This will provide me with the large-scale opportunity to improve mental health care and outcomes for children and youth.

Community outreach activities

Breathe: Online anxiety tool for youth

Highlands Junior High School

Additional support received from

- Queen Elizabeth II Graduate Scholarship, University of Alberta
- Graduate Studentship, Alberta Innovates

Honours and awards

- Poster Presentation Award, WCHRI Research Day
- Trainee Travel Grant, WCHRI
- Academic Travel Award, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Anthony Reardon

Supervisor

Jonathan Martin

Research project

Maternal co-exposure to perfluoroalkyl acids (PFAAs) and methylmercury (MeHg) and their impact on neurodevelopment

In recent years, there have been increasing diagnoses in the number of child behavioural and developmental disorders. Although some of this is likely due to increasing awareness and changing diagnostic criteria, environmental factors must also be considered. The average woman has detectable levels of more than 100 environmental contaminants in her blood during pregnancy, and prenatal maternal environmental chemical exposures are an established risk factor for adverse development of the fetal brain. A classic example of a compound that crosses the placenta and causes deficits in normal brain development is methylmercury. For this reason, pregnant women in Canada are advised to limit their intake of certain dietary fish that contain high levels of mercury. However, fish are also the major source of human exposure to emerging environmental chemicals, specifically perfluoroalkyl acids (PFAAs). PFAAs are the most prominent organic contaminants in human blood today. Little is known about the neurodevelopmental risks of PFAAs, and virtually nothing is known about the combined effects of exposure to both methylmercury and PFAAs.

In the human body, both PFAAs and methylmercury interfere with maternal thyroid hormones; which play a vital role in healthy fetal development. We hypothesize that maternal exposure to methylmercury and PFAAs during pregnancy can adversely impact the neurodevelopment of children through a mechanism involving thyroid hormone disruption. This hypothesis is being tested in both a large scale epidemiology study as well as in a controlled animal experiment in a laboratory setting. 500 children have undergone standardized testing at two years of age and maternal blood samples from the mothers of these children during pregnancy have been screened for PFAAs and levels of thyroid hormones. Statistical modeling is underway to determine associations between maternal PFAA levels, thyroid hormone regulation and child development outcomes. Combined exposure, in study models, has shown that exposure to PFAAs and methylmercury exacerbates the effects from exposure to each single contaminant, and affects both behaviour and molecular outcomes.

The results obtained from each of these investigations will influence global regulation of PFAAs that continue to be manufactured and used internationally in large quantities.

Career ambitions

My experience in environmental toxicology and chemistry at the University of Alberta has provided me with the technical skills required for a career in industry. I would like to continue to conduct research, and my first prospect is to pursue commercial research in the biotechnology industry in Canada.

Community outreach activities

Environmental contaminant exposure during pregnancy

Highlands Junior High School

Honours and awards

- Profiling Alberta's Graduate Students Award, University of Alberta
- Bell McLeod Educational Fund - Travel Award, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Priatharsini (Tharsini) Sivananthajothy

Supervisor

Zubia Mumtaz

Research project

Exploring the differential rates of caesarean sections in Canadian born and newcomer women in Edmonton, Alberta – a comparative analysis

Caesarean section (C-section) deliveries are conducted when there is a failure to progress in labor, or compromised fetal status. However, they place women at higher risk for immediate complications compared to vaginal deliveries. It has been shown that newcomer women in the prairie provinces experienced significantly higher C-section delivery rates compared to Canadian-born women, even though rates of recommendations by health care providers was equal. This study aims to understand this trend, and explore how decisions regarding C-section deliveries are made within the experiences of newcomer and Canadian-born women, including the roles of women and physicians in decision-making, as well as factors considered.

A focused ethnography was conducted at a hospital in Edmonton, Alberta for an eight-month period. The study population was comprised of newcomer women who immigrated to Canada and Canadian-born women. All women included had a higher risk of undergoing a C-section. Data collection strategies included participant observation of prenatal appointments, labour and delivery and in-depth interviews with the women.

Findings indicate that power differentials exist between healthcare providers and patients, and affect obstetrical decision-making. Power differentials manifested in two forms: 1) the perception participants held towards their healthcare providers, including unquestionable trust, which resulted in discomfort in expressing their personal preferences, and 2) the subtle acts of persuasion and power carried out by healthcare providers when interacting with patients. However, both Canadian born and newcomer women who had health system knowledge were able to express their preferences for treatment. Most newcomer women lacked this knowledge and were more likely to follow provider recommendations.

Career ambitions

Although I entered the M.Sc. in Global Health program with interests in working internationally, after completing my thesis research, my interests have changed to focusing on community health, specifically that of marginalized communities. I hope to the use skills I have developed in my M.Sc. to create a career in evidence-based policy development.

Community outreach activities

3 Minute Thesis Competition, University of Alberta

Funding partner

Lois Hole Hospital for Women

Awardee

Rachel Skow

Supervisors

Craig Steinback and Margie Davenport

Research project

Sympathetic neurovascular regulation in normal and preeclamptic pregnancy

Current guidelines recommend all women with low-risk pregnancies exercise in order to improve pregnancy outcome including a reduced risk of diabetes and high blood pressure.

During exercise, the sympathetic (fight/flight) nervous system plays an important role in delivering blood flow to the working muscles. Exercise training has been shown to improve blood vessel health in non-pregnant people and reduce sympathetic nerve activity. Our previous work in healthy pregnant women demonstrated that sympathetic nerve activity is hyperactive but the effect on blood vessels are blunted in pregnancy allowing for maintenance of normal blood pressure. The impact of physical activity (i.e. exercise training) on the nervous system regulation of blood vessel function in pregnancy has not been explored.

This project tests how the nervous system controls the blood vessels in healthy pregnant women before and after an aerobic exercise training program. We hypothesize that exercise training will be associated with improved blood vessel control and function compared to controls. We will randomly assign 100 pregnant women into exercise training or control groups. The exercise training will follow the current *Canadian Clinical Practice Guidelines* for exercise during pregnancy and consist of aerobic activity that will occur for 40 minutes, three times per week. Prior to and following training, we will measure sympathetic activity, heart rate, blood pressure, blood flow in an artery in the leg during a voluntary breath hold and while putting a hand in ice water. Both of these simple tests increase sympathetic activity. We will also assess the ability of blood vessels to dilate and their stiffness. Both measures are predictive of future cardiovascular health. Changes in sympathetic activity and cardiovascular responses will be assessed to establish effects of exercise training during pregnancy.

We believe this data will be important for understanding the role of physical activity in regulating the responses of the blood vessels to changes in nervous system activity during pregnancy and will be significant in informing clinical guidelines for exercise during pregnancy so as to maximize health benefits.

Career ambitions

My main goal is to become a researcher in a Canadian university, looking at integrative human physiology with a focus on women's health.

Community outreach activities

Exercise in pregnancy and the nervous system control of blood vessels

Highlands Junior High School

Additional support received from

- CIHR

Funding partner

Lois Hole Hospital for Women

Awardee

Hoda Soleymani Abyaneh

Supervisor

Afsaneh Lavasanifar

Research project

Nanotechnology for enhanced chemotherapy in triple negative Breast Cancer

Triple Negative Breast Cancer (TNBC) is an aggressive type of Breast Cancer with limited treatment options and poor prognosis. It has a high incidence of re-occurrence, metastasis, and a very short median survival. These tumors are initially responsive to first line therapy, but reoccurring TNBC are usually chemo-resistant.

Chemotherapy regimens cause detrimental side effects, reducing the quality of life in TNBC patients. This can result in clinical use of sub-optimal drug dosage. When these cancer cells survive sub-optimal therapy, they become resistant and lead to cancer re-occurrence.

Our objective is to develop nano-delivery systems that can introduce a significant amount of chemo-therapeutics to primary or metastatic TNBC tumors, while sparing normal cells. This approach is expected to decrease the side effects of chemotherapy and at the same time reduce the chance of drug resistance development and tumor re-occurrence in TNBC.

Career ambitions

I am a people person. Education, research and health are my passions. I like to see myself in a position that I know I can significantly advance the pharmaceutical field through my research and subsequently improve the quality of life of patients

Community outreach activities

Targeted therapy: Avoids the normal cells and aims at the cancer cells

3 Minute Thesis Competition, University of Alberta

Additional support received from

- Dr. Leonard Wiebe Grad Award in Pharmaceutical Sciences, University of Alberta
- Professional Development Grant, University of Alberta
- Graduate Studentship, Alberta Cancer Foundation

Honours and awards

- Finalist, 3 Minute Thesis Competition, University of Alberta
- Poster Presentation Award, Inaugural Cancer Research Institute of Northern Alberta (CRINA) Research Day

Funding partner

Lois Hole Hospital for Women

Awardee

Ameneh (Amy) Toosi

Supervisor

Solina Richter

Research project

Disparities in early development between children from international migrant and Canadian-born families

Early childhood development is important to ensure a solid foundation for children's health and wellbeing. This study is one of the few that explores how the development of children from foreign-born parents at two years of age differs from Canadian-born children, and the factors that influence their development.

Data from a prospective community-based cohort study (n=1597) was utilized to compare the domains of childhood development between children who were born to foreign-born parents (n=452) and those who were born to Canadian-born parents (n=1129) at two years of age.

Children born to foreign-born parents were two times more likely to be at risk for delays in both behavioral problem and competence scores, almost one and half times more likely to have developmental delays in at least two domains of development, and almost one and half times more likely to need further assessment in communication as compared to children born to Canadian-born parents.

Competencies in social-emotional development: The modifiable factors that may have influenced possible delay in social-emotional competencies for children of foreign-born parents were: history of mental health issues and lack of utilization of informal community resources. For children of Canadian-born parents, the factors were: lack of plays, games and activities that inspire child imagination.

Social-emotional behaviour problems: The modifiable factors that may have influenced possible delay in social-emotional behaviour problems for children of foreign-born parents were: maternal health and lack of non-parental care, and speaking a language other than English at home. For children of Canadian-born parents, the factors were: maternal health, history of mental health issues and being an only child.

Communication development: The modifiable factor that may have caused delay in communication development for children of foreign-born parents was lack of non-parental care. For children of Canadian-born parents, this included: prematurity and lack of plays, games and activities that inspire children's imagination.

Our finding may indicate that the quality of parental caregiving of foreign-born parents may be lower than Canadian-born parents, which negatively influences the communication and emotional-social development of their children.

Foreign-born parents may benefit from parenting and education support to improve maternal care in home. Promoting parent-child interactions to improve responsiveness, increase attachment, encourage learning, book reading, play activities, positive discipline and problem-solving related to children's development are some examples that could be part of parenting and education support. History of mental health issues was a risk factor for possible delay in social-emotional competencies for children with foreign-born parents and also a risk factor for possible social-emotional problems in children with Canadian-born parents. Therefore, the need for assuring maternal mental health is warned.

Career ambitions

My research reflects my clinical background and personal interests. I intend to develop a program of research that will lead to improvements in child health outcomes, specifically those from international migrant families

Community outreach activities

Health literacy and immigrant women

3 Minute Thesis Competition, University of Alberta

Additional support received from

- Alberta Registered Nurses Educational Trust, University of Alberta
- Mary Louise Imrie Graduate Student Award, University of Alberta
- Graduate Students Association Professional Development Award, University of Alberta

Honours and awards

- Education Award, Mu Sigma Theta Tau International Honor Society of Nursing
- Publication Award, University of Alberta, Endowment Fund for the Future for the Support for the Advancement of Scholarship

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Aleksander Touznik

Supervisor

Toshifumi Yokota

Research project

Novel antisense oligonucleotides for the treatment of spinal muscular atrophy

Spinal muscular atrophy (SMA) is one of the most common neuromuscular disorders. It usually has an early onset, with rapid progression of weakness, resulting in death at a young age. SMA is caused by a mutation of the survival of motor neuron 1 (SMN1) gene. With a mutation in this gene, patients are no longer able to produce an essential protein for survival called SMN. Humans are unique, because they contain a nearly identical copy of the SMN1 gene known as SMN2, that is capable of producing approximately ten per cent of the much-needed SMN protein, allowing children to survive long enough to be born. This biological miracle is short lived however, as ten per cent is not enough to remain healthy, and many children do not live past the age of eight, with many dying within their first year of life.

SMA is the result of our body's messenger system being tricked by a couple of faulty letters in the gene. For proper production of the SMN protein, our cellular machinery first must read a message sent from our DNA. In the SMN2 gene, this message is written incorrectly, but only a small part of the message is incorrect. In our SMA project, I will use a new technology using DNA-like molecules that act as molecular "band-aids" to cover up the mistake in the message. Covering the mistake allows the machinery in charge of making protein to properly read the message, and ultimately use that message to produce normal levels of proteins. I have been doing experiments with several types of molecular band-aids, some of which were able to restore near normal levels of SMN in patient's cells. Two key challenges faced in clinical trials are delivery of the molecular band-aids into cells, and the harmful effects some of them have on our bodies.

The goal for the project was to develop safer and more effective antisense drugs for treating Spinal Muscualr Atrophy. We have examined both chemistries that are highly tolerable as well as those that work at extremely low concentrations. Both showed promising results.

Career ambitions

My goal is to enroll into a medical school. Thanks to this research experience, I also want to continue to be involved in research as a physician.

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Geetha Venkateswaran

Supervisor

Sujata Persad

Research project

Osteosarcoma progression: Role of beta-catenin/ active beta-catenin

Osteosarcoma (Bone Cancer) has high incidence in children and adolescents. The spread of tumor cells to distant sites (mostly lungs) is one of the major causes for poor survival in patients. Another cause is poor response to current treatments. This clearly suggests that development of new strategies for early detection and effective treatment is important for improved survival.

In normal cells, there are several biological processes that are involved in maintaining the limited lifespan of cells. This includes the very tight control of cell growth and contact between cells (as cells need to be bound to each other to keep them alive and functioning normally). These processes are mediated in the cell by the passage of signals between the cell and its outer environment, as well as within the cell (signaling pathways). In cancer cells, the intensity of the signals are changed (increased or decreased), which causes the cells to behave differently: They may have a longer lifespan, grow without control and have less contact with other cells. The latter alteration may facilitate cancer cells to move away from each other and migrate from their original organ to other organs (metastasis).

Our lab is interested in studying how a signaling pathway, called the Wnt/β-catenin signaling pathway, is involved in orchestrating the changes to Osteosarcoma that helps tumour cells metastasize. Although studies have shown that the Wnt/β-catenin signaling pathway is modified in Osteosarcoma, how this pathway promotes the spread of Osteosarcoma is not well understood. The main focus of our study is on a central component of this pathway called β-catenin and especially its active form, Active Beta-Catenin (ABC). Our results indicate that ABC levels increase as Osteosarcoma becomes metastatic. We are currently seeking to completely confirm if ABC is involved in the spreading/metastasis of Osteosarcoma and also understand the mechanism that controls ABC levels in cells. The first aim will inform whether ABC can be used as an effective marker to identify Osteosarcoma that has the potential to metastasize, and the second will inform the development of better treatment strategies.

Career ambitions

My ambition is to pursue a research career with a focus on investigating the molecular mechanisms of tumor metastasis to find potential targets for improved cancer therapy.

Community outreach activities

Signaling in cancer

Highlands Junior High School

Additional support received from

- Medical Sciences Graduate Program Scholarship, University of Alberta
- Hair Massacure/Stollery Children's Foundation Studentship Award, University of Alberta

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Sonya Widen

Supervisor

Andrew Waskiewicz

Research project

The role of WNT signaling in pediatric blinding disorders

Thirty-nine million people are blind worldwide. Yet, we know surprisingly little about the genetic inheritance of blinding disorders. Ocular diseases that are prevalent in children, such as Leber Congenital Amauraosis (LCA; a retinal dystrophy) and Ocular Coloboma (incorrect structural development of the ventral eye) have been shown to be caused by improper genetic regulation of processes involved early eye development. Recent sequencing data of human patients with ocular coloboma show various mutations in FRIZZLED-5 (FZD5), a receptor involved in the essential WNT signaling pathway.

My primary research aim addressed the role of FZD5 and other WNT pathway members in Ocular Coloboma. I aimed to characterize the effects of mutations in genes associated with eye formation and to assess the biological activity of the identified human sequence variant. This aim was successfully completed and we were able to implicate mutations in WNT receptor FRIZZLED-5 in formation of coloboma. This finding is particularly significant as this is the first study implicating WNT signaling in formation of Ocular Coloboma, a leading cause of pediatric blindness. An additional aim focuses on retinal dystrophies. Sequencing of human patients with LCA or Retinitis Pigmentosa has identified two novel WNT pathway members as candidates for causality of retinal dystrophies. I aim to investigate the role of WNT signaling in ocular development and how loss of WNT gene function leads to retinal dystrophies. This aim is currently ongoing.

Overall, I hope to elucidate the role of WNT signaling, a major developmental signaling pathway, in causality of pediatric blindness.

Community outreach activities

Using zebrafish to understand human genetic eye diseases

Highlands Junior High School

Additional support received from

- President's Doctoral Prize of Distinction, University of Alberta
- Graduate Studentship, Alberta Innovates Technology Futures
- Travel Award, University of Alberta
- Queen Elizabeth II Graduate Scholarship, University of Alberta
- Alexander Graham Bell Canada Graduate Scholarship, NSERC

Honours and awards

- President's Doctoral Prize of Distinction, University of Alberta
- Top-Up Award, Alberta Innovates Technology Futures
- Best Oral Presentation, Alberta Vision Net Symposium
- Graduate Student Poster Award, Canadian Developmental Biology Meeting
- First Place PhD Oral Presentation Award, Richard E. Peter Biology Conference
- Best Oral Presentation, Medical Genetics Research Day

Funding partner

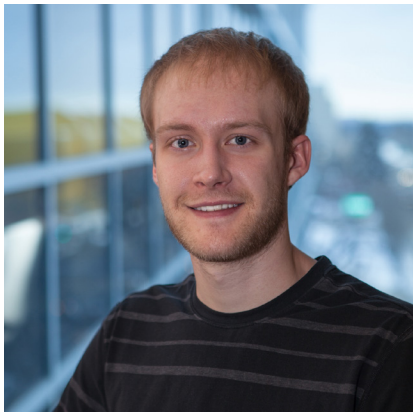
STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Shane Wiebe

Supervisor

Todd Alexander



Research project

The role of NHE8 in the regulation of renal proximal tubule calcium reabsorption

Children and women are suffering from kidney stones and thin bones more and more frequently. Unfortunately we have no idea why this is occurring, and indeed what causes kidney stones and osteoporosis in the first place for the majority of our patients. The approach the Alexander laboratory is taking to this problem is to try to understand how calcium is maintained in the body. We believe this information is fundamental to understand why some women and children pee too much calcium – a common problem in women and children who form kidney stones and develop thin bones.

To do so, we followed up on an unknown protein identified by a genetic screen performed in the laboratory. We found that there was less of the sodium proton exchanger Isoform 8 in the kidneys of animals treated with a drug. This drug made the kidney “think” that the body had too much calcium.

Shane provided substantial new knowledge around how this protein works in the kidney to regulate blood calcium levels. He used both animal and cell models including state of the art imaging techniques to demonstrate a role for NHE8 in regulating how the kidney handles calcium. This knowledge will inform further work into understanding rare and common diseases characterized by kidney stone formation, and ultimately hopefully help design new therapies for women and children with kidney stones and thin bones.

Career ambitions

My ambition is to be a professor in biomedical research.

Community outreach activities

Calcium and the kidneys

W.P. Wagner High School

Honours and awards

- First Place Oral Presentation, 24th Annual Physiology Research Day

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Osnat Wine

Supervisor

Alvaro Osornio Vargas

Research project

Exploring integrated knowledge translation in the complex context of environmental health research: A case study

There is a great need for, and interest in, research that investigates the impact of the environment on children's health. This type of research is complex, requiring different specialty fields and experiences. It also needs collaboration between researchers and those who can use research findings to make changes in public acts (for example, decision makers) to improve children's health. This research investigates what works and what does not work in research partnerships with specific emphasis on the integrated knowledge translation (iKT) component of research collaborations between different stakeholders in research projects that explore the relationship between children's health and environmental variables.

My research project relates to the activities of one research project team (DoMiNO-Data Mining & Neonatal Outcomes), which is a project involving a partnership between interdisciplinary researchers, practitioners and decision-makers representing academia, governmental agencies and the public. This project investigates the relationship between early births and small babies with industrial emissions, and social and economic variables, by using new computing systems to analyze large volumes of existing data on exposures and health outcomes. In order to evaluate partnerships, I work on and with different research activities of the DoMiNO project, and collect information from team members to learn what they think is important or challenging working in collaboration in this context.

Findings from the ongoing research provide further support to the importance of the dedicated effort, time and planning to support and maintain effective collaborations and partnerships. This will enable production and translation of new knowledge. Findings identified iKT enhancers (e.g. engagement and learning) and challenges (e.g. consensus, and roles) in real time and provide opportunities to address those during the research process and in future research projects.

Career ambitions

The experience and knowledge gained through my research are guiding my career plans. I strive to become an independent researcher and practitioner who is able to work and develop research independently which is competitive, relevant and creative, in my specific context of children's environmental health.

Community outreach activities

Studying environmental health: It's all about the team

Louis St. Laurent School

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Tamara Yee

Supervisors

Lonnie Zawaigenbaum and Joyce Magill-Evans

Research project

Development and content validity of Autism Social Participation Classification System (ASPCS) for preschool children with Autism Spectrum Disorder

Social participation is considered the ultimate aim of rehabilitation, particularly for preschool children with Autism Spectrum Disorder (ASD). Given the inherent social difficulties of preschool children with ASD, social participation is a relevant and meaningful construct to explore and target as part of a multidisciplinary team. However, the construct of social participation has not yet been refined for preschool children with ASD by stakeholders to ensure its measurement is meaningful and relevant. There are also no available measures exclusively focused on social participation for preschool children with ASD, which may be imperative to the inclusion of these children in community activities with peers.

The purpose of my project was to complete a scoping review on participation measures available for preschool children with ASD (understanding stakeholders' perspectives, including parents, professionals and educators, on social participation for preschool children with ASD); as well, to develop and establish content validity for a social participation classification system – a new measure to address current gaps in clinical practice. My research identified seven measures of participation for possible use with preschool children. Five measures had standardization samples that included preschool children with ASD and three provided both validity and reliability data. However, none focused on social participation. Subsquently, stakeholders identified the following as essential components of social participation for preschool children with ASD: behaviour management, social interactions, and various types of play. Additional analysis revealed that stakeholders used intrinsic motivation strategies and contingency management to facilitate social participation. Finally, an expert group of clinicians and a parent developed the Autism Social Participation Classification System (ASPCS). Content validity was established with >80 per cent consensus that each of the five levels in three domains (behaviour, social desire and activities & enviroment) in the ASPCS were clinically meaningful and distinct.

In conclusion, there were few standardized participation measures for preschool children with ASD and none were exclusively focused on social participation. A new measure was needed. With the refinement of social participation by stakeholders, the ASPCS was developed and validated for preschool children with ASD.

Career ambitions

I will be commencing a joint post-doctoral fellowship at the Dalla Lana School of Public Health, University of Toronto and Holland Bloorview Kids Rehabilitation Hospital. My career aspiration is to become a child-health clinician-scientist in the area of program development and evaluation.

Additional support received from

- Clinician Fellowship, Alberta Innovates
- Career Enhancement Award, Canadian Child Health Clinician Scientist Program
- Clinical Seed Grant Foundation, Glenrose Rehabilitation Hospital Foundation
- Pilot Grant, Autism Research Centre & Autism Society of Edmonton Area Graduate Student
- Fellowship, Autism Research Training Program (CIHR-STIHR)
- Doctoral Recruitment Scholarship, University of Alberta

Honours and awards

- Best Poster in Developmental Pediatrics, Canadian Pediatric Society Conference
- Trainee Travel Grant, WCHRI
- Student Travel Scholarship, American Academy of Cerebral Palsy & Developmental Medicine
- Student Travel Scholarship, NeuroDevNet
- Honourable Mention, CIHR National Health Research Poster Competition

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Deenaz Zaidi

Supervisor

Eytan Wine

Research project

Alterations in intestinal epithelial cell extrusion and microbial virulence in pediatric inflammatory bowel diseases

Inflammatory Bowel Diseases (IBD), encompassing Crohn Disease (CD) and Ulcerative Colitis (UC) are highly prevalent in Canada, especially in the pediatric population and are documented to be on the rise in children. Although significant progress has been made in research endeavors to identify the cause of these diseases in order to facilitate targeted treatments, much remains unclear and additional studies targeted towards unearthing the molecular cause of the disease are needed. Multiple factors are associated with these complex diseases, such as defects in the gut lining, changes in the composition of bacteria in the gut, and increased inflammation, but their role in disease progression is yet unknown. The gut lining functions as a protective barrier, that allows nutrients to be absorbed, and at the same time, prevents harmful bacteria from invading the lining and destroying the structures underneath.

We recently found that there is increased cell shedding in the bowels of adult patients with IBD, which indicates a break in the gut lining called “epithelial gaps”. This shedding predicted the disease course in adults. We speculated that there is increased intestinal epithelial cell shedding in children with IBD as well. As IBD starts in childhood, we wanted to investigate if these epithelial gaps are potential causes that may contribute to the disease in children and further identify other changes in their bowel. This is important because epithelial gaps are a potential route for bacteria to invade the gut lining and cause disease. Also, how bacteria function in the diseased bowel and contribute towards these diseases, is not known. Thus, the relationship between epithelial gaps and bacteria and the role each plays in causing disease is yet to be explored. As well, inflammatory factors, such as, TNF-α and its counteracting proteins, play an important role in gut barrier disruption. Thus it is important to investigate their role in IBD as well. The aim of my study was to evaluate epithelial gaps in children with IBD and to investigate the potential link between inflammation and epithelial gaps disease.

This study has revealed important information about the key factors involved in causing and affecting the course of IBD. We found that epithelial gaps are increased in IBD, and there is dysregulation in factors controlling inflammation. Findings from this study might help in improving treatment strategies such as, medications that enhance the gut barrier and reduce epithelial cell shedding and drugs that target specific proteins and reduce inflammation.

Career ambitions

I aim to continue my career in translational medicine, and this research experience has provided me excellent training.

Additional support received from

- Medical Sciences Graduate Program Scholarship, University of Alberta

Honours and awards

- Educational Event Agreement International Trainee Travel Sponsorship, Muana Kea Technologies
- Travel Trainee Award, WCHRI

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Awardee

Kirby Ziegler

Supervisor

D. Alan Underhill

Research project

Defining PAX3 target gene networks and their dysregulation in birth defects and pediatric cancer

The main interest of my laboratory is on a protein (called PAX3) that is necessary to make certain cell types and tissues during development. The most notable are muscle and neural crest (these latter cells give rise to a range of structures or cells, including facial bones, parts of the inner ear and the pigment-producing cells of our skin). While too little PAX3 leads to birth defects, too much can contribute to cancer and its balance is therefore critical. PAX3 is a so-called “master regulator”, meaning that PAX3 binds to DNA and turns other genes on and off in a specific sequence to determine what function a cell will have. We refer to this sequence as a network and our research is directed at understanding how this network is made up in muscle and neural crest cells and how it becomes rewired in cancer with a focus on the pediatric muscle tumor alveolar rhabdomyosarcoma. At the same time, we expect to learn how breakdowns in these networks lead to birth defects that are caused by a loss of PAX3 activity.

With WCHRI funding, we were able to identify for the first time, multiple modes in which PAX3 binds to DNA. This knowledge promotes our understanding of the target genes that PAX3 regulates and how this regulation may be altered in disease.

Career ambitions

Following the completion of the PhD program, I intend to apply for competitive postdoctoral positions that, if successful, will lead to a career in academia as a principal investigator.

Additional support received from

- Graduate Student Scholarship, Alberta Innovates
- Izaak Walton Killam Memorial Scholarship, University of Alberta
- Graduate Student Scholarship Top-Up Award, Alberta Innovates

Honours and awards

- Presentation Award, Signal Transduction Research Group Annual Retreat

Funding partner

STOLLERY CHILDREN'S HOSPITAL FOUNDATION

Notes

Thank you to all the participants, supervisors, mentors and community partners who participated in this year's program!

To find out more about the
WCHRI Graduate Studentship Program, visit:
http://www.wchri.org/GraduateStudentship

women & children's health research institute 10 years

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