

4th Annual Canadian Pharmacy Education & Research Conference

# LEADING CHANGE

*through* **innovation**  
*and* **technology**

June 11-13, 2013  
Full Program



UNIVERSITY OF  
**WATERLOO**

70th Annual General Meeting of the AFPC



# *Table of Contents*

<b>Welcome from Conference Chairs, CPERC 2013 Planning Committee .....</b>	<b>3</b>
<b>Welcome from Daniel Thirion, AFPC President .....</b>	<b>5</b>
<b>Invitation from the Hallman Director, David Edwards .....</b>	<b>6</b>
<b>Looking Ahead to the 2014 CPERC in Saskatoon .....</b>	<b>7</b>
<b>AFPC Executive &amp; Council .....</b>	<b>8</b>
<b>Program .....</b>	<b>10</b>
<b>Conference sessions for Wednesday, June 12 ,2013 .....</b>	<b>13</b>
<b>Conference sessions for Thursday, June 13, 2013 .....</b>	<b>19</b>
<b>Award Winners .....</b>	<b>26</b>
<b>Poster Listing.....</b>	<b>35</b>
<b>Poster Abstracts .....</b>	<b>43</b>
<b>Map of the Vintage Hotel.....</b>	<b>63</b>
<b>Conference Sponsors .....</b>	<b>64</b>
<b>Awards Sponsors .....</b>	<b>65</b>





# Introductions

## Welcome from Colleen Maxwell, Cynthia Richard & Nancy Waite: The 2013 CPERC Planning Committee



Bienvenue à Niagara-on-the-Lake ! Nous attendons avec impatience de pouvoir passer les prochains jours avec vous.

The CPERC Planning Committee hopes you will enjoy the fourth annual CPERC conference and 70<sup>th</sup> AFPC Annual General Meeting. Our theme for the conference is “Leading Change Through Innovation and Technology”. Given the evolution in pharmacists’ scope of practice and shift to entry-to-practice PharmD programs, we are in an era where we must embrace and lead change to prepare new pharmacists and researchers for the world they will face upon graduation.

Our keynote speaker is Lucinda Maine, Executive Vice President and CEO of the American Association of Colleges of Pharmacy. Dr. Maine has been involved with many national and international initiatives that have tackled the curricular reform that is needed to prepare graduates for the changing health care environment. But what exactly are the “game changers” - the aspects of health care, education, business or technology that we really need to pay attention to? Dr. Maine will provide you with the answers!

Plenary session topics include informatics, experiential education, and accreditation standards. New to this year’s program are the “Innovations in Pharmacy Education and Research” presentations, for which we solicited proposals from across the country. We were very pleased with both the quantity and quality of proposals we received, and we trust that you will enjoy hearing about the innovative strategies that your colleagues have adopted. In addition, you will have the opportunity to network and share ideas in our Rotating Roundtable Discussions, another new addition to the conference.

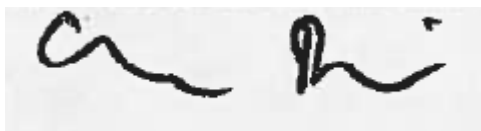


This year the CPERC program was planned by a national committee, which was a subcommittee of AFPC's Education committee. Having a national committee ensured that we focused on initiatives taking place throughout Canada, while also embracing the opportunity to highlight unique aspects of the University of Waterloo School of Pharmacy. Program planning committee members included Cynthia Richard (co-chair, University of Waterloo), Nancy Waite (co-chair, University of Waterloo), Sandra Bjelajac Meija (Hospital for Sick Children), Dave Edwards (University of Waterloo), Patricia Gerber (University of British Columbia), Harold Lopatka (AFPC Executive Director), Sharon Mitchell (University of Alberta), Eric Schneider (University of Waterloo), and Linda Suveges (University of Saskatchewan). In addition, we had a local organizing committee that worked tirelessly to ensure you have a delightful conference experience. Local organizing committee members included Colleen Maxwell, Barb Rae-Schneider, and Dave Edwards. We would like to thank both the program planning committee and the local organizing committee for their valued contributions. Finally, we would like to thank our AFPC Executive Director, Board of Directors, and Council of Faculty for their support and input, as well as our sponsors without whom the conference could not take place.

We hope that you find the conference to be thought-provoking and engaging, and that you enjoy your time in beautiful Niagara-on-the-Lake!

Sincerely,

Colleen Maxwell, Cynthia Richard and Nancy Waite





## Welcome from AFPC President, Daniel Thirion



### Welcome from Dr. Daniel Thirion, AFPC President

It is with my warmest welcome that I greet you to Niagara-on-the-Lake for the 2013 4th annual CPERC Conference.

For the first time at AFPC, a national committee was formed to prepare an unforgettable experience with a focus on 'Leading change through innovation and technology'. As keynote speaker, Dr. Lucinda Maine, Executive Vice President and CEO of the American Association of Colleges of Pharmacy, will share her vision of pharmacy education and health care in North America.

This opening session sharing visions of leadership and innovation sets the tone for an exciting AFPC initiative on pharmacy practice technology education . Come see for yourself if this can be a solution for improving health care system safety, efficiency and productivity.

Also, thanks to the CPERC Planning Committee which is co-chaired by Dr. Cynthia Richard and Dr. Nancy Waite, and a subcommittee of the AFPC Education Committee chaired by Dr. Eric Schneider. A new competitive process for selection of conference presentation proposals was put in place. You will now have the opportunity to learn about the best innovations in pharmacy education in Canada! This conference has a lot to offer, including roundtable discussions to keep you on your toes, research and teaching excellence awards, and interesting news from CCAPP.



Daniel J. G. Thirion, Pharm.D., FCSHP  
AFPC President 2012-2013



## Welcome from Hallman Director, David Edwards



Dear Registrants,

On behalf of the University of Waterloo, I am pleased to welcome each of you to Niagara-on-the-Lake for the 2013 Canadian Pharmacy Education and Research Conference (CPERC). The Niagara region is a delightful area to explore and offers something for everyone. Excellent shopping and world-class theatre are a short walk from the conference venue and with 27 wineries in the area, it is no surprise that the village was voted Canada's #1 food and wine destination by TripAdvisor. Be sure to stop by the authentically restored Niagara Apothecary to experience pharmacy as it was practiced in 1869 when the apothecary opened its doors. A short drive along the Niagara River will lead you to beautiful gardens, historic sites from the War of 1812 and the spectacular scenery of Niagara Falls.

The theme for this year's conference is "Leading Change through Innovation and Technology". I can't think of a more appropriate theme given the changes to the scope of practice for pharmacy in many provinces and the introduction of entry-to-practice PharmD programs in Quebec and Ontario. How we deal with these changes will impact pharmacy education and the practice of the profession for many years to come. I am confident that CPERC 2013 will help prepare us to meet these challenges.

My best wishes to all for a rewarding conference and a wonderful visit to Niagara-on-the-Lake!

David J. Edwards, BScPharm, PharmD, MPH  
Hallman Director, School of Pharmacy  
University of Waterloo





# Introductions

## Looking Ahead: 2014 CPERC in Saskatoon



*Photos courtesy of: Scott Prokop*

The College of Pharmacy and Nutrition at the University of Saskatchewan is pleased to host the CPERC meeting in 2014 as part of a larger conference which will include the Pharmacists' Association of Saskatchewan and the Canadian Pharmacists Association. The College will be celebrating its Centennial in 2014 and hope that you will be able to join us in Canada's sunniest city, Saskatoon.

One of the fastest growing cities in Canada, Saskatoon has affectionately been referred to as the "Paris of the Prairies" because of its bridges, lights and beauty. Nestled on the banks of the South Saskatchewan River, Saskatoon offers big-city amenities and small-town hospitality. Saskatchewan's greatness is evident in the changing landscape. The prairie flatlands are known for seemingly endless fields of wheat, while the rolling hills of the north harbour the majority of Saskatchewan's 100,000 lakes. We look forward to welcoming you to explore our vast horizons and endless skies – see you in Saskatoon in 2014!



# Introductions

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# Introductions

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# Conference Program

## MONDAY JUNE 10

1600 - 1900 AFPC Board of Directors business meeting  
**Scarlet Boardroom**

## TUESDAY JUNE 11

830 - 1230 AFPC Council of Faculties business meeting  
**Scarlet Boardroom**

1230 - 1630 Joint AFPC Council of Faculties & Council of Deans business meeting  
**Loyalist Room**

1500 - 2000 Registration  
**Atrium**

1800 - 2000 Opening reception  
**Imperial Room**

## WEDNESDAY JUNE 12

### **Atrium**

730 - 1030 Registration

730 - 830 Breakfast

### **Grand Georgian Ballroom**

830 - 845 Welcoming comments  
*Dave Edwards, Nancy Waite,  
Cynthia Richard*

845 - 945 Keynote address: Game  
changers in healthcare &  
pharmacy education  
*Lucinda Maine*  
Canadian Perspective  
*Pierre Moreau*

**945 - 1015 Break**

1015 - 1130 Canadian pharmacy informatics  
online: innovation & inception  
*Marie Rocchi, Donna Pipa*

1130 - 1200 Engaging technology & informatics  
through learning & doing  
*Danny Ho*

### **Atrium**

1200 - 1330 Lunch & AFPC business  
meeting/town hall

### **Grand Georgian Ballroom**

1330 - 1500 AFPC award winners' presentations

1500 - 1530 Break

### **1a Grand Georgian Ballroom, 1b Somerset Room**

1530 - 1700 Innovations in pharmacy education  
& research presentations  
See pg 4

### **Loyalist Room**

1700 - 2000 Invitational workshop on program  
evaluation  
*Consult Dean's Office regarding  
attendance*





## Conference Program

### THURSDAY JUNE 13

#### **Atrium**

700 - 1030

Registration

1200 - 1400

Lunch, poster viewing & judging

730 - 830

Breakfast/Poster set-up

1400 - 1545

Rotating roundtable discussions  
See below for topics

#### **Grand Georgian Ballroom**

830 - 930

New accreditation standards:  
What is CCAPP looking for?  
Wayne Hindmarsh

1545 - 1615

Break

930 - 1000

Break

#### **2a Grand Georgian Ballroom, 2b Somerset Room**

1615 - 1715

Innovations in pharmacy education & research presentations  
See pg 4

1000 - 1130

Collaborating in experiential education: National initiatives & more...

Andrea Cameron, Ann Thompson, Michael Legal

#### **Grand Georgian Ballroom**

1800 - 2100

AFPC awards banquet (ticket required)  
Reception at 1800  
Dinner at 1900

1130 - 1200

Experiential Learning: Working Our Way to Excellence  
Anson Tang

### Rotating Roundtable Discussion Topics

*held in the Grand Georgian Ballroom*

1. Addressing professionalism: current practices, challenges & opportunities
2. Global health in pharmacy curricula
3. Adapting curriculum to reflect changes in scope of practice
4. Current practices, challenges & opportunities in admissions & recruitment processes
5. Integration of pharmaceutical sciences into pharmacy curricula of the future
6. Use of social media & technology in academic programming
7. Career development in academia & research
8. Current practices, challenges & opportunities in the use of students as peer teachers/tutors



# *Innovations in Pharmacy Education & Research Presentations*

## **WEDNESDAY JUNE 12**

### **SESSION 1A**

*held in Grand Georgian Ballroom*

- 1530 - 1600 A service learning activity:  
600 students working together  
*Chantal Pharand*
- 1600 - 1630 A descriptive account of  
pharmacy education using  
near-peer teaching  
*Marissa Battistella*
- 1630 - 1700 Evaluation of innovative injection  
curriculum & training for  
University of Alberta student  
pharmacists  
*Hoan Linh Banh, Ken Cor*

### **SESSION 1B**

*held in Somerset Room*

- Teaching social media  
professionalism in pharmacy  
undergraduate education  
*Kelly Grindrod*
- Evolution of a natural health  
products curriculum: from 'weeds  
& seeds' to integrative therapy  
*Tannis Jurgens*
- 'Walking the talk': A scholarly  
approach to fostering scholarship  
of teaching & learning through a  
teaching support unit  
*Marion Pearson, Simon Albon*

## **THURSDAY JUNE 13**

### **SESSION 2A**

*held in Grand Georgian Ballroom*

- 1615 - 1645 Measuring student & community  
outcomes achieved with the  
PHarmacy Innovation Garden  
(PHIG): A community  
service-learning initiative  
*Nancy Waite, Katie Cook*
- 1645 - 1715 The role of medicinal chemistry  
in Canadian pharmacy curriculum  
*Praveen P. Nekkar Rao*

### **SESSION 2B**

*held in Somerset Room*

- Putting design to practice:  
Building meaningful exposure to  
rural & underserved populations  
*Feng Chang*
- Simulation-based patient &  
family-centred care: From the  
educational literature to the  
'classroom'  
*Debra Moy, Suzanne Singh*



# Conference Sessions

## Wednesday, June 12



### **Lucinda L. Maine**

Lucinda Maine serves as Executive Vice President and CEO of the American Association of Colleges of Pharmacy. As the leading advocate for high quality pharmacy education, AACP's vision is that academic pharmacy will work to transform the future of health care to create a world of healthy people.

Dr. Maine previously served as Senior Vice President for Policy, Planning and Communications with the American Pharmacists Association (APhA). She served on the faculty at the University of Minnesota where she practiced in the field of geriatrics and was an associate professor and associate dean at the Samford University School of Pharmacy. Her current interests include innovations in health professions education, including interprofessional education, and global human resources for health.

Dr. Maine is a pharmacy graduate of Auburn University and received her doctorate at the University of Minnesota. Her research includes projects on aging, pharmacy manpower and pharmacy-based immunizations. Lucinda has been active in leadership roles in the profession. Prior to joining the APhA staff she served as Speaker of the APhA House of Delegates and as an APhA Trustee. She currently serves as president of the Pharmacy Workforce Center (formerly the Pharmacy Manpower Project) and as a board member for Research! America.

### **Session Title: Game changes in healthcare & pharmacy education**

#### **Session Chair: Nancy Waite**

Technology as well as new perspectives on patient and student/learner engagement are poised to introduce major change in both higher education and health care delivery. How soon will these changes be seen? How dramatically will they change the approaches that pharmacy faculty have traditionally used in their education and practice activities? How will the roles of patients, practicing pharmacists and other health care professionals change? Paraphrasing the words of Bill Gates, change typically occurs more slowly than we think it will in two years and more rapidly than we think it will in ten. Dr. Maine will address these and other salient issues in her keynote address.

### **The Canadian Perspective**

**Pierre Moreau, Dean, Faculty of Pharmacy, University of Montreal**





# Conference Sessions

## Wednesday, June 12



### **Marie Rocchi**

Marie Rocchi has been at the Leslie Dan Faculty of Pharmacy at the University of Toronto since 1999, when she developed what is now the International Pharmacy Graduate Program. She has been teaching undergraduate pharmacy students since 2008, and has been responsible for developing and teaching a range of courses, including Health Systems, Informatics, Medication Therapy

Management, and Early Practice Experience. Her area of research and practice is technology enabled education. She was responsible for the development and delivery of an inter-professional online course for internationally educated healthcare professionals (Orientation to the Canadian Healthcare System, Culture and Context), and is the instructional designer for a Defence Canada grant to train health, psychosocial and communication first responders for CBRNE (chemical, biological, radio-nuclear and explosive) events.



### **Donna Pipa**

Donna Pipa, B.Sc.Pharm, FCSHP, is Project Manager for the AFPC - Canada Health Infoway initiative aimed at developing an on-line educational program for optimizing the use of pharmacy information and information technology. She is a licensed pharmacist in Alberta with considerable experience in informatics. Donna has been involved with Alberta's electronic health record (EHR) initiative for over 10 years, including direct involvement in assisting pharmacists, physicians and

other health professionals with implementation of the EHR. She has been recognized for her expertise by being appointed to numerous provincial and national committees relating to informatics. Prior to her work in the area of informatics, she was the Director of Pharmacy at the Alberta Children's Hospital, then Pharmacy Operations Manager for Pediatrics within the Calgary region. Donna has also been professionally active with associations and colleges at the provincial and national levels.





# Conference Sessions Wednesday, June 12

## Session Title: Canadian pharmacy informatics online: innovation & inception

### Session Chair: David Edwards

Against a backdrop of the evolving and expanding scope of pharmacy practice in all provinces, increasing complexity surrounds the use and application of Information and Communication Technologies (ICT) in practice. Importantly, the Association of Faculties of Pharmacy of Canada (AFPC) views ICTs as enablers of safe and effective patient care.

To help prepare undergraduate pharmacy students in optimizing the use of ICTs, AFPC has partnered with Canada Health Infoway to develop a national, on-line, competency based, educational program. Faculty input and feedback is essential at this critical stage and most welcome; opportunities to review, contribute, utilize and evaluate are available.

This presentation will describe the analysis, design and development phases of the project including:

- Sharing the prototype module on Documentation
- Creation of a unique Canadian Competency Framework
- Development of a Content, Theme and Design Matrix
- Analysis of Faculty and Student Needs
- Selection of Learning Management System
- Student Award Recipients and Engagement
- Innovative Pedagogy with Virtual Patients
- Intersection of AFPC project with Medicine and Nursing

Image depicts informatics as the intersection of people, data, and systems. In a profession such as pharmacy, the use of informatics is essential for patient care.

debate. Although the article is of limited value, it does provide a good starting point for discussion.

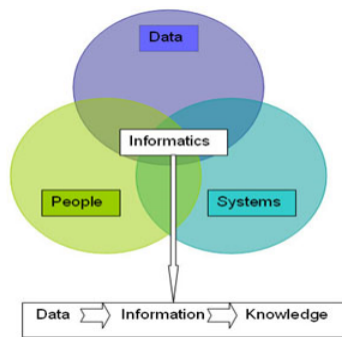


Figure 1: Informatics exists at the intersection of people, data, and systems. Information is generated from data, and must be learned and interpreted to become knowledge.

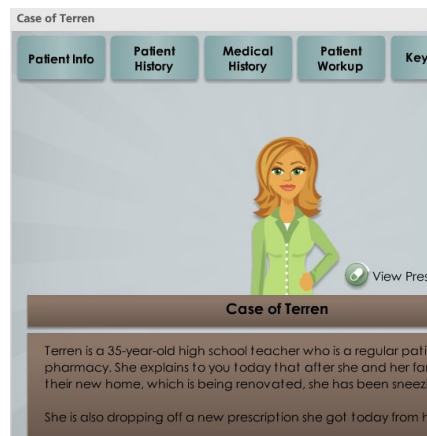


Figure 1: View of the Learning Management System and Virtual Patient Case

This project's educational program will equip future practitioners with a deeper understanding and ability to use ICTs in a meaningful manner, as well as appreciate the rapidly changing landscape in ICT within the context of interprofessional collaboration and an emerging legal and regulatory framework.



# Conference Sessions

## Wednesday, June 12



### Danny Ho

Danny Ho joined University of Waterloo's School of Pharmacy in 2010 as Adjunct Assistant Professor. He holds a PhD in Information Systems, and Masters and Bachelors degrees in Systems Design Engineering from University of Waterloo. His research and industry experiences span Human Factors, Healthcare, and Industrial Automation fields. Danny's areas of expertise are user research and product design and development for computerized collaboration, information access, and data-driven workflow in healthcare and consumer technology applications.

**Session Title: Engaging technology & informatics through learning & doing**

**Session Chair: David Edwards**

As computing technology plays ever increasing roles in patients' homes and healthcare practice settings, we aim to empower pharmacists with key information technology perspectives and skills, so they can identify and address the myriad of challenges in pharmacy and healthcare information systems adoption. This presentation shares course preparation, teaching, and student achievements from two offered courses which span topics including computing basics, database theory and design, pharmacy automation, decision support systems, electronic medical records and ordering systems, telehealth, and telepharmacy.



## **Session 1A**

**Session Chair: Eric Schneider**

### **A service learning activity: 600 students working together**

#### **Chantal Pharand**

**Faculty of Pharmacy  
Université de Montréal**

In 2011, our first entry-level PharmD program was modified to allow the inclusion of a curricular innovation that would contribute to the development of Service Learning as well as several generic competencies. All 600 students of the first three cohorts of our program now work together to develop & implement a common year long project targeting one of two imposed themes that generate a social or community impact and is deployed in the community. This activity has run on two occasions so far & it had a considerable impact on the development of the Service Learning competency in our students. It will remain part of the curriculum.

### **A descriptive account of pharmacy education using near-peer teaching**

#### **Marisa Battistella**

**Leslie Dan Faculty of Pharmacy  
University of Toronto**

This presentation will provide a review of near peer teaching models in health care education. It will describe the realities of this teaching model in pharmacy education within a hospital setting and outline key ways to implement the model in pharmacy practice.

### **Evaluation of Innovative Injection Curriculum & Training for University of Alberta Student Pharmacists**

#### **Hoan Linh Banh**

**Faculty of Pharmacy and Pharmaceutical Sciences  
University of Alberta**

#### **Ken Cor**

**Faculty of Pharmacy and Pharmaceutical Sciences  
University of Alberta**

University of Alberta student pharmacists are currently the only pharmacy students in Canada that are afforded an opportunity to participate in the university flu clinic to enhance their injection knowledge and skills. This unique learning opportunity not only moves beyond theoretical instructions in injection and immunization, but also provides an opportunity for student pharmacists to better integrate their knowledge within the context of a real world clinical environment. This project provides objective assessment on the degree to which the injection curriculum and influenza clinic impact and enhance student confidence and learning.





## **Session 1B**

**Session Chair: Cynthia Richard**

### **Teaching social media professionalism in pharmacy undergraduate education**

**Kelly Grindrod,**

**School of Pharmacy**

**University of Waterloo**

Social media is changing the way we talk about health care. For students who have grown up using social media for personal communications, the shift to professional communications can be daunting. In this session we will discuss how social media is being used in undergraduate pharmacy programs worldwide and explore how we can implement e-professionalism training here at home.

### **Evolution of a natural health products curriculum: from ‘weeds & seeds’ to integrative therapy**

**Tannis Jurgens**

**College of Pharmacy**

**Dalhousie University**

The last 20 years has seen an evolution in the use of Natural Health Products (NHPs) by Canadian consumers from a predominately “alternative” practice to one that many embrace as a standard part of their health care. As medication therapy experts, pharmacists must be prepared to consider NHPs as a fundamental therapeutic option when assessing and resolving a patient’s medication-related needs. This session will describe strategies used to help students assess and integrate knowledge about NHPs into the patient care process.

### **‘Walking the talk’: A scholarly approach to fostering scholarship of teaching & learning through a teaching support unit**

**Marion Pearson**

**Faculty of Pharmaceutical Sciences**

**University of British Columbia**

**Simon Albon**

**Faculty of Pharmaceutical Sciences**

**University of British Columbia**

The leadership team of the UBC Faculty of Pharmaceutical Sciences’ Office of Educational Support and Development will describe their efforts to re-envision the unit’s mission and the impact this is starting to have in the Faculty. The scholarship of teaching and learning (SoTL) has been deliberately placed at the heart of the unit’s work, with the intention that the unit will serve as a role model of scholarly activity for the Faculty, especially for the members of its SoTL Research Stream.



# Conference Sessions

## Thursday, June 13



### Wayne Hindmarsh

Dr. Hindmarsh was appointed Executive Director of the Canadian Council for Accreditation of Pharmacy Programs in 2010. He is currently Dean Emeritus of the Leslie Dan Faculty of Pharmacy at the University of Toronto where he served as Dean for 11 years, from 1998-2009. Previously, he was Dean of Pharmacy at the University of Manitoba and Assistant Dean at the College of Pharmacy at the University of Saskatchewan.

Dr Hindmarsh' academic credentials include a Bachelor of Science in Pharmacy and a M.Sc. Degree from the University of Saskatchewan and a PhD from the University of Alberta. Among his many research accomplishments, he is the author of two books dealing with drug related topics: 1) "Drugs-What your Kid Should Know", a widely acclaimed book used by numerous libraries, high schools

and parents and 2) "Too Cool For Drugs" (co-authored with a professional counselor), a book aimed primary school age children dealing with peer pressure and the problem of drug usage. He is also the author of over 80 scientific articles related to drug distribution and forensic toxicology.

Dr Hindmarsh has served as President of the Association of Deans of Pharmacy of Canada, the Association of Faculties of Pharmacy in Canada, and the Canadian Council for Accreditation of Pharmacy Programs, the Pharmacy Examining Board of Canada and the Canadian Foundation for Pharmacy. He has also represented pharmacy on Hospital Boards in Manitoba and Toronto, and recently completed a term as a member of the Pharmacy Council for the Ontario Government.

Dr Hindmarsh is a Fellow of the Canadian Society of Forensic Science and of the Canadian Academy of Health Sciences.

### **Session Title: New accreditation standards: What is CCAPP looking for?**

### **Session Chair: Elaine Lillie**

CCAPP approved new accreditation standards in June 2012. In an attempt to address some of the comments expressed during the stakeholder review of these standards, CCAPP has been looking at the duration of accreditation, transparency in the decision processes of the Board, and how to deal with conditional and probational status. A Decision Tree has been developed and initially presented to the Deans for their input. This tool will be shared during this presentation, as well as those standards considered to be "critical" and the effect of partially met and non-met standards on the type and length of accreditation. Other issues discussed at the Board table at their recent June meeting will also be shared.



# Conference Sessions

## Thursday, June 13



### Andrea Cameron

Andrea Cameron received her B.Sc.Pharm. from the University of Toronto in 1981, and began a career in hospital pharmacy, with a one year residency program at the Toronto General Hospital, followed by clinical pharmacist and management positions at The Wellesley Hospital in Toronto, until 1997. She completed an MBA in 1992 from U of T. Joining the Leslie Dan Faculty of Pharmacy in 1997, Andrea was a Coordinator with the Structured Practical Experience Program (SPEP). From 2011 to date, Andrea has been intensely

involved with the Office of Experiential Education team in planning and implementation of many components of the Experiential Program related to the new entry to practice Doctor of Pharmacy curriculum. She has served on the executive of the AFPC's Pharmacy Experiential Program – Committee from 2011 to 2013.

Concurrently, Andrea has been involved with many Interprofessional Education initiatives through the Centre for IPE at U of T, and is the lead for implementation of Multiple Mini Interviews for Admissions, initiated in 2009, for the Pharmacy undergraduate program. Andrea is also the U of T representative on AFPC Council of Faculties.

### Ann Thompson

Ann Thompson is the Director of Experiential Education at the Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta in Edmonton, AB. Her clinical practice is with the Hypertension Clinic at the University of Alberta Hospital.

Since joining the Faculty in 2010, Ann has been a member of the Pharmacy Experiential Programs of Canada, and joined the executive in 2011. She just finished her term as the current Chair of this group. This year, she was nominated to be the University of Alberta representative for the AFPC Council of Faculties.

Ann is actively involved with the profession through the Canadian Society of Hospital Pharmacists and the Canadian Cardiovascular Pharmacists Network.



### Michael Legal

Michael Legal graduated from the University of Manitoba in 1995 with a BSc. Pharm and completed a Hospital Pharmacy Residency at Health Sciences Centre in Winnipeg in 1996. He began working as a clinical pharmacist at St. Paul's Hospital in downtown Vancouver in 1997 and completed the Doctor of Pharmacy degree at the University of British Columbia in 2005. He returned to St. Paul's hospital to work as a Clinical Pharmacy Specialist on the Internal Medicine Unit. In this role he has been heavily involved in the experiential rotations of undergraduate

pharmacy students, pharmacy residents, and doctor of pharmacy students. Starting in November 2012 Michael began a 1 year term position at the Faculty of Pharmaceutical Sciences at UBC as the Project Lead for the Advancement of Institutional Pharmacy Education in BC (The AGILE project). In this role he is evaluating novel options & approaches to the challenges in capacity and quality of experiential rotations in BC hospitals.





# Conference Sessions

## Thursday, June 13

### **Session Title: Collaborating in experiential learning education: National initiatives & more**

**Session Chair: Patricia Gerber**

With all schools committed to moving to entry-level PharmD programs by 2020, the biggest curriculum change required is the addition of more experiential education. More than ever, this requires collaboration of faculties with practicing pharmacists to develop and deliver high quality experiences for students. In order to identify national strategies, the Pharmacy Experiential Programs of Canada obtained a grant from the Blueprint Steering Committee to host a multi-stakeholder workshop. This brought together pharmacists from faculties, professional organizations, regulatory authorities, practice, and the accreditation body for pharmacy programs to discuss priorities for expanding experiential education and also collaborating on what could be achieved nationally. The outcomes of the workshop will be presented, and next steps will be discussed.

In addition to national initiatives, various faculties are engaged in projects to address experiential capacity and quality. The Faculty of Pharmaceutical Sciences at the University of British Columbia has embarked on a year-long project to engage health authority stakeholders. The AGILE project will attempt to identify solutions to address upcoming capacity challenges for pharmacy learners at BC health authority sites. A key strategy of AGILE is to identify and promote suitable models for experiential education that allow increased flexibility to accommodate more learners and maximize the use of peer assisted learning. A review of common models employed in health discipline experiential education will be presented followed by a discussion of the suitability of each model for pharmacy learning.

The University of Toronto's Leslie Dan Faculty of Pharmacy began a pilot project to determine the feasibility and acceptability of using the online experiential database to enable students to track their clinical activities and interventions. Students in early and advanced practice rotations will record data throughout the day, using a data tracking worksheet, and subsequently enter this online, capturing age range, gender, medical condition, and clinical activities reflecting the pharmaceutical care process. A survey of students and preceptors will gather feedback about the module and suggestions for future implementation. Initial data and feedback will be presented.



# Conference Sessions

## Thursday, June 13



### **Anson Tang**

Anson Tang is a Clinical Lecturer and Assistant Director of Experiential Learning at the University of Waterloo, School of Pharmacy. He earned his B.Sc.Pharm degree from the University of Toronto, and went on to complete a B.A. (French) degree at Glendon College, York University, and a MBA at the Schulich School of Business, York University (MBA Exchange: China Europe International Business School, in Shanghai). His career path has taken him through roles in community pharmacy, multinational firms within pharmaceutical industry, and the drug insurance sector of health business management. Anson's current research interests include pharmacy experiential education, as well as drug payer themes in healthcare systems.

**Session Title:** Experiential learning: Working our way to excellence

**Session Chair:** Patricia Gerber

As the first pharmacy co-op program in Canada, the University of Waterloo School of Pharmacy has created a learning model that uses outcome-based curricular design both in the classroom and in the co-op workplace. Having experiential learning throughout the program is thought to allow students the opportunity to encounter real patients in real time as they learn about disease, so they do not think of a disease in abstract.

The School has not only enjoyed a 100% employment rate to date, but experience thus far has shown co-op to be a viable and sustainable model for students, practice sites, and the School. This has been based on experiential data gathered from various sources, for example: the Professional Learning Outcome Tracker (PLOT) tool used during co-op terms, student satisfaction survey questions, employer feedback, the Year IV Clinical Capstone, etc.

Delivering experiential via semester-long co-op terms exposes students to learning in a real-world environment. This allows students to bring classroom learning out into the real world, and then bring real world learning back into the classroom again. With the current movement towards expanded scope of practice in pharmacy, ongoing experiential research will be used as part of our program-level curricular planning.



# Conference Sessions

## Thursday, June 13

### Rotating Roundtable Discussions

Number	Topic	Facilitators
1	Addressing professionalism: current practices, challenges and opportunities	Patricia Gerber Elaine Lillie Chantal Pharand
2	Global health in pharmacy curricula	Venita Harris Veneta Anand
3	Adapting curriculum to reflect changes in scope of practice (ex. Immunization)	Marion Pearson & Simon Albon Christine Hughes
4	Current practices, challenges and opportunities in admissions & recruitment processes	Ken Potvin Andrea Cameron
5	Integration of pharmaceutical sciences into pharmacy curricula of the future	Mike Beazely Tannis Jurgens Praveen Rao
6	Use of social media and technology in academic programming	Kelly Grindrod Marie Rocchi
7	Career development in academia and research	Jonathan Blay Beth Sproule
8	Current practices, challenges and opportunities in the use of students as peer teachers/tutors	Ann Thompson Ema Ferreira





## **Session 2A**

**Session Chair: Mike Beazely**

### **Measuring student & community outcomes achieved with the PHarmacy Innovation Garden (PHIG): A community service-learning initiative**

#### **Nancy Waite**

**School of Pharmacy  
University of Waterloo**

#### **Katie Cook**

**School of Pharmacy  
University of Waterloo**

The University of Waterloo's School of Pharmacy developed as the result of a unique relationship with the City of Kitchener and is committed to the City beyond mutual economic benefit and into the area of civic responsibility. For a six-month period, first year students work on projects such as educational presentations, research, fundraising, and event planning. The goal of this presentation is to: 1) discuss the implementation of the "PHarmacy innovation Garden: planting ideas, growing change", a community service-learning (CSL) initiative, that addresses community-identified needs while offering structured student learning opportunities, 2) discuss the community and student outcomes derived from qualitative and quantitative data and 3) explore whether a win-win for students and the community was achieved.

### **The role of medicinal chemistry in Canadian pharmacy curriculum**

#### **Praveen P. Nekkar Rao**

**School of Pharmacy  
Health Sciences Campus  
University of Waterloo**

Medicinal chemistry is indispensable in the Canadian Pharmacy Curriculum as it provides the structural basis for therapeutic action, pharmacokinetic parameters, adverse events and drug-drug interactions. These foundations will play a significant role in enhancing the quality of patient-pharmacist interaction.



## **Session 2B**

Session Chair: Kelly Grindrod

### **Putting design to practice: Building meaningful exposure to rural & underserved populations**

#### **Feng Chang**

School of Pharmacy  
University of Waterloo

Healthcare Delivery in Rural and Underserved Populations is a new undergraduate level elective at the University of Waterloo School of Pharmacy. This session will focus on the design experience, considerations given to different methods of assessment, lessons learned, and challenges faced with implementation. The intent is to share the experience and initiate discussion for future improvement.

### **Simulation-based patient & family-centred care: From the educational literature to the 'classroom'**

#### **Debra Moy**

Leslie Dan Faculty of Pharmacy  
University of Toronto

#### **Suzanne Singh**

Leslie Dan Faculty of Pharmacy  
University of Toronto

This oral presentation will highlight the integration of evidence-based learner-centered course design and assessment tools, in a simulation-based undergraduate pharmacy course that offers critical opportunities for students to develop effective patient-centered care skills anchored in a professional context, in preparation for their early practice experiential.

## AFPC New Investigator Award: Carolyn Cummins



**Dr. Carolyn Cummins** completed her undergraduate degree in chemistry at McGill University and her Ph.D. in pharmaceutical chemistry at the University of California San Francisco with Dr. Leslie Z. Benet. During her postdoctoral training at the University of Texas Southwestern Medical Center with Dr. David Mangelsdorf she gained molecular biology, in vivo biology, and receptor pharmacology experience in the area of nuclear hormone receptors. Dr. Cummins is currently an Assistant Professor in the Faculty of Pharmacy at the University of Toronto. Her independent research program is interdisciplinary and focuses on the study of nuclear hormone receptors in diabetes and diabetic complications using a combination of methodologies including analytical chemistry, cell and molecular biology, epigenetics and small animal pharmacology. She is a recent recipient of an Early Researcher Award from the Government of Ontario and a CIHR New Investigator Award.

### Research Focus

Nuclear hormone receptors (NRs) comprise a superfamily of ligand-activated transcription factors that regulate reproduction, growth and metabolism by coordinating pathways of gene expression. NRs are attractive pharmaceutical targets because of their intrinsic ability to be activated by small molecule ligands. The Cummins lab focuses on the study of the glucocorticoid receptor and liver x receptors (LXR) emphasizing their molecular mechanisms in physiology with the goal of tailoring novel pharmacologic agents to treat different facets of metabolic disease. Some of the most potent anti-inflammatory drugs on the market target the glucocorticoid receptor. Unfortunately, prolonged activation of this receptor induces major metabolic side-effects that remain a key limitation for the therapeutic use of these drugs. The Cummins lab has recently shown that the nuclear receptor LXR $\beta$  is required for glucocorticoid-induced hyperglycemia and fatty liver but not for glucocorticoid-mediated anti-inflammatory or immunosuppressive effects. With funding from a Connaught Innovation grant the Cummins lab is working to identify small molecules to target this receptor and determine whether co-administration of glucocorticoids with these compounds can prevent glucocorticoid-induced diabetes.

Primary cell culture and animal models of glucocorticoid induced diabetes are used in the Cummins lab to dissect the complex interplay of different organs in contributing to the pathophysiology of diabetes and diabetic complications. Her research program also investigates the subcellular and molecular interactions that occur between nuclear receptors, co-regulatory proteins and DNA that drive the physiologic responses. Her research program is currently funded by NSERC, CIHR and CFI.





## Award Winners

### AFPC Graduate Student Research Award:

#### Erik Orava



Erik Orava received his B.Sc. from Queen's University with a focus in Molecular Biology and his Ph.D. in Pharmaceutical Sciences at the University of Toronto in the laboratory of Dr. Jean Gariépy. During his graduate research he was a member of the Ontario Cancer Institute at Princess Margaret Hospital and subsequently the Molecular Targeting and Therapeutics Lab in the Centre for Research in Image-Guided Therapeutics at the Sunnybrook Research Institute. He is a three time recipient of the Canadian Institute of Health Resources Strategic Training in Biological Therapeutics Grant. His research has focused on the development of oligonucleotides known as aptamers able to bind and block validated therapeutic targets including Tumor Necrosis Factor alpha ( $TNF\alpha$ ) and Carcinoembryonic Antigen (CEA) in addition to investigating their ability to act as diagnostic and targeting agents.

#### ABSTRACT:

Aptamers are single-stranded oligonucleotides, DNA or RNA, which can bind to a myriad of targets such as ions, peptides, proteins, drugs, organic and inorganic molecules with high affinity and specificity. Tumor necrosis factor-alpha ( $TNF\alpha$ ) is a pivotal component of the cytokine network linked to inflammatory diseases. Protein-based,  $TNF\alpha$  inhibitors have proven to be clinically valuable. Here, we report the identification of short, single stranded DNA aptamers that bind specifically to human  $TNF\alpha$ . One such 25-base long aptamer, termed VR11, was shown to inhibit  $TNF\alpha$  signalling as measured using NF-KB luciferase reporter assays. This aptamer bound specifically to  $TNF\alpha$  with a dissociation constant of  $7.0\pm 2.1$  nM as measured by surface plasmon resonance (SPR) and showed no binding to  $TNF\beta$ . Aptamer VR11 was also able to prevent  $TNF\alpha$ -induced apoptosis as well as reduce nitric oxide (NO) production in cultured cells for up to 24 hours. As well, VR11, which contains a GC rich region, did not raise an immune response when injected intraperitoneally into C57BL/6 mice when compared to a CpG oligodeoxynucleotide (ODN) control, a known TLR9 ligand. These studies suggest that VR11 may represent a simpler, synthetic scaffold than antibodies or protein domains upon which to derive nonimmunogenic oligonucleotide-based inhibitors of  $TNF\alpha$ .



## *Award Winners*

### **AFPC Canadian Foundation for Pharmacy Graduate Student Award for Pharmacy Practice Research:**

#### **Wasem Alsabbagh**



**Wasem Alsabbagh** received his bachelor of science in pharmacy from Damascus University, Syria in 2000. He moved to Canada in 2004, and started the International Pharmacist Program (IPG) at U of T in 2005. He received his PEBC and Ontario license in 2006, and received his NABP with Michigan license in 2007. He practiced as hospital pharmacist in Orillia, Ontario until 2008, when he moved to Saskatchewan to start MSc. in clinical pharmacy at U of S. He transferred to PhD. program in 2010, and expected to graduate in 2013. Wasem is married to Rama and have two boys (Moffa and Moyad).

Wasem Alsabbagh is enrolled in the PhD program at the U of S under the supervision of Dr. David Blackburn. His research is focused on medication adherence, socioeconomic status, and major health outcomes using population-based data from the Saskatchewan Ministry of Health. He has extensive expertise in the design and analysis of pharmacoepidemiological studies. He published a pharmacist practice research and performed a systematic review. The goal of Wasem's future career is to pursue a faculty job where's his research will focus on Pharmacoepidemiology, Pharmacoconomics, drug safety and effectiveness, and delivery of pharmaceutical care in vulnerable populations including patients with low SES.



## **AFPC Pfizer Research Career Award:**

### **Reina Bendayan**



**Dr. Reina Bendayan** is a Professor, Department of Pharmaceutical Sciences, Leslie Dan Faculty of Pharmacy, University of Toronto. After obtaining a Bachelors of Sciences in Pharmacy and a Hospital Pharmacy Residency Program at the University of Montreal, Dr. Bendayan completed a Doctor of Pharmacy at the University of Florida and a three year Medical Research Council Post-Doctoral Fellowship Program in Clinical Pharmacology and

Membrane Cell Biology at the University of Toronto. Dr. Bendayan's research program at the University of Toronto is primarily focused on Membrane Transport and Therapeutics. She obtained a five-year young career investigator award from the Ministry of Health of Ontario and her research program is primarily funded by the Canadian Institutes of Health Research, Canadian Foundation for AIDS Research and the Ontario HIV Treatment Network, Ministry of Health of Ontario. She is the author of over 70 peer-reviewed manuscripts and has supervised many graduate students and post-doctoral research fellows. She is a member of several scientific associations, in particular, the American Association for the Advancement of Sciences (AAAS), American Society of Pharmacology and Experimental Therapeutics (ASPET), American Association of Pharmaceutical Sciences (AAPS), International Blood-Brain Barrier Society (IBBS), International AIDS Society and Canadian Society of Pharmaceutical Sciences (CSPS). Dr. Bendayan has recently been elected FELLOW of the American Association of Pharmaceutical Sciences (November 2010) and is the recipient of a five-year Career Scientist Award from the Ontario HIV Treatment Network, Ministry of Health of Ontario. Dr. Bendayan served as Graduate Coordinator (1998-2003), Chair and Associate Dean Graduate Education of the Graduate Department of Pharmaceutical Sciences (July 2005-July 2011) and as Acting Dean of the Leslie Dan Faculty of Pharmacy (January 2007-July 2007).

### **Research Focus**

In the past years, Dr. Bendayan's research interests have primarily focused in the field of Human Immunodeficiency Virus (HIV) infection pharmacotherapy. The objectives of the work are to investigate the molecular expression, cellular/subcellular location and functional activity of putative membrane transporters known to play an important role in the disposition of various antiretroviral compounds at several blood-tissue barriers and known sanctuary sites of the infection (i.e., blood-brain barrier, glial cells, blood-intestinal barrier, blood-testicular barrier) in normal physiological conditions as well as in the context of HIV-1 associated inflammatory response and oxidative stress.





## Award Winners

### **AFPC Janssen Innovation in Education Award:**

**Hoan Linh Banh, Cheryl Cox, Marlene Gukert, Shirley Heschuk,  
Cheryl Sadowski & Lynette Shultz**



**Hoan Linh Banh** has special interests in developing innovative approach to teaching by creating and presenting course materials that are relevant to patient care and genuinely believe in teaching with concrete and hands-on examples.

**Cheryl Cox** has an interest in the transitions for students from classroom to practice. This course provides an exciting interface and creates opportunities for students to better understand what influences their knowing and how to see differently.

**Marlene Gukert:** "I have interest in experiential learning; therefore the Italian course was a good fit as it matched many of my interests."

**Shirley Heschuk** continues to pursue her interests in nutrition and complementary and alternative medicine.

**Cheryl Sadowski** has clinical, teaching, and research expertise in geriatrics. She has an interest in advocacy issues related to special populations, and enjoys active teaching strategies. She has a research interest in attitudes toward older adults, falls risks, and geriatric syndromes.

**Lynette Shultz**, Associate Professor Department of Educational Policy Studies is the Co-Director of the Centre for Global Citizenship Education and Research, University of Alberta.



## Award Winners

### **AFPC Janssen Innovation in Education Award:**

**Hoan Linh Banh, Cheryl Cox, Marlene Gukert, Shirley Heschuk,  
Cheryl Sadowski & Lynette Shultz**

#### **Abstract:**

Pharmacy 453 is an innovative international educational model that optimizes outcomes for students and faculty. As a U of A course taught in an international location we had the advantage of determining course outcomes consistent with the standards and expectations of our curriculum while utilizing the resources of the Italian learning environment. The students walked daily through the town to the classroom which was situated with an ocean view. The classroom activities included daily discussions and group work as well as the students' daily experiences which were immersed in a new culture, language, lifestyle and community. The communities included students and faculty members from the University of Naples, residents of the Italian community, the multi-generational Italian host family, and the community of 36 pharmacy students and faculty members from the U of A.

The course assignments fostered exploration of linkages between pharmacy education and role of pharmacists, of health care models and of obligations of professionals with respect to global citizenship and inequities which can jeopardize human rights. Interdisciplinary teaching has facilitated the integration of complementary forms of inquiry and learning which further support transformational learning. The following comment from the University of Naples illustrates the impact for all involved: *Working in the lab side by side with the students from the U of A and interacting with them during the simulation activities have surely increased the awareness of the Italian students of being in fact part of the same world. This has had a dramatic impact on bringing down the existing barriers between the Canadian and the Italian students due to cultural and linguistic differences, while enriching them all with their different professional, scientific and cultural backgrounds.*



## Award Winners

### **AFPC National Award for Excellence in Education:**

#### **James McCormack**



**James McCormack** received his undergraduate pharmacy degree at the University of British Columbia in 1982 and completed a hospital pharmacy residency program at Lion's Gate Hospital in North Vancouver in 1984. He received his doctorate in pharmacy (Pharm.D.) in 1986 from the Medical University of South Carolina in Charleston, South Carolina. He has had extensive experience, both locally and internationally, talking to health professionals and consumers about the rational use of medication, has presented over 300 seminars on drug therapy over the last 20 years. His focus is shared-informed decision-making using evidence based information and rational therapeutic principles. In addition, he has published over 100 articles in the medical literature, mainly in the area of rational drug therapy and has been an editor for two internationally recognized textbooks on appropriate/rational drug therapy. He is also the co-host of a very popular weekly podcast called the Best Science Medicine Podcast. It can be found at [therapeuticseducation.org](http://therapeuticseducation.org) or in the iTunes store.

#### **Research Focus**

The main goal of my teaching over the last 25 years has been to provide health care students, pharmacists, physicians, nurses, nurse practitioners, physician assistants, naturopathic physicians, other health professionals, and the public with current, evidence-based, practical and relevant information on rational drug therapy. My overall philosophy has been to encourage clinicians to engage in shared informed decision-making, critical thinking, and exercise some degree of healthy skepticism when it comes to the use of new and old medications.

I try to keep the information useful, practical and relevant for physicians and pharmacists so that they can incorporate this information into their day-to-day practice. Humour (because evidence can be really dull) plays an important role in many of my presentations. I am a strong advocate of shared-informed decision-making and my sessions try to provide information in a way that can be used with patients. Maybe the best way to describe me is as a "Mythbuster" of drug therapy.



## **AFPC Merck Canada Postgraduate Pharmacy Fellowship Award:**

### **Anil Maharaj**



Anil completed his Bachelor of Science with the Faculty of Pharmacy at the University of Manitoba in 2008. Prior to joining the graduate program at the University of Waterloo in 2012, he practiced as a hospital pharmacist at the Victoria General Hospital in Winnipeg, MB. Anil is currently completing his Ph.D under the guidance of Dr. Andrea Edginton at the University of Waterloo's School of Pharmacy. His research interest involves the integration of physiological and anatomical information with compound specific

properties in order to estimate drug pharmacokinetics within special populations (i.e. pediatrics). Children have long been known as an underserved population with regards to drug development research. Anil's current research focusses on use the physiologically-based pharmacokinetic (PBPK) models to aid in pediatric drug development.

### **Parameterization of an *in silico* Gastrointestinal (GI) Tract Absorption Model: Focus on Pediatrics**

Despite an abundance of wealth of information regarding adult drug absorption, very little data exists regarding the pediatric population. In order to estimate the effects of developmental changes to the gastrointestinal tract, an *in silico* absorption model will be developed and parameterized towards a pediatric patient population (ages 0-17 years). The development and application of a pharmacokinetic-based absorption model specifically parameterized towards pediatric patients would decrease the uncertainty around appropriate dosage selection for this unique age group.



**AFPC Rx&D Pharmacy Research Student Poster Awards**

**Congratulations to our 10 winners!**

Maria Whelan — Memorial University of Newfoundland

Waheed Asghar — University of Alberta

Lilia Magomedova — University of Toronto

Wesseem Osman — University of Waterloo

Alexandre Melkoumov — University of Montreal

Kathryn Landry — Dalhousie University

Donna Leung — University of British Columbia

Fahad Alzahrani — University of Saskatchewan

Sarita Jha — University of Manitoba

Wael Alata — Laval University



# Poster Listing

BASIC RESEARCH		
Category	Title & Authors	Page
BR—01	<p><b>Fluoxetine-induced transactivation of the platelet-derived growth factor type <math>\alpha</math> receptor in serotonergic signaling reveals heterologous desensitization in neurons</b></p> <p>Jeff S. Kruk<sup>1</sup>, Maryam S. Vasefi<sup>1</sup>, John J. Heikkila<sup>2</sup>, and Michael A. Beazely<sup>1</sup></p> <p>School of Pharmacy<sup>1</sup> and Department of Biology<sup>2</sup>, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1</p>	43
BR—02	<p><b>Downstream development of HIV DNA-VLP vaccine upon optimization of linear covalently closed (lcc) mini-plasmid production</b></p> <p>Chi Hong Sum, Nafiseh Nafissi, Roderick Slavcev</p> <p>Sum, C. S., MSc. Candidate, School of Pharmacy, University of Waterloo</p> <p>Nafissi, N., Phd. Candidate, School of Pharmacy, University of Waterloo</p> <p>Slavcev, R., Associate Professor, School of Pharmacy, University of Waterloo</p>	43
BR—03	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Potential Role of RAS Enzymes in NSAID-Induced Cardiovascular Changes</b></p> <p>Muhammad W. Asghar, Ali A.Habashi, Mahtab Tavasoli, Fakhreddin Jamali, University of Alberta, Edmonton AB, Canada</p>	43
BR—04	<p><b>Ministring DNA Vector: The Gold Standard of Gene Delivery in Molecular Medicine</b></p> <p>Nafiseh Nafissi<sup>1,2</sup> and Roderick Slavcev<sup>1</sup></p> <p><sup>1</sup> School of Pharmacy, University of Waterloo, Waterloo, ON</p> <p><sup>2</sup> Waterloo Institute of Nanotechnology, University of Waterloo, Waterloo, ON</p>	44
BR—05	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Teaching an old drug new tricks: a case report of ipratropium bromide for clozapine-induced sialorrhea</b></p> <p>Kathryn M. Landry, BSc<sup>1</sup>; David M. Gardner*, BSc Pharm, ACPR, PharmD, MSc<sup>1,2</sup>; Michael D. Teehan, MD, MRCPsych, FRCPC<sup>2</sup>; and Andrea L. Murphy*, BScPharm, ACPR, PharmD<sup>1,2</sup></p> <p><sup>1</sup>College of Pharmacy and <sup>2</sup>Department of Psychiatry, Dalhousie University, Halifax, NS</p>	44
BR—06	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Improving the efficacy of nystatin by nanomilling</b></p> <p>Alexandre Melkoumov, <sup>1</sup> Mathieu Goupil, <sup>1</sup> Fatiha Louhichi, <sup>1</sup> Martine Raymond, <sup>1</sup> Louis de Repentigny, <sup>1</sup> and Grégoire Leclair. <sup>1</sup></p> <p><sup>1</sup>Université de Montréal, H3C 3J7, Montreal, Canada.</p>	45
BASIC RESEARCH listing continued on next page		





# Poster Listing

BASIC RESEARCH continued		
Category	Title & Authors	Page
BR—07	<p><b>Design and characterization of lytic nanoparticles as novel antibacterials against drug-resistant <i>Staphylococcus aureus</i></b></p> <p><i>Farah El-zarkout, Roderick Slavcev</i> School of Pharmacy, University of Waterloo, Kitchener, ON, Canada</p>	45
BR—08	<p><b>Construction and Analysis of a Genetically Tunable Lytic Phage Display System</b></p> <p>Jessica Nicastro and Roderick Slavcev</p>	
BR—09	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Targeted delivery of rosiglitazone and pioglitazone using magnetic nanoparticles</b></p> <p><i>Donna Leung<sup>1</sup>, Sarah Tod<sup>2</sup>, Kathy Saatchi<sup>1</sup>, Sarah L. Gray<sup>2</sup> and Urs O. Häfeli<sup>1</sup></i> <sup>1</sup> Faculty of Pharmaceutical Sciences, University of British Columbia; <sup>2</sup>Northern Medical Program, University of Northern British Columbia</p>	46
BR—10	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Expression of human apolipoprotein E <math>\epsilon 4</math> impairs cerebral vascularization and blood-brain barrier function</b></p> <p><i>Wael Alata<sup>1-2</sup>, Milène Vandal<sup>1-2</sup>, Frédéric Calon<sup>1-2</sup></i> <sup>1</sup>Faculty of pharmacy, Pavillon Ferdinand-Vandry Université Laval, Québec (Québec), G1K 7P4, Canada. <sup>2</sup>Centre Hospitalier Universitaire de Quebec Research Center, Quebec (Québec), G1V 4G2, Canada.</p>	46
BR—11	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Characterization of ARGLU1 - a novel regulator of glucocorticoid signaling.</b></p> <p><i>Lilia Magomedova<sup>1</sup>, Jens Tiefenbach<sup>2</sup>, Melanie Robitaille<sup>1</sup>, Henry Krause<sup>2</sup>, Stephane Angers<sup>1</sup> and Carolyn L. Cummins<sup>1</sup>.</i> <sup>1</sup>Leslie Dan Faculty of Pharmacy and <sup>2</sup>Banting and Best Department of Medical Research, University of Toronto, Toronto, ON, Canada</p>	46
BR—12	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Evaluation of Acridine---Derivatives as Effective Multi---target Therapies for Alzheimer's Disease</b></p> <p><i>Wesseem Osman<sup>1</sup> Victor Musing Sit<sup>1</sup> Tarek Mohammed<sup>1,2</sup> Praveen P.N. Rao<sup>a1</sup></i> <sup>1</sup>University of Waterloo 200 University Ave W, Waterloo, ON N2L 3G1, School of Pharmacy <sup>2</sup>University of Waterloo 200 University Ave W, Waterloo, ON N2L 3G1, Department of Chemistry</p>	47



<b>EDUCATION &amp; TEACHING RESEARCH</b>		
Category	Title & Authors	Page
ETR—01	<p><b>Predicting students' communication skills in a Pharmacy program</b></p> <p>Robert D. Renaud<sup>1,2</sup>, Chris Louizos<sup>2</sup>, Cheryl Kristjanson<sup>2</sup>, Sheryl A. Zelenitsky<sup>2</sup></p> <p><sup>1</sup>Faculty of Education, University of Manitoba, <sup>2</sup>Faculty of Pharmacy, University of Manitoba</p>	47
ETR—02	<p><b>Exploring Rasch Measurement and Latent Class Modeling for Academic Decision Making</b></p> <p>Gilles Leclerc, Faculty of Pharmacy, University of Montreal</p>	47
ETR—03	<p><b>Introduction to health literacy and writing patient educational material for pharmacists: workshop development and evaluation</b></p> <p>Harvinder Singh<sup>1</sup>, Artemis Diamantouros<sup>1,2</sup></p> <p><sup>1</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario; <sup>2</sup>Sunnybrook Health Sciences Centre, Toronto, Ontario</p>	48
ETR—04	<p><b>Online Summative Assessment in an Undergraduate Therapeutics Course</b></p> <p>Peter S. Loewen, Assistant Professor &amp; Director, Doctor of Pharmacy Programs</p> <p>Jon-Paul Marchand, Educational Technology Manager</p> <p>Faculty of Pharmaceutical Sciences, The University of British Columbia, Vancouver, BC, Canada</p>	48
ETR—05	<p><b>Development and delivery of a pharmacist-taught pharmacology course for dental hygiene students.</b></p> <p>Casey L. Sayre<sup>1</sup>, Joanna Asadoorian<sup>2</sup>, Kelly N. Brink<sup>1</sup>, Frank J. Burczynski<sup>1</sup>, Dennis Cote<sup>1</sup>, Neal M. Davies<sup>1</sup>, Drena Dunford<sup>1</sup>, Nancy Kleiman<sup>1</sup>, Chris Louizos<sup>1</sup>, Michael Namaka<sup>1</sup>, Sheila R. Ng<sup>1</sup>, Keith J. Simons<sup>1</sup></p> <p>1. Faculty of Pharmacy, University of Manitoba, 750 McDermot, Winnipeg, MB, Canada, R3E 0T5 2. School of Dental Hygiene, University of Manitoba, 780 Bannatyne, Winnipeg, MB, Canada, R3E 0W2</p>	49
ETR—06	<p><b>Implementing a Pharmacy Training Program of Immunizations and Injections in Manitoba</b></p> <p>Immunizations and Injections Program Group (Christopher Louizos<sup>1</sup>, Lavern Vercaigne<sup>1</sup>, Casey Sayre<sup>1</sup>, Kim McIntosh<sup>2</sup>, Shawn Bugden<sup>1</sup>, Harris Iacovides<sup>1</sup>, Kelly Brink<sup>1</sup>, Dinah Santos<sup>1</sup>, Susan Lessard-Friesen<sup>2</sup>, Nicole Nakatsu<sup>4</sup>, Michelle Glass<sup>5</sup>), Theresa Bowser<sup>3</sup>, Grace Frankel<sup>1</sup>, Sheila Ng<sup>1</sup>, Melissa Gobin<sup>1</sup>, Neal Davies<sup>1</sup></p> <p><sup>1</sup> University of Manitoba, Faculty of Pharmacy, Winnipeg, Manitoba, R3E 0T5 <sup>2</sup> Manitoba Pharmaceutical Association (MPhA), Winnipeg, Manitoba, R2H 1A7 <sup>3</sup> University of Manitoba, Faculty of Nursing, Winnipeg, Manitoba. R2T 2N2 <sup>4</sup> Canadian Society of Hospital Pharmacists, Winnipeg, Manitoba, R2H 1A7 <sup>5</sup> Manitoba Society of Pharmacists, Winnipeg, Manitoba, R3C 4H1</p>	49
<b>EDUCATION &amp; TEACHING RESEARCH listing continued on next page</b>		



EDUCATION & TEACHING RESEARCH continued		
Category	Title & Authors	Page
ETR—07	<p><b>The effect of repeating undergraduate pre-Pharmacy core courses on performance in a Pharmacy program</b></p> <p>Sheryl A. Zelenitsky<sup>1</sup>, Robert D. Renaud<sup>1,2</sup>, Cheryl Kristjanson<sup>1</sup>, &amp; Nancy Kleiman<sup>1</sup>  <sup>1</sup>Faculty of Pharmacy, University of Manitoba, <sup>2</sup>Faculty of Education, University of Manitoba</p>	49
ETR—08	<p><b>Evaluation of an online delivery method to teach pharmacy informatics</b></p> <p>Elnaz Haddadi, Marie Rocchi            Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario</p>	50
ETR—09	<p><b>A survey of pharmacy preceptors' expectations and experiences with pharmacy</b></p> <p>A. Diamantouros, R. Marchesano, G. Rzychniak, S. Gerges, B.G. Hardy            Sunnybrook HSC, University of Toronto</p>	50
ETR—10	<p><b>Doctor of Pharmacy Students Acquire Skills in Curriculum Design and Project Management Through Participation in an Education Project with Coaching Support</b></p> <p>Lawrence D. Jackson<sup>1</sup>, Joy Makari<sup>2</sup>, Patrick Edwards<sup>2</sup>, Sandra Gerges<sup>2</sup>, Hardeep Hehar<sup>2</sup>, Jennifer Lo<sup>2</sup>, Michelle Lui<sup>2</sup>, Froozan Amin<sup>1</sup>, Lisa Zhu<sup>1</sup>, Jennifer Do<sup>1</sup>, Andrea Fox<sup>1</sup>  <sup>1</sup>Sunnybrook Health Sciences Centre and <sup>2</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON</p>	51
ETR—11	<p><b>Implementation of Human Patient Simulation Technology to Teach Physical Assessment to Pharmacy Students</b></p> <p>Katherine Seto, Colleen M. Brady, Tamiz J. Kanji, and Tony T. Seet            The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC</p>	51
ETR—12	<p><b>Aligning learning objectives and assessments in pharmacy therapeutics courses to foster higher level thinking</b></p> <p>Beverly A. FitzPatrick, John J. Hawboldt, Terri Genge, Memorial University, NL</p>	52=1
ETR—13	<p><b>The “up-scaling” of a pharmacotherapy course: harnessing instructional technology in a large classroom.</b></p> <p>Heather R. Kertland<sup>1,2</sup> Natalie Crown<sup>1,3</sup>  <sup>1</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, <sup>2</sup> St. Michael's Hospital, <sup>3</sup>Women's College Hospital</p>	52
EDUCATION & TEACHING RESEARCH listing continued on next page		





# Poster Listing

EDUCATION & TEACHING RESEARCH continued		
Category	Title & Authors	Page
ETR—14	<p><b>The "ABC's" of Creating and Delivering a Module into a Non-Modular Curriculum</b>            Colleen M. Brady and Linda T. Tran            The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC</p>	52
ETR—15	<p><b>Problem- and case-based learning to enhance pharmacy students' education</b>            Maryam S. Vasefi            School of Pharmacy, University of Waterloo 200 University Ave W. Waterloo, ON N2L 3G1</p>	53
ETR—16	<p><b>The process of developing new student performance assessments for experiential education courses</b>            M. Ken Cor, Marlene A. Gukert, Ann E. Thompson, Sheila L. Walter            Faculty of Pharmacy &amp; Pharmaceutical Sciences, University of Alberta</p>	53
ETR—17	<p><b>Development and Implementation of a Remedial Program for Undergraduate Pharmacy Students</b>            Janice L. Moshenko* and Katherine Seto*            The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC            *Both authors contributed equally to this work</p>	54
ETR—18	<p><b>The Merits of Formative Oral Exams in an Entry-to-Practice Pharmacy Program</b>            Arun K. Verma, Gary X. Peng, Marc Levine            University of British Columbia Faculty of Pharmaceutical Sciences</p>	54
ETR—19	<p><b>Refining higher order learning assessment in a case-based course stream</b>            Ingrid V. Price, Arun K. Verma, Janice L. Moshenko, Marion L. Pearson            University of British Columbia Faculty of Pharmaceutical Sciences</p>	54
ETR—20	<p><b>Medication incident reporting and analysis in professional practice lab: Continuous quality assurance starts in pharmacy school</b>            Certina Ho <sup>1,2</sup>, Lisa McLean <sup>1</sup>  <sup>1</sup> School of Pharmacy, University of Waterloo, 200 University Avenue West, Waterloo, ON, N2L 3G1  <sup>2</sup> Institute for Safe Medication Practices Canada, 4711 Yonge Street, Suite 501, Toronto, ON M2N 6K8</p>	55
EDUCATION & TEACHING RESEARCH listing continued on next page		



# Poster Listing

EDUCATION & TEACHING RESEARCH continued		
Category	Title & Authors	Page
ETR—21	<p><b>Effectiveness of extracurricular journal clubs on pharmacy students' learning of evidence-based medicine and critical appraisal</b></p> <p>Certina Ho, Joyce Tsang, Olla Wasfi, Mary Power, Brett Morphy, Saurabh Patel, Calvin Poon, Boris Tong</p> <p>University of Waterloo, 200 University Avenue West, Waterloo, ON, N2L 3G1</p>	55
ETR—22	<p><b>Development of a Foundational Course in Pharmacotherapeutics in a Doctor of Pharmacy Curriculum</b></p> <p>Lalitha Raman-Wilms<sup>1</sup>, Amita Woods<sup>1,2</sup>, Sharon K. Yamashita<sup>1,3</sup></p> <p><sup>1</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, <sup>2</sup>University Health Network, <sup>3</sup>Sunnybrook Health Sciences Centre</p>	56
ETR—23	<p><b>Development of a Geriatric Curricular Pathway within a Doctor of Pharmacy Program</b></p> <p>Sidika Dhalla and Lalitha Raman-Wilms</p> <p>Leslie Dan Faculty of Pharmacy, University of Toronto.</p>	56
ETR—24	<p><b>Aging Simulation Workshop</b></p> <p>Pauline E. Santora<sup>1</sup>, Lalitha Raman-Wilms<sup>2</sup>,</p> <p><sup>1</sup>Pharmacy Department, Baycrest Health Sciences,<sup>2</sup>Leslie Dan Faculty of Pharmacy, University of Toronto.</p>	56

SOCIAL ADMINISTRATIVE RESEARCH		
Category	Title & Authors	Page
SAR—01	<p><b>Developing a Code of Conduct for the UBC Faculty of Pharmaceutical Sciences</b></p> <p>Patricia Gerber</p> <p>Faculty of Pharmaceutical Sciences, University of British Columbia</p>	57
SAR—02	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>Utilization of Antipsychotic Medications in the Youth Population of Manitoba: 1996-2011</b></p> <p>Sarita Jha*, Robert Biscontri", Laurence Katz^, Shawn Bugden*, David Collins* and Silvia Alessi-Severini*</p> <p>*Faculty of Pharmacy, "Asper School of Business, ^ Faculty of Medicine (Psychiatry) University of Manitoba, Winnipeg, Manitoba, Canada</p>	57



PHARMACY PRACTICE RESEARCH		
Category	Title & Authors	Page
PRR—01	<p><b>Translating knowledge about bioidentical hormones (BHs) into practice via an undergraduate pharmacy presentation</b></p> <p><i>Tannis Jurgens</i><sup>1</sup>, Anne Marie Whelan<sup>1,2</sup>, Ashley McMullin<sup>1</sup>, <sup>1</sup>College of Pharmacy, Dalhousie University; <sup>2</sup>Department of Family Medicine, Dalhousie University, Halifax, Nova Scotia.</p>	58
PRR—02	<p><b>Practitioner perceptions of warfarin management in community pharmacies</b></p> <p>Feng Chang<sup>1,2</sup>, Shawn Sayavong<sup>1,2</sup>, Holly Pizzey<sup>1,2,3</sup></p> <p><sup>1</sup>University of Waterloo School of Pharmacy, <sup>2</sup>Gateway Rural Health Research Institute, <sup>3</sup>University of Toronto Faculty of Pharmacy</p>	58
PRR—03	<p><b>Social media guidelines governing online professional behaviour: A survey of 32 Canadian pharmacy organizations</b></p> <p><i>Andrea Forgione, BSc</i>  <i>Kelly Grindrod BScPharm, PharmD, MSc</i>            School of Pharmacy, University of Waterloo</p>	59
PRR—04	<p><b>Public knowledge and preventive screening for cardiovascular risk factors in Kuwait</b></p> <p><i>Abdelmoneim I. Awad</i><sup>1</sup>, Amna Al-Ansari<sup>2</sup>, Mohammad A. Waheedi<sup>1</sup></p> <p><sup>1</sup>Department of Pharmacy Practice, Faculty of Pharmacy, Kuwait University, Kuwait  <sup>2</sup> Ministry of Health, Kuwait</p>	59
PRR—05	<p><b>Diabetes Education in Pharmacy Residencies Across Canada</b></p> <p><i>Henry Halapy</i><sup>1,3</sup>, Gary Wong<sup>2,3</sup></p> <p>St. Michael's Hospital<sup>1</sup>, Toronto, Ontario; University Health Network<sup>2</sup>, Toronto, Ontario;            Leslie Dan Faculty of Pharmacy<sup>3</sup>, Toronto, Ontario</p>	59
PRR—06	<p><b>UBC Clinical Pharmacist Services Initiative – Developing an Interdisciplinary Model for Learning, Research and Innovative Practice in Family Practice Clinics</b></p> <p><i>Tessa Nicholl</i><sup>1</sup>, Jason Min<sup>1</sup>, Larry Leung<sup>1</sup>, and Ingrid Price<sup>1</sup></p> <p><sup>1</sup>Faculty of Pharmaceutical Sciences, University of British Columbia (UBC)</p>	60
PRR—07	<p><b>Pharmacy student perceptions of pharmacists' role and educational needs in the era of expanding scopes of practice</b></p> <p><i>Christine A. Hughes</i><sup>1</sup>, Theresa J. Schindel<sup>1</sup>, Nese Yuksel<sup>1</sup>, Jason Daniels<sup>2</sup>, Rene Breault<sup>1</sup></p> <p><sup>1</sup>Faculty of Pharmacy &amp; Pharmaceutical Sciences, University of Alberta; <sup>2</sup>Faculty of Extension, University of Alberta</p>	60
PHARMACY PRACTICE RESEARCH listing continued on next page		





PHARMACY PRACTICE RESEARCH		
Category	Title & Authors	Page
PRR—08	<p><b>Pharmacy students' experiences of service provision to people with lived experience of mental illness.</b></p> <p><i>Andrea L Murphy<sup>1-4</sup>, Magdalena Szumilas<sup>5</sup>, Kathryn Landry<sup>1</sup>, Denise Rowe<sup>1</sup>, Ruth Martin-Misener<sup>3</sup>, Stan P Kutcher<sup>2,4</sup> David M Gardner<sup>1,2</sup>; Halifax, NS, Canada.</i></p> <p><sup>1</sup>College of Pharmacy, <sup>2</sup>Department of Psychiatry, <sup>3</sup>School of Nursing, <sup>4</sup>Sun Life Financial Chair In Adolescent Mental Health; <sup>5</sup>Faculty of Medicine; Dalhousie University</p>	61
PRR—09	<p><b>Development of a Framework for Fostering an Effective Relationship between a Faculty of Pharmacy and Academic Institutions</b></p> <p><i>Lalitha Raman-Wilms, Henry J. Mann.</i> Leslie Dan Faculty of Pharmacy, University of Toronto.</p>	61
PRR—10	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>A retrospective cohort study to measure the safety and efficacy of concurrent neoadjuvant capecitabine-radiation therapy in the treatment of rectal cancer: the Newfoundland experience</b></p> <p><i>Maria A. Whelan<sup>1,2</sup>; Scott J. Edwards<sup>1,2</sup>; Kendra Lester<sup>3</sup>; Laurie K. Twells<sup>2,3</sup>; David Saltman<sup>1,3</sup>; and Rick Abbott<sup>1</sup></i></p> <p><sup>1</sup>Dr. H. Bliss Murphy Cancer Center, St. John's, NL; <sup>2</sup>Memorial University School of Pharmacy, St.</p>	62
PRR—11	<p><b>Rx&amp;D Pharmacy Research Poster Award Winner</b></p> <p><b>A Qualitative Assessment of Practice Experiences of Certified Diabetes Educator Pharmacist</b></p> <p><i>Fahad Alzahrani, Kerry Mansell, Jeff Taylor and Jason Perepelkin (College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, SK, Canada)</i></p>	62



## Basic Research

### **BR01: Fluoxetine-induced transactivation of the platelet-derived growth factor type $\beta$ receptor in serotonergic signaling reveals heterologous desensitization in neurons**

Jeff S. Kruk<sup>1</sup>, Maryam S. Vasefi<sup>1</sup>, John J. Heikkilä<sup>2</sup>, and Michael A. Beazely<sup>1</sup> School of Pharmacy<sup>1</sup> and Department of Biology<sup>2</sup>, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1

**Objective:** Selective serotonin reuptake inhibitors (SSRIs) are widely used for the treatment of mental diseases including depression. SSRIs act by blocking the serotonin transporter (5-HTT) and increasing synaptic serotonin (5-HT) levels. However, whether these drugs can directly influence downstream 5-HT receptor signaling remains largely unexplored. Previously, we showed that acute 5-HT application can induce phosphorylation (termed transactivation) of the platelet-derived growth factor (PDGF) type  $\beta$  receptor in a time- and dose-dependent manner in SH-SY5Y cells and primary mouse neuron cultures. Here, we investigate the effects of fluoxetine on transactivation pathways in the 5-HT system.

**Methods:** Experiments were performed in the human neuroblastoma cell line SH-SY5Y and primary cortical mouse neuron cultures. Cell lysates were analyzed for fold changes in phosphorylation of PDGF $\beta$  receptors at Y1021 by densitometric analyses of western blots.

**Results:** 5-HT-mediated PDGF $\beta$  receptor transactivation was blocked by acute, but not long-term pretreatment with fluoxetine, an SSRI. However, we were only able to observe a reduction in PDGF $\beta$  receptor transactivation at 1-10  $\mu$ M, a concentration 1,000-fold above the  $K_i$  for inhibiting the 5-HTT. Upon further examination, we determined that fluoxetine itself was able to transactivate PDGF $\beta$  receptor via 5-HT<sub>2</sub> receptor activation, and this effect was also time and dose dependent. To our knowledge, this is the first described instance of fluoxetine inducing PDGF $\beta$  receptor transactivation. We further showed that 5-HT pretreatment was able to block dopamine-induced PDGF $\beta$  receptor transactivation but not activation by PDGF. This is the first demonstration of the heterologous desensitization of the transactivation phenomenon: one transactivating stimulus disallows transactivation by a second stimulus.

**Conclusions:** These findings suggest a novel regulatory mechanism in growth factor transactivation signaling exists between the initiating receptor and PDGF $\beta$  receptor, and this knowledge may increase our understanding of the mechanism of action of fluoxetine in the pathophysiology of diseases such as depression.

### **BR02 Downstream development of HIV DNA-VLP vaccine upon optimization of linear covalently closed (lcc) mini-plasmid production.**

Chi Hong Sum, Nafiseh Nafissi, Roderick Slavcev Sum, C. S., MSc. Candidate, School of Pharmacy, University of Waterloo, Nafissi, N., Phd. Candidate, School of Pharmacy, University of Waterloo, Slavcev, R., Associate Professor, School of Pharmacy, University of Waterloo

**Objective:** To optimize the production of linear covalently closed (lcc) mini-plasmids through the introduction of specific heat shock associated protease gene deletions. Achieving optimal lcc mini-plasmid production permit downstream development of a novel endogenous HIV DNA-Virus Like Particle (VLP) vaccine.

**Methods:** One step *in vivo* lcc mini-plasmid production system employs recombinant *E. coli* expressing phage protelomerase, a protein that converts parental circular plasmids into lcc mini-plasmids. Protelomerase expression cassette was introduced into bacterial strains with different gene deletions by P1 phage mediated transduction. Target plasmid was transformed into those strains through electroporation. Protelomerase conversion of target parental plasmids and lcc mini-plasmid production was assessed by gel electrophoresis and densitometry.

**Results:** Introduction of *hflX* gene deletion achieved significantly greater lcc mini-plasmid production in comparison to the current production system. Lcc mini-plasmids conferring the generation of HIV VLPs had been produced.

**Conclusion:** Protease associated gene deletions led to greater lcc mini-plasmid production, enabling the production of lcc mini-plasmids encoding HIV VLPs at greater efficiency. Subsequent delivery of the lcc mini-plasmid into dendritic cells will prompt potential implications of an efficacious endogenous HIV DNA-VLP vaccine.

### **BR03 Potential Role of RAS Enzymes in NSAID-Induced Cardiovascular Changes**

Muhammad W. Asghar, Ali A.Habashi, Mahtab Tavasoli, Fakhreddin Jamali, University of Alberta, Edmonton AB, Canada

**Objectives:** Non-steroidal anti-inflammatory drugs (NSAIDs) are used for the treatment of arthritis and other rheumatic disorders. But they cause various side effects including cardiovascular (CV) consequences, mainly through unknown mechanisms. Angiotensin converting enzymes (ACE, ACE<sub>2</sub>), a component of renin angiotensin system (RAS) are involved in the regulation of blood pressure through their product peptides, cardiotoxic; angiotensin<sub>II</sub> (ANG-II) and cardioprotective; angiotensin<sub>1-7</sub> (ANG1-7). We have previously



# Poster Abstracts

reported that in inflammation the balance between ACE and ACE<sub>2</sub> is disrupted in the rat heart. Here, we aimed to assess if inflammation and NSAIDs can influence the production of RAS peptides.

**Methods:** Sprague Dawley rats were divided into 3 groups (n=6-7/group): control, inflamed and inflamed-treated (rofecoxib 20 mg/kg, meloxicam 6 mg/kg). The inflamed group received *Mycobacterium butyricum* in squalene. After 12 days, rats in inflamed group developed arthritis and started receiving therapeutically equivalent doses of NSAIDs. After 7 days rats were sacrificed and their organs were stored (-80°) until analyzed for the peptides using ELISA

**Results:** Inflammation reduced ANG<sub>1-7</sub> in plasma (0.88± 0.04 vs 0.22±0.07\* ng/ml) but not in heart (0.22±0.09 vs 0.29±0.04 ng/g); \*, p<0.05.

	Plasma ng/mL	Heart ng/g	Plasma ng/ mL	Heart ng/g	Plasma ng/mL	Heart ng/g
	Control		Rofecoxib		Meloxicam	
ANG <sub>1-7</sub>	0.88± 0.04	0.22±0.09	9.11±2.55 <sup>a</sup>	1.72±0.72 <sup>a</sup>	8.56±2.63 <sup>a</sup>	0.35±0.03
ANG <sub>II</sub>	0.37±0.12	0.18±0.04	13.43±3.47 <sup>a</sup>	1.13±0.19 <sup>a</sup>	5.38±1.12 <sup>a</sup>	0.15±0.06
ANG <sub>II</sub> / ANG <sub>1-7</sub>	0.49±0.02	0.85±0.12	1.65±0.54 <sup>a</sup>	0.88±0.47	0.83±0.18 <sup>a,b</sup>	0.44±0.12

ANOVA-Bonferroni (α=0.05): a, significantly different from control; b, significantly different from rofecoxib

**Conclusion:** The activity of ACE and ACE<sub>2</sub> enzymes is influenced by inflammation and NSAIDs. This results in a significant increase in ANG<sub>II</sub>:ANG<sub>1-7</sub> ratio in plasma for rofecoxib but not for meloxicam. The prevalence of more ANG<sub>II</sub> over ANG<sub>1-7</sub> suggests a dysfunction of RAS in rofecoxib treated rats. This may explain the reported greater cardiotoxicity for rofecoxib. It also suggests that the plasma ratio of cardiotoxic peptide ANG<sub>II</sub> over cardioprotective ANG<sub>1-7</sub> can serve as a biomarker for NSAIDs toxic effects on cardiovascular system.

## BR04 Ministring DNA Vector: The Gold Standard of Gene Delivery in Molecular Medicine

Nafiseh Nafissi<sup>1,2</sup> and Roderick Slavcev<sup>1</sup> <sup>1</sup> School of Pharmacy, University of Waterloo, Waterloo, ON <sup>2</sup> Waterloo Institute of Nanotechnology, University of Waterloo, Waterloo, ON

**Objectives** Plasmid DNA (pDNA) vectors are the fundamental of modern molecular medicine involving in all forms of gene transfer approaches in human cells including mal/non functional gene replacement, DNA vaccination, and production of therapeutic proteins. However, conventional pDNA vector suffers from several safety and efficiency limitations: 1) it imparts adverse immune responses to bacterial sequences required for maintenance and amplification in prokaryotes; 2) its bioavailability can be compromised due to size; 3) it may be genotoxic due to its potential to integrate into the host chromosome and yield an oncogenic event. We have constructed an *in vivo* platform for the production of mini linear DNA vectors with covalently closed ends (LCC DNA), called ministring DNA. Ministring DNA vectors are devoid of unwanted bacterial sequences, encoding only the gene(s) of interest and necessary complementary eukaryotic expression/enhancement genetic elements.

**Methods** In this study, for the first time, we applied the bacteriophage PY54 derived recombination system to generate ministring DNA vectors. We chemically introduced our novel DNA vector into slow-dividing and fast-dividing human cells to compare transfection efficiency, and used live cell confocal imaging to monitor cytoplasmic kinetics of ministring DNA vectors. We also measured the genotoxicity of our novel DNA vector by site-specific recombination.

**Results** The ministring DNA vector generated in our study showed higher transfection efficiency, improved bioavailability, and better intercellular diffusion compared to its parental pDNA vector counterpart due to lack of bacterial sequences, smaller size, and linear topology. These benefits compiled with super-safety profile due to significant lower integration frequency of LCC vectors into human genome align with chromosomal disruption and apoptotic cell death of integrated cells, which in turn eliminates the lethal side effects of random insertional mutagenesis.

**Conclusion** Our novel ministring DNA vector significantly improved the safety and efficiency obstacles encountered by conventional pDNA and other circular DNA vectors and would be the gold standard of gene delivery vectors in modern molecular medicine.

## BR05 Teaching an old drug new tricks: a case report of ipratropium bromide for clozapine-induced sialorrhea

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<sup>1</sup>College of Pharmacy and <sup>2</sup>Department of Psychiatry, Dalhousie University, Halifax, NS

**Objectives:** The objective of this N of 1 trial was to identify and assess an appropriate treatment option for clozapine-induced





## Poster Abstracts

sialorrhea. A female patient (JD) diagnosed with schizophrenia and treated with clozapine presented with distressing sialorrhea and associated anxiety. Sialorrhea is a disturbing adverse effect experienced by many patients taking clozapine. Worsening at night-time, sialorrhea can significantly impact a patient's quality of life by interfering with sleep, social interactions, and self-esteem. Although the mechanism is unclear, clozapine as an agonist of oral M4 receptors is suspected. JD experienced at least one night-time awakening of choking, and reported a soaked pillow more than 3 nights per week.

**Methods:** A literature search was conducted to determine treatment options for sialorrhea. We found one case series and one randomized controlled trial assessing the effect of sublingual anticholinergics for treating clozapine-induced sialorrhea. We conducted an N of 1 trial of ipratropium bromide 0.03% nasal spray dosed 2 sublingual sprays twice daily. The Toronto Nocturnal Hypersalivation Scale (TNHS) was used to assess treatment effectiveness.

**Results:** Four weeks following treatment initiation, JD's TNHS score reduced from very severe/severe to moderate and night-time awakenings ceased. Ten weeks after initiation, JD described significant improvement in anxiety related to sialorrhea. Side effects included nausea if taken without food and an unpleasant taste. Dosing was increased to three times daily with minimal improvements after 12 weeks.

**Conclusion:** Sublingual ipratropium bromide nasal spray is an inexpensive and relatively safe option to treat clozapine-induced sialorrhea. Dosing can be increased up to three times daily, and the concentration can be increased to 0.06%. Subjectively, JD reported less anxiety and positive views towards the medication.

### **BR06 Improving the efficacy of nystatin by nanomilling**

Alexandre Melkoumov,<sup>1</sup> Mathieu Goupil,<sup>1</sup> Fatiha Louhichi,<sup>1</sup> Martine Raymond,<sup>1</sup> Louis de Repentigny,<sup>1</sup> and Grégoire Leclair.<sup>1</sup>

<sup>1</sup>Université de Montréal, H3C 3J7, Montreal, Canada.

**Objectives:** To develop a nystatin nanosuspension by nanomilling and compare its *in vitro* and *in vivo* antifungal activity against conventional nystatin suspension.

**Methods:** A nystatin nanosuspension was prepared from a commercially available nystatin suspension by high energy wet media milling. The nanosuspension was characterized for particle size by laser diffraction and assayed for content by HPLC. Its *in vitro* activity was evaluated using disk diffusion assays against *C. albicans* strains SC5314 and LAM-1 (12.5 µg/mL to 5000 µg/mL). *In vivo* efficacy was evaluated using a murine model of oral candidiasis. Briefly, DBA/2 mice were immunosuppressed with cortisone acetate and then orally infected with *C. albicans* strain LAM-1. They were then treated for 14 days with conventional nystatin suspension, nystatin nanosuspension or saline water. Oral fungal burden was measured daily to assess efficacy of treatments. Mouse survival and organ histopathology were also evaluated. A single-dose pharmacokinetic study was also performed to evaluate drug absorption.

**Results:** Median particle size was 6577 nm for nystatin suspension and 137 nm for nystatin nanosuspension. HPLC assay of the nanosuspension demonstrated a content of  $98.7 \pm 0.8$  % of label claim. The *in vitro* activity of the nanosuspension was superior to conventional suspension at 100 µg/mL to 5000 µg/mL concentrations. For *in vivo* results, lower oral burdens of *C. albicans* were found in the nanosuspension group as compared to the suspension and control groups. Mouse survival was also superior in the nanosuspension group. Histopathology confirmed oral candidiasis diagnostic. No systemic absorption was observed.

**Conclusions:** A nystatin nanosuspension was successfully prepared from a conventional suspension while maintaining its composition and assay. This nanosuspension demonstrated improved antifungal activity *in vitro* and *in vivo*. Taken together, these data reveal that nanosizing of nystatin provides a novel approach to enhanced efficacy in the treatment of oral candidiasis. The approach could be used for other antimicrobial agents.

### **BR07 Lytic endolysin nanoparticles: are they the novel antibacterials against drug-resistant *Staphylococcus aureus* infections?**

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**Objectives:** The growing threat of drug-resistant *Staphylococcus aureus* infections mandates the need to develop novel, effective and alternative antibacterial therapeutics. Regardless of infection control measures, diseases caused by methicillin resistant *S. aureus* reached up to 20.06 % in USA in 2011. To overcome drug-resistant *Staphylococcus aureus* threat, our study sought to design and characterize a novel therapeutic based on the display of lytic antibacterial enzymes or endolysins, on surfaces of bacteriophages termed bacteriophages, to generate lytic nanoparticles. Endolysins, which are isolated from bacteriophages, confer a high degree of host specificity that could substitute, or be combined with antibiotics in treatment of gram-positive bacterial infections such as methicillin resistant *S. aureus* (MRSA).

**Methods:** Endolysin K, lysis-specific for *S. aureus* was displayed on the head surface of bacteriophage via fusion with the major head protein, gpD, in various combinations. Bacteriophage lysates were collected and purified and lysis was investigated by zymogram assay, in which standardized lysates were added on a fresh lawn of bovine *S. aureus*.

**Results:** Lysis was not observed with the bacteriophage preparation which is possibly due to either the high number of displayed fusions or misfolding of the displayed proteins. To test if the fusion affects lytic activity, we cloned our fusions into a pET expression vector then expressed, purified and tested for the lytic activity of the fusion proteins. We found that gpD::LysK fusion protein activity was not impaired by the fusion since it showed lysis on live bovine *S. aureus* in no less than 3 hours. In contrast to gpD::LysK, D::CHAP protein fusion, where CHAP is a lytic domain in endolysin K, showed lytic activity on dead bovine *S. aureus*.



# Poster Abstracts

**Conclusions:** In this study, we showed that neither of the fusions of endolysin K and lytic domain CHAP to gpD protein interfere with the lytic activity. We suggest that activity was impaired when displayed on the bacteriophage head due to misfolding of the protein and steric hindrance.

## **BR09 Targeted delivery of rosiglitazone and pioglitazone using magnetic nanoparticles**

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**Objectives:** Magnetic nanoparticles (MNPs) coated with alendronic acid (Al) or undecylenic acid (Un) were assessed for their suitability to use as therapeutic delivery agents for thiazolidinediones (TZDs) such as rosiglitazone (RSG) and pioglitazone (PGZ).

**Methods:** Al-MNPs and Un-MNPs were incubated in concentrated solutions of RSG (in water) and PGZ (in ethanol) to allow successful adhesion of drug molecules to surface coatings by lipophilic interactions. Thereafter, MNPs were magnetically separated from binding solutions, washed, and subjected to a timed release study under sink conditions in PBS. The amount of drug bound and released from MNPs was determined through a HPLC assay. To assess the cytotoxicity of MNPs, MTT assays were performed on INS-1 (insulinoma) and 3T3-L1 (preadipocyte) cells.

**Results:** Preliminary results show that RSG adsorbed to and was then slowly released from both MNP types. On average,  $21.2 \pm 4.9\%$  and  $15.22 \pm 2.9\%$  of bound RSG was released from Al- and Un-MNPs, respectively, over 2 days. Due to PGZ's poor solubility under ionic conditions and the limited amount of particles used in the study, further studies are necessary to determine whether PGZ can reliably adsorb to MNPs. However, the typical drug release kinetics of PGZ from MNPs points to successful system implementation after optimization. Initial results from MTT assays reveal that both MNP coatings had similar effects on cell viability. MNPs were found to be non-toxic to INS-1 cells and showed a dose independent effect on cell viability in 3T3-L1 cells.

**Conclusion:** Coated MNPs serve as a feasible delivery system for RSG and possibly PGZ. Future studies will involve visualization of cellular uptake of fluorescently labelled MNPs and measurements of TZD-MNPs' effects on biological activity *in vitro*.

## **BR10 Expression of human apolipoprotein E $\epsilon$ 4 impairs cerebral vascularization and blood-brain barrier function**

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**Abstract:** The blood-brain barrier (BBB) is a dynamic and biological barrier, which physically separates the blood from the central nervous system (CNS). Several studies suggest that changes in the BBB occur in Alzheimer's disease (AD). Among the three common isoforms of apolipoprotein E (ApoE, alleles  $\epsilon$ 2,  $\epsilon$ 3 or  $\epsilon$ 4), the expression of the  $\epsilon$ 4 allele is a major genetic risk factor for AD.

**Objectives:** determining whether  $\epsilon$ 4 allele exerts a pathogenic role by affecting the functional and morphological properties of the BBB.

**Methods:** *in situ* brain perfusion technique (ISBP), a quantitative technique to assess the passage of molecules across the BBB, and the immunohistochemistry were used here in mice specifically expressing human ApoE isoforms  $\epsilon$ 2,  $\epsilon$ 3 or  $\epsilon$ 4.

**Results:** using ISBP of [<sup>14</sup>C]-sucrose, a vascular space marker that does not cross the BBB, we first showed that the vascular volume remains similar across all groups. In contrast, significant decreases in the passage of [<sup>3</sup>H]-diazepam and [<sup>3</sup>H]-glucose into the brain were detected in ApoE4 knock-in mice at 4 and 12 months, compared to ApoE2 or ApoE3 mice. Accordingly, immunohistochemistry experiments revealed thinner basal laminae and lower vessel density in the brain cortex of ApoE4 mice at 12 months, suggesting vascular atrophy.

**Conclusions:** profound divergences were observed between ApoE genotypes at the cerebrovascular interface. Further investigations are needed to determine whether these ApoE-induced BBB anomalies contribute to the development of AD.

## **BR11 Characterization of ARGLU1 - a novel regulator of glucocorticoid signalling.**

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**Purpose:** The glucocorticoid receptor (GR) has important roles in maintaining glucose homeostasis and immune responses, and plays an essential role in the central nervous system. We have identified ARGLU1 (arginine and glutamate rich 1) as a novel protein that strongly potentiates GR transcriptional activity, and is highly conserved across species. Our objective is to uncover the physiological function of ARGLU1 and determine the mechanism by which ARGLU1 modulates GR activity.

**Methods/Results:** Using an HEK293 cell luciferase-reporter assay, we found that the C-terminal domain of ARGLU1 is responsible for GR $\alpha$  coactivation. ARGLU1 protein interaction network was obtained by using Flag affinity purification and LC/MS/MS and was found to be composed of numerous spliceosomal proteins as well as, JMJD6, a recently identified, histone arginine demethylase. QPCR analysis of tissues from C57Bl/6 mice revealed that ARGLU1 is widely expressed and is highest in the CNS. To study the role of ARGLU1 *in vivo*, morpholino-mediated knockdown experiments were performed in zebrafish embryos. Over 50% of ARGLU1



# Poster Abstracts

morpholino-injected embryos exhibited developmental abnormalities including a curved body axis and expanded brain ventricle, consistent with the phenotype observed following GR knockdown. Wholemount RNA in situ hybridization found that ARGLU1 expression is highest in the brain and strongly overlaps with GR localization.

**Conclusion:** ARGLU1 is a novel GR coactivator, which is highly expressed in the brain of mice and zebrafish and its knockdown in zebrafish results in severe brain abnormalities. We believe that ARGLU1 may be a novel GR coregulator that mediates stress-induced changes in gene transcription in the CNS.

## **BR12 Evaluation of acridine-derivatives as effective multi-target therapies for Alzheimer's disease**

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**Objectives:** To develop a multi-target therapy capable of inhibiting major contributors to Alzheimer's disease, including cholinesterase inhibition, antioxidant properties, and metal chelation, in order to halt or slow-down Alzheimer's disease progression.

**Methods:** Computational modeling protocols allowed for the generation of potential test compounds to be generated *in silico* along with their respective chemical properties.

Synthetic chemistry schemes were utilized in order to generate a library of methoxybenzene-substituted acridine derivatives. Compounds were analyzed and purified via nuclear magnetic resonance (NMR), mass spectroscopy (MS), flash chromatography, and high performance liquid chromatography (HPLC).

Biological assays were performed to determine the inhibitory constants (IC<sub>50</sub>) toward acetylcholinesterase and butyrylcholinesterase via the Ellman's cholinesterase inhibition protocol. Antioxidant assays and chelation assays were performed to determine reactive oxygen species scavenging capacity, and metal chelation capacity, respectively.

**Results:** A library of test compounds were generated with information regarding their individual chemical and physical properties including partition coefficients (ClogP) and melting point (MP). Structure activity relationship (SAR) data was also determined for test compound acetylcholinesterase and butyrylcholinesterase IC<sub>50</sub> values, percent inhibition of DPPH.

**Conclusions:** It was determined that acridine derivatives carrying methoxybenzyl groups show significant dual cholinesterase inhibition ranging from high nM to low  $\mu$ M IC<sub>50</sub>. Test compounds also exhibit varying levels of anti-oxidant properties thus making test compounds potential multi-target therapeutics for Alzheimer's treatment.

## **Education & Teaching Research**

### **ETRO1 Predicting students' communication skills in a Pharmacy program**

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**Objective:** Continuing our previous research, this study explored the predictive validity of an admission essay (AE), intended to assess communication skills, on subsequent grades in the Performance Based Assessment (PBA) component in the Pharmacy Skills Lab (PSL) stream in the Pharmacy curriculum.

**Methods:** Data consisted of AE scores and subsequent PBA grades in years 1, 2, and 3 for all students over six academic years (n=309). The AE score for each student represented the mean score on one essay graded by at least two evaluators. Because the AE scores were highly skewed, with many scores at the lower end, AE scores of 17 (out of 30) or higher were retained. The overall PBA grade for each student was the total grade across all assignments within the PBA component. Given the restricted range of AE scores, a correction formula was used to calculate the correlations between AE scores and PBA grades.

**Results:** From the adjusted sample (n=197), the mean and standard deviation of the AE scores were 19.3 and 2.3 respectively. The mean percentage grades across all PSL sections in each year level were: year 1 (73.8  $\pm$ 6.2), year 2 (74.1  $\pm$ 8.5), and year 3 (71.1  $\pm$ 8.1). The mean correlation between AE scores and PBA grades in years 1, 2 and 3 were 0.48, -0.13, and 0.03 respectively.

**Conclusions:** There was a notably significant correlation between AE scores and PBA grades in first year, which assessed both written and verbal communication skills. A relationship was not observed for subsequent years possibly due to an increasing emphasis on the application of knowledge. Overall, these findings validate the use of an AE in predicting how well an applicant will perform in relevant parts of the Pharmacy curriculum that assess communication abilities. Given the potential for finding more meaningful relationships between predictor variables and specific academic outcomes, future research should continue exploring the predictability of key learning outcomes such as critical thinking and professionalism.

### **ETRO2 Exploring Rasch Measurement and Latent Class Modeling for Academic Decision Making**

Gilles Leclerc, Faculty of Pharmacy, University of Montreal

**Objectives:** Significant academic decisions like selection, classification and grading demands valid, accurate, efficient and reproducible decision processes. Theoretical and empirical basis of using Rasch Modeling and Latent Class Modeling as decision aids will be discussed and preliminary findings of empirical exploration with admission test, course and clerkship data displayed.





## Poster Abstracts

**Methods:** Rasch Modeling is a psychometric model based on Item Response Theory that translate dichotomous and polytomous data into linear measurement. It provides sample independent measures with specific measurement error that enables more accurate classification and predictive processes. Latent Class Modeling is a statistical method based on posterior probabilities that explicit the heterogeneous latent structure into a set of independent manifest variables. Latent Class Modeling defines the number of classes in empirical data with fit indices, displays class membership as probabilities, and assumes that all individuals in each class presents homogeneous characteristics. Sound substantive arguments is needed to provide insight in interpreting latent class analysis output classification. Presumed and observable benefits and limitations of using latent models as academic decision aids will be discuss.

**Results:** Empirical explorations of latent models were performed on fourth year clerkship assessment data, on selected first and second year computer assisted exams data and on admission psychometric test data. Modeling methods provided accurate differentiation between students which is believed to contribute to sound empirical arguments aiming for informed equitable academic decisions. These theoretical based methods demands solid measurement background for data interpretations, software technical training and further empirical explorations for generalized academic use.

**Conclusions:** Basing academic decisions on sound measurements provided by Rasch measurement and Latent Class Modeling is believed to foster equity and enable solid supportive arguments to prevail.

### **ETRO3 Introduction to health literacy and writing patient educational material for pharmacists: workshop development and evaluation**

Harvinder Singh<sup>1</sup>, Artemis Diamantouros<sup>1,2</sup>

<sup>1</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario; <sup>2</sup>Sunnybrook Health Sciences Centre, Toronto, Ontario

**Background:** Pharmacists are often involved in writing educational materials for patients. It is widely recognized that much of the available material is written at a higher than acceptable reading level and pharmacists receive no formal training on writing patient education materials or on health literacy. This gap in knowledge identified by pharmacists at Sunnybrook HSC led to the development of a workshop to teach concepts surrounding health literacy and writing patient educational material.

**Objective:** To develop and evaluate a one-hour workshop surrounding the topics of health literacy and writing patient educational materials.

**Description:** A one-hour workshop was delivered to 40 members of the Sunnybrook HSC pharmacy department over six different sessions. A 30 minute didactic lecture defined health literacy, the state of health literacy in Canada and outlined the steps involved in creating patient educational material. Given that a key principle in adult learning is to learn by doing, 30 minutes was reserved for an interactive session whereby participants critiqued commercially available patient educational information.

**Results:** Evaluation involved assessment of satisfaction just after the workshop where participants commented that the interactive design enhanced their learning. Of the 21 respondents to another online survey (53%), 90% of participants were classified between beginner and intermediate in their level of understanding of health literacy and experience in writing patient educational information. 81% of participants were able to correctly answer all 5 knowledge based questions while 95% and 90% of participants agreed or strongly agreed that the workshop increased their knowledge and was relevant to their practice respectively.

**Conclusions:** The workshop was successful in providing an introduction to health literacy and writing patient educational material as participants expressed satisfaction and were able to accurately respond to post-workshop questions. This workshop is delivered in a brief, application-based format which allows it to be delivered in most settings to all health care professionals involved in writing patient educational material.

### **ETRO4 Online Summative Assessment in an Undergraduate Therapeutics Course**

Peter S. Loewen, Assistant Professor & Director, Doctor of Pharmacy Programs; Jon-Paul Marchand, Educational Technology Manager Faculty of Pharmaceutical Sciences, The University of British Columbia, Vancouver, BC, Canada

**Objectives:** To implement an online in-class summative assessment within a pharmacotherapeutics course involving 150 students for a majority of the course grade. This was the first fully online summative assessment performed in our faculty and the first with the new LMS at our university.

**Methods:** *Preparation:* The process for completing the online exam in December, 2012 began in August. This included (1) liaising with the university's network management and LMS team to identify barriers and tasks; (2) design two in-class sessions with students to test and develop comfort with the system; (3) optimize the existing exam for online delivery; and (4) develop contingency plans for untoward occurrences during the exam. *Delivery:* An entirely online 2-hour in-class summative assessment consisting of 3 different question types completed by 150 students simultaneously and comprising 65% of the course grade. *Evaluation:* During the session students were asked to evaluate the experience using Likert scale and open-ended questions within the LMS.

**Results:** *Preparation:* The university confirmed adequate system capacity to deliver the assessment. Two preparatory sessions for students revealed incompatibilities between the assessment software and certain types of PCs. These sessions were very important for technical and comfort reasons. *Delivery:* The exam was successfully delivered with only one instance of invoking a paper-based exam due to a student's PC failure. Marking was very efficient. *Evaluation:* Compared to a paper-based exam, students did not enjoy completing MCQs but found written and essay questions more enjoyable.





# Poster Abstracts

**Conclusions** It is feasible to conduct an in-class summative assessment involving MCQs, short answers, and an essay for a large class entirely online. Students exam-writing practices, particularly related to MCQs, require modification, but overall acceptance was high. Online MCQ-writing strategies can be taught during preparatory sessions. Many other important lessons were learned and we will continue use and expand this assessment approach within our Faculty.

## **ETRO5 Development and delivery of a pharmacist-taught pharmacology course for dental hygiene students.**

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**Objective:** Prescriptive authority for limited drug therapy is a recent practice advancement for dental hygienists being implemented in multiple provinces across Canada. In anticipation of this practice in Manitoba and to capitalize on the specialized expertise of interprofessional education, faculty members from the School of Dental Hygiene and the Faculty of Pharmacy at the University of Manitoba joined to develop a pharmacology course taught by clinical and basic science faculty from the Faculty of Pharmacy emphasizing both basic pharmacology principles and their therapeutic application for dental hygiene students.

**Methods:** Representatives from the Faculty of Pharmacy and the School of Dental Hygiene at the University of Manitoba reviewed currently existing dental hygiene pharmacology texts and courses available in Canada and abroad. In collaboration with the School of Dental Hygiene, content was selected to maximize applicability to the current and future practice of dental hygiene in Manitoba and avoid redundancy. Instructors from the Faculty of Pharmacy were selected based on clinical and academic expertise in the pharmacological principles or therapeutic drug classes being discussed.

**Results:** A single dental hygiene pharmacology text was selected to unify the knowledge base being presented by the various instructors. Desire2Learn (D2L) was implemented as the learning management system. Topics were introduced with a foundation of basic pharmacological principles followed by an enhanced emphasis on pharmacotherapeutic application by the use of dental hygiene focused clinical case studies. Twenty-six dental hygiene students were registered in the course. Interim course feedback was positive from students and faculty. Exit survey results will be tabulated at the end of the course offering.

**Conclusions:** In response to a higher demand of pharmaceutical education in Canadian dental hygienists, a pharmacist-taught pharmacology course for dental hygiene students was successfully developed and delivered.

## **ETRO6 Implementing a Pharmacy Training Program of Immunizations and Injections in Manitoba**

Authors: Immunizations and Injections Program Group (Christopher Louizos<sup>1</sup>, Lavern Vercaigne<sup>1</sup>, Casey Sayre<sup>1</sup>, Kim McIntosh<sup>2</sup>, Shawn Bugden<sup>1</sup>, Harris Iacovides<sup>1</sup>, Kelly Brink<sup>1</sup>, Dinah Santos<sup>1</sup>, Susan Lessard-Friesen<sup>2</sup>, Nicole Nakatsu<sup>4</sup>, Michelle Glass<sup>5</sup>), Theresa Bowser<sup>3</sup>, Grace Frankel<sup>1</sup>, Sheila Ng<sup>1</sup>, Melissa Gobin<sup>1</sup>, Neal Davies<sup>1</sup> <sup>1</sup> University of Manitoba, Faculty of Pharmacy, Winnipeg, Manitoba, R3E 0T5 <sup>2</sup> Manitoba Pharmaceutical Association (MPhA), Winnipeg, Manitoba, R2H 1A7 <sup>3</sup> University of Manitoba, Faculty of Nursing, Winnipeg, Manitoba. R2T 2N2 <sup>4</sup> Canadian Society of Hospital Pharmacists, Winnipeg, Manitoba, R2H 1A7 <sup>5</sup> Manitoba Society of Pharmacists, Winnipeg, Manitoba, R3C 4H1

**Objective:** An Immunizations and Injections Program Group (IIPG) was established with the task of developing a certificate program for students and practitioners to embrace the expanding scope of pharmacy practice in Manitoba.

**Methods:** The IIPG was comprised of interested stakeholders focused on the development of a certificate program. The IIPG included representation from the University of Manitoba, Faculty of Pharmacy, Manitoba Pharmaceutical Association (MPhA), Manitoba Society of Pharmacists, Canadian Society of Pharmacists, and Manitoba Health. The IIPG reviewed existing immunization and injection programs available in Canada and curriculum currently taught in associated health faculties at the University of Manitoba. Once an appropriate program was selected, an ad-hoc committee collaborated with the Faculty of Nursing to create a detailed practical workshop which demonstrated and evaluated participants. The ad-hoc committee also worked closely with the MPhA to create specific content regarding the legal obligation and best practices for immunization and injecting pharmacists in Manitoba.

**Results:** The IIPG developed an Immunizations and Injections certificate program comprised of two unique parts. Pre-requisites included standard or emergency first aid, CPR level C, and an online Immunization Competencies Education Program (CCCEP # 1066-2010-092-I-P) which contained a Manitoba specific module (CCCEP #1193-2012-577-B-P). An Immunizations and Injections workshop was also created which taught and assessed the administration of intradermal, subcutaneous, and intramuscular injections. Currently we have 89 pharmacy students and 136 practicing pharmacists that have successfully received certification.

**Conclusion:** The IIPG has successfully implemented a model for an Immunizations and Injections certificate program that is embedded into the Pharmacy program curriculum and for use by practicing Pharmacists.

## **ETRO7 The effect of repeating undergraduate pre-Pharmacy core courses on performance in a Pharmacy program**

Sheryl A. Zelenitsky<sup>1</sup>, Robert D. Renaud<sup>1,2</sup>, Cheryl Kristjanson<sup>1</sup>, & Nancy Kleiman<sup>1</sup>

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**Objectives:** Further to our initial study, the objective was to examine, with a larger sample, the relation between several background variables (e.g., incoming GPA, number of voluntary withdrawals from previous courses) on subsequent GPA in a Pharmacy program.



# Poster Abstracts

**Methods:** Data consisted of 13 background variables and yearly GPA for 211 students over four consecutive academic years. Multiple regression analyses were used to determine which background variables were most significantly related to Pharmacy GPA.

**Results:** Out of 13 background variables, incoming GPA and number of pre-Pharmacy core course repeats (CCR) each significantly predicted Pharmacy GPA in years 1, 2 and 3 with an adjusted  $R^2$  of 0.11, 0.24, and 0.21 respectively. Controlling for incoming GPA, the partial correlations between CCR and Pharmacy GPA were -0.18 (year 1), -0.25 (year 2), and -0.34 (year 3). In years 1, 2, and 3, the mean Pharmacy GPA of those who had no CCR (year 1 = 3.74, year 2 = 3.54, year 3 = 3.54) was significantly higher than the mean Pharmacy GPA of those who had at least one CCR (year 1 = 3.56, year 2 = 3.24, year 3 = 3.16).

**Conclusions:** Students who repeated pre-Pharmacy courses, especially core courses, did not perform as well in the Pharmacy program. These findings suggest that identifying applicants who had more difficulty in achieving an acceptable incoming GPA, may help to better select those most likely to succeed in the program. Because the number of students who repeated at least one CCR was relatively small, examining these and other background variables in greater detail (e.g., grades in pre-Pharmacy courses) may better characterize the relationships with performance in the Pharmacy program.

## **ETR08 Evaluation of an online delivery method to teach pharmacy informatics**

Elnaz Haddadi, Marie Rocchi, Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario

**Objectives:** Pharmacy Informatics and Clinical Trials (PHM112) is delivered through lectures, small group tutorials, guided workbooks, and practice activities. This was the first year that 4 of 6 lectures in the pharmacy informatics section were delivered online using lecture capture software. A survey was created to determine students' impressions, user experience, satisfaction with, and effectiveness of this delivery method.

**Methods:** A 15 item online survey with 4 domains (impression, experience, satisfaction, effectiveness) was administered with two weeks allotted for completion. Students were informed about the survey via an in-class announcement and emails.

**Results:** Twenty-seven percent of students (64/240) completed the survey. More than 75% surveyed agreed or strongly agreed that online lectures were convenient and engaging, and were satisfied with this delivery method. Most students (98%) viewed the online lectures from home, with Tuesdays (scheduled lecture day) and weekends being the most popular days. Thirty three percent viewed online lectures more than once; the top three lectures were the CPS, Drug Benefit Formulary/Comparative Drug Index and E-health. Students commented positively about convenience, flexibility, and the ability to work at their own pace, pause, rewind and expand on notes. Engaging and effective were the two most popular words used to describe the online teaching style of the instructor. Fourteen percent surveyed (8/64) agreed or strongly agreed that all lectures should be delivered in person, citing live interactivity and forced scheduling ("keeping up") as reasons. Seventy-eight percent of those surveyed recommended the use of lecture capture within other pharmacy courses.

**Conclusions:** The instructor's style and comfort with online delivery, coupled with subject matter that was suitable for computer screen sharing may have been factors in the intervention's relative success. Feedback from the end users of this delivery method can help with use of this intervention in other contexts. Although a 27% response rate might be considered low, it should be viewed in comparison to the usual completion rate of 10% for course evaluations.

## **ETR09 A survey of pharmacy preceptors' expectations and experiences with pharmacy students on rotations in the inaugural Combined BScPhm/PharmD Degree Program class at the University of Toronto**

Authors: A. Diamantouros, R. Marchesano, G. Rzyznik, S. Gerges, B.G. Hardy, Sunnybrook HSC, University of Toronto

**Background:** In September 2011, the Leslie Dan Faculty of Pharmacy began to offer a Combined BScPhm/PharmD (CDP) program to Year 3 students and post-baccalaureate graduates. Learning is comprised of both in-class teaching and Advanced Pharmacy Practice Experience (APPE) rotations.

**Objectives:** A survey was conducted to explore the APPE preceptors' expectations, perceptions of student performance and work impact.

**Methods:** 132 preceptors were invited to complete an online survey consisting of 17 items. Survey questions addressed demographics, preceptors' expectations and experiences. Participation was voluntary and responses were anonymous.

**Results:** The survey response rate was 48%. Most respondents worked in teaching hospitals, provided direct patient care and had prior experience precepting. Preceptors' expectations of the CPD students ranged from the same as traditional PharmD (28%), between Structured Practical Experience Program (SPEP)/hospital residency and PharmD (9%), and between SPEP and hospital residency (64%) learners. Irrespective of expected performance level, over 75% of preceptors believed that students met or exceeded expectations. Compared to preceptors' overall perception of student performance, only 31% ranked the students at the corresponding level of performance on the assessment form, while 62% ranked them above their performance level. Preceptors felt students were adequately (60%) or well prepared (23%), excelled in professionalism (57%) and communication skills (45%), but needed most improvement in the areas of application of knowledge (72%), problem solving skills (48%), and patient work-ups (40%). Preceptors felt the students increased their workload (41%), but improved patient care (36%) and were helpful in completing site projects (45%).

**Conclusion:** The preceptors' perceptions of the rotation and level of student expectations were highly varied and influenced by prior teaching experiences, the individual student's performance, and impact on workload and patient care. Clarity on the expected level



# Poster Abstracts

of performance for a CPD student as well as additional preceptor training and support would further enhance the experiential rotations of the CPD program.

## **ETR10 Doctor of Pharmacy Students Acquire Skills in Curriculum Design and Project Management Through Participation in an Education Project with Coaching Support**

Lawrence D. Jackson<sup>1</sup>, Joy Makari<sup>2</sup>, Patrick Edwards<sup>2</sup>, Sandra Gerges<sup>2</sup>, Hardeep Hehar<sup>2</sup>, Jennifer Lo<sup>2</sup>, Michelle Lui<sup>2</sup>, Froozan Amin<sup>1</sup>, Lisa Zhu<sup>1</sup>, Jennifer Do<sup>1</sup>, Andrea Fox<sup>1</sup> <sup>1</sup>Sunnybrook Health Sciences Centre and <sup>2</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON

**Objectives:** To examine the impact of participating in an education project during a clinical rotation with coaching support on students' acquisition of skills in curriculum design and project management, and assess the impact on coaches.

**Methods:** Six PharmD students participated in an education project during their initial 4-week Advanced Pharmacy Practice Experience rotation. Students used a curriculum design template to develop an education module for nurses pertaining to the monitoring of outcomes in nephrology patients receiving treatment for anemia and hyperphosphatemia. Students prepared drug monographs for the two conditions and delivered two oral presentations. Five staff pharmacists provided coaching in curriculum design and project management. An extemporaneous outcomes measurement tool using a 4-point scale ranging from 1 (no improvement) to 4 (significant improvement) was completed several months after the rotation. Subjective outcomes included students' perceptions of improvement in skills related to curriculum design and project management and the impact of coaching on skill development, and coaches' perceptions.

**Results:** Averages of students' scores for selected elements of the measurement tool were: improvement in curriculum design skills = 3; improvement in project management skills = 2; confidence to design a curriculum or conduct future projects = 2.5; impact on personal growth = 2.8; and impact of coaching on acquisition of skills = 3.5. Components of coaching rated most highly were leadership, task focus and administration. Among coaches, the impact on personal growth was rated 3.5 and impact on work life was rated 3.8.

**Conclusions:** Participation in an education project during a clinical rotation with coaching support produced a moderate improvement in students' skills and confidence related to curriculum design and project management. Coaching had a high impact on the acquisition of skills. Coaches experienced moderate to high personal growth and job satisfaction.

## **ETR11 Implementation of Human Patient Simulation Technology to Teach Physical Assessment to Pharmacy Students**

Katherine Seto, Colleen M. Brady, Tamiz J. Kanji, and Tony T. Seet, The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC

**Background:** Human Patient Simulation (HPS) technology has been adopted as a teaching tool by numerous programs. Although this technology has been used frequently in nursing and medicine, its use in pharmacy education is a relatively new innovation. HPS technology was introduced into the *Pharmacy Skills* stream of courses in Years 1 to 3 of our 4-year entry-to-practice baccalaureate degree program. These courses provide students with opportunities to develop the knowledge and skills required for pharmacy practice.

**Objective:** The implementation of HPS technology into the curriculum of the *Pharmacy Skills* stream of courses is described.

**Methods:** An orientation to the simulators was provided. HPS technology was implemented in the "vital signs" tutorial in Year 1 and the "pulmonary" tutorial in Year 2. In Year 3, students utilized data obtained from their physical examination to develop a pharmacotherapy plan. HPS technology was also used to provide student assessment.

**Results:** In Year One, 223 students completed a "vital signs" tutorial on measuring heart rate and blood pressure. In Year Two, 215 students learned how to conduct a pulmonary examination during their tutorial. In Year Three, 143 students completed a tutorial on the clinical application of physical exam data. The implementation of HPS technology allowed students to practice skills and apply knowledge repeatedly in a safe environment while causing no harm to the patient. HPS technology helped to control the exam environment and standardize student assessment. Challenges identified include large student-to-instructor ratios, classroom time restrictions, and familiarity and logistical use of HPS.

**Conclusion:** HPS technology provided a learning environment conducive to increasing students' competence and confidence in physical assessment, communication, teamwork, and critical thinking skills. Student feedback suggested that they felt positively about using HPS to learn and preferred HPS to didactic methods. Next steps include expansion of the use of HPS technology. Additional research is required to evaluate educational outcomes and techniques for using simulation.

## **ETR12 Aligning learning objectives and assessments in pharmacy therapeutics courses to foster higher level thinking**

Authors: Beverly A. FitzPatrick, John J. Hawboldt, Terri Genge Memorial University, NL

**Objectives:** Instruction and assessment is scrutinized in higher education. Course objectives set expectations for students. When objectives and assessments are aligned, students have the opportunity to learn and think at a higher level. In Newfoundland and Labrador, the pharmacy curriculum is based upon the outcomes of the Association of Faculties of Pharmacies of Canada (AFPC). The purpose of





# Poster Abstracts

this study is to analyze the objectives and assessments of two therapeutics courses to determine if they are aligned for content according to AFPC and cognitive levels of thinking, particularly higher order thinking.

**Method:** The objectives of each course and the lectures in each course were aligned with the AFPC outcomes for content and thinking levels, using Anderson and Krathwohl 2001 taxonomy. This was repeated for the courses' respective exam questions. Focus groups were held with 12/36 third year students to explore their thoughts regarding the assessments and their thinking processes when responding to the questions. Class observations also occurred to determine how objectives were taught.

**Results:** Preliminary results indicate that there are 31 course objectives that reflect six of the seven AFPC outcomes. Of 244 lecture objectives, 241 align generally for content with two of the AFPC outcomes—care provider and scholar. Four AFPC outcomes are not represented in the lecture objectives despite being in course objectives. With regard to exam question analysis, two of the AFPC outcomes are consistently being assessed. When aligning exam questions and course objectives, the results to date indicate that for four of the exams, 25/58 questions match cognitively with their corresponding objectives, and 12 of the matches require higher order thinking. Thirty-three of 58 questions are below the cognitive levels of the corresponding objectives, but 14/33 required higher order thinking.

**Conclusions:** Lecture objectives generally align with course objectives, but both need modifications so they are more directly related. Higher order thinking is assessed, but not at the highest levels, and exam questions need to reflect a stronger alignment with objectives for content and cognitive levels.

## **ETR13 The “up-scaling” of a pharmacotherapy course: harnessing instructional technology in a large classroom.**

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**Objectives:** Pharmacotherapy 5: Cardiovascular Diseases is a mandatory course in the entry to practice Doctor of Pharmacy program at the University of Toronto. Our goal was to determine whether students would utilize a wiki to facilitate pre-class learning. We sought to utilize a method previously implemented with a class of 40 students in the Doctor of Pharmacy Program and scale it to a class of 240 students. The objectives were to support the acquisition and application of cardiovascular pharmacotherapy knowledge at an advanced level while encouraging the development of skills and attitudes required for collaborative and self-directed learning.

**Methods:** Six disease based workshops were designed to help students integrate and apply basic science (pathophysiology, pharmacology, pharmacokinetics and pharmaceuticals) covered in lectures. A case, learning objectives and readings were developed for each workshop. Students were divided into groups of 60 students, and a wiki was developed for each group. The wiki was used to complete case-based learning objectives prior to the workshops. Students utilized the wiki to summarize drug information, clinical practice guidelines and critically appraise primary literature. This information provided the basis for the workshop. Utilization statistics including number of wiki pages, page views and page modifications were collected. Student and facilitator surveys and focus groups to elicit perceptions of wiki use and value are on-going.

**Results:** Six workshops (dyslipidemia, hypertension, secondary prevention, heart failure, stroke, venous thromboembolism) were delivered. The mean number of wiki pages populated per workshop was of 23. Over the length of the course, each wiki had more than 11,000 visits. Mean number of modifications per page were similar among the 4 wikis (8.18, 8.36, 8.69, 9.54).

**Conclusions:** We were able to “up scale” the use of wikis into a larger student class. Students successfully populated the wikis prior to workshops, developing a repository of editable information to facilitate the discussion in workshops and their understanding of cardiovascular pharmacotherapy.

## **ETR14 The “ABC's” of Creating and Delivering a Module into a Non-Modular Curriculum**

Colleen M. Brady and Linda T. Tran, The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC

**Background:** In the second and third year of our 4-year entry-to-practice program, horizontal integration occurs in terms of the timing of the delivery of content from different disciplines surrounding a specific medical condition. However, the formation of links between these disciplines are often left to the students to make. In 2011, second year course coordinators created a pulmonary system module that provided integrated learning activities in addition to content sequencing.

**Objectives:** Integrate the learning activities across the various disciplines. Facilitate students' ability to assimilate content and application of knowledge. Enhance horizontal integration within the second year of our curriculum. Ensure sustainability of all activities in relation to class size (224).

**Methods:** Relevant course materials and assessment techniques were reviewed from: Therapeutics, Pathophysiology, Pharmacology, Pharmacy Practice II, Cases in Pharmaceutical Sciences II. In 2011, a pilot module was developed and implemented. Student and instructor surveys were created to gain feedback on the module. Improvements based on this feedback were implemented in the 2012 module offering.





**Results:** In the 2011 pilot module, integrated learning activities focused on asthma. An integrated exam that incorporated practice activities, cases, oral exams and multiple-choice questions was created to assess student learning. In this pilot year, this exam did not count for marks. Survey results suggested that the module should expand to include COPD, make the exam worth marks, ensure all lectures occurred before labs/tutorials and ensure students received their marks back in a timely fashion. All these changes were incorporated into the 2012 module.

**Conclusions:** Completion of the module may contribute to the student's ability to be successful in patient education related to asthma and COPD. Student's stated that learning with a modular approach enhanced their learning. Integration promoted collaborative interactions between students and faculty from various disciplines. Additional research is required to evaluate the benefits of a modular curriculum related to educational outcomes as well as sustainability, particularly in terms of learning assessment.

## **ETR15 Problem- and case-based learning to enhance pharmacy students' education**

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**Objective.** A challenge for pharmacy educators is involving students and making them interested in the learning process. This increases the student's retention of material and ability to apply the information in clinical practice. The main objective of this work is to determine if problem- and case-based learning increases the effectiveness of the learning process.

**Methods.** Eight studies from the Scopus database were selected. Papers were selected based on their focus on problem- and case-based learning in pharmacy students' training. This summarized literature review was conducted by searching for the discipline-specific teaching topics. The selected papers were published in North America between 2002 and 2012. These studies analyzed quantitative and qualitative data to investigate the advantages and disadvantages of problem- and case-based learning methods.

**Results.** Problem- and case-based learning uses real-world situations that motivates pharmacy students and enhances their understanding of the practicalities of the pharmacy profession. The results of the selected studies showed that problem- and case-based learning led to the enhancement of critical thinking, self-directed learning, decision making and effective communication and that students found the format enjoyable. Examination scores were higher when such formats were used. However, one study indicated that the transition from didactic teaching to problem-based learning presented some difficulties such as adapting to new learning method by students.

**Conclusions.** Problem- and case-based learning can have multiple benefits over didactic lectures as they lead to higher knowledge retention rates that can be applied in real-world situations. Problem- and case-based learning develops critical thinking and problem solving. Pharmacy students must combine knowledge, skills, and professional demeanor in the pharmacy in order to be successful in their field. Therefore, problem- and case-based learning are important learning styles that are recommended to be more frequently incorporated in pharmacy education.

## **ETR16 The process of developing new student performance assessments for experiential education courses**

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**Objectives:** A revised set of educational outcomes was published by AFPC in 2010 that defines the competencies student pharmacists must have upon graduation. The experiential education program aims to have students build toward the final set of competencies in a step-wise fashion. Upon review of the student performance assessment process utilized in the experiential program currently, it was realized each course was diverse and inconsistent. Accordingly, a "skills mapping process" was undertaken to more clearly define the intended outcomes students would achieve after each experiential course. This process facilitated the creation of a new set of assessments to be used by preceptors to assess student achievement of the intended outcomes.

**Methods:** Guided by the AFPC outcomes, we employ a systematic backwards design approach to 1) identify a list of intended competencies for each experiential course, 2) define associated student behaviours that are written in clear and observable terms for each competency 3) state the intended progression of skill development across the experiential program, and 4) create placement specific online assessments using the appropriate set of identified behaviours.

**Results:** The process produced maps outlining a comprehensive set of skills developed in each experiential course. Based on the skills maps, course specific online assessments that standardize the competencies and the accompanying behaviours that preceptor's rate before providing an overall evaluation of the student have been created.

**Conclusions:** The set of assessment tools that resulted from this process clearly state the Faculty's expectations for skill development within each course that makes up the experiential program. This is expected to improve the ability of preceptors to assess students more objectively and consistently, and also make the assessment process easier to complete. The assessments should also produce diagnostic information that can be used to improve student learning during the placement. Stakeholder feedback and data to determine how the tools function in the practice setting will be collected next.



# Poster Abstracts

## **ETR17 Development and Implementation of a Remedial Program for Undergraduate Pharmacy Students**

Janice L. Moshenko\* and Katherine Seto\*, The University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, BC

\*Both authors contributed equally to this work

**Background:** Remediation is an essential component of any undergraduate curriculum to support students who struggle in the experiential setting. Prior to December 2011, our faculty did not have a formal remedial process in place. There are many approaches to the remediation of health professions students; however, no one strategy has been identified as optimal. To this end, we developed and implemented a multifaceted remedial program to support students with experiential difficulties.

**Objective:** To develop, implement, and evaluate the Student Success Program (SSP).

**Methods:** A literature search was conducted to identify remediation processes that have been previously implemented. A framework was developed and implemented for the SSP, which included the following components: i) student identification; ii) structured student interview; iii) individualized learning plan development; iv) learning activity completion; v) student assessment and feedback; vi) student and program evaluation.

**Results:** Since December 2011, of the 7 students that were identified for participation in the SSP, 6 students have successfully completed the SSP. Four of these students have repeated and successfully completed their experiential clerkship and 2 of these students are currently reattempting their experiential clerkship. One student is currently still participating in the SSP. Common learning gaps that were identified include care plan development, communication skills, and knowledge application. Student feedback on the SSP has been positive and suggests that students found the program to be student-centered, supportive and flexible. Students identified care plan development and patient counseling as the most beneficial activities and felt better prepared for their repeat clerkship. Challenges identified include student resistance, faculty time commitment, and program sustainability.

**Conclusions:** Based on feedback, the SSP has demonstrated benefit to pharmacy undergraduate students and provided an atmosphere of encouragement, support and collaboration. Students who have completed the program have had a noticeable improvement in their clinical knowledge and skills. Next steps for the SSP include exploring methods to identify students earlier in the academic program.

## **ETR18 The Merits of Formative Oral Exams in an Entry-to-Practice Pharmacy Program**

Arun K. Verma, Gary X. Peng, Marc Levine, University of British Columbia Faculty of Pharmaceutical Sciences

Formative assessment provides opportunities for students to identify areas of strength and weakness, provide feedback to instructors on content students find difficult, and encourage deeper learning of material, whereas summative assessments evaluate student learning at the end of an instructional unit. Oral exams are a traditional form of assessment in which one or more examiners ask candidates questions, generally as part of high stakes summative assessment.

**Objective:** To ascertain evidence for formative oral exams in pharmacy education as a method of assessing progress toward learning outcomes such as clinical decision-making and pharmaceutical care provision.

**Methods:** A systematic search was conducted using MEDLINE (1946 to present), EMBASE (1974 to present), CINAHL (1982 to present), ERIC and International ERIC. Articles were reviewed for relevance to health profession education. Relevant articles were used to conduct a cited reference search through Web of Science and Google Scholar. Further information was sought by searching the bibliographies of selected articles. In addition to literature review, ten North American pharmacy programs, including UBC, were contacted and interviewed regarding the use of oral exams.

**Results:** 41 studies investigating oral exams in health profession education were identified; however, only 4 were related to pharmacy education. No studies investigated formative oral exams in pharmacy education. A review of the literature on summative oral

**Conclusions:** There has been limited research on formative oral exams in pharmacy or other health disciplines. Until more research is conducted, studies regarding summative oral exams can illuminate potential advantages and disadvantages of formative oral exams. The ability of oral exams to increase student understanding is particularly encouraging in this regard. Faculty should consider these factors when designing and conducting formative oral exams.

## **ETR19 Refining higher order learning assessment in a case-based course stream**

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University of British Columbia Faculty of Pharmaceutical Sciences

While higher order learning (problem solving, clinical reasoning) is recognized as important in pharmacy curricula, assessment of these skills is time consuming and often requires clinical expertise. These challenges compound as class size increases. We highlight two strategies to refine higher order learning assessment practices in a stream of integrated case-based courses. Research has shown that reliable assessment must involve several samples of a student's skill. Further, specific assessment methods have been shown to be less important than what we assess (content, skills).

**Objectives:** To develop more reliable, valid and efficient assessment strategies that can be implemented regularly to provide individual students with ongoing, formative feedback on their success within these courses.



# Poster Abstracts

**Methods:** A thorough review of the literature in terms of assessment tools developed for use within health care education was conducted. Assessment methods were considered based on their ability to assess higher order learning skills in large classes with a minimum amount of resources.

**Results:** This work resulted in two major changes in the assessment practices in these courses:

Development of multiple-choice questions to test application of knowledge regarding key clinical concepts. This type of multiple choice question has been shown to assess higher order thinking skills in students.

Adapting the “modified essay question” (MEQ) technique to include key features for problem resolution. The MEQ is a written assessment of decision-making skills employing focused questions that can be marked by trained lay markers. A key feature is a step which examinees are most likely to make errors in the resolution of the problem.

**Conclusions:** These assessment strategies have supported a shift from group to individual accountability for learning, and have eased the burden of marking individual assignments while maintaining performance standards. Future plans include diffusing these assessment practices into other courses.

## **ETR20 Medication incident reporting and analysis in professional practice lab: Continuous quality assurance starts in pharmacy school**

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**Objective:** Continuous quality assurance (CQA) is necessary for advancing safe medication practices in community pharmacies. Students should embrace this concept and start practicing CQA when they are in pharmacy school. We introduced an activity in Professional Practice Lab (PPL) where pharmacy students reported their near misses and medication incidents to an online reporting program with the intention to determine underlying system-based contributing factors and prevent similar incidents from occurring in PPL.

**Methods :** Two classes of pharmacy students participated in this CQA PPL exercise in 2010 and 2012. 248 near misses or incidents were voluntarily reported by pharmacy students to the Institute for Safe Medication Practices Canada (ISMP Canada) Community Pharmacy Incident Reporting (CPhIR) Program Training Site (<http://www.cphir.ca/training>). The incidents were analyzed, with a focus on the potential severity of “patient” outcome of the incidents and medication-use areas associated with these incidents.

**Results:** Of the 248 incidents, 61% (150 of 248) were near misses, 26% (65 of 248) resulted in no potential harm, i.e. medication was “dispensed”, but no symptoms were expected to be detected and no treatment was required in “patients”. 13% (33 of 248) resulted in anticipated harm in “patients”. The majority of incidents occurred during the Prescription Order Entry and the Prescription Dispensing stages. The most common types of incidents reported were incorrect strength/concentration (29%), incorrect dose/frequency (24%), and incorrect drug (22%). Possible contributing factors to these medication incidents include look/sound-alike drug names, look-alike packaging, and miscommunication of drug order.

**Discussion:** This CQA medication incident reporting and analysis PPL exercise served as an initial attempt to study factors that may contribute to near misses and medication incidents in simulated community pharmacy practice settings. Through the analysis of medication incidents and sharing of findings in class, pharmacy students can learn from reported incidents and implement safeguards in PPL.

## **ETR21 Effectiveness of extracurricular journal clubs on pharmacy students’ learning of evidence-based medicine and critical appraisal**

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**Objectives:** Journal clubs have been instrumental facilitators to medical and dental students in learning critical appraisal (CA) skills and incorporation of the best evidence into clinical practice. This study intends to investigate the effectiveness of extracurricular student-driven journal clubs in enhancing undergraduate pharmacy students’ evidence-based medicine (EBM) knowledge and CA of primary literature.

**Methods:** Eight one-hour journal clubs were organized by students in two consecutive academic terms as extracurricular activities. Attendance and presentations by students at journal clubs were voluntary. Students who attended journal clubs were asked to complete an online questionnaire to self-report their learning and understanding of EBM and CA concepts after attending journal clubs. Journal club presenters were invited to focus groups to share their feedback and learning on EBM and CA skills.

**Results:** Attendance of each journal club ranged from 25 to 50 students. 28 students completed the online questionnaire. After attending journal clubs, 57% students agreed or strongly agreed that they were able to critically appraise primary literature in a timely fashion; 68% believed that they were able to formulate clinically-relevant conclusions from research studies; and 57% were confident in presenting clinical decisions based on assessment of a research study. We conducted two focus groups with 13 student presenters. Focus group data were transcribed and a thematic analysis was performed. Student presenters found themselves more proactive in seeking evidence-based clinical decisions and they strived for continuous development of their CA skills. They recognized the importance of critically analyzing methods and results presented in clinical trials. They also offered recommendations for future journal clubs.





# Poster Abstracts

**Conclusions:** Pharmacy students self-reported that journal clubs offered them a platform to further practice and apply their knowledge on EBM and CA skills. Traditional didactic teaching/learning in classroom serves as an introduction to EBM and CA. Students need to continuously practice these skills in order to fulfill the competencies of being a medication therapy expert capable of evaluating and applying EBM in practice

## **ETR22 Development of a Foundational Course in Pharmacotherapeutics in a Doctor of Pharmacy Curriculum**

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**Background:** A new Doctor of Pharmacy curriculum was developed with seven Integrated Pharmacotherapy Courses. The first course offered in year one is important in setting the foundation and preparatory work for the other courses.

**Objective:** To determine foundational information that should be included within the first of a series of Pharmacotherapy courses.

**Methods:** Course developers worked to identify key concepts required for students to understand the therapeutics of drug therapy. Data from several health-related resources and input from clinical practitioners informed this process. Based on this evidence, several important concepts were identified as being critical to include in a foundational course. Therapeutic topics considered to be relevant early in the professional practice of pharmacy were also identified.

**Results:** Concepts identified as essential in the first foundational pharmacotherapy course related to patient populations, medical conditions and concepts required in the interpretation and application of drug therapy information. These included principles of drug therapy in Geriatrics, Pediatrics and during pregnancy and lactation; interpretation of laboratory values; an overview of adverse drug reactions and allergies, and an introduction to the area of complementary and alternative medicine. An overview of the Patient Care Process was provided as a pre-requisite in an online learning format. Practice in application of evidence-based principles in interpreting therapeutic information was also implemented in a small group seminar utilizing the Pharmaceutical Care work-up Therapeutic topics in general medicine, such as musculoskeletal, gastrointestinal, and respiratory disorders was included within the course.

**Conclusions:** The Foundations and General Medicine course has been offered twice with positive student feedback. Students are able to expand on these concepts in subsequent pharmacotherapy courses. A recommendation has been made to expand on the teaching of the Patient Care Process within this course. This course, with some modifications, is considered to be important in year one of the curriculum.

## **ETR23 Development of a Geriatric Curricular Pathway within a Doctor of Pharmacy Program**

Sidika Dhalla and Lalitha Raman-Wilms, Leslie Dan Faculty of Pharmacy, University of Toronto.

**Background:** As the elderly continue to grow in Canada, Faculties of Pharmacy need to ensure that pharmacy students have the required training to address the drug-related needs of this population.

**Objectives:** To determine competencies required for pharmacy students to provide comprehensive geriatric care and to design a curricular pathway to achieve these outcomes.

**Methods:** This project was undertaken by a PharmD student as part of an elective Education rotation. A background literature search on geriatric pharmacy education and geriatric competencies was conducted; also, an internet search was done to identify existing programs in geriatrics in North America. Based on these, desirable competencies for pharmacy students in geriatric education were drafted. Input on these was sought from five local pharmacist experts. The revised competencies were mapped to identify mandatory components covered in the curriculum. A curricular pathway was then designed which would enable attainment of the proposed competencies.

**Results;** Geriatric education in schools of pharmacy across North America remains inconsistent with respect to depth and breadth of content taught. Only two pharmacy schools offer specialized or focused educational programs in geriatrics. The only North American recognized certification program in geriatrics is the Certified Geriatric Pharmacist (CGP). Based on the various resources, the required competencies for pharmacy students in geriatrics education was determined. Based on the mapping of required core curricula, specific competencies to be addressed in a focused elective curriculum were identified. A curricular pathway was proposed which will enable students to meet the required competencies. This will require a combination of courses and experiential education. Upon completion of this pathway, students will be well prepared to pursue the CGP certification after graduation.

**Conclusions:** This curricular pathway, when implemented, will provide a unique opportunity for pharmacy students to gain focused training in geriatrics. The process used in the development of this pathway serves as a model to develop similar pathways in other patient care or therapeutic areas.

## **ETR24 Aging Simulation Workshop**

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<sup>1</sup>Pharmacy Department, Baycrest Health Sciences,<sup>2</sup>Leslie Dan Faculty of Pharmacy, University of Toronto.

**Objective:** To increase pharmacy students' awareness of health related challenges of geriatric patients.





**Methods:** An optional 2.5 hour workshop was offered by Baycrest Health Sciences to first year pharmacy students where they were asked to role-play an older individual in an ambulatory and an inpatient setting. This was followed by a debriefing reflection exercise and a written assignment. The workshop was facilitated by a team of inter-professional care providers including pharmacists and physicians. Students completed an evaluation form following the session.

Each student was provided with the profile of a specific geriatric person to role play, including age, weight, medical history and medications. Also, each individual had specific challenges such as poor eyesight, poor hearing and physical disabilities. For e.g. poor eye sight was simulated through students' wearing of specialized goggles. Students, in their assumed role, were given instructions for their day's schedule of activities. The simulated stations included a community pharmacy, a family physician's office, nursing home, etc. The focus of the workshop was on health and medication use. A discussion related to the student's physical and emotional challenges in their role occurred during the debrief. The written assignment asked them to identify challenges faced by the elderly and how they, as future pharmacists, would respond to these.

**Results:** Forty seven students completed one of three workshop offered in January-February 2013. The workshop was received very positively by all students and 93 % would recommend that this be offered to all pharmacy students. Students indicated that the workshop provided a safe environment in which to better understand the challenges faced by the older patient. The assignment further highlighted their understanding of the challenges and their strategies on how better to serve geriatric patients.

**Conclusions:** This workshop provided students with an opportunity to experience first-hand some challenges faced by the older patient. Based on feedback, this workshop will be considered as a mandatory component of the training provided to year one pharmacy students.

## Social Administrative Research

### **SAR01 Developing a Code of Conduct for the UBC Faculty of Pharmaceutical Sciences**

Patricia Gerber, Faculty of Pharmaceutical Sciences, University of British Columbia

**Background:** Much has been written in the literature about the process of inculcating our profession's values and behaviours in our students. Before we can explore how to further develop student professionalism, faculty must first explore how to define it and identify those behaviours that constitute professionalism. Over the past 12 months, our Faculty has undertaken a rigorous process to develop a comprehensive, operational definition of professional conduct in the form of a Code of Conduct for faculty, staff and students.

**Methods:** An environmental scan of existing Codes of Conduct from Faculties of Pharmacy in Canada and the US as well as the UBC Faculties of Medicine and Dentistry was performed by our newly formed Professionalism Committee. Within our Faculty, a series of interviews, meetings and presentations with faculty and staff as well as a series of small group discussions with representative students from all years of our Entry-to-Practice Program were conducted to ascertain views on professional conduct and to inform the development of a Code of Conduct.

**Results:** The information gathered from the various meetings and activities informed the development of a draft Code by our Professionalism Committee. The document consisted of an introduction followed by a set of 10 tenets and a glossary of terms. When circulated for comment, the document was received with general support; however, concern regarding some of the wording and fear of the Code setting expectations beyond those in collective agreements were expressed. In addition, many were opposed to the inclusion of a dress code and a section requiring a signature to indicate commitment to the Code. After further revisions and consultation, the Code was approved at a Faculty Council meeting.

**Conclusions:** The development of a Code of Conduct required considerable efforts, and generated some controversy. However, this step is just the beginning of our efforts to enhance how we foster and address professionalism. Next steps include a review and further development of curricular activities focused on professionalism and the Code of Conduct.

### **SAR02 Utilization of Antipsychotic Medications in the Youth Population of Manitoba: 1996-2011**

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**Objectives:** To determine the utilization of antipsychotic medications in the youth population of the Canadian province of Manitoba.

**Methods:** Databases from the Population Health Research Data Repository of the Manitoba Centre of Health Policy (MCHP) were accessed for this study. Approvals were obtained from the HREB at the University of Manitoba and from the Manitoba's Health Privacy Information Committee.

Prevalent and incident use of antipsychotic medications was determined in the youth population of Manitoba during the time period of 1996 to 2011. A cohort of young (0-19 years of age) incident users of second-generation antipsychotic medications (SGAs; i.e. clozapine, risperidone, olanzapine, quetiapine, paliperidone, ziprasidone and aripiparazole) was constructed and stratified by sex



and age-groups. Utilization of each SGA was described and the most common diagnoses reported. Diagnoses of adverse events such as diabetes, hypertension, arrhythmias and movement disorders were also counted. SAS statistical software was used for the analyses.

**Results:** Prevalence of SGA use in the youth population of Manitoba increased from 2.3 to 9 per 1000 between 2001 and 2011 while incidence increased from 1.2 to 2.7 per 1000. Incidence rates were higher in males (0.8 to 1.5 per 1000) than in females (0.3 to 1.1 per 1000). The age-group of 13-19 years was the segment with the highest use (49.4%). The most commonly prescribed SGA was risperidone (65.2%) followed by quetiapine (19.6%) and olanzapine (7.4%). The most common diagnosis was Attention Deficit Hyperactivity Disorder (56.8%) followed by Conduct Disorders (38%) and mood disorders (22.7%). Diagnoses of adverse events such as diabetes (1.9%), hypertension (2%), arrhythmias (1%) and movement disorders (1%) were reported in incident users following their first prescription of SGA.

**Conclusions:** Increased SGA utilization and diagnoses of adverse events were observed in the youth population of Manitoba. It is important to evaluate the risks associated with antipsychotic therapy in young patients.

## Pharmacy Practice Research

### **PRR01 Translating knowledge about bioidentical hormones (BHs) into practice via an undergraduate pharmacy presentation.**

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**Objective:** Nova Scotia pharmacists completing a survey in 2011 identified specific educational needs regarding the use of bioidentical hormones (BHs) to treat menopause-related symptoms. The objective of this part of a comprehensive Knowledge Translation (KT) plan was to develop, administer and evaluate an oral presentation for pharmacy students.

**Methods:** A comprehensive search and evaluation of the literature was undertaken to identify a suitable KT model to guide the development of knowledge on BHs and its delivery to pharmacists. An oral presentation was developed as an intervention to be delivered as part of the pharmacy curriculum; the impact on learning was evaluated using a pre and post-test.

**Results:** The "Knowledge to Action (KTA) Process" was selected as the model for this project. Phase one of the KT model, "identifying the problem", was accomplished by reviewing results from our 2011 survey of pharmacists regarding their knowledge about BHs. Gaps in published knowledge were addressed using the knowledge creation phase of the KT model, where systematic reviews (SRs) were completed. This knowledge was used to develop an oral presentation for educating future pharmacists. The intervention was piloted in the women's health course in the pharmacy curriculum, using a pre and post-test to assess the effectiveness. Four out of six pre/post test questions showed an improvement in knowledge of BHs. The presentation will be revised based on response to questions as well as informal feedback.

**Conclusion:** Application of the KTA process identified educational needs of pharmacists regarding BHs and guided the translation of best evidence into interventions for future pharmacists. The first intervention, an oral presentation, was found to be effective in improving pharmacy student's knowledge in most areas.

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**Disclosure:** The authors of this presentation have nothing to disclose. Portions of this project were presented at the 48<sup>th</sup> Annual Dalhousie Continuing Education Refresher / PANS Annual Conference, Halifax NS, Oct 2012.

### **PRR02 Practitioner perceptions of warfarin management in community pharmacies**

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**Objective:** To describe pharmacist and physician perceptions and preferences for warfarin management in the primary care setting, including training requirements, barriers, beliefs and attitudes, costs and safety.

**Methods:** Pharmacists and physicians from the Kitchener/Waterloo area and surrounding rural municipalities were randomly selected by postal code, and invited to complete a survey by mail. Focus groups or semi-structured interviews were then held with pharmacists. Sessions were transcribed and thematically analyzed.

**Results:** A total of 250 practitioners were contacted in each group. Response rates were identical (42, 16.8%) for pharmacists and physicians. Twenty-three (54.8%) respondents in the pharmacist group were male, with varying years of experience and position titles. Fifty-four percent of pharmacists worked in independent pharmacies. Among the physician respondents, over half (58.5%) had at least 12 years of experience. Nineteen (45.2%) worked in a private practice while 40.5% worked at a family health team. A majority (78.6%) of pharmacists were in favour of point-of-care warfarin testing in a pharmacy whereas 50% of the physicians showed concern with potential inaccuracies. All pharmacists already offering point-of-care warfarin testing (4, 9.5%) had obtained additional training, which 89.2% of pharmacists and 76.9% of physicians agreed should be required. Financially, pharmacists



# Poster Abstracts

offering the service received partial reimbursement from Medschecks. Preliminary analysis of focus groups and interviews suggests that pharmacists felt comfortable with knowledge base, cited convenience as a benefit, and felt with training they should be delegated to offer the service. However, there were mixed opinions as to patient responsibility, coverage of expenses, and concerns over lack of system communications and backlash from governing bodies and physicians. In addition, a lack of space for private consultation was cited as a barrier.

**Conclusions:** Pharmacists were largely in favour of point-of-care INR testing in community pharmacies while physicians were more hesitant. Both groups agreed that additional training should be required. Areas that require further development for implementation of the service were identified.

## **PRR03 Social media guidelines governing online professional behaviour: A survey of 32 Canadian pharmacy organizations**

Andrea Forgione, BSc, Kelly Grindrod BScPharm, PharmD, MSc, School of Pharmacy, University of Waterloo

**Objective:** To determine the extent to which Canadian pharmacy organizations provide social media guidance for their members.

**Methods:** In February 2011, we invited 32 Canadian pharmacy organizations to respond to an online social media survey. We asked five questions about the use of social media by the organization and any guidance provided to members. All pharmacy organizations were contacted by phone two years later to identify any changes, to determine if organizations that planned on creating social media guidelines now had guidelines and if changes were made to existing social media guidelines.

**Results:** As of February 2011, only one organization offered written social media guidance to their members but seven planned to create it in the future. Two years later, one of the seven pharmacy organizations had created social media guidelines. No additional organizations have created social media guidelines to date but three plan to create guidelines in the future. Currently, eight organizations are using Facebook and five are using Twitter.

**Conclusion:** Social media is changing the way health care professions communicate with patients and other providers. However, guidelines to support or influence use by pharmacists lag. All pharmacy organizations should consider their role in guiding eProfessionalism in pharmacy. Guidelines should explicitly state the organization's expectations and the legal and/or ethical considerations for the safe and effective use of social media.

## **PRR04 Public knowledge and preventive screening for cardiovascular risk factors in Kuwait**

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**Background and Objectives:** Cardiovascular disease has become one of the main health concerns worldwide. Although cardiovascular mortality rates have decreased in many developed countries, the incidence of cardiovascular deaths and disease have increased in developing countries<sup>1</sup>. Knowledge and awareness of cardiovascular risk factors are essential components of behaviour change; however, little is known about knowledge of cardiovascular risk factors among public in Kuwait. Therefore, this study was designed to determine public knowledge and preventive screening of cardiovascular risk factors in Kuwait.

**Methods:** A descriptive cross-sectional study, which included a total of 100 randomly selected individuals living in five governorates of Kuwait. Data were collected via face to face structured interview of the respondents using a pre-tested questionnaire. Data were analysed using SPSS version 16.

**Results:** The response rate was 93%. Fifty two percent aged between 40-49 years and 55.9% were females. Eighty seven percent of the participants agreed that the heart disease is preventable. Respondents demonstrated high knowledge of obesity (97.8%), smoking (93.5%), physical inactivity (90.3%), high cholesterol (86.0%), stress (81.7%) and unhealthy diet (80.6%) as major causes of heart disease. The general level of agreement about diabetes, hypertension, and family history of heart disease was low (< 60%) compared to the other risk factors. The risk factor that most screened by the respondents at least once within 1 year prior to the study period was obesity/overweight (83.9%) followed by blood pressure (79.6%), cholesterol level (71.0%) and blood glucose (68.8%).

**Conclusions:** Overall, participants knowledge of the most significant cardiovascular risk factors is low. The present findings highlight the need for more public education to improve knowledge and the importance of preventive screening for cardiovascular risk factors to promote cardiovascular wellness.

## **PRR05 Diabetes Education in Pharmacy Residencies Across Canada**

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**Rationale:** Diabetes is a growing chronic health problem in Canada, requiring complex management. As a result teaching, pharmacy students about diabetes has become increasingly important. However, little is known about the amount and type of education regarding diabetes given to post-graduate pharmacy residents in Canada.





# Poster Abstracts

**Objective:** To evaluate the extent and type of training currently conducted around diabetes management in Canadian pharmacy residencies.

**Study design and methods:** A web-based survey tool asking about exposure to diabetes topics (such as diabetes medication pharmacology, insulin dosing) in pharmacy residency training was distributed to pharmacy residency coordinators/ directors and residents across Canada via email. Most answers were recorded using a 5 point Likert scale (no exposure, a little, some, a lot, resident becomes proficient). The survey was reviewed for face and content validity prior to distribution. Congestive heart failure, a frequently occurring chronic health problem in Canada, was used as a comparator therapeutic topic.

**Results:** A total of 41 responses were received (19 coordinators, 5 directors, 17 residents). Diabetes rotations were uncommon in Canadian pharmacy residencies (2.4% of responses), while cardiology rotations were common (81% of responses). Residents were exposed predominantly to no (4/15 topics, e.g., carbohydrate counting), a little (5/15 topics, e.g., blood glucose meters), or some (6/15 topics, e.g., sliding scales) with regard to diabetes topics while residents were exposed predominantly to some (8/15 topics, e.g., amiodarone use) or a lot (4/15 topics, e.g., blood pressure monitoring) to heart failure topics. Between 4-9% of residents became proficient in some heart failure topics (warfarin counseling) while very few residents became proficient in diabetes topics.

**Conclusions:** This survey would suggest that pharmacy residents are exposed to diabetes topics relatively less than congestive heart failure. Greater exposure to diabetes topics may be beneficial in pharmacy residency training.

## **PRR06 UBC Clinical Pharmacist Services Initiative – Developing an Interdisciplinary Model for Learning, Research and Innovative Practice in Family Practice Clinics**

Tessa Nicholl<sup>1</sup>, Jason Min<sup>1</sup>, Larry Leung<sup>1</sup>, and Ingrid Price<sup>1</sup> Faculty of Pharmaceutical Sciences, University of British Columbia (UBC)

**Objectives:** The UBC Clinical Pharmacist Services Initiative (UBC CPSI) is a patient-centered, Clinical Pharmacist consultation service initiated in three family practice clinics. There are three main project goals. 1. To develop an innovative practice model in which clinical pharmacists are integrated into the community-based team in medical offices. 2. To provide experiential and collaborative learning opportunities for pharmacy students. 3. To develop and implement unique research opportunities within interdisciplinary medical clinics.

**Methods:** Increasing their awareness of the role of the Clinical Pharmacist was done in order to develop collaborative relationships with 26 physicians in three different clinics. Pharmacists conducted patient and drug therapy assessments, educated patients regarding the risks and benefits of their drug therapies, while incorporating the philosophy of informed shared decision-making. Recommendations were documented via existing electronic medical records within the offices. All drug therapy problems (DTPs) identified and actions to resolve them were recorded. We piloted an elective course for ten third-year pharmacy students. The course goals were to meet the AFPC outcomes of Collaborator, Care Provider and Communicator. We encouraged faculty to participate in this opportunity. To evaluate the success of the project we collected preliminary student, physician, patient and faculty feedback.

**Results:** We successfully integrated two clinical pharmacists into three family practice offices, as demonstrated by positive physician and patient feedback. Through this initial integration period of 6 months, the pharmacists identified and resolved 442 DTPs. We also successfully integrated 10 third-year pharmacy students into the clinics, as demonstrated by their positive feedback. Faculty members also appreciated this environment as a learning experience.

**Conclusions:** The UBC CPSI successfully integrated two clinical pharmacists into three family practice offices, involving 26 physicians. Integration of students into this environment successfully met student expectations and the goals of the course. Future plans are to expand the project to include more medical clinics, more students, and to develop research collaborations with physicians and pharmacy faculty.

## **PRR07 Pharmacy student perceptions of pharmacists' role and educational needs in the era of expanding scopes of practice**

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**Objectives:** Pharmacy practice has been moving towards patient-centered care and expanded scopes of practice. Professional education and training as well as understanding roles have been noted to be important in change efforts. The objective of our study was to examine how pharmacy students perceived the pharmacist's role in the changing health care environment in Alberta, as well as education and training needs.

**Methods:** First and fourth year pharmacy students enrolled at the University of Alberta were recruited via email to participate in focus group interviews. Questions for the focus group were semi-structured in nature with a focus on open-ended questions. Interview questions were grouped into two dimensions of focus, (1) Roles and Changes in Healthcare, and (2) Support for Education. An experienced facilitator conducted the focus groups. The interview was recorded and transcribed verbatim. Data was coded and analyzed for themes using an inductive constant comparison technique.





# Poster Abstracts

**Results:** Three focus groups were conducted between October 2012 and February 2013. Two focus groups (n=17) were held with fourth year students and one (n=10) with first year students. Students described the pharmacist's role as drug therapy expert, however students observed that there is a lack of consistency in patient centered care activities performed by pharmacists in practice. Three distinct themes regarding roles of the pharmacist and support needed emerged: (1) Physician Support and Interdisciplinary Experience, (2) Education and Training, and (3) Professional Unification.

**Conclusions:** Pharmacy students overall conveyed positive perceptions of the changing role of the pharmacist, and identified factors such as education, support from other practitioners, and professional unification as greatly impacting adoption of the role. However, inconsistencies in practice hinder widespread recognition of the pharmacist's role. Expansion of experiential and inter-professional education was deemed important to better position students for the transitions currently underway in pharmacy practice.

## **PRR08 Pharmacy students' experiences of service provision to people with lived experience of mental illness.**

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<sup>1</sup>College of Pharmacy, <sup>2</sup>Department of Psychiatry, <sup>3</sup>School of Nursing, <sup>4</sup>Sun Life Financial Chair In Adolescent Mental Health; <sup>5</sup>Faculty of Medicine; Dalhousie University

**Objectives:** To explore pharmacy student experiences of community pharmacy service provision to people with lived experience of mental illness.

**Methods:** We conducted a qualitative study using Interpretive Description and recruited senior pharmacy students from a Canadian undergraduate pharmacy program. All dialogue with participants was recorded and transcribed verbatim. Audio files, transcripts, journal entries, memos and field notes were used in the analysis. AM and DG met biweekly in one month to analyze concepts and thematic descriptions from the data regarding students' observations and experiences. AtlasTi 6.2 was used for data and code management.

**Results:** Eleven (7 third and 4 fourth year) students participated in two focus groups in October and November, 2012. Three hours of audio recording was collected. Six women and 5 men, with a mean age of 24.5 (range 21 to 30) years, averaging 3.2 (range 2 weeks to 7 years) years of cumulative community pharmacy experience, participated. Ten students reported current pharmacy employment. Students described "identity pluralism" in which they assumed multiple roles, each with a role-dependent suite of knowledge, attitudes, behaviours, skills, and level of responsibilities and decision-making authority. Engagement with patients was proactive or reactive and influenced by factors in three main themes: business tension; roles, responsibilities, and relationships; and stigma.

**Conclusion:** To our knowledge, this is the first qualitative Canadian study exploring students' experiences of service provision to people with lived experience of mental illness. This study's findings are important regarding formal, informal, and hidden curricula for students considering they experience identity pluralism when proactively or reactively engaging with patients. They are influenced by multiple factors that direct their behaviours. This research has broader implications with evolving pharmacist roles and highlights the need to consider behaviour change frameworks for our profession as we expand our scope of practice.

## **PRR09 Development of a Framework for Fostering an Effective Relationship between a Faculty of Pharmacy and Academic Institutions**

Lalitha Raman-Wilms, Henry J. Mann. Leslie Dan Faculty of Pharmacy, University of Toronto.

**Background:** With the development of a new Doctor of Pharmacy curriculum, an effective working relationship with teaching institutions is critical to the successful administration of experiential education.

**Objective:** To develop a formal framework for fostering a pharmacy 'think tank' consisting of hospital pharmacy directors and faculty members to inform curricular planning and implementation, specifically with respect to experiential education.

**Methods:** Informal regular meetings were initially held by the Dean and others at the faculty with directors of pharmacy of 13 formally affiliated teaching institutions to seek their input and to share the faculty's vision. These meetings naturally led to a more formal framework that would enable the directors to act as an advisory group to the Dean on matters related to course delivery and experiential education. This formal advisory committee paralleled similar advisory groups in place for medicine and nursing at the University.

**Results:** The Hospital University Pharmacy Education Committee (HUPEC) was developed in the summer of 2012 as an advisory group to the Dean and chaired by the Associate Dean, Professional Programs. Specific Terms of Reference were determined and the Committee is recognized at the University level. Important discussion items addressed by the committee include a mechanism for involvement of clinical faculty in teaching, their recognition and evaluation, reimbursement guidelines for teaching, determination of a feasible experiential model for advanced pharmacy practice experience (APPE) rotations, etc. The committee meets at least three times during each academic year and their input has assisted in the effective delivery of our program and has further enhanced the Faculty's relationship with teaching institutions.



## Poster Abstracts

**Conclusions:** A significant portion of the new Doctor of Pharmacy Program is taught by clinical faculty. HUPEC has been instrumental in providing input to the Dean and creating a mechanism for supporting teaching and fostering an effective working relationship between academic institutions and the Faculty of Pharmacy. A similar model is being considered in the development of academic community pharmacies.

### **PRR10 A retrospective cohort study to measure the safety and efficacy of concurrent neoadjuvant capecitabine-radiation therapy in the treatment of rectal cancer: the Newfoundland experience**

*Maria A. Whelan*<sup>1,2</sup>; Scott J. Edwards<sup>1,2</sup>; Kendra Lester<sup>3</sup>; Laurie K. Twells<sup>2,3</sup>; David Saltman<sup>1,3</sup>; and Rick Abbott<sup>1</sup>

<sup>1</sup>Dr. H. Bliss Murphy Cancer Center, St. John's, NL; <sup>2</sup>Memorial University School of Pharmacy, St. John's, NL; <sup>3</sup>Memorial University Faculty of Medicine, St. John's, NL

**Objectives:** The dosing guidelines for neoadjuvant capecitabine-radiation therapy in advanced stage RC patients are not well established. We conducted a retrospective cohort study on patients who received treatment for either seven or five days each week to compare the efficacy and safety of concurrent neoadjuvant capecitabine-radiation therapy in advanced stage RC patients.

**Methods:** A retrospective chart review was conducted. Data were extracted from the medical records of 81 patients who met the inclusion criteria and consisted of patient demographics and disease characteristics prior to the start of chemoradiation therapy. From the first cycle to the completion of the fifth cycle of concurrent neoadjuvant capecitabine-radiation therapy, data were collected on the occurrence and severity grade (using NCI CTCAE V4.0) of the following toxicities: nausea, vomiting, hand-foot syndrome, mucositis and diarrhea. The histopathological results after concurrent neoadjuvant capecitabine-radiation therapy were examined to determine the rate of complete pathological response.

**Results and Discussion:** 24 patients received 825 mg/m<sup>2</sup> capecitabine twice a day for seven days a week, 57 patients received the same treatment for five days a week. A total of 217 treatment related toxicities were reported, 109 of these incidences were graded as moderate to high severity. The five day treatment group reported the majority of these moderate to high severity toxicities at 96 occurrences over the five cycle period ( $p < 0.001$ ). 17.1% had a complete response (TONOMO), there was no relationship between the courses of treatment the patients received and achieving a pathological complete response ( $p = 0.205$ ).

**Conclusion:** Patients in the five-day treatment group reported significantly more moderate to high severity toxicities. There was no difference in achieving a pathological complete response or discontinuation of therapy between treatment groups.

### **PRR11 A Qualitative Assessment of Practice Experiences of Certified Diabetes Educator Pharmacists**

Authors: Fahad Alzahrani, Kerry Mansell, Jeff Taylor and Jason Perepelkin (College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, SK, Canada)

**Background:** Health care professionals are increasingly becoming involved in diabetes management. Pharmacists are a rapidly growing segment of new Certified Diabetes Educators (CDEs) in Canada; however, little is known about their practice experiences.

**Objective:** This study aimed to describe the practice experiences of CDE pharmacists and the impact of the CDE designation.

**Methods:** A qualitative research approach was used. A purposive sample of 14 CDE pharmacists in Saskatchewan was selected to obtain data by means of in-depth semi-structured interviews. Data were analysed using inductive thematic analysis and NVivo 10 software.

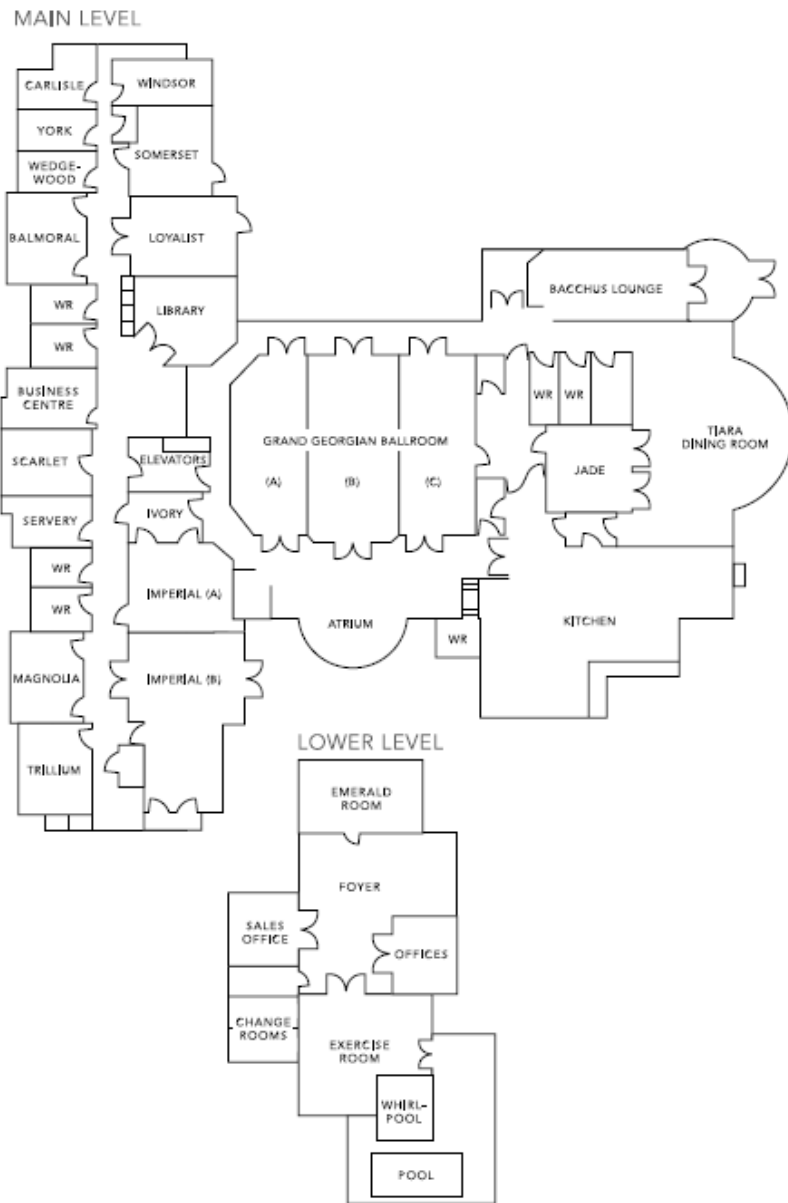
**Findings:** From the data, four themes emerged: (1) CDE pharmacists engage in a multitude of diabetes-related activities; (2) becoming a CDE has been beneficial; (3) certain challenges still exist when trying to provide diabetes-related education; (4) strategies were proposed to try and overcome these challenges. CDE pharmacists are engaging in both broad and focused diabetes management, such as insulin starts and adjustments. Pharmacists are satisfied the CDE designation has helped achieve some of their goals, and have benefited from improved relationships with other health care professionals. Although some solutions were offered, CDE pharmacists still face challenges in putting their knowledge to full use with respect to time to devote towards diabetes-management, and remuneration for diabetes services in pharmacy practice.

**Conclusions:** This study found that becoming a CDE has had a positive impact on pharmacists through engaging in more comprehensive diabetes management, overcoming challenges to delivering diabetes care, and improving the relationship with other health care professionals and patients.



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