Welcome

On behalf of the Australasian Pharmaceutical Science Association (APSA), we welcome you to the 2013 APSA Annual Conference, being held in Dunedin at the Hunter Centre, University of Otago Campus.

The conference is the major gathering of pharmacy and pharmaceutical science academics and researchers from Australia and New Zealand. APSA members and conference delegates have a diverse range of expertise and have a commitment to teaching and research in the areas of pharmaceutical sciences, clinical sciences and pharmacy practice and social pharmacy.

This year’s conference will continue to promote the research activities and achievements of honours and postgraduate students, and we expect them to have a strong presence at the conference.

We are proud of the diversity and standard of research highlighted in this year’s conference program.

Our social program aims to showcase historic Larnach Castle and give the opportunity for conference delegates to network in a relaxed atmosphere.

The venue, The Hunter Centre, is conveniently located in easy walking distance to the CBD with numerous shops, cafés and restaurants are in close proximity, including the Otago Museum, Cadbury’s World, the Otago Settlers Museum.

We are confident that this New Zealand flavoured APSA conference will provide a perfect mix of research, practice, education and collegiality set in a special part of the APSA “world”.

We warmly welcome you all, and trust that this will be an exceptional conference.

Conference Organising Committee
Dr Rhiannon Braund (Convenor)
Prof Stephen Duffull
Dr James Green
Prof Sarah Hook
Katrin Kramer
Dr Arlene McDowell
Dr Prasad Nishtala
Dr Shakila Rizwan

Conference Secretariat
Events 4 You Limited
PO Box 7168
Dunedin 9040
New Zealand
p: +64 3 487 6622
f: +64 3 487 6625
www.events4you.co.nz
NZCRS is very pleased to be part of the 2013 APSA conference in Dunedin, New Zealand. We are proud of the NZCRS program of speakers and are confident their talks will be stimulating. We hope you have an enjoyable and successful conference.

Speak to one of the Committee and join NZCRS today.

Arlene McDowell (NZCRS President)
Merck Millipore

Website: www.merckmillipore.com
Contact Name: Debbie Stanley
Email Address: debbie.stanley@merckgroup.com
Phone: +61 3 9728 7600

Merck Millipore, a division of Merck KGaA (Darmstadt, Germany), offers a broad range of tools and technologies dedicated to helping our customers succeed in the research, development and production of biotechnology and pharmaceutical drug therapies.

Merck Millipore is a reliable and experienced partner for the pharmaceutical industry, offering more than 400 pharmaceutical raw materials for solid, semi-solid and liquid dosage forms, making a unique partner for customers in the area of pharmaceutical formulation. Combined with effective regulatory support, and comprehensive ready-to-use documentation, Merck Millipore products help you to achieve maximum product safety, lower costs of drug registration processes, and faster time to market.
## Conference Timetable

### SUNDAY 8 DECEMBER 2013

<table>
<thead>
<tr>
<th>TIME</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.30 am</td>
<td><strong>REGISTRATION</strong></td>
</tr>
<tr>
<td>9.30 am</td>
<td><strong>WORKSHOPS</strong></td>
</tr>
<tr>
<td>4.30 pm</td>
<td><strong>WELCOME</strong></td>
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<tr>
<td>5.00 pm</td>
<td><strong>PLENARY</strong></td>
</tr>
<tr>
<td>6.00 – 7.30 pm</td>
<td><strong>RECEPTION</strong></td>
</tr>
</tbody>
</table>

### REGISTRATION

Registration desk open from 8.30 am

### WORKSHOPS

- **What do the threshold learning outcomes in pharmacy mean for you?**
  - Ieva Stupans
  - HERC Lab – Off Site Venue (refer map)

- **Introduction to questionnaire design and analysis**
  - James Green and Pauline Norris
  - Hunter Centre Computer Lab

### WELCOME

- **Conference Opening / Mihi Whakatau** (Hunter Centre Atrium, Cnr Frederick & Great King Streets)
  - Mark Brunton, Research Manager Māori, University of Otago
  - Peter Crampton, Pro-Vice-Chancellor, Health Sciences, Dunedin School of Medicine
  - Rhiannon Braund, Conference Convenor APSA2013, School of Pharmacy, University of Otago

### PLENARY

- **Opening Plenary 1:**
  - *Patients’ expectations of treatment: positive and negative influences on therapeutic outcome*
  - Keith Petrie, Auckland University Medical School, New Zealand

### RECEPTION

- **Welcome Reception**
### MONDAY 9 DECEMBER 2013

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Title</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am</td>
<td>Registration</td>
<td>Hunter Centre Ground Floor</td>
<td>Desk opens from 8.30am</td>
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</tr>
<tr>
<td>9.30</td>
<td>Plenary 2</td>
<td>Hunter Centre Ground Floor</td>
<td><em>Bridging the adherence gap between efficacy and effectiveness</em></td>
<td><em>Bernard Vrijens, University of Liège, Belgium</em></td>
</tr>
<tr>
<td>10.30</td>
<td>Morning Tea</td>
<td>Hunter Centre Ground Floor</td>
<td>10.30 am – 11.00 am</td>
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</tbody>
</table>

#### CONTRIBUTED PAPERS

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Ali Seyfoddin Chitosan Coated Nanostructured Lipid Carriers</td>
<td>Arlene McDowell</td>
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<tr>
<td></td>
<td>(NLCs) for ocular drug delivery</td>
<td><em>Do animal patients have a place in a pharmacy education?</em></td>
</tr>
<tr>
<td>11.15</td>
<td>Sifei Han Evaluation of the metabolic pathways responsible for</td>
<td>Trudi Aspden</td>
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<tr>
<td></td>
<td>lymphatic transport of a triglyceride-mimetic prodrug</td>
<td><em>“One needs to adapt to others, not force others to adapt to your ways.” Exploring the perceptions of pharmacy students following participation in a cross cultural simulation and introductory lecture</em></td>
</tr>
<tr>
<td>11.30</td>
<td>Matthew Crum Evaluation of drug absorption from lipid-based formulations using a coupled <em>in vitro</em> lipid digestion-absorption model</td>
<td>Lorraine Smith</td>
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<tr>
<td></td>
<td></td>
<td><em>What is the relationship between pharmacy students’ preferred teacher qualities and their achievement goal orientations?</em></td>
</tr>
<tr>
<td>11.45</td>
<td>Xiaowen Liang Intravital multiphoton imaging of water dispersible CdTe/CdS quantum dots in rat liver: comparison with cationic and anionic dyes</td>
<td>Sanya Ram</td>
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<td></td>
<td><em>Prevalence of, and attitudes towards, cognitive enhancer use amongst New Zealand tertiary students</em></td>
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<tr>
<td>12.00</td>
<td>Qi (Tony) Zhou Inhalable powder formulation of combination antibiotics with high aerosol efficiency and moisture protection</td>
<td>Pauline Norris</td>
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<td><em>Pharmacy students’ attitudes to, and use of, traditional healthcare</em></td>
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<td>Hanni Puspitasari</td>
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<td><em>Indonesian pharmacists’ awareness of secondary prevention of cardiovascular disease: a study in the community setting</em></td>
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</tbody>
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Legend: [Hunter Centre Atrium], [Barnett], [Colquhoun], [Hunter Centre Ground Floor], [Hunter Centre 1st Floor]
## CP CONTINUED

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 12.15 pm | Hanisah Azhari  
Phytantriol cubosomes sterically stabilised with the surfactants Tween 80 and Myrj 100: formulation, characterisation and permeability studies in an in vitro model of the blood-brain barrier |
| 12.15 pm | Daniel Bernal  
Development of an education package for accredited pharmacists providing directed Home Medicines Review following acute coronary syndrome |
| 12.15 pm | Rana Ahmed  
A question prompt list (QPL) for parents of children with attention-deficit hyperactivity disorder (ADHD): Part II- validation using Delphi methodology |

## LUNCH

12.30 pm – 1.30 pm

### LUNCH

12.30 pm – 1.30 pm

### SYMPOSIUM

1.30 pm

- **Symposium 01 - Pharmaceutical Science**
  
  **Strategies for developing high dose powders for inhalation to treat chronic lung conditions**
  
  Shyamal Das, University of Otago

- **Symposium 02 - Pharmacy Practice**
  
  **The role of pharmacists in mental health: the challenges and opportunities**
  
  Timothy F Chen, University of Sydney

2.00 pm

- **The impact of disease on drug transport across the blood-brain barrier**
  
  Joseph Nicolazzo, Monash University

- **Influencing health behaviours during pregnancy for the health of future generations**
  
  Johnson George, Monash University

2.30 pm

- **Fluorescent probes as drug discovery tools**
  
  Andrea Vernall, University of Otago

- **Developing, implementing and evaluating deprescribing guidelines for the elderly: A mixed methods approach**
  
  Lalitha Raman-Wilms, University of Toronto

## BREAK

3-4.00 pm

### Afternoon Tea/Poster Session 1 (Posters authors present for even numbers)
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
</table>
| 4:00 pm | **APSA Medal**  
*Understanding variability in response to medicines – a journey*  
Andrew McLachlan, University of Sydney, Australia |
| 5-6:00 pm | **AGM**  
APSA Annual General Meeting – Room G30 |
| 7:00 pm | **DINNER**  
APSA Student Dinner  
Carrington College, 57 Heriot Row, Dunedin |
### TUESDAY 10 DECEMBER 2013

**Registration** desk opens from 8.30am

**PLENARY**

**9.00 am**

**Plenary 3 - NZCRS Session 1 – The biological therapeutic interface**

*Good cop, bad cop: Intracellular trafficking and its implications for drug targeting*

*Peter Swaan*, University of Maryland, Baltimore, USA

**LECTURES**

**9.45 am**

**Invited Lecture**

*Written information as a tool to promote patient-centred care*

*Parisa Aslani*, University of Sydney, Australia

**NZCRS Lecture – The biological therapeutic interface**

*Preclinical formulation of therapeutics – what does industry want?*

*Thomas Rades*, University of Copenhagen, Denmark

**Morning Tea:** 10.30 am – 11.00 am

**CONTRIBUTED PAPERS**

**11.00**

**CP04 – Medication Safety** (Rm 120 & 121)

*Greg Kyle*

Trends in Australian antipsychotic usage 1992-2012

**CP05 – Pharmacy Practice** (Rm G30)

*Patti Napier*

Would the separation of the clinical check and the mechanical process of dispensing have an impact on public safety? - New Zealand pharmacists’ views

**11.15**

**Henry Ndokwe**

Utilisation of psychotropic medicines in older people in New Zealand from 2005 to 2011

**Edwin Tan**

An evaluation of clinical services provided by pharmacists co-located in general practice clinics: the Pharmacists in Practice Study (PIPS)

**CP06 NZCRS Session 1 - The biological therapeutic interface** (Rm 122 & 123)

*NZCR CP session times differ from CP04 & 05*

**11.00 -11.20: Yuan Huang**

Epithelial cell-targeting nanoparticles for oral delivery of protein drugs & the influence of mucus

**11.20 – 11.40:**

*Arlene McDowell*

Cell-penetrating peptides to enhance cell uptake of polymeric nanoparticles

**11.30**

**Sujita Narayan**

Use of high risk medicines in older New Zealanders: A population-level study

**Mudassir Anwar**

Do positive attitudes to pharmacists mean that pharmacies are the first port of call for minor illnesses?

**11.40 – 12.00 - Natalie Medlicott**

Protein instability on interfaces – implications for dosage form design
### TUESDAY 10 DECEMBER 2013

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>11.45</td>
<td><strong>Contributed Papers</strong></td>
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<td></td>
<td><strong>CP04 – Medication Safety</strong> (Rm 120 &amp; 121)</td>
<td></td>
<td>Ines Krass</td>
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<td>Medication adherence and use among NSW adults with type 2 diabetes (T2D)</td>
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<td><strong>CP05 – Pharmacy Practice</strong> (Rm G30)</td>
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<td>Julia Knobloch</td>
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<td>The effects of regular peak flow meter utilisation on asthma self-management</td>
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<tr>
<td>12.00</td>
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<td></td>
<td>Edwin Tan</td>
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<td></td>
<td><strong>NZCRS Session 1 - The biological therapeutic interface</strong> (Rm 122 &amp; 123)</td>
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<td>12.00 – 12.30 Ian Tucker</td>
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<td>Mastitis in dairy cattle – A challenge for the drug delivery scientist</td>
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<td>11.45</td>
<td><strong>Michael Leach</strong></td>
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<td>Michael Leach</td>
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<td>Medicine use among elderly Australians before and after hip fracture</td>
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<td></td>
<td><strong>Mouna Sawan</strong></td>
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<td>Mouna Sawan</td>
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<td></td>
<td>The relationship between organisational climate and prescribing practices in Residential Aged Care Facilities (RACFs) from the perspective of Health Care Professionals (HCPs)</td>
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<td></td>
<td><strong>Amy Waldron</strong></td>
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<td>Amy Waldron</td>
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<td>The use of compounded melatonin by children: parents’ perspectives</td>
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<tr>
<td>12.30</td>
<td><strong>Lunch</strong></td>
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<tr>
<td>12.30</td>
<td><strong>SYMPOSIUM</strong></td>
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<td></td>
<td><strong>Symposium 03 – Social Pharmacy</strong> (Rm 120 &amp; 121)</td>
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<td>1.30</td>
<td><strong>Utilisation of compounded progesterone</strong></td>
<td></td>
<td>Joy Spark</td>
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<td>2.00</td>
<td><strong>A qualitative study of the relationship between number of medicines and illness perceptions in hypertension - James Green</strong></td>
<td></td>
<td>Stephen Duffull, Hesham Al-Sallami, Daniel Wright</td>
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<tr>
<td>2.30</td>
<td><strong>Medications in everyday life</strong></td>
<td></td>
<td>Pauline Norris</td>
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<tr>
<td>3-4 pm</td>
<td><strong>Afternoon Tea/Poster Session 2</strong> (Poster authors present for odd numbers)</td>
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</tbody>
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**Legend:**
- Hunter Centre Atrium
- Barnett
- Colquhoun
- Hunter Centre Ground Floor
- Hunter Centre 1st Floor
### NZCRS Session 3 – Advances in delivery of cancer therapeutics (Rm 122 & 123)

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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</thead>
<tbody>
<tr>
<td>4.00–4.30</td>
<td><em>Turning weapons of mass destruction into precision guided munitions</em></td>
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<td></td>
<td>Sarah Hook</td>
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<tr>
<td>4.30–4.45</td>
<td><em>Nanomicelle based novel treatments for prostate cancer</em></td>
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<td>Khaled Greish</td>
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<td>4.45–5.00</td>
<td><em>Nanomedicine combination of micellar crizotinib and dasatinib for the</em></td>
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<td><em>treatment of glioblastoma multiforme</em></td>
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<td>Hayley Nehoff</td>
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</tbody>
</table>

### Transport to Larnach Castle

- Bus departs Carrington College 6.20 pm, The Hunter Centre 6.30 pm, Scenic Hotel Southern Cross 6.40 pm

### Dinner

- **APSA Conference Dinner**
  - Location: Larnach Castle
  - Bus transport returns at 11.30 pm
**WEDNESDAY 11 DECEMBER 2013**

**PLENARY**

9:30 am

**Plenary 4**

*The future is now: the importance of medication review (Chapter 2)*

*Gregory Peterson, University of Tasmania, Australia*

**Morning Tea** 10.30 – 11.00 am

**CONTRIBUTED PAPERS**

<table>
<thead>
<tr>
<th>Time</th>
<th>CP07 – Drug Design &amp; Formulation (Rm 120 &amp; 121)</th>
<th>CP08 – Clinical Pharmacy (Rm G30)</th>
<th>CP09 – Pharmacy Education (Rm 122 &amp; 123)</th>
</tr>
</thead>
</table>
| 11.00       | Zong-Quan Ou  
Cellular activity of antioxidant extracts from pūhā (*Sonchus oleraceus* L.) leaves                         | Dana McLennan  
Drug-related problems in pain management in palliative care                        | James Windle  
Learning and assessment connections between the internship and undergraduate years of Otago BPharm students – a longitudinal study |
| 11.15       | Mohammed Azad  
Polymyxin B (PMB) induces mitochondrial dysfunction and activation of caspases in NRK-52E cells           | Kevin Mc Namara  
Prevalence of factors that influence prescribing of key therapies at discharge following acute coronary syndrome | Saleh Alrakaf  
An international validation study of two student achievement goal questionnaires      |
| 11.30       | Franziska Huschmann  
Antifungal drug discovery – Crystallization of the cytochrome P450 triazole target  | Nagham Ailabouni  
Examining the appropriateness of prescribing in older people in care homes in New Zealand using the STOPP/START Criteria | Ramesh Walpola  
Developing a peer-led patient safety education program for pharmacy students        |
| 11.45       | Feifei Feng  
Unexpected in vitro cell uptake of norketotifen compared with ketotifen                                  | Durga Bista  
Tasmanian atrial fibrillation study: baseline characteristic                          | Lisa Koulaqian  
Assessment of pharmacists’ knowledge and application of pharmacologic risk assessment tools in older adults using a continuing professional development educational method |
| 12.00       | Joan Ho  
PEGylation increases the distribution and transfection efficiency of DNA vaccine lipoplexes in muscle       | Stella Tulo  
An evaluation of patients’ adherence with hypoglycaemic medications among Papua New Guineans with type 2 diabetes: influencing factors. | James Townshend  
Evaluating the understanding of the process, and use of, reflective thinking among undergraduate health students |

Legend:  
- Hunter Centre Atrium  
- Barnett  
- Colquhoun  
- Hunter Centre Ground Floor  
- Hunter Centre 1st Floor
<table>
<thead>
<tr>
<th>Time</th>
<th>CP Continued</th>
<th>CP07 – Drug Design &amp; Formulation (Rm 120 &amp; 121)</th>
<th>CP08 – Clinical Pharmacy (Rm G30)</th>
<th>CP09 – Pharm Education (Rm 122 &amp; 123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.15</td>
<td>Jamal Khan</td>
<td>Linking solid state issues to the precipitation behaviour of poorly soluble drugs from lipid based formulations</td>
<td>Tariq Alhawassi</td>
<td>Changes to antihypertensive regimens in hospitalisation of elderly inpatients</td>
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<tr>
<td>12.30 pm</td>
<td>LUNCH</td>
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<tr>
<td>1.00 pm</td>
<td>CLOSE</td>
<td>Lunch 1.00 pm – 2.00 pm</td>
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</table>
Destination

Dunedin, New Zealand’s oldest city, a university city of Scottish heritage, possesses a unique combination of cultural riches, fine architecture and world-famous wildlife reserves on the Otago Peninsula.

Situated on the south-eastern coast of New Zealand’s South Island, Dunedin has a population of around 125,000 and is the main centre of Otago, a region recognized for its spectacular scenery.

Soaring cathedral spires, a magnificent Flemish-style railway station, fine banks and office blocks, nineteenth-century Larnach Castle, Olveston Historic House, heritage university buildings and a neo-gothic convent are among the city’s architectural treasures.

Attractions include the Dunedin Public Art Gallery, Toitū Otago Settlers Museum, the Otago Museum, where you will find some of the best collections in New Zealand. Visit the Dunedin Chinese Garden, a perfect miniature of a traditional Chinese landscape painting, take a tour of the Cadbury Chocolate and Speights Beer factories.

Dunedin a coastal city has some fabulous beaches along its coastline, all within easy reach of the city. Walking and tramping tracks abound around the city suitable for all ages and degrees of fitness.

Travel

Delegates need to make their own way to and from the airport. The Dunedin International Airport is approximately 30 minutes drive from the Dunedin Central Business District. There is no public bus service from the airport to Dunedin City.

Taxi and Shuttles are available at the airport and will cost from $90 (taxi) to $25-50 (shuttle). We recommend that you pre-book your shuttle online where considerable saving can be made.

Taxis
Dunedin Taxis (03) 477 7777
City Taxis (03) 477 1771

Shuttles
www.supershuttle.co.nz 0800 748885
www.kiwishuttles.co.nz 03 487 9790

Sign up lists will be available on Tuesday at the registration desk for people wanting to share shuttles on their return to the airport on Wednesday (passengers will share costs)

A Dunedin a-to-z Visitor Guide has been included in the conference bag:

www.dunedinnz.com
http://www.dunedinnz.com/visit/see-and-do/a-to-z-visitor-guide
Venue

Conference Venue

A  The Hunter Centre, Corner Great King and Frederick Streets

The Hunter Centre is the main conference venue where the conference registration desk will be situated. All catering sessions, the Welcome Reception, the pre-conference workshop: Introduction to Questionnaire Design, the APSA AGM, contributed paper presentations and the poster display will take place in this building. The main entrance is off Great King Street.

B  The Colquhoun Lecture Theatre and The Barnett Lecture Theatre (Dunedin Hospital)

The Colquhoun and Barnett Lecture Theatres are located on the first floor of the Dunedin Hospital and will be the venue for the plenary sessions. There is a direct entry to the Lecture Theatres via an external set of stairs on Great King Street.

C  The Hercus Building, Hanover Street

The Hercus Building is situated on Hanover Street and is approximately 5 minutes walk from the Hunter Centre. The Threshold Learning Outcomes Workshop will be held at this location (attendees should register at The Hunter Centre first).
The Hunter Centre – First Floor

Room 122 + 123

Room 120 + 121
Conference Information

Registration

The registration desk will be located in The Hunter Centre Ground Floor Atrium and will be open the following hours:

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Sunday 8 December</td>
<td>08:30 am – 07:30 pm</td>
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<tr>
<td>Monday 9 December</td>
<td>08:30 am – 06:00 pm</td>
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<tr>
<td>Tuesday 10 December</td>
<td>08:30 am – 05:30 pm</td>
</tr>
<tr>
<td>Wednesday 11 December</td>
<td>08:30 am – 03:00 pm</td>
</tr>
</tbody>
</table>

Internet Access

Wireless internet is available at The Hunter Centre. A username and password for the UO-Guest will be issued as part of the delegate packs at the registration desk.

Name badges

Name badges will be issued when registering at the conference. For security purposes the conference name badge must be worn at all times during the conference.

Dress

There is no formal dress code for any social events. As the weather can be changeable we suggest layers and an umbrella in case of rain showers.

Catering

All day catering will be provided in The Hunter Centre Ground Floor Atrium. There is also a public café in The Hunter Centre which is open week days. Special diets: All food provided by the University Catering at the Hunter Centre is Halal Certified. There will be vegetarian options available at all catering sessions, for all other special diets, these will be labelled and available for collection from the registration desk at each catering session.
Conference Information

Toilets

Toilets are located on the ground floor of The Hunter Centre – refer to the venue map.

Smoking

All venues are smoke free with no smoking permitted on the premises.

Emergency Exit Procedures

In the event of the fire alarms activating please vacate the building via the main entrance (all exits are clearly marked).

APSA Annual General Meeting

The Australasian Pharmaceutical Science Association will hold its Annual General Meeting on Monday 9 December 2013 in Room G30, The Hunter Centre 5.00 pm – 6.00 pm. This is open to all current APSA Members.

Suggestions for Dining in Dunedin

There are a large number of great restaurants in Dunedin with some listed in the A to Z. Here are some recommendations:

Two Chefs: 121 Stuart St 03 477 7293  
Bacchus: 12 The Octagon 03 474 0824  
Scotia: 199 Stuart St 03 477 7704  
Ombrelllos: 10 Clarendon St 03 477 8773  
Plato: 2 Birch St 03 477 4235  
Paasha: 31 St Andrew St 03 477 7181  
del Sol: 12 Moray Place 03 477 7560  
Little India 308 Moray Place 03 477 6559  
Thai Over  388 George St 03 477 7815
Pre-Conference Workshops

All workshop attendees should first register at the Hunter Centre (registration desk open from 8.30 am on Sunday)

“What do the threshold learning outcomes in pharmacy mean for you?”

Prof Ieva Stupans

Sunday 8 December 9.30 am - 4.30 pm
Hercus Computer Lab, Hanover Street
Entry: Pre-booked NZ$75.00 includes lunch and afternoon

The Office of Learning and Teaching (previously ALTC) funded Pharmacy network has collaboratively developed threshold learning outcomes (TLOs) for all pharmacy programs across Australia and New Zealand see http://pharmacylearning.edu.au/

This workshop will focus on the collaborative development of assessment items which will be able to be adapted in individual programs to evidence the achievement of the TLOs. These assessment items will be applicable across the sciences and practice areas.

Introduction to questionnaire design and analysis

Dr James Green and Prof Pauline Norris

Sunday 8 December 9.30 am - 4.30 pm
Hunter Centre First Floor Computer Lab, Cnr Frederick & Great King Streets
Entry: Pre-booked NZ$75.00 includes lunch and afternoon tea

In this full day workshop, we will cover the basic principles of questionnaire design and analysis. This will include how to use qualitative techniques (interviews, focus groups) to determine potential items and topics for a quantitative survey, how to format a questionnaire on paper or online, how to pilot your questionnaire, and cover some basic data analysis.

This workshop is targeted at new PhD students or researchers starting out in social pharmacy, or those with a research background in clinical or pharmaceutical sciences who might be interested in using a questionnaire. Some experience with data analysis would be advantageous but not required.

Dr James Green comes from a social psychology background, and has used questionnaires extensively in research across a wide variety of topics.

Prof. Pauline Norris comes from a sociology background, and frequently uses mixed methods (qualitative and quantitative) in her research.
**Presentations**

**Presenter Information**

There will be Audio Visual Technicians located at both The Hunter Centre and at the Dunedin Hospital. Please ensure that you have your presentation pre-loaded on the AV equipment prior to your presentation (the Audio Visual Technician will be available to assist with this during refreshment breaks). Presenters in the contributed sessions will not be permitted to use their own laptops for powerpoint presentations due to time constraints and must provide their presentation on a USB stick. Should you encounter any problems with the audio visual equipment please consult the Session Chair who will contact the Audio Visual Technician. Please keep to your presentation time which needs to also include Q&A time (eg; where total presentation time is 15 minutes: 10 minutes presentation, 5 minutes Q&A).

**Poster Information**

There will be two poster sessions (all posters will be displayed for the duration of the conference on the first floor of The Hunter Centre):

**Poster Session 1: Monday 9th December 3.00 pm – 4.00 pm (Posters with even numbers)**

**Poster Session 2: Tuesday 10th December 3.00 pm – 4.00 pm (Posters with odd numbers)**

Authors are asked to stand beside their posters during their allocated session poster numbers. There are no formal presentations at these sessions, this is an opportunity for delegates to peruse the posters with authors on hand to answer any questions.

Poster authors will need to put their posters up on the first floor of the Hunter Centre by Monday 9th December 10.00 am. Please refer to your poster number in the Conference Handbook (there will also be a printed guide in the poster display area) and ensure that you have put your poster up before the commencement of the session. The Registration Desk will be able to store your poster tube, please ensure that this is clearly named.

Posters will be removed on Wednesday morning after 11 am and will be available at the registration desk for collection and will be labelled by Poster Number. Please note that it is the poster author’s responsibility to collect their poster – no responsibility will be taken for any posters left at the venue following the conclusion of the event.

Note: All poster abstracts have the presenting author first and the key to poster numbers is in alphabetical order by presenting author surname.
Social Programme

Welcome Reception

Sunday 8 December 2013
6.00 pm – 7.30 pm
The Hunter Centre, Cnr Great King & Frederick Streets
Entry: Inclusive for full registrants

Renew old acquaintances and meet new contacts at the official Welcome Reception immediately following the opening plenary by Professor Keith Petrie. Drinks and canapés provided.

APSA Student Dinner

Monday 9 December 2013
7.00 pm – 9.30 pm
Carrington College, 57 Heriot Row
Entry: Students – Must have pre-booked NZ$30.00

Mix and mingle with other students over a kiwi barbeque. Attendees will receive two vouchers (this will be included in the registration pack) which can be redeemed at the bar. A cash bar will be available for additional beverage purchases.

Conference Dinner

Tuesday 10 December 2013
7.15 pm – 11.30 pm (bus departs Dunedin from 6.20 pm)
Larnach Castle, 145 Camp Road, Otago Peninsula
Entry: Pre-booked NZ$120.00 per ticket

The conference dinner will be held in the Ballroom at Larnach Castle. A three course buffet dinner with wine and beer will be provided along with entertainment provided by Girl Friday.

Transport will be by bus with departures from the following locations:
6.20 pm Carrington College, 57 Heriot Row
6.30 pm The Hunter Centre, Cnr Frederick and Great King Streets
6.40 pm Scenic Hotel Southern Cross, 118 High Street
The bus will depart Larnach Castle at 11.30 pm

The above times are departure times – delegates who miss the bus must make their own arrangements to Larnach Castle.

If you are driving to Larnach Castle please go to the website for specific directions www.larnachcastle.co.nz
Plenary Sessions

**Plenary 1** (Sunday 5.00 pm – 6.00 pm)
Keith Petrie, Auckland University Medical School, New Zealand
Patients’ expectations of treatment: positive and negative influences on therapeutic outcome

**Plenary 2** (Monday 9.30 am – 10.30 am)
Bernard Vrijens, University of Liège, Belgium
Bridging the adherence gap between efficacy and effectiveness

**Plenary 3** (Tuesday 9.00 am – 9.45 am)
Peter Swaan, University of Maryland, Baltimore, USA
Good cop, bad cop: Intracellular trafficking and its implications for drug targeting

**Plenary 4** (Wednesday 9.30 am – 10.30 am)
Gregory Peterson, University of Tasmania, Australia
The future is now: the importance of medication review (Chapter 2)

**APSA Medal** (Monday 4.00 pm – 5.00 pm)
Andrew McLachlan, University of Sydney, Australia
Understanding variability in response to medicines – a journey
Patients’ expectations of treatment: positive and negative influences on therapeutic outcome

Chair: Rhiannon Braund
Sunday 8 December 2013, 5.00 – 6.00pm
Venue: Barnett

Professor Keith Petrie

Auckland University Medical School, New Zealand

Keith Petrie is a Professor of Health Psychology at Auckland University Medical School. Keith Petrie worked as a clinical psychologist in medical settings before taking up a faculty position in Auckland. His primary research focus involves how patients’ perceptions about their illness influence coping and recovery. His research group also does work on adherence to treatment, psychological influences on symptom reporting, as well as the placebo and nocebo response.

Professor Petrie’s work in this area is published in major international medical and psychology journals. His recent awards include a Fulbright Senior Fellowship to Harvard Medical School, a Lifetime Achievement Award from the International Association of Applied Psychology, the Gluckman Medal for Research Excellence and a Distinguished Fellow award from Health Psychology Division of the American Psychological Association.

Summary

Patients’ expectations have a strong influence on drug effectiveness and side effects. This talk will present some recent findings on both the positive and negative effect of expectations in health care settings. The role of the media and medical professionals in influencing expectations will be discussed with particular reference to recent medication scares. Whether expectations should be used more often to potentiate medicine effectiveness will also be discussed. This area has ethical and clinical implications with respect to the level and type of information about treatment side effects that is provided to patients and the public.
Bridging the adherence gap between efficacy and effectiveness

Chair: Stephen Duffull
Monday 9 December 2013, 9.30 – 10.30 am
Venue: Barnett

Associate Professor Bernard Vrijens
University of Liège, Belgium

Bernard Vrijens is Chief Science Officer at MWV Healthcare. He was General Manager of the AARDEX Group, prior to AARDEX becoming part of MWV Healthcare in 2012. He is also Associate Professor of Biostatistics at the University of Liège, Belgium.

Dr. Vrijens holds a PhD from the Department of Applied Mathematics and Informatics at the University of Ghent, Belgium, and a Master’s Degree in Biostatistics from the Belgian University of Limburg. During his graduate studies, he was appointed to the Royal Commission that investigated the Belgian dioxin crisis, which had toppled the government and temporarily halted Belgian farm exports.

Dr Vrijen’s currently leads a research programme investigating (a) the most common errors in dosing using a simple but robust taxonomy, (b) particular dosing errors that can jeopardise the efficacy of a drug, and (c) the optimal measurement-guided medication management programme that can enhance adherence to medications and maintain long-term persistence.

Dr. Vrijens is a co-author of two book chapters, over 30 peer-reviewed scientific papers, and named as inventor on two patents. He is a founding member and managing director of the European Society for Patient Adherence, Compliance, and Persistence, and an active member of several EU- and US-funded collaborative projects around the theme of adherence to medications.

Summary

Doctors, nurses, patients, and drug regulators are absolutely dependent upon having reliable data from clinical trials to define the dose-requirements and dose-dependent benefits and risks of drugs to be used in medical care. Two main things that go wrong in clinical trials of new and established drugs are that some patients skip many doses of the test medicine and that some patients completely stop taking the test medicine. More often than not, these deviations from the trial plan are not communicated to the trial staff and thus go unrecorded and unanalyzed. Without reliable data on when doses were taken or missed by trial patients, the results of drug trials can be misinterpreted, leading to overestimated dosing requirements or erroneous conclusions about whether a new drug is effective when dosed correctly.

In adherence-informed drug development, electronic compilation of drug dosing history data in clinical trials has been shown to turn patients’ variable adherence from a source of confusion to a source of knowledge. Our presentation will review data collected over the last 15 years from many therapeutic areas. Case studies will be presented which demonstrate how the measurement and management of patient adherence in clinical trials can provide reliable information with the following advantages:
1. Decreased heterogeneity by identifying and enrolling patients likely to adhere to the test drugs.

2. Provision of the data/information for a focused discussion between clinical trial site managers and patients to encourage patient adherence to the test drug(s) throughout the course of the study.

3. Facilitation of adherence/exposure-response analyses for both efficacy and safety.

4. Evaluation of the performance of each recruitment center, with objective criteria to identify centers that need management support.

The results of this approach are to maximize patients’ exposure to test drugs, simultaneously maximizing drug response and reducing its variance, thus increasing statistical power. Adherence is now becoming a regulatory priority and has been formally addressed in the recently issued US FDA draft guidance on enrichment strategies for clinical trials to support approval of human drugs and biological products.
Good cop, bad cop: Intracellular trafficking and its implications for drug targeting

Chair: Arlene McDowell
Tuesday 10 December 2013, 9.00 – 9.45 am
Venue: Barnett

Professor Peter Swaan
University of Maryland, Baltimore, USA

Peter Swaan is Professor of Pharmaceutical Sciences and Associate Dean for Research at the University of Maryland, Baltimore, USA. Swaan is also Director of the Center for Nanomedicine and Cellular Delivery at the University of Maryland School of Pharmacy in Baltimore and leads a research group that focuses on transport proteins in drug targeting and delivery, pharmacokinetics and pharmacodynamics and specializes in innovative methods for drug delivery, especially nanotechnology platforms aimed at increasing oral drug bioavailability.

His major contributions to this research area involve the application of transporters as targets for prodrugs and in 2000, he received the AAPS New Investigator Award in Pharmaceutics and Pharmaceutical Technology. Swaan has pioneered the use of computational techniques to determining structural requirements of membrane transporters, which has paved the way for the discovery of novel substrates and inhibitors.

In addition to a significant body of original research articles, reviews and book chapters he holds several US patents and serves as a member of the editorial board for The AAPS Journal, the Journal of Pharmaceutical Sciences and serves as Associate Editor for Drug Metabolism and Disposition and Editor-in-Chief for Pharmaceutical Research.

Summary

Advances in targeted drug delivery systems have enabled highly regulated site-specific localization to subcellular organelles. Targeting therapeutics to individual intracellular compartments has resulted in benefits to therapies associated with these unique organelles. Endocytosis, a mechanism common to all cells in the body, internalizes macromolecules and retains them in transport vesicles which traffic along the endolysosomal scaffold. An array of vesicular internalization mechanisms exist, therefore understanding the key players specific to each pathway has allowed researchers to bioengineer macromolecular complexes for highly specialized delivery. Membrane specific receptors most frequently enter the cell through endocytosis following the binding of a high affinity ligand. High affinity ligands interact with membrane receptors, internalize in membrane bound vesicles, and traffic through cells in different manners to allow for accumulation in early endosomal fractions or lysosomally associated fractions. Although most drug delivery complexes aim to avoid lysosomal degradation, more recent studies have shown the clinical utility in directed protein delivery to this environment for the enzymatic release of therapeutics. Targeting nanoparticles to the endolysosomal pathway has potential for improving drug delivery for the treatment of lysosomal storage diseases, cancer, and Alzheimer’s disease.
The future is now: the importance of medication review (Chapter 2)

Chair: Prasad Nishtala

Wednesday 11 December 2013, 9.30 – 10.30 am

Venue: Barnett

Professor Gregory Peterson

University of Tasmania, Australia

Currently the Associate Dean (Research) in the Faculty of Health Science at the University of Tasmania, Greg has held a personal Chair in Pharmacy since 2000, awarded on the basis of research and teaching excellence.

Greg established and leads an innovative research unit in Improving Medication Outcomes (UMORE; Unit for Medication Outcomes Research and Education). He has more than 160 research papers published in refereed international and national journals. He is Co-Editor of Blackwell-Wiley’s Journal of Clinical Pharmacy and Therapeutics. Greg is also a Chief Investigator in the NHMRC Centre of Research Excellence in airways disease (Breathe Well), focused on improving the management of chronic obstructive pulmonary disease.

He has served as an alternate Director of the National Prescribing Service. He is currently a member of the Australian Government’s Repatriation Pharmaceutical Benefits Committee and the Drug Utilisation Subcommittee, Pharmaceutical Benefits Advisory Committee. Greg is Adjunct Professor, Manipal College of Pharmaceutical Sciences, Manipal University, India and External Examiner to International Medical University, Kuala Lumpur, Malaysia.

Greg is still a practicing pharmacist, accredited consultant pharmacist, and has until recently co-owned a large rural community pharmacy. In 2007 he was awarded the Pharmaceutical Society of Australia’s highest honour – the Australian Pharmacist of the Year. He was the 2012 APSA Lecturer in recognition of his research career.

Summary

In 2002, in recognition of the introduction of federally-funded Home Medicines Reviews, whereby Australian pharmacists were remunerated for conducting medication reviews for their community-based patients, the presenter published a lengthy review article urging community pharmacists to fully commit to this service and other programs intended to improve the use of medications because of (i) the enormous unresolved issue of drug-related problems in society and (ii) the need to secure the future of the profession of pharmacy.¹

More than a decade later, medication-related problems have increased, in part with ageing of the population, and community pharmacy in Australia is in a precarious situation. It has essentially failed to make the transition from a product-based profession to a patient-care, service-based profession. Low-cost, high-volume, rapid-fire dispensing has become the dominant business model, and is clearly unsustainable.

Unperturbed, the presenter returns to again make a case for the importance of medication reviews to society and the profession. In particular, the development of specialised reviews (e.g. for patients taking warfarin; for patients post-acute coronary syndrome), and the potential dangers of brief in-pharmacy Medicines Use Review services (e.g. MedsCheck) will be discussed.
APSA Medal: Understanding variability in response to medicines – a journey

Chair: Parisa Aslani
Monday 9 December 2013, 4.00 pm – 5.00 pm
Venue: Barnett

Professor Andrew McLachlan
University of Sydney, Australia

Professor Andrew McLachlan is a pharmacist and researcher with experience in clinical and experimental pharmacology and research into the quality use of medicines. He holds the position of Professor of Pharmacy (Aged Care) and theme leader in Health Services and Patient Safety in the Faculty of Pharmacy at the University of Sydney and the Centre for Education and Research on Ageing (CERA) at Concord Hospital. His main research interests centre on understanding the causes and consequences of variability in response to medicines and how this informs their quality use. The focus of his research has been in special patient populations such as older people. Andrew is currently the Director of a NHMRC Centre for Research Excellence in Medicines and Ageing. He has authored 175 research papers and attracted over $6 M in competitive research funds. Andrew is a pharmacy educator involved in the teaching and supervision of undergraduate students, postgraduate students, health care practitioners and pharmaceutical scientists. He has supervised more than 20 postgraduate students to successful PhD completion in the last 15 years, and served as Associate Dean (Postgraduate) and Associate Dean (Research) in the Faculty of Pharmacy, University of Sydney. Andrew is proud to have served on the APSA executive including a term as APSA President. He currently serves on the Editorial Boards of national and international peer reviewed journals and has been appointed to expert committees of the Australian and NSW Governments related to medicines safety, medicines policy and antidoping.

Summary

The quality use of medicines requires careful selection of the right drug and dose regimen to achieve optimal therapeutic outcomes. The safe and effective use of medicines relies on a sound understanding of factors that contribute to variability in response to medicines. Variability in pharmacokinetics, pharmacodynamics and adherence are the main determinants that contribute to variability in response to medicines. In turn, these determinants of response are influenced by intrinsic and extrinsic factors such as age, weight, organ function, comorbid medical problems, diet, geographical ancestry, concomitant medicines (polypharmacy and drug interactions), genetic factors (regulating drug metabolism and response) and other clinical factors. Of all the factors that have been identified, the major contributor to variability in response to medicines is likely to be poor adherence to prescribed therapy. Variability in drug metabolism and its impact on the efficiency of elimination of medicines (clearance) has been identified as the major intrinsic factor contributing to variability in dose requirements. The patients who are most at risk of adverse outcomes from medicines are older people, those with chronic and serious illness and those people receiving multiple medications. Frail older people have the most significant variation in response to medicines and a higher frequency of significant adverse effects to medicines. It is this group of patients for whom we know least about the predictors of optimal medication dosing. This presentation will reflect on the speaker’s research journey in investigating and understanding the factors that contribute to variability in response to medicines with a view to inform rational recommendations to optimise medicines use even when formal clinical trial evidence is lacking.
Invited Lecture
Session Chair: Andrew McLachlan
Tuesday 10 December 2013, 9.45 am – 10.30 am
Venue: Colquhoun

Parisa Aslani, University of Sydney, Australia
Written information as a tool to promote patient-centred care

NZCRS Lecture
Session Chair: Arlene McDowell
Tuesday 10 December 2013, 9.45 am – 10.30 am
Venue: Barnett

Thomas Rades, University of Copenhagen, Denmark
Preclinical formulation of therapeutics – what does industry want?
Written information as a tool to promote patient-centred care

Parisa Aslani
Faculty of Pharmacy, The University of Sydney, NSW 2006

Patient-centred care has been associated with positive outcomes, in particular, increased adherence to therapy. Focusing a clinical consultation on the patient, identifying their needs, respecting their preferences, and involving them in treatment decision-making, are all components of effective patient-centred care. Key to promoting patient-centred care is the provision and use of comprehensible information during consultations, and the anticipated increase in patients’ knowledge about their condition and its treatment. Easy to understand, balanced information, which contains relevant evidence-based facts is vital, yet currently limited in availability. There is a growing need to arm healthcare professionals with fit-for-purpose, balanced information that is tailored to the needs of their patients in order for them to foster shared decision-making and promote positive health outcomes for their patients.

This presentation will focus on research aimed at optimising written medicine information as a tool to promote patient understanding and patient-centred care.
Preclinical formulation of therapeutics – what does industry want?

Thomas Rades ¹

¹ Department of Pharmacy, University of Copenhagen, Denmark

Preclinical formulation of drugs is increasingly becoming more challenging, as most new small molecular weight drugs today are poorly or very poorly water-soluble. In particular, toxicology studies in animals are becoming difficult as doses can be very high and dose linearity may be lost. It is thus of importance to develop preclinical formulations that allow for a higher solubility of the drug and subsequently a higher bioavailability in toxicology studies. Given the time and material constraints, the preclinical formulation scientist is usually facing, this can be a daunting task. The use of enabling formulations, already at the preclinical stage thus becomes necessary. In contrast to clinical and market formulations, however, physical stability of the preclinical dosage form is of lower importance and usually stability for about one month or less is sufficient. In this presentation, preclinical formulation solutions, using nano-milled drug suspensions, the use of amorphous drugs or glass solutions and the use of lipid based drug delivery systems will be discussed. Emphasis will be placed on a fast development of reliable formulations of poorly water soluble drugs in preclinical development.
Pharmaceutical Science

Session Chair: Sarah Hook
Co-Chair: Andrew Mclaughlin
Monday 9 December 2013, 1.30 – 3.00pm
Venue: Barnett

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**Symposium 1-01** (1.30 – 2.00 pm)
Shyamal Das, University of Otago, New Zealand
Strategies for developing high dose powders for inhalation to treat chronic lung conditions

**Symposium 1-02** (2.00 – 2.30 pm)
Joseph Nicolazzo, Monash University, Australia
The impact of disease on drug transport across the blood-brain barrier

**Symposium 1-03** (2.30 – 3.00 pm)
Andrea Vernall, University of Otago, New Zealand
Fluorescent probes as drug discovery tools
Strategies for developing high dose powders for inhalation to treat chronic lung conditions

Shyamal C Das 1, D.A.V. Morton 1, P Stewart 2

1 New Zealand’s National School of Pharmacy, University of Otago, Dunedin, NEW ZEALAND
2 Monash Institute of Pharmaceutical Sciences, Monash University, Melbourne, Victoria, AUSTRALIA

Objective
The purpose of this study was to evaluate formulation strategies to improve delivery efficiency of powders for pulmonary delivery for treating chronic lung conditions such as asthma, COPD and lung infections such as tuberculosis and lung cancer.

Methods
Carrier based formulations were developed using ternary components and lactose alone formulations simulating drug alone formulations were developed by dry coating with different concentrations of magnesium stearate. The powders were aerosolized from size 3 gelatin capsule using a range of devices such as Rotahaler® (RH), Monodose Inhaler® (MI) and Handihaler® (HI) at different flow rates. Powders were also developed by spray drying. The surface energy, surface morphology, primary particle size distributions and tapped density were determined by inverse gas chromatography, scanning electron microscopy, laser diffraction method and tapped density apparatus, respectively.

Results
The fine particle dose (FPD, amount of drug that can reach in lower respiratory tract) significantly increased after dry coating, the increase was higher compared to carrier based formulations. When 40mg dose was dispersed using Monodose Inhaler at 60L/min, the maximum FPD of 14mg was obtained. No significant difference in mean particle size was observed before and after dry coating (P>0.05). The surface energy decreased while the bulk density, tapped density and packing fraction increased. Spray drying of drug with or without excipients also produced highly aerosolizable particles.

Conclusions
The use of ternary components improves delivery efficiency. However, dry coating with magnesium stearate results in powder formulations capable of high dose delivery. Spray drying technique is also promising for developing powders with high dose efficiency.
The impact of disease on drug transport across the blood-brain barrier

Joseph A Nicolazzo
Drug Delivery, Disposition and Dynamics, Monash Institute of Pharmaceutical Sciences, Monash University, Parkville, Victoria 3052, Australia

The blood-brain barrier (BBB), the endothelial lining of cerebral microvessels, forms one of the major obstacles to the delivery of therapeutics to the central nervous system (CNS). Due to the existence of inter-endothelial tight junctions and sophisticated efflux transport systems, many therapeutics fail to reach their site of action within the CNS when delivered systemically. However, reports of altered BBB function have emerged in various inflammatory and neurological disorders. The impact of such changes on the ability of drugs to enter the CNS, and whether this subsequently places patients at greater risk of drug-induced neurotoxicity, remains to be clearly characterised. This symposium presentation will provide an overview of some of our recent findings on how drug transport is altered in mouse models of systemic inflammation, bacterial infection and Alzheimer’s disease.
Fluorescent probes as drug discovery tools
Andrea J Vernall \(^1\), Leigh A Stoddart \(^1\), Stephen J Briddon \(^2\), Stephen J Hill \(^2\), Barrie Kellam \(^1\)

\(^1\) School of Pharmacy, University of Otago, Dunedin, NZ
\(^2\) School of Life Sciences, University of Nottingham, Queen’s Medical Centre, Nottingham

Objective
G protein-coupled receptors (GPCRs) are estimated to be the target of at least 30% of all marketed drugs, therefore molecular tools to better understand these receptors are vital for drug design and optimization. This work aimed to develop small molecule-based fluorescent probes for the adenosine receptor, an important Class A GPCR, and demonstrate utility of these molecules as drug discovery tools.

Methods
Fluorescent probes were designed, chemically synthesized and their pharmacological profile evaluated.

Results
High affinity and subtype selective fluorescent probes were successfully developed. A fragment-based drug discovery screen, receptor identification in a native mixed receptor population and real-time receptor trafficking demonstrated utility of these probes.

Conclusions
Fluorescent probes with high affinity and selectivity for a target receptor can be rationally designed. These compounds are very powerful drug discovery and development tools, and can be used to interrogate a receptor-ligand interaction at the molecular level in a single, live cell.
Pharmacy Practice

Session Chair: Prasad Nishtala
Monday 9 December 2013, 1.30 – 3.00pm
Venue: Colquhoun

Symposium 2-01 (1.30 – 2.00 pm)
Timothy F Chen, University of Sydney, Australia
The role of pharmacists in mental health: the challenges and opportunities

Symposium 2-02 (2.00 – 2.30 pm)
Johnson George, Monash University, Australia
Influencing health behaviours during pregnancy for the health of future generations

Symposium 2-03 (2.30 – 3.00 pm)
Lalitha Raman-Wilms, University of Toronto, Canada
Developing, implementing and evaluating “deprescribing” guidelines for the elderly: A mixed methods approach
The role of pharmacists in mental health: the challenges and opportunities

A/Prof Tim Chen, The University of Sydney

Pharmacists are ideally placed to play a significant role in the care of consumers with mental illness, especially given that medicines are a major modality of treatment for many conditions, including depression, bipolar disorder and schizophrenia. In Australia, approximately 11% of all medicines dispensed under the Pharmaceutical Benefits Scheme are psychotropic medicines and 85% of these are prescribed by general practitioners. A number of key documents provide a comprehensive framework for the delivery of mental health care by pharmacists. These include the Australian Pharmacy Council Mental Health Capabilities Statement for Pharmacists (2009), the Pharmaceutical Society of Australia Framework for Pharmacists as Partners in Mental Health Care (2013) and the Society of Hospital Pharmacists of Australia Practice Guidelines for Mental Health Hospital Pharmacists (2012).

This presentation will cover three main areas relevant to the education of pharmacy students and the practice of pharmacy: contact-based interventions to decrease mental health stigma; interventions designed to understand and improve the use of psychotropic medicines by mental health consumers and the challenges and opportunities for pharmacists to become more involved in the delivery of patient-centred care for consumers with a mental illness. A number of recent and current studies will be used to highlight the professional contribution of pharmacists to patient care.
Influencing health behaviours during pregnancy for the health of future generations

Johnson George, Monash University

Poor health behaviours during pregnancy, such as exposure to tobacco smoke and treatment nonadherence, has implications on the health and well-being of pregnant women and that of future generations. Two in five women have at least one ongoing health condition during pregnancy. One in eight pregnant women has asthma. More than a quarter of pregnant women use at least one prescribed medication for a chronic health condition during pregnancy. The use of non-prescription medications, including complementary and alternative medicines, is common.

13.5% Australian women smoke during pregnancy; many more live with a smoker. 37.0% of teenage mothers and almost half of indigenous women smoke during pregnancy. Self-reported smoking rates among pregnant women attending maternity hospitals are much lower than the national average. Current smokers have high motivation to quit, but their confidence to quit is low. One in two pregnant smokers have reported that their health professionals were either not aware of their smoking or did not discourage smoking.

Pregnancy brings with it important dilemmas about medication use. Perceptions that any medication use during pregnancy carries some risk and natural remedies are safe exist. Pregnant women and care providers often overestimate the perceived risk of medications. More than half of pregnant women are nonadherent to prescribed medications during pregnancy. Although the safety of ‘preventers’ during pregnancy is established, more than half do not take them regularly before and during pregnancy, leading to asthma exacerbations. Over one-third of women discontinue asthma medications during pregnancy, many without consulting their doctors. Reasons for nonadherence include concerns about the safety of the medications, past experiences, and desire for an ‘all natural’ pregnancy. Communication between pregnant women and health professionals regarding asthma management is also poor.

Health behaviours during pregnancy should be systematically assessed and evidence-based, strategic, and cost-effective solutions should be developed and implemented.
Developing, implementing and evaluating “deprescribing” guidelines for the elderly – A mixed methods approach

Lalitha Raman-Wilms 1, Barbara Farrell 2, James Conklin 1,2, Hannah Irving 2, Kevin Pottie 2, Carlos Rojas-Fernandez 4, Pamela Eisener-Parsche 5, Lisa McCarthy 1

1 Leslie Dan Fac of Pharm, Univ of Toronto, Toronto, Canada
2 Bruyère Research Institute, Ottawa, Canada
3 Dep of Applied Human Sci, Concordia Univ, Montreal, Canada
4 School of Pharm, Univ of Waterloo, Waterloo, Canada
5 Bruyère Continuing Care, Ottawa, Canada

Objective
To develop, implement and evaluate three deprescribing guidelines to assist clinicians in discontinuing medications that may be inappropriate or harmful for elderly patients. The evaluation will provide an enhanced understanding of the way in which deprescribing guidelines, along with the processes of creating and implementing them, can influence behaviour change in clinical settings.

Methods
This study will employ mixed methods including: modified Delphi consensus (expert meeting and surveys) to identify guideline priorities; developmental evaluation using ethnographic and case study analysis, observations and interviews with guideline development teams and for nine implementation cases; descriptive analysis of guideline uptake and effect (chart audit); changes in clinician self-efficacy in deprescribing (survey); patient acceptance (interviews) and projected cost-savings from discontinued medications.

Results
Upon completion of the project, the team anticipates the development of feasible, effective deprescribing guidelines, an adaptable deprescribing implementation process, a better understanding of how deprescribing guidelines might bring about behaviour change, and the development of an outcomes evaluation approach to determine clinical and economic impacts.

Conclusions
By creating and optimizing a deprescribing guideline development and implementation process, this project aims to facilitate clinicians’ ability to reduce inappropriate medication use. Input regarding effective deprescribing guideline implementation processes and relevant outcomes important to primary health care practitioners and researchers will be sought during the presentation.
Social Pharmacy

Session Chair: Rhiannon Braund
Tuesday 10 December 2013, 1.30 – 3.00pm
Venue: Hunter Centre, First Floor, Rooms 120 & 121

Symposium 3-01  (1.30 – 2.00 pm)
Joy Spark, La Trobe University, Australia
Utilisation of compounded progesterone

Symposium 3-02  (2.00 – 2.30 pm)
James Green, University of Otago, New Zealand
A qualitative study of the relationship between number of medicines and illness perceptions in hypertension

Symposium 3-03  (2.30 – 3.00 pm)
Pauline Norris, University of Otago, New Zealand
Medications in everyday life
Utilisation of compounded progesterone

M Joy Spark

School of Pharmacy and Applied Science, La Trobe University, Bendigo, VIC

Objective

To use the Behavioral Model of Health Services Use (The Behavioral Model) to compare utilisation of compounded progesterone alone or combined with other hormones.

Methods

The Perspectives on Progesterone questionnaire was used to collect data from 363 Australian women who use compounded progesterone. Items from the questionnaire were mapped to the Behavioral Model, then binomial logistic regression was used to identify differences in utilisation of compounded progesterone when it was used alone compared to use with other hormones. Items with a univariate $p$ value of $<0.25$ or of clinical significance were included in the multivariate analysis.

Results

A model containing items from the individual characteristics (demographic, enabling, need), personal health behaviours and outcomes components of the Behavioral Model was tested and found to be statistically significant $\chi^2(18,N=279)=85.6$, $p<0.0005$. Eight of the 16 items in the final model had unique statistical significance. Women who were using progesterone alone had different individual characteristics: they were more likely to be younger, live closer to their doctor, have less disposable income and find the product more affordable. There were no differences in need characteristics. The only difference in personal health beliefs was that their prescribing doctor was less likely to be known to prescribe progesterone. With regard to outcomes, women using progesterone alone experienced less side effects and less unexpected benefits and were more likely to recommend the treatment to others. The effect of symptom improvement was the same for both groups of women.

Conclusions

Women using progesterone alone are likely to be younger with less disposable income but find the product more affordable; they experience less side effects and fewer unexpected benefits than women who use it in conjunction with other hormones.
A qualitative study of the relationship between number of medicines and illness perceptions in hypertension

James A Green, † Virginia E Brailsford †
† School of Pharmacy, University of Otago, Dunedin, NEW ZEALAND

Objective

Many chronic illnesses, such as hypertension, require multiple medications, with each medication often comprising multiple physical dosage units (e.g., tablets), not including multiple other medicines for comorbidities. Anecdotally, pharmacists often receive off-hand comments such as “Look at all these pills I take. I must be really sick”. We aimed to explore this more formally, especially whether perception of illness was related to the number of medicines/physical doses taken.

Methods

Semi-structured interviews were conducted with ten purposively selected patients with hypertension in Canterbury, New Zealand. General thematic analysis was performed.

Results

A primary theme of adjustment to and acceptance of multiple medicines and doses emerged. Several potential mechanisms by which this occurred were described. This included ‘chunking’, where medicine organisers (e.g., dosset boxes, blister packs) lead to multiple tablets being seen as a single ‘dose’, and comparing themselves with others taking more medicines than themselves.

Conclusions

Participants’ illness perceptions were nested within social context, including their relationships with their healthcare professionals. Understanding how some people come to accept taking large numbers of medicines may guide strategies to increase adherence.
Medications in everyday life

Pauline Norris ¹, Kerry Chamberlain², Kevin Dew³, Darrin Hodgetts⁴, Helen Madden², Jonathon Gabe⁵, Linda Nikora⁴

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³ School of Social and Cultural Studies, Victoria University of Wellington, New Zealand
⁴ School of Psychology, University of Waikato, Hamilton, New Zealand
⁵ Centre for Criminology and Sociology, Royal Holloway, University of London, Egham, Surrey, TW20 0EX, United Kingdom

Objective

The aim of this project was to explore how people think about and use medicines. Although there is a considerable amount of research on prescribing, and on adherence, less is known about what happens once people take their medications home.

Methods

This was a large qualitative study using ethnographic methods in 59 households. Households rather than individuals were the primary unit of data-gathering so that we could explore relationships between household members around medicine-taking and explore the storage and use of medicines within households. A wide range of methods such as household interviews, photo-elicitation interviews, diaries and diary-elicitation interviews were used.

Results

This presentation will describe and discuss a selection of findings from this large project, focussing on relationships within households around medicine-taking, storage of medicines in households, use of and views about complementary and alternative medicines, and how households make sense of and remake expert knowledge.

Conclusions

Previous research on medicine-taking has focussed on individuals and may consequently have neglected the effects of relationships on medicines use, and the effect of medicines use on relationships.
Workshop: Clinical Practice

Tuesday 10 December 2013, 1.30 – 3.00pm
Venue: Hunter Centre, Ground Floor, Room G30

When EBM meets clinical practice
Facilitators: Stephen Duffull, Hesham Al-Sallami, Dan Wright.
School of Pharmacy, University of Otago, New Zealand

The symposium will be run as a 90 minute workshop with an opportunity for participants to interact in small group and large group discussions.

There are few drugs where a single dose can be used safely and effectively for everyone. Most drugs will inevitably require some form of dose adjustment to ensure that the exposure in different people is both safe and effective. Clinical practice requires a balance between the recommendations that arise from evidence based medicine and those that we believe will meet our patient’s needs. Creating the balance is a difficult task and is often thought of as the “art of clinical pharmacy”.

The learning objective of this workshop is for the participant to be able to determine the need for dose individualisation in spite of recommendations from EBM and apply the concepts in a quantitative manner.

Examples will be chosen from a range of therapeutic areas, including the anticoagulants warfarin and dabigatran, and patient populations including paediatrics and adults.

Is this workshop for you? This workshop is designed for participants who have a wide range of clinical and academic skills and experience from the novice to the expert.
NZCRS Session 2: Progressing ideas to the clinic

Session Chair: Jingyuan Weng
Co-Chair: Guanyu Chen
Tuesday 10 December 2013, 1.30 – 3.00pm
Venue: Hunter Centre, First Floor, Rooms 122 & 123

NZCRS Session 2-01 (1.30 – 2.00 pm)
Ami Radunskaya, Claremont Colleges, USA
Of mice and math: a link from the lab to clinic

NZCRS Session 2-02 (2.00 – 2.30 pm)
Shakila Rizwan, University of Otago, New Zealand
Zebrafish as a vertebrate model: opportunities in pharmaceutical research

NZCRS Session 2-03 (2.30 – 3.00 pm)
Jonathan Bray, Massey University, New Zealand
Clinical oncology in companion animals – opportunities for translational research
Of mice and math: a link from the lab to the clinic

Ami Radunskaya

1Department of Mathematics, Claremont Colleges, Los Angeles, USA

Mathematical models of physical, chemical and behavioral processes can be used to understand the mechanisms behind the process, to hypothesize about how the process can be modified and to predict future behavior. A useful mathematical model can help the laboratory scientist interpret data, and model simulations can suggest ways to translate discoveries into effective clinical treatments. In this talk I will describe several modeling projects with collaborators from the School of Pharmacy at the University of Otago: controlled release cellular automata tablets, simulated liposomes in bile salts, and virtual mice responding to in silico vaccines.
Zebrasfish as a vertebrate model: opportunities in pharmaceutical research

Shakila Rizwan¹

¹School of Pharmacy, University of Otago, Dunedin, New Zealand

Formulation strategies are often required to optimise clinical efficacy of a large number of bioactives. To rationally design such systems, biological efficacy and safety testing of the formulation technology early in the development process is essential. Additionally, basic knowledge about pharmacokinetics and interactions at target and off-target sites is also crucial for formulation optimisation. However, to undertake these studies inexpensively and with high-throughput in physiologically relevant animal models is often challenging. At present, rats are the most frequently used animal for such studies. However, rat models are expensive, labour intensive and restricted in the type and the number of experiments that can be conducted.

In recent years, zebrafish (Danio rerio) have emerged as a vertebrate organism of growing interest in many areas of research including preclinical drug discovery research. Despite it not being a traditional mammalian model such as rodents, the zebrafish has a remarkable genetic homology to humans allowing a reasonably accurate representation of human disorders.

In this talk I will address the versatility of zebrafish and highlight the potential advantages of utilising this simple and inexpensive whole-organism model in the drug development and formulation process.
Many promising advances in drug development or delivery mechanisms fail to make the translation from bench to clinical practice. This is because preclinical models (e.g. *in vitro* cell culture, rodent models etc) are unable to account for the innate complexity of cancer, or the syngeneic relationship that exists between the tumor, local host tissues (stroma) and the immune system. Furthermore, even if efficacy is demonstrated in these models, human clinical trials are becoming increasingly expensive to perform.

There is now good evidence that studies of pet dogs with cancer can yield valuable information for human research. Cancer is common in dogs, and many canine cancers share similar genetic aberrations to those reported in humans. Because the cancer has developed spontaneously, the tumour microenvironment and patient physiology share many similarities with the equivalent human disease. The dog patient is typically tolerant of clinical procedures, thus enabling studies that may involve multiple sample collections, biopsies, or imaging analyses. These attributes make the canine cancer patient an ideal model for comparative clinical trials.

An important feature of this model is the potential benefit that the dog gains from being involved in a comparative clinical trial. More and more pet owners are seeking cancer treatment for their animal, yet existing treatments may be too expensive or a ‘gold standard’ protocol may not be available. By becoming involved in a clinical trial, there is opportunity for owners to receive a subsidy on treatment costs, or for their pet to receive a potentially beneficial agent when no other options exist. For the human researcher, this also means it is possible to evaluate investigational agents as first line therapies, or as an adjuvant therapy, much earlier in the drug development process.

In this talk, I will outline some of the many clinical advances that have been made using a spontaneously occurring canine cancer model, and illustrate some of opportunities that may be available in New Zealand for comparative oncologic research.
NZCRS Session 3: Advances in delivery of cancer therapeutics

Session Chair: Jing Weng
Tuesday 10 December 2013, 4.00 – 5.15 pm
Venue: Hunter Centre, First Floor, Rooms 122 & 123

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**NZCRS Session 3-01** (4.00 – 4.30 pm)

Sarah Hook, University of Otago, New Zealand

Turning weapons of mass destruction into precision guided munitions

**NZCRS Session 3-02** (4.30 – 4.45 pm)

Khaled Gerish, University of Otago, New Zealand

Nanomicelle based novel treatments for prostate cancer

**NZCRS Session 3-03** (4.45 – 5.00 pm)

Hayley Nehoff, University of Otago

Nanomedicine combination of micellar crizotinib and dasatinib for the treatment of glioblastoma multiforme
Turning weapons of mass destruction into precision guided munitions

Sarah Hook ¹

¹ School of Pharmacy, University of Otago, Dunedin, New Zealand

Drugs used to treat cancer are highly toxic and non-specific WMD, often causing collateral damage to healthy cells. Current research into the delivery of cancer therapeutics is focused on how to introduce selectivity of the drug or the delivery system for cancer cells or the tumor microenvironment. Two methods by which this can be achieved are by using prodrugs that are only activated in the tumor microenvironment or through using delivery systems that only release drug in the tumor microenvironment. Targeting ligands can also be included in the formulation to further decrease off-target activity and to increase efficacy. Here we will present proof of concept data on newly developed doxorubicin formulations developed as precision guided munitions.
Nanomicelle based novel treatments for prostate cancer
Khaled Greish¹, Sebastien Taurin¹, and Hayley Nehoff¹
¹Department of Pharmacology and Toxicology, University of Otago, Dunedin, New Zealand

Several theories have been proposed to explain the recurrence of prostate cancer and its evolution toward metastatic castrate resistant prostate cancer (mCRPC). Such mechanisms may be the result of the increased expression of the androgen receptor (AR) or its co-regulators or the existence of splice variants or point mutations, or even the autocrine production of androgen by prostate tumour cells. Overall, these events promote constitutive AR activation, hypersensitivity to low level of androgen or promiscuous affinity to non-androgen ligands.

In this work we present two different approaches to manage CRPS prostate cancer involving the use of styrene maleic acid (SMA) based nanomicelles. The first approach utilizes the potential of the selective estrogen receptor modulators, raloxifene (RAL). The second approach involves inhibition of downstream signaling of the AR by using combination of inhibitors of Ca²⁺ mediated signalling along with receptors tyrosine kinase inhibitors.

In both approaches, these drugs encapsulated SMA micelles have shown improve solubility, increase the targeted delivery to the tumour site, lowered their metabolism and potential systemic toxicity. Further, we will present new insight on potential different mechanism of action for miceller drugs compared to the parent drugs on CRPC prostate cancer cell lines.
Nanomedicine combination of micellar crizotinib and dasatinib for the treatment of glioblastoma multiforme

Hayley Nehoff, Sebastien Taurin, Khaled Greish
Department of Pharmacology and Toxicology, University of Otago, New Zealand

Objective
The objective of the study was to develop a novel treatment strategy for glioblastoma multiforme (GBM) by combining two micelles, loaded with the tyrosine kinase inhibitors crizotinib or dasatinib.

Methods
The synthesis of the crizotinib and dasatinib micelle is a pH dependent process which allows the encapsulation of hydrophobic drugs into styrene co-maleic micelle. Loading was determined via UV absorbance and size by dynamic light scattering. Three GBM cell lines were used, LN-18, U87 and U373. Cytotoxicity was established following 72 h incubation, by Sulforhodamine B assay. Western blot was used to determine the effect on the signalling pathways associated with cell proliferation and survival.

Results
The loading of crizotinib and dasatinib micelles was 20.23% and 11.5% and their size was 128 nm and 198 nm, respectively. The cytotoxicity of a combination of free crizotinib and dasatinib was additive or subadditive depending on the GBM cell line treated. In LN-18 cells, free dasatinib 0.2 µM kills 42% of cells, free crizotinib 4 µM kills 70% of cells while the combination kills 90% of cells. Treatment with micellar crizotinib and dasatinib showed a synergistic relationship in all three cell lines. Micellar dasatinib killed 5% of cells while micellar crizotininb killed 40% of cells while combined the micellar drugs killed 85% of cells. Western blot analysis showed that only combination treatment was effective at abolishing downstream AKT and ERK activity, essential for cell proliferation and inhibition of apoptosis.

Conclusions
We showed that the combination treatment with two tyrosine kinases is efficient against GBM cells. This new strategy for the treatment of GBM warrants further study to establish its potential in the clinic.
Drug Design and Formulation

Session Chair: Shaymal Das
Co-Chair: Franziska Hushmann
Monday 9 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Rm 120 & 121

CP01-1
Ali Seyfoddin, University of Auckland, New Zealand
Chitosan coated Nanostructured Lipid Carriers (NLCs) for ocular drug delivery

CP01-2
Sifei Han, Monash University, Australia
Evaluation of the metabolic pathways responsible for lymphatic transport of a triglyceride-mimetic prodrug

CP01-3
Matthew Crum, Monash University, Australia
Evaluation of drug absorption from lipid-based formulations using a coupled in vitro lipid digestion-absorption model

CP01-4
Xiaowen Liang, University of Queensland, Australia
Intravital multiphoton imaging of water dispersible CdTe/CdS quantum dots in rat liver: comparison with cationic and anionic dyes

CP01-5
Qi (Tony) Zhou, University of Sydney, Australia
Inhalable powder formulation of combination antibiotics with high aerosol efficiency and moisture protection

CP01-6
Hanisah Azahari, University of Otago, New Zealand
Phytantriol cubosomes sterically stabilised with the surfactants Tween 80 and Myrj 100: formulation, characterisation and permeability studies in an in vitro model of the blood-brain barrier.
Chitosan coated Nanostructured Lipid Carriers (NLCs) for ocular drug delivery

Ali Seyfoddin 1, John Taylor 2 and Raida Al-Kassas 1

1 School of Pharmacy, The University of Auckland, Auckland, New Zealand
2 School of Biological Sciences, The University of Auckland, Auckland, New Zealand

Objective

The objective of this study was to assess the suitability of Nanostructured Lipid Carriers (NLCs) for ocular drug delivery of a poorly soluble drug, Acyclovir (ACV) and to determine whether NLCs have the ability to enhance the ocular bioavailability of the drug without inducing irritation or toxicity.

Methods

NLCs were prepared by a hot microemulsion technique and coated with a mucoadhesive polymer, chitosan, by an aqueous dispersion method. The nanoparticles were characterised for their size, surface charge, drug release, entrapment efficiency and binding efficiency in vitro. An ex vivo set up was used to measure precorneal resident time of the formulation. The ex vivo bovine eye (BE) assay, histopathological examinations of bovine corneas, and MTT cell proliferation assay were used to assess cytotoxicity and irritancy potential of NLCs. The in vivo drug permeation studies were carried out on white rabbits. The concentration of drug in aqueous humour samples were analysed by HPLC.

Results

The nanoparticles were spherical and within the size range suitable for ocular drug delivery (457.3 ± 44.3). The surface charge of the nanoparticles rendered them cationic (+28 ± 0.7) and suitable for increasing corneal penetration. The release profile of the nanoparticles was in a controlled manner and within the time frame ideal for ocular drug delivery. At the same time the corneal penetration was enhanced due to cellular penetration enhancing properties of chitosan. The nanoparticles were nontoxic and did not cause any ocular irritation. Ocular bioavailability of ACV in the nanoparticles was increased by 4.5 fold when compared to a commercially available ophthalmic ointment, Zovirax.

Conclusions

NLCs are easy to fabricate, customize, and scale up. Their intrinsic properties such as lipophilicity, small size, cationic charge, bio-adhesiveness, cell internalisation, and controlled release properties render them suitable for ocular drug delivery of poorly soluble drugs.
Evaluation of the metabolic pathways responsible for lymphatic transport of a triglyceride-mimetic prodrug

Sifei Han 1, Luojuan Hu 1, Tim Quach 1, William N. Charman 1, Valentino J. Stella 2, Jamie S. Simpson 1, Natalie L. Trevaskis 1 and Christopher J.H. Porter 1

1 Monash Institute of Pharmaceutical Sciences, Monash University, Parkville, Victoria, Australia
2 School of Pharmacy, University of Kansas, Lawrence, Kansas, USA

Objective

In a previous study we described the application of a triglyceride mimetic prodrug strategy to promote the delivery of a model immunomodulator [mycophenolic acid (MPA)] to the lymphatic system after oral administration. The current study aims to clarify three critical steps that are responsible for efficient biochemical integration of the prodrug [1,3-dipalmitoyl-2-mycophenoloyl glycerol (2-MPA-TG)] into endogenous lipid metabolic pathways.

Methods

Lymphatic transport and plasma exposure of MPA related compounds was assessed in mesenteric lymph-duct and carotid artery cannulated rats. Lipid-based formulations of 2-MPA-TG were infused intraduodenally in the presence and absence of a pancreatic lipase inhibitor (orlistat), a diacylglycerol acyltransferase-1 inhibitor (A922500), and a chylomicron transport inhibitor (Pluronic L81) to evaluate the importance of luminal lipolysis, enterocyte-based re-esterification and chylomicron secretion to efficient lymphatic transport.

Results

Co-administration with any of orlistat, A922500 or Pluronic L81 markedly decreased the lymphatic transport of the prodrug in rats. The three agents appeared to disturb lymphatic transport of 2-MPA-TG via selective inhibition of different metabolic steps. Orlistat (via lipolysis inhibition) hindered generation of the absorbable monoglyceride form (2-MPA-MG) of the prodrug in the gastrointestinal lumen, resulting in reduced absorption and negligible drug exposure to the lymph or systemic circulation. A922500 blocked the re-esterification of absorbed 2-MPA-MG to the lymphotropic triglyceride analogue, and the intracellular lability of 2-MPA-MG subsequently resulted in liberation of MPA and redirection of MPA into the systemic blood circulation. Pluronic L81 inhibited lymphatic transport of the re-esterified prodrug via disturbing chylomicron secretion but did not affect systemic drug exposure.

Conclusions

The current study defines the importance of three key steps along the endogenous lipid metabolism pathway that dictate the success of triglyceride mimetic, lymph targeted, prodrug strategies. The data may provide insight into the improved design of lymphotropic prodrugs, and in doing so bring benefits for treatment of lymph-resident disease.
Evaluation of drug absorption from lipid-based formulations using a coupled *in vitro* lipid digestion-absorption model

Matthew F. Crum, Hywel D. Williams, Colin W. Pouton and Christopher J.H. Porter.

Drug Delivery, Disposition and Dynamics, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Melbourne, VIC

**Objective**

One of the limitations to the more widespread use of lipid-based formulations in oral drug delivery is incomplete understanding of the drug properties that are most critical to *in vivo* performance. Here an *in vitro* model that incorporates both simulated lipid digestion and lipid/drug absorption was developed. Using this digestion-absorption model, the impact of drug formulation on formulation digestion, drug solubilisation and drug permeability was assessed *in vivo*.

**Methods**

The *in vitro* digestion model was based on previously reported conditions (Williams et al., 2012). The addition of the absorptive sink was achieved using an isolated perfused rat jejunum (Yeap et al., 2013). A peristaltic pump was used to connect the two systems, and digesting lipid formulations were continually perfused from the *in vitro* digestion apparatus through the jejunum.

**Results**

A range of lipid-based formulations, incorporating the model poorly water-soluble drug fenofibrate, were characterised by *in vitro* digestion. In general formulations containing higher quantities of co-solvent and surfactant (e.g. Lipid Formulation Classification Scheme (LFCS) Type IV formulation) resulted in higher supersaturation and more rapid drug precipitation when compared to those with proportionally higher quantities of lipid (e.g. LFCS Type IIIA formulation). In contrast, when the same formulations were examined using the coupled digestion-absorption model, drug flux into the mesenteric vein was similar regardless of formulation.

**Conclusions**

This work demonstrates the potential of a combined *in vitro* digestion and *in situ* permeability model to improve understanding of drug absorption from digesting lipid-based formulations *in vivo*. The data suggest that simple *in vitro* lipid digestion models may overestimate the potential for drug precipitation since they lack an absorption sink.

Yeap et al. (2013) Mol Pharm 10:1874-1889
Intravital multiphoton imaging of water dispersible CdTe/CdS quantum dots in rat liver: comparison with cationic and anionic dyes

Xiaowen Liang¹, David Liu¹, Yian Zhu², Zhi Ping Xu², Jeffrey Grice³, Michael S Roberts¹,³ and Xin Liu¹.

¹ Therapeutics Research Centre, School of Medicine, University of Queensland, Brisbane, QLD
² ARC Centre of Excellence for Functional Nanomaterials, Australian Institute for Bioengineering and Nanotechnology, University of Queensland, Brisbane, QLD
³ School of Pharmacy & Medical Sciences, University of South Australia, Adelaide, SA

Objective

Quantum dots (QDs) are colloidal nanocrystalline semiconductors, which are potentially useful as imaging probes for tumour diagnosis and drug delivery. Multiphoton microscopy (MPM) allows the direct in vivo visualization of QDs in space and time. The aim of this study was to investigate hepatic disposition of QDs in rat after intravenous injection using MPM coupled with fluorescence lifetime imaging (FLIM).

Methods

Water dispersible negatively charged cadmium telluride (CdTe) QDs (~ 2.1 nm) were synthesised in aqueous solution, purified, characterised and administered to rat at a dose of 0.097 nmol/g via jugular vein. The carotid artery and bile duct was cannulated for blood and bile collection. The concentration of cadmium in bile and blood was measured by ICP-MS. A DermaInspect MPM with a MaiTai femtosecond laser at 900 nm excitation was used to directly image QDs in rat livers during anaesthesia after laparotomy.

Results

In vivo imaging of QDs reveals a quick and even distribution of QDs in sinusoid without hepatocyte uptake and bile excretion. In contrast, anionic dye fluorescein was found to enter the hepatocytes from the sinusoids and then concentrate into the biliary canaliculae and bile ducts, while cationic dye rhodamine 123 was rapidly taken up from the sinusoids into hepatocytes but slowly excreted to the bile. The fluorescence intensity of QDs in the liver decreased much slower compared to that of the organic dyes. The different hepatic distribution between QDs and organic dyes is mainly due to the different physicochemical properties of molecules and nanoparticles. Few QDs were detected in bile by ICP-MS, which further confirms the observation from MPM imaging.

Conclusions

Intravital imaging with MPM enables the visualization of QDs disposition in the rat liver. QDs show different distribution in rat liver compared to organic dyes.
Inhalable powder formulation of combination antibiotics with high aerosol efficiency and moisture protection

Qi (Tony) Zhou¹, Thomas Gengenbach¹, John A. Denman¹, Heidi H. Yu¹, Jian Li⁴ and Hak Kim Chan¹

¹Faculty of Pharmacy, The University of Sydney, Sydney, NSW
²Ian Wark Research Institute, University of South Australia, Mawson Lakes, SA
³CSIRO Materials Science and Engineering, Clayton, VIC
⁴Monash Institute of Pharmaceutical Sciences, Monash University, Parkville, VIC

Objective
For many respiratory infections caused by multidrug-resistant Gram-negative bacteria, colistin is the only effective antibiotics despite its nephrotoxicity. A novel synergistic inhaled combination formulation of colistin and rifampicin was prepared, aiming to deliver the drug directly to the respiratory tracts and minimise the resistance and adverse effects.

Methods
Combination powder formulations were produced by co-spray-drying. Particle size distribution, morphology, dynamic water sorption, and crystallinity were characterized. Particle surface composition was evaluated by XPS and ToF-SIMS. Aerosolisation performance was measured using a multi-stage liquid impinger via an Aerolizer device after storage at varying RH of 45%, 60%, and 75%.

Results
An antibacterial synergy against Acinetobacter baumannii was shown for the combination formulation with a high emitted dose (96%) and high fine particle fraction (FPF) (92%). Storage of the spray-dried colistin alone formulation at the 75% RH resulted in a substantial deterioration in aerosolisation performance because they absorb up to 30% (by weight) water. In contrast, the FPF of the combination formulation having stored at various RH was unchanged, which was similar to the aerosolisation of the spray-dried rifampicin alone. XPS and ToF-SIMS have indicated the dominance of rifampicin on the combination particle surfaces, which contributes to the moisture protection.

Conclusions
We have developed a highly dispersible powder formulation of combination antibiotics with both antibacterial synergy and moisture protection.

Acknowledgment
This research was supported under Australian Research Council's Discovery Projects funding scheme (project number DP120102778)
Phytantriol cubosomes sterically stabilised with the surfactants Tween 80 and Myrj 100: formulation, characterisation and permeability studies in an *in vitro* model of the blood-brain barrier

Hanisah Azhari¹, Ben J. Boyd² and Shakila B. Rizwan¹

¹New Zealand’s National School of Pharmacy, University of Otago, Dunedin, New Zealand
²Monash University, Faculty of Pharmacy and Pharmaceutical Sciences, Australia

**Objective**

To prepare phytantriol cubosomes sterically stabilised with the surfactants Tween 80 and Myrj 100. And to investigate their effect on the transport of the model drug rhodamine (R123) in an *in vitro* model that resembles the blood-brain barrier (BBB).

**Methods**

LCPs with Tween 80 or Myrj 100 as stabilizer were prepared using our previously published methods (Rizwan et al., 2011). In this study LCPs stabilised with Pluronic F127 were used as a positive control. The physical properties of the particles including size, surface charge and homogeneity, were investigated using dynamic light scattering (DLS), whilst the nanostructure of the particles were determined by small angle x-ray scattering (SAXS). The optimal formulations from this part of the study were subsequently tested in cell cultures.

To investigate the efficacy of LCPs to improve the transport of drugs across the BBB, we used the molecule R123 as our model drug. Permeability studies were conducted using the Caco-2 cell line and quantified using spectrofluorometry. The integrity of the barriers during permeability studies was regularly monitored by measuring the permeability to [¹⁴C]mannitol using scintillation counting.

**Results**

All formulations investigated were within the nanometre size range and had negative zeta potential. The nanostructure of both Tween 80 and Myrj 100 stabilized particles was bicontinuous cubic (I₃m₃m). In Caco-2 cells, F127-stabilised formulations showed a trend towards greater permeability of R123 as compared to Tween 80 or Myrj 100 stabilised formulations.

**Conclusions**

We were able to prepare stable nanometre sized cubosomes using phytantriol and Tween 80 or Myrj 100 as the steric stabiliser. The *in vitro* cell culture studies suggest that Pluronic F127-stabilised LCPs have the potential to improve transport of poorly permeable drugs across the BBB.

Pharmaceutical Education

Session Chair: Liza Seubert
Co-Chair: James Windle
Monday 9 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Rm G30

CP02-1
Arlene McDowell, University of Otago, New Zealand
Do animal patients have a place in a pharmacy education?

CP02-2
Trudi Aspden, University of Auckland, New Zealand
“One needs to adapt to others, not force others to adapt to your ways.” Exploring the perceptions of pharmacy students following participation in a cross cultural simulation and introductory lecture

CP02-3
Lorraine Smith, University of Sydney, New Zealand
What is the relationship between pharmacy students’ preferred teacher qualities and their achievement goal orientations?

CP02-4
Sanya Ram, University of Auckland, New Zealand
Prevalence of, and attitudes towards, cognitive enhancer use amongst New Zealand tertiary students

CP02-5
Pauline Norris, University of Otago, New Zealand
Pharmacy students’ attitudes to, and use of, traditional healthcare

CP02-6
Daniel Bernal, University of Tasmania, New Zealand
Development of an education package for accredited pharmacists providing directed Home Medicines Review following acute coronary syndrome
**Do animal patients have a place in a pharmacy education?**

Arlene McDowell

'School of Pharmacy, University of Otago, Dunedin, New Zealand

**Objective**

There is international interest in the One Health initiative to expand interdisciplinary collaborations between medical and veterinary sciences. The current curricula for Bachelor of Pharmacy students in New Zealand is focused on providing quality use of medicines for different groups of human patients. Is there value in pharmacy students learning about dosing considerations and medicines for animals as part of their education?

**Methods**

Final year Bachelor of Pharmacy students at the University of Otago (n=126) were invited to complete a standard questionnaire to gauge their interest on learning about drugs for animal patients. The preferred format for a course on animal medicines was also investigated. The second group of participants were practicing pharmacists in Dunedin, New Zealand (n=6), with ranging experience, who were individually interviewed to seek their views on the relevance of having a knowledge of animal medicines.

**Results**

The questionnaire was completed by 104 final year pharmacy students (83% response). Approximately 60% of the students surveyed were interested in medicines for animal patients. Living with animals was found to correlate with an increased interest in veterinary pharmacy. Approximately half of student respondents would be interested in taking a specialised course on animal medicines. The pharmacists interviewed regarded a knowledge of animal medicines as not essential to conduct their practice, however 4 out of 6 pharmacists were interested in pursuing a specialised course on veterinary pharmacy.

**Conclusions**

Whilst acknowledged as not an essential part of the role of a pharmacist, there is interest in New Zealand from both undergraduate students and practicing pharmacists to learn more about medicines for animal patients. This interest may provide the impetus to create a new course on veterinary pharmacy.
“One needs to adapt to others, not force others to adapt to your ways.”
Exploring the perceptions of pharmacy students following participation in a cross cultural simulation and introductory lecture

Trudi J. Aspden, Rosalind Smart and Janie L. Sheridan
School of Pharmacy, The University of Auckland, New Zealand

Objective
Cultural competence has recently been incorporated into the competence standards for pharmacists registered in New Zealand. To prepare students for this requirement Auckland School of Pharmacy introduced a cross-cultural simulation workshop, a follow up lecture and an evaluation, the aim of which was to elicit student views on the intervention and their perceptions of its effect on aspects of their cultural competence.

Methods
Final year pharmacy students (n=104) participated in the two part teaching intervention. The intervention was evaluated with an anonymous survey consisting of six statements using a five point Likert scale and seven questions requiring binary or free text responses. Completing the evaluation was compulsory as it was considered to be self-reflection, an important component of cultural competence. Giving permission for this to be included in the evaluation was voluntary.

Results
Ninety students agreed to their responses being used in the evaluation. Most (78/90) students found the intervention enjoyable, 65/90 thought their tolerance of cultural differences had increased, 74/90 had become more aware of the influence of culture during interactions with people, and 67/90 thought the simulation increased their cultural competence/awareness. Explanations provided: through the experience of discrimination and language barriers; realising the importance of understanding and accepting other cultures; and experiencing the dangers of comparisons, assumptions and judgements.

Conclusions
The intervention was well received by most students, stimulated self-reflection and seemed to increase sensitivity to culture. How this affects and relates to the other components of cultural competence such as knowledge and patient centred skills requires further investigation.
What is the relationship between pharmacy students’ preferred teacher qualities and their achievement goal orientations?

Lorraine Smith¹, Grenville Rose², Erica Sainsbury¹ and Saleh Alrakaf¹

¹ Faculty of Pharmacy, University of Sydney, Sydney, NSW
² Aftercare, Sydney, NSW

Objective

To test a series of theory-driven hypotheses regarding the relationships between pharmacy students’ preferred ‘teacher qualities’ and their academic achievement goal orientations.

Methods

Second and fourth year undergraduates completed a validated achievement goal questionnaire and a ‘build a teacher’ task. For the latter, participants were given a $20 hypothetical budget to purchase amounts of nine widely valued teachers’ qualities such as ‘intellectually challenging’, ‘interactive teaching style’ and ‘warm personality’. Descriptive statistics, ANOVA and regression analyses were conducted.

Results

A total of 363 students participated. Students’ spending with the budget revealed that the most preferred teacher qualities were ‘enthusiasm’, ‘topic expertise’, ‘clear presentation style’ and ‘clarity about how to succeed’, with the least preferred qualities being ‘warm personality’ and ‘interactive teaching style’ (P = 0.01, eta² = 0.44). Hypotheses were supported, showing significant relationships between mastery and performance goal orientations and certain teacher quality preferences. For example, students adopting a mastery orientation to academic achievement valued topic expertise most of all in their teachers (β = 0.16, P = 0.04), whereas students adopting a performance-avoidant orientation least preferred intellectually challenging material (β = -0.24, P = 0.01).

Conclusions

These novel findings in the pharmacy education field provide a richer profile of the ways students respond to their learning environment. Understanding the relationships between teacher characteristics and pharmacy students’ achievement goal orientations will contribute to improving the quality of pharmacy learning and teaching environments. Further, this approach provides a means of exploring a key aspect of how the learning context shapes the achievement goal orientations of students.
Prevalence of, and attitudes towards, cognitive enhancer use amongst New Zealand tertiary students

Sanya Ram1, Safeera Hussainy2, Marcus Henning3, Maree Jensen1 and Bruce Russell1
1School of Pharmacy, University of Auckland, Auckland, New Zealand
2Centre for Medicine Use and Safety, Monash University, Melbourne, Victoria, Australia
3Centre for Medical and Health Sciences Education, University of Auckland, Auckland, New Zealand

Objective
Cognitive enhancers (CEs) such as methylphenidate, amphetamines and modafinil are becoming more commonly used in non-medical situations. Initially developed to treat cognitive disabilities, these medicines are gaining popularity amongst healthy individuals aiming to increase their cognitive performance in academic settings. This study explored the prevalence, and attitudes towards CE use in a tertiary institution in New Zealand.

Methods
Students from the Schools of Pharmacy, Nursing, Medicine, Law and Accounting at a university in New Zealand were invited to complete a paper-based questionnaire that elicited their views on the prevalence, reasons for use, and attitudes towards use of CEs. Questionnaires were distributed (August – September 2012) at the end of a compulsory third year lecture. Factor analysis was performed to explore the factors associated with attitudes towards CE use and binary logistic regression analysis was used to examine which of these factors were associated with CE use.

Results
Response rate was 88.6% (442/499). CE use has a low prevalence in the tertiary environment. Reasons for use differed based on the CE that was used, including, getting a “high” (M=3.96, SD= 2.44), experimentation (M =3.73, SD = 2.25), increased alertness (M =3.46, SD=2.41), help concentration (M=3.4, SD = 2.36) and to stay awake (M =3.12, SD =2.25). Students who used CE were more likely to believe CE use was safe, necessary and the benefits outweighed the risks, compared to students that did not use CE (OR 1.86, p=0.001). Students who used CE were also more likely to believe that use was socially acceptable and ethical compared non-users of CE (OR 1.615, p=0.001).

Conclusions
Students who use CE have different attitudes towards its acceptability. This warrants further research of how these attitudes influence CE use and attitudes towards academic performance.
Pharmacy students’ attitudes to, and use of, traditional healthcare
Pauline Norris, Mudassir Anwar and James Green
School of Pharmacy, University of Otago, Dunedin, New Zealand

Objective
There is increasing interest in educating healthcare practitioners to provide more culturally-competent care. This often includes providing education about the traditional healthcare practices. Pharmacy students come from many different cultural backgrounds, and may use traditional healthcare, so educators cannot assume that all students share knowledge or attitudes towards traditional healthcare. There is little research about whether exposure to a health professional curriculum changes students’ views. The aim of this study was to explore New Zealand pharmacy students’ knowledge and beliefs about traditional healthcare at the beginning of the pharmacy course, and to examine whether these changed during the course.

Methods
University of Otago students were surveyed in their first year of Pharmacy studies and again in their final year, in lectures. A written questionnaire was designed to gauge students’ use of and beliefs about traditional healthcare, ethnicity and acculturation. The same questionnaire was used on both occasions.

Results
The students were from a wide range of ethnic groups. The percentage who reported that they used traditional healthcare rose from 48% in their first year to 63%. Many different products were used, primarily herbal medicines. Traditional healthcare was used for a wide range of health problems, usually for minor illness or prevention. Students who were not of New Zealand European ethnicity were more likely to use traditional healthcare. Between the surveys students’ attitudes towards traditional healthcare did not change. Students primarily used traditional healthcare from their own culture. The main reported reasons for use were because they had experienced the effectiveness of traditional healthcare, family encouragement or because it was part of their culture.

Conclusions
Despite the focus on biomedical approaches to healthcare within the pharmacy course, students’ attitudes to traditional healthcare did not change between the first and final years of pharmacy study, but their reported use increased.
Development of an education package for accredited pharmacists providing directed Home Medicines Review following acute coronary syndrome

Daniel DL Bernal, Leanne Chalmers, Luke RE Bereznicki, Ronald Castelino and Gregory M Peterson
School of Pharmacy, University of Tasmania, Sandy Bay, Tasmania, Australia

Objective
To develop and evaluate an education package to enable accredited pharmacists to provide a directed Home Medicines Review (dHMR) service for patients following acute coronary syndromes (ACS). The education package was designed to comprehensively address post-discharge management of ACS, and allow for a flexible completion timeframe enabling a strong uptake among practising accredited pharmacists.

Methods
Five lectures, an assessment quiz and an evaluation questionnaire were developed. Course material was generated from a targeted appraisal of literature and reviewed by expert pharmacists. With guidance from a theoretical framework, the material aimed to highlight the importance of considering both the patient and prescriber when addressing non-adherence to guideline-based therapy. To allow for simple access and completion, the course was delivered as an online learning module and pharmacists could complete the course within a flexible timeframe.

Results
From a pool of 91 Tasmanian accredited pharmacists, 36 registered an interest in the education package and completed the online enrolment, and 27 completed the package. Twenty-two pharmacists passed the quiz on their first attempt, and three passed on their second attempt. Analysis of the evaluation questionnaire consistently showed pharmacists’ feedback to the material was positive. Twenty-one pharmacists went on to take part in the associated trial of the dHMR service following ACS.

Conclusions
The education package received strong uptake and positive feedback. Pharmacists who successfully completed the package participated actively in the trial. We hypothesise that this resource has the potential to improve accredited pharmacists’ ability to address specific issues with adherence and medication use following ACS.
**Pharmacy Practice**

Session Chair: Rhonda Clifford

Co-Chair: Patti Napier

Monday 9 December 2013, 11.00am – 12.30pm

Venue: Hunter Centre Rm 122 & 123

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**CP03-1**

Greg Kyle, University of Canberra, Australia

How times change: The profession’s opinion of graduate numbers 2003-2012

**CP03-2**

Natalie Gauld, University of Auckland, New Zealand

Why do developed countries vary in medicines reclassification? A nine country qualitative comparison

**CP03-3**

Sharon Davis, University of Sydney, Australia

Attention pharmacists – disability support workers need your help!

**CP03-4**

Vivien Tong, University of Sydney, Australia

User testing of over-the-counter medicine labels and leaflets in Australia and UK: a comparative study

**CP03-5**

Hanni Puspitasari, University of Sydney, Australia

Indonesian pharmacists’ awareness of secondary prevention of cardiovascular disease: a study in the community setting

**CP03-6**

Rana Ahmed, University of Sydney, Australia

A question prompt list (QPL) for parents of children with attention-deficit hyperactivity disorder (ADHD): Part II- validation using Delphi methodology
How times change: The profession’s opinion of graduate numbers 2003-2012

Greg J. Kyle, Brooke Townsend and Mark Naunton

Discipline of Pharmacy, University of Canberra, Canberra, ACT

Objective
To investigate whether the opinion on the number of pharmacy graduates has changed over the period 2003-2012.

Methods
A systematic review of the Pharmaceutical Society of Australia’s professional journal Australian Pharmacist was conducted from 2003 to 2012. All articles referring to graduate, pharmacist or pharmacy school numbers were extracted. Opinions expressed were categorised according to their year of publication and whether they supported, refuted or offered a balanced opinion on whether the number of pharmacy graduates in Australia was too high. Comparative annual analysis was used to identify any shift in opinions expressed over the study period.

Results
Opinions supporting the need for more graduates reduced from 93% in 2003 to 13% in 2013. Conversely, opinions expressed about excess graduates increased from 0% in 2003 to 60% in 2013. Neutral or balanced opinions varied between 7% and 47%, but showed no clear trend across the time series. The main ‘tipping point’ occurred in 2010 when “too many graduates” consistently exceeded “not enough graduates” in a divergent trend. However, this divergence is on the back of a declining trend in articles refuting a graduate excess and growth in the articles supporting a graduate excess.

Conclusions
A shift in opinion from a pharmacy graduate shortage to an oversupply occurred between 2003-2013 indicating pharmacy graduates are available to embrace additional professional opportunities.
Why do developed countries vary in medicines reclassification? A nine country qualitative comparison

Natalie J. Gauld1, Fiona S. Kelly 2,3, Lynne M. Emmerton4, Nahoko Kurosawa5, Linda J. M. Bryant1 and Stephen A. Buetow1

1 Dept of General Practice and Primary Healthcare, University of Auckland, Auckland, NZ
2 School of Pharmacy, University of Auckland, Auckland, NZ
3 Griffith Health Institute, Griffith University, Brisbane, QLD
4 School of Pharmacy, Curtin University, Perth, WA
5 School of Pharmacy, Hokkaido Pharmaceut University, JAPAN

Objective

Reclassification of medicines from prescription to non-prescription can increase consumer access and relieve burden on health resources, but may confer risks. Countries differ in the medicines available without prescription, but, other than scheduling, the reasons behind this variation have not been studied. This research aimed to explore why a cross-section of developed countries vary in medicines reclassification.

Methods

The reclassification experience of five core countries (United Kingdom (UK), United States (US), Japan, Australia and New Zealand (NZ)) and four supplementary countries was investigated. Sixty five semi-structured, in-depth interviews were conducted with 79 key informants across these countries from industry, regulatory agencies, pharmacy, academia, and medicine. Qualitative heuristic analysis both of the interviews and of supplementary documents was conducted to draw on the professional experience of the lead researcher.

Results

Company, market and product factors at local, regional, and global levels affected reclassification. Every country had a unique and complex mix of enablers and barriers to reclassification, many of which were not safety-related. Key enablers included government policy (UK, Japan), a pharmacy or pharmacist-only schedule (most countries), regulator and committee comfort with innovation (UK and NZ), and proactive individuals (NZ). Market exclusivity or reclassification by brand in some markets, and/or a large population, attracted sponsors to reclassification. Significant barriers existed in all countries studied. For example, US reclassification appeared hindered by a lack of pharmacy schedule, patent effects, and high cost and effort of reclassification. Doctor negativity, culture and pharmacy factors hinders reclassification in Japan. Committee factors, inability to advertise, limited confidence in pharmacy, and loss of healthcare funding also affected reclassification in some countries. Regional effects occurred in Australasia and Europe.

Conclusions

Variability in reclassification occurs for many reasons, some of which are modifiable, and many of which are not safety-related. Benefits and risks of this variation needs exploring.
Attention pharmacists – disability support workers need your help!

Sharon R. Davis¹, Seeta Durvasula², Diana Merhi³, Daniela Traini¹, Paul M. Young¹ and Sinthia Z. Bosnic-Anticevich¹.

¹Woolcock Institute of Medical Research, The University of Sydney
²Centre for Disability Studies, The University of Sydney, Sydney, NSW
³Synergy Medical Practice, St Leonards, NSW

Objective: People with intellectual disability comprise about 2% of the Australian population (Wen, 2004) and inhalers are prescribed for a subset of them (Davis et al., 2013). In supported accommodation they are often assisted to take medications by disability support workers (DSWs) who are not health trained. This study sought to determine current practice with giving respiratory medications, training of DSWs, opportunities for DSWs to increase their knowledge of asthma management, and future support options.

Methods: Providers of supported accommodation in NSW were approached to recruit participants. Semi-structured face to face, or telephone interviews were conducted. The interviews probed topics including DSWs' perceived role in giving medications, challenges when assisting clients with respiratory medications, and interactions with health care professionals. Interviews were audiotaped, transcribed verbatim and grouped into themes.

Results: Twenty-five interviews were completed. Emerging themes included responsibility for medication administration and awareness of asthma management. Participant responses indicated a lack of support for prn reliever medications, and a lack of awareness of asthma management including correct inhaler technique. Pharmacists were not generally seen as a resource despite their specialised medication knowledge.

Conclusions: DSWs require support for respiratory medication administration. Strategies should include training in asthma management, training in inhaler technique and improved documentation using asthma Action Plans. Pharmacists, as medication experts, can play a more active role.

User testing of over-the-counter medicine labels and leaflets in Australia and UK: a comparative study

Vivien Tong\textsuperscript{1}, David K. Raynor\textsuperscript{2} and Parisa Aslani\textsuperscript{1}

\textsuperscript{1}Faculty of Pharmacy, University of Sydney, Sydney, NSW.
\textsuperscript{2}School of Healthcare, University of Leeds, Leeds, UK.

Objective

Over-the-counter (OTC) medicines allow consumers to engage in self-management. Accordingly, OTC labels and leaflets must be fit-for-purpose to support safe and appropriate medicine use. Few studies have investigated their usability with consumers in Australia and UK. Therefore, this study aimed to explore and compare the usability of OTC labels and leaflets in Australia and UK. Consumer perspectives on the tested medicine information were also explored.

Methods

Australian and UK OTC pholcodine and diclofenac products (4 brands in total) were selected for ‘user testing’, an intensive method that examines consumers’ ability to locate and understand information (Raynor, 2013). Demographically matched groups of 10 consumers will be recruited in Australia and UK to user-test each label and leaflet set to determine whether nine salient messages are adequately communicated. Semi-structured interviews explored consumer perspectives, and were more extensive than those usually undertaken following user testing.

Results

To date, user testing of Voltaren\textsuperscript{®} and Voltarol\textsuperscript{®} medicine labels and leaflets (diclofenac) has been conducted with 20 UK and 5 Australian consumers. Maximum daily dose and contraindication information was understood by most consumers. Some consumers misunderstood dosage information included on the Voltaren\textsuperscript{®} label. Many consumers could not locate information regarding maximum treatment duration for Voltaren\textsuperscript{®}, due to its inclusion in the ‘What Voltaren\textsuperscript{®} Rapid 25 is used for’ section of the leaflet. When using either of the leaflets, consumers had difficulty determining that another NSAID could not be used in combination with diclofenac. Clearer headings, larger font, judicious information grouping and bolding were identified as possible improvements.

Conclusions

Preliminary data suggest that Voltaren\textsuperscript{®} medicine information inadequately communicates specific key messages, whereas key messages are generally better communicated by information accompanying Voltarol\textsuperscript{®}. Further improvements may be required to maximise the usability of OTC medicine information by consumers.

Indonesian pharmacists’ awareness of secondary prevention of cardiovascular disease: a study in the community setting

Hanni P Puspitasari 1, 2, Parisa Aslani 1 and Ines Krass 1

1Faculty of Pharmacy, University of Sydney, Sydney, NSW
2Faculty of Pharmacy, Airlangga University, Surabaya, Indonesia

Objective

To investigate pharmacists’ awareness of primary and secondary prevention of CVD, CVD management guidelines, and knowledge about what constitutes secondary prevention of CVD.

Methods

In-depth, semi-structured face-to-face interviews were conducted using the Indonesian language with a convenience sample of 15 community pharmacists and five community health centre pharmacists in East Java. Interviews were audio-recorded and transcribed ad verbatim in the Indonesian language. Data were analysed using thematic analysis and then translated in English.

Results

The definition of ‘prevention of CVD’ given by almost all participants reflected aspects of primary prevention. Several respondents misunderstood the terms primary and secondary prevention and could not differentiate between them. Despite their availability, the majority could not specify any CVD management guidelines. Those who could name guidelines acknowledged that they did not apply them in practice. Many participants highlighted that taking medicines regularly and regular check-ups were essential elements of secondary prevention of CVD. However, many respondents could not specify types of medicines required in secondary prevention of CVD. In terms of lifestyle elements, most respondents mentioned healthy diet and physical activity. The main source of information used to identify patients with CVD in practice was from the medicines they collected, either with or without a prescription. Clinical information was virtually never sought from doctors. Doctors’ diagnoses could only be obtained when dispensing medicines to ASKES-Refer-Back (an insurance program) patients.

Conclusions

Indonesian pharmacists’ awareness of CVD secondary prevention was limited. Without adequate understanding and reliable resources of clinical information, pharmacists would not be able to provide support for patients with CVD.
A question prompt list (QPL) for parents of children with attention-deficit hyperactivity disorder (ADHD): Part II- validation using Delphi methodology

Rana Ahmed¹, Kirsten McCaffery² and Parisa Aslani¹

¹Faculty of Pharmacy and ²School of Public Health, University of Sydney, Sydney, NSW

Objective

Question prompt lists (QPLs) are structured lists of disease and treatment-specific questions intended to encourage patient question-asking during consultations with healthcare professionals. This study aimed to validate the content of a QPL developed for parents of children with ADHD.

Methods

A modified Delphi method, involving a three-round web-based survey, was used to validate the QPL content. Thirty-six experts were recruited into one of two panels: professional (paediatricians, child psychiatrists, psychologists, researchers (n=28)); and non-professional (parents of children with ADHD, consumer advocates (n=8)). Panel members were asked to rate the importance of 111 questions relating to ADHD diagnosis and management using a five-point scale ranging from essential to should not be included; and to suggest additional questions. After each survey round, questions were accepted for inclusion in the QPL if they were rated as essential or important by ≥ 80% of both panels.

Results

A total of 122 questions, including 11 new questions suggested by panellists, were rated by both panels. Of these, 88 (72%) were accepted for inclusion in the QPL while 50 were re-rated during follow-up survey rounds and 29 (58%) subsequently accepted. The questions covered: diagnosis; understanding ADHD; treatment (medicines, psychological/alternative); healthcare team; monitoring; management; future expectations (adolescence, health and medicines, academic/social progress); and support.

Conclusions

To our knowledge, this is the first use of Delphi methodology in validating QPL content. We propose that this method may provide a more structured approach to validating the content of future QPLs or other healthcare materials where consensus between stakeholders with potentially divergent views may be required.
**Medication Safety**

Session Chair: Rhiannon Braund  
Co-Chair: Ngaham Ailabouni  
Tuesday 10 December 2013, 11.00am – 12.30pm  
Location: Hunter Centre Rm 120 & 121

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**CP04-1**  
**Greg Kyle, University of Canberra, Australia**  
Trends in Australian antipsychotic usage 1992-2012

**CP04-2**  
**Henry Ndukwe, University of Otago, New Zealand**  
Utilisation of psychotropic medicines in older people in New Zealand from 2005 to 2011

**CP04-3**  
**Sujita Narayan, University of Otago, New Zealand**  
Use of high risk medicines in older New Zealanders: A population-level study

**CP04-4**  
**Ines Krass, University of Sydney, Australia**  
Medication adherence and use among NSW adults with type 2 diabetes (T2D)

**CP04-5**  
**Michael Leach, University of South Australia, Australia**  
Medicine use among elderly Australians before and after hip fracture

**CP04-6**  
**Mouna Sawan, University of Sydney, Australia**  
The relationship between organisational climate and prescribing practices in Residential Aged Care Facilities (RACFs) from the perspective of Health Care Professionals (HCPs)
Trends in Australian antipsychotic usage 1992-2012

Greg J Kyle¹, Veronica Scola¹, and Mark Naunton¹

Discipline of Pharmacy, University of Canberra, Canberra, ACT

Objective

The aim of this study was to compare the prescribing trends and 2012 drug costs for antipsychotic medications in Australia subsidised on the Pharmaceutical Benefits Scheme (PBS).

Methods

The Australian Government publishes aggregate usage data for all subsidised medications on the internet. Dispensing data for all subsidised oral antipsychotic drugs dispensed for concessional beneficiaries were downloaded for the period 1992-2012. The daily defined dose (DDD)/day and cost/DDD (2012 cost data) were calculated for typical and atypical antipsychotics. Time series data plots were utilised to determine usage trends by year through graphical analysis. Each antipsychotic was compared to all other similar drugs available on the PBS at each time point. Simple average cost data were calculated as a cost per DDD for each drug and also total typical and atypical antipsychotic classes.

Results

Total antipsychotic use increased by almost one order of magnitude. Extensive switching from older, typical drugs to newer atypical drugs was also found. The simple average cost for oral atypical antipsychotics in 2012 was AU$7.15 and AU$1.79 for typical antipsychotics per DDD dispensed in Australia, indicating markedly increased drug costs from switching. Increased total usage compounds the cost further. The changing adverse effect profile from predominantly movement disorders to Type 2 diabetes and cardiovascular complications was not considered. Total market growth may increase the total system cost due to the number of patients with these adverse effects.

Conclusions

This study demonstrates a swing to atypical agents on total market growth indicating increased fiscal impact on subsidy budgets. The incidence and impact of different adverse event profiles affect cost implications and require further investigation for incidence and cost impact.
Utilisation of psychotropic medicines in older people in New Zealand from 2005 to 2011

Henry C Ndukwe¹, June M Tordoff¹, Ting Wang², Prasad S Nishtala¹
¹School of Pharmacy, Univ of Otago, Dunedin, NZ
²Dept of Mathematics and Statistics, Univ of Otago, Dunedin, NZ

Objective
The purpose of this study was to describe and characterise the utilisation of psychotropic medicines in older people in New Zealand from 2005 to 2011.

Methods
Dispensing data for all psychotropic medicines were obtained from the Ministry of Health, New Zealand. Psychotropic medicines were categorised using WHO/ATC classification system and consumption was measured in defined daily doses (DDDs) per 1000 people per day.

Results
Psychotropic drug consumption from 2005 to 2011, showed a gradual decline (0.8%) over time. Antidepressants consumption increased from 73.4 to 92.1 in DDDs/1000 people/day. However, antipsychotics (7.5 to 7.1), anxiolytics (10.4 to 6.5), hypnotics and sedatives (52.5 to 36.9) all decreased. Atypical antipsychotic consumption in DDDs/1000 people/day increased (4.1 to 4.9) with the highest change observed for olanzapine (67.5% rise) whilst the consumption of typical antipsychotics declined (3.3 to 2.0). The consumption of tetracyclic antidepressants (TeCAs) and venlafaxine grew rapidly by 0.4 and 2.5 folds, respectively. Recently funded mirtazapine (>50 folds increase) was the major driver for the rise in TeCA use. Notable decreases were recorded in percentage consumption patterns for tricyclic antidepressants (14.4% to 12.9%) and benzodiazepines (7.1% to 4.5%). The average consumption of zopiclone was high (≈27.8 DDDs/1000 people/day) compared to other hypnotics.

Conclusions
Psychotropic drug consumption in older people declined from 2005 to 2011. Important findings included: (1) a marked increase in the consumption of the recently funded antidepressants, mirtazapine and venlafaxine; (2) a decrease in the consumption of tricyclic antidepressants, anxiolytics, hypnotics and sedatives (3) a high consumption of zopiclone despite risks associated with use in older people.
Use of high risk medicines in older New Zealanders: A population-level study

Sujita W. Narayan and Prasad S. Nishtala

New Zealand’s National School of Pharmacy, University of Otago, Dunedin, New Zealand

Objective

To examine the exposure to potentially inappropriate medicines (PIMs) in people aged ≥ 65 years, on a population-level, in New Zealand.

Methods

A total of 537,387 individuals were included in the study. The diagnostic information was matched for 356,409 (66.3%) of these individuals. Extracts from the Ministry of Health, Pharmaceutical Claims Data Mart (Pharms) was used to obtain information on sex, date of birth, medicine, daily dose, frequency, quantity, prioritised ethnicity and District Health Board of domicile. The International Classification of Diseases (ICD)-10 (version 6) codes were used to extract the diagnostic information from the National Minimum Data sets (2007-2011) and the updated Beers 2012 criteria was used to identify PIMs.

Results

The prevalence of PIMs was 41% (n= 537,837) with almost half of these individuals dispensed ≥ 2 PIMs in 2011. Exposure to PIMs was highest in individuals aged 65–74 years (68.92 ± 2.93) The most prevalent PIMs dispensed in the study population were diclofenac (6.0%) and amitriptyline (4.9%) followed by ibuprofen (4.6%), zopiclone (3.2%) and naproxen (3.0%). Sixty six percent of individuals (n=356,409) were dispensed at least one medicine with a potential for drug-disease/syndrome interaction. Over 33% of individuals with dementia and cognitive impairment were dispensed antipsychotics and 20.7% with anticholinergics. Among those with chronic constipation 30% received anticholinergics. Over 27.7% individuals with delirium were dispensed tricyclic antidepressants and anticholinergics and 26.3% with corticosteroids.

Conclusions

The use of inappropriate medicines at a population-level is common; a substantial number of older people were prescribed NSAIDs, amitriptyline and zopiclone. Targeting high-risk prescribing in older people represents an opportunity to reduce the costs associated with the harm from use of high risk medicines.
Medication adherence and use among NSW adults with Type 2 diabetes (T2D)

Ines Krass¹ and Teerapon Dhippayom²

¹ Faculty of Pharmacy, the University of Sydney, Sydney, NSW, Australia
² Faculty of Pharmaceutical Sciences, Naresuan University, Phitsanulok, Thailand

Objective

To investigate medication adherence and patterns of medication use among adults with Type 2 diabetes (T2D).

Methods

A cross-sectional survey was conducted among T2D members of the Australian Diabetes Council between April and June 2013. The 8-item Morisky Medication Adherence Scale (MMAS) (Morisky et al., 2008) was used to measure adherence, with a score of ≥6 as a cut-off point to indicate adherence to diabetes medication. The Brief Medication Questionnaire (BMQ) (Svarstad et al., 1999) was used to determine patterns of medication use.

Results

A total of 543 patients completed the survey (57.6% male). The median (IQR) age and duration of diabetes were 65 (57-70) years and 9 (4-14) years, respectively. Overall, 351 respondents (64.6%) were classified as adherent with a median MMAS score of 6.8 (IQR, 5.0-7.0). Among respondents, 69 (12.7%) failed to list all prescribed medicines for diabetes, hypertension and dyslipidemia; 53 (9.8%) stopped therapy due to a late refill or other reasons; 140 (25.8%) reported missed days or doses; 53 (9.8%) reduced the prescribed amount per dose; 47 (8.7%) reported that their medications do not work well; and 101 (18.6%) reported some difficulty remembering to take all medications.

Conclusions

Based on the findings of this study, adherence to diabetes medication is less than optimal. The results also suggest that a range of factors contribute to non-adherence highlighting the need for health professionals to explore and address individual barriers to assist patients to derive maximal benefits from their medication.

**Objective**

The objective of this study was to investigate the use of medicines associated with hip fracture before and after hospitalisation for hip fracture.

**Methods**

The data source for this study was the Australian Government Department of Veterans’ Affairs (DVA) healthcare claims database. The study cohort included patients over 65 who were hospitalised for hip fracture in 2009. The percentage of patients dispensed medicines associated with hip fracture was calculated in the six weeks before admission to hospital for hip fracture. McNemar’s test was used to assess changes in medicine classes that were dispensed in the six weeks before admission and the six weeks after discharge.

**Results**

There were 2,235 hip fracture patients with a median age of 87 years. Thirty-five per cent of patients were in residential aged care. At least one medicine class that increases the risk of hip fracture was used by 84% of patients before admission. The four most commonly-dispensed medicine classes were antihypertensives (63%), antidepressants (29%), benzodiazepines (26%) and opioids (19%). Osteoporosis medicines were dispensed to 15% of patients. Six weeks after discharge, dispensing of antipsychotics (P<0.0001), opioids (P<0.0001), benzodiazepines (P=0.0009) and antidepressants (P=0.01) all increased significantly. The dispensing of osteoporosis medicines also increased significantly in the six weeks after discharge (P<0.0001).

**Conclusions**

Before their hip fractures, most patients were dispensed medicines that increase the risk of hip fracture; for many of these medicines there are alternative therapeutic options to reduce risk. Antipsychotic, opioid, benzodiazepine and antidepressant use increased significantly after hospitalisation. While some of the increased use may be to treat pain or manage co-morbid dementia, it is likely that a proportion could also have been modified to reduce further risk.
The relationship between organisational climate and prescribing practices in Residential Aged Care Facilities (RACFs) from the perspective of Health Care Professionals (HCPs).

Mouna Sawan, Romano Fois and Timothy Chen
Faculty of Pharmacy, University of Sydney, Camperdown, NSW, Australia

Objective
Research shows almost half of residents in RACFs are prescribed psychotropic medications. Use of these medicines in the elderly is associated with drug related morbidity and mortality and warrants caution. There is increasing evidence of a relationship between organisational climate and the quality of health service delivery. Organisational climate refers to employees’ perception of the work environment. This qualitative explorative study aims to investigate the relationship between organisational climate and prescribing practices particularly surrounding psychotropic medicines in RACFs.

Methods
HCPs across disciplines of medicine, nursing and pharmacy servicing RACFs were purposively selected to participate in semi-structured interviews. Interviews were recorded, transcribed verbatim and thematic analysis was used to derive conceptual domains.

Results
Analysis of 40 interviews revealed a number of salient and interacting aspects of organisational climate which appear to influence prescribing practices, including work load, collaboration between HCPs and leadership. Some sample quotes follow:

“We are facing challenge with the nursing staff to manage the patients... I get frustrated sometimes like they want to use antipsychotic agents for patients who are screaming.” [Psychogeriatrician].

“They’re the necessary evil sometimes we do have to use it, it’s when you use it for behavior sometimes it’s not appropriate but you have the nursing staff and to calm down patients...we forget to review it and we leave it on for too long” [General Practitioner].

Conclusions
This study reveals complex interactions between factors influencing organisational climate and prescribing practices involving psychotropic medicines in RACFs. Strategies to support good prescribing practices in RACFs may need to consider organisational climate and calls for exploration in future research.
**Pharmacy Practice**

Session Chair: Lynne Emmerton  
Tuesday 10 December 2013, 11.00am – 12.30pm  
Venue: Hunter Centre Room G30

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**CP05-1**  
Patti Napier, University of Otago, New Zealand  
Would the separation of the clinical check and the mechanical process of dispensing have an impact on public safety? - New Zealand pharmacists’ views

**CP05-2**  
Edwin Tan, Monash University, Australia  
An evaluation of clinical services provided by pharmacists co-located in general practice clinics: the Pharmacists in Practice Study (PIPS)

**CP05-3**  
Mudassir Anwar, University of Otago, New Zealand  
Do positive attitudes to pharmacists mean that pharmacies are the first port of call for minor illnesses?

**CP05-4**  
Julia Knobloch, Pharmacy Discipline, Darwin, Australia  
The effects of regular peak flow meter utilisation on asthma self-management

**CP05-5**  
Edwin Tan, Monash University, Australia  
Improving osteoporosis management in general practice: a pharmacist-led drug use evaluation program

**CP05-6**  
Amy Waldron, La Trobe University, Australia  
The use of compounded melatonin by children: parents’ perspectives
Would the separation of the clinical check and the mechanical process of dispensing have an impact on public safety? - New Zealand pharmacists' views

Patti Napier¹, Rhiannon Braund and Pauline Norris
¹ New Zealand’s National School of Pharmacy, University of Otago, Dunedin, New Zealand

Objective
To investigate New Zealand pharmacists attitudes towards the separation of the clinical role from the mechanical process of dispensing. These roles are currently not separated in New Zealand and this study investigated New Zealand pharmacists’ attitudes to this separation and the impact this separation might have on public safety.

Methods
Surveys were sent to all those pharmacists registered with the New Zealand Pharmacy Council who had indicated a willingness to participate in research.

Results
Surveys were returned from 736 pharmacists, a return rate of 36%. Over half (53%) of the pharmacists felt that this change would have a positive impact on public safety, over a third (34%) were unsure and nine percent felt this would have a negative impact. The majority of respondents agreed that the greatest benefit would be improved clinical outcomes for the patients, due largely to better use of pharmacists’ clinical skills and training.

Issues were identified that could lead to an increase in dispensing errors and many suggestions were made as to how to overcome these.

Conclusions
The pharmacists believed that the separation of the clinical from the mechanical part of the dispensing process would result in an increased emphasis on the clinical component of the dispensing process. This could lead to more time dedicated to a clinical assessment of prescriptions which they felt would improve clinical outcomes for the patients. To ensure safety clear and stringent guidelines and standard operating procedures would need to be in place.
An evaluation of clinical services provided by pharmacists co-located in general practice clinics: the Pharmacists in Practice Study (PIPS)

Edwin C. K. Tan¹, Kay Stewart¹, Rohan A. Elliott¹,² and Johnson George¹
¹ Centre for Medicine Use and Safety, Monash University, Parkville, VIC
² Pharmacy Department, Austin Health, VIC

Objective

To evaluate a practice pharmacist role in primary care clinics to improve the quality use of medicines.

Methods

A prospective, before-after study (the Pharmacists in Practice Study [PIPS]) was conducted at two general practice clinics in Melbourne. The intervention consisted of a multi-faceted, collaborative service involving a pharmacist co-located part-time in the clinics for six months. The practice pharmacists provided long and short patient consultations, medicines information and education services, and quality assurance activities (a drug use evaluation [DUE] program for osteoporosis management). Patients who received long consultations were followed over six months. Medication-related problems (MRPs), medication adherence and patient satisfaction were assessed using validated instruments. Clinician and patient experiences were explored qualitatively using interviews, focus groups and narrative reports.

Results

Eighty-two patients were recruited for a long consultation and 62 (75.6%) completed the study. The median number of MRPs per patient identified by the clinic pharmacist was 2 (interquartile range [IQR] 1, 4). Six months after review, this fell to 0 (IQR 0, 1), p<0.001. The proportion of patients who were adherent to their medications improved significantly, according to both the Morisky (44.1% versus 62.7%, p=0.023) and the Tool for Adherence Behaviour Screening (TABS) (35.6% versus 57.6%, p=0.019) scales. There was no significant effect on health service use. Patients were highly satisfied with the consultations. Staff were receptive to the clinical pharmacy services and pharmacists enjoyed their new role.

Conclusions

This study demonstrated the feasibility and value of integrating pharmacists into general practice clinics to optimise medication use.
**Do positive attitudes to pharmacists mean that pharmacies are the first port of call for minor illnesses?**

Mudassir Anwar, James Green and Pauline Norris

New Zealand’s National School of Pharmacy, University of Otago, Dunedin, New Zealand

**Objective**

The traditional role of community pharmacists as dispensers has been broadened to include areas such as giving advice on minor ailments and involvement in health promotion. Community pharmacists can be the first port of call for advice on minor illnesses. However, many people still continue to seek advice directly from GP. This study investigated people’s attitudes towards pharmacists, explored predictors of positive attitudes to pharmacists, and to determine how often people consult pharmacists for minor illness.

**Methods**

A random telephone sample of 152 people from Dunedin was surveyed on attitudes towards pharmacists, along with a range of demographic data, personality traits and beliefs. The participants were then prospectively surveyed daily for a period of 30 days to report their experience of minor illnesses and whether they consulted any health care professional for their symptoms.

**Results**

People generally reported positive attitudes towards pharmacists with a mean score of 4.0 (on a 1 to 5 scale). Young age, future orientation and a positive attitude towards other orthodox health professionals were found to be the predictors of positive attitude towards pharmacists. Despite the positive attitudes, and 812 symptom episodes, there were only 20 instances where respondents considered seeking help from pharmacists and only 9 episodes resulted in actual consultation. The figures for consultation with GP were 55 and 21 respectively.

**Conclusions**

The findings suggest that people despite having positive attitudes towards pharmacists do not see them often for minor illnesses and doctors are still the preferred choice. There is a need to develop strategies to increase patients' awareness of the qualifications and training of pharmacists and their role in the management of minor illness.
The effects of regular peak flow meter utilisation on asthma self-management

Julia Knobloch¹, Kwang C. Yee² and Mary-Jessimine Bushell
¹Pharmacy Discipline, SPCS, CDU, Darwin, NT (introduced by Rahul Patel, UTAS, Hobart, AUS)

Introduction

Asthma is a common chronic disease in Australia with suboptimal self-care. The peak flow meter (PFM) is a simple device available at pharmacies that measures a specific part of lung function, the peak expiratory flow (PEF), which can be utilised by people with asthma for their disease management.

Objective

To identify if the introduction of PFM with appropriate education can improve engagement in asthma self-management.

Methods

The study was designed as a before-and-after controlled intervention pilot study, conducted in 3 separate steps each including a meeting with the researcher. Participants in the intervention group were provided with a PFM and asthma education, whereas the controlled group only received asthma education. The participants’ asthma management was compared using validated questionnaires and formative feedback.

Results

Twelve subjects were recruited (five intervention and seven control). The effect of asthma knowledge and asthma control determined by questionnaires was similar between the two groups. However, majority of feedback was positive, and indicated an increase in self-awareness of their asthma.

Conclusions

The study does not show great improvement in asthma control. However, the findings are limited by small sample size and relatively good asthma control at baseline of most subjects. In addition, the long term benefit of asthma control is not assessed and follow-up assessment is recommended for future studies. The finding suggested that participants are more confident in their asthma control after the intervention, and it is achievable to integrate PFM education and monitoring into pharmacy practice. The service can expand current pharmacist service in multidisciplinary approach to optimise asthma control, and potentially improve asthma self-management.
Improving osteoporosis management in general practice: a pharmacist-led drug use evaluation program

Edwin C. K. Tan¹, Johnson George¹, Kay Stewart¹ and Rohan A. Elliott¹,²

¹Centre for Medicine Use and Safety, Monash University, Parkville, VIC
²Pharmacy Department, Austin Health, VIC

Objective
To evaluate and improve the management of osteoporosis in general practice clinics.

Methods
A drug use evaluation (DUE) program, led by practice-based pharmacists at two primary healthcare clinics in Melbourne, Australia, was undertaken as part of a larger study (the Pharmacists in Practice Study [PIPS]). Patients with a diagnosis of osteoporosis were identified by searching of the clinics’ electronic medical records. Data on the use of osteoporosis medications and supplements, and contraindications to therapy, were extracted from the medical records. Patients’ management was compared to Australian guidelines for osteoporosis management. An intervention comprising prescriber feedback, education and case-conferences, and patient education mail-outs was implemented. The audit was repeated six months after the intervention. The primary outcome was the proportion of patients with a diagnosis of osteoporosis who were prescribed an anti-osteoporosis medicine, taking into account precautions and/or contraindications to all anti-osteoporosis therapies. Feedback was obtained from GPs, pharmacists and practice staff about the acceptability of the DUE service.

Results
227 patients with osteoporosis were included in the pre-intervention audit and 240 in the post-intervention audit. The proportion of patients who did not have contraindications or precautions to all anti-osteoporosis drug therapies documented in their records and were prescribed an anti-osteoporosis medicine increased significantly after the intervention (134/227 [59.0%] vs. 168/240 [70.0%], p=0.002). The proportion of patients for whom vitamin D and/or calcium supplement use was documented also increased significantly (145/227 [63.9%] vs. 205/240 [85.4%], p=0.002). Practice staff were generally positive about the intervention, although some areas for improvement were suggested.

Conclusions
A practice pharmacist-led DUE improved the management of osteoporosis in general practice and was well accepted by practice staff.
The use of compounded melatonin by children: parents’ perspectives

Amy Waldron, Joy Spark and Christina Dennis
Pharmacy and Applied Science, La Trobe University, Bendigo, Victoria

Objective
The objective of this study was to explore the perceptions and experiences of parents whose children were using compounded melatonin.

Methods
A qualitative exploratory study was undertaken using semi-structured interviews to explore parents’ experiences and perceptions of their child using melatonin following an interview guide that was adapted after each interview. The research project was advertised by two participating compounding pharmacies. Interviews were audio recorded and transcribed verbatim then data were thematic analysed. Data collection continued until theoretical saturation occurred.

Results
Ten interviews were conducted with 12 participants. In each interview, melatonin was perceived positively, and participants conveyed the favourable impact melatonin had had on the life of the family. Children of participants had been experiencing sleep disturbances for an extended period of time; participants had tried many techniques to encourage sleep prior to initiating melatonin therapy. That melatonin enabled their children to sleep came as a welcome and often unexpected result as many participants had no expectation that melatonin would solve their child’s sleep issues. The behaviour of children during the day was also reported to have improved during therapy with melatonin. The perceived ‘naturalness’ of melatonin was also valued by participants who tended to favour it over other medications prescribed for sleep. The cost of melatonin was commented on by every participant, even when subsidized by their private health insurance to be the same as the PBS general patient contribution; however, all perceived the benefits of melatonin for the child and the family to be greater than the cost burden.

Conclusions
Parents perceive melatonin to be effective in alleviating both their child’s sleep disturbance and behaviour, as well as restoring family functioning.
NZCRS – Session 1 -The Biological-Therapeutic Interface

Session Chair: Kahled Greish
Co-Chair: Kan Kaneko
Tuesday 10 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Room 122 & 123

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**CPO6-1**

Yuan Huang, Sichuan University, China

Epithelial cell-targeting nanoparticles for oral delivery of protein drugs & the influence of mucus

**CPO6-2**

Arlene McDowell, University of Otago, New Zealand

Cell-penetrating peptides to enhance cell uptake of polymeric nanoparticles

**CPO6-3**

Natalie Medlicott, University of Otago, New Zealand

Protein instability on interfaces – implications for dosage form design

**CPO6-4**

Ian Tucker, University of Otago, New Zealand

Mastitis in dairy cattle – a challenge for the delivery scientist
Epithelial cell-targeting nanoparticles for oral delivery of protein drugs and the influence of mucus

Yuan Huang

West China School of Pharmacy, Sichuan University, China

Objective
Nanocarriers are considered promising vehicles for oral delivery of peptide and protein drugs. However, one of the greatest challenges in developing an efficient nanocarrier for oral delivery is to overcome the absorption barrier of intestinal mucosa, consisting of intestinal epithelial cells as well as mucus layer.

Methods
Goblet cell-targeting trimethyl chitosan nanoparticles conjugated with CSK peptide (CSK-M NPs) were prepared by multi ion crosslinked method with hydrophobic modification. Mucus-producing HT29-MTX cells and the entrocytes like Caco-2 cells were co-incubated as the cell model to simulate the epithelium and applied for the in vitro evaluations of targeting efficiency and the influence of mucus. Hypoglycemic effect and relative bioavailability of the targeting NPs were tested in diabetic rats.

Results
Compared with unmodified nanoparticles, CSK-M NPs showed enhanced drug internalization and transport across the Caco-2/HT29-MTX cell monolayer. Significantly enhanced bioavailability was obtained in vivo.

Conclusions
The multi ion cross-linked method with hydrophobic modification could improve the stability of NPs and provide better drug protection, thus enhance the drug absorption both in vitro and in vivo. Meanwhile, CSK peptide modification was able to facilitate the drug absorption by its goblet cell-targeting effect even in the presence of mucus. Finally, pharmacological studies suggested that this oral delivery system might be a promising strategy for the delivery of peptide and protein drugs.
Cell-penetrating peptides to enhance cell uptake of polymeric nanoparticles

Arlene McDowell

1School of Pharmacy, University of Otago, Dunedin, New Zealand

Cellular uptake of nanoparticulate drug carriers depends on the surface characteristics presented at the nano-bio interface. Cell penetrating peptides (CPPs), or Trojan peptides, are short cationic sequences of amino acids that are of interest due to their ability to traverse membranes and potentially enhance oral bioavailability of drugs. We have used a histidine tagging strategy to produce polymeric nanoparticles surface-decorated with cell-penetrating peptides. We have in vitro evidence that the arginine-tagged nanoparticles increase cell uptake compared to plain nanoparticles.
Protein instability on interfaces – implications for dosage form design

Natalie J Medlicott

1 School of Pharmacy, University of Otago, Dunedin, New Zealand

New protein molecules are being discovered in the biotechnology industries and investigated as drug candidates (1,2). Although proteins have been well studied in nature and biochemistry, these molecules demonstrate unique problems when attempting to use them as medicines as they often have poor physical stability during manufacturing and storage (3).

Protein molecules are often surface active and aggregation reactions may occur when protein molecules accumulate at interfaces (4). During formulation protein molecules are expected to encounter many interfaces (liquid/air, liquid/liquid and liquid solid), which may promote physical instability of the protein. Understanding the time-course and mechanisms by which formulation excipients mediate or inhibit protein interfacial physical aggregation may yield results that are useful for formulation design. This talk will describe how interfacial rheology may be used as a tool to investigate protein aggregation at model hydrophobic interfaces, and explore whether this information can have implications in dosage form design for protein drugs.

Mastitis in dairy cattle – a challenge for the delivery scientist

Ian Tucker ¹
¹School of Pharmacy, University of Otago, Dunedin, New Zealand

Clinical mastitis in dairy cattle occurs due to bacterial infections. The incidence is about 40 cases per 100 cows per year, and the cure rate of bovine mastitis varies between 20-80%, depending on the mastitis-causing organisms. It is estimated that annual losses from mastitis exceed $35b US dollars.

The choice of antibiotics for treatment is restricted because of concerns that over-use of antibiotics in the veterinary field may lead to development of resistance, which would undermine treatment of human infections. Thus, innovative antibiotic treatments of mastitis based on novel delivery systems are required.

In this paper, I will discuss the challenges for the drug delivery scientist of effectively delivering antibiotics to infected regions of a 30kg organ – the udder. Delivery can either be through the teat (intramammary administration) or by injection, in which case the challenge is to cross the blood-milk barrier. This paper will discuss some of the approaches we have taken and describe the translation of those approaches into effective products for the treatment of bovine mastitis.
Drug Design and Formulation

Session Chair: Shakila Rizwan
Co-Chair: Kan Kaneko
Wednesday 11 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Rm 120 & 121

CP07-1
Zong-Quan Ou, University of Otago, New Zealand
Cellular activity of antioxidant extracts from pūhā (Sonchus oleraceus L.) leaves

CP07-2
Mohammed Azad, Monash University, Australia
Polymyxin B (PMB) induces mitochondrial dysfunction and activation of caspases in NRK-52E cells

CP07-3
Franziska Huschmann, University of Otago, New Zealand
Antifungal drug discovery – Crystallization of the cytochrome P450 triazole target

CP07-4
Feifei Feng, University of Otago, New Zealand
Unexpected in vitro cell uptake of norketotifen compared with ketotifen

CP07-5
Joan Ho, Monash University, Australia
PEGylation increases the distribution and transfection efficiency of DNA vaccine lipoplexes in muscle

CP07-6
Jamal Khan, Monash University, Australia
Linking solid state issues to the precipitation behaviour of poorly soluble drugs from lipid based formulations
Cellular activity of antioxidant extracts from pūhā (*Sonchus oleraceus* L.) leaves

Zong-Quan Ou1, Bettina Poller1, David M. Schmierer1, Thomas Rades2 and Arlene McDowell1
1 New Zealand's National School of Pharmacy, University of Otago, Dunedin, New Zealand
2 Department of Pharmacy, University of Copenhagen, Copenhagen, Denmark

**Objective**

*Sonchus oleraceus* has high antioxidant activity indicating potential to be formulated into a nutritional supplement. Although chemical antioxidant activity assays have been widely used, none has the ability to represent the complexity of biological systems. We aim to investigate *in vitro* cellular antioxidant activity and anti-aging effect of antioxidant extracts from *S. oleraceus* leaves.

**Methods**

Antioxidant activity of 70% methanolic leaf extracts under biological conditions was assessed using the Cellular Antioxidant Activity (CAA) assay (Wolfe and Liu, 2007) using two cell culture models – human hepatoma (HepG2) and lung fibroblast (WI-38) cells. To investigate anti-aging effect of leaf extracts, WI-38 cells were exposed to 20 mg/mL leaf extracts or 100 µM ascorbic acid for 1 hr per day. Senescence associated-β-galactosidase (SA-β-gal) activity was evaluated using C12FDG, a fluorogenic substrate for β-gal activity (Debacq-Chainiaux et al., 2009). Fluorescence detection was performed using flow cytometry.

**Results**

CAA assay data were expressed as median effective dose (EC50). *S. oleraceus* leaf extracts exhibited high CAA with an average EC50 of 1.87 ± 0.33 mg/mL in HepG2 cells. Leaf extracts reduced SA-β-gal activity in WI-38 cells, compared to the controls.

**Conclusions**

The antioxidant effects of *S. oleraceus* leaf extracts exhibited in biochemicals assays translates to a high CAA. Further, these extracts have been shown to possess some anti-aging effects *in vitro*. Thus, *S. oleraceus* leaf material is a good candidate to be formulated into nutraceutical product with demonstrated antioxidant effects.


Polymyxin B (PMB) induces mitochondrial dysfunction and activation of caspases in NRK-52E cells

Mohammad A. K. Azad\textsuperscript{1}, Lachlan Whitehead\textsuperscript{2}, Cameron Nowell\textsuperscript{2}, Kelly Rogers\textsuperscript{2,3}, Roger L. Nation\textsuperscript{1}, Tony Velkov\textsuperscript{1} and Jian Li\textsuperscript{1}

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\textsuperscript{2}Centre for Dynamic Imaging, Walter and Eliza Hall Institute, Parkville, VIC
\textsuperscript{3}Department of Medical Biology, University of Melbourne, Parkville, VIC

Objective
Understanding of the detailed mechanism of dose-dependent nephrotoxicity induced by polymyxins, a last-line therapy for Gram-negative ‘superbugs’, is crucial for rational use and discovery of novel and safer polymyxins. Our aim was to investigate whether PMB induces mitochondrial dysfunction and activation of specific caspases in rat kidney proximal tubular cells (NRK-52E).

Methods
NRK-52E cells were exposed to 0.25, 0.5 and 1.0 mM of PMB for 24 h in DMEM with 0.1% FBS. Activation of caspases-3, -8, and -9 was determined using confocal microscope (CM) after staining the treated cells with Red-DEVD-FMK, Red-IETD-FMK and Red-LEHD-FMK. To examine the loss of membrane potential ($\Delta \psi_m$) and superoxide generation of mitochondria, cells were incubated with TMRE and MitoSOX Red, respectively, and examined by CM.

Results
Dose-dependent activation of caspases-3, -8, and -9 was observed in PMB-treated cells. CM studies revealed $\Delta \psi_m$ in the PMB-treated cells. The number of cells (%) containing mitochondria with intact membrane potentials gradually decreased down to 30.0 ±5.2\% (Mean ±SD; \textit{n}=3) after treatment with PMB (up to 1.0 mM). In PMB-treated cells, increase of fluorescence intensity of MitoSOX Red up to 686.8 ±66.7\% of control cells indicates induction of mitochondrial superoxide by PMB.

Conclusions
This study is the first to demonstrate that PMB treatment leads to mitochondrial dysfunction and activation of caspases in NRK-52E cells which could play a potential role in PBM induced apoptotic-like cell death.
Antifungal drug discovery – Crystallization of the cytochrome P450 triazole target


1School of Pharmacy, University of Otago, Dunedin, New Zealand.
2Sir John Walsh Research Institute and Department of Oral Sciences, Faculty of Dentistry, University of Otago, Dunedin, New Zealand.
3Department of Biochemistry, University of Otago, Dunedin, New Zealand.
4Department of Biochemistry and Biophysics, University of California at San Francisco, San Francisco, California 94158, USA.

Objective
Lanosterol 14α-demethylase (Erg11p or Cyp51p) is the target of the triazole drugs commonly used to treat life-threatening fungal infections. Erg11p is a membrane-anchored cytochrome P450 enzyme in the biosynthetic pathway of ergosterol, a component of the fungal cell membrane required for cell growth. Crystal structures of the soluble Cyp51p from Mycobacterium tuberculosis and N-terminal truncated catalytic domains from mammalian cytochrome P450s are unsuitable for modelling azole-target interactions in fungi. The aim of this study was the functional and structural characterisation of Erg11p in order to establish a platform for the development of improved antifungal drugs less susceptible to known resistance mechanisms.

Methods
Full-length membrane-anchored Erg11p was expressed in Saccharomyces cerevisiae. Stable and monodisperse Erg11p suitable for crystallography was obtained by solubilization in n-decyl-β-D-maltopyranoside, Ni-NTA affinity chromatography and size exclusion chromatography. Inhibitor binding assays were performed for Erg11ps from fungal pathogens by measuring the wavelength shift in the heme peak absorbance. Data collection for six ScErg11p crystals was conducted at the Advanced Light Source at the Lawrence Berkeley National Laboratory, California, USA.

Results
Crystal structures generated for empty and ligand-bound ScErg11p are the first structures for any full-length cytochrome P450 enzyme showing resolution of the membrane spanning helix and give insight into the binding of lanosterol and triazole drugs. The ScErg11p crystal structure revealed a rigid interaction between the transmembrane and catalytic domain that orientates the enzyme relative to the lipid bilayer and helps define the size and shape of the substrate channel. A newly discovered secondary vestibule with a product exit channel and conserved amino acid residues in fungal pathogens provide suitable anchor points for a pharmacophore.

Conclusions
The pharmacophore could lead to a new class of drugs that lacks the triazole ring and instead targets features more specific for fungal pathogens, which would minimize off-target effects.
Unexpected *in vitro* cell uptake of norketotifen compared with ketotifen

Feifei Feng, J. Paul Fawcett and Ian G. Tucker.
New Zealand’s National School of Pharmacy, University of Otago, Dunedin

**Objective**

To investigate and clarify the unexpected behaviours of apparent uptake and permeation of ketotifen (pKa 8.8, base) versus norketotifen (pKa 10.4, base) in RBE4 and Caco-2 cells.

**Methods**

The uptake of ketotifen and norketotifen atropisomers (0.2-100 μM) by RBE4 cell monolayers was investigated in 12-well plates for 2 min at 37 ºC. Cells were lysed and homogenised and then analysed for ketotifen and norketotifen atropisomers. The permeation of ketotifen and norketotifen atropisomers (5 μM) through Caco-2 cell monolayers (A to B and B to A) was investigated in 12-well Transwell plates for 2 hr at 37 ºC. Samples were taken at 0, 20, 40, 60, 90, and 120 min from receptor side, and from cells and donor at 120 min for mass balance. Ketotifen and norketotifen atropisomers were quantified by a validated chiral HPLC assay. LogD (liposome/pH7.4 buffer; octanol/pH7.4 buffer) for ketotifen and norketotifen were determined at 37 ºC.

**Results**

In uptake studies, norketotifen showed unexpectedly higher uptake into RBE4 cell monolayers than ketotifen. This was in conflict with the logD (octanol-buffer) but not for the log D (liposome-buffer). In Caco-2 studies, there was no significant difference between ketotifen and norketotifen permeation across the cell monolayers. However, there was more norketotifen than ketotifen associated with the Caco-2 cells at 120 min, in agreement with the RBE4 uptake result.

**Conclusions**

The unexpectedly higher uptake of norketotifen compared with ketotifen into RBE4 cells may be due to nonspecific binding to cell membranes. This is probably due to binding of the cationic drug to anionic membranes. Cell uptake studies will be misleading if the binding of cationic drugs to cell surfaces is misinterpreted as uptake into cells.
**Objective**

DNA vaccinations are a novel approach whereby immunisation is achieved by administering plasmid DNA coding for a specific immunogenic epitope to cells. It has broad applications – where the DNA can be engineered to code for pathogenic antigens to fight off infectious diseases, or even for anti-oncogenic genes to suppress tumour growth in cancer. However, they are still poorly immunogenic due to their low ability to transfected cells in vivo. Our study focuses on designing an intramuscular DNA delivery system that is able to efficiently transfect cells.

**Methods**

Two nanoparticle formulations were designed and tested in mice: a cationic DNA lipoplex and a charge-neutralised PEGylated DNA lipoplex. A 50 ug plasmid dose of each lipoplex was administered to the calf muscle of mice. To determine the transfection efficiency, the muscle was collected 24 hours post-injection and assayed for expression of the luciferase reporter. To study the extent of distribution of our nanoparticles throughout the muscle, the plasmid was fluorescently labelled and tracked via confocal microscopy.

**Results**

Results show that the PEGylated lipoplexes had a 30-fold higher luciferase transfection activity (n=6; P < 0.0001) than the un-PEGylated lipoplexes in the injected muscle. Confocal studies illustrated that the cationic DNA lipoplexes were found mostly localised to only the site of injection, while their PEGylated counterparts showed a higher degree of dispersion throughout the muscle.

**Conclusions**

These findings suggest that PEGylation can increase the transfection efficiency of DNA lipoplexes in muscle tissue. This is likely due to its increased motility and dispersion in the tissue, enabling it to come into contact with more cells. This provides a basis for new intramuscular DNA vaccine strategies.
Linking solid state issues to the precipitation behaviour of poorly soluble drugs from lipid based formulations

Jamal T Khan and Ben J Boyd

Drug delivery, disposition and dynamics, Monash Institute of Pharmaceutical Sciences, Parkville, VIC

Objective

A fundamental issue with lipid formulations is a loss of solubilisation capacity on digestion of the lipids, which can lead to drug precipitation. Until now, polymeric precipitation inhibitors have been extensively studied (Warren DB et al., 2010), but formulation strategies that take into account the solid state of precipitated drug have not surfaced. However, recent findings indicate that drug precipitation during digestion is not limited to poorly soluble crystalline forms, with amorphous precipitation of the basic drug cinnarizine being detected during in-vitro lipolysis (Sassene PJ et al., 2010). This study examined a possible approach, based on the ionisability of a model acidic drug (naproxen) and cationic lipids, to form amorphous salts upon drug precipitation, which could potentially improve drug dissolution properties and bioavailability.

Methods

Naproxen (50 mg) was weighed into a scintillation vial and combined (in a 1:1 mol ratio) with cationic lipids; stearyl- and octyl-amine, separately. Samples were dissolved in ethanol and excess solvent removed under vacuum.

Solid samples were then characterized with FTIR, as a way to confirm ionic interaction between naproxen and the cationic lipids used.

Results

Infrared absorption for raw naproxen indicates the presence of a carboxyl functional group (1700 cm\(^{-1}\)), conversely stearylamine and octylamine both show an absorption peak corresponding to an amine function (3300 cm\(^{-1}\)). Spectra for combined samples showed an absence of these functional groups, suggesting that ionic interaction has taken place, giving rise to a naproxen/cationic lipid salt.

Conclusions

It is proposed that the combination of acidic drug and cationic lipids, in this case naproxen and stearyl/octylamine, leads to the formation of a salt form upon precipitation, due to ionic interactions. Thus, lipid based formulations that make use of this finding could potentially improve solid state dissolution properties upon drug precipitation during digestion, in turn improving drug absorption and bioavailability.

References:

Sassene PJ et al. Precipitation of a Poorly Soluble Model Drug during In Vitro Lipolysis: Characterization and Dissolution of the Precipitate. J Pharm Sci. 2010

Warren DB et al. Using polymeric precipitation inhibitors to improve the absorption of poorly water-soluble drugs. J Drug Target. 2010
Clinical Pharmacy

Session Chair: Natalie Gauld
Co-Chair: Mudassir Anwar
Wednesday 11 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Room G30

CP08-1
Dana McLennan, University of Tasmania, Australia
Drug-related problems in pain management in palliative care

CP08-2
Kevin Mc Namara, Monash University, Australia
Prevalence of factors that influence prescribing of key therapies at discharge following acute coronary syndrome

CP08-3
Nagham Ailabouni, University of Otago, Dunedin
Examining the appropriateness of prescribing in older people in care homes in New Zealand using the STOPP/START Criteria

CP08-4
Durga Bista, University of Tasmania, Australia
Tasmanian atrial fibrillation study: baseline characteristics

CP08-5
Stella Tulo, Curtin University, Australia
An evaluation of patients’ adherence with hypoglycaemic medications among Papua New Guineans with type 2 diabetes: influencing factors.

CP08-6
Tariq Alhawassi, University of Sydney, Australia
Changes to antihypertensive regimens in hospitalisation of elderly inpatients
Drug-related problems in pain management in palliative care

Dana McLennan¹, Angus Thompson¹, Leanne Chalmers¹, Gregory Peterson¹ and Guy Bannink³
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²Pharmacy Department, Royal Hobart Hospital, Hobart, Tasmania
³Palliative Care Unit, Royal Hobart Hospital, Hobart, Tasmania

Objective
The palliative care population are at risk of experiencing a range of drug related problems (DRPs) in the management of pain, their most prevalent symptom. This study aimed to comprehensively explore the DRPs experienced by southern Tasmanian palliative care patients in their pain management.

Methods
This study consisted of two parts. Part A involved a retrospective audit of medical records of patients admitted to the Royal Hobart Hospital (RHH) palliative care unit between August 2010 and June 2012. Data were collected regarding DRPs experienced, and medication use was compared with guideline recommendations. Part B was conducted between April and June 2013 and used a survey to interview palliative care patients and carers about their experiences of pain management.

Results
In Part A, 104 of the 150 patients reviewed experienced pain; this was uncontrolled on admission in 88/104 patients (84.6%). Fifty-seven of 75 documented pre-admission drug regimens contained potential DRPs (76.0%); drug toxicity was especially common (40.4%). Adherence with prescribing guidelines ranged from 17% to 48%. In Part B, 22 of the 30 (73.3%) patients or carers described potentially unrealistic expectations regarding pain management. Almost half of the patients (46.7%) reported major problems with medication side effects, especially constipation.

Conclusions
Southern Tasmanian patients admitted for in-patient palliative care commonly experience DRPs regarding management of their pain and these impact significantly on their quality of life. The findings of this study may assist in directing healthcare services, especially pharmacy services, in the future development of strategies to better assist these patients.
Prevalence of factors that influence prescribing of key therapies at discharge following acute coronary syndrome

Kevin Mc Namara\textsuperscript{2,3}, Eva Hoff\textsuperscript{1,2}, Edward Janus\textsuperscript{3,4}, Harin Karunajeewa\textsuperscript{4}, Rochelle Gellatly\textsuperscript{2}, Rohan Elliott\textsuperscript{2}, Karen Sanders\textsuperscript{5}, Melanie Welsh\textsuperscript{5}, Danny Lay\textsuperscript{5}, Adam Pastor\textsuperscript{4}, Susan Poole\textsuperscript{2} and Omar Farouque\textsuperscript{5}

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\textsuperscript{5}Department of Cardiology, Austin Hospital, Heidelberg Victoria

Objective

To measure the prevalence in cardiology and non-cardiology units of factors influencing discharge prescribing of evidence-based therapies following acute coronary syndrome (ACS).

Methods

Random, retrospective medical chart audit of patients discharged following ACS, undertaken in three Victorian tertiary referral centres and a regional hospital. Key medicines were beta-blockers, antiplatelet, lipid-lowering, and renin-angiotensin system agents. Known prescribing influences examined included age, co-morbidities, ACS acuity, therapy contraindications, cardiovascular history and risk factors.

Results

Overall, 307 non-cardiology and 246 cardiology discharges were examined. Cardiology patients were twice as likely to receive all four therapies (63% vs. 34%). On average, non-cardiology patients were older (83 vs. 66 years), had higher Charlson Co-Morbidity Score scores (4.4 vs. 2.6) and were less frequently male (51% vs. 72%) or had STEMI diagnosis (5% vs. 28%). Non-cardiology patients were more frequently admitted in the 28 days prior to the current admission (28% vs. 9%). Smoking was significantly more prevalent among cardiology patients (26% vs. 9%), other chronic risk factors were not. Non-cardiology patients had significantly higher prevalence of other primary diagnoses (28% vs. 13%); and were significantly more likely (54% vs. 20%) to have contraindications to key medicines.

Conclusions

Decisions to prescribe key evidence-based therapies appear more complex for typical non-cardiology patients, compared with cardiology patients.
Examining the appropriateness of prescribing in older people in care homes in New Zealand using the STOPP/START Criteria

Naghm J. Ailabouni, Prasad S. Nishtala and June M. Tordoff
New Zealand’s National School of Pharmacy, University of Otago, Dunedin, NZ

Objective

To identify potential inappropriate prescribing (PIP) and potential prescribing omissions (PPO) in two residential care homes in New Zealand, using the STOPP/START criteria; and to compare with findings in Europe.

Methods

The study was approved by the University of Otago Human Ethics Committee. Consent was sought from residents’ ≥65 years-old living in two rest homes in Dunedin, New Zealand, or from their representatives. Data were collected on age, sex, medicines, medical conditions and laboratory tests surveying medication charts and clinical notes. STOPP/START criteria was used to examine the appropriateness of prescribing, and findings compared with studies from Europe.

Results

In total 137 (68.5%) residents participated, and most of these 103 (75.2%) were women. The mean age of the residents was 85.4 years old (±7.7). The median number of regular medicines was 9 (0-21) and that for ‘when required’ medicines was 6 (0-14). STOPP identified 205 PIPs affecting 102 residents (74.5%). START identified 66 PPOs affecting 49 (35.8%) residents. The most commonly occurring PIP (18.6%) was the use of antipsychotic medicines in residents with a medium or high falls risk. The findings for PIP and PPO are comparable with studies in Europe, PIP:79%, PPO:74% (García-Gollarte F et al., 2011).

Conclusions

Consistent with findings in Europe, a high proportion of residents aged ≥65 years-old in two New Zealand rest homes were prescribed at least one potentially inappropriate medicine, or had an omission of a clinically indicated medicine. The STOPP/START tool could be useful in residential care to screen for potential problems with prescribing.

References

Tasmanian atrial fibrillation study: baseline characteristics

Durga Bista, Gregory Peterson, Leanne Chalmers, and Luke Bereznicki
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Objective

1. To review the prescribing and outcomes of antithrombotic therapy in patients with AF who are admitted to Tasmanian public hospitals

2. To identify the rate of readmissions for thromboembolic and haemorrhagic complications in patients with AF.

Methods

This is a retrospective observational study designed to review and follow AF patients admitted to the Royal Hobart, Launceston General and North –West Regional Hospitals. The initial phase involves the retrospective review of patients with AF admitted between 1\textsuperscript{st} Jan 2011 to 30\textsuperscript{th} June 2012. The present findings describe the baseline characteristics of the AF patients in the study as of 2013.

Results

As of September 2013 we reviewed the records of 914 adults (≥ 18 years) diagnosed with chronic AF and excluded all acute cases of AF. A total of 534 (RHH: 353, NWRH: 97, LGH: 84) have been included in the study. The mean ±SD age of the patients was 75.1 ±11.6 years; 55% were male. Overall 54.6% of patients had paroxysmal AF. The mean ± SD CHADS\textsubscript{2} score was 2.1 ±1.3, and 65.1% had score ≥2. The mean ±SD CHA\textsubscript{2}DS\textsubscript{2}-VASc score was 3.6 ±1.8, and 9.7% had score of 1 while 86.5% had score ≥2. The majority of the patients (69.0%) had intermediate HAS-BLED score of 1-2. More than half of the enrolled were receiving antithrombotic treatment (68.9%) on admission and 40.7% of those receiving antithrombotic therapy had moderate renal impairment (eGFR 30-60 mL/min per 1.73 m\textsuperscript{2}). Hypertension was the most commonly associated comorbid condition (67%).

Conclusions

This study will provide crucial information to aid the proper selection of antithrombotic drugs for individual patients to improve the quality of antithrombotic use in Australians with AF.
An evaluation of patients’ adherence with hypoglycaemic medications among Papua New Guineans with type 2 diabetes: influencing factors.

Stella T. P. Tulo¹, Richard Parsons² and Jeffery D. Hughes¹

¹School of Pharmacy¹, Curtin University, Perth, WA
²School of Psychology², Curtin University, Perth, WA.

Objective
The aims of this study were to evaluate the extent of adherence to hypoglycaemic medications, assess the relationship between adherence and glycaemic control, and evaluate factors affecting adherence.

Methods
Patients diagnosed with type 2 diabetes for more than 3 months, who were registered at the Port Moresby General Hospital Diabetes Clinic and who gave informed consent were included in the study. Face to face interviews were done using a standardised questionnaire designed and data were collected concerning the 3 months prior to interview. Data collected included participants’ demography, lifestyle, biochemical and physical measurements, and medication management. Adherence cut offs of 100%, 90% and 80% were used to examine how different levels of adherence affected glycaemic control. Statistical analysis was undertaken using the SAS version 9.2 statistical software.

Results
Of a total of 356 prescribed hypoglycaemic medications, 40.5% reported 100% adherence. Age appeared to have a significant impact on adherence at all levels of adherence with those ≥50 years being more likely to be adherent (logistic regression). At 100%, 90% and 80% adherence, the percentage of those achieving optimal HbA1c (≤7.0) were 19.6%, 18.0% and 17.8% respectively. At 100% adherence, HbA1c appeared to be independently associated with omission of doses. Those who were non-adherent were significantly more likely to have HbA1c≥10.0 (p=0.0107). The Logistic regression model showed that level of adherence did appear to be associated with HbA1c levels. Several factors were associated with non-adherence, and these were classified as patient-based issues (86.0%) and health care system (21.7%) related factors.

Conclusions
This study showed a significant level of non-adherence amongst patients with type 2 diabetes in PNG with associated poor glycaemic control. As many factors contributed to non-adherence, future interventions aimed at improving adherence will need to take these into account.
Changes to antihypertensive regimens in hospitalisation of elderly inpatients

Tariq Alhawassi¹, Beata Bajorek², Romano Fois¹, Ines Krass and Lisa Pont³

¹Faculty of Pharmacy, University of Sydney
²School of Pharmacy, University of Technology Sydney
³Sydney Nursing School, University of Sydney

Objective
To explore changes in antihypertensive medications during hospitalisation in the elderly.

Methods
A retrospective review of medical records for patients admitted to a large metropolitan teaching hospital during 2010 was conducted. The cohort comprised a random sample of patients (n=503) aged ≥65 years admitted for ≥48 hours for any indication and taking at least one medicine. Demographic, clinical (including blood pressure BP)) and medication regimen data surrounding the admission period were extracted.

Results
The mean age of study participants was 80.3 years (SD±8.2), (58.6%) were female. Mean length of admission was 10.2 days (SD ±9.2). Most patients (68.8%, n= 346) had a documented history of hypertension and were admitted for non-cardiovascular conditions (84.5%). Information regarding BP control prior to admission in hypertension patients was available for only (16.7%) and on admission only (37.5%) had well-controlled BP. During hospitalization (43.6%, n=151) of hypertension patients experienced a change to their antihypertensive regimen and 61.3% patients experienced BP perturbations as hypotensive (7.8%, n=27) or hypertensive (53.5%, n=185) episodes. Antihypertensives were ceased or dose reduced in (59.1%) and commenced or dose increased in (37.3%) of patients. The most common reasons for ceasing medications and/or dose reduction were adverse reactions (ADRs), hypotension and renal function impairment.

Conclusions
Many elderly hypertension patients experienced modification to their antihypertensive regimen during hospitalisation despite a lack of information on previous long-term BP control. While many medication changes were in response to hypotensive or hypertensive episodes, a relatively large number of antihypertensive medications were ceased due to ADRs. Antihypertensive ADRs should be considered when reviewing management of hypertension, especially in the elderly.
Pharmacy Education

Session Chair: James Green
Co-Chair: Rosie Nash
Wednesday 11 December 2013, 11.00am – 12.30pm
Venue: Hunter Centre Rm 122 & 123

CP09-1
James Windle, University of Otago, New Zealand
Learning and assessment connections between the internship and undergraduate years of Otago BPharm students – a longitudinal study

CP09-2
Saleh Alrakaf, University of Sydney, Australia
An international validation study of two student achievement goal questionnaires

CP09-3
Ramesh Walpola, University of Sydney, Australia
Developing a peer-led patient safety education program for pharmacy students

CP09-4
Lisa Kouladjian, Royal North Shore Hospital, Australia
Assessment of pharmacists’ knowledge and application of pharmacologic risk assessment tools in older adults using a continuing professional development educational method

CP09-5
James Townshend, Griffith University, Australia
Evaluating the understanding of the process, and use of, reflective thinking among undergraduate health students

CP09-6
Roundtable
Learning and assessment connections between the internship and undergraduate years of Otago BPharm students – a longitudinal study.

James M. Windle¹, Jeffrey K. Smith², Rachel A. Spronken-Smith³ and Ian G. Tucker¹

¹School of Pharmacy, University of Otago, Dunedin
²College of Education, University of Otago, Dunedin
³Higher Education Development Centre, University of Otago, Dunedin

Objective
The School of Pharmacy at Otago is conducting a five year longitudinal study to determine if objective measures of students’ knowledge attained during pharmacy school and within one year of graduation (internship) are highly correlated, and if low or high academic standings are directly and significantly associated with their subsequent competence ratings as intern pharmacists. This paper reports the processes to establish this 5-year study and some results from the first three years.

Methods
The study was approved by the University of Otago Ethics Committee and is being conducted with the cooperation of the Pharmaceutical Society of New Zealand and the Pharmacy Council of New Zealand. Consenting students, who were intending to register with the sole national internship programme (EVOLVE), are recruited in August of their final undergraduate year, the first consenting year being 2009. Data are gathered retrospectively from student records, internal databases and prospectively from the Pharmaceutical Society and the Pharmacy Council. Interns from each cohort are surveyed prior to the final assessment in the internship. Data are validated prior to statistical analysis.

Results
Three cohorts have completed their internship with 80, 81 and 104 graduates being tracked from each year. Preliminary results indicate that performance in some individual papers (courses) and paper groups in the undergraduate program are predictive of internship performance; however, there are outliers who provide opportunity for qualitative analysis.

Conclusions
This longitudinal study provides opportunity to collect evidence and understand relationships by tracking the student pharmacist from entry into the School through to registration as a competent professional. Analysis will help inform aspects of selection, curriculum teaching methods, workplace training and assessments throughout. Ultimately, the profession and public can have greater confidence in a competent early career pharmacist if we can demonstrate alignment of measures of performance.
An international validation study of two student achievement goal questionnaires

Saleh Alrakaf¹, Ahmed Abdelmageed², Mary Kiersma², Sion Coulman³, Dai John³, June Tordoff⁴, Claire Anderson⁵, Shubashini Gnanasan⁶, Ayman Noreddin⁷, Erica Sainsbury⁷, Grenville Rose⁸ and Lorraine Smith¹

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⁵ School of Pharmacy, University of Nottingham, Nottingham, England.
⁶ Faculty of Pharmacy, University Teknologi MARA, Puncak Alam, Selangor, Malaysia.
⁷ School of Pharmacy, Hampton University, Hampton, VA, USA.
⁸ Aftercare, Sydney, NSW, AU.

Objective

To assess the psychometric properties of an achievement goal questionnaire (AGQ) and its revised version (AGQ-R) using a multi-national pharmacy student cohort.

Methods

Questionnaires were administered during tutorial and lecture class time. A confirmatory factor analysis procedure was performed. The following criteria were used to compare the fit of the questionnaires to the data: comparative-fit index (CFI) ≥ 90, Tucker-Lewis Index (TLI) ≥ 90 and root-mean-square-error of approximation (RMSEA) ≤ 0.08.

Results

A total of 1226 undergraduate pharmacy students from six countries participated in the study. Contrary to the test developers’ results, the findings from this analysis indicated that the original version of the questionnaire (AGQ) was a better fit of the data (CFI = 0.97, TLI = 0.96 and RMSEA = 0.06) compared to the revised version (AGQ-R) (CFI = 0.93, TLI = 0.91 and RMSEA = 0.09).

Conclusions

Pharmacy students’ responses to measures of achievement motivation differ to those of the original population used to validate the measures. Based on these results, the AGQ is being used to conduct cross-sectional and longitudinal analyses of achievement goals and academic performance of undergraduate pharmacy students from six countries.
Developing a peer-led patient safety education program for pharmacy students

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¹ Faculty of Pharmacy, The University of Sydney, Camperdown, NSW
² Centre for Education and Research on Ageing, Concord Repatriation General Hospital, Concord, NSW

Objective

Patient safety education is being introduced to healthcare student curricula as a strategy to improve patient safety. Peer-led education has been shown to improve knowledge and attitudes towards patient safety. This study aims to develop, implement and evaluate an introductory peer-led education program in patient safety for pharmacy students. We report here the surveyed knowledge and attitudes of students prior to the education program.

Methods

Fourth-year undergraduate pharmacy students at The University of Sydney, Australia, were trained as peer educators (n=38) to facilitate a patient safety workshop for 281 first-year students (intervention group). First-year, second-year (a comparator group who have not received the education program) and fourth-year students’ knowledge, attitudes and values regarding patient safety were assessed using a 34-item modified version of the “Patient Safety/Medical Fallibility Survey” (Madigosky et al., 2006) at three time-points (prior to, immediately after, and five weeks after the education program).

Results

Completed pre-program surveys were collected from 245 first-year students (response rate 87.2%), 201 second-year students (74.7%) and 38 fourth-year peer educators (100%). Responses to many survey items reflect a positive attitude to patient safety across year groups. However, responses to survey items regarding safety culture showed that students often identify with Reason’s “person approach” to error. Free text responses and survey items also reveal that errors cause embarrassment and are often “swept under the carpet” rather than openly discussed.

Conclusions

The pre-education survey results highlight a need for patient safety education among pharmacy students, particularly targeting aspects of safety culture.

Reference

Assessment of pharmacists’ knowledge and application of pharmacologic risk assessment tools in older adults using a continuing professional development educational method

Lisa Kouladjian1,2, Timothy Chen3, Danijela Gnijdic4 and Sarah Hilmer1,2
1 Kolling Institute of Medical Research, Clinical Pharmacology and Ageing, Royal North Shore Hospital, St Leonards, NSW
2 Sydney Medical School, University of Sydney, Sydney, NSW
3 Faculty of Pharmacy, University of Sydney, Sydney, NSW
4 Centre for Education and Research on Ageing, University of Sydney, Concord, NSW

Objective
The Drug Burden Index (DBI) is a novel pharmacologic risk assessment tool measuring an individual’s total exposure to anticholinergic and sedative medications (Hilmer et al., 2007), and has been associated with impaired functional outcomes in older adults (Lowry et al., 2012). There is a potential for pharmacists to use the DBI as a clinical tool to advise changes to exposure of these medications in older adults when conducting medication management reviews (MMRs). The objective of this study was to deliver Continuing Professional Development (CPD) education to pharmacists to assess knowledge and application of pharmacologic risk assessment tools, such as the DBI, in older adults.

Methods
The intervention was an article on issues such as polypharmacy, DBI, and prescribing surrounding a fictional patient case, followed by four multiple-choice questions (MCQs), which when answered, provided CPD credits for pharmacists (Kouladjian, 2013). De-identified information on participants completing the CPD activity was collected including age, gender, area and locality of pharmacy practice, MMR accreditation status and the answers to the MCQs. Descriptive analyses were used to describe pharmacist characteristics and performance in the MCQs.

Results
The MCQs were completed by 2,522 participants. The median age was 38 (IQR = 27) and the majority were female (59.5%). Participants were mainly from New South Wales (31.8%), practising in community pharmacy (71.5%) and not accredited to conduct MMRs (82.3%). The majority of participants were given full CPD credits for satisfactory completion of the MCQs (97.9%), however only 76.5% of participants received full marks. The question which required calculation of the DBI for the fictional patient was the lowest scored question.

Conclusions
Our findings suggest that pharmacists have good knowledge of pharmacologic risk assessment tools and there is potential for use of the DBI as a clinical tool to optimise prescribing in older adults.
Evaluating the understanding of the process, and use of, reflective thinking among undergraduate health students

James Townshend¹, Sohil A. Khan¹² and Nicola Shapland¹

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²Mater Research Institute, Mater Health Services, South Brisbane, Queensland

Objective
To establish the baseline level of understanding of the term, and use of the process of, “reflective thinking” by students in first year health courses.

Methods
The Biggs’ revised two-factor Study Process Questionnaire (R-SPQ-2F) [Biggs et al., 2001] was modified to include five questions on the process of reflective thinking. The questionnaire was delivered as an online survey which was offered to students enrolled in two first year level courses within undergraduate health degree programs. The courses were an introductory pharmacy course (Introduction to Pharmacy), chosen as the course in which we intended to introduce the teaching and learning activities proposed to guide the reflective thought processes, and an introductory public health course (Health Challenges in the 21st Century).

Results
A combined total of 69 students (18 public health students and 51 pharmacy students) completed the baseline questionnaire. Results showed 61% (42/69) of students lacked familiarity with the term “reflective thinking”. Yet, surprisingly, when given a definition of “reflective thinking”, 67% (28/42) of these students stated that they either agreed, or strongly agreed, that “Reflective thinking helps me to understand the subject matter in my courses”.

Conclusions
The ability to apply reflective thinking is regarded as an intellectual challenge across a wide range of healthcare professions including pharmacy. Because of its complexity the topic can pose difficulties for integration into the syllabus. Early results from this research have allowed us to tailor teaching and learning activities to the students’ current level of knowledge.

References
Biggs, J et al. (2001), Br J Ed Psych, 71, 133-49
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Impact of anticholinergic discontinuation on cognitive outcomes in older people

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Objective
Drug consumption in older people is high, and many commonly prescribed medicines have anticholinergic side effects (Nishtala et al., 2009 and Ancelin et al., 2006). The objective of this study was to systematically evaluate the literature on the impact of discontinuing anticholinergic medicines on cognitive function in older adults.

Methods
A comprehensive literature search was electronically performed to identify relevant studies, using MEDLINE, EMBASE, International Pharmaceutical Abstracts, PsycINFO, CINAHL and CENTRAL till July 2013. We included studies with intervention focussed on anticholinergic discontinuation, studies mention patients used of anticholinergic medicines, studies used an appropriate scale to assess cognitive outcomes, studies of human and population mean age not less than 65 years and study design with a randomised controlled trial or studies with control group. The primary outcome of interest was to evaluate cognitive changes in older people after anticholinergic discontinuation measured using cognitive scales.

Results
The primary electronic literature search identified a total of 475 records in six different databases. Out of this, only four studies met the inclusion criteria based on full text analysis and snowballing. Of a total of 4 included studies, two study designs were randomised control trials (RCTs) and the other two were prospective cohort, also 2 studies were done in nursing homes and 2 in hospital setting. The studies were assessed quantitatively. In hospitalised patients, discontinuation of anticholinergic medicines led to improvement in cognition. In contrast, discontinuation of anticholinergic medicines in the nursing home population failed to show any significant improvements in cognitive function.

Conclusions
The impact of anticholinergic discontinuation on cognitive function mainly depended on the study population and baseline cognitive impairment. In conclusion, a larger sample size, longer duration of follow-up and better methods of assessing anticholinergic-induced cognitive impairment is warranted.

References
Drug polymer interactions increase the physical stability of amorphous indomethacin solid dispersions in aqueous suspensions

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Objective
To understand the mechanisms of polymer action in stabilising amorphous indomethacin (IND) in aqueous suspensions.

Methods
Amorphous IND and solid dispersions (SD) of IND with four polymers (Soluplus®, PVP, HPMC and HPMC-AS) were prepared by melt quenching. DSC thermograms were used to understand the antiplasticising effect of the polymers. IND-polymer interactions were studied using FTIR spectroscopy. Relative strengths of the interactions were determined using interaction density parameter calculations as well as drug-polymer interaction parameter (χ) and binding energy (E_b) calculations. Crystallisation was monitored using FTIR spectroscopy coupled with principal component analysis.

Results
All polymers (in SDs) delayed crystallisation onset in comparison to amorphous IND drug alone. Of the solid dispersions, Soluplus®-SD inhibited crystallisation the longest (stable >28 days), followed by SDs of PVP (8 hr), HPMC (6 hr) and HPMC-AS (2 hr) while the PVP-SD generated the highest T_g, followed by Soluplus®, HPMC and HPMC-AS. This indicates that T_g was not a predictor of physical stability. FTIR showed differences in the carbonyl stretching region for all SDs, indicating the presence of drug-polymer interactions. The values of the calculated interaction density parameters as well as E_b and χ indicated that drug-polymer interactions were the strongest with Soluplus® followed by PVP, HPMC and HPMC-AS, in agreement with the observed physical stability.

Conclusion
The nature of drug-polymer interactions is more important than T_g when predicting physical stability of amorphous SD with different polymers in aqueous suspension.
Anti-inflammatory effects of kinos of Australian Eucalyptus species

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Objective
This research aims to investigate any possible \textit{in vitro} anti-inflammatory effects of kinos from Australian Eucalyptus species.

Materials and Methods
Toxic effect of the kinos on RAW 264.7 murine macrophage cells was assessed using the MTT assay. The ability of kinos to inhibit the induction of pro-inflammatory mediators by LPS stimulated RAW 264.7 was investigated. Nitric oxide (NO) was evaluated by the Griess assay, tumour necrosis factor alpha (TNF-\textalpha{}) and interleukin (IL)-6 were measured by an ELISA assay. The effect of kinos on phagocytic ability was also investigated using an Attune flow cytometer.

Results
Preliminary results have demonstrated that kinos can inhibit inflammation mediator production by LPS stimulated macrophages in a time and concentration dependent manner. Kinos also enhanced the phagocytic activity of the macrophages.

Conclusion
We conclude from these studies that the kinos is a modulator of inflammation and may have potential to modulate immune cell functions in physiological and pathological processes.
HPTLC analysis of the polyphenolic composition in wine samples

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Objective

It is known that moderate consumption of red wine can reduce the risk for cardiovascular disease. This protective role has been attributed to the presence of a wide range of polyphenolic constituents with potent antioxidant activity. The type and concentration of these potentially beneficial compounds varies and depends on the variety of grapes and the vinification process. However, there is limited information on the polyphenolic composition of wines. The aim of this study was to investigate and develop a simple high performance thin layer chromatographic (HPTLC) method to quantify levels of gallic acid, caffeic acid, resveratrol and rutin in a total of 45 wine samples (43 red wines and 2 white wines) collected from different regions of Australia (35) and oversees (10).

Method

Samples were spotted using a Linomat 5 applicator (Camag, Muttenz, Switzerland) on silica gel 60F-254 HPTLC plates. A gradient elution method was developed using dichloromethane: methanol: formic acid (7.5: 2.0: 0.75) and sodium dodecyl sulphate: pentanol: water: heptane (8 g: 25 ml: 8 ml: 160 ml). The plates were developed in an AMD2 (Camag) developer. Images of plates were captured using a TLC-Visualiser (Camag) under366 nm. A digitised image of chromatogram was evaluated using WinCATS® version 1.4.6 to determine the peak areas present on the HPTLC plate.

Results

Caffeic acid and gallic acid were present in most of the wines tested. The red wines contained more gallic acid, resveratrol and rutin compared to the white wines. Pinot Noir wines were found to have significantly more resveratrol than any of the other red wine varieties tested.

Conclusions

Wine produced from grapes grown in damped, temperate climates were observed to contain more antioxidants when compared to wines from dry warm climates. Some grape varieties were observed to contain more antioxidants than others.
Stability of Carbamazepine Solid Dispersions
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Objective
As part of an undergraduate Elective project, the physical stability of selected carbamazepine (CBZ)-polymer solid dispersions was determined.

Methods
Solid dispersions of CBZ with polyvinylpyrrolidone (PVP), hydroxypropyl methylcellulose (HPMC) and hydroxypropyl methylcellulose acetate succinate (HPMCAS) were prepared in the CBZ:polymer ratio 1:1 by quench cooling. The obtained glasses were ground using mortar and pestle and stored at 40°C and 75% RH for 15 days. The solids were characterised initially and then monitored for stability using Differential Scanning Calorimetry (DSC), Fourier Transform Infrared (FTIR) and Polarising Light Microscopy (PLM) at 1, 3, 5, 8 and 24 hr and then days 2, 3, 5, 8 and 15. Moisture uptake was monitored using Thermogravimetric Analysis (TGA) until crystallisation was observed.

Results
The FTIR spectra differed for CBZ in amorphous form and in crystalline form, and CBZ appeared amorphous in all three solid dispersions, so that the onset of crystallisation could be determined by FTIR in combination with PLM. The stability order of the three dispersions was CBZ:HPMCAS > CBZ:HPMC > CBZ:PVP. The PVP dispersion showed crystallisation within 5 hr, HPMC within 24 hr while HPMCAS showed no crystals on PLM even after 15 days, although small changes were seen in FTIR. Moisture uptake was greatest for PVP and least for HPMCAS, suggesting a link between hygroscopic nature and crystallisation. Moisture usually lowers Tg of the polymer system, leading to an increase in molecular mobility and potentially crystallisation.

Conclusions
The above results showed that the three polymers showed different abilities to stabilise CBZ in the amorphous form. Stabilisation ability may be linked to the hygroscopic nature of each polymer. More studies are needed.
Development of a stability indicating isocratic HPLC method for gemcitabine with application to drug release and enzymatic degradation studies

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Objective

Previously reported HPLC methods for gemcitabine determination are time-consuming with complicated mobile phase compositions and gradient elution protocols which cause base line shifting. Thus a more sensitive HPLC method for simple, fast and precise measurement was investigated.

Methods

The operating conditions were optimized. Validation of method was investigated. Forced degradation studies were conducted using acidic (1 N HCl), basic (1 N NaOH), oxidative (3% v/v H₂O₂), thermal (70°C) and photolytic stress conditions over 7 days. The application of the method to in-vitro drug release of a gemcitabine-loaded microemulsion was conducted. Finally the HPLC method was applied to enzymatic degradation studies of naked drug and drug-loaded nanoparticles using tripsin, chymotripsin and pepsin.

Results

The optimal operating conditions were of a RP-C18 column, mobile phase containing acetonitrile and potassium dihydrogen phosphate buffer (pH 6.5) in the ratio of 7:93, v/v with 20 µL injection volume, 1 mL/min flow rate, and the UV detection at 270 nm with elution time of 4.8 minutes. The method was linear from 1 to 100 µg/mL (R²=0.9999), with accuracy >97.4% and intra-day and inter-day precision <0.2%, a limit of detection (LOD) of 0.014 µg/mL and limit of quantification (LOQ) of 0.043 µg/mL. The stability of gemcitabine to acidic, basic and photolytic conditions, with 6.5%, 7.3% and 5.2% degradation, respectively. Greater degradation under oxidative conditions with 13.2% of drug degrading. A sustained drug release profile obtained for the in-vitro drug release studies, and the enzymatic degradation study showed the delivery system improved resistance to digestive enzymes.

Conclusions

The presented HPLC method is a promising analytical tool to assess gemcitabine and gemcitabine formulations.
Overcoming biological barriers for anticancer drug delivery through nanotechnology

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Objective
To evaluate the effectiveness of novel nanoconstructs (under patent) to overcome gastrointestinal barrier through *in vitro* and *ex vivo* models.

Methods
The nanoconstructs under evaluation were synthesized with epirubicin as the model drug and characterized for size and charge using dynamic light scattering. The release rate of the drug from the nanoconstructs was measured at physiological pH and in simulated gastric fluid using dialysis method. A monolayer of differentiated Caco-2 cells grown on transwell inserts were used as an *in vitro* model of intestinal epithelium to evaluate the potential of the nanoconstructs to traverse through the intestinal epithelium. An everted sac system of isolated rat intestinal tissue was used for further confirmation the transport efficiency of these nanoconstructs.

Results
Nanoconstructs were synthesized with 7%-18% loading of epirubicin (N1>N2>N3 in terms of loading) and had a size >7 nm and neutral charge. At physiological pH, N1 and N2 showed almost no release of drug in the initial 4 hr, ensuring integrity of the system. In simulated gastric fluid, N1 showed less than 12% release in the initial 2 hr (time required to traverse through the stomach). Through the Caco-2 monolayer, N3 showed a higher transport (12.670 ±0.918 µM/cm², n=5, P<0.05) as compared to N1 (2.710 ±0.839 µM/cm², n=5, P<0.05). Analysis of translocated epirubicin, showed a size distribution similar to the original size of the nanoconstructs confirming the nanoconstruct stability. Everted sac system, showed that N3 loading to have a higher transport of (19.200 ± 0.986% of total treated, n=5, P<0.05) as compared to N1 (9.145 ±1.093% of total treated, n=5, P<0.05), in accordance with the transportation through Caco-2 monolayer.

Conclusion
Nanoconstructs were shown to successfully traverse through Caco-2 monolayer and isolated rat intestinal tissue, warranting further in vivo testing.
The impact of the degree of (un)saturation of co-administered fatty acids on the intestinal lymphatic transport of a triglyceride-mimetic prodrug

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Objective

The intestinal lymphatic transport of a model immunosuppressant, mycophenolic acid (MPA) is enhanced by administration of a triglyceride-mimetic prodrug [1,3-dipalmitoyl-2-mycophenoloyl glycerol (2-MPA-TG)]. The current study aimed to examine the impact of changes to the degree of (un)saturation of co-administered fatty acid on the lymphatic transport of 2-MPA-TG.

Methods

Lymphatic transport was examined in mesenteric lymph-cannulated rats following intraduodenal infusion of 2 mg of 2-MPA-TG in 5.6 ml of a lipid free vehicle (0.45% Tween 80) or the same vehicle containing 40 mg of oleic acid (OA), linoleic acid (LA), linolenic acid (LNA) or arachidonic acid (ADA). Prodrug derivatives and triglyceride in lymph were analysed by HPLC-MS and a commercial enzymatic assay, respectively.

Results

Compared to MPA (0.17% of the dose recovered in lymph), 2-MPA-TG markedly enhanced lymphatic transport after administration in all formulations. The degree of enhancement varied and was greatest for OA (80-fold enhancement relative to MPA) > LA (52-fold) > LNA (47-fold) > ADA (44-fold) > lipid free formulation (8-fold). A similar trend was seen in lymphatic triglyceride recovery which was highest for OA (56 mg) and LA (56 mg), lower for LNA (52 mg) and ADA (30 mg) group, and lowest for the lipid free formulation (25 mg). The rate of lymphatic transport of triglyceride also peaked at later times after administration of formulations containing fatty acids with increasing degree of unsaturation.

Conclusions

The lymphatic transport of a triglyceride-mimetic prodrug was enhanced by co-administration with fatty acid, however, the degree of enhancement was less for fatty acids with increasing degrees of unsaturation. Fatty acids with lower degrees of unsaturation appeared to better stimulate triglyceride turnover in enterocytes and to better match the peak time of triglyceride transport with the kinetics of prodrug absorption. In turn this appeared to facilitate prodrug association with triglycerides and to promote lymphatic prodrug transport.
Evaluation of coated liposomes as delivery vehicles for oral vaccines

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Objective

The main limitation for oral delivery of liposomal vaccines is their inherent instability under the conditions found in the gastrointestinal tract. The aim of this study was to characterise and evaluate the stability of liposomes containing α-galactosylceramide and coated with either silica nanoparticles (SNP) or chitosan.

Methods

Liposomes made from dipalmitoylphosphatidylcholine and cholesterol were coated with SNP or low molecular weight chitosan and characterised for size, zeta potential and surface morphology. Stability was assessed after storage at 4 and 25 °C for 28 days and after incubation in simulated gastric fluid at 37 °C for 2 hours. Antigen retention, particle size and polydispersity were measured using conventional methods.

Results

Particle size increased upon coating with SNP and chitosan and the surface charge matched the respective negative and positive charges of the coating components. Coated particles had improved retention of the model antigen during incubation in the simulated gastric conditions, but were observed to flocculate into large agglomerates. Antigen retention during storage was similar between formulations, with the majority of the antigen being retained over the 28 day period. However coated particles exhibited an increased in size during the storage period.

Conclusions

Coated liposome formulations may be useful for retaining antigen in vivo, however stability of the formulations remains to be sub-optimal.
PLGA nanoparticle-embedded thermoresponsive hydrogels for sustained vaccine delivery

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Objective

The aim of this study was to develop a new thermogelling formulation containing poly lactide-co-glycolic acid nanoparticles (PLGA-NP) loaded with antigen and adjuvants. The rheological characteristics, in vitro stability and release profiles of the resulting formulations were investigated.

Methods

Thermoresponsive sol-gels were prepared using two novel thermoresponsive pentablock copolymers consisting of polyethyleneglycol-polycaprolactone-poly-lactide-polyacaprolactone-polyethyleneglycol (PEG-PCL-PLA-PCL-PEG) with different ratios of PCL and PLA (Tamboli et al., 2013). PLGA-NP containing the model antigen ovalbumin, and monophosphoryl lipid A and Quil A as adjuvants were prepared using the W/O/W double emulsion method (Hamdy et al., 2008). The thermosensitive polymer solutions (17% w/v in phosphate buffered saline) were loaded with PLGA-NP or free antigen and adjuvant at 4 °C and stirred for 24 hr. The sol-gel transitions were characterized with an oscillatory rheometer using a cone and plate geometry. In vitro gel erosion and release studies were performed at 37 °C for 30 days.

Results

Thermoresponsive sol-gels made with the two polymers differed in their transition temperatures (P1=28 °C versus P2=32 °C) and complex viscosity (P1=2504 Pa.s versus P2=1090 Pa.s). The addition of PLGA-NP (size range of 325-345 nm) to the thermosensitive polymer solutions resulted in a decrease in gelation temperature and time, and an increase in the complex viscosity of the gel. The erosion of gels was reduced in systems with nanoparticles compared to systems without nanoparticles. The release of PLGA nanoparticles, antigen and adjuvants from the hydrogels was slower from P1 formulations as compared to P2 formulations.

Conclusions

Both P1 and P2 formed rigid hydrogels at body temperature and PLGA nanoparticles incorporated into the gels were released over a sustained period of time.

References

Objective

The spread of “superbugs” and the failure of drugs to control them are regarded as important challenges facing medicine today. While the search continues for new and diverse classes of anti-microbial agents, an approach to tackling the problem of resistant bacteria is to employ the use of naturally occurring endogenous “killers” of bacterial cells, the bacteriophage. While the capacity of these viruses to inhibit the spread of infection has long been known, there have generally been few on-going studies to develop their potential in clinical application. Certainly there are scant adequately controlled reports of the formulation of bacteriophage into dosage forms that allow for topical application, as in for the treatment of skin infections. The objectives of this study, then, were to initially make critical informed predictions of the pharmaceutical parameters of various semi-solid vehicles (such as creams and ointments) that would allow suitable formulation and release of bacteriophage particles. The semi-solid vehicles were then assessed empirically for their capacity to sustain and allow release of viable bacteriophage capable of killing bacteria.

Methods

Bacteriophage were formulated into a range of semi-solid delivery bases, which were then applied onto a bacterial lawn grown on agar in a petri dish. Appropriate controls such as semi-solid base without bacteriophage, as well as with and without preservative, were included.

Results

We report here the formulation of bacteriophage into a cream base and the successful release of these viruses from this preparation and killing of underlying cultured bacteria.

Conclusions

These studies can be extrapolated to assess for the capacity to treat various pathogenic skin bacteria by incorporating diverse bacteriophage into our test semi-solid base.
PDMS-b-PDMAEMA polymersomes as a pH sensitive drug or vaccine carrier

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Objective

The aim of this study was to investigate the use of PDMS-b-PDMAEMA polymersomes as a pH sensitive delivery system to deliver cancer therapies. A pH sensitive system was designed to achieve targeted delivery of the active to the hypoxic tumor microenvironment or to the late endosome of antigen presenting cells. The objective of these studies was to confirm the pH sensitivity of the polymersomes in vitro. Several techniques were investigated for determining pH sensitivity. These included particle size, preparation homogeneity and the release of active.

Methods

PDMS-b-PDMAEMA polymersomes were prepared using the dry film method (Hub et al.), and were rehydrated in Iscove’s Modified Dulbecco’s Media (IMDM) containing 1 mg/mL fluorescein-labelled ovalbumin (FITC-OVA). Aliquots of polymersomes (75 µg) were incubated in 3 mL IMDM with the pH adjusted to 5.5-8.6 with 0.5 M HCl or 0.5 M NaOH. Particle size and formulation homogeneity were determined by photon correlation spectroscopy. Entrapment and release of active was determined by fluorescence spectroscopy.

Results

Unloaded polymersomes had a diameter of 63.0 ± 3.36 nm (SD, n=3) and a polydispersity index (PDI) of 0.213, while polymersomes loaded with FITC-OVA had a size of 162.5 ± 18.1 nm (SD, n=3) and a PDI of 0.268. A small increase in particle size was observed upon incubation of polymersomes in media with lower pH. This increase in size correlates with repulsion between the blocks which will break the integrity of the structure and allow the contents to escape.

Conclusion

PDMS-b-PDMAEMA polymersomes show potential as a pH sensitive delivery system.

References

Tagging poly(ethylcyanoacrylate) nanoparticles with oligoarginine enhances their uptake by fully differentiated Caco-2 cells

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Objective

Bioactives associated with oligoarginine, a cell-penetrating peptide, have improved cellular penetration. We proposed that combining polymeric nanoparticles with oligoarginine may improve the cellular uptake of nanoparticles for enhanced intracellular drug delivery. The objective is to determine if nanoparticles either tagged or entrapped with oligoarginine augment cellular uptake in Caco-2 cell model.

Methods

Poly(ethylcyanoacrylate) (PECA) nanoparticles loaded with FITC-dextran (MW = 2,000 kDa) were prepared by in situ polymerization using a microemulsion template, with or without oligoarginine (RRH (di-arginine-histidine) or R4-aca-H (tetra-arginine-hexanoic acid-histidine)). MALDI-TOF (Matrix-Assisted Laser Desorption/Ionization – Time of Flight) spectrometry was used to determine the nature of oligoarginine association with PECA nanoparticles. The size and zeta-potential of the nanoparticles were determined using photon correlation spectroscopy. Fully differentiated Caco-2 cells were incubated with nanoparticle formulations for 2 hours at 37 °C and the uptake of nanoparticles was analyzed using flow cytometry.

Results

RRH covalently associated with PECA nanoparticles, whereas R4-aca-H did not covalently associate but was entrapped within PECA nanoparticles. Both RRH-tagging and R4-aca-H encapsulation produced cationic nanoparticles with a zeta-potential of approximately 34 mV, suggesting the presence of the oligoarginine on the surface of the nanoparticles. All nanoparticles were of approximately 200 nm, with oligoarginine association having no effect on the nanoparticle size. The proportion of viable cells that took up the FITC-dextran loaded nanoparticles (mean ±SD) was 3.3% ±1.1 for unmodified nanoparticles, and was significantly enhanced with RRH-tagging (14.1% ±3.8) and R4-aca-H encapsulation (15.1% ±6.3).

Conclusions

Oligoarginine can be associated covalently with RRH or non-covalently with R4-aca-H to produce cationic nanoparticles, to significantly enhance nanoparticle uptake in Caco-2 cells.
Comparison of melting and moist granulation methods for proteins: Effects on protein stability

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Objective
Protein drugs are important therapeutic agents (Antonio et al., 2007). Lipids can be used to prepare controlled-release dosage forms (Walduck et al., 1998). However, protein may degrade in the formulation. The objective of this study was to understand protein stability in lipid matrices prepared using melting and granulation methods.

Methods
Bovine serum albumin (BSA), lysozyme (LZ), horse radish peroxidase (HRP) catalase (CT) and α-chymotrypsin (CTP) were used. Each protein was heated alone at 70 °C and was also incorporated into Precirol AT05 (glycerol palmitostearate, melting point 58 °C) at 20% w/w loading. ATR spectroscopy, enzyme activity assay and size exclusion chromatography (SEC) were determined.

Results
ATR spectra of the amide I band of heat exposed solid protein and protein formulated into lipid matrices were found closely similar to the control non-heat exposed protein. Enzyme activity of LZ, HRP and CT was 90% ±1.2, 75% ±1.1 and 40% ±0.89 of the control respectively. SEC showed BSA 80% ±1.3, LZ 90% ±0.9, HRP 80% ±1.1, CTP 90% ±0.88 and CT 45% ±0.70 remained after heating. Heat exposure up to 70 °C in the solid form and incorporation into lipid matrices did not cause any significant change in ATR spectra of amide-I band for all proteins used. However, the level of enzyme activity and protein content was found reduced and was dependent on protein type suggesting a rank order of thermal stability. ATR spectroscopy could not predict loss of activity of enzymes exposed to heat in the solid state. LZ and CTP appeared to be the most stable proteins followed by BSA and HRP. CT was the most heat labile model protein.

Conclusion
Using a range of proteins with different relative thermal stabilities may enable more complete understanding of factors affect protein stability during formulation.

References
Enhancing the buccal mucosal delivery of ShK peptide for the treatment of multiple sclerosis

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Objective
To examine the impact of sodium taurodeoxycholate (STDC) on the buccal mucosal permeability of 5-Fam-ShK.

Methods
Freshly isolated porcine buccal mucosa was mounted into modified Ussing chambers, and 1.5 mL of 5-Fam-ShK (100 µg/mL in physiological buffer) was placed in the donor chamber with or without STDC (20 or 100 mM). Samples were collected over 5 hr and the tissue removed at the completion of the study. The disappearance and appearance of 5-Fam-ShK from the donor and receptor chambers, respectively, were measured by a gradient HPLC-fluorescence method. Furthermore, the deposition of 5-Fam-ShK in the buccal epithelium was monitored by confocal microscopy, with quantification determined using Image J.

Results
The HPLC-fluorescence method exhibited a linear relationship between peak area and 5-Fam-ShK concentrations over the range of 0.05 to 2.5 µg/mL ($r^2>0.999$) with precision and accuracy values ranging from 2.0-7.0% and 92.0-16.1%, respectively. The disappearance of 5-Fam-ShK from the donor chamber was similar with or without STDC treatment ($p>0.05$). In the absence of any bile salt, ShK was not detectable in the receptor chamber over 5 hr, while 0.05% and 0.13% of the 5-Fam-ShK applied dose appeared in the receptor chamber when 20 and 100 mM STDC was applied, respectively. Interestingly, the concentration of 5-Fam-ShK in the receptor chamber quickly reached a plateau within the first 0.5 hr with 100 mM STDC, which is in line with confocal microscopic studies demonstrating that 5-Fam-ShK gradually accumulated in the upper one-third of the buccal tissue and appeared to plateau after 1 hr.

Conclusions
ShK exhibited slow release into the receptor chamber with co-application of STDC, likely due to a strong connection between the positively charged 5-Fam-ShK and the negatively charged lipids within the buccal epithelium. Given the potency of this compound, this amount of absorption may be ample for multiple sclerosis treatment.
Investigating the potential for direct compaction of a fine surface-modified ibuprofen powder

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Objective

To explore the feasibility of applying an ultra-thin magnesium stearate (MgSt) coating on a fine cohesive ibuprofen powder suitable to form tablets with high drug loading by direct compaction.

Methods

A fine ibuprofen powder with a low melting was processed with 0.1, 1 or 5% w/w MgSt, via “mechanofusion”. Conventional blending of ibuprofen with 1% MgSt was conducted (tumbling mixer) as a comparison. Further conventional mixing of the unprocessed and processed powders with a binder (PVP) and a super-disintegrant (crospovidone) was performed, respectively. The morphology and surface chemical properties of the sample particles were investigated using SEM and ToF-SIMS. The flowability was characterized using the FT4 powder rheometer. The selected powders were compacted directly into tablets using a GTP-1 tablet press. Furthermore, the dissolution behaviour of the selected tablets was examined.

Results

After mechanofusion, SEM images showed the powders were less agglomerated than the unprocessed and blended drug powders. The FT4-measured cohesion values were significantly reduced, indicating effective surface modification and good flow. Surface coverage of MgSt measured by ToF-SIMS was also shown to be greater and increased with concentration of MgSt ranging from 0.1-5%. MgSt relatively weakened tablets as expected, but robust tablets could be formed from the mechanofused-powders, and were enhanced by a binder, exhibiting significantly lower ejection forces ($p < 0.05$). Of particular note, mechanofused-MgSt did not delay dissolution data and 90% of drug from the tablets with the mechanofused-powders was released in 2 minutes.

Conclusions

Surface modification of ibuprofen drug by mechanofusion, gives a novel ultrafine coating of MgSt that provides excellent powder flow. However, on addition of minor excipients to this powder, robust tablets were made with a fast dissolution rate. Initial results indicate this coating approach may have the potential in developing novel formulation strategies suitable for direct compaction of high dose drugs with a low melting point.
Quality of aqueous creams extemporaneously compounded with different preservatives

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Objective
To evaluate the effects of alternative preservatives on the quality of extemporaneously compounded aqueous creams listed in the Australian Pharmaceutical Formulary and Handbook, 22nd edition (APF).

Methods
Buffered Aqueous Cream (BuffAC), Cetrimide Cream Aqueous (CetriCA), Cetomacrogol Cream Aqueous (CetoCA) and Calamine Cream Aqueous (CalaCA) were prepared according to the APF recommendations. Parallel experiments were conducted in which the recommended preservative, chlorocresol (0.1% w/w), was replaced with either phenoxyethanol (1% v/v) or methyl hydroxybenzoate solution APF (MHB, 1% v/v).

Results
For all 4 creams, the APF recommends to heat the aqueous phases to > 80 °C prior to mixing with the oily phases. The substitution of chlorocresol with phenoxyethanol allowed stable creams to be prepared with the aqueous phases heated to lower temperatures. For BuffAC and CetriCA, the aqueous phase temperature could be lowered from 70 °C to 50 °C; for CalaCA, the temperature could be lowered to 40°C. Phenoxyethanol, being a liquid that is miscible with both water and oil, was also a much easier excipient to use than chlorocresol, a hydrophobic solid that dissolved with difficulty in the aqueous phases. Creams preserved with MHB had the same aqueous phase temperature requirements as those preserved with chlorocresol; however, MHB was found to be an incompatible preservative for BuffAC and CalaCA.

Conclusions
Extemporaneously compounded APF creams may be more readily prepared using phenoxyethanol as a preservative than chlorocresol. The use of MHB as an alternative preservative requires careful evaluation of compatibility with other excipients in the APF creams.
Effects of processing conditions on the quality of extemporaneously prepared aqueous creams

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Objective
To evaluate the effects of temperature and method of agitation on the quality of extemporaneously compounded aqueous creams listed in the Australian Pharmaceutical Formulary and Handbook, 22nd edition (APF).

Methods
Buffered Aqueous Cream, Cetrimide Cream Aqueous, Cetomacrogol Cream Aqueous and Calamine Cream Aqueous were prepared according to the APF recommendations. Parallel experiments were conducted in which the temperature to which the aqueous phases were heated was varied by ± 30 °C, and magnetic stirring was employed for mixing the oily and aqueous phases.

Results
For all 4 creams, the APF recommends to heat the aqueous phases to > 80 °C prior to mixing with the oily phases. Stable creams were consistently obtained (100%, n = 3) when the aqueous phases were heated to 90 °C. Creams of variable quality were observed with aqueous phases heated to temperatures ≤ 80 °C. While stable creams (100%) were still obtained for aqueous phases at 70 °C and 80 °C, the cream quality deteriorated rapidly when prepared with aqueous phases heated to lower temperatures. The success rates of stable creams were 34 – 66% and 0% for aqueous phases at 60 °C and 50 °C, respectively. The use of a magnetic stirrer did not change the quality of creams obtained at the optimum temperatures, but it significantly reduced processing time, and freed the formulator to perform other tasks.

Conclusions
Careful attention must be paid to the temperature of the aqueous phases in order to obtain stable extemporaneously prepared APF aqueous creams. A magnetic stirrer may be a helpful tool for the extemporaneous preparation of aqueous creams.
A study of mechanical dry coating using hydrophobic (Aerosil® R972) and hydrophilic (Cab-o-sil® M-5) fumed silica to modify the flowability and surface free energy of a model cohesive powder

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Objective
To investigate the correlation between flowability improvement of cohesive powder and surface free energy following dry coating.

Methods
Soda lime glass microspheres (VMD <4μm) were the model cohesive powder, and Aerosil® R972 and Cab-o-sil M-5 as guest particles. Dry coating of glass microspheres was done in a Nobilta-130 Mechanofusion system at three different speeds (1500, 3000 and 4500 rpm) and three different concentration of Aerosil® R972 (1, 3, 5% w/w) and 1% w/w Cab-o-sil M-5 at 4500 rpm for 10 minutes. As a comparison, conventional blending was conducted at the same concentrations with Turbula® T2F mixer at 72 rpm for 30 minutes. Powder flowability tests were measured using a FT4 powder rheometer. Contact angle measurements were undertaken through a capillary rise technique. The contact angle of uncoated and powder coated with 1% Aerosil® R972 and 1% Cab-o-sil M-5 in 1-bromonaphthalene and water was used to calculate their surface free energies using the Owen-Wendt equation.

Results
After mechanofusion with 1% w/w Aerosil® R972, the flowability improved significantly from 2.48 ±0.09 for uncoated particles to 11.77 ±1.10, 7.68 ±1.11, and 8.91 ±0.46 (n=3, P<0.05) for particles mechanofused at 1500, 3000 and 4500 rpm, respectively. Increasing Aerosil® R972 concentrations decreased flowability but the powder was still classed as “easy flowing”. The same trend was also found with the conventionally coated powder. However, coating with 1% w/w Cab-o-sil M-5 had no significant effect on powder flowability. The surface free energies of particles changed significantly from 38.50 ±0.80 mN/m for uncoated particles to 46.02 ±0.81 mN/m and 26.57 ±0.81 mN/m (n=3, P<0.05) for particle coated with 1% Cab-o-sil M-5 and 1% Aerosil® R972, respectively. A decreased total surface energy corresponded with increased flow.

Conclusions
The flowability of the cohesive powder improved significantly after mechanofusion with hydrophobic fumed silica due to the decrease in surface free energy.
The involvement of fatty acid-binding protein 5 in the brain endothelial cell uptake of docosahexaenoic acid

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Objective
To investigate the binding affinity of fatty acid-binding protein 5 (FABP5) for docosahexaenoic acid (DHA) and the impact of FABP5 down-regulation on DHA uptake into human brain microvascular endothelial cells.

Methods
The binding affinity of human recombinant FABP5 for DHA was measured using isothermal titration calorimetry. Using hCMEC/D3 cells as an in vitro blood-brain barrier (BBB) model, the time-dependency of [¹⁴C]-DHA cellular uptake was assessed and normalised to total cellular protein content. FABP5 siRNA transfection efficiency was optimised by trialling various concentrations of siRNA for different durations, with resulting mRNA levels determined by RT-PCR. Using the optimised conditions, the impact of genetic silencing on [¹⁴C]-DHA uptake into hCMEC/D3 cells was assessed over 2 min.

Results
DHA bound to human recombinant FABP5 with an equilibrium dissociation constant of 155 ±8 nM (mean±SEM, n=15). The hCMEC/D3 uptake of [¹⁴C]-DHA was shown to be linear for up to 5 min, after which time, cellular uptake reached a plateau. A maximum of 53 ±7% (mean±SEM, n=4) reduction of FABP5 mRNA was measured by transfecting the hCMEC/D3 with 5 nM siRNA for 2 days and then re-transfected for another 2 days. The down-regulation of FABP5 at the mRNA level was associated with a 17.1 ±2.7% (mean±SEM, n=12) reduction of [¹⁴C]-DHA uptake into hCMEC/D3 cells.

Conclusions
This study has demonstrated that FABP5 binds DHA and that FABP5 may play an important role in the uptake of DHA across the BBB.
Preparation, optimization and characterization of bovine lactoferrin loaded liposomes and solid lipid particles modified by hydrophilic polymers using factorial design

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Objective

Bovine lactoferrin (bLf) is an ideal candidate for incorporation into a controlled release formulation due to its poor oral bioavailability. In this study, novel carrier systems—liposomes and solid lipid particles (SLPs) modified by polymers were developed to protect bLf against proteolysis in the gastrointestinal tract (GIT).

Methods

Factorial design was employed to evaluate the main factors which affect liposomes and SLPs particle size and EE. In vitro drug release profiles were evaluated to determine the optimized proportions of polymers added. Morphological examination, Fourier transform infrared spectroscopy (FTIR) and differential scanning calorimeter (DSC) were performed to characterize the properties of the selected pectin and chitosan modified liposomes and SLPs. Finally, the pharmacokinetics of free bLf and polymer modified liposome and SLP encapsulated bLf were evaluated after oral administration to Sprague Dawley rats.

Results

Net like structures of the polymer-particle mixture consisting of a polymeric network in which multiple particles were imbedded were observed by scanning electron microscopy (SEM). Chemical stability of bLf after encapsulation into pectin and chitosan modified liposomes and SLPs was confirmed by Fourier transform infrared spectra (FTIR). Bovine lactoferrin was located within phospholipids bilayer, whereas in SLPs bLf was within the matrix. The crystalline nature of bLf after encapsulation was investigated by differential scanning calorimetry (DSC) of drug-loaded particles, indicating amorphous dispersion of bLf in the polymer-lipid matrix of pectin and chitosan modified liposomes and SLPs. In vivo pharmacokinetic investigation of bLf in pectin and chitosan modified liposomes and SLPs showed prolong mean residence time (MRT) of bLf in rat blood and increased the relative bioavailability ($F_{bio}$%) by 1.95 to 2.69 fold compared with free bLf.

Conclusions

Polymer modified lipid based particles, particularly chitosan modified SLPs, are promising carriers for transporting the drug to the intestinal lymphatic region which resulted in increased oral bioavailability of bLf.
Expression and binding characteristics of fatty acid binding proteins at the blood-brain barrier

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Objective

Fatty acid-binding proteins (FABPs) facilitate the cellular trafficking of lipophilic molecules in adipocytes and hepatocytes. As a precursor to future studies that will evaluate the role of FABPs in drug transport across the BBB, the current study has examined the patterns of expression of FABPs at the blood-brain barrier (BBB) and has profiled the potential for lipophilic drugs to bind to BBB-resident FABPs.

Methods

Real time reverse transcriptase polymerase chain reaction (RT-PCR) and Western blot analyses were used to determine the expression of FABPs in a BBB cell line (hCMEC/D3). The equilibrium dissociation constant ($K_D$) describing the binding of a fluorescent probe, 1-anilinonaphthalene-8-sulfonic acid (ANS) to FABP5 was determined by steady state florescence spectroscopy and verified by isothermal titration calorimetry (ITC). The binding of a panel of structurally diverse lipophilic drugs to FABP5 was characterised by calculating inhibition constants ($K_i$) of the ligands using a fluorescence competition assay involving displacement of ANS.

Results

The relative expression of FABP3, FABP4 and FABP5 to glyceraldehyde 3-phosphate dehydrogenase (GAPDH) mRNA were 0.68 ±0.02, 0.62 ±0.04 and 0.69 ±0.03, respectively (n=3, mean ±SD). At the protein level, however, only FABP5 was present at detectable levels. ANS bound to FABP5 with a $K_D$ of 1.4 ±0.17 (fluorescence spectroscopy) and 0.70 ±0.02 µM (ITC) (n=3, mean ±SD). Drugs including fibrates, non-steroidal anti-inflammatory drugs and fenamates, were shown to bind to FABP5, with $K_i$ values ranging from 0.2 – 400 µM.

Conclusions

hCMEC/D3 cells express appreciable levels of FABP3, FABP4 and FABP5 mRNA, but only FABP5 was detectable by Western blot. FABP5 was shown to interact with a diverse range of lipophilic drugs, some which have potential in treating neurological disorders. Given the role of FABPs in transport in other cells types, FABP5 may be involved in the transport of therapeutics across the BBB.
Effect of bile salt on the ultrasound triggered release from soy lecithin liposomes

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Objective

The concept of triggering drug release from delivery vehicles with pulses of ultrasound (US) has potential application for triggered and targeted drug delivery. It was hypothesized that the addition of bile salts to liposomes would increase their sensitivity to ultrasound through creation of mechanical defects in the liposomal walls. The aim of this study was to investigate if incorporating bile salts of different amphilicities into liposomes would lead to differential effects on their sensitivity to ultrasound. Furthermore, the response of the most promising formulation was characterized using milder conditions of ultrasound.

Methods

Liposomes (soy lecithin: cholesterol, 70:30 mole ratio) containing carboxyfluorescein (CF, 50 mM) were prepared using the thin film hydration method. They were freeze thawed (<10 times) then extruded (200 nm polycarbonate membrane) and separated from untrapped CF by size exclusion (Sephadex G50) chromatography. Cholate, ursodeoxycholate and taurocholate were added at the molar concentrations 20% of total lipids. Following manufacture, liposomes were exposed to ultrasound at 30 kHz and 1.1 MHz for a cumulative ultrasound exposure time of 30 seconds and 10 minutes respectively. After each US pulse, the amount of CF released was quantified by a validated spectrofluorimetric assay (480 nm/522 nm).

Results

Control (no bile salt) liposomes release approximately 7% CF after 30 s of US whereas liposomes containing chololate, ursodeoxycholate and taurocholate released 20% (±5), 19% ±3 and 70% ±2 respectively. Bile salts thus increase the sensitivity of liposomes to 30 kHz US. At 1.1 mHz US, control liposomes and liposomes containing taurocholate released 0.2% ±0.1 and 4% ±3 respectively of entrapped CF over ten minutes.

Conclusion

Bile salts increase the sensitivity of soy lecithin liposomes to US at 30 kHz and 1.1 MHz. At 1.1 MHz, the response of liposomes is significantly diminished.
A nanofiber ‘textile-like’ dressing which slowly releases wine waste bioactives

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Objective
Incorporate wine waste bioactives into a nanofiber textile which can then release these actives in a controlled manner to kill bacteria.

Methods
Bioactives were incorporated into a nanofibre textile by electrospinning a solution of 5% (w/v) Zein, 5% (w/v) PVP and 5% (w/v) wine waste in 70% (v/v) ethanol. Morphology of the electrospun nanofibre was determined by scanning electron microscopy. Total phenolic content was determined using the Folin-Ciocalteu assay and antioxidant activity was determined by the 10-diphenyl-2-picrylhydrazyl assay. Release assays were performed in phosphate buffered saline pH 7.4 at 37 °C.

Results
The produced textiles exhibited nanofiber diameters ranging from 500 to 800 nm. Total phenolic content and 10-diphenyl-2-picrylhydrazyl assays showed that the wine waste bioactives retained their activity after incorporation in the electrospin nanofibers. In vitro release studies showed that 70-90% of the total phenolic content was released in 2hr.

Conclusions
The electrospinning technique has shown promising results as an efficient and effective method for the preparation of sub-micron structured encapsulated functional textile. These functional textiles may find uses in food industry or in wound healing devices.
Changes in coprescribing antisecretory drugs with clopidogrel in clinical practices
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Objective
To investigate the changes in the coprescribing of antisecretory drugs in patients using clopidogrel in clinical practice after the warnings on drug-drug interaction between clopidogrel and proton pump inhibitors (PPIs), specifically omeprazole and esomeprazole.

Methods
The coprescribing of antisecretory medicines within 30 days post clopidogrel prescribing were identified during Jan2006–Dec2011 in the AsteRx database. AsteRx is a de-identified clinical database that collects data from more than a hundred of practices in Australia. Coprescribing changes after three safety warnings from 1) the European Medicine Agency (EMA) in May 2009, 2) the U.S. Food and Drug Administration (FDA) in November 2009 and 3) Therapeutic Goods Administration (TGA) in October 2011 were investigated using the time-series analysis “ARIMA”.

Results
There were a total of 5,458 coprescriptions of antisecretory drugs with clopidogrel during the study period. A decrease in the trend of omeprazole coprescribing after the warnings was observed; however, no significant change was found after fitting it to the ARIMA model. There was no significant change in esomeprazole coprescribing after the warnings; moreover, esomeprazole was the highest proportion in antisecretory coprescribing with clopidogrel after the warnings. The proportion of pantoprazole significantly increased after the EMA warning ($p = 0.011$) and the FDA warning ($p = 0.019$) while no change was observed after the TGA warning. There was no change in histamine-2-receptor antagonist prescribing.

Conclusions
It appears that after the PPI/clopidogrel warnings, patients continued to be prescribed esomeprazole whereas some of those prescribed omeprazole were swapped to pantoprazole, the alternative PPI. Further investigation is needed to determine the rationale behind these findings.
Objective

Human activities have introduced thousands of chemicals into water. Monitoring programs measure concentrations of some of these chemicals, but it is difficult to know if these or other untested chemicals are impacting aquatic ecosystems. Toxicity tests directly measure the biological effects of pollutants in water samples and provide indications of the effects pollutants have on aquatic life. Thus, most regulatory authorities still require the submission of in vivo fish lethality tests. In addition to the ethical concerns over this type of toxicity testing, the time and costs involved in vivo experiments are prohibitive and faster and cheaper alternative methods are needed. QSARs were recommended as a cost-effective and faster alternative to conventional methods. Therefore, the aim of this study was to develop an in silico QSAR model capable of predicting aquatic toxicity of pesticides measured as the fish lethal dose (LD) without requiring the use of in vivo tests.

Methods

A large data set of 270 diverse pesticides, including fungicides, herbicides and insecticides with experimentally derived LD values taken from the literature, was used to train, test and validate a predictive model. Each compound was encoded with 53 calculated molecular structure descriptors, including constitutional, topological, geometrical, quantum chemical descriptors, molecular connectivity and physicochemical properties. Sensitivity analysis was used to select a subset of the descriptors that best describe the model and an artificial neural network was used to correlate the selected descriptors with the LD values in order to develop a predictive QSAR

Results

The developed model included 37 molecular descriptors related to lipophilicity, hydrogen binding and polarity, with the high correlation value for the model (0.82). Furthermore, the value of the predictive squared correlation coefficient ($q^2$) of the final model was 0.67, further displaying the model’s predictability. In the domain of QSAR studies, a $q^2$ value above 0.5 renders a model predictive.

Conclusions

The model could be used to screen a wide range of compounds without the need for actual compound synthesis and to prioritize potentially toxic compounds for further testing.
**pH-sensitive biodegradable cross-linked HPMA copolymer micelles for cancer therapy**

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**Objective**

Increasing the size and molecular weight using micellar structures formed by self-assembly of N-(2-Hydroxypropyl) methacrylamide (HPMA) copolymers could result in more pronounced EPR effect, thus enhancing the tumor drug accumulation. However, the poor stability of the micelles and non-specific drug release limited their application. In this study, amphiphilic conjugates were synthesized by grafting the hydrophobic drugs doxorubicine (DOX) and β-sitosterol (SITO) onto the hydrophilic HPMA polymers via pH-sensitive hydrazone linkages. After the conjugates self-assemble into micelles, the structures were cross-linked through the hydrazone bond to ensure the stability of the micelles in blood circulation. It was expected that the novel cross-linked micelles could efficiently accumulate in tumor via enhanced EPR effect and once endocytosed by the cancer cell into the lyso/endosomes compartments, the hydrazone linkages were hydrolyzed followed by the collapse of micelle structure and rapid drug release.

**Methods**

Micelles (M) were prepared by self-assembly of pHMPA-DOX-SITO conjugates. Then, glutaraldehyde was added to prepare cross-linked micelles (CM). The in vivo biodistribution and anti-tumor activity were evaluated on a Kunming mice model bearing H22 xenografts. The in vitro uptake mechanism was studied using HepG2 and A549 cell lines.

**Results**

Cross-linked HPMA micelles were successfully prepared with the diameter of 10-20 nm. The drug was specifically released at pH 5.0 (80%) within 24h while maintained stable at pH 7.4 or in mice plasma. The accumulation of CM in tumors was 2.71-fold higher than M after 24 hr p.i., and 3.18-fold at 120 hr. Meanwhile, higher anti-tumor rate (71.8%) was observed in CM group. The internalization of CM and M were mediated by caveolin, clathrin, and giant pinocytosis.

**Conclusions**

Novel HPMA copolymer cross-linked micelles were prepared and exhibited excellent stability in plasma, rapidly drug release in the acid environment and better in vivo anti-tumor activity. All the results suggest their potential as an excellent carrier for the anti-cancer drugs.
The effects of natural and artificial sweeteners in soft drinks on glycaemic response, hydration and hunger

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Objective

Soft drinks containing non-nutritive sweeteners (NNS) are popular due to health concerns relating to high sugar consumption. However, the effects of NNS on metabolism and eating behaviour are equivocal. We aimed to compare the effects of soft drinks containing NNS or nutritive sweeteners (NS) on blood glucose concentration, hydration and hunger.

Methods

Eleven healthy young males (BMI: 26.5±4.8 kg/m²) volunteered to participate in this double-blind crossover study. Participants reported on two occasions after abstinence from food, alcohol and caffeine for 8 hours. An indwelling cannula was inserted. After 30 min of rest, 600 ml of soft drink (NNS or NS) was consumed within 5 min. Venous blood samples were taken before soft drink consumption (0 min) and at 5, 10, 15, 20, 30, 60, 90 and 120 min for determination of blood glucose concentration (2900; YSI, USA) and plasma osmolality (Advanced Micro-Osmometer 3320; AII, USA). Ad libitum food consumption was recorded during a 30-min buffet lunch.

Results

Sweetener influenced the glucose response (time*supplement interaction: p<0.01), where blood glucose concentrations were elevated at 10, 15, 20 and 30 min in NS and reduced at 20 min in NNS. Plasma osmolality was not influenced by sweetener (time*supplement interaction: p>0.05). The calorific value of food consumption during lunch tended to be higher after NNS when compared to NS (p=0.14).

Conclusions

Although participants generally report similar satiety and hunger after NNS and NS, these findings suggest that NNS might influence cephalic phase and gut endocrine response leading to greater snack food consumption after NNS in non-diabetic healthy males.
Evaluation of oral communication workshops for second and third year undergraduate pharmacy students

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Objective

There is a high attrition rate of pharmacy students in oral assessment items. Recognising the need to be better prepared for these oral assessments, a series of workshops was provided. The aim of this paper is to gauge how effective oral communication workshops are and to explore the learning resources which pharmacy students utilize.

Methods

Academic Learning & Literacy Skills Program (ALLSP) within Charles Darwin University, delivered workshops about oral communication skills to undergraduate pharmacy students. A survey determining how prepared for oral assessments students believed themselves to be, was conducted after every workshop. These surveys were analysed using the sort function in Microsoft Excel.

Results

Correlations were noted between workshop quality, content and significance to the preparation for oral assessments. A reverse correlation was noted between preference for private study and confidence levels.

Conclusions

Learning styles influenced the appeal of these workshops to students in need of additional support in preparation for oral assessments.
Effectiveness of e-learning in the pharmacy context: a systematic review
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Objective
E-learning has become a mainstream method of delivering pharmacy education. E-learning permits control over time and place of learning, allowing real-time feedback. Despite the promise e-learning may offer over traditional methods, there are no reviews of the effectiveness of e-learning in the pharmacy context. We conducted a systematic review on this topic. Our aim was to describe the effectiveness of e-learning in pharmacy education.

Methods
We conducted a systematic search of MEDLINE, EMBASE, ERIC, Web of Knowledge, PsycINFO, Science Direct, CINAHL and grey literature including Google Scholar, Mednar, OpenGrey and Scirus databases. Two reviewers independently screened and reviewed studies, evaluated study quality and abstracted data including learner characteristics, e-learning intervention (topic, setting, type) and outcome measured. We developed and implemented a quality assessment scale addressing domains of reporting, methodology and analysis. Impact of interventions was classified according to Kirkpatrick’s levels, and trustworthiness of conclusions graded according to a Best Evidence Medical Education collaboration scale.

Results
Fourteen of 336 identified studies were eligible for review, (n=7 for pharmacists, n=8 for pharmacy students). All e-learning topics were distinct. Online interventions were similar and included modules, synchronous and asynchronous lectures, virtual patients and reading materials. E-learning settings included continuing/distance education (n=7) and university units/courses/preregistration courses (n=7). The main outcomes measured were attitudes/satisfaction (n=12), knowledge/skills (n=10) and behavioural/practice change (n=3) corresponding to Kirkpatrick’s levels 1, 2b and 3 (out of four). Five studies were low quality. Eight studies were moderate quality; trustworthiness of conclusions was rated high (>=4/5) for three studies. All studies reported significant change from baseline in satisfaction and knowledge scores, however heterogeneity, insufficient data and the lack of comparator groups prevented meta-analytic synthesis.

Conclusions
E-learning in pharmacy education is probably effective in terms of attitudes/satisfaction and knowledge/skills. High quality, controlled studies are lacking in this area. Future controlled studies may shed more light.
The development of a teaching tool to identify and prioritise potential causes of adverse drug reactions: The ATTEND DR acronym.

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Objective

To develop a clinical teaching tool to evaluate the causality of adverse drug reactions (ADRs). A tool based on existing algorithms, and augmented by incorporating factors and processes used by experienced clinicians.

Methods

Individual discussions were held between the first author and five practicing clinicians with clinical teaching experience (4 clinical pharmacists and 1 general practitioner) to determine the factors and processes they used to assess the causality of ADRs. These were then added to a list of factors identified from existing causality assessment algorithms. An iterative process was used to develop and refine an acronym to help students identify potential causes of an ADR and prioritise them. Student feedback was sought on valuable aspects of the acronym and how it could be improved.

Results

The order of the letters in the acronym was integral to the students’ application, as was having separate identifiers for each individual action. Due to this TRACED (timeline, rechallenge, abnormality, cannot be another cause, evidence, dechallenge/dose) became ATTEND DR (abnormality, taken, timeline, evidence, nothing else?, dose, dechallenge, rechallenge). Students commented that the acronym was “well structured”, a “good way to work out ADR considering polypharmacy, lifestyle factors.” and was “practice oriented”. Comments related to improvement focused on “more practice questions to get better acquainted with ATTEND DR”.

Conclusions

ATTEND DR was well received, understood and successfully applied by students. Students felt better able to identify and prioritise potential causes of ADRs when using this acronym, especially in comparison with the existing algorithms.
Development and acceptability of an online module for training in professional decision making

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Objective

Pharmacists must recognise ‘shades of grey’ in an ethical dilemma, and identify and defend their decision(s). We report the collaborative development of an e-learning Professional Decision-Making module between Curtin University and IMU, with reflections from a cohort of students following its implementation at Curtin University.

Methods

A concept document was prepared to address learning objectives of both universities and develop an interactive e-learning module, hosted on IMU’s learning management system. The module comprises two scenarios representing ethical dilemmas, with characters portrayed in an interactive family tree and animated using Articulate® Storyline software, and a 15-minute recorded lecture on Toulmin’s Argumentation Pattern. An experimental design was applied to test the effectiveness of training in Argumentation. Second semester of third-year BPharm studies was identified as the appropriate timing for in-class trial of the module, followed by facilitated discussion. Ethical approval from Curtin University allows reporting of Curtin students’ data; reflections are reported here.

Results

The module was experienced by approximately 150 IMU and 100 Curtin University students. Of the Curtin University cohort, 65 (44 females, 21 males) consented to analysis of their data. Completion of the Argumentation training resulted in a small but non-significant increase in their confidence in articulating an argument. The self-directed learning experience was well received. Criticism related to the electronic character voices. Lack of a ‘correct’ answer was challenging to some.

Conclusions

This e-learning module was trialled in class, but would ideally be a pre- or post-class individual learning activity, with class time reserved for debate and group engagement, as per current pedagogical developments. Further analysis may explore determinants of responses to the scenarios and issues raised in students’ arguments.

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Problem Based Learning (PBL) – Bringing clinic into interactive classroom

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Objective
Teaching of pharmacy practice is often limited by insufficient student’s exposure to clinical scenarios, due to factors such as location, time and access to clinics. The PBL is designed to achieve the ultimate outcome of pharmacy student’s teaching-learning achievement, quality of graduates, work-readiness and employability.

Methods
Various clinical case studies was introduced into interactive classroom environment, where students were guided to identify clinical problems, assess the problems, research and develop appropriate solutions for each case. Students were working in groups to help sharing their knowledge and ideas. The outcome was evaluated by student’s academic achievement, and feedback survey utilising visual-rating-scale and open questions.

Results
The average academic grade of students improve from 59.6% (2012) to 63.7% (2013), compared to previous student cohort of 69.3% to 64.2%. The general improvement in student’s problem solving skills and self-learning skills was also observed. All participants have very positive feedback and indicated they would like to attend future classes conducted using the model. Participants indicated the PBL model has improved their learning and making them more aware of their own strengths and weaknesses. Participants also indicated that the model is different and much more enjoyable than conventional lecture and tutorial.

Conclusions
The PBL model has provide a positive learning experience and safe environment which students can practice utilising theoretical knowledge in clinical scenario. This teaching model is an effective method to narrow the gap and improves student’s work-readiness and ability to conduct continues self-directed learning. An upgraded PBL model that also includes interaction with local and interstate practicing professionals (via social media) is currently being conducted as follow up trial at CDU.
An international review of the use of professional competencies within pharmacy education

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Objective

To review the recent documented use of professional competency standards within pharmacy education. Pharmacists worldwide self-regulate their competency to practice. Does the introduction of competency standards (CS) to undergraduate students promote a self-reflective culture, essential for continual growth as a safe, competent practitioner.

Methods

Four databases (Proquest ERIC, Scopus, IPA and Cinahl) were searched for articles published in English between 2000 and 2013. All types of literature were reviewed. Identified papers were assessed by two reviewers for relevance to the research question, study design, study quality, consistency and internal and external validity and reliability.

Results

Of the 1646 papers identified and screened, 19 were included in the review; most reported qualitative findings. The majority of papers arose from the United States (US). Ninety percent of the studies reviewed described CS being employed in curriculum design and in 50% they were used in curriculum mapping. These processes were largely driven by accreditation requirements.

Curriculum design and mapping against CS underpin competency based education and assessment. CS have a variety of other roles, including curriculum review, quality assurance, benchmarking and acceptance into placements. Authors suggest that a paradigm shift in teaching and assessment practices are required to ensure tomorrow’s pharmacists are more self-directed and practice ready focussed; in other words, worthy of self-regulation.

Conclusions

Competency based pharmacy education is well established internationally. Australian Pharmacy Schools have a requirement around curriculum review and mapping against CS but further work is required to ensure their implementation into teaching practice. This forms the basis for the presenter’s PhD.
Patient experiences with gabapentinoid therapy for persistent pain

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Objective

To evaluate the real-life experiences of patients receiving gabapentinoid therapy for persistent pain. Persistent pain often contains a neuropathic component and whilst clinical trial evidence supports the use of gabapentinoids in neuropathic pain, there has been little research into patient’s experiences with these therapies in practice.

Methods

Patients receiving prescriptions for gabapentin or pregabalin through the Royal Hobart Hospital Pharmacy Department were invited to take part in this study at the point of dispensing. Participation involved patients completing a questionnaire to assess issues including efficacy and how the experience of therapy compared to expectations.

Results

Of 243 surveys distributed during March and April 2013, 83 (34%) were returned with signed consent forms and eligible for inclusion. Sixty-four participants were taking gabapentin (mean dose 1448mg/day) and 19 patients pregabalin (mean dose 232mg/day). In terms of efficacy, 93.8% of gabapentin patients and 89.4% of pregabalin patients reported treatment was either partially or fully effective. Sustained effectiveness was also apparent, with 82.8% and 63.1% of gabapentin and pregabalin users respectively reporting treatment was equally or more effective than when first stabilised on therapy. The vast majority of respondents found that treatment met or exceeded their expectations, with only 12.5% and 21% of those on gabapentin and pregabalin respectively reporting their experience was worse than expected.

Conclusions

In this population with persistent pain, we found high levels of patient satisfaction with gabapentinoid therapy when assessed in terms of overall efficacy, sustained efficacy and alignment with expectations. It appears that the benefits of gabapentinoids reported in clinical trials are translated into real-life practice.
How do developed countries vary in medicines reclassification? A six country comparison

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Objective

Reclassifying medicines from prescription to non-prescription can increase consumer access and relieve burden on health resources, but confer risks. Countries appear to vary in reclassification, but research on reclassification activity has been limited. This research aimed to explore how developed countries vary in medicines reclassification.

Methods

Six countries were purposively selected for variation in location, population size and scheduling: the United Kingdom (UK); United States (US); Japan; Australia; New Zealand (NZ); and the Netherlands. A new tool, “progressive” reclassifications, was developed to count prescription to non-prescription reclassifications (2003-2012) deemed by four researchers to benefit consumers over current non-prescription medicines. First-in-world “progressive” reclassifications were counted, and 31 selected medicines reclassified in one or more countries since the 1970s were compared across all countries. Meeting minutes, industry documents, regulator websites and key informants were used to compile a list of reclassifications and dates.

Results

NZ, the UK and Japan were most active in “progressive” reclassifications in the decade studied with 11-13 such reclassifications each, but Japan’s activity arose from a low base. The US, Netherlands and Australia were less active with four, five and six reclassifications, respectively. First-in-world progressive reclassifications occurred most in NZ and the UK (four each), with Australia having one, and the other countries having none from 2003 to 2012. Reclassification timing varied, with some reclassifications delayed by 20 years (e.g. vaginal antifungals in the Netherlands, and naproxen in the UK) compared with other countries. Many first-in-world reclassifications had reclassified in one market only.

Conclusions

Developed countries vary in reclassification, with the UK and NZ the most progressive of the countries studied. This research provides bench-marking for countries considering their reclassification activity. There is a need to explore why reclassification variation occurs, and its implications for consumer access, well-being and use of health resources.
Home Medicines Review following acute coronary syndrome: case findings from a randomised controlled trial

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Objective

To describe two cases of medication misadventure detected during a trial of directed Home Medicines Reviews (dHMRs) following acute coronary syndrome (ACS) and the interventions performed by the accredited pharmacists specially trained for the trial.

Methods

A randomised controlled trial was conducted at two Tasmanian hospitals. An online education package was developed to tailor the HMR service towards detecting drug-related problems and improving adherence following ACS. Intervention patients received a dHMR two months following discharge by pharmacists who had completed this training.

Results

Case 1: a 70 year old male with a history of Barrett’s oesophagus, was discharged following treatment for an in-stent restenosis taking aspirin, prasugrel, warfarin, and pantoprazole. Two months following discharge the pharmacist noted the re-initiation of a previous medication, clopidogrel and cessation of pantoprazole. Through phone liaison with the GP, clopidogrel was ceased and pantoprazole restarted promptly.

Case 2: a 63 year old male with first presentation ACS was discharged taking aspirin, clopidogrel, atorvastatin and metoprolol. On the day of discharge, the patient noted cold extremities and stopped all medications. At the two-month visit, the pharmacist highlighted metoprolol as the likely contributor, and formulated a plan for the patient to restart aspirin with the others to be progressively added by the GP.

Conclusions

These cases demonstrate the complex medication issues many patients with ACS face after hospital discharge, and the potential of a HMR service provided by appropriately trained pharmacists to assist with medication management and optimise adherence. A dHMR service may be a useful additional management option for these patients.
A delivery model for rural pharmacists to provide medication management services: sessional (cross-sectoral) employment

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Objective

Rural communities in Australia are typically serviced by one or two community pharmacists; the closest hospital employing a pharmacist may be some hours’ distance by road. In the absence of clinical pharmacy services in small hospitals, one solution involves contracting a cross-sectoral pharmacist to service the local non-pharmacist hospital on a sessional basis. This study explored elements of such employment models in rural Australia and New Zealand, from the perspective of former, practising or intending sessionally-employed pharmacists.

Methods

Ethical approval was obtained for a series of semi-structured one-on-one interviews with rural pharmacists with experience, or intention to practise, in a sessional employment role. Participants were identified via newsletters, discussion forums and referrals in Australia and New Zealand. The interview guide, developed with reference to the literature and qualitative research with rural health practitioners, explored model logistics, drivers and challenges. Pharmacists were interviewed in August 2012-January 2013 via telephone or Skype for 40-55 minutes each.

Results

Seventeen pharmacists were interviewed; eight were currently employed sessionally, five were formerly employed sessionally, and four were working towards sessional employment. Their hospital roles included medication stock management, dispensing, medication review and ad-hoc education of hospital staff about medicines. Enablers for the model included recognition for value of service, funding availability through funds pooling, district or regional support and increased employment opportunities. Flexibility in scopes of practice and service hours was key; the pharmacists were typically very busy but professionally satisfied. Upskilling in clinical services was sometimes required, although the majority of skills were developed ‘on the job’.

Conclusions

There is potential to address clinical service needs in rural areas by cross-sectoral employment of community pharmacists. Functionality of this model is largely dependent on the setting, and financial and collegial support. Pharmacists aspiring to sessional employment are advised to invest in these foundations.
How do consumers perceive privacy and confidentiality in community pharmacies?

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Objective

Pharmacy staff require consumers to disclose relevant health information for effective management of their health. Consumers are only likely to disclose such information if confidentiality is assured, and private information is used only for clinical purposes. This study acknowledges the complexities around management of privacy and confidentiality in pharmacies, by exploring perspectives and experiences of consumers.

Methods

Ethical approval was obtained. Semi-structured interviews of 2-18 minutes’ duration were undertaken during mid-2013 with 55 consumers from 22 community pharmacies in Perth, Western Australia. Independently-owned and ‘banner group’ pharmacies of varying sizes were included from a range of suburbs. Consumers were introduced by staff to the interviewer and interviewed in a private/semi-private area of the pharmacy. Interview topics included perceptions of privacy and confidentiality, experiences with management of private information and level of comfort during consultations. Data were recorded and thematically analysed. Data were not shared with the pharmacy staff.

Results

Fifty-five participants (mean estimated age 55 years) comprised 31 females, 21 males and 3 couples. These consumers were largely satisfied with privacy during their consultations, despite most conversations taking place at the main pharmacy counter. A number had experienced being “taken aside” by a staff member recognising the need for more privacy. The majority perceived that their requests were not particularly embarrassing, but considered that should the need arise, they would be comfortable discussing more personal matters in the pharmacy. Some participants reported visiting the pharmacy in off-peak times or sought information elsewhere to enhance privacy. Rare concerns were reported about overhearing conversations and accessibility of information.

Conclusions

Awareness of consumers’ positive and negative experiences will advise the refinement of Australian guidelines, training priorities and policies to enhance staff sensitivity to privacy and confidentiality needs. Comparison of these data with perspectives of pharmacists is firstly required to confirm current practices.
Australian drugs and poisons nomenclature

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Objective

Australian Health Practitioner Regulation Agency (AHPRA) initiated national registration in July 2010, removing barriers for pharmacists working interstate. Drugs and poisons legislation, which guides the safe and legal practice of pharmacists, remains the responsibility of the eight Australian state and territory jurisdictions. This research aimed to investigate differences in drugs and poisons nomenclature between jurisdictions that may confuse, or disrupt the legal practice of Australian pharmacists.

Methods

A literature review of core Australian state and territory drugs and poisons legislation was conducted in 2013. Researchers reviewed particular schedules of the Standard for Uniform Scheduling of Medicines and Poisons (SUSMP) as they applied to each jurisdiction and documented the nomenclature used to describe the schedules, and exceptional categories of medicines within the legislation, of each of the states and territories. In order to limit variability in interpretation of the regulations and reduce errors, data were verified by another researcher.

Results

Nomenclature is the most inconsistent aspect of Australian legislation. All jurisdictions recognise the SUSMP schedules, but use different terminology to describe them, e.g. Schedule 8 medicines are termed Drugs of Dependence (SA, TAS, VIC), Controlled Drugs (QLD, SA), Prescription Drugs (SA), Drugs of Addiction (NSW, WA), Controlled Medicines (ACT), Restricted Medicines (ACT), Non-Restricted and Restricted Drugs (NT) and Narcotics (TAS). All S4 drugs in Queensland are Restricted Drugs, whereas in the ACT, Restricted Medicines include S8 drugs, benzodiazepines, anabolic steroids and SUSMP Appendix D drugs, thereby providing inconsistent terminology and difficulty in interpreting drugs and poisons legislation.

Conclusions

Uniform national drugs and poisons legislation is imperative to facilitate a common practice reference for all Australian pharmacists.
Diabetes risk assessment: Exploring facilitators and barriers of pharmacy practice in Australia and Thailand based on organisational theory.

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Objective
Application of organisational theory into the pharmacy practice is still limited. There has also been no attempt to evaluate the possible impact from the health systems among inter-country differences in delivering health services. This study was therefore conducted to explore the facilitators and barriers of community pharmacists in Australia and Thailand in providing diabetes risk assessment.

Methods
The intervention study was conducted in eight community pharmacies in New South Wales, Australia and six community pharmacies in Central Thailand. Diabetes risk assessment tools were applied to determine the risk of developing type 2 diabetes. An open-ended question was applied to solicit the willingness to pay value for the service. Semi-structured interview was conducted to solicit the perceived facilitators and barriers in providing diabetes risk assessment intervention from participating pharmacists.

Results
Totals of 132 and 185 participants, the ratio of participants in the three risk categories of low: intermediate: high was 1:4:11 and 2:1:1.5 for Australia and Thailand respectively. More Thai participants were willing to pay for the service (72.4% vs. 18.9%, p=0.0001). Pharmacists from both countries agreed that providing risk assessment would increase health awareness and assist in dampening the burden of disease. Major barrier was time and staff shortage. Support from the government, collaboration among healthcare providers, and remuneration were major facilitators from Thai and Australian pharmacists’ perspective respectively.

Conclusions
Pharmacists in both countries agreed that risk assessment intervention would contribute in dampening the burden of disease. The difference in health systems and practice influence the facilitators and barriers in providing the service, as well as the different proportion of consumer willing to pay for the service. It is essential for pharmacists and policy makers (particularly in developing countries) to be aware of the pitfalls of replicating practice initiatives in developed countries without any consideration of the local healthcare environment.
Interventions addressing adherence to anti-diabetic medications in Type 2 diabetes: a systematic review

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Objective

Low levels of patient medication adherence in Type 2 diabetes (T2D) has been associated with sub-optimally controlled blood glucose levels. Interventions to promote adherence in T2D have been implemented in different practice settings. This presentation aims to review the interventions that focus on improving medication adherence in T2D patients.

Methods

Medline, Embase, CINAHL, IPA, PUBmed, and PsychINFO were searched for articles (limited to English and from January 2000-April 2013) which addressed interventions to improve adherence to anti-diabetic medications in T2D patients. Each intervention was assessed to determine its type, dimensions of non-adherence factors it addressed, and its effect on medication adherence and glycaemic control.

Results

Fifty two studies were included: 49 consisted of patient-level interventions, two provider-level interventions, and one consisted of both. Interventions were classified as educational (n=6), behavioural (n=3), affective, economic (n=3) or multifaceted (a combination of the above; n=40). Interventions addressed patient-related (n=35), condition-related (n=31), and therapy-related (n=21) non-adherence factors.

Twenty two studies reported improvement in medication adherence. These were multifaceted (n=16), educational (n=3), behavioural (n=2), and economic (n=1). Fourteen studies addressed more than one adherence related factors. Of these, 10 reported improvements in HbA1c; all of which were multifaceted and majority (n=8) addressed multiple adherence factors.

Conclusions

Multifaceted interventions appear to be a more effective approach in improving medication adherence and glycaemic target in T2D patients. Reviewed studies varied in terms of research designs, assessment methods, and sample population, preventing a detailed comparison of findings. Furthermore, there is a need for well-designed and well conducted interventions to ascertain which interventions have the greatest sustained impact on medication adherence.
Diabetes risk assessment and intention to adopt healthy lifestyle: Application of the theory of planned behaviour in health promotion program.

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Objective

To determine the impact of pharmacist intervention in providing diabetes risk assessment and education on clients’ intention to adopt healthy lifestyle, health related quality of life (HRQoL), and the perceived value based on the theory of planned behaviour (TPB).

Methods

The study was conducted in eight community pharmacies in New South Wales, Australia during September 2012 to January 2013. Australian Diabetes risk assessment tools (AUSDRISK) was applied to determine a risk of developing type 2 diabetes (T2DM) in participants’ age > 25 years with no known diabetes. Participants were randomized into intervention and control groups. Multiple regression analysis was performed to determine the associations between total risk scores, age, and TPB variables to the intention in performing healthy behaviours. EQ-5D-5L was used to determine HRQoL and an open-ended question was applied to solicit the willingness to pay value (WTP) for the service.

Results

Among 194 participants (intervention =100, control =94), mean age 53 ± 17 years, approximately 54% were at high risk of developing T2DM. At 3 months after initial visit, more participants in intervention group reported they had blood glucose checked at the pharmacies (38% vs. 0%, p=0.001), and went to see the doctor for further diagnosis or advice (31% vs. 0.03%, p=0.01). No significant reduction of HRQoL, but relatively lower reduction was observed in the intervention group. Approximately 18% of total participants were willing to pay for the service. No significant difference of the WTP value for the service between groups, but a trend of higher agreed fee in intervention group was observed. Total risk scores, motivation from pharmacists’ advice and subjective norms were found as variables to predict the perception to perform regularly blood glucose checked.

Conclusions

The observations highlighted the positive impact of pharmacists’ intervention in delivering health promotion and in influencing individuals’ healthy seeking behaviour.
Pharmacy and social media

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Objective

There is a trend towards increased social media use amongst patients, healthcare professionals, healthcare students and academics. This review aims to systematically assess the use of social media in both pharmacy practice and pharmacy education.

Methods

Medline, Embase, PubMed, IPA, and CINHAL databases were searched for research studies broadly about Pharmacy and Social Media. Search restrictions were not applied.

Results

Twenty studies were identified on Pharmacy and Social Media. Seventeen studies (85%) were based in the United States (US), two in the United Kingdom, and one in Australia. Pharmacy students were the subject of 12 studies, pharmacists of four, and faculty members and administrators of four. Survey methods were used in seventeen studies, alone or with an additional method; focus groups were used in two; interviews in one; and direct observation of social media activity in five. Three studies evaluated an educational intervention on social media. The main topics addressed were 1) type of social media used, 2) frequency of use, and 3) reasons for using or not using social media. Other topics discussed were academic-student relationship, and pharmacy student e-professionalism. Social media as a pharmacy education tool was present in 5 studies: 3 used wikis, 2 Facebook, and 1 Twitter.

Conclusions

As social media is a new topic, only a few studies were identified about its use in pharmacy, with the majority based in the US. Most studies identified, assessed the use of social media in educational setting. Although there were some attempts to use social media to deliver/enhance pharmaceutical education, no study so far has focused on how this pervasive communication tool can improve patient care by pharmacists.
A question prompt list (QPL) for parents of children with attention-deficit hyperactivity disorder (ADHD): Part I- development by thematic analysis

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Objective

A question prompt list (QPL) contains a structured list of disease and treatment-specific questions that patients may choose to ask their physicians. QPLs enhance patient-clinician communication and empower patients by fostering shared decision-making. This study aimed to develop a QPL intended for use by parents of children affected by attention-deficit hyperactivity disorder (ADHD) during consultations with the clinicians involved in their child’s care.

Methods

The QPL content was derived through thematic analysis of existing ADHD and QPL related resources: (i) 8 QPLs published in peer-reviewed journals; (ii) 14 information leaflets about ADHD and its treatments; (iii) draft Australian guidelines on ADHD; and (iv) earlier unpublished research on parents’ ADHD-related information needs. Questions were categorised according to emerging themes and subthemes from the thematic analysis conducted.

Results

Eight themes and 6 subthemes were identified and used as the main topics for the QPL: (1) Diagnosis; (2) Understanding ADHD; (3) Treatment (i) Medicines (ii) Alternative; (4) Healthcare Team; (5) Monitoring ADHD; (6) Managing ADHD; (7) Future Expectations: (i) Approaching Adolescence, (ii) Health and Medicines, (iii) Academic Progress, (iv) Social Progress; and (8) Support and Information. Questions written for each topic used simple language and avoided medical terminology. The QPL contains a comprehensive list of 111 questions relevant to the listed topics.

Conclusions

To our knowledge, this is the first ADHD-specific QPL to be developed. It is anticipated that the QPL will assist parents in obtaining relevant information and empower their treatment decisions by enhancing the potential for shared decision-making with clinicians. The content of the QPL has been validated by parents and clinicians using a modified Delphi method.
Online diabetes management: don’t sugarcoat it

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Objective

The quest to monitor diabetes has led to rapid development of online tools allowing users to record their blood glucose levels (BGLs) and lifestyle practices. While research has found these tools to be useful, there has been little research into the characteristics of such tools. This pilot study investigated the characteristics of one online tool, and evaluated the potential for its long-term use, from the user’s perspective.

Methods

The study followed a qualitative descriptive design. Five participants were recruited for a four week trial of the tool. The pre-trial interview explored their perception of diabetes, and the post-trial interview focussed on the participant’s feedback from using the tool. The interviews were recorded, transcribed, and thematically analysed.

Results

The mean age of participants was 50.6 years, all were married and diagnosed with diabetes mellitus – three type I and two type II. Over the trial, all participants created logins via desktop computers, but infrequently accessed the tool – reasons for this were explored. The tool was perceived as straightforward and simple to use. The predominant barrier to infrequent use was time. Suggestions for improvement included training prior to using the tool and the development of a mobile application interface. All participants were interested in accessing diabetes education via the tool.

Conclusions

This pilot study investigated key aspects of an online diabetes management tool from users’ perspectives. Participants agreed the move to an easy-to-use online platform for logging their diabetes management was timely and that supported education through the tool was desirable, which elsewhere has been shown to improve outcomes. These results provide valuable information for development in diabetes management, supporting patients to have a greater role in their health management.
The needs of culturally and linguistically diverse (CALD) communities relating to medicines

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Objective

This study aimed to ascertain the needs of culturally and linguistically diverse populations in NSW, Australia in regards to their medicines. Literature indicates that low health literacy is a problem that persists in all communities, but for those from CALD backgrounds, this problem is compounded by language and other access barriers. The recent census shows that Australia is a thriving multicultural society in which many languages are spoken. There had been no study to date conducted of such an exploratory nature in NSW.

Methods

We invited various community pharmacies and community centres with our “invitation to participate” to distribute an “advertisement” of the project to members of the community with a CALD background who were taking medicines. Interested community members contacted the researcher and an interview time was set. In this way, exploratory, semi-structured interviews were conducted and interpreter service was arranged for when needed.

Results

30 interviews were conducted. Interview data was transcribed and thematically analysed using NVivo. Some important emerging themes identified were: a heavy reliance on the doctor for understanding of medicines and health, perception of the pharmacist to be unhelpful in this regard as it was beyond their scope of practice, hesitation to ask the pharmacist for help and the need for multilingual and patient concordant medicine labels.

Conclusions

This study provided an insight into the needs of some culturally and linguistically diverse populations in NSW in regards to their medicines. This has provided a basis on which a pharmacy intervention will be developed and trialled with the aim to address the needs identified and in turn improve health literacy levels in such populations.
Can asthma management services be sustained in pharmacy?

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Objective
To investigate the barriers to implementation and sustainability of an evidence-based asthma service post the research trial.

Methods
Qualitative semi-structured interviews were conducted with 19 pharmacists who had been involved in a pharmacy asthma service trial. We explored the nature of the asthma services they currently offered and the pharmacists’ thoughts on barriers and future directions. Based on this information, we streamlined the original trial service to ‘practice ready’ and then trialled it in 10 patients for feasibility and acceptability. Post-service qualitative semi-structured interviews were conducted with the patients to explore their experiences and preferences.

Results
Pharmacists unanimously stated that participation in the trial had led to an improvement in the way that all asthma patients were managed in their pharmacies. The majority of interviewed pharmacists wanted to continue providing the service, however the structural barriers of lack of professional support, remuneration and time meant none had done so. Most pharmacists wanted a fee for service from Government. They recognised the need to have ongoing training and accreditation. The ‘practice ready’ service was found to take less than 50% of the time of the original research service and was still acceptable to pharmacists and patients.

Conclusions
Several significant barriers to implementation and sustainability were identified. The structural barriers could not be modified at this stage however we could successfully address the time related issues. Patients were supportive of the service and the pharmacist offering asthma services. This information may help pharmacists and policy makers evaluate and cost services to enable future implementation and sustainability.