# Table of Contents

Welcome Address from the Dean and Associate Dean for Research & Graduate Education 1

Program 2

Keynote Speaker: *Steven D. Pearson, MD, MSc* 3

2018 Alum of the Year Award: *Michael T. Flavin, PhD* 4

2018 Hans W. Vahlteich Research Award: *Laura M. Sanchez, PhD* 5

2017 Graduate Student Awards and Other Trainee Accomplishments 6

2017 Riback Summer Research Fellowship Program and Poster Presenters 9

PharmD/PhD Program and Poster Presenters 11

Graduate Student Chapters of Professional Organizations in the College (AAPS, CRS, ISPOR, ISPE) 12

Graduate Programs, Departments, and Centers in the College (BPS, CBS, CPR/PSOP, CER/PSOP) 16

Scientific Poster Judges 22

Scientific Poster Categories and Awards 24

**Abstracts** 25

Posters Category Guide 68

**Author Index** 73

Map of Poster Locations 77

Special Thanks to Our Sponsors 78
Dear Colleagues,

Welcome to the 9th Annual College of Pharmacy Research Day, a special event that celebrates the world-class research mission of the College. Whether it is natural product or synthetic drug discovery; novel drug delivery methods; fundamental cancer, infectious disease, women’s health, or neurology research; clinical drug trials, applied research in health outcomes, drug safety, or pharmacy services; or the many other research programs at the UIC College of Pharmacy—we seek to lead the nation in pharmacy research that has a clear and measurable impact on health.

A key component of Research Day is the presentations by students and other trainees, which showcase the College’s positive impact on future generations of pharmaceutical scientists. This year, we have the privilege of highlighting the research of 85 graduate, joint degree, and professional students, postdoctoral fellows, residents, and research associates during our two poster sessions. These trainees will present their scientific efforts of the last year to the Research Day audience, which includes our esteemed judges. These judges, who graciously volunteer their time and knowledge, are alumni, academics, and industry experts, and their interactions with our students and postdocs is what makes this event an invaluable learning and networking experience year after year.

Following the poster sessions we have the honor of hosting keynote speaker Dr. Steven D. Pearson, Founder and President of the Institute for Clinical and Economic Review (ICER), a Boston-based non-profit organization that evaluates evidence on the value of medical tests, treatments, and delivery system innovations and moves that evidence into action to improve the health care system. Dr. Pearson’s presentation, titled “Is there a ‘fair’ price for a new drug? The new landscape for pharmaceutical value assessment in the United States,” will address a key issue that has been at the forefront of the political and health care debate. The study of the cost and value of pharmaceuticals, or pharmacoeconomics, is also a nationally/internationally recognized research strength the UIC College of Pharmacy. The keynote address will be followed by the presentation of the Alumnus of the Year and Hans W. Vahlteich Research awards.

Finally, we would like to extend our heartfelt thanks to our alumni and friends in the pharmaceutical industry who have sponsored this event. Your support has allowed us not only to present this Research Day, but to maintain the event for almost a decade and continue to bring in impressive guest speakers.

We hope that you enjoy this year’s Research Day, award ceremony, and reception, and look forward to seeing you again next year!

Best wishes,

Glen T. Schumock, PharmD, MBA, PhD
Professor and
Joanna E. Burdette, PhD
Associate Dean for Research and Graduate Education
Friday, February 9, 2018

9:00 am – on

Registration
1st Floor Lobby. COP

11:45 am – 12:45 pm

Lunch & Networking Event; Sponsors' Table Displays
(Wrist band required for entry)
Rooms 204/208/212/216, COP

12:45 – 1:45 pm

Poster Session #1 (Odd Numbers)
1st Floor Lobby and Hallways, COP

2:00 – 3:00 pm

Poster Session #2 (Even Numbers)
1st Floor Lobby and Hallways, COP

3:15 – 4:45 pm

Dean's Welcome Address

Keynote Lecture:
Is there a ‘fair’ price for a new drug? The new landscape for pharmaceutical value assessment in the United States

Steven D. Pearson, MD, MSc
Founder and President, Institute for Clinical and Economic Review (ICER)
Lecturer, Department of Population Medicine, Harvard Medical School
Visiting Scientist, Department of Bioethics, National Institutes of Health
Boston, MA

Hans W. Vahlteich and Alumnus of the Year Faculty Awards

Room 134-1, COP

5:00 – 5:30 pm

Graduate Student Awards and Poster Awards
Room 134-1, COP

5:30 – 6:30 pm

Reception and Networking Event
Rooms 204/208/212/216, COP
Is there a "fair" price for a new drug? The new landscape for pharmaceutical value assessment in the United States

Steven D. Pearson, MD, MSc

Founder and President of the Institute for Clinical and Economic Review (ICER)

Lecturer, Department of Population Medicine, Harvard Medical School
Visiting Scientist, Department of Bioethics, National Institutes of Health

Friday, February 9 at 3:15 pm, Room 134-1, CoP

Steven D. Pearson, MD, MSc is the Founder and President of the Institute for Clinical and Economic Review (ICER), a Boston-based, independent non-profit organization that evaluates the evidence on the value of medical tests, treatments, and delivery system innovations to encourage collaborative efforts to improve patient care and control costs. Prominent among its evidence reports are ICER reviews of new drugs that include full assessments of clinical and cost-effectiveness along with suggested “value-based price benchmarks” to inform policymakers and guide price and coverage negotiation. ICER convenes public hearings to discuss its evidence reports under the auspices of the California Technology Assessment Forum (CTAF) and Comparative Effectiveness Public Advisory Councils (CEPAC) in New England and the Midwest. At these meetings independent groups of evidence experts and public representatives engage with all stakeholders to debate the strength of evidence and provide recommendations on how best to apply the best evidence to clinical practice and coverage policies. Dr. Pearson is a Lecturer in the Department of Population Medicine at Harvard Medical School and also serves as Visiting Scientist in the Department of Bioethics at the National Institutes of Health. His published work includes over 100 articles on quality of care, the role of evidence-based medicine within the health care system, and related clinical, ethical, and organizational policy challenges. His book, No Margin, No Mission: Health Care Organizations and the Quest for Ethical Excellence, was published by Oxford University Press.

Among his past roles, from 2005-2006 Dr. Pearson served during the Bush Administration as Special Advisor on Technology and Coverage Policy within the Coverage and Analysis Group at the Centers for Medicare and Medicaid Services. Dr. Pearson has also been a Senior Visiting Fellow at England’s National Institute for Health and Care Excellence (NICE), a Board Director of HTAi, the international society of health technology assessment agencies, and the Vice Chair of the Medicare Evidence Development and Coverage Advisory Committee (MedCAC). He received his medical degree from UCSF and completed an internal medicine residency and research fellowship at Brigham and Women’s Hospital.
2018 Alum of the Year Award

Michael T. Flavin, PhD '84
Managing Director, Flavin Ventures, LLC
Chief Executive Officer, Shamrock Structures, LLC
Chairman & Chief Executive Officer, Advanced Life Sciences, Inc.

Each year, the UIC College of Pharmacy recognizes alumni who have distinguished themselves through their research and service and who embody the highest values of our institution. We are very proud and honored to acknowledge Dr. Michael Flavin as the 2018 Alumnus of the Year.

Michael T. Flavin is the CEO of Shamrock Structures, a drug discovery services company founded in 2003 to provide pharmaceutical researchers with access to technologies and expertise to accelerate their lead compound discovery programs. Shamrock’s combination of protein target structure determination using x-ray crystallography, medicinal chemistry to synthesize new compounds that bind to the protein target, and biological screening to determine the resulting biological effect of the new compounds is a powerful approach to creating more potent and selective new drugs. He is also the Chairman and CEO of Advanced Life Sciences (ADLS), a biopharmaceutical company focused on the development of new drugs to fight infection, inflammation, and cancer. Founded in 1999, Advanced Life Sciences completed a $35M IPO in 2005 and several follow-on financings to advance drugs through clinical trials, including Restanza™ (cethromycin), a novel once-a-day oral antibiotic in NDA-stage development for the treatment of respiratory tract infections including pneumonia. In 1987, Dr. Flavin founded MediChem Life Sciences. He established MediChem as a premier drug discovery and development company for the pharmaceutical industry. In 2000, MediChem completed a $54M IPO.

In addition to his pharmaceutical career, Dr. Flavin has 45 publications in scientific journals and 20 U.S. patents in the fields of organic chemistry, medicinal chemistry, and biochemistry. He has been awarded several grants from the National Institutes of Health to further his research in anti-infective and anticancer drug discovery. Dr. Flavin is a frequent lecturer on topics related to scientific entrepreneurship at Notre Dame, the University of Chicago, and in the Department of Medicinal Chemistry and Pharmacognosy at UIC. Dr. Flavin received his B.S. degree in chemistry from Notre Dame and his Ph.D. degree in medicinal chemistry from University of Illinois at Chicago under Professor Matthias Lu. After completing his postdoctoral fellowship at Harvard with Professor Yoshito Kishi, one of the best known natural product chemists in the world, he was a Senior Research Scientist at Baxter prior to founding MediChem.
Hans W. Vahlteich Research Award

The UIC College of Pharmacy’s Hans W. Vahlteich Research Awards are funded by the income generated by the Hans and Ella McCollum Vahlteich Endowment Fund. This fund, a generous gift from Mrs. Beverly Vahlteich DeLaney, was created from the estate of the Vahlteichs following their death and totaled nearly $1.4 million. The Vahlteich Research Awards are intended to provide seed money to support junior faculty in their efforts to receive external funding for their research programs. Starting in 2016, the fund has also been used to support the Vahlteich bridge program. This award provides short-term relief to established investigators to cover funding gaps and allow for stronger grant resubmissions to regain extramural funding.

Hans, who earned his Graduate in Pharmacy (PhG) and Pharmaceutical Chemist (PhC) degrees from the college in 1917 and 1918, respectively, died in August 1989; Ella, who earned her Doctor of Philosophy (PhD) degree from Columbia University, died in November of 1984. Mrs. Beverly Vahlteich DeLaney, Hans and Ella’s daughter, maintains active interest in the program. To date, the award has funded nearly $1,500,000 in research endeavors supporting over 30 scientists in their work.

2018 Vahlteich Award Scholar: Laura Sanchez, PhD
Assistant Professor
Department of Medicinal Chemistry and Pharmacognosy

Laura received her BA in Chemistry from Whitman College. She earned her PhD in Chemistry from the University of California, Santa Cruz, where she worked under Roger Linington on two main projects: (1) using the natural product almiramide C as a basis for structure activity relationship and mechanism of action studies; and (2) exploring the fish microbiome as a niche environment for isolating microbes. She then moved to the University of California, San Diego to work as an NIH IRACDA postdoctoral fellow with Pieter Dorrestein in the Skaggs School of Pharmacy and Pharmaceutical Sciences. Laura joined the Department of Medicinal Chemistry and Pharmacognosy as an Assistant Professor in August 2015.

Dissecting host-microbe chemical communication in pathogenic relationships

Despite a dramatic increase in the number of microbiome studies examining various microbes and their contributions to health and disease across environments and hosts, foundational questions pertaining to the chemical networks that apply across these studies remain unanswered. Microbiome studies to date have demonstrated that types of microbial communities substantially influence the host’s health, but the molecular mechanisms and precise chemical effectors underlying this interplay are unknown. The goal of Laura’s proposal work is to provide answers to such fundamental questions by utilizing analytical methodologies that characterize small molecules originating from microbe-host interactions, in situ.
20th Annual Graduate Student Awards Ceremony

Award Recipients from the Biopharmaceutical Sciences Program (Mentor)
Sungjoon Cho (Jeong/H. Lee) Charles Wesley Petranek Memorial Scholarship
Ashutosh Tripathi (Jeong) Myron Goldsmith Scholarship
Jason Bugno (Hong) Paul Sang Award
Dulari Jayawardena (Onyuksel) W.E. van Doren Scholar
Catherine Dial (Gemeinhart) W.E. van Doren Scholar

Award Recipients from the Forensic Science Program (Mentor)
Rupal Sharma (Hall) Edward Benes Scholarship
Jacqueline Davila (Larsen) Paul Sang Award

Award Recipients from the Medicinal Chemistry Program (Mentor)
Jesse Gordon-Blake (Thatcher) Charles L. Bell Award in Medicinal Chemistry
Jose Colina (Burdette) Professor Ludwig Bauer Scholarship in Medicinal Chemistry
Caitlin Howell (Bolton) W.E. van Doren Scholar
Obinna Mbachu (Bolton) W.E. van Doren Scholar
Rhea Bovee (Thomas) W.E. van Doren Scholar
Alanna Condren (Sanchez) W.E. van Doren Scholar
Julia Austin (Burdette) W.E. van Doren Scholar

Award Recipients from the Pharmacognosy Program (Mentor)
Daniel May (Orjala) Al R. Langerman Memorial Scholarship HSC
Tanja Florin (Mankin)* Charles Wesley Petranek Memorial Scholarship
Jessica Cleary (Sanchez)* Edward Benes Scholarship
Maryam Elfeki (Murphy) Myron Goldsmith Scholarship
Chase Clark (Murphy) W.E. van Doren Scholar
Mary Choules (Pauli) W.E. van Doren Scholar
Camila Crnkovic (Orjala) W.E. van Doren Scholar
Laura Tyler (Pauli) W.E. van Doren Scholar
Laura Hardy (Burdette)* W.E. van Doren Scholar

Award Recipients from the Department of Pharmacy Systems, Outcomes and Policy (Mentor)
Kellyn Moran (Schumock) Al R. Langerman Memorial Scholarship HSC
Ruixuan Jiang (Pickard) Edward Benes Scholarship
Ernest Law (Pickard) Lloyd Yale Memorial Scholarship
Jifang Zhou (Calip) W.E. van Doren Scholar
Alemsaged Asfaw (Calip) W.E. van Doren Scholar
Sruthi Adimadhyam (Schumock) W.E. van Doren Scholar

*CBS program within Pharmacognosy
Additional Awards Received by our Trainees during 2017

**UIC Chancellor’s Graduate Research Award**
- Sungjoon Cho (Jeong/H. Lee)
- Taha Taha (Petukhov)

**UIC Chancellor’s Student Service Award**
- Alanna Condren (Sanchez)
- Maryam Muhammad (Eustaquio)
- Kayleigh Tovar (Federle)
- Shan Xing (T. Lee)
- Alexandria Young (Burdette)

**UIC Graduate College Deans’ Scholar Fellowship**
- Dulari Jayawardena (Onyuksel)
- Subbulakshmi Karthikeyan (Burdette)
- Shan Xing (T. Lee)

**UIC Graduate College Provost’s Award and W.C. and May Preble Deiss Award**
- Chase Clark (Murphy)
- Sungjoon Cho (Jeong/H. Lee)

**UIC Graduate College Abraham Lincoln Retention Fellowship**
- Alanna Condren (Sanchez)

**UIC Honors College-Graduate College Excellence in Undergraduate Mentoring Award**
- Beenish Manzoor (Nutescu)

**UIC-IHRP Cancer Education & Career Development Program CECDP)**
- Rachel Harrington (T. Lee)

**American Chemical Society (ACS) Chemical Computing Group Excellence Award**
- Thomas Speltz (Moore)

**American Medical Association (AMA) Foundation Seed Grant**
- Artemis Gogos (Federle)

**American Society for Pharmacognosy (ASP) Meeting Travel Award**
- Jana Braesel (Eustaquio)
- Chase Clark (Murphy)

**American Association for Dental Research (AADR) Student Research Fellowship**
- Gabriella Szewczyk (Federle)

**Center for Clinical and Translational Science (CCTS) Pre-doctoral Education for Clinical and Translational Scientists (PECTS) Fellowship**
- Kayleigh Tovar (Federle)

**DAAD (German Academic Exchange Service) Fellowship**
- Tanja Florin (Mankin)

**Environmental Mutagenesis & Genomics Society Meeting Student Travel Award**
- Matthew Summerlin (Hanakahi)

**Foundation in Women’s Wellness Fellowship:**
- Laura Rodgers (Burdette)

**ISPOR Student Chapter President Outstanding Service Award**
- Ernest Law (Pickard)
Midwest Microbial Pathogenesis Conference NIH Fellow Travel Award
Sofia Costa (Murphy)

NIH Ruth L. Kirschstein National Service Award NSRA (F30) Dual Degree Fellowship
Alexandria Young (Burdette)

NIH/NIMH Ruth L. Kirschstein National Service Award NSRA (F31) Predoctoral Fellowship
Shan Xing (T. Lee)

North American Society of Thrombosis and Hemostasis Research Fellowship
Benito Valdepanas (Nutescu)

Ovarian Cancer Research Fund Alliance (OCRFA) Ann and Sol Schreiber Mentored Investigator Award
Matthew Dean (Burdette)

Rho Chi Society Clinical Research Scholarship
Chris Saffore (Pickard)

Scientific Presentation Award Winners
Jason Bugno (Hong) 3rd Place, Poster Category, 49th Annual PGSRM Meeting
Sungjoon Cho (Jeong/H. Lee) 2nd Place, Podia Category, 49th Annual PGSRM Meeting
Sungjoon Cho (Jeong/H. Lee) Presidential Poster of Distinction, AASLD Liver Meeting 2017
Alanna Condren (Sanchez) Best Oral Presentation Award, SACNAS National Diversity in STEM Conference
Alanna Condren (Sanchez) Outstanding Student Presentation Award, 2017 ASM Meeting
Brian David (Moore) Top Poster Award, UIC Diabetes & Obesity Research Day
Matthew Dean (Burdette) Presidential Poster Competition, Endocrine Society’s 99th Annual Meeting
Matthew Gilbertson (Nitiss) Outstanding Poster Award, College of Pharmacy Rockford Research Day
Dulari Jayawardena (Onyuksel) 2nd Place, Poster Category, 49th Annual PGSRM Meeting
Jing Li (Hanakahi) 2nd Place, Graduate Student Posters, 19th Annual Midwest DNA Repair Symposium
Sezen Meyden (Mankin) Best Poster Award, 22nd Annual RNA Society Meeting
Thomas Speltz (Moore) Presentation Award, 2017 MIKI Meeting
Yilun Sun (Nitiss) Speaker Award, GEMS Research Symposium
Kayleigh Tovar (Federle) Life Sciences Category Poster Award, UI Research Forum

Society for Advancement of Chicanos and Native Americans in Science (SACNAS) National Diversity in STEM Conference Travel Award
Alanna Condren (Sanchez)

Society for the Study of Reproduction Meeting Travel Award
Subbulakshmi Karthikeyan (Burdette)
Laura Rodgers (Burdette)
Alexandria Young (Burdette)

U.S. Pharmacopeial Convention (USP) Fellowship
Yang Liu (Pauli)

Industry Internships
Luying Chen (van Breemen) Shire
Lauren Gutgesell (Thatcher) Genentech Inc.
Thomas Hanigan (Petukhov) Adello Biologics
Lingyi Huang (van Breemen) Genentech Inc.
Inyoung Lee (T. Lee) AbbVie, Inc.
Emily Pierce (Thatcher) AbbVie, Inc.
Peter Sullivan (Orjala) Sirenas

*PIIPS Fellow
The David J. Riback Research Pre-doctoral Fellowships, at the UIC College of Pharmacy, are funded by an endowment created by Aaron E. Kaplan, BS ’47 in honor of his uncle, David J. Riback, BS ’27. Funds from this endowment support intensive, short-term research training for PharmD students.

PharmD students selected as Riback Fellows receive a $5,000 stipend to pursue summer research in the lab of a College of Pharmacy faculty mentor. They receive an additional $1,000 for research-related supplies. The Riback Fellowship program is best suited for PharmD students who might be considering a “non-traditional” career path following their graduation. Former fellows have worked on projects ranging from basic and clinical sciences to translational research and several of past fellows have gone on to pursue a joint PharmD/PhD degree or postdoctoral research positions.

To meet current Riback Fellows and to learn more about the program, please visit the following poster presentations:

Nada Alsuhebany  
*Interactions Between Ketolide Antibiotics and the Bacterial Ribosome Important for Antibacterial Activity*  
Mentor: Shura Mankin & Nora Vázquez-Laslop  
*Poster #: 1*

Jeremy Capulong  
*The Impact of Health Literacy and Numeracy on Quality of Anticoagulation Control in Minority Patients*  
Mentor: Edith Nutescu  
*Poster #: 2*

Ashley Cha  
*American Perceptions of Health Then and Now: Comparing the United States General Adult Population in 2002 and 2017*  
Mentor: Simon Pickard  
*Poster #: 3*
Zamia Siddiqui  
*Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer*  
Mentor: Terry Moore  
**Poster #: 4**

Samantha Socco  
*Nitric Oxide Regulates DNA Methyl Adducts: Implications for Cancer Etiology*  
Mentor: Douglas Thomas  
**Poster #: 5**

Zhaoju Wu  
*Risk of Non-Hodgkin Lymphoma with Use of TNF-alpha Inhibitors among Adult Patients with Rheumatologic Conditions*  
Mentor: Gregory Calip  
**Poster #: 6**

**Deadline** for the 2018 round of Riback applications is **March 19, 2018**, with the letter of intent required by **March 5, 2018**. For more information about the program, as well as application materials, please visit: [go.uic.edu/Riback](go.uic.edu/Riback)
Joint PharmD/PhD Program

The PharmD/PhD program is for exceptional, highly motivated, and achieving students ready to meet the challenge of increased academic load and independent research project.

The objective of the joint program is to train students for careers in academic pharmacy and research. Students admitted to this joint program participate in the PharmD curriculum and pursue original doctoral research projects in the laboratories of the university's graduate faculty. The joint program offers the potential of reducing the time of earning both degrees in sequence (9 or more years) by approximately two years by counting some requirements toward the completion of both degrees. The trade-off is that both degrees are awarded at the end of the training period and neither degree can be received before the other is completed.

Students may apply to the joint PharmD/PhD degree program at the same time as when applying to the PharmD program or within the first two years after their acceptance into the PharmD program. Students must be accepted by both programs.

Students admitted to the joint program can begin requirements for both degrees upon admission. Summers can be used for research and laboratory rotations. The first two to three years of the program are used to complete the P-1 through P-3 didactic PharmD curriculum with some PhD courses as electives. Choice of a permanent thesis advisor can take place at any point before moving to the graduate focused years (G-1 through G-3). Following completion of the PhD phase of the program, students rejoin other PharmD students to complete PharmD didactic and/or clerkship requirements. The program is flexible and actual timeline will depend on the requirements of the specific PhD program and the PhD thesis advisor. Sample timelines used by our current PharmD/PhD students are in the figure. ("P" refers to PharmD portions of the joint degree program, "G" refers to graduate segments of the joint program. The numbers indicate years spent in each segment. However, it should be understood that some research will be going on in years labeled as "P".)

The program currently has seven students. Visit some of our current PharmD/PhD students at their posters to learn more:

Zamia Siddiqui  
Thesis Advisor: Terry Moore  
Poster #4

Taha Taha  
Thesis Advisor: Pavel Petukhov  
Poster #7

Mary Choules  
Thesis Advisor: Guido Pauli  
Poster #8

Karol Sokolowski  
Thesis Advisor: Richard Gemeinhart  
Poster #9

Jason Bugno  
Thesis Advisor: Seungpyo Hong  
Poster #10

For more information about the program, please visit: go.uic.edu/pharmdphd
The American Association of Pharmaceutical Scientists (AAPS) is a professional organization with more than 10,000 members worldwide dedicated to the discovery, development, and manufacturing of pharmaceutical products. The AAPS connects professionals and students with a wide variety of fields of study, including chemistry, biology, and engineering. If you're interested in building a career in pharmaceutical research and development, consider joining the AAPS organization! For more information, visit: https://www.aaps.org/about-aaps/who-we-are

Also, the AAPS supports local student chapters around the globe and we are fortunate to have one right here at the UIC College of Pharmacy!

**Goals of the AAPS UIC Student Chapter:**

- Provide a platform for scientific discussion.
- Enable professional and leadership development.
- Organize career development and community outreach events.
- Create networking opportunities among students.

To find out more, visit: https://aaps.publish.uic.edu
To join the AAPS student chapter, email: kdeoli2@uic.edu or visit our website!

<table>
<thead>
<tr>
<th>Executive committee members 2017 – 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Karina Esparza</td>
</tr>
<tr>
<td>Chair elect: Timothy Langridge</td>
</tr>
<tr>
<td>Vice-Chair: Catherine Dial</td>
</tr>
<tr>
<td>Secretary: Subbulakshmi Karthikeyan</td>
</tr>
<tr>
<td>Treasurer: Vanessa Nepomuceno</td>
</tr>
<tr>
<td>Faculty advisor: Dr. Richard A. Gemeinhart</td>
</tr>
</tbody>
</table>
About Us
The Controlled Release Society (CRS) is the premier society worldwide for delivery science and technology. CRS serves more than 1,600 members from more than 50 countries. Two-thirds of CRS membership represents industry and one-third represents academia and government.

Mission
CRS is the international, multidisciplinary society dedicated to delivery science and technology.

Activities
CRS encourages its members to participate in a variety of important activities to advance delivery science and technology, including:
- An annual symposia and exposition
- Delivery science and technology contributions to the CRS website including webinars
- Contributions to and publication of the CRS Newsletter
- Promotion of collaborations among members
- Contributions to/administrative and editorial support for the Journal of Controlled Release, and the Drug Delivery and Translational Research Journal along with CRS books
- Advocacy in regulatory affairs

Goal of the CRS - Illinois Student Chapter
Promote awareness of CRS, and provide a platform for professional interaction and scientific discussion among students and postdocs in Illinois.

Membership
For further information about CRS- Illinois Student Chapter or to join us, please contact any of the Board Members: Karina Esparza (President)- kdeoli2@uic.edu, Nilanjana Sadhu (Vice-President)- nsadhu2@uic.edu, or Catherine Dial cdial2@uic.edu.

Come visit us at our table at COP Research Day this year!
University of Illinois at Chicago ISPOR Student Chapter
Established 2003

“Outcomes research—the study of the end results of health services that takes patients’ experiences, preferences, and values into account—is intended to provide scientific evidence relating to decisions made by all who participate in health care.” (Clancy & Eisenberg, 1998)

Mission Statement

- Provide an environment where students can share knowledge in pharmacoconomics and health outcomes research.
- Serve as a bridge in bringing together students interested in pharmacoconomics and members of the pharmaceutical industry, health-related organizations, and academia.
- Act as a resource for new students interested in pharmacoconomics and outcomes research.
- Provide an opportunity for student chapter members to become familiar with the affairs of ISPOR as well as have representation in its affairs.

For more information, or to get involved, contact rjiang2@uic.edu

2017-2018 Executive Board:
Chapter President: Ruixuan Jiang, PharmD
Vice President: Kellyn Moran, PharmD
Treasurer: Christopher Saffore, PharmD
Secretary: Alemseged Asfaw, MSc
Faculty Advisor: A. Simon Pickard, PhD
**ISPE Student Chapter at UIC**

**MEMBERSHIP**
Membership to the UIC ISPE student chapter is free and open to all interested UIC students.

**WHAT IS PHARMACOEPIDEMIOLOGY?**
Pharmacoepidemiology is a public health discipline that relies on non-experimental (epidemiologic) methods to assess wanted and unwanted drug effects to support decision-makers in the absence of specific evidence from experimental studies (randomized controlled trials).

**WHAT CAN YOU GAIN FROM THE ISPE STUDENT CHAPTER?**
- Understand the power of BIG DATA and what you can do with it!
- Attend free webinars and learn novel approaches to analyze big data
- Connect with PSOP faculty and explore future opportunities for research
- Set yourself apart in fellowship and work opportunities!!
- Learn about career opportunities and meet professionals in pharmacoepidemiology

**MISSION**
- To provide learning, networking, and career development opportunities to students interested in pharmacoepidemiology
- To expose students to potential career opportunities in pharmacoepidemiology, including but not limited to academia, consulting, pharmaceutical industry, and government
- To support and foster mentorship between working professionals and students
- To organize student activities that promote pharmacoepidemiology among students at UIC’s College of Pharmacy and School of Public Health

**COME TALK TO US!**
- Student Board: Sruthi Adimadhyam (sadima2@uic.edu), Inyoung Lee (ilee37@uic.edu), Katharine Ozenberger (kozenb2@uic.edu), Jenny Guadamuz (jguada2@uic.edu)
- Faculty advisor: Gregory Calip (gcalip@uic.edu)
PhD Program in Biopharmaceutical Sciences

The UIC Department of Biopharmaceutical Sciences offers a comprehensive, rigorous, and interdisciplinary graduate program applying chemical and biologic tools to pressing therapeutic challenges. The program applies the tools of biologic imaging, biophysics, chemistry, cell and molecular biology, genetics, bioinformatics, nanotechnology and biomedical engineering to address these issues, but the underlying research seeks to gain insight into the given research problem.

Research in the Department

The biopharmaceutical sciences involve pharmaceutics (drug delivery), pharmacodynamics (drug action/pharmacology), pharmacokinetics (absorption, metabolism, distribution, and elimination), toxicology, and pharmacogenomics.

Specific research programs include:

• Neuropharmacology
• Cancer pharmacology
• Drug metabolism
• Microbial biology
• Lipid-based drug delivery
• Polymer-based drug delivery

Admissions Requirements

To be considered for admission into the PhD Program in Biopharmaceutical Sciences, you must submit an application with fee to the UIC Graduate College (http://www.uic.edu/depts/oar/grad/apply_grad.html) online. In addition to the Graduate College’s minimum requirements, applicants must meet the following program requirements:

• Bachelor’s degree in biology, biochemistry, chemistry, engineering, pharmacology or pharmacy, or an advanced degree (MS, PharmD, or other) in a related area of biomedical science
• Transcripts showing grade point averages of at least 3.00 (A=4.00) for the undergraduate degree and any advanced degree work
• Graduate record examination scores (verbal, quantitative, and analytical/writing) are required
  o Institution Code: 1851-University of Illinois at Chicago
  o Department Code: 0613-Pharmaceutical Sciences
  o Subject GRE examinations are not required
• Three letters of recommendation
• A personal statement outlining your objectives for graduate study

Degree Requirements

Courses
A minimum of 96 credit hours of graduate study are required beyond the baccalaureate degree (or its equivalent). A minimum of 20 hours of didactic coursework at the 500 level or above must be completed at UIC.

Examinations:
1. An oral Preliminary Examination is required, typically after the second year;
2. An oral and written proposal is required to be presented before the thesis committee; and,
3. A formal Dissertation and an open thesis defense are required.

Graduate Program Contact Information

Director of Graduate Studies: Prof. Richard A. Gemeinhart, PhD
E-mail: bpsdgs@uic.edu
Telephone: (312) 996-2253
Program URL: http://go.uic.edu/BPSPhD
The goal and mission of the Center for Biomolecular Sciences is to advance and support research that exploits genomics-based and genome-wide approaches for revealing the basis of human diseases, developing new therapeutics and exploring mechanisms of drug action.

Location: Molecular Biology Research Building

**Burdette Lab:**
Natural product drug discovery for women’s health and cancer; origins of ovarian cancer

**Eustaquio Lab:**
Genetic engineering, natural product biosynthesis, drug discovery, synthetic biology.

**Mankin/Vasquez Lab:**
Mechanisms of protein synthesis; structure, function and evolution of ribosome and ribosomal RNA; mechanisms of action of ribosome-targeted antibiotics.

**Lee Lab:**
Molecular (virulence) mechanisms, antibacterial targets, validation of drug targets in vitro and in vivo.

**Johnson Lab:**
Structure-based design of therapeutic agents using modern techniques of computer-aided drug design

**Murphy Lab:**
Innovating the process of microbial natural product drug discovery; TB antibiotic discovery

**Orjala Lab:**
Discovery of pharmacological active natural products from cultured cyanobacteria

**Thomas Lab:**
Epigenetics, cancer etiology, oxidative stress, cell signaling

**Jeong Lab:**
Pharmacokinetics; molecular pharmacology; precision drug therapy

**Wang Lab:**
Pain, addiction, and natural product pharmacology.

**Federle Lab:**
Chemical signaling of pathogenic bacteria
The Center for Pharmacoepidemiology and Pharmacoeconomic Research (CPR) is an interdisciplinary research unit of the UIC College of Pharmacy. The Center was established in November 2001, by the Illinois Board of Higher Education, as the "Center for Pharmacoeconomic Research." In November 2012 the name was changed to the "Center for Pharmacoepidemiology and Pharmacoeconomic Research" to reflect an expanded scope of work conducted by the Center. The Faculty of the CPR are among the top researchers in the field of health services and pharmaceutical outcomes research - both nationally and internationally.

Groundbreaking Research
A primary goal of the CPR is to conduct ground-breaking research in pharmacoeconomics, pharmacoepidemiology, and patient-centered outcomes research in order to advance understanding of the impact of pharmacy and health care services, products, and policy. Research conducted by investigators in the Center is funded by a variety of sources, including pharmaceutical manufacturers, private research foundations, and by government agencies, including the National Institutes of Health, and the Agency for Healthcare Research and Quality.

Mission
One of the only Centers of its kind, the mission of the CPR is to advance understanding of the impact of pharmacy and health care services, products, and policy by:
1) conducting research in pharmacoeconomics, pharmacoepidemiology, and patient-centered outcomes;
2) translating and disseminating research; and
3) educating, training, and mentoring researchers.

Training Future Researchers
By virtue of its position as a leading research center, the CPR seeks to educate, train, and mentor current and future scientists to expand the fields of pharmacoeconomics, pharmacoepidemiology, and patient-centered outcomes research by providing post-doctoral fellowships and other research training experiences.

Dissemination of Knowledge
While conducting research and generating new knowledge are important, for such information to inform public policy and impact society it must be disseminated and used. Thus, the CPR actively seeks to disseminate its research findings in scholarly publications and presentations at scientific meetings in order to inform health care policy and practice.
About the Department

Pharmacy Systems, Outcomes and Policy (PSOP) is among the largest and finest Departments of its kind in the US.

PSOP has four primary areas of emphasis:
1.) Pharmacoeconomics and Outcomes Research
2.) Pharmaceutical Education
3.) Pharmacy Systems and Policy
4.) Pharmacoepidemiology and Drug Safety

Top Tier Faculty

• PSOP faculty are recognized by their peers as among the best in their areas of expertise in the US and the World.
• Current faculty hold national and international leadership positions in professional associations, are editors of major medical and pharmacy journals, and serve on boards of pharmacy and healthcare-related companies.
• Along with the full-time members, adjunct and affiliate faculty members from government, industry, and pharmacy practice, provide complementary expertise and contributions.

Research that Impacts Health

• A primary goal of the Department is to conduct research that is both innovative and that will have an impact on health and society.
• This research is facilitated by strong local, national, and international partnerships with government agencies, insurance companies, pharmaceutical manufacturers, professional associations, and with other researchers.
• The research of the Department funded by top governmental agencies, foundations, and pharmaceutical companies.

Successful Alumni

• Individuals with knowledge and analytic expertise in pharmacy systems, outcomes, and policy are highly sought after by employers.
• Many alumni of the graduate program have highly successful positions in pharmaceutical industry, consulting, government, academia, and health care organizations.

MISSION

Discover and share new knowledge through impactful research, innovative professional and graduate education training programs, engaged professional service, and entrepreneurial activities in pharmacy systems, outcomes, and policy.

Education That Matters

• A key role of the Department is to contribute to the education of pharmacists and pharmacy researchers who specialize in the area of pharmacy systems, outcomes, and policy.
• The Department offers graduate-level study (PhD, MS and Certificates) and, in cooperation with the CPR, fellowships in pharmaceutical outcomes research.
• The programs are highly competitive, attracting students from all over the world.
• Each program offers opportunities for individualized work to meet the special needs of each prospective student.

Our Website

Our LinkedIn Group

833 S. Wood Street, MC 871
Chicago, IL 60612-7231
(312) 996 - 7879
Program Description

The aim of the program is to provide skills and knowledge relevant to conducting CER for application in the pharmaceutical and health care industries. After completing the program, graduates will be able to:

- develop policy and patient-care relevant comparative effectiveness and patient-centered outcomes research questions that, when answered, will address important gaps in knowledge and/or lead to improved individual and population-level health care decision-making.
- recognize, design, conduct, and analyze CER studies that incorporate state-of-the-art methods, including both primary and secondary studies.
- incorporate the stakeholder in the conceptualization, design, and dissemination of CER.
- apply CER studies in his/her work or practice site and to broader issues in health care such as health technology assessment and medical decision making.

Who Should Apply?

The Master of Science in CER designed for those who would like to become competent in conducting and interpreting comparative effectiveness research. Because it is 100% online, the program is ideal for individuals already working in a pharmaceutical or medical product company, government agency, or in a health care provider organization.

Program Highlights

- Fully-accredited and top-ranked college/program
- Internationally renowned faculty with research and field experience
- University top-ranked for online teaching programs
- No required campus visits
- 32 credit hour program
- Learn anytime, anywhere – 100% online
- Diverse student population
- Flexibility and ample course selection
- Progress at your own pace
Master of Science in Comparative Effectiveness Research (CER)

100% Online Degree

Faculty
The program draws from faculty of UIC College of Pharmacy’s Department of Pharmacy Systems, Outcomes and Policy, who are among the top in their fields. Students in the program will work with faculty who hold national and international leadership positions in professional associations are editors of major medical and pharmacy journals, serve on boards of pharmacy and health care-related companies, and are frequently consulted for their opinions and expertise.

Admission Requirements
• Bachelor’s or health professional degree with a minimum grade point average of 2.75 (on a scale of 4.0).
• Transcripts from the institution where the most recent degree was earned.
• Personal statement explaining why interested in the program.
• Current resume or CV.
• Recommended background: experience in healthcare industry and college-level algebra.

Curriculum
The 32-hour program is designed to meet national competencies for comparative effectiveness research training.

The program includes 20 credit hours of required courses and 12 credits of electives.

Required courses include:
• Ethics and Privacy Issues in Comparative Effectiveness Research
• Comparative Effectiveness Research
• Pharmacoepidemiology
• Biostatistics or Clinical Research Methods
• Introduction to Epidemiology: Principles and Methods
• Comparative Effectiveness Research Capstone

Elective courses can include:
• Pharmacoeconomics
• Pharmaceutical Policy
• Drug Development
• Decision Analysis
• Intermediate Biostatistics or Clinical Research Methods
• Systematic Reviews and Meta-Analysis
• CER Seminar

More Information
Phone: (312) 996-7879
Email: CER@uic.edu
Website: go.uic.edu/CER

100% Online Degree

The program is designed to meet national competencies for comparative effectiveness research training.

The program includes 20 credit hours of required courses and 12 credits of electives.

Required courses include:
• Ethics and Privacy Issues in Comparative Effectiveness Research
• Comparative Effectiveness Research
• Pharmacoepidemiology
• Biostatistics or Clinical Research Methods
• Introduction to Epidemiology: Principles and Methods
• Comparative Effectiveness Research Capstone

Elective courses can include:
• Pharmacoeconomics
• Pharmaceutical Policy
• Drug Development
• Decision Analysis
• Intermediate Biostatistics or Clinical Research Methods
• Systematic Reviews and Meta-Analysis
• CER Seminar

More Information
Phone: (312) 996-7879
Email: CER@uic.edu
Website: go.uic.edu/CER
Many thanks go to our judges for generously donating their time and expertise to our trainees and for making this year’s Research Day possible.

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leslie Aldrich, PhD</td>
<td>UIC Dept. of Chemistry</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Dr. Roxanne Atienza</td>
<td>Illinois Science and Technology Coalition</td>
<td>Director of Operations</td>
</tr>
<tr>
<td>Dr. George H. Aynilian, PhD '73</td>
<td>Abbott Labs</td>
<td>Director of Drug Development (retired)</td>
</tr>
<tr>
<td>Animesh Barua, PhD</td>
<td>Rush University Medical Center</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>Jan Mark Bassali, PharmD</td>
<td>Celgene</td>
<td>HEOR Field Executive</td>
</tr>
<tr>
<td>Jerry L. Bauman, PharmD, FACC, FCCP</td>
<td>UIC College of Pharmacy</td>
<td>Dean Emeritus and Distinguished Professor Emeritus</td>
</tr>
<tr>
<td>Shawna Blasing, PharmD</td>
<td>Takeda</td>
<td>Senior Director Field Medical Teams</td>
</tr>
<tr>
<td>Dr. Jeffrey A. Borgia, PhD</td>
<td>Rush University Medical Center</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>Libby Brunsvold</td>
<td>Takeda</td>
<td>Director of State Governmental Affairs, Central Region</td>
</tr>
<tr>
<td>Lin Chen, MD, MS, PhD</td>
<td>UIC College of Dentistry</td>
<td>Research Associate Professor</td>
</tr>
<tr>
<td>Dr. Stephanie Cline, PhD</td>
<td>Takeda</td>
<td>Director, Global Outcomes Research</td>
</tr>
<tr>
<td>John B. Coleman, PharmD</td>
<td>Novartis</td>
<td>Senior Medical Science Liaison, Medical Affairs</td>
</tr>
<tr>
<td>Stephanie Cologna, PhD</td>
<td>UIC Dept. of Chemistry</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Dr. Jenny Colombo, PharmD</td>
<td>Takeda</td>
<td>Vice President, Global Medical Affairs Functions</td>
</tr>
<tr>
<td>Amanda Dombrowski, PhD</td>
<td>AbbVie</td>
<td>Senior Scientist 1 - Discovery Chemistry and Technologies</td>
</tr>
<tr>
<td>Dr. James Driver, PharmD '90</td>
<td>Novartis</td>
<td>Medical Science Liaison, Director</td>
</tr>
<tr>
<td>Jill Erickson, MPH, RD</td>
<td>Takeda</td>
<td>Director, Medical External Affairs &amp; Education</td>
</tr>
<tr>
<td>Michael Fairbanks, MBA</td>
<td>Adello Biologics</td>
<td>Head Of Quality</td>
</tr>
<tr>
<td>Ronak P. Gandhi, PhD</td>
<td>CSL Behring</td>
<td>Senior Scientist, R&amp;D Bio-analytical</td>
</tr>
<tr>
<td>Dr. Michael Greenberg, PhD '76</td>
<td>Image Tripping</td>
<td>Owner</td>
</tr>
<tr>
<td>Tony Hebden, PhD</td>
<td>Takeda</td>
<td>Vice President, HEOR</td>
</tr>
<tr>
<td>Robert M. Heyman, BSc, RPh</td>
<td>Adello Biologics</td>
<td>Board Member</td>
</tr>
<tr>
<td>Dr. Chang-Hwa Hwang, PhD '12</td>
<td>UIC EHSO</td>
<td>Biological Safety Specialist</td>
</tr>
<tr>
<td>Dr. Kenneth E. Johnson, PharmD</td>
<td>Xeris Pharmaceuticals</td>
<td>Senior Vice President - Clinical Development, Medical Affairs and QA</td>
</tr>
<tr>
<td>Erin Jordan, MS</td>
<td>AbbVie</td>
<td>Senior Scientist I</td>
</tr>
<tr>
<td>Cynthia Kozic, PharmD</td>
<td>Takeda</td>
<td>Manager, Independent Medical Education and Medical External Affairs</td>
</tr>
<tr>
<td>Nicholas Liu, PharmD</td>
<td>Lundbeck</td>
<td>Medical Information Associate, Medical Affairs</td>
</tr>
<tr>
<td>Dr. Patricia Lurvey, PhD</td>
<td>LynnDon Consulting</td>
<td>President/Owner</td>
</tr>
<tr>
<td>Dr. Alriel Martin, PharmD '98</td>
<td>Baxter</td>
<td>Senior Manager, Medical Affairs</td>
</tr>
<tr>
<td>Maggie McCue, MS, RD</td>
<td>Takeda</td>
<td>Clinical Scientific Director, US Medical Affairs</td>
</tr>
<tr>
<td>Shahila Mehboob Christie, PhD</td>
<td>Novalex Therapeutics</td>
<td>Cofounder, COO and VP of Science</td>
</tr>
<tr>
<td>Dimple A. Modi, PhD</td>
<td>AbbVie</td>
<td>Senior Scientist I (Clinical Biomarkers, Oncology)</td>
</tr>
<tr>
<td>Name</td>
<td>Affiliation</td>
<td>Position/Stakeholder Area</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>José Napolitano Farina, PhD</td>
<td>AbbVie</td>
<td>Senior Scientist II, Structural Chemistry - Discovery Chemistry and Technology</td>
</tr>
<tr>
<td>Phil Naughten, PharmD</td>
<td>Takeda</td>
<td>Senior Director Outcomes Research &amp; Patient Access</td>
</tr>
<tr>
<td>Daniel Ng, PharmD, MBA, MPH</td>
<td></td>
<td>Director, HEOR</td>
</tr>
<tr>
<td>Bethany E. Perez White, PhD</td>
<td>Northwestern University Feinberg School of Medicine</td>
<td>Research Assistant Professor-Department of Dermatology</td>
</tr>
<tr>
<td>Marlyne P. Pineda, PharmD</td>
<td>Lundbeck</td>
<td>Senior Medical Information Associate, Medical Information</td>
</tr>
<tr>
<td>Manish Puri, PharmD, MBA</td>
<td>AstraZeneca</td>
<td>Executive Medical Science Liaison</td>
</tr>
<tr>
<td>Dr. Ahnal A. Purohit, PhD</td>
<td>Purohit Navigation Inc.</td>
<td>President, CEO, Purohit Navigation Inc.</td>
</tr>
<tr>
<td>Jennifer Samp, PharmD, PhD</td>
<td>AbbVie</td>
<td>Associate Director, Oncology, HEOR</td>
</tr>
<tr>
<td>Dr. Ankur Saxena, PhD</td>
<td>UIC Dept. of Biological Sciences</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td>John R. Sowa, PhD</td>
<td>Governor's State University</td>
<td>Professor of Chemistry</td>
</tr>
<tr>
<td>Karina Szymulanska-Ramamurthy, PharmD, PhD</td>
<td>Baxter Healthcare</td>
<td>Research Associate III, R&amp;D</td>
</tr>
<tr>
<td>Dr. Clare Thibodeaux</td>
<td>Cures Within Reach</td>
<td>Director of Scientific Affairs</td>
</tr>
<tr>
<td>Clarie Thom, PharmD</td>
<td>Retired</td>
<td></td>
</tr>
<tr>
<td>Dr. Robin S. Turpin, PhD</td>
<td>Takeda</td>
<td>Head, US Value Evidence</td>
</tr>
<tr>
<td>Dr. Iulia Ursan, PharmD '13, MS '15</td>
<td>OptumRX</td>
<td>Clinical Analytic Consultant, Clinical Consulting</td>
</tr>
<tr>
<td>Dr. Theresa Vera, PhD</td>
<td>Takeda</td>
<td>Global Scientific Director, Global Medical Affairs Strategy and Training</td>
</tr>
<tr>
<td>Tom Westerkamp, M.S., RPh.</td>
<td>Pharmacy Consulting Services</td>
<td>Pharmacy Consultant</td>
</tr>
<tr>
<td>Steve Zylberman, R.Ph., MBA</td>
<td>AbbVie</td>
<td>Trade Marketing &amp; Programs Manager</td>
</tr>
</tbody>
</table>
*Biology: Molecular and Cell Biology; Mechanisms of Action

1st Place  Takeda Pharmaceuticals Award for Excellence in Research  $500
2nd Place  AbbVie Award for Excellence in Research  $300
Horizon Award for Excellence in Research  $300

*Chemistry: Discovery, Modeling, Design and Evaluation of Novel Drugs; Detection and Delivery Systems

1st Place  Takeda Pharmaceuticals Award for Excellence in Research  $500
2nd Place  AbbVie Award for Excellence in Research  $250
Horizon Award for Excellence in Research  $250

*Clinical, Social, and Applied Sciences

1st Place  Takeda Pharmaceuticals Award for Excellence in Research  $500
2nd Place  AbbVie Award for Excellence in Research  $200
Horizon Award for Excellence in Research  $200

*Value of prizes awarded in each category is proportionate to number of entries

Innovate@UIC Innovation Award
Presented by the UIC Office of Technology Management

1st Place  $750
2nd Place  $250

UI Cancer Center Cancer Science Prize
Presented by the UI Cancer Center for cancer-related research

1st Place  $750
2nd Place  $250

CCTS Multi-Disciplinary Team Science Award
Presented by the UIC Center for Clinical and Translational Science  $200

AAPS Student Chapter Choice Award
American Association of Pharmaceutical Scientists UIC Student Chapter Award for Excellence in Research  $250

CRS Student Chapter Choice Award
Controlled Release Society UIC Student Chapter Award for Excellence in Research  $250

ISPOR Student Chapter Choice Award
International Society of Pharmacoeconomics and Outcome Research UIC Student Chapter Award for Excellence in Research  $250

ISPE Student Chapter Choice Award
International Society for Pharmacoepidemiology UIC Student Chapter Award for Excellence in Research  $250
Interactions Between Ketolide Antibiotics and the Ribosome Important for Antibacterial Activity

Center for Biomolecular Sciences

PharmD Student

The bacterial ribosome is a preferred target for antibiotics. Macrolides antibiotics prevent protein synthesis by binding in the nascent peptide exit tunnel of the large ribosomal subunit. Ketolides (such as telithromycin, TEL, and solithromycin, SOL), a newer generation of macrolides, have improved binding characteristics and counteract some macrolide resistant pathogens. However, two ketolides-specific resistance mutations were found in the vicinity of the macrolide-binding pocket of the E.coli ribosome: The change of U to C at position 2609 and deletion or mutation of A752 of 23S rRNA. These mutations were proposed to confer resistance because they disrupt the Watson-Crick base pair that could be formed between these two nucleotides and suggested to be critical for ketolide binding. The focus of our study is to explore whether such base pair really exists in the ribosome and which aspect of the interactions with ketolides is affected when it is disrupted by mutations. Equilibrium binding experiments with isolated E.coli ribosomes and radioactive SOL showed that the U2609C change does not affect the equilibrium affinity of the drug for the ribosome. In contrast, the drug dissociated from the mutant ribosomes with significantly faster rate. Re-establishment of the base pair by introducing the double mutation 2609C:752G resulted in restoration of the original slow off-rate of SOL. Our results demonstrate that the base pair between the 23S nucleotides 2609 and 752 is responsible for establishing a slowly reversible interaction with ketolide antibiotics that is critical to exert their inhibitory action.

The Impact of Health Literacy and Numeracy on Quality of Anticoagulation Control in Minority Patients

Pharmacy Systems, Outcomes & Policies

PharmD Student

A patient’s ability to understand basic health information (literacy) and numerical concepts (numeracy) is essential for precise anticoagulation control in chronic warfarin therapy. Therefore, the purpose of this study is to assess the impact of health literacy (HL) and health numeracy (HN) on quality of anticoagulation control (AC) in minority patients (African-Americans [AA] and Hispanics).

This study is part of an ongoing randomized controlled trial of minority patients enrolled in a specialized anticoagulation clinic. HL and HN were assessed via completion of the Short Test of Functional Health Literacy in Adults (STOFHLA) and Short Numeracy Understanding in Medicine Instrument (SNUMI), respectively. AC was measured by the percent time in therapeutic range (%TTR), which was calculated by both the linear interpolation method and percent of international normalized ratio (INR) tests in range. Multivariate linear regression models were used to examine the association between HL and AC, and HN and AC, adjusted for confounders.

A total of 96 patients were randomized into the study (mean age 57.1 years; 34.4% male; 86.5% AA; 41.7% had some college education). The prevalence of limited HL (STOFHLA score 0-14) was 25.0% (n=24) and the prevalence of low HN (SNUMI score 0-3) was 29.2% (n=28). The mean %TTR of all patients was 79.5±17.3. Data analysis shows that there is no significant difference in %TTR between limited HL and adequate HL (81.0±14.2 vs. 79.2±17.8; p=0.9380, respectively) or low HN, average HN and high HN (77.0±15.2 vs. 79.6±17.7 vs 88.8±13.8; p=0.7330, respectively).

In this minority population, only 25% of participants had limited HL which is notable and in contrast to what is postulated by others. We were unable to identify any significant associations between HL or HN on AC. Further investigation is warranted to consider other factors that contribute towards the quality of AC for minority populations with limited HL or low HN.
3) Ashley S. Cha, Ernest H. Law, A. Simon Pickard

**American Perceptions of Health Then and Now: Comparing the United States General Adult Population in 2002 and 2017**

*Pharmacy Systems, Outcomes & Policies*

**PharmD Student**

**Objective:** A key indicator of population health and well-being is self-rated health. We aimed to compare self-rated health by Americans in 2002 and 2017.

**Methods:** Data from two US EQ-5D valuation studies conducted in 2002 and 2017 were combined. In both studies, respondents completed the EQ-5D-3L self-classifier and visual analogue scale (VAS), where health is rated from 0 (worst imaginable health) to 100 (best imaginable health). To take into account differences in cohort characteristics, ordinary least squares regression models adjusted for sociodemographic characteristics, presence of disease, and self-reported problems in EQ-5D dimensions, defined as any/no problems.

**Results:** The proportion of respondents in 2002 (n=3,728) vs. 2017 (n=1,047) reporting a VAS score of 100 (13.4% vs. 13.0%) or 90-99 (40.0% vs. 41.6%) were similar. No differences in mean VAS scores were observed between respondents in 2017 (84.6 [SD=14.5]) and 2002 (84.4 [SD=16.1]). Adjusting for sociodemographic characteristics and presence of disease had negligible effect. However, upon adjusting for problems on each EQ-5D dimension, mean 2017 VAS scores were significantly higher than 2002 (89.8 vs. 87.6; mean difference=2.2 [95% CI: 1.36 to 3.10]).

**Conclusions:** Self-rated health of the general US adult population in 2017 was very similar to 2002, although by adjusting for health problems it was slightly higher in 2017. These results suggest that the “average” adult American rates their health as slightly better compared to 15 years ago. The datasets were highly comparable which was a strength of the analysis, while a limitation is that some unobserved factors may have been important.

4) Zamia Siddiqui, Thomas E. Speltz, Terry W. Moore

**Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer**

*Medicinal Chemistry and Pharmacognosy*

**PharmD/PhD Student**

A major unmet medical need in breast cancer therapy is in developing new treatments for breast cancers that become resistant to known therapies, such as endocrine therapies. Breast cancers are often classified according to their estrogen receptor status. Estrogens fuel the growth of so-called estrogen receptor positive (ER+) breast cancers. Blocking the estrogen receptor/coactivator interaction may be a useful approach in treating therapy-resistant ER+ breast tumors.

This approach was recently utilized by the Moore lab, leading to the development of α-helical stapled peptides: stabilized, high-affinity peptides that bind to a different surface on ER than clinical endocrine agents. These peptides have shown activity that inhibits the ER/coactivator interaction, but the biophysical properties of these stapled peptides are less well-understood. Understanding these properties is important for developing compounds with good pharmacokinetic and pharmacodynamic properties.

Our hypothesis is that installing an olefin staple will increase 1) the proteolytic stability and 2) the helicity of a coactivator peptide, owing to their rigidity. Furthermore, installing an additional lactam staple on these peptides will further improve these characteristics. We have characterized the stapled peptides with the use of proteolytic assays to study their susceptibility to enzymatic degradation and circular dichroism to investigate their helicity. The results presented have allowed us to gain insight into the biophysical properties of these peptides, which will lead to their optimization as drug candidates for ER+ breast cancer.
5) Samantha Socco, Douglas Thomas

**Nitric Oxide Regulates DNA Methyl Adducts: Implications for Cancer Etiology**

*Medicinal Chemistry and Pharmacognosy*

**PharmD Student**

The purpose of this study was to explore the roles of nitric oxide (NO) as an epigenetic regulator of breast cancer progression. This is based on the observation that NO can inhibit the catalytic activity of two DNA demethylase enzymes: ABH2 (human AlkB homologue 2) and TET (ten eleven translocation). ABH2 is a repair enzyme which removes a methyl group from the 1st position on adenine and/or 3rd position on cytosine. An important class of chemotherapy drugs works as methylating agents. Therefore, NO may exacerbate their effects by inhibiting endogenous repair mechanisms. Alternatively, TET is an enzyme that is involved in cytosine demethylation by oxidizing the methyl group from 5-methylcytosine (5mC). DNA demethylation can have important downstream effects in gene expression and inhibition of this process by NO could have important phenotypic effects. The main project with ABH2 involved treating MDA-MB-231 ER- breast cancer cells with either DETA/NO (an NO donor) alone, MMS (a methylating agent) alone, or a combination of the two. Cell viability and confluence were then examined. ABH2 protein and mRNA levels were also studied after treating cells with NO. For the TET project, TET isoform (there are 3) mRNA levels and protein levels were studied in drug resistant vs. non-resistant cell lines. We suspect that TET levels and DNA modifications may differ significantly between these cell types and contribute to their resistant phenotypes. A major challenge was optimization of cell culture and treatment conditions including: MMS and NO concentrations, validating antibodies, and validating primers. More definitive conclusions will be made once more data is available. Preliminary results demonstrate that NO can significantly alter DNA methylation patterns via its ability to interact with DNA demethylase enzymes; ABH2 and TET.

6) Zhaoju Wu, Sruthi Adimadhyam, Brian C.-H. Chiu, Gregory S. Calip

**Risk of Non-Hodgkin Lymphoma with Use of TNF-Alpha Inhibitors among Adult Patients with Rheumatologic Conditions**

*Pharmacy Systems, Outcomes & Policies*

**PharmD Student**

Objectives: Based on a limited number of cases, the U.S. Food and Drug Administration (FDA) communicated a black box warning for the use of TNF-α inhibitors (TNFIs) and risk of non-Hodgkin lymphoma (NHL). Our objective was to evaluate the association between duration and type of TNFI use with NHL risk in adults with rheumatologic conditions, including rheumatoid arthritis, psoriatic arthritis and ankylosing spondylitis.

Methods: We conducted a nested case-control study using the Truven MarketScan Research Database of patients ages 30+ years without prevalent cancer or HIV/AIDS between 2009 and 2015. Administrative pharmacy and medical claims were used to determine use of TNFIs and other disease-modifying antirheumatologic drugs. Conditional multivariable logistic regression models were used to estimate odds ratios (OR) and 95% confidence intervals (CI) for associations between TNFI use and NHL risk.

Results: From a retrospective cohort of 55,982 adults, we identified 101 NHL cases and 984 matched controls. Ever use of TNFIs was greater among cases (33%) than in controls (20%). Overall, TNFI use associated with increased NHL risk (OR=1.93, 95% CI: 1.16-3.20, p=0.011). Longer duration of TNFI use was suggestive of increased risk but not statistically significant (p=0.053). By type of TNFI, etanercept (TNF fusion protein) was associated with increased risk of NHL (aOR=2.73, 95% CI: 1.40-5.33, p=0.003), whereas increased risk with anti-TNF monoclonal antibodies was not statistically significant (aOR=1.77, 95% CI: 0.87-3.58, p=0.112).

Conclusions: These findings in adult rheumatologic patients support the FDA black box warning for surveillance of NHL with use of TNFIs. Continued awareness of this very rare but serious adverse events is warranted with new TNFIs and biosimilar products becoming available. Additional studies with long-term follow-up are needed to confirm our findings.

**Design, Synthesis, and Biological Evaluation of Tetrahydroisoquinoline-Based Histone Deacetylase 8 Selective Inhibitors**

*Medicinal Chemistry and Pharmacognosy*

**PharmD/PhD Student**

Histone deacetylase 8 (HDAC8) is a promising drug target for multiple therapeutic applications. Here, we describe the modeling, design, synthesis, and biological evaluation of a novel series of C1-substituted tetrahydroisoquinoline (TIQ)-based HDAC8 inhibitors. Minimization of entropic loss upon ligand binding and use of the unique HDAC8 “open” conformation of the binding site yielded a successful strategy for improvement of both HDAC8 potency and selectivity. The TIQ-based 3g and 3n exhibited the highest 82 and 55 nM HDAC8 potency and 330- and 135-fold selectivity over HDAC1, respectively. Selectivity over other class I isoforms was comparable or better, whereas inhibition of HDAC6, a class II HDAC isoform, was below 50% at 10 μM. The cytotoxicity of 3g and 3n was evaluated in neuroblastoma cell lines, and 3n displayed concentration-dependent cytotoxicity similar to or better than that of PCI-34051. The selectivity of 3g and 3n was confirmed in SH-SY5Y cells as both did not increase the acetylation of histone H3 and α-tubulin. Discovery of the novel TIQ chemotype paves the way for the development of HDAC8 selective inhibitors for therapeutic applications.


**HiFSA Sequencing Bioactive Peptides by ¹H-NMR for Quality Assurance**

*Medicinal Chemistry and Pharmacognosy*

**PharmD/PhD Student**

The assurance of identity, purity, and reproducibility is equally essential during the drug discovery process as for the final pharmaceutical product. Many active pharmaceutical ingredient (API) peptides are larger molecules (≥800 amu) that require great efforts to fully characterize and standardize. However, many compendial methods (HPLC, MS, chemical analysis) have limited ability to identify small structural changes or impurities that could plausibly affect biological or safety outcomes. ¹H iterative Full Spin Analysis (HiFSA) concurrently yields definitive identity and purity information allowing for quality assurance (QA) of the API. HiFSA sequencing lends itself to research and commercial applications as ¹H 1D NMR is the most sensitive and basic NMR experiment permitting automation and microgram scale analysis. HiFSA profiles need to be generated only once per API and can be adopted for external calibration. Coupled with QM-qHNMR, it is possible to quantify mixtures and/or determine the ratio of peptide conformers. As HiFSA profiles achieve exhaustive structural characterization, even small changes within larger molecules can be identified. The methodology behind HiFSA Sequencing, its use in enhancing reproducibility of biological studies and clinical usage, will be discussed, as will specific applications of increasing complexity, including standard amino acids (75-204 amu), angiotensin II (1046 amu), and case studies involving amino acid stereochemistry inversion and translocation.

Acknowledgments. T32AT007533 (ODS, NCCIH); U41AT008706 (ODS, NCCIH)
Reversible protein hydrogels are a relatively unexplored drug delivery approach that utilizes bio-specific protein interactions capable of sol-gel transitions dependent on environment. The aim of this study was to develop a sol-gel system based on glutathione-S-transferase (GST). GST exists as a dimer under normal physiologic conditions, which allows for crosslinking with appropriate ligands unaffected by fusion partners. In previous work, we developed GST labeled microspheres utilizing the GSH-GST specific interaction. GSH, or alternatively cysteine as a control, ligands were appended to micelles utilizing thiolene click chemistry with maleimide groups on maleimide-poly(ethylene glycol-block-ε-caprolactone) (MAL-PEG-PCL) block co-polymers. Upon mixing of MAL-PEG-PCL micelles with GST protein, ligand-dependent aggregation appears nearly instantaneously with preference for GSH appended micelles. Through variation of the ligand to protein concentration ratio, we are able to control aggregation occurrence with non-aggregative labeling possible as well. Investigation of the aggregate properties with GST-GFP recombinant protein showed an environment and time-dependent dissociation, with protein release occurring at different rates in the presence of 10 mM GSH or 1X PBS at 37°C. Utilizing MAL-PEG-PCL micelles loaded with DiO/Dil dyes, release of micelles was also observed in a similar environment and time-dependent fashion. The above findings suggest a flexible nature of the micelle-protein system, with simple labeling or hydrogel formation possible dependent on the experimental conditions. The ability to modulate hydrogel formation and composition, in addition to protein and micelle release, warrants for further investigation with GST-recombinant proteins and potential drug delivery applications.
11) Kayleigh Tovar, Michael Federle

Elucidating Rgg-mediated Quorum Sensing Networks in *Streptococcus pneumoniae* and Testing their Contributions in Pathogenesis

*Center for Biomolecular Sciences*

PhD Student

Quorum Sensing (QS), or bacterial communication by intercellular chemical signaling, is a process common to many (if not most) bacterial species; yet, it is unclear how QS signaling pathways contribute to virulence in many clinically significant pathogens. The Federle lab has helped to characterize a family of transcriptional regulators, known as Rgg proteins, as mediators of QS. We and others have shown the importance of Rgg proteins in multiple species of streptococci in regulating expression of genes that may enhance their ability to colonize and infect the host. Rgg proteins are known to regulate genes important for 1) controlling virulence; 2) promoting the development of resistance to lysozyme, a host-produced antimicrobial enzyme; 3) stimulating the formation of biofilms, or protective bacterial communities; and 4) initiating the development of natural competence to take up DNA from the environment. The role of the Rgg proteins in the pathogenic lifestyle of the clinically significant pathogen *S. pneumoniae* has yet to be investigated, but published genome-level mutagenesis studies indicate Rgg proteins in this organism are critical in *in vivo* animal models of infection. We have constructed isogenic mutants for each Rgg protein important *in vivo* and have performed transcriptomic analysis to identify gene targets under Rgg-regulation. Our analysis has revealed 18 gene targets under regulation by the Rgg protein SP_0141 in the pneumococcal encapsulated strain TIGR4 (serotype 4). Interestingly, this Rgg appears to be regulating a gene set important for transporting metal ions. We are in the process of testing gene targets of interest in order to understand Rgg-mediated QS and its role in virulence. Understanding the molecular networks under QS regulation is the first step towards developing novel approaches for interfering with bacterial communication and combatting clinically significant pathogens.

12) Rachel Harrington, Sruthi Adimadhyam, Todd A. Lee, Glen T. Schumock, James W. Antoon

*A Case-Crossover Study Examining the Association between Oseltamivir and Suicide among Pediatric Patients, 2009-2014*

*Pharmacy Systems, Outcomes & Policies*

PhD Student

Prior studies examining the association between oseltamivir exposure and neuropsychiatric events (including suicide) among children had mixed findings and were limited by small sample size, older data, or potential confounding. We examined the oseltamivir-suicide association using recent administrative claims data, and a case-crossover design that minimized confounding. Over five contemporary influenza seasons (2009-2013), 21,407 suicide events were identified, 251 of which were oseltamivir-exposed. We did not find any association between oseltamivir (Odds Ratio [OR] 0.64 [95% CI: 0.39, 1.00]) or influenza diagnosis (only) (OR 0.63 [CI: 0.34, 1.08]) and suicide. Results were robust to sensitivity analysis. Our results suggest that oseltamivir does not increase the risk of suicide in the pediatric population.
13) Dulari Jayawardena, Arivarasu N. Anbazhagan, Pradeep K. Dudeja, Hayat Onyuksel

**Local Colonic Delivery of Vasoactive Intestinal Peptide (VIP) Nanomedicine Alleviates Colitis in Mice**

*Biopharmaceutical Sciences*

**PhD Student**

In our previous studies, we have demonstrated the superior therapeutic effects of systemically administered VIP nanomedicine (VIP in sterically stabilized micelles; VIP-SSM), in alleviating colitis in mice. In addition, we have also characterized a luminal expressed VPAC1 receptor in human and mice colonic mucosa. Thus, the current studies were undertaken to determine if delivering the nanomedicine directly to the colon could have similar therapeutic benefits.

**Methods:** Colitis was induced in C57Bl/6 mice with 3.5% w/v dextran sulfate sodium (DSS) in drinking water for 7 days. Animals were randomly divided into 5 groups; (Control, DSS, VIP-SSM, DSS+VIP-SSM and DSS+ VIP). On day 5, 100 µls of either VIP-SSM (0.25 nmol), free VIP (0.25 nmol) or SSM (100 nmol) was instilled intrarectally to reach the colon. Colon appearance was observed for diarrheal phenotype, distal colonic mucosa was used for RNA and protein isolation for qPCR and western blot analysis, respectively. Frozen sections of colon were used for H & E and immunostaining. Results: VIP-SSM treated mice showed significant improvement in body weight compared to DSS and free VIP treated DSS mice. The diarrheal phenotype seen with DSS indicated by loose stool in colon and reduced length was alleviated with VIP-SSM. In parallel, reduced expression of ion transporters such as SLC26a3 seen in colitis was abrogated with VIP-SSM but not with the free peptide. Furthermore, increased pro-inflammatory cytokine mRNA expression and damaged distal colonic histology and goblet cell loss seen in DSS was significantly reversed with VIP-SSM treatment. The VPAC1 receptor expression was similar across all groups. Conclusions: These results demonstrate that local administration of VIP nanomedicine is effective in alleviating severe inflammation and associated diarrhea in colitis. Thus, delivering VIP-SSM nanoparticle orally with specific release at the colon could be a potential option to manage UC in future.

14) Maryam Elfeki, Mohammad Alanjary, Stefan J. Green, Nadine Ziemert, Brian T. Murphy

**Assessing the Efficiency of Cultivation Techniques to Recover Natural Product Biosynthetic Gene Populations from Sediment**

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Despite decades of cultivating microorganisms for use in drug discovery, few attempts have been made to measure the extent to which common cultivation techniques have accessed existing chemical space. Metagenomic studies have shown that cultivable bacteria represent only a fraction of the organisms found in the environment and the remaining uncultivated organisms encode a diversity of novel biosynthetic enzymes suggesting a huge untapped potential of novel secondary metabolites. The question is how much more biosynthetic diversity is there and how much are we accessing this diversity with current cultivation techniques. Herein we employed next generation amplicon sequencing to assess the natural product (NP) biosynthetic gene populations present in two Lake Huron sediment samples, and compared these with populations from their corresponding cultivatable microbes. After plating sediment onto six nutrient media, we recovered only 10%, 1.6%, and 3.5% of polyketide synthase (PKS) KS, KSA, and nonribosomal peptide synthetase (NRPS) adenylation (A) domain operational biosynthetic units (OBUs) from sediment, respectively. Of these, 81.8% of KS, 75.7% of KSA, and 89.9% of A domain sequences on nutrient agar are not represented in known biosynthetic gene cluster databases. Even though the predominant taxa present on nutrient media represented some of the major producers of bacterial NPs, our estimated BGC recovery indicated that these taxa likely harbor a minority of the natural product chemical space present in the sediment. These results provide evidence that the extension of current cultivation and mining techniques will lead to novel molecules.
15) Subbulakshmi Karthikeyan, Daniel Lantvit, Joanna E. Burdette

**Prolactin Pathways contributing to Tumorigenesis in Fallopian Tube-derived Spontaneous Model of Ovarian Cancer**

*Center for Biomolecular Sciences*

**PhD Student**

Increasing evidence supports that the fallopian tube epithelium (FTE) are progenitors for high grade serous ovarian cancer (HGSOC). A spontaneous model of FTE derived ovarian cancer called MOEhigh (murine oviductal epithelium high passage) was generated by serially passing cells. A human prolactin (PRL) like murine protein called proliferin (encoded by Prl2c2) was amplified >100 fold in the spontaneous oviductal model. Enhanced PRL activate key oncogenic pathways and reduces the overall survival of HGSOC patients as reported by The Cancer Genome Atlas. Therefore, the goal of this project was to define the molecular role of PRL signaling in HGSOC tumorigenesis using the MOEhigh model and human cellular models. A stable knockdown of Prl2c2 in the MOEhigh cells demonstrated a significant reduction in cell proliferation, 2 dimensional foci, and anchorage independent growth compared to the control cells. No tumor formation was detected post Prl2c2 knockdown, while the spontaneous model required sacrifice due to tumor burden. To translate these findings, human HGSOC cell line (OVCAR3) and tumorigenic human FTE cells were treated with recombinant PRL in a dose-dependent manner. Both cell lines displayed an increase in proliferation and foci formation following PRL treatment. A CRISPR/Cas9 mediated homozygous prolactin receptor (PRLR) knockout (KO) in OVCAR3 and FTE cells demonstrated significant reduction in cell proliferation and tumor burden. A phosphokinase array revealed a list of kinases that were phosphorylated after PRL exposure in OVCAR3 cells. Inhibitors for pAKT, RAS, pSTAT5 and pmTOR were all capable of blocking proliferation induced by PRL treatment in OVCAR3 and FTE-myc cells. Bioneutralizing antibodies that inhibit PRL signaling already exist and provide a reasonable approach for disrupting this pathway in order to block tumorigenesis. Overall this project has revealed novel mechanism of prolactin signaling that were necessary for tumor formation in HGSOC.

16) Caitlin E. Howell, Ryan Hitzman, Tareisha L. Dunlap, Birgit M. Dietz, Judy L. Bolton

**The Use of Mammospheres as Models for Predicting P450 1A1/1B1 Metabolism?**

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Since the Women’s Health Initiative reported that hormone replacement therapy directly correlated with increased risk of breast cancer and heart disease, many American women have turned to botanical supplements to seek relief from menopausal symptoms. Unfortunately, little is known about how these extracts modulate the chemical carcinogenic effects of estrogens. The genotoxic pathway involves 4-hydroxylation of estrone/estradiol by P450 1B1 whereas detoxification of estrogen through 2-hydroxylation is catalyzed by P450 1A1. These pathways are classically regulated by the aryl hydrocarbon receptor (AhR) and epigenetically regulated by estrogen receptor alpha (ERα). Botanical supplements can affect both ERα and AhR, causing differential effects within the same supplement. The ethoxyresorufin-O-dealklase (EROD) assay is a relatively simple assay that measures the enzyme activity of P450 1 family of enzymes. Unfortunately, in 2D MCF-7 cells, EROD could not measure enzyme inhibition without pretreatment with a strong agonists or separate the AhR-mediated effect from the ERα-mediated effect. 3D-Mammospheres are considered to be better models of humans than 2D monolayers. qPCR was utilized to understand differences in gene expression of CYP1A1/1B1 in 2D monolayers and 3D mammospheres. EROD showed increased enzyme activity in the 3D models as compared to the 2D models, which allowed the detection of AhR antagonists without pretreatment with an AhR agonists. With the P450 1B1 selective inhibitor, 2,3',4,5'-tetramethoxystilbene (TMS), ERα-mediated effects can be separated from those mediated by AhR. These results indicate that MCF-7 mammospheres, not monolayers, can be utilized to screen for modulation of estrogen chemical carcinogenesis and should be investigated in other assays as a way to achieve in vitro results more similar to humans. Supported by NIH Grant P50AT000155.
17) Christopher D. Saffore, Jenny Guadamuz, Katie Ozenberger, Sruthi Adimadhya, Gregory S. Calip

**Racial differences in the prevalence of cognitive impairments and dementia, utilization of chemo-immunotherapy, and Mortality in Elderly Diffuse Large B-cell Lymphoma Patients**

*Pharmacy Systems, Outcomes & Policies*

**PhD Student**

Objectives: To describe racial differences in the prevalence of a cognitive impairment or dementia (CID) diagnosis, likelihood of chemo-immunotherapy utilization and subsequent survival in elderly diffuse large B-cell lymphoma (DLBCL) patients.

Methods: We conducted a retrospective cohort study using cancer data from the Surveillance, Epidemiology, and End Results (SEER)–Medicare linked database. We identified Medicare beneficiaries with a first primary DLBCL diagnosis between 2001 and 2011. A validated algorithm for use with administrative claims data was used to determine presence of CID diagnosis at baseline and throughout the study period based on International Classification of Diseases, Ninth Revision (ICD-9) and procedural codes.

Results: Of the 10,626 Medicare beneficiaries identified with a DLBCL diagnosis, 410 (3.9%) patients also had evidence of a CID diagnosis during the study period. The proportion of patients with comorbid CID with DLBCL diagnosis was slightly higher among Non-Hispanic Black (6.1%) and Hispanic (4.6%) patients compared to non-Hispanic White (3.7%) and Asian/Pacific Islander (3.3%) patients. In multivariable models, patients with CID had significantly lower odds of systemic treatment with chemo-immunotherapy (OR: 0.43; 95% CI: 0.34–0.54) with even lower odds of treatment among Black (OR: 0.16; 95% CI: 0.04–0.48) and Hispanic patients (OR: 0.17; 95% CI: 0.06–0.46). Poorer cancer-specific survival was observed among DLBCL patients with documented CID (HR: 1.61, 95% CI: 1.43, 1.81), but this association was attenuated when adjusting for differences in curative treatment received (HR: 1.39, 95% CI: 1.24, 1.57).

Conclusions: There are racial differences in CID and chemo-immunotherapy utilization among elderly DLBCL patients. Further research is needed to understand patient, caregiver and provider preferences in the care of lymphoma patients with these conditions.

18) Vanessa M. Nepomuceno, Tiara Perez-Morales, Michael Federle, Brian T. Murphy

**A Streptomyces tendae Specialized Metabolite Interferes with Quorum Sensing in Group A Streptococcus**

*Center for Biomolecular Sciences*

**PhD Student**

Quorum Sensing (QS) is a process where bacteria produce, secrete, and detect chemical signals that trigger specific phenotypic responses including competence, antibiotic production, biofilm formation, and secretion of virulence factors. In group A Streptococcus (GAS), this cross-talk between bacteria is believed to play a role in the regulation of virulence. Therefore, finding a natural product regulator of QS in GAS may aid in understanding and manipulating this “switch”. A family of transcriptional regulators, the Rgg proteins, have been shown to exhibit regulatory activity on pathogenic behaviors in bacteria, such as lysozyme resistance and biofilm development. Thus, inhibition of Rgg may offer a way to regulate these behaviors. To discover small molecule modulators of QS, a high-throughput luciferase assay was used to screen our actinomycete specialized metabolite fraction library to identify natural product inhibitors of Rgg. A potential QS inhibitor has been identified from a Streptomyces tendae strain. The strain, D051, was cultivated in a 28 L fermentation that yielded 1.7 grams of crude extract. Consecutive rounds of chromatographic separation were used to isolate four milligrams of the bioactive molecule from the crude material. High resolution mass spectrometry (HRMS) along with nuclear magnetic resonance spectroscopy (NMR) is currently being employed to elucidate the structure of the compound. Successful structural elucidation allows the use of this molecule as a molecular probe to understand QS mechanisms within GAS.
19) Sungjoon Cho, Kyoung-Jae Won, Ashutosh Tripathi, Vanessa Leone, Nathaniel Hubert, Eugene B. Chang, Hyunwoo Lee, Hyunyoung Jeong

**Differential Microbiota in the Gut Modulates Susceptibility to Acetaminophen-induced Hepatotoxicity in C57BL/6 Mice**

*Biopharmaceutical Sciences*

**PhD Student**

Drug-induced liver injury (DILI) is the leading cause of acute liver failure in the US. Risk factors for developing DILI remain unclear, and thus identification of the individuals highly susceptible to DILI has been difficult. The objective of this study is to investigate the role of gut microbiota in modulating susceptibility to DILI using an acetaminophen (APAP) as a model drug. C57BL/6 mice from two different vendors [Jackson (JAX) and Taconic (TAC)] were cohoused with mice from the same or the other vendor for 4 weeks. After overnight fasting, mice were dosed with APAP (300 mg/kg, i.p) and sacrificed 24 h after dosing. Hepatotoxicity was determined by measuring serum levels of alanine aminotransferase (ALT). TAC mice showed 4.7-fold higher ALT level compared to JAX mice, and this was abrogated upon cohousing. To further verify the role of differential gut microbiota in APAP hepatotoxicity, cecum materials from JAX or TAC mice were inoculated to C57BL/6 germ-free (GF) mice and APAP toxicity were measured after 4 weeks. Mice given TAC cecum exhibited 2.8-fold higher ALT level than mice that received JAX cecum, recapitulating the toxicity difference in conventional JAX and TAC mice. To identify the underlying mechanisms, a time-course experiment was performed where JAX and TAC mice were sacrificed at 0, 0.5, 2, 6, 12 or 24 h after APAP dosing. TAC mouse liver exhibited faster and prolonged presence of APAP-protein adducts. The extent of glutathione depletion after APAP dosing was greater in TAC mouse liver, suggesting greater bioactivation of APAP to toxic metabolite in the TAC mice. TAC mouse liver showed higher basal activity of CYP2E1, the major enzyme mediating APAP bioactivation. GF mice given TAC cecum also showed higher CYP2E1 activity compared to GF mice given JAX cecum. Taken together, these results suggest that differential gut microbiota modulates susceptibility to APAP-induced hepatotoxicity potentially by altering CYP2E1-mediated APAP bioactivation.

20) Brian P. David, Oleksii Dubrovskyi, Jonna M. Frasor, Laura M. Sanchez, Terry W. Moore

**Label-Free Visualization of Peptides and Small Molecules in Tumor Explants Using Mass Spectrometry Imaging**

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Matrix assisted laser desorption ionization imaging mass spectrometry, with a time-of-flight mass spectrometer (MALDI-TOF IMS), has been used in this work to show permeability and uptake of small molecules and peptides in a tumor explant model. Analysis using MALDI does not require the use of a chemical label, which represents an advantage compared to other methodologies, such as fluorescence microscopy. We have treated ex vivo explants derived from MCF-7 tumor xenografts to examine cellular uptake of several different drugs and probes, including the selective estrogen receptor modulator 4-hydroxytamoxifen, the macrocyclic peptide cyclosporin A, and peptides we have prepared to inhibit the estrogen receptor/coactivator interaction. Tumor explants were cryosectioned onto indium tin oxide glass slides and dried in a desiccator. Matrix was applied to the tissue sections. IMS data indicates that all three mass-to-charge ratios of our molecules of interest are detected within the explants. Together, these data demonstrate that a 3D explant model can be used for visualization of not only small molecules, but also cell-penetrating peptides, and they provide a strong proof-of-concept for using mass spectrometry imaging to probe cellular penetration in tumor explants.
Novel Model of Accelerated Cognitive Deficits Induced by Oxidative Stress and Traumatic Brain Injury with Exacerbated Neupathology

PhD Student

Recent reports have linked traumatic brain injury (TBI) ranging from sports athlete’s concussions to soldier blast impacts to earlier onset dementia. However, the link between mild trauma and its role in the ability to deplete a person’s “cognitive reserve” as they age leading to dementia is still unknown. Any advances in early identification tools, understanding sequela mechanism, and therapies for TBI would have significant socioeconomic and health care implications. To address this, we have developed an oxidative stress induced mouse model (Aldh2-/-), demonstrating aging-like pathology, in conjunction with a closed head weight drop injury model to mimic cognitive deficits and neuroinflammatory pathology that occurs post mild TBI. Our primary objective is to identify functional damage and future consequences induced by mTBI that contribute to increased risk of dementia.

In the Aldh2-/- mice where oxidative stress (OS) represents a “1st hit”, Aldh2-/- mice exhibited increased levels of OS and accelerated cognitive deficits as early as 3 months. We further characterized this model using a chemoproteomic approach to identify a network of differentially expressed proteins linked to accelerated cognitive decline. More interestingly, when a “2nd hit” was administered such as mTBI, it led to an exacerbation of neuroinflammatory surge and post concussive syndrome 24 hrs post injury and sustained deficits in behavior up to 1 month. To utilize this model, we tested a novel library of small molecules that reactivate CREB through NO/cGMP signaling that have been previously evaluated for its anti-inflammatory, anti-convulsant, and pro-cognitive properties. Our results demonstrated a reversal of post-concussive syndrome, decrease in inflammation, and additional alleviated damage from other contributors of mTBI. This novel model of mTBI on a background strain of aging (Aldh2-/-) allows us to develop a preclinical model where disease modifying strategies for TBI can be tested.

SORF Proteins as Newcomers in Double-Strand Break Repair by Classical Non-Homologous End Joining

PhD Student

We present evidence that a family of small proteins (<160aa) contribute to DNA double-strand break (DSB) repair by Non-Homologous End Joining (NHEJ). These proteins are alternatively spliced variants encoded by the human C7orf49 locus. We previously showed that C7orf49-encoded proteins bound to Ku70/80-DNA complexes, and stimulated DNA-PK and NHEJ in vitro. Here we show that CRISPR/Cas9-mediated deletion of the C7orf49 locus in HEK-293 cells increased sensitivity to the DSB-inducing agents ionizing radiation and bleomycin, and reduced ability to repair I-SceI-generated chromosomal DSBs. Further, we show that C7orf49-encoded proteins co-immunoprecipitate the required NHEJ factors, physically interact with XLF, and impact upon the ability of XLF-XRCC4 complexes to bridge DNA ends in vitro. Further investigation revealed that the 150aa variant was able to increase the amount of XLF protein that binds to DNA. It was also shown that the 150 aa variant is attracted to DNA by the XRCC4 protein. Abundance of C7orf49-encoded proteins is regulated by the proteasome, and increased with etoposide treatment through an ATM-dependent mechanism. Our data support a role for these small proteins as novel participants NHEJ in human cells. We hypothesize that C7orf49-encoded proteins bind to Ku70/80 and XLF and regulate the ability of these NHEJ factors to form macromolecular complexes that are required for NHEJ.
23) Daniel S. May, Camila M. Crnkovic, Aleksej Krunic, Jimmy Orjala

A Bioinformatic and Metabolomic Strategy to Discover New Natural Products from Cultured Cyanobacteria

Medicinal Chemistry and Pharmacognosy

PhD Student

Natural products are a valuable source of new pharmaceuticals and molecular probes. Improvements in both sequencing and bioinformatic technologies have made genome mining a powerful tool for the identification of bacterial natural products. Bioinformatic tools, such as AntiSMASH, can be used to identify biosynthetic gene clusters from genomic data and provide predictions on the structures of the produced compounds. However, the predicted structures are often not complete, making identification of the produced compounds in a cell extract with mass spectrometry challenging. Taking advantage of the unique growing conditions of cyanobacteria, stable isotope labeling was used to match biosynthetic gene clusters to their produced compounds in a cyanobacterial cell extract. Bioinformatic analysis with AntiSMASH was able to identify six biosynthetic gene clusters from the sequenced genome of the cyanobacterium UIC 10630 *Nostoc sp*. Three of the six biosynthetic gene clusters had high homology to reported biosynthetic gene clusters, while three appeared to be orphan gene clusters. Stable isotope labeling with $^{15}$N labeled nitrate, and subsequent comparative metabolomic analysis, was able to match four of the six biosynthetic gene clusters with compounds in the cell extract. Two of the identified compounds were new natural products and their structures were elucidated by NMR and mass spectrometry.

24) Yunlong Lu, Lauren Gutgesell, Jiong Zhao, Rui Xiong, Carlo Rosales, Yueting Wang, Katherine Dye, Sue Lee, Daniel Lantvit, Debra A. Tonetti, Gregory Thatcher

Design and Synthesis of Basic Amino Selective Estrogen Receptor Degraders (BA-SERDs) for Treatment Resistant Breast Cancer

Medicinal Chemistry and Pharmacognosy

PhD Student

About 1 in 8 United States women (about 12%) will develop invasive breast cancer during their lifespan. Approximately 40,000 women are expected to die from breast cancer each year. The largest single breast cancer subtype is defined as estrogen receptor alpha (ERα) positive breast cancer (75%), wherein ERα played a critical role in cancer cell survival, proliferation and metastasis. The deregulation of ERα signaling formed the most important molecular event in the ER positive (ER+) breast cancer. Endocrine therapy (ET) had been successfully employed on such breast cancer patients and most of them had substantial reduced risks of breast cancer recurrence and mortality in the initial 5-10 years. However, the emergence of resistance is inevitable over time and will eventually lead to metastatic disease after long term of ET. Recent studies confirmed treatment failure of SERMs and AIs in ER+ metastatic breast cancer. Fortunately, the treatment resistant breast cancer patients remain responsive to fulvestrant (ICI182,780) which has been described as a “pure antagonist” and caused ERα degradation as a SERD. Nonetheless, the pharmaceutical liabilities of fulvestrant including poor solubility and pharmacokinetics (PK) resulted in poor compliance. The development of orally bioavailable SERDs i.e. GDC-0810, AZD9496, RAD1901 is needed to overcome these shortcomings.

WITHDRAWN
Chloramphenicol and Linezolid Selectively Inhibit A-site tRNA Accommodation

PhD Student

Chloramphenicol and linezolid are inhibitors of bacterial protein synthesis. They bind to the A-site of the peptidyl transferase center in the ribosome, the site occupied by all incoming aminoacyl-tRNAs during translation elongation. Therefore it was thought that chloramphenicol and linezolid inhibit formation of every peptide bond because they interfere with the accommodation of any aminoacyl-tRNA. However, we have recently shown that chloramphenicol and linezolid are not universal inhibitors but, instead, their action depends on the amino acid sequence of the nascent peptide. Specifically, translation is strongly arrested when an alanine is in the penultimate position of the nascent chain. To investigate how antibiotic dependent arrest influences translation dynamics we used single-molecule FRET to discretely monitor ribosome and tRNA conformations in real-time during translation of model templates in the presence or absence of chloramphenicol. We found that, in spite of the presence of chloramphenicol, the ribosome progressed normally when translating the non-arrest template. In contrast, a ribosome translating an arrest peptide in the presence of chloramphenicol binds A-site tRNA but in a non-productive fashion because it remains in a partially accommodated state for an extended period of time. After the non-productive A-site tRNA finally dissociates from the ribosome, another round of non-productive binding can occur. Our findings not only contribute to understanding the mechanism of action of ribosomal antibiotics but also reveal critical aspects tRNA dynamics in the peptidyl transferase center during protein synthesis.

Genes within Genes in Bacteria

PhD Student

Bacteria can extend the capacity of their genetic code and diversify their proteome by taking unorthodox paths during protein synthesis. Such unusual translation events include programmed frameshifting, codon redefinition, or the widely unexplored internal initiation. Although internal initiation events have been reported for few genes, their regulation and functions of the alternative products remained obscure. Furthermore, it is completely unknown whether translation initiation can occur, and render functional proteins, at potential internal start codons preceded by strong ribosome binding sequences. We therefore implemented an approach to systematically explore internal translation start sites in bacterial cells. We performed ribosome profiling of E. coli cells treated with the antibiotic retapamulin, which had been shown to inhibit initiation during in vitro translation. Our ribosome profiling data revealed that retapamulin indeed causes a strong arrest on initiating ribosomes, whose locations mapped to the canonical start sites of actively expressed genes. In addition, we observed retapamulin-arrested ribosomes at sites within the coding regions of a small subset of genes. Computational analysis of these sites revealed that they are putative internal initiation regions. Some of these internal sites are in the same frame as the primary start codon and include previously reported cases. Strikingly, we also observed internal sites that are out-of-frame relative to the primary start codon. We are currently analyzing the possible functions of the alternative initiation products and their contributions to cell fitness. Our findings reveal that internal translation initiation as a strategy to expand the bacterial proteome is probably not as eccentric as previously thought. The use of the antibiotic retapamulin in ribosome profiling experiments may reveal a universe of alternative translation start sites in bacteria living in different physiological conditions.
27) Matthew Gilbertson, Karin C. Nitiss, Matthew Summerlin, John Nitiss

**Batteries Sold Separately: A Link between Etoposide Hypersensitivity of Human Top2α Mutant Proteins and the ATP Requirement for Activity**

*Biopharmaceutical Sciences*

**PhD Student**

DNA topoisomerases regulate DNA structure by introducing transient DNA strand breaks, and use the breaks to carry out topological transformations of DNA. Anti-tumor agents such as etoposide and doxorubicin target human topoisomerases IIα and IIβ (hTop2α and hTop2β). Clinically active Top2 inhibitors stabilize a covalently bound DNA-enzyme intermediate, and kill tumor cells by generating enzyme-mediated DNA damage. Therefore, this class of inhibitors is referred to as Top2 poisons. Our laboratory performed a large-scale yeast-based screen to isolate etoposide hypersensitive hTop2 alleles. We hypothesize that these mutant alleles will provide a unique window into the action of Top2 poisons. As expected, many of the drug hypersensitive alleles introduce changes in the protein that are distant from the etoposide binding site, and do not affect etoposide sensitivity by directly altering drug binding. Therefore, these mutants may illuminate the dynamics of drug action and unperturbed topoisomerase reactions. We identified clusters of mutants in the ATPase domain of the protein and hypothesize that these mutants alter communication between the ATPase domain and the enzyme catalytic core. One mutant protein, Asp374Gly demonstrates a decreased ATP requirement for topoisomerase reactions. We hypothesize that the Asp374Gly mutant protein tightly couples ATP hydrolysis to catalytic cycles and increases the catalytic efficiency of the enzyme, affecting to etoposide sensitivity through enzyme turnover. We also isolated many mutants in both the tower domain of the catalytic core and adjacent to the C-terminal dimerization domain of Top2. The C-terminal domain harbors mutations that significantly block the enzyme from carrying out religation of cleaved DNA. These results suggest a tight coordination that transduces signals from the ATPase domain, the breakage reunion domain and the C-terminal dimerization domain to regulate progression through the catalytic cycle of the enzyme.

28) Karina Esparza, Khee Keong Woo, Hyunwoo Lee, Hayat Onyuksel

**Thiostrepton in Sterically Stabilized Phospholipid Micelles: A Promising Antibacterial Nanomedicine**

*Biopharmaceutical Sciences*

**PhD Student**

Thiostrepton (TST) is an antimicrobial agent with potent activity against gram-positive bacteria, including Methicillin-resistant *Staphylococcus aureus* (MRSA). However, lack of water solubility and gastrointestinal absorption limit the clinical application of TST. To overcome these barriers, we encapsulated TST in sterically stabilized micelles (SSM) for intravenous administration. SSM is composed of a biodegradable and biocompatible PEGylated phospholipid which self-assembles in aqueous media forming a 15 nm core-shell structure. This nanocarrier solubilizes water-insoluble drugs in its hydrophobic core and targets drug to sites with leaky vasculatures, such as in localized infections. Using the thin-film hydration method, we encapsulated up to 5 TST molecules per micelle. However, this method is not suitable for large-scale production. The purpose of this study was to develop a practical and scalable method of encapsulation to produce TST-SSM antibiotic nanomedicine. We combined drug and phospholipid in 50% tert-butanol: water co-solvent system and freeze-dried the formulation. We reconstituted formulation in 0.9% saline and characterized particle size by dynamic light scattering, drug concentration by HPLC, and antimicrobial activity by microdilution assay. We obtained elegant and uniform TST-SSM lyophilized cakes that rapidly reconstituted and formed particles of 15nm. We estimated maximum drug loading of 1 TST molecule per micelle and observed that encapsulation did not impair the drug activity against MRSA COL (MIC = 0.1 µM). Interestingly, MRSA USA300 exhibited reduced susceptibility to free TST (MIC = 0.8 µM), but activity was improved with TST-SSM (MIC = 0.1 µM). Reasons for such improvement are unknown, but further investigation could reveal novel roles of SSM in overcoming bacterial intrinsic resistance to TST. In conclusion, we successfully developed a TST-SSM antibiotic nanomedicine which is effective against MRSA and suitable for large-scale production.
29) Thomas Speltz, Zamia Siddiqui, Jeanne Danes, Sean Fanning, Colin Fowler, Chris Mayne, Emad Tajkhorshid, Geoffrey L. Greene, Jonna Frasor, Terry W. Moore

Functionalized Hydrocarbon Stapled Peptides for the Estrogen Receptor/Coactivator Interaction

Medicinal Chemistry and Pharmacognosy

PhD Student

A current limitation in treating estrogen receptor positive breast cancer is the development of resistance to endocrine therapy. Among the many possible mechanisms of resistance, mutations in the estrogen receptor ligand binding domain have been recently shown to be a contributing factor. Specifically, estrogen receptor mutations Y537S and D538G have been reported to contribute to resistance by decreasing the efficacy of the clinically used drug tamoxifen.

A standing hypothesis in estrogen receptor pharmacology is that coactivator binding inhibitors can be used in place of traditional endocrine therapy to block cellular proliferation mediated by estrogen receptor. To validate the coactivator binding inhibitor hypothesis within a cellular context, we have prepared cell permeable stapled peptides to function as inhibitors of the estrogen receptor/steroid receptor coactivator interaction in both wild-type and mutant estrogen receptors.

Guided by x-ray crystallography, we have applied molecular dynamics and structure based rational design to develop stapled peptides with high affinity for the estrogen receptor. In targeting the wild-type receptor, we have found that stapled peptides mimicking steroid receptor coactivators have even higher affinity against mutant receptors Y537S and D538G. In addition to inhibiting the estrogen receptor/coactivator interaction in biochemical assays, we find inhibition of estrogen receptor function within multiple breast cancer cell lines. The stapled peptides reported in this research support the coactivator binding inhibitor hypothesis and will shed light on estrogen receptor/coactivator interactions in cells expressing both wild-type and mutant receptors.

30) Brian Guo, Ming Zhao, Austin Czarnecki, Joanna Burdette, CT Che

Phytochemical Exploration of Medicinal Tuber Native to West Africa

Medicinal Chemistry and Pharmacognosy

PhD Student

The purpose of this research is to conduct a phytochemical analysis of Icacina trichantha Oliv. (Icacinaceae), a plant endemic to Nigeria and other regions of western Africa that has traditionally been used to treat food poisoning, constipation, and malaria. Bioassay-guided fractionation was used to guide the enrichment of previously reported pimarane diterpenes and the isolation and identification of novel compounds. Compounds were isolated by chromatography and HPLC. The structures were elucidated with NMR and MS data. Isolated compounds were also analyzed for cytotoxicity. Our work has led to the enrichment of known compounds such as icacinol, reported to have favorable herbicidal traits. We have also recently identified several novel compounds, including 14-OH icacinlactone, a derivative of a previously reported (9βH)-pimarane, and a novel (9βH)-19-nor-pimarane diterpene. Further investigation of the diterpenes from Icacina trichantha is warranted due to their unique chemical diversity and biological activity.
31) Jay Anand, Jing Li, Leslyn Hanakahi, John Nitiss

**Repair of Top2-mediated DNA Damage by DNA Polymerase β**

*Biphorarmaceutical Sciences*

PhD Student

Topoisomerase 2 (Top2) is a target of clinically active anti-cancer agents. Top2 poisons like etoposide produce cytotoxicity by generating Top2-DNA covalent complexes (Top2cc). Factors affecting levels of Top2cc are key determinants of cellular responses to Top2 poisons. DNA polymerase β (Pol β) is a single strand break repair protein critical for base excision repair. Recent studies suggested that Polβ might be involved in processing the topoisomerase-like meiotic protein Spo11, and overexpression of Polβ confer resistance to etoposide in small cell lung cancer (SCLC). Based on these results, we hypothesize that Polβ might play a role in repair of Top2cc. Using a quantitative assay for Top2ccs termed ICE assay, we found that Polβ inhibition using pamoic acid, and stable shRNA Polβ knockdown (kd) elevated etoposide-induced Top2cc. Polβ kd also sensitized cells to etoposide. Using cells expressing mutant Polβ that specifically affect either of the Polβ activities (DNA polymerase or 5’ deoxyribose phosphate lyase), we determined that lyase activity of Polβ is important for repair of Top2cc. Further, knockdown of any of the known nucleolytic proteins that repair Top2cc (Mre11, CtIP, Tdp1, or Tpd2) generated elevated levels of etoposide-induced Top2cc in Polβ kd cells compared to cells expressing wild type Polβ. This result suggests that Polβ repairs Top2cc independent of these nucleolytic activities. Tdp1-/- cells did not generate elevated levels of Top2cc, but following pretreatment with pamoic acid generated elevated levels of Top2cc, signifying a dependence on Tdp1-/- cells on Polβ for repair of Top2cc. These results provide further evidence that Polβ (as well as Tdp1) is important for repairing Top2cc. Since the lyase activity appears to be the relevant Polβ activity, we plan to test processing of Top2cc directly using recombinant Polβ.

32) Benjamin G. Richardson, Atul D. Jain, Phillip R. Lazzara, Brian P. David, Haranatha Potteti, Chandra Tamatam, Ewelina Choma, Kornelia Skowron, Katherine Dye, Yue-Ting Wang, Aleksej Krunic, Sekhar P. Reddy, Terry W. Moore

**Replacement of a Naphthalene Scaffold in Keap1/Nrf2 Inhibitors**

*Medicinal Chemistry and Pharmacognosy*

PhD Student

Small molecules that activate Nrf2 present potential therapeutics for prevention and treatment of chronic oxidative stress and inflammatory disorders. Nrf2 is negatively regulated by Keap1 through targeted polyubiquitination and degradation via the 26S proteosome. Competitive inhibition of the Keap1/Nrf2 interaction through targeting Keap1 has been shown to activate Nrf2. Previously, we and others have described a series of naphthalene-based Nrf2 activators, but the 1,4-diaminonaphthalene scaffold is not ideal as a drug-like scaffold. Paying particular attention to aqueous solubility, metabolic stability, and potency, we modified a naphthalene-based non-electrophilic Nrf2 activator to give a series of non-naphthalene and heterocyclic scaffolds. We found that a 1,4-isoquinoline scaffold provides similar potency, stability, and solubility to previously reported naphthalene-based compounds.
33) Ellyn Polley, Kelsey Bridgeman, Juliana Chan

Fibrosis Criteria Comparison across State Medicaid Programs to Qualify for Direct-acting Antiviral Treatment in Patients with Hepatitis C
Pharmacy Practice
PharmD Student

Introduction: Direct-acting antivirals (DAAs) are the treatment of choice for chronic hepatitis C (CHC). High DAA cost causes state Medicaid programs to restrict patient access by requiring prior authorization (PA) before approving therapy, such as a Metavir fibrosis score. The American Society for the Study of Liver Disease (AASLD) 2016 recommend treating all patients with CHC with no restrictions to staging for treatment.

Research Question: How do restrictions on Metavir fibrosis scores for approval of DAAs vary across state Medicaid plans?

Study Design: Qualitative

Methods: An online search of 50 States’ Medicaid services were conducted. Two individuals reviewed the most recent PA forms and treatment criteria on state Medicaid websites between 5/22/2017–6/5/2017. The minimum Metavir fibrosis score required for approval was documented, and states without fibrosis restrictions or a minimum Metavir score of F0 were labeled “No Restrictions”. States not providing any criteria were deemed “unspecified” and removed from the analysis.

Results: Fifty states were included in the original study, but 8 (16%) were labeled “unspecified” due to lack of information available through their Medicaid website and were removed from the remainder of the analysis. A minimum Metavir fibrosis score of F3 was found in 15 states (35.7%), and 15 other states require a score of F2. Thirty states (71.4%) require evidence of moderate fibrosis to approve treatment. Three states (7.1%) require a minimum Metavir fibrosis score of F1, while 9 states (21.4%) have no restrictions. No state requires evidence of Metavir fibrosis score F4.

Conclusion: Though the criteria required for CHC treatment with DAAs vary by state, 42 states require a Metavir fibrosis score of F2 or F3. These data prove there is no consistency in Metavir fibrosis score requirements. Further studies must be conducted to better understand the factors that influence changes in the authorization of DAA treatment.

34) Sara Weber, Guido F. Pauli

Antimycobacterial Compounds from Plants and Microbes Reported Between 2000-2017
Institute for Tuberculosis Research
PharmD Student

With the number of cases of tuberculosis (TB) being higher than estimated, the 2017 WHO report estimated 10.4 million new cases of TB worldwide in 2016. Worldwide, TB is a more prevalent reason for deaths from a single infection than HIV/AIDS and on place nine as a cause of death. However, efforts to combat TB are still insufficient, and there are important gaps in diagnosis and treatment of multi-drug resistant TB (MDR-TB) and extensively drug resistant TB (XDR-TB). This study assesses the current situation of the pipeline of new antimycobacterial compounds, and the status of single compounds from plants and microbes that were discovered since the last comprehensive review by Cantrell et al. (Planta Med 67, 685-694, 2001). More than 154 publications were reviewed, and > 300 compounds were selected as being relevant for this report based on their biological profile. The latest Phase I or II pipeline of anti-TB lead compounds comprises only five compounds belonging to a new chemical class. The biological profile reported for the > 300 potential lead compound is largely insufficient to assess their validity as true anti-TB drug leads. In order to be translational and making these compounds fit for the further pre-clinical drug development pipeline, early natural product drug discovery efforts should focus more on early comprehensive characterization by, e.g., (a) purity evaluation, (b) full MIC90 determination, ideally in different M. tb. strains, and (c) assessment of general cytotoxicity, e.g., in Vero cells.
Non-Electrophilic Nrf2 Activators on the Expression of Cytoprotective Proteins and on Wound Closure in \textit{In-Vivo} and \textit{Ex-Vivo} Models

\textit{Medicinal Chemistry and Pharmacognosy}

PharmD Student

Nrf2 is a transcription factor that is upregulated in response to oxidative or electrophilic stress, promoting the downstream expression of antioxidant enzymes. Activating Nrf2 has been of pharmaceutical interest as a plausible therapeutic strategy for targeting various inflammatory and oxidative stress-related diseases. Prolonged inflammation is the underlying pathology for chronic non-healing wounds, commonly seen in diabetic patients. Additionally, Zhang and coworkers have shown an essential role for Nrf2 in diabetic wound healing in a genetic model. Our hypothesis is that pharmacologically activating Nrf2 will accelerate wound closure of such wounds. We have synthesized non-electrophilic Nrf2 activators designed to have higher target specificity, as opposed to electrophiles that have been shown to be poorly selective. To study the ex-vivo response of Nrf2 activators on wound closure, we performed scratch assays using HaCaT keratinocyte cells by scratching a confluent cell monolayer and treating groups with different Nrf2 activators. Additionally, we performed western blots on the same keratinocytes cell line to study the effects of selected compounds on the expression levels of Nrf2 and its target proteins. The cells are exposed to Nrf2 activators, harvested and probed with antibodies to measure target protein levels. Finally, we have performed an \textit{in-vivo} study on a diabetic mouse model by creating paired wounds, treating them with different Nrf2 activators, and documenting wound closure over the course of a 14-day treatment. The results of these studies will help us to understand the effects of Nrf2 activation on wound closure in \textit{ex-vivo} and \textit{in-vivo} models, and the level of Nrf2 activation by different compounds. We will also use this data to compare the efficacy of electrophiles to different non-electrophilic Nrf2 activators.

Similar Survival but Increased Toxicity with a Sequential Versus Concurrent FluBu4 Regimen

\textit{Pharmacy Practice}

PharmD, BCOP

Fludarabine and myeloablative busulfan (FluBu4) has been administered in both a concurrent and a sequential fashion. We sought to compare outcomes between patients receiving allogeneic stem cell transplant (SCT) using a concurrent 5-day versus a sequential 9-day FluBu4 regimen.

We analyzed 102 consecutive patients who received FluBu4 prior to allogeneic SCT between 2003 and 2016. Thirty-seven (36%) patients received the 5-day regimen while 65 (64%) received the 9-day regimen. More patients receiving the 9-day regimen experienced Grade 4 mucositis (53 versus 6 patients, \(p<0.0001\)). 23 (35.4%) in the 9-day group versus 5 (13.5%) patients in the 5-day group required a day +11 methotrexate dose reduction/omission (\(p=0.02\)). This resulted in a higher cumulative incidence of both Grade 2-4 (27% versus 38%, \(p=0.01\)) and Grade 3-4 (11% versus 34%, \(p=0.006\)) acute GVHD (aGVHD) in the 9-day group. In a multivariate analysis, the 9-day regimen predicted for a greater risk of developing grade 3-4 aGVHD (\(p=0.025\)). Extensive chronic GVHD was higher in the 9-day group (19% vs. 40% \(p=0.047\)). Median 1-year GVHD-free, relapse-free survival (GRFS) was worse for patients receiving a 9-day regimen (68.4 versus 144 days, \(p=0.032\)). In a multivariate analysis, a trend towards significance was observed with the 5-day regimen predicting for longer GRFS (\(p=0.07\)).

We observed no differences in overall survival, progression-free survival, or relapse rates.

We demonstrate similar survival and relapse rates, suggesting that concurrent administration of fludarabine and busulfan may not be necessary for synergistic cytotoxicity. We also observed increased early toxicity, less MTX administration, and higher aGVHD rates in those sequential 9-day FluBu4. Our data suggests that a prolonged administration schedule of conditioning chemotherapy leads to greater toxicity resulting in higher GVHD rates.
Acute Kidney Injury before Day 90 Predicts for Both Early and Late Mortality after FluBu4

Pharmacy Practice

PharmD

Fludarabine/ i.v. busulfan (FluBu4) is a myeloablative regimen with reduced extra-hematologic toxicity. We sought to examine the impact of AKI on survival in patients receiving FluBu4. We retrospectively analyzed 91 consecutive patients who underwent allogeneic stem cell transplant and conditioning with FluBu4 between January 2003 and December 2016. We observed a high incidence of AKI (defined as creatinine clearance below 60 ml/min) within 90 days of HSCT (n=62, 68%). The mean tacrolimus concentration in the first 90 days after HSCT was similar between the two groups (9.2 versus 9.1 ng/mL, p=0.87). Patients that experienced AKI within the first 90 days of HSCT had significantly worse overall survival (OS) (p=0.04) and progression-free survival (PFS) (p=0.02). The incidence of grade III-IV acute graft-versus-host disease was similar between the two groups. However, patients who developed AKI had a significantly higher cumulative incidence of relapse (21 (34%) versus 4 (14%), p=0.03) making this the major driver of reduced OS and PFS. In an age-adjusted multivariate analysis, AKI was associated with significant decreases in both OS (p=0.047) and PFS (p=0.033). We next analyzed the impact of early AKI on the development of chronic kidney disease (CKD) at one year. In all patients surviving more than one year, we found that 13 (34%) of 38 patients in the AKI group and 1 (4.5%) of 22 patients in the non-AKI group developed CKD (p=0.02). OS measured from 1 year post transplant was significantly shorter in patients with CKD (39.3 months versus median not reached, p=0.002). We observed a high incidence of AKI during the first 90 days that predicted for worse OS and PFS. Early AKI also leads to a significant increase in CKD at one year, which in our cohort is associated with late mortality after HSCT.

Collaborative Physician-Pharmacist Multiple Myeloma Autologous Transplant Clinic Improves Guideline Adherence and Prevents Treatment Delays

Pharmacy Practice

PharmD, BCOP

Achieving optimal outcomes both prior to and after autologous stem cell transplant (ASCT) requires timely delivery of anti-myeloma therapy as well as adherence to supportive care guidelines. We hypothesized that a multidisciplinary approach of a collaborative physician-pharmacist MM clinic would have a positive impact on patient care by improving guideline adherence and decreasing treatment delays. From 2014 to 2015, we initiated a collaborative MM clinic, whereby dedicated board-certified oncology pharmacists provided consultation on all patients. Outcomes were compared to those of patients being treated by the same physician the previous year, when ad-hoc pharmacist consultation was available (traditional model). We observed improved adherence to bisphosphonates (BP) in the collaborative clinic (55 (96%) versus 30 (68%) patients, p=0.0002). The time to BP re-initiation after ASCT was shorter in the collaborative clinic (12.5 versus 135 days, p<0.001). In patients receiving IMID-based regimens, appropriate VTE prophylaxis was prescribed in 52 (100%) versus 29 (76%) patients in the collaborative and traditional clinic, respectively (p<0.0002). Acyclovir prophylaxis in patients receiving PI-based treatment was observed more frequently in the collaborative clinic (98% versus 56%, p=0.004). The time to initiation of Pneumocystis Jirovecii pneumonia prophylaxis after ASCT was shorter in the collaborative clinic (11 versus 40.5 days, p<0.0001). Influenza vaccination administration in the ASCT setting was higher in the collaborative clinic (76 versus 24 percent, p<0.001). When analyzing delays in obtaining IMID therapy including post-ASCT maintenance, there was a significant reduction in treatment delays in the collaborative clinic (21% vs. 85% of patients undergoing a delay, p<0.0001). Here we pilot a multidisciplinary approach that leads to increased guideline adherence and prevents delay in anti-myeloma treatment, which includes post-ASCT maintenance.
Valentina Petukhova, Alexandria Young, Joanna Burdette, Laura Sanchez

**A Mass Spectrometry Fingerprinting Technique as a Robust Tool for Differential Profiling of Mammalian Cells Lines**

*Medicinal Chemistry and Pharmacognosy*

**Senior Research Specialist**

Matrix-assisted laser desorption/ionization (MALDI) mass spectrometry has been successfully applied to identification and classification of microorganisms and microbial fingerprinting is routinely used in hospitals for diagnostics. MALDI fingerprinting requires minimal sample preparation and generates species-specific protein profiles which serve as unique cellular ID fingerprints. Adaptation of whole cell MALDI fingerprinting to mammalian cells is still nascent. However, if further developed, this technique could lead to advances in cell biology and clinical diagnostics since its sensitivity allows for rapid and facile differentiation between cell types and cell states. Here we describe optimization of MALDI fingerprinting workflow for mammalian cell lines and application of whole cell MALDI fingerprinting towards discrimination of cancer cell lines *in vitro*. Multiple instrument-, sample-, software-related parameters (such as mass detection range, sample preparation, choice of matrix for protein ionization, cell density, acquisition parameters) as well as standardization of cell culture had to be considered for generating reproducible cell-type specific fingerprints. After consistent method optimization this methodology was successfully applied to generating characteristic fingerprints of different human-derived ovarian cancer cell lines (OVCAR3, OVCAR8, OVCAR4-RFP (red fluorescent protein tagged), and OVCAR8-RFP) and patient-derived normal Fallopian tube cells (collected through the UIC Tissue Bank). Differences in spectral patterns can be observed for the raw cell lines and principal component analysis (PCA) by ClinProTools confirms that these cell populations are unique and cluster independently from one another. We are planning to apply this methodology to *in vivo* xenografts with OVCAR4-RFP and OVCAR8-RFP in a mouse model.

Connie H. Yan, Aida Rodriguez, Ben S. Gerber, Lisa K. Sharp

**Patients’ Self-reported Experience of Community Healthcare Worker Support in Type 2 Diabetes Management**

*Pharmacy Systems, Outcomes & Policies*

**Fellow**

To explore patients’ reported experiences working with a community healthcare worker (CHW) over 12 months as part of a CHW-clinical pharmacist team model. Data was collected from a NIH-funded crossover study exploring the impact of the team model on uncontrolled type 2 diabetes outcomes in a population of Hispanic/Latino and African-American patients. Two hundred forty-four patients with uncontrolled type 2 diabetes (HbA1c ≥8%) were assigned clinical pharmacist support and randomized to receive additional CHW support in study year one or two. CHWs supported patients through home visits, clinic encounters, phone calls, healthcare resource referrals, and diabetes self-management education. One hundred ninety-two patients completed a mixed-methods survey one year after assignment to a CHW. Patients rated CHW helpfulness on a ten-point Likert scale (“not at all helpful” to “very helpful”). One open-ended question asked patients to describe the support received that was helpful. Responses were coded and categorized based on a modified CHW framework. Two research members coded responses independently and a third assisted with discrepancies. Of the 157 patients who were assigned to work with a CHW and completed the data collection, 75% were African-American, 25% Hispanic/Latino, 68% female, and mean age was 54 years. Seventy-two percent of patients rated CHWs as “very helpful,” and 2% as “not at all helpful.” Most patients reported that the CHWs provided health education and information, coaching and social support, and cultural mediation and communication. Thirty-five patients reported having limited or no contact with a CHW during the study. Common reasons included scheduling conflicts, issues with communication, and not knowing they were assigned a CHW. Most patients found working with a CHW to be very helpful regarding their diabetes care and general well-being. Patient perceptions of CHWs provide important feedback on how CHWs can support diabetes management.
Colonization of the Ovary During Ovulation and Metastasis of Fallopian Tube Derived Ovarian Cancer

Center for Biomolecular Sciences

Postdoc

High-grade serous ovarian cancer (HGSOC) can originate in the fallopian tube epithelium (FTE). Blocking ovulation reduces the risk of ovarian cancer, but much remains to be discovered about how this occurs for fallopian tube derived tumors. The objectives of this research were to 1) determine if colonization of the ovary influenced the spread of FTE-derived tumors to the peritoneum and 2) explore the role of ovarian rupture, that occurs in ovulation, for tumor cell colonization of the ovary. Xenografting tumorigenic murine oviductal epithelial (MOE) cells into the ovarian bursa (IB) resulted in aggressive tumor formation throughout the peritoneum, while injection into the peritoneal space (PS) did not. Using an ex vivo adhesion assay we found that rupture of the ovarian surface increased adhesion of MOE GFP and OVCAR8 RFP cell lines to the ovary. MOE GFP cells adhered more to three-dimensional (3D) type I collagen gels (the primary extracellular matrix protein in the ovarian stroma) than to monolayers of murine ovarian stroma (MOST). RNAseq identified that 3D collagen decreases genes associated with focal adhesion, regulation of actin cytoskeleton, and ECM-receptor interaction, and reduced the viability of normal epithelial cells. Tumor cells survived on 3D collagen indicating that transformation of FTE is important for survival in the collagen rich ovarian stroma. PTENshRNA enhanced viability on 3D collagen, adhesion to the ovary, and 3D spheroid formation. Interestingly, these effects were mediated through AKT and RAC1/JNK pathways. These results show that that tearing of the ovary during ovulation enhances colonization of the ovary and this is an important step in primary metastasis of fallopian tube derived cancer to the ovarian microenvironment.

A Work-Sampling Study of an Innovative Pediatric Care-Coordination Program

Pharmacy Systems, Outcomes & Policies

Fellow

Background: Care coordination is defined as the deliberate organization of patient care activities and sharing of patient information among all healthcare providers to achieve optimal health outcomes.1 Prior studies have demonstrated clinical benefits and reduction of unmet needs among children in such programs.2,3 The Coordination of Healthcare for Complex Kids (CHECK) program is a care coordination service focused on underserved children and young adults with asthma, diabetes, sickle-cell disease, and who were born premature.

Objective: To describe the time allocation of care coordinators (CCs), community health workers (CHWs), and mental health workers (MHWs) to their respective tasks.

Methods: The study was conducted from May - October 2017. Five CCs, 20 CHWs, and 4 MHWs were randomly sampled within working hours on weekdays using a text message-based survey to observe who the worker was interacting with and the service being performed. The portion of working time devoted to a task is inferred from its percent of total observations.

Results: The response rates were 74% (CCs), 65% (CHWs), and 62% (MHWs). CCs allocated most of their time to management of CHW teams (41%) and visiting patients in the hospital (31%). CHWs allocated 37% of their time to providing a service to the child and 26% to the caregiver. When providing a service to the child or caregiver, the majority of time was allotted to conducting assessments, screenings, and care planning (>50%), followed by seeing the patient in the home or at a clinic appointment (25%). MHWs allocated 16% of their time to providing a service to the child and 29% to the caregiver. When providing a service to the child or caregiver, the majority of time was allotted to conducting mental health assessments (70%), followed by direct services such as therapy sessions (16%).

Conclusion: The CHECK program allocates the majority of time to providing patient care activities and coordination of care.
43) Alexandria N. Young, Denisse Herrera, Andrew Huntsman, Daniel D. Lantvit, Melissa A. Korkmaz, Leslie N. Aldrich, A. Douglas Kinghorn, James R. Fuchs, Joanna E. Burdette

**Phyllanthusmins Induce Apoptosis and Reduce Tumor Burden in High Grade Serous Ovarian Cancer by Late-stage Autophagy Inhibition**

*Medicinal Chemistry and Pharmacognosy*

**MD/PhD Student**

High grade serous ovarian cancer (HGSOC) is a lethal gynecological malignancy with a need for new therapeutics. Many of the most widely used chemotherapeutic drugs are derived from natural products or their semi-synthetic derivatives. We developed potent synthetic analogues of a class of compounds known as the phyllanthusmins, inspired by natural products isolated from *Phyllanthus poilanei* Beille. The most potent analogue, PHY34, had the highest potency in HGSOC cell lines *in vitro* and displayed cytotoxic activity through activation of apoptosis. PHY34 exerts its effects by initially inhibiting autophagy at a late stage in the pathway, involving the disruption of lysosomal function. The autophagy activator, rapamycin, combined with PHY34 eliminated apoptosis, suggesting that autophagy inhibition was required for apoptosis. PHY34 was readily bioavailable through intraperitoneal administration *in vivo* where it significantly reduced cancer cell lines grown in hollow fibers as well as ovarian tumor burden. We show that PHY34 is a new late-stage autophagy inhibitor with nanomolar potency and significant antitumor efficacy as a single-agent against HGSOC *in vivo*. This class of compounds holds promise as a potential, novel chemotherapeutic and demonstrates the effectiveness of targeting the autophagic pathway as a viable strategy for combating the disease.

44) Laura Hardy, Melissa Pergande, Stephanie Cologna, Joanna Burdette

**PAX8 Increases Migration and Metastasis of Ovarian Cancer through Upregulation of Rho GTPases**

*Center for Biomolecular Sciences*

**MD/PhD Student**

High grade serous ovarian cancer, the most lethal subtype of ovarian cancer, can originate in either the fallopian tube epithelium (FTE) or ovarian surface epithelium (OSE). PAX8 is a lineage specific transcription factor that is ubiquitously expressed in HGSOC. We have shown that knockdown of PAX8 using shRNA in multiple ovarian tumor cells lines leads to apoptosis, suggesting that PAX8 plays an essential role in cancer survival. In this study, we used CRISPR technology to delete PAX8 from the OVCAR8 cell line. PAX8 deletion led to a decrease in migration and invasion *in vitro* and an increase in survival and a reduction in tumor volume *in vivo*. Previous work using RNAsequencing and ChIP-sequencing identified cell adhesion as a top differentially expressed gene between malignant ovarian cancer and benign fallopian tube cell lines. We performed quantitative proteomic analysis of the OVCAR8-PAX8-/- cell line to define PAX8 altered proteins. We also performed quantitative proteomics and transcriptomic analyses on a previously generated murine OSE cell line with forced PAX8 expression (MOSE-PAX8). These analyses identified several genes that contribute to an increase in migration and EMT. Specifically, our data indicates PAX8 upregulates key drivers involved in altering cell morphology including the GTPases: RhoA, Cdc42, and Ras. Inhibition of RhoA led to a greater decrease in migration for both OVCAR8-PAX8-/- and MOSE-PAX8 when compared to control. Inhibition of Ras had a greater effect in OVCAR8-PAX8-/- while inhibition of Cdc42 had a greater effect in MOSE-PAX8. These data provide a mechanistic explanation for the role of PAX8 on increasing migration and metastasis in ovarian cancer.
Apolipoprotein E (APOE) E4 allele is the strongest risk factor for sporadic Alzheimer’s disease (AD). ApoE4-containing lipoproteins have lower lipid content, which decreases stability and contributes to loss of lipoprotein function. To correct these deficits, we developed tissue-selective ABCA1 agonists (TSAAgs) that induce central nervous system expression of cholesterol transporter ABCA1, thereby increasing lipid content of apoE4-containing lipoproteins, with minimal impact on peripheral lipogenesis. High-throughput screening (HTS) utilized luciferase reporter elements expressed by CCF-STTG1 astrocytoma (primary screen) and HepG2 hepatocellular carcinoma cells (counterscreen) linked to ABCA1 and SREBP1c promoters, respectively, to identify several hits, which have since been validated by concentration-response assay following repurchase. Priority hits, which showed anti-inflammatory and insulin-sensitizing properties in addition to TSAAg activity, served as scaffolds to synthesize a library of novel structural analogs. In vitro evaluation of this analog library via luciferase assay, PCR, and fluorescent cholesterol efflux measurements established structure-activity relationships to identify compounds with improved TSAAg activity and guide further structural modification. The results demonstrate a proof-of-concept to develop TSAAgs with multifunctional therapeutic potential for Alzheimer’s disease. Future in vivo experiments in healthy mice will establish pharmacokinetic profiles, determine magnitude of tissue-selective ABCA1 induction, and monitor alterations in peripheral lipogenesis. Finally, treatment in EFAD mouse model will assess TSAAg effect on cognitive and pathological deficits. Our study represents a novel strategy to develop small molecule drug candidates that target multiple aspects of AD pathology, which would ultimately serve as leads for further pharmaceutical development and human clinical testing.
Delayed AC was associated with significantly greater risk of the composite outcome compared to those with timely AC initiation.

Conclusions: It is of concern that SCD patients with VTE were less likely to receive timely AC. Delayed AC initiation was associated with greater risk of VTE recurrence and clinically significant bleeding.

47) Maria Sofia Costa, Chase Clark, Sesselja Omarsdottir, Laura M. Sanchez, Brian T. Murphy

**A MALDI-TOF MS Platform to Discover Understudied Actinomycetes from Icelandic Waters**

Center for Biomolecular Sciences

PhD Student

In the course of a nearly century-long global effort to discover new bacterial-derived antibiotics from the environment, there have been few innovations to the way that researchers have collected samples and subsequently created microbial libraries sourced for therapeutic discovery. As a result, it is difficult to discover novel antibiotic scaffolds due to the degree of taxonomic and chemical redundancy that exists in these strain libraries. To address the need for isolating novel taxa from environmental samples, we developed a high-throughput matrix assisted laser desorption ionization mass spectrometry technique that allows us to readily group bacterial colonies by putative taxonomic identity and further discriminate them based on in situ natural product production. In August 2015 we embarked on a collection trip to Iceland, which has a unique geology and geographical position in the North Atlantic Ocean. Using SCUBA and sampling off of vessels, we collected greater than one hundred samples of sediment from forty sites. After purifying 400 strains from the samples that we collected, we acquired protein and specialized metabolite data from single colonies of these strains. In approximately four hours we are able to prepare, acquire data for, and visualize 384 colonies using our semi-automated, freely available bioinformatics pipeline. From this collection of strains, we selected eight minor outlying groups, which we postulated to represent understudied actinomycete genera and generated specialized metabolite networks to visualize which strains contain unique chemical profiles. Analysis of 16S ribosomal RNA gene sequencing data of these strains confirmed that our method rapidly highlighted understudied strains directly from colonies on a plate, and we are currently investigating whether this unique taxonomy will afford new chemistry.

48) Peter Sullivan, Camila M. Crnkovic, Daniel S. May, Jimmy Orjala

**Correlating Phylogeny and Chemistry to Improve the Cyanobacterial Natural Product Drug Discovery Pipeline**

Medicinal Chemistry and Pharmacognosy

PhD Student

Cyanobacteria have emerged as a source of biomedically relevant natural products. Strains that are closely related have shown to generate the same or similar chemistry. Utilizing the 16S rRNA sequence to establish phylogeny, we carried out an analysis of cyanobacteria across orders from both freshwater and marine environments to identify taxonomic trends in secondary metabolite production. We found that similar secondary metabolites are generally produced by closely related strains though there are instances in which evolutionarily distant stains produce the same chemistry or analogs. With a better understanding of where chemistry is being produced within the phylum, we can exploit this trend to help expedite our drug discovery pipeline to prioritize which strains to grow. This technique has the potential to essentially map out cyanobacterial secondary metabolite production based on the 16S rRNA region.
Cheese Rinds as a Model to Study the Chemistry of Complex Microbial Communities

PhD Student

Recently, interest in microbiomes has exploded as they are increasingly recognized to play key roles in health and disease in humans and many other hosts. While many studies link microbial composition to biological outcomes, the molecular mechanisms that determine these outcomes are poorly understood. This is partially due to the difficulty of dealing with the large number of variables present in complex multi-domain microbial communities. Cheese rind biofilms have recently been described as a simplified model system with highly reproducible patterns of microbial community succession. As such, the cheese rind biofilm model can be used to establish patterns of underlying biochemical processes that drive bacterial-fungal interactions. For this study we investigate the molecules produced by bacteria and fungus in response to different growing partners. Based on RNAseq data from our collaborators we selected bacteria and fungus of natural cheese rind members to grow in pairs on cheese curd agar and using MALDI-TOF imaging mass spectrometry (IMS) we visualized differences in the presence and spatial distribution of molecules. *E. coli* and *Pseudomonas sp.* JB418 were grown with different Penicillium and Scopulariopsis fungal partners, and the native inhabitants of camembert cheese (Geotrichum, Hafnia, and Penicillium) were grown separately, in a community, and with the food borne pathogen *E. coli*. IMS screening of these diverse interactions has shown some common molecular distributions as well as unique chemistry with putative identities based on tandem mass spectrometry data. In the future we will use HPLC purification and NMR of bacterial and fungal extracts to confirm suspected identity of molecules.

Global Analysis of Protein Synthesis Arrest Induced by the Translation Termination Inhibitor Apidaecin

PhD Student

Apidaecin (Api) belongs to the group of proline-rich antimicrobial peptides (PrAMPs), which protect the host from bacterial infection. Some PrAMPs bind to the ribosome and inhibit protein synthesis. Recent studies have shown that most ribosomal targeting PrAMPs obstruct the nascent peptide exit tunnel and the active site (peptidyl transferase center, PTC) of the ribosome and hereby they block the initiation step of translation. We have shown that, in contrast, Api does not inhibit initiation but, instead, it targets the termination step of translation. Similar to other PrAMPs, Api binds to the exit tunnel but, instead of inhibiting initiation, it locks release factors RF1 or RF2 on the ribosome after release of the newly synthesized polypeptide. We hypothesized that, by trapping RF1 and RF2, Api leads to depletion of free RFs in the cell, likely resulting in stalling of the majority of the ribosomes at the stop codons in the pre-release state.

In order to investigate the mechanism of action of Api at the genome-wide level, we performed ribosome profiling of *E. coli* cells treated with this special PrAMP. Our preliminary data analysis shows that, in the presence of Api, ribosomes are largely stalled at the stop codons, indicating that Api is indeed a global inhibitor of termination. Nevertheless, in several genes we observe ribosome density after the stop codons, indicating occurrence of readthrough events. We are currently investigating whether a specific sequence context leads to differential stalling and stop codon readthrough efficiency. In addition, we observed ribosome density peaks at internal sites revealing unusual translation events that could result in the generation of alternative gene products.
51) Nilanjana Sadhu, Ellie H. Jhun, Yingwei Yao, Ying He, Diana J. Wilkie, Robert E. Molokie, Zaijie Jim Wang

**Single Nucleotide Polymorphisms of GCH1 Associates with Sickle Cell Disease Pain in African Americans**

*Biopharmaceutical Sciences*

**PhD Student**

The inadequate therapeutic management of pain in sickle cell disease (SCD) can be attributed to our limited knowledge of its multifaceted nature. We explored the association of SCD pain with 5 GTP-Cyclohydrolase (GCH1) single nucleotide polymorphisms (SNPs) of interest. GCH1 the rate-limiting enzyme in tetrahydrobiopterin biosynthesis- a cofactor involved in the synthesis of several pain modulators. Blood/buccal swab samples collected from 132 subjects were genotyped using MassARRAY iPLEX platform. Composite pain index (CPI) scores obtained from pain assessment tool, PAINReporitIt, and acute care utilization scores were used as markers for chronic and acute pain respectively. CPI scores were fitted using multiple linear regression (MLR) and utilization scores using negative binomial regression (NBR), for additive, dominant and recessive models. SNPs were in Hardy-Weinberg equilibrium ($p>0.05$). The A allele of rs3783641 was associated with increased utilization in the additive and recessive NBR models for acute pain (IRR= 1.39, 1.84; 95% CI= [1.07, 1.82], [1.13, 3.10]; $p=0.017$, 0.015). It was also found that the C allele of rs8007267 was associated with decreased CPI scores for the additive and dominant MLR models (B=-3.69, -5.41; 95% CI= [-7.21, -0.17], [-10.17, -0.66]; $p=0.040$, 0.026). Additionally, we identified two haploblocks based on linkage disequilibrium plot. For haploblock rs10483639[G>C]-rs752688[C>T]-rs4411417[T>C], haplotype CTC was associated with high utilization (4 or more) compared to the reference haplotype GCT (OR=2.05, $p=0.049$). For haploblock rs3783641[A>T]-rs8007267[C>T], haplotype TC was less likely to have high utilization than the reference haplotype AT (OR=0.30, $p=0.001$). These data indicate that genetic polymorphisms of GCH1 may contribute to some of the pain heterogeneity in SCD. Supported by grants from the NIH (R01HL124945, R01HL098141, T32DE018381) and IDPH.

52) Julio C. Soriagalvarro, Jennifer Diaz, Sylvia Kunakom, Roberto G. S. Berlinck, Alessandra S. Eustáquio

**A Nonribosomal Peptide Promotes Motility in *Pseudovibrio sp.*, a Bacterial Symbiont of Marine Sponges**

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Microorganisms are known to produce many specialized metabolites that have been developed into pharmaceuticals such as antibiotics and anticancer agents. Nevertheless, recent advances in microbial genomics have revealed that the biosynthetic potential of microorganisms is not fully recognized. Furthermore, the function of specialized metabolites for the producing organism is often unknown. Genes that encode the production of specialized metabolites are usually co-localized in the genome in so-called biosynthetic gene clusters (BGCs). BGCs are thus genomic signatures that indicate the potential of a microorganism to produce specialized metabolites.

The marine bacterium *Pseudovibrio sp*. Ab134 can produce specialized metabolites with pharmaceutical properties, such as the antimicrobial fistularin-3. However, many of the BGCs within the genome of *Pseudovibrio sp*. Ab134 have not been linked to the specialized metabolites that they encode. In this study, we investigated the role of a nonribosomal peptide synthetase (NRPS) gene cluster in the genome of *Pseudovibrio sp*. Ab134, and observed that the nonribosomal peptide is involved in promoting motility.

A mutant of *Pseudovibrio sp*. Ab134 that harbors an inactivated version of the NRPS BGC displayed poor swarming and swimming motility on agar plates when compared to the wild-type strain. Experimental results from an oil spreading assay—a technique used to determine the presence of biosurfactants which are known to promote swarming motility—suggest that the nonribosomal peptide is not a biosurfactant. Future plans to reveal the structure, biological activity, and ecological role of this nonribosomal peptide may lead to insights beyond *Pseudovibrio sp*. Ab134, since other bacteria, such as some *Pseudomonas* species, also harbor relatives of the NRPS BGC family.
Metabolomics Guided the Discovery of New Natural Products from Cyanobacteria

Medicinal Chemistry and Pharmacognosy

PhD Student

Cyanobacteria (blue-green algae) produce chemically diverse metabolites of biotechnological importance, including but not limited to pharmaceuticals and molecular probes. As an addition to the classical bioassay-guided fractionation, omics-based approaches are expanding the field of natural product discovery. Here we report three new compounds from freshwater cyanobacteria discovered by two metabolomic approaches. In the first approach, strains growing under different culture conditions were analyzed by comparative metabolomics based on UPLC-HRMS profiling and statistical analysis. These experiments provided valuable insights into the effect of nitrate and phosphate on growth and metabolomic profiles of different strains. In addition, a novel metabolite (1) from strain *Scytonema sp.* UIC 10036 showed increased production under low nitrate and high phosphate conditions. In a second approach, cyanobacterial strains growing on solid media were analyzed in situ by droplet–liquid microjunction–surface sampling probe (droplet-LMJ-SSP) coupled with UPLC-UV-HRMS/MS. In situ metabolomics identified two new compounds (2-3) in strain Calothrix sp. UIC 10520. Compounds 1-3 were isolated by HPLC and elucidated by a combination of HRMS, MS/MS, 1D and 2D NMR experiments. Their relative and absolute configurations were determined by J-based configurational analysis, chemical degradation reactions, and derivatization methods (Mosher’s, Marfey’s, and phenylglycine methyl ester). The structures of Scytoamide (1) and Calothrixamides A (2) and B (3) will be presented, along with preliminary results of their respective biological activities.

Patient-reported Barriers to Medication Adherence and Perspectives on Sensored-medication Devices in Patients from Lower Socioeconomic Background with Multiple Myeloma

Pharmacy Systems, Outcomes & Policies

PhD Student

Oral cancer medications are already a vital component of treatment in Multiple Myeloma (MM). This transition to oral therapy offers clear benefits to patients and providers; however, it also has serious challenges including poor adherence. Sensored medication devices (SMD) offer a novel approach to intervention. Some SMDs record and transmit real-time data that can serve as a proxy for medication adherence. This can provide insight into behavioral patterns that signal specific adherence barriers for intervention. Importantly, little is known about the acceptability of using SMDs in populations that are from lower socioeconomic backgrounds. The objectives were to identify patient reported factors that affect adherence and explore their perspectives towards the use SMDs. An in-person, semi-structured, qualitative interview was conducted at UI Health cancer center with a convenience sample of patients being treated for MM. Patients were shown two different SMDs devices and given a brief overview of their functions. Twenty were included with a mean age of 56 years (range=29-71 years) and 14 were African American. The most common factors reported as promoting medication adherence were developing daily routines and receiving social support from partners and children. Almost all participants reported that they had missed taking doses of their cancer-related medicine at some point in the recent past. They identified busy days or travel as triggers for missing doses. Patients perceived that the SMDs might help them remember to take their pills and two felt that the information could assist their healthcare team provide care. Patients who were not interested in the device expressed privacy concerns, dislike of the bottle’s appearance, concern about added healthcare costs, and/or questioned which medications would be placed into the SMD. In conclusion, most patients acknowledged missing doses of their cancer medication and expressed positive attitudes towards SMDs.
55) Lauren Gutgesell, Rui Xiong, Jiong Zhao, Huiping Zhao, Debra A Tonetti, Gregory RJ Thatcher

**Profiling Endocrine-therapy Resistance and Novel Treatment Options in Multiple *in vitro* Models of ER+ Breast Cancer**

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Endocrine therapy is the standard of care for breast cancer expressing estrogen receptor (ER), which occurs in 70% of patients. Unfortunately, acquired or *de novo* resistance to endocrine therapy is observed in up to 50% of patients, leaving a significant portion of patients with insufficient treatment options. Endocrine-resistance, usually defined as resistance to tamoxifen and aromatase inhibitor (AI) therapy, can also include resistance to selective estrogen receptor degraders (SERDs), since these also target ER. Since multiple mechanisms contribute to resistance, development of multiple resistant cell lines is needed for drug discovery and to identify characteristics that may suggest susceptibility to alternative and combination therapies. We have developed 5 stable, endocrine-resistant cell lines from a parent MCF-7 cell line, which all retain ER. Clinical metastatic breast cancers that have gained endocrine resistance are overwhelmingly ER+. In addition to ER, progesterone receptor (PR) status and a small array of resistance-associated genes were assessed, and correlated with the response of these cells in culture to four classes of endocrine therapeutics: SERDs, selective ER modulators (SERMs), and selective human ER partial agonists (ShERPAs). Growth of all 5 cell lines was endocrine independent, indicating resistance to AI therapy. Two of the ER+, PR- cell lines were most resistant to the spectrum of endocrine therapies, but these cell lines both showed sensitivity to ShERPAs, especially in combination with non-endocrine targeted therapies, such as the PI3K inhibitor, alpelisib. Paradoxically, all endocrine-resistant cell lines responded to at least one of the endocrine therapies tested, demonstrating that if ER is not lost in the metastatic state, it remains a vulnerability suitable for therapeutic targeting.

56) Melissa M. Galey, Shilpa Kolachina, Rachel J. Dutton, Laura M. Sanchez

**Small Molecule Interactions from the Cheese Microbiota: *Pseudomonas* vs. *Candida***

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Cheese rinds are often composed of relatively small microbial community populations, in terms of diversity, making them attractive for the study of a natural microbiome. These small communities allow us to more easily study interactions between specific species in a controlled laboratory environment. Specifically, growth inhibition of *Candida* sp. 135E as a direct result of its interaction with *Pseudomonas* sp. JB418 was observed during a phenotypic screen. We hypothesized that *Pseudomonas* is excreting an antifungal metabolite, which is contributing to the adverse effects shown in *Candida* when the two are grown in co-culture. To further investigate this interaction, we used matrix assisted laser desorption/ionization time-of-flight (MALDI-TOF) imaging mass spectrometry (IMS) to visualize the spatial distribution of metabolites in both a co-culture of the two microbial species and individually. Simultaneously, *Pseudomonas* was cultured at a 1L scale, and its metabolites were subsequently extracted and crudely fractionated using SPE. In order to narrow down the fraction containing the metabolite of interest, bioactivity guided fractionation was performed to determine if *Candida* exhibited growth inhibition upon exposure. Fraction F (100% methanol) was found to elicit the strongest growth response when spotted onto a lawn of *Candida*, supporting our hypothesis that the reaction is mediated by specialized metabolites. Further bioassay guided fractionation by reverse phase high performance liquid chromatography of fraction F was performed to identify specific compounds that directly impacted *Candida* growth. Currently, ten fractions have been found to exhibit antifungal properties and will be further rarefied to identify the metabolites responsible for growth inhibition of *Candida*. Future directions for this research include the incorporation of tandem mass spectrometry and NMR to carry out structure elucidation of the isolated antifungal metabolites.
Developing a Novel Imaging Mass Spectrometry Method to Detect Chemical Communication Driving Metastasis in Ovarian Cancer

**Medicinal Chemistry and Pharmacognosy**

**PhD Student**

Ovarian cancer is the most lethal gynecological malignancy in the United States. A precancerous mutation in a fallopian tube epithelial (FTE) cell is hypothesized to be the origin of 60% of cases of high-grade serous ovarian cancer (HGSOC), and the primary metastatic event is characterized by the migration of the tumorigenic FTE cell into the ovary during ovulation. However, there is little known about the chemical processes that may be involved in this initial metastasis. Therefore, understanding the chemical exchange that occurs between the fallopian tube and the ovary is imperative to combating HGSOC.

The spatial distribution of molecules within a system can be visualized using imaging mass spectrometry (IMS) to determine products of specific inter-tissue interaction. We have optimized a system where an ovary is co-cultured with cells that are the murine equivalent of FTE cells (murine oviductal epithelial cells) demonstrating a tumorigenic PTEN alteration (MOE PTENshRNA). This experimental design provides spatial distinction between the ovary and MOE PTENshRNA, and can determine the origin and relative abundance of the mass-to-charge ratios ($m/z$). This is the first development of an IMS platform that visualizes interactive chemical exchange between mammalian cell culture and tissue. Our platform has identified a molecule at $m/z$ 170.6 whose upregulation in co-culture may be implicated in early-stage HGSOC. HPLC retention time matching and UPLC-MS/MS indicate the molecule is norepinephrine, a neurotransmitter. IMS reveals that upregulation of norepinephrine by the ovary is being induced by the MOE PTENshRNA cells, recapitulating previous literature that has described a role for norepinephrine in ovarian cancer. The identification of a mammalian metabolite in this system has validated that our method of IMS can detect metabolites relevant to disease, so that we can continue to use this method to unravel the biological pathways causing or affected by HGSOC.

**Humulus lupulus** (Hops) Activation of AhR Promotes Estrogen (E2) Detoxification

**Medicinal Chemistry and Pharmacognosy**

**PhD Student**

Estrogen receptor positive (ER+) breast cancer poses a significant health risk in postmenopausal women. Estrogen carcinogenesis is in part mediated by the oxidative estrogen (E2) metabolite, estradiol-3,4-quinone. P450 1B1 (CYP1B1) is the main enzyme responsible for the conversion of E2 to the genotoxic 4-hydroxylated product, while P450 1A1 (CYP1A1) converts E2 to a benign 2-hydroxylated product. E2 further enhances the genotoxic pathway through epigenetic repression of CYP1A1 and thus the benign 2-hydroxylation pathway (estrogen detoxification pathway). Activated aryl hydrocarbon receptor (AhR) induces degradation of ER$\alpha$ and leads to preferential upregulation of the CYP1A1 mediated detoxification pathway. Many postmenopausal women use Botanical Dietary Supplements (BDS), such as hops, for the alleviation of menopausal symptoms. It has been shown that 6-prenylnaringenin (6-PN) isolated from hops activates AhR. The purpose of this study was to analyze whether hops and 6-PN enhance the estrogen detoxification pathway through AhR. Inhibition of E2-induced alkaline phosphatase activity was used to identify antiestrogenic activity in the Ishikawa cell line, CYP1A1 and CYP1B1 fold induction was determined in ER+ MCF-7 cells by qRT-PCR, and In-Cell Western (ICW) was used to quantify ER$\alpha$ proteasomal degradation. At non-cytotoxic doses a clinical Humulus lupulus (hops) extract and 6-PN acted as antiestrogens to preferentially upregulate CYP1A1 more than 100-fold, and caused at least 50% degradation of ER$\alpha$ likely through the AhR-mediated proteasomal pathway. This work describes a new chemopreventive pathway for hops and highlights the importance of elucidating bioactivities for individual phytochemicals and the standardization to these compounds for optimal resilience promoting properties in women’s health BDS. Efforts were supported by NIH grant, P50 AT000155.
59) Alanna Condren, Lisa Kahl, Lars Dietrich, Laura Sanchez

**Bile Acid Exposure Alters Specialized Metabolism Leading to Biofilm Inhibition in *Pseudomonas aeruginosa***

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

To communicate and regulate infection, pathogenic bacteria release a series of specialized metabolites to coordinate a cumulative response within the bacterial community. An example of this bacterial communication is transformation into a biofilm state. Bacterial biofilms are a contributory factor to 80% of hospital acquired infections however previous studies have shown that bile acids, such as taurolithocholic acid (TLCA), have biofilm inhibition activity *in vitro*. Studies exploring the mechanism of action have shown that bioactivity observed from TLCA exposure does not hinder motility and c-di-GMP production which are important for biofilm formation. Therefore we hypothesize that TLCA is triggering specific specialized metabolite production that leads to the observed biofilm inhibition. To identify the specialized metabolite(s) involved in biofilm inhibition from TLCA exposure, the ESKAPE pathogen *Pseudomonas aeruginosa* was used as a model organism due to its previously characterized specialized metabolism. As a proof of principle for our technique, *P. aeruginosa* colonies were analyzed using matrix assisted laser desorption/ionization time-of-flight imaging mass spectrometry (MALDI-TOF IMS) to visualize the spatial distribution of specialized metabolites produced when exposed to TLCA. In this axenic culture, we visualized a shift in specialized metabolism of known and unknown metabolites including an unknown metabolite with an \( m/z \) of 609 that is only produced when the *P. aeruginosa* colonies are exposed to TLCA. Further analytical techniques were used to work towards identifying \( m/z \) 609. The colony morphology impact of TLCA was studied and found to mimic the unhealthy biofilm structure of phenazine mutants exhibiting the ability of TLCA to prevent healthy biofilm colony growth.

60) Chase Clark, Michael Mullowney, Antonio Hernandez, Milan Patel, Laura Sanchez, Brian T. Murphy

**Innovating Microbial Libraries for Drug Discovery Using MALDI-TOF-MS and the Cultivable Freshwater Sponge Microbiome.***

*Medicinal Chemistry and Pharmacognosy*

**PhD Student**

Aquatic sponges (phylum Porifera) are sessile, filter feeding organisms that are among the oldest animals on Earth and harbor diverse microbial communities that can comprise 35% of the sponge biomass. Consequently, they are among the most prolific sources of natural products to date, with nearly 5,000 new small molecules reported in literature. However, most investigations have focused on marine sponges as opposed to their freshwater relatives. Furthermore, creating diverse microbial libraries from environmental sources such as sponges has historically been a blind, cumbersome process that relies on evaluation of colony morphology rather than phylogenetic identity and chemical phenotype. Since 2015 our lab has collaborated with citizen scientists to collect over sixty freshwater sponges from diverse locations across the Great Lakes. We indiscriminately isolated sponge associated bacteria and analyzed the strains using IDBac: an innovative mass spectrometry proteomics and metabolomics platform our lab developed to profile hundreds of cultivable bacteria from agar diversity plates. This rapid, semi-automated method has allowed us to group sponge-associated bacteria by phylogeny, similar to 16S rRNA gene sequencing analysis, while simultaneously providing information about small molecule production in situ. This represents a significant advance in creating microbial libraries rich in taxonomic diversity and functional chemistry; and has facilitated detailed studies on the cultivable microbiome of an underexplored natural product source.
Selective Calpain-1 versus Calpain/Cathepsin-B Dual Inhibition as a Therapeutic Approach to AD

Medicinal Chemistry and Pharmacognosy

PhD Student

It has been hypothesized that the imbalance or over-activation of cysteine proteases (notably cathepsins and calpains) contributes to neurodegenerative progression. Specifically, hyper-activation of calpain-1 (CAPN1), a modular cysteine protease, has been implicated in the early pathogenesis of Alzheimer’s Disease (AD), traumatic brain injury (TBI), and ischemic stroke. Prolonged CAPN1 over-activation indirectly permeabilizes lysosomes, leading to release of cathepsin B (CTSB), a lysosomal cysteine-protease implicated in neurodegeneration. Several reports propose CAPN1 and CTSB as therapeutic targets in AD and TBI, but do not unambiguously provide evidence for a desired strategy, and selectivity for inhibition of CAPN1 over CTSB has been the goal of the most developed program in pharma. We hypothesize dual CAPN1/CTSB inhibition will afford superior efficacy in AD and TBI over selective inhibition. We have identified selective and dual inhibitors and established enzyme inhibition and neuroprotective profiles in neuronal cells using Oxygen Glucose Deprivation (OGD), an in vitro model simulating ischemia-reperfusion injury in stroke. All inhibitors were differentially neuroprotective against OGD-induced cell death, depending on the treatment paradigm (pretreatment, ischemia, and reperfusion). Monitoring spectrin breakdown products (CAPN1-specific) identified different pathways of neuronal death with varying neuro-insults. Additional in vitro models using chemical insults were utilized to monitor CAPN1/CTSB substrates with roles in neuroplasticity/neurodegeneration via immunoblots. After establishing the selectivity of inhibitors for CAPN1 and CTSB, monitoring of peptide substrate proteolysis confirmed inhibitory effects in neuronal cultures, and allowed selection of inhibitors for further study in vivo. Next we aim to test these in a mouse model of mTBI manifesting cognitive deficit and cytokine surge, monitoring behavioral and biochemical changes.

Design and Synthesis of Peptidomemitics with Attenuated Reactivity in the Treatment of Neurodegenerative Diseases

Medicinal Chemistry and Pharmacognosy

PhD Student

It has been postulated that CNS diseases result from the dysregulation in either the expression and/or activity of cysteine proteases, and that inhibition of the respective enzymes should be an effective treatment. A well-known example of a CNS disease is Alzheimer’s, and it has been suggested that its pathology could be linked to cysteine protease over-activity. More precisely, it has been posited that certain isoforms of cathepsins and calpains may precipitate such neuronal degeneration. Therefore, targeting these enzymes with small molecule inhibitors may present an effective strategy in impeding the progression of the illness. Our lead oxirane electrophilic compound, epoxysuccinate NYC-438, has been subjected to a battery of both in vitro and in vivo assays. Both NYC-438 and the commercial calpain inhibitor, E-64d, possess significant potency; however, both show limited brain bioavailability and poor selectivity. In addressing these issues, the objective now has been to design and synthesize reversible, selective inhibitors. More specifically, for calpain-1 and cathepsin B, since their inhibition is beneficial in neurodegeneration and traumatic brain injury (TBI), we hope to answer whether preferred selective inhibition of one enzyme alone matters. After modifying lead compound NYC-438, such endeavors so far have yielded compounds AJ1-35 and ING-108, which showed remarkable selectivity toward cathepsin K. In addition, recently synthesized novel series displayed similar selectivity, though they were less potent than either compound (i.e. AJ1-35 and ING-108). Other synthesized compounds showed neuroprotective effects using oxygen-glucose deprivation cell model assays as well as using neuroblastoma SH-SYSY cell models.
63) Kyle Mathes, Jimmy Orjala, Alessandra S. Eustaquio

Genome Mining of Freshwater Cyanobacteria for Rare Metabolites

Medicinal Chemistry and Pharmacognosy

PhD Student

Freshwater cyanobacteria are a prolific group of natural product producers that are understudied. Among the natural product classes that cyanobacteria produce are polyketides biosynthesized by type III polyketide synthases (T3PKS). For example, T3PKS genes encode enzymes involved in the production of the cytotoxic molecules known as cyclophanes. The Orjala lab has built the world’s largest freshwater cyanobacteria strain collection at UIC. Since freshwater cyanobacteria chemistry is understudied, we propose that genome mining for T3PKS genes will expand the knowledge of cyanobacterial chemistry and T3PKS products. We have sequenced cyanobacterium UIC 10110, a Nostoc sp. and merocyclophane producer. We then used the gene sequence coding for the merocyclophane T3PKS to find homologs using Basic Local Alignment Search Tool (BLAST), and designed a degenerate primer pair to probe the strain library for T3PKSs by Polymerase Chain Reaction (PCR). After the initial screen of 449 strains, 69 strains were identified as potential hits to contain type III polyketides. We are currently in the process of confirming the hits by repeating the PCR reactions, and gel-purifying and sequencing the PCR products, followed by BLAST search and phylogenetic analysis. We have sequenced eight hits thus far, two of which were false positives and six of which were confirmed as potentially encoding T3PKSs. Future work includes sequencing the genomes of selected hits, predicting the encoded metabolites using bioinformatics tools, and obtaining the type III polyketide natural products. This work will ultimately expand the current knowledge of cyanobacterial chemistry and has the potential to discover new molecules that may be of biomedical relevance.

64) Yukuang Guo, Camila Crnkovic, Hyunwoo Lee, Jimmy Orjala, John Lee, Hyunyoung Jeong

The Role of Gut Microbiota in Tacrolimus Metabolism

Center for Biomolecular Sciences

PhD Student

Tacrolimus is a commonly prescribed immunosuppressive drug used after solid organ transplantation. Tacrolimus is a narrow therapeutic index drug, but maintaining blood drug concentrations within the therapeutic range has been difficult due to large inter- and intra-individual variability in tacrolimus disposition. The objective of this study was to examine the role of gut microbiota in tacrolimus disposition. To explore the possibility of gut bacteria directly metabolizing tacrolimus, tacrolimus was incubated with C57BL/6J mouse cecum content or human stool samples anaerobically for 24 hours, and the mixture was analyzed by HPLC-UV. The results showed that tacrolimus amount decreased by up to 80% upon incubation, and this was accompanied by appearance of two new peaks on the chromatogram. Such results were not observed when tacrolimus was incubated with boiled cecum content or hepatic microsomes. Based on a recent report showing a positive correlation between fecal abundance of Faecalibacterium prausnitzii (F. prausnitzii) and tacrolimus oral dose needed to maintain therapeutic concentration in kidney transplantation patients, the ability of F. prausnitzii to metabolize tacrolimus was also tested. Incubation of tacrolimus with F. prausnitzii led to production of the same metabolites. Results from mass spectrometer analysis of the metabolites suggest that the metabolites are likely reduction products of tacrolimus. Together, these results indicate that gut bacteria, specifically F. prausnitzii, can metabolize tacrolimus. The extent of its contribution to overall tacrolimus disposition remains to be defined.
3D Spheroid Cultures of Resistant Breast Cancer Cell Lines as in vitro Models for Drug Discovery
Medicinal Chemistry and Pharmacognosy

PhD Student

1 out of every 8 U.S. women will develop invasive breast cancer during her lifetime, making it the second most common form of cancer affecting women. Breast cancer is also a leading cause of cancer-related deaths for women in the U.S., second only to lung cancer. Activation of estrogen receptor alpha (ERα) is the primary proliferative mechanism of breast cancer cells, making it a logical target for therapy. ER ligands with antiestrogenic activity, such as the selective estrogen receptor modulator (SERM), tamoxifen, and selective estrogen receptor degrader (SERD), fulvestrant, have proven clinically successful as treatments for breast cancer; however, resistance in up to 50% of patients provides a therapeutic challenge. Once resistant, breast cancer cells become endocrine-independent, because of this, there is an urgent need for both novel therapy and improved models of resistant breast cancer. Our lab has created a panel of various endocrine-independent cell lines to mimic SERM and SERD resistance. Along with traditional 2D cell culturing, 3D spheroids have also been utilized to gain a better understanding of resistance. Importantly, the response to therapeutic agents, of cell lines in 2D versus 3D cultures is not identical. We observe that 3D cultures better replicate observations in mouse xenograft models, demonstrating that elements of the spheroid microenvironment, such as cell-cell interactions and the presence of extracellular matrix (EM), mimic aspects of the tumor microenvironment in vivo. Cells cultured as spheroids are therefore a suitable in vitro model for drug discovery, predictive of response in preclinical animal models, in contrast to 2D monolayer cell cultures.

Fully Orthogonal Translation System Built on the Dissociable Ribosome
Center for Biomolecular Sciences

PhD Student

The ribosome is the macromolecular RNA-based machine responsible for the protein biosynthesis. Mutational analysis is a powerful tool for understanding the functions of rRNA in translation. Unfortunately, mutations of the most conserved, and thus, most interesting nucleotides are often lethal and thus those mutations are hard to examine in the living cell. One solution to this problem is an orthogonal translation system, when a subpopulation of ribosomes, can translate a reporter protein but does not participate in housekeeping cellular translation. Recently, a fully orthogonal ribosome, Ribo-T, was generated in our laboratory. Ribo-T is based on a hybrid 16S/23S rRNA molecule. In Ribo-T, the small ribosomal subunit, which is responsible for mRNA recognition, is covalently linked to the large ribosomal subunit, responsible for amino acid polymerization. By modifying the anti-Shine-Dalgarno sequence, it is possible to functionally isolate Ribo-T, which makes it possible to alter the critical 16S rRNA or 23S rRNA nucleotides and analyze their effect on the expression of the cognate reporter without disrupting cellular translation. Unfortunately, covalent linkage between the subunits impedes to some extent the assembly and functions of Ribo-T in comparison with the wild type ‘dissociable’ ribosome.

We explore a possibility of modifying the Ribo-T based system by creating a ‘flipped’ orthogonal system in which Ribo-T carries out translation of cellular proteins, while dissociable ribosome functions as an orthogonal translation apparatus dedicated to the expression of a specific reporter. We demonstrated the general feasibility of this approach by being able to transform cells with the plasmid carrying mutations in the 23S rRNA gene, which would be lethal in the ‘non-orthogonal’ ribosome. We are currently optimizing the system in order to make it suitable for the broad analysis of the functional engagement of the critical rRNA nucleotides.
Micelle Stability Varies in Biologic Fluid Identity

PhD Student

Block copolymer micelles are attractive drug delivery vehicles due to their ability to solubilize and load hydrophobic drugs and deliver them in aqueous environments in locally efficacious doses. Despite their thermodynamic stability, evidence suggests they have limited stability in the blood due to interactions with specific circulating proteins and may be best suited for administration locally. The present study evaluates the stability of two well-known micelle forming block copolymer systems, poly(e-caprolactone-β-ethylene glycol) (PEG-PCL) and poly(D,L lactide-β-ethylene glycol) (PEG-PLA), in a variety of human biological fluids. The aim of this study was to explore the potential of these vehicles for delivery via alternative routes to intravenous administration, specifically intraarticular (synovial fluid; SyF), intraperitoneal (ascites fluid; AsF), cardiac (pericardial; PcF), pulmonary (pleural; PlF), and cerebrospinal (CSF). Stability of micellar systems at 200 times their critical micelle concentration (CMC) were examined via the disappearance of Förster resonance energy transfer (FRET) at 37°C across varying compositions of the biologic fluids diluted with phosphate buffered saline (PBS). Interestingly, micelle hydrophilic-lipophilic balance (HLB) and protein concentration did not predict stability. Pericardial and pleural fluids had little effect on mPEG-PLA stability beyond initial mixing, whereas mPEG-PCL micelle stability decreased dramatically. Fetal bovine serum had similar protein concentrations to pleural and pericardial fluids, but caused loss of stability for mPEG-PLA after 3 hours. Interestingly, cerebrospinal fluid exhibited instability in mPEG-PLA micelle within 30 mins whereas mPEG-PCL exhibited relative stability at the same concentrations for up to an hour. Taken together, our study suggests the biological identity of fluids greatly impact micellar stability and this affect is beyond the protein concentration.

Evaluating Mediterranean Herb Extracts and Selected Phytochemicals for the Reversal of Oxidative Stress in Colon Cells

PhD Student

The purpose of this study was to evaluate herb extracts and phytochemicals that have the potential for anti-oxidant and anti-inflammatory activity. HCT 116 colon carcinoma cells were treated for 24 hours with varying concentrations of herb extracts and isolated phytochemicals. Then the treated cells were exposed to hydrogen peroxide to induce oxidative stress for 1 hour. Cells were then lysed and the total protein content was isolated. Proteins involved in anti-oxidant and inflammatory pathways were analyzed by Western blot. The data suggest that the expression levels of various anti-oxidant and inflammatory proteins changed in response to extract and phytochemical treatment versus untreated cells. These data indicate that selected herb extracts and phytochemicals have the potential to reduce harmful levels of free radicals and inflammation in the GI tract, particularly the colon. Through modulation of pathways such as the Nrf2-Keap1 and the unfolded protein response (UPR) pathways, cells can be relieved of oxidative and inflammatory stress. These compounds have the potential to prevent, slow, or treat chronic inflammatory diseases such as ulcerative colitis.
Identification and Characterization of Synergistic Phytoprogestin Compounds in Herbal Supplements

Medicinal Chemistry and Pharmacognosy

PhD Student

Progestins are used to treat many gynecological diseases that result from dysregulated progesterone. Detrimental side effects like breast cancer, cardiovascular disease, and stroke are associated with progestin therapy. To prevent these side effects, alternative progestins that are selective for the progesterone receptor are necessary. Herbal supplements are popular among patients and it is unclear what these supplements contain since they are not tightly regulated. Previous studies have shown that some herbal supplements contain phytoestrogens and there is evidence that herbal supplements contain phytoprogestins. The purpose of this study is to identify phytoprogestin compounds in the herbal supplements, dogwood and red clover, and to understand their effects on the progesterone receptor. Dogwood (Cornus officinalis) is a popular botanical in Traditional Chinese Medicine and red clover (Trifolium pratense) is a popular botanical for women’s health. Phytoprogestin agonist compounds from dogwood and red clover were identified by bioassay guided fractionation using a luciferase reporter assay. To test if the compounds were antagonists, the compounds were combined with progesterone. No antagonistic activity was found but it was discovered the compounds in dogwood were synergistic. Irilone from red clover was also found to be synergistic. Furthermore, proliferation assays revealed that irilone significantly decreased ovarian cancer cell proliferation, which is characteristic of a progestin. To understand irilone’s mechanistic activity, irilone was tested to see if it stabilized the progesterone receptor or caused progesterone receptor ubiquitination. It was found that irilone could potentially be stabilizing the progesterone receptor.

In summary, the herbal supplements, dogwood and red clover, contain phytoprogestin compounds that are synergistic with progesterone. This is a novel finding as synergistic compounds with progesterone have not yet been discovered.

Loss of PAX2 Recapitulates Secretory Cell Outgrowths (SCOUTs), precursors to High-Grade Serous Ovarian Cancer and Potentiates Aberrant AKT and Steroid Signaling

Medicinal Chemistry and Pharmacognosy

PhD Student

Ovarian cancer is the most lethal gynecological malignancy and the 5th leading cause of cancer deaths among women. The deadliest subtype of the disease is high grade serous ovarian cancer (HGSOC) with an average 5 year survival rate of 29%. The fallopian tube epithelium (FTE) gives rise to pre-cancerous secretory cell outgrowths (SCOUTS) that can go on to become HGSOC. PAX2 is a transcription factor that is lost in HGSOC and in SCOUTs, indicating that loss of PAX2 is an early event in tumorigenesis. Additionally, it has been shown that re-expressing PAX2 in HGSOC models reduces cell survival and tumor burden. In the present study, we developed PAX2 deficient murine oviductal cell lines (MOE- murine equivalent of human FTE) to model SCOUTs and study how it potentiates the FTE for further transformation. We modeled PAX2 deficiency into MOE cells with either a stable PAX2 shRNA knock down to explore partial PAX2 loss or PAX2 CRISPR knockout to study cells with complete loss of PAX2. Loss of PAX2 in MOE cells, regardless of level of PAX2 deficiency, lead to no significant cancer specific phenotypic changes including adhesion, migration, and proliferation. However, RNA sequencing of PAX2 shRNA cells revealed a transcriptional overhaul that results in an mRNA expression pattern similar to human SCOUTs. Among these changes emerged potentiating alterations in key pathways in ovarian cancer such as AKT signaling. Furthermore, cross analysis with RNAseq of estrogen stimulated cells revealed remarkable overlap suggesting that loss of PAX2 regulates hormonal responses. Hormone responsiveness of these cells was investigated using ERE and PRE luciferase assays, which revealed higher basal hormone activity and sensitivity to hormone treatment. In summary, loss of PAX2 in early lesions does not manifest itself in transformative phenotypes, but rather in potentiating changes in the transcriptome, particularly in key pathways shown to be dysregulated in HGSOC.
71) Kyle Mangano, Dorota Klepacki, Nora Vazquez-Laslop, Alexander Mankin

**Context-specific Translation Arrest by Antibiotics Targeting the Small and Large Ribosomal Subunits**

*Center for Biomolecular Sciences*

**PhD Student**

Crystal structures of antibiotics bound to the ribosome have greatly improved our understanding of their mechanisms of action. However, due to the dynamic nature of translation and the variety of substrates the ribosome interacts with, modeling may not accurately predict how protein synthesis is inhibited. It is now well accepted that contextual factors such as nascent peptide sequence and mRNA secondary structure can have surprising effects on the mechanisms of action of ribosome-targeting antibiotics. The Ribo-Seq technique provides a genome-wide view of the distribution of translating ribosomes on mRNAs in vivo. By comparing a control sample of *E. coli* to those treated with antibiotics, fundamental mechanisms of action are revealed. Using an *in vitro* translation assay called toe-printing, stalled ribosomes are precisely mapped onto template mRNAs. Selective mutagenesis of the template can define the rules of antibiotic-induced ribosome stalling. We found that two classes of antibiotics thought to universally inhibit protein synthesis arrest translation in a context-specific manner. Spectinomycin (Spc) inhibits small ribosomal subunit movement which should prevent the ribosome from moving along any transcript. Evernimicin (Evn) binds the large ribosomal subunit and should inhibit all A-site tRNA accommodation. With toe-printing experiments, we demonstrate that strength of Spc inhibition is gene dependent, and synthetic derivatization can modulate activity. Through Ribo-Seq analysis, we discovered that Evn mechanism of action depends on both the amino acids in the nascent chain and the specific codon sequence of the A-site tRNA. Specifically, proline rich motifs and the CGA arginine codon are selectively inhibited *in vivo*. Our findings can contribute to rational drug design of new antibiotics and help understand ribosome dynamics during translation.

72) Noor Khudeira, Busola Bawala, Lori Wilken

**Efficacy of Combination Therapy or Varenicline on Smoking Cessation in Light Smokers**

*Pharmacy Practice*

**PharmD Student**

The purpose of this study is to assess the efficacy of varenicline versus combination therapy for light smokers. This was a retrospective chart review. Combination therapy was defined as using two nicotine replacement therapy medications together, nicotine replacement therapy with bupropion, bupropion and varenicline, or varenicline and nicotine replacement therapy. Patients included in the study were tobacco users between the ages 18 to 80. The inclusion criteria for the study were: patients who smoked less than 10 cigarettes a day at the initial visit to the tobacco treatment center, had a carbon monoxide level greater than or equal to six parts per million, and were prescribed first-line medications for tobacco dependence. Patients were excluded from the study if they were pregnant.

A total of twenty-four patients met the inclusion criteria. Fifteen patients were included in the varenicline group, and nine were included in the combination therapy group. Four of the patients in the varenicline group quit smoking (27 percent) and six patients in the combination therapy group quit smoking (67 percent). Eight patients were abstinent for 1-3 months, one patient was abstinent for 3-6 months, and four patients were abstinent for 6-12 months. Of the patients who were abstinent for 1-3 months, six were prescribed combination therapy and two were prescribed varenicline. Of the patients who were abstinent for 6-12 months, three were prescribed varenicline and one was prescribed combination therapy. Thirteen out of fifteen of the patients taking varenicline were compliant with their medication (86.7%) and six out of the nine patients taking combination therapy were adherent (67%).

Based upon the results obtained from this study, combination therapy may be more effective than varenicline, initially, in increasing quit rates in light smokers. Long-term tobacco abstinence was greater with the use of varenicline in light smokers.
**73) Liyu Elise Lei, Diana Moreno, Beenish Manzoor, Edith Nutescu**

**The Impact of a Patient-Centered Self-Care Behavioral Intervention on Clinical Outcomes in a Minority Population**

*Pharmacy Systems, Outcomes & Policies*

**PharmD Student**

Introduction: Minority underserved patients often face access barriers to high quality care and are at higher risk of poor anticoagulation control and related complications. Self-monitoring offers an accessible, high-quality treatment alternative that can decrease access-to-care and quality-of-care disparities. However, the feasibility of self-monitoring has not been explicitly evaluated in minority patients. The objective of this study is to evaluate the effectiveness of a patient-centered self-monitoring behavioral intervention in minority, disadvantaged patients.

Methods: This study is part of a randomized controlled trial comparing anticoagulation control in patients receiving a self-monitoring behavioral intervention (intervention group) and patients receiving care in a specialized anticoagulation clinic (control group). Each patient served as his/her own control with clinical outcomes data compared for 6 months before and 6 months after the intervention. The primary outcome was anticoagulation control as measured by the percent time in therapeutic range (%TTR) calculated by the Rosendaal linear interpolation method.

Result: A total of 96 patients were randomized into the study. The mean age (+SD) was 57.1±5.7 years, 34.4% (n=33) were males 86.5% (n=83) African-Americans and 13.5% (n=13) Hispanics. A total of 41.7% (n=40) of patients had some college education. The TTR increased from 59.8% prior intervention to 69.6% post intervention in the intervention group. Likewise, there was an increase in TTR in the control group from 63.1% prior to study randomization to 65.6% post randomization.

Conclusion: Based on interim analysis, although TTR has improved in both groups the intervention group appears to have a larger degree of improvement in their TTR. Statistical analysis is ongoing.

---

**74) Kevin A. Meyer, Eric Wenzler, Susan C. Bleasdale, Monica Sikka, Kristen Bunnell, Larry H. Danziger, Keith A. Rodvold**

**Ex vivo Urinary Pharmacodynamics of Repeated Doses of Fosfomycin against 8 Typical Uropathogens**

*Pharmacy Practice*

**PharmD Student**

Background: The increase in bacterial resistance and complicated genitourinary infections has spurred the use of off-label, repeated dosing regimens of fosfomycin due to its broad in vitro antibacterial activity. The objective of this study was to evaluate the urinary pharmacodynamics of fosfomycin after these regimens.

Methods: *Ex vivo* annex to a Phase I study. Eighteen subjects received oral fosfomycin tromethamine 3 g every other day for 3 doses then 3 g every day for 7 doses, or vice versa. Urine was collected in intervals over 24 hours following dosing on day 5 to determine fosfomycin concentrations and urinary bactericidal activity. Pathogens: clinical *E. coli* strains 8383, 24767, 16283; *E. coli* ATCC-25922; *E. coli* ATCC-BAA-2326 (ESBL-CTX-M-15); *P. mirabilis* ATCC-35659; *K. pneumoniae* ATCC-33495; *K. pneumoniae* ATCC-700603 (ESBL-SHV-18). MICs were performed via agar dilution. Urinary bactericidal kinetics were performed according to CLSI time-kill analysis guidelines. Bactericidality was defined as 99.9% (>3log10) reduction of the initial bacterial inoculum.

Results: Mean 24 hour urinary concentration of fosfomycin on day 5 for both dosing regimens was approximately 350 mg/L. Modal MICs (mg/L) of pathogens were 32, 64, 64, 4, 2, 256, 256, 512. Fosfomycin was bactericidal against all pathogens, aside from *P. mirabilis*. Bactericidality was briefly achieved against *K. pneumoniae* 700603, followed by regrowth. Bactericidality was maintained through 48 hours against all other pathogens (Figure 1).

Conclusion: Fosfomycin was reliably bactericidal against susceptible *E. coli* strains at physiologically achievable urine concentrations within 4 hours, with no appreciable bacterial regrowth after 48 hours. Despite supra-MIC urine
concentrations, there was little activity against fosfomycin-resistant *P. mirabilis* and activity against *K. pneumoniae* was variable and not predicted by MIC. Observed inter and intraspecies differences require validation in *in vivo* experiments.

75) Yazed Alsowaida, Vicki Groo

**Evaluation of Quality Improvement Initiatives for Monitoring of Novel Oral Anticoagulants in Patients with Atrial Fibrillation at an Academic Medical Center**

*Pharmacy Practice*

**PharmD Student**

Purpose: Novel oral anticoagulants (NOACs) eliminate the need for international normalized ratio monitoring. However, dosing is dependent on creatinine or creatinine clearance (CrCL) warranting monitoring of renal function. A chart review from October 2010-2012 revealed only 55% of patients with non-valvular atrial fibrillation (NVAF) had renal function evaluated after NOACs initiation. Therefore, additional staff education, a pocket reference card, a standardized NOAC clinical note and a clinical care guideline were implemented starting in 2013. The purpose of this study is to evaluate if the quality improvement initiatives have improved follow-up of patients using NOACs for NVAF.

Methods: The study is a retrospective cohort evaluating the patients taking a NOAC for NVAF at the University of Illinois Hospital and Health Sciences System (UIH) from January 1st, 2013 to October 1st, 2017. UIH guidelines recommend monitoring of renal function annually for CrCL more than 60 milliliters per minute (mL/min); every 6 months for CrCl 30 to 60 mL/min, age more than 75 or the presence of drug interactions; and every 3 months if CrCl 15 to 30 mL/min or fluctuating.

The primary outcome is the percent adherence to monitoring CrCL on an annual basis; the secondary outcomes are appropriate dose, percent adherence to monitoring hemoglobin, prevalence of interacting medications, and the provision of anticoagulant related patient education.

Results: The study included 320 patients. The demographic data reveal that 38.4%, 35%, and 26.5% of patients were on dabigatran, rivaroxaban, and apixaban respectively. The study outcomes analyses are pending.

Conclusion: It is hypothesized that the quality improvement initiatives have improved monitoring of NOACs in patients with NVAF.
76) Henry Okoroike, Mathew Thambi, Wenchin Li

**A Pilot Study Evaluating Potential Predictors of Readmission in Hospitalized Medicine Patients**

Pharmacy Practice

PharmD Student

Many patients are readmitted to hospitals shortly after discharge, at a significant cost. A fifth of Medicare beneficiaries discharged were re-hospitalized within 30 days at a cost to Medicare estimated at $17.4 billion. Identifying patients with a high readmission risk is important for allocating resources in a manner that is targeted and cost-effective.

The objective of this pilot study was to develop a survey administered to patients that can identify patients at risk for readmission in a time-sensitive clinical setting. The survey consists of validated as well as investigator developed survey instruments to assess the following: health literacy, numeracy, medication adherence, self-efficacy, and tolerance. The predictive indices are the LACE index, Charleston Comorbidity Index, and the Comorbidity Polypharmacy Score. An estimated 40 subjects were included in this pilot study. Subjects were admitted to Internal Medicine at UIH, over 18 years old, and fluent in English. If eligible, the process of informed consent followed. If consent is granted, subjects participated in a one-time survey that took about 20 minutes to complete.

Approximately 30 days and 60 days after discharge, patients were contacted via phone to ask how many admissions and Emergency Department visits they had since discharge. A correlation analysis was done of the aspects of the survey to determine redundancies and a regression analysis was done to determine the predictive ability of the survey components combined with predictive indices for readmission. We do not expect to see statistical significance in the pilot stage of this study.

77) Emily Rue, Richard van Breemen, Karl Larsen

**Fentanyl Analogues: Instrumental Future of Illicit Drug Identification**

Forensic Science

MS Student

Fentanyl is a synthetic opioid, developed for anesthetic purposes. Currently, Fentanyl has been gaining popularity among the heroin epidemic that our country is facing. In 2016, drug overdoses killed roughly 64,000 people in the United States—the leading cause of deaths for Americans under 50 years old. Fentanyl and its analogues are among the most dangerous; responsible for the increasing death toll. Since fentanyl is a schedule II narcotic under the Controlled Substance Act, fentanyl analogues have begun to enter the illicit market, causing issues with the identification of emerging analogues. Analytical methods have been employed in the field of forensic science since the beginning. In this study, we use nuclear magnetic resonance, liquid chromatography- quadrupole-time-of-flight- mass spectrometer, liquid chromatography-triple quadrupole-mass spectrometer, and gas chromatography-mass spectrometer to unveil the fingerprint leading to the identification of fentanyl analogues by analysis of 17 different analogues. We chose these 17 different analogues to get a broad range of what happens to these compounds by means of mass spectrometry to assist in the identification of unknowns that have yet to hit the illicit market. By studying these analogues and developing these methods, we hope to impact law enforcement offices, hospitals and forensic laboratories by aiding in the rapid identification of emerging fentanyl analogues.
Inositol Monophosphatase, a Bifunctional Enzyme in *Mycobacterium smegmatis*

Institute for Tuberculosis Research

Research specialist

The major immunomodulatory components of mycobacterial cell wall are phosphatidyl-based lipids such as phosphatidylinositolmannosides. The enzyme inositol mono-phosphatase (IMPase) is crucial for the biosynthesis of phosphatidylinositol, an essential component of mycobacteria. This study focuses on the enzyme IMPase A (impA) from *M. smegmatis*. ImpA is a bifunctional enzyme as it also functions as fructose-1,6-bisphosphatase (FBPase) in addition to the ImpA activity. We have expressed and purified ImpA from *M. smegmatis*. Sequence comparisons between IMPase and FBPase from mycobacteria indicates that this impA enzyme has two active sites. Kinetics of both IMPase and FBPase activities were studied and the results suggest that both substrates display similar behavior with nearly identical KMs. Catalytic residues in each active site were selected for point mutagenesis and we found that mutating the residue in the IMPase active site also affected FBPase activity and vice-versa. This suggests the two active sites are in close proximity in the tertiary structure. Work is ongoing trying to obtain a molecular level understanding the structure-function relationship of this enzyme.

Long-term Cost-effectiveness of Valbenazine and Deutetrabenazine for Tardive Dyskinesia

Pharmacy Systems, Outcomes & Policies

Fellow

Objectives: To conduct a cost-effectiveness analysis of two FDA-approved drugs, valbenazine and deutetrabenazine, for treating the symptoms of moderate-to-severe tardive dyskinesia (TD) compared to placebo in adult patients with underlying schizophrenia, bipolar, and major depressive disorders in the US.

Methods: A semi-Markov model with time-dependent mortality and TD medication discontinuation rates was developed, employing annual cycles over a lifetime horizon from a health system perspective. The base case model included four health states: improved TD, moderate-to-severe TD, discontinued therapy with improved TD, and death. Treatment outcomes, utility, and cost inputs were obtained through systematic literature review, grey literature, and consensus-based assumptions. The primary outcomes included total payer costs and quality-adjusted life years (QALYs) gained (discounted 3% per year) to generate incremental cost/QALY gained. Sensitivity analyses were conducted to evaluate model uncertainty.

Results: Discounted lifetime costs for valbenazine and the placebo comparator were approximately $185,200 and $6,900. Discounted QALYs for valbenazine and placebo were 15.35 and 15.12, respectively. Deutetrabenazine and its placebo comparator had lifetime discounted costs of approximately $220,000 and $6,600 and lifetime discounted QALYs of 15.37 and 15.18, respectively. The incremental cost-effectiveness ratios were $750,000/QALY for valbenazine and $1.1 million/QALY for deutetrabenazine. When model inputs were varied across reasonable ranges in one-way sensitivity analyses, none resulted in estimates below thresholds of $150,000/QALY. Probabilistic sensitivity analyses resulted in acceptability curves with a very low likelihood that the treatments will reach these thresholds.

Conclusions: In base-case and sensitivity analyses, incremental cost effectiveness ratios for valbenazine and deutetrabenazine versus placebo exceeded commonly utilized cost-effectiveness thresholds.
Mutagenesis and Structures of the *Mycobacterium tuberculosis* Class II Fructose-1,6-Bisphosphatase: Implications for the Active Oligomeric State, Catalytic Mechanism, and Possible Regulatory Controls of this Enzyme Class

Institute for Tuberculosis Research

Postdoc

Class II fructose-1,6-bisphosphatase enzyme in *Mycobacterium tuberculosis* (Mt) is an essential enzyme for pathogenesis. The T84S and T84A active-site mutant enzymes have been prepared by site directed mutagenesis to explore the binding affinity of the substrate and the catalytic mechanism. The T84A mutant fully abolishes enzyme activity while retaining substrate binding affinity. In contrast, the T84S mutant retains some activity having a ten-fold reduction in Vmax and exhibited similar sensitivity to lithium when compared to the wild type.

The crystal structure of the apo *M. tuberculosis* FBPasell is presented as well as that of T84A and T84S in complex with the reaction product, fructose-6-phosphate. The structures reveal a 222 symmetrical tetramer that corresponds to the aggregate present in the previously solved crystal structure of FBPasell from the AMP allosterically regulated Synechocystis (3rpl). The structures have been found to contain crystallization components, which are important TCA cycle intermediates, in this plausible allosteric regulatory site. Moreover, the structures of the active sites of the mutants in complex with the reaction product are consistent with the previously proposed catalytic mechanism in the *E. coli* enzyme. The structure of the Escherichia coli enzyme suggested that the replacement of the critical nucleophile OH- in the Thr84 residue of the wild type enzyme by Ser84 would result in subtle alterations that could reduce catalytic efficiency. In the structure of the T84S mutant, we have found the side chain of this residue to be flipped without a phosphate present but in the same position. The insights into the structure of the Class II FBPase of *M. tuberculosis* will facilitate the discovery and optimization of potent inhibitors for these widespread pathogens and their antibiotic-resistant varieties.

atRA-Induced Cholesterol Accumulation is Mediated by CYP7A1 Repression in the Liver

Pharmacy Practice

Postdoc

All-trans retinoic acid (atRA) is one of the most frequently used retinoids to treat certain cancers or dermatological diseases. Common side effects include hypercholesterolemia. Previous studies have shown that atRA downregulates CYP7A1, potentially responsible for hypercholesterolemia. However, the detailed molecular mechanisms are unclear. atRA increased cholesterol levels in a dose dependent manner in HepaRG cells, and this was accompanied by dramatic decrease in CYP7A1 mRNA and protein levels. CYP7A1 overexpression by lentiviral system reversed atRA-induced cholesterol accumulation in HepaRG cells, suggesting that cholesterol accumulation is mediated by CYP7A1 repression. CYP7A1 promoter reporter assays in HepG2 cells revealed that the HNF4α binding site in the promoter (-149/-118) is essential for atRA-mediated CYP7A1 repression. HNF4α depletion by siRNA abrogated CYP7A1 repression by atRA in HepaRG cells. Western blot analysis revealed that atRA activates MAPKs signaling pathways including JNK, ERK, and p38 MAPKs in HepaRG cells. Pharmacological inhibition of JNK and ERK pathways but not p38 pathway by using a specific inhibitor attenuated atRA-mediated CYP7A1 repression and cholesterol accumulation. Overexpression of AP-1 (c-Jun/c-Fos), a downstream target of JNK and ERK, repressed CYP7A1 expression in HepG2 cells. In DNA pull-down assay, AP-1 exhibited sequence-specific binding to the HNF4α binding site in CYP7A1 promoter following atRA treatment in HepaRG cells. ChIP assay also showed that AP-1 binding to the CYP7A1 promoter (-181/-34) was increased following atRA treatment, whereas HNF4α binding was decreased. Collectively, results from this study indicate that atRA-activated JNK and ERK pathways and downstream target AP-1 represses HNF4α transactivation of CYP7A1 promoter. These results suggest an important role of CYP7A1 in atRA-induced cholesterol accumulation and provide a basis to establish future strategy in cholesterol disorder by atRA.
82) Jeongho Lee, Matthew Dean, Julia Austin, Joanna E. Burdette, Brian T. Murphy

**Identification of Multiple Phytoprogestins with Mixed Agonist Activity in Red Clover**

*Medicinal Chemistry and Pharmacognosy*

Postdoc

Botanical supplements are becoming increasingly popular for the treatment of menopausal symptoms and hormone replacement therapy. In particular, red clover (*Trifolium pratense*) is consumed as a natural alternative for such ailments. Yet, phytoprogestins are understudied, despite that progesterone (P4) plays a significant role in women’s health. Particularly, women consuming estrogens should use them in combination with progestins to oppose estrogen action in the uterus that increases the risk of hyperplasia and cancer. Few studies indicate the presence of phytoprogestins in botanical extracts. Thus, presence and effect of phytoprogestigenic compounds in botanical extract such as red clover must be investigated.

83) Danielle Tompkins, Scott T. Benken, Eljim P. Tesoro, Sean P. Kane

**Impact of Obesity on Propofol Utilization and Adverse Effects from a Large De-Identified Database**

*Pharmacy Practice*

Resident

To date, there have been no studies conducted to evaluate the use of propofol for ICU sedation in obese patients (BMI of 30 or higher) versus patients who fall into a lower BMI range. The hypothesis of this study is that standard total body weight (TBW) dosing of propofol has higher rates of oversedation and propofol-related side effects in obese patients when compared to normal body weight patient populations. Rates of oversedation are an outcome of interest, as light sedation has been shown to have improved outcomes when compared with deep sedation. Therefore, this retrospective review may identify a need for adjusted dosing schemes in the obese patient population.

This study is a single-center retrospective cohort study. Patients who received a propofol infusion for at least 24 consecutive hours from January 2008 to October 2012 will be evaluated for inclusion. Data will be obtained from the MIMIC III Database, which is a multi-parameter intelligent monitoring, intensive care database. This open-access research database includes about 58,000 hospital admissions for 38,645 adult patients admitted to medical or surgical intensive care units at Beth Israel Deaconess Medical. The primary endpoint of this study is percentage of time spent in goal RASS range. Secondary endpoints of this study will include time on ventilator, ICU length of stay, and mortality, as well as safety outcomes, such as rates of hypotension, bradycardia, hypertriglyceridemia, delirium, and propofol-related infusion syndrome.

Correlation between BMI and the primary and secondary endpoints will be assessed as continuous data. Additional subgroup analyses will be performed on BMI classes (less than 25, 25.0-29.9, 30.0-34.9, 35-39.9, 40 and greater), goal RASS (light, moderate, and deep sedation), and duration of sedation (24 hours to 7 days or greater than 7 day). Appropriate statistical testing will be incorporated. This study is currently in progress.

84) Hannah Underwood, Alicia Lichvar, Jamie Benken, Zahraa Hajjiri, Enrico Benedetti

**Clinical Response to Salvage Bortezomib Therapy for Antibody Mediated Rejection and Mixed Acute Rejection in a High Immunologic Risk Renal Transplant Population**

*Pharmacy Practice*

Resident

Bortezomib-containing regimens treat antibody mediated rejection (AMR) and mixed acute rejection (MAR) due to elimination of donor specific antibody (DSA). This agent is used in the setting of salvage therapy after traditional treatment
modalities fail to achieve desired clinical responses. The long-term impact of this strategy is unknown. The purpose of this evaluation was to assess salvage bortezomib-based therapy in high risk patients with AMR or MAR.

High immunologic risk renal transplant (RTx) recipients experiencing AMR or MAR from 1/2008–09/2017 treated with a salvage bortezomib regimen were assessed. Salvage therapy was introduced when primary therapy (plasmapheresis/IVIG) was deemed ineffective by transplant team. The Banff Criteria was utilized to diagnose AMR and ACR. MAR was defined as having both ACR and AMR concurrently. The primary outcome was incidence of patients achieving a greater than 25% reduction in serum creatinine (SCr) 30 days post-bortezomib initiation.

A total of 12 RTx patients were analyzed and followed for a median of 474 (IQR 193–1723) days post-salvage bortezomib treatment. A majority of patients were female (58.3%) and African American (42%) with living-donor RTxs (83.3%). Pre-formed DSA occurred in 60% of recipients and 50% had positive flow cross-matches at the time of RTx. 58.3% of patients experienced a greater than 25% reduction in SCr, and 66.7% of patients experienced a greater than 50% reduction in immunodominant DSA. Four patients (33.3%) experienced graft loss 471 (IQR 227–1285) days post-salvage bortezomib therapy. After introduction of bortezomib, there was a reduction in both SCr and DSA in a majority of patients. Salvage bortezomib is a therapeutic option in refractory AMR and MAR in a high immunologic risk population as a part of a multi-modal treatment regimen.

85) Shijie Huang, Dorota Klepacki, Luc Jaeger, Alexander S. Mankin

**Bacterial Cells can Live Without Free SS rRNA**

*Center for Biomolecular Sciences*

*Postdoc*

The 120 nucleotide-long 5S rRNA is a universal component of cytoplasmic ribosomes of all living organisms. Together with the 23S rRNA and a handful of ribosomal proteins it assembles into the bacterial large ribosomal subunit. 5S rRNA has been suggested to be critical for ribosome assembly, to play a role in the catalysis of peptide bond formation, participate in signal transmission within the ribosome and be involved in other activities. However, even after decades of research, the true function of 5S rRNA remains unclear. The lack of new tools and methodologies hinders the progress towards the understanding the role of 5S rRNA in translation.

To develop a novel system for analyzing the functions of 5S rRNA in the living cell and to implement new approaches to enable ribosome engineering, we succeeded in fusing 5S with 23S rRNA into a single molecule. This was achieved by inserting circularly-permuted 5S rRNA at two different 23S rRNA locations. The resulting 23S-5S rRNA hybrid molecule assembles into a functional large ribosomal subunit. Furthermore, we were able to engineer *E. coli* cells in which all the ribosomes carry the 23S-5S hybrid rRNA and, therefore, we have created a cell which completely lacks free 5S rRNA. These results unequivocally show that free 5S rRNA is dispensable for the ribosome assembly or function.

We have also introduced 5S rRNA into Ribo-T, the ribosome with tethered small and large subunits, which has been previously built upon a hybrid 16S-23S rRNA molecule. The preliminary result shows resulting single-RNA ribosome is capable of catalyzing polypeptide formation. We envision that the 23S-5S hybrid or the single-RNA ribosome could be powerful new tools for studying 5S rRNA functions, biogenesis and evolution. The single-RNA ribosome makes it possible to create an orthogonal translation system in the cell which does not exchange any of its RNA components with the ‘housekeeping’ ribosome.
<table>
<thead>
<tr>
<th>Author's Last Name</th>
<th>Author's First Name</th>
<th>Poster Number</th>
<th>Poster Session</th>
<th>Abstract Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aleksashin</td>
<td>Nikolay</td>
<td>66</td>
<td>2</td>
<td>Fully Orthogonal Translation System Built on the Dissociable Ribosome</td>
</tr>
<tr>
<td>Alsuhebany</td>
<td>Nada</td>
<td>1</td>
<td>1</td>
<td>Interactions Between Ketolide Antibiotics and the Ribosome Important for Antibacterial Activity</td>
</tr>
<tr>
<td>Anand</td>
<td>Jay</td>
<td>31</td>
<td>1</td>
<td>Repair of Top2-mediated DNA Damage by DNA Polymerase β</td>
</tr>
<tr>
<td>Austin</td>
<td>Julia</td>
<td>69</td>
<td>1</td>
<td>Identification and Characterization of Synergistic Phytoprostegnin Compounds in Herbal Supplements</td>
</tr>
<tr>
<td>Bondoc</td>
<td>Jasper Marc</td>
<td>78</td>
<td>2</td>
<td>Inositol Monophosphatase, a Bifunctional Enzyme in Mycobacterium smegmatis</td>
</tr>
<tr>
<td>Cho</td>
<td>Sungjoon</td>
<td>19</td>
<td>1</td>
<td>Differential Microbiota in the Gut Modulates Susceptibility to Acetaminophen-induced Hepatotoxicity in C57BL/6 Mice</td>
</tr>
<tr>
<td>Colina</td>
<td>Jose</td>
<td>70</td>
<td>2</td>
<td>Loss of PAX2 Recapitulates Secretory Cell Outgrowths (SCOUTs), Precursors to High-Grade Serous Ovarian Cancer and Potentiates Aberrant AKT and Steroid Signaling</td>
</tr>
<tr>
<td>Dean</td>
<td>Matthew</td>
<td>41</td>
<td>1</td>
<td>Colonization of the Ovary During Ovulation and Metastasis of Fallopian Tube Derived Ovarian Cancer</td>
</tr>
<tr>
<td>Florin</td>
<td>Tanja</td>
<td>50</td>
<td>2</td>
<td>Global Analysis of Protein Synthesis Arrest Induced by the Translation Termination Inhibitor Apidaecin</td>
</tr>
<tr>
<td>Gilbertson</td>
<td>Matthew</td>
<td>27</td>
<td>1</td>
<td>Batteries Sold Separately: A Link between Etoposide Hypersensitivity of Human Top2α Mutant Proteins and the ATP Requirement for Activity</td>
</tr>
<tr>
<td>Gutgesell</td>
<td>Lauren</td>
<td>55</td>
<td>1</td>
<td>Profiling Endocrine-therapy Resistance and Novel Treatment Options in Multiple in vitro Models of ER+ Breast Cancer</td>
</tr>
<tr>
<td>Hardy</td>
<td>Laura</td>
<td>44</td>
<td>2</td>
<td>PAX8 Increases Migration and Metastasis of Ovarian Cancer through Upregulation of Rho GTPases</td>
</tr>
<tr>
<td>Hitzman</td>
<td>Ryan</td>
<td>58</td>
<td>2</td>
<td>Humulus lupulus (Hops) Activation of AhR Promotes Estrogen (E2) Detoxification</td>
</tr>
<tr>
<td>Howell</td>
<td>Caitlin E.</td>
<td>16</td>
<td>2</td>
<td>The Use of Mammospheres as Models for Predicting P450 1A1/1B1 Metabolism?</td>
</tr>
<tr>
<td>Huang</td>
<td>Shijie</td>
<td>85</td>
<td>1</td>
<td>Bacterial Cells can Live Without Free 5S rRNA</td>
</tr>
<tr>
<td>Karthikeyan</td>
<td>Subbulakshmi</td>
<td>15</td>
<td>1</td>
<td>Prolactin Pathways Contributing to Tumorigenesis in Fallopian Tube-derived Spontaneous Model of Ovarian Cancer</td>
</tr>
<tr>
<td>Knopp</td>
<td>Rachel</td>
<td>61</td>
<td>1</td>
<td>Selective Calpain-1 versus Calpain/Cathepsin-B Dual Inhibition as a Therapeutic Approach to AD</td>
</tr>
<tr>
<td>Lee</td>
<td>Sue Hyun</td>
<td>21</td>
<td>1</td>
<td>Novel Model of Accelerated Cognitive Deficits Induced by Oxidative Stress and Traumatic Brain Injury with Exacerbated Neuropathology</td>
</tr>
<tr>
<td>Mangano</td>
<td>Kyle</td>
<td>71</td>
<td>1</td>
<td>Context-specific Translation Arrest by Antibiotics Targeting the Small and Large Ribosomal Subunits</td>
</tr>
<tr>
<td>Marks</td>
<td>James</td>
<td>25</td>
<td>1</td>
<td>Chloramphenicol and Linezolid Selectively Inhibit A-site tRNA Accommodation</td>
</tr>
<tr>
<td>Mathes</td>
<td>Kyle</td>
<td>63</td>
<td>1</td>
<td>Genome Mining of Freshwater Cyanobacteria for Rare Metabolites</td>
</tr>
<tr>
<td>Meydan</td>
<td>Sezen</td>
<td>26</td>
<td>2</td>
<td>Genes within Genes in Bacteria</td>
</tr>
<tr>
<td>Rosales</td>
<td>Carlo</td>
<td>65</td>
<td>1</td>
<td>3D Spheroid Cultures of Resistant Breast Cancer Cell Lines as in vitro Models for Drug Discovery</td>
</tr>
<tr>
<td>Socco</td>
<td>Samantha</td>
<td>5</td>
<td>1</td>
<td>Nitric Oxide Regulates DNA Methyl Adducts: Implications for Cancer Etiology</td>
</tr>
<tr>
<td>Soriagalarro</td>
<td>Julio C.</td>
<td>52</td>
<td>2</td>
<td>A Nonribosomal Peptide Promotes Motility in Pseudovibrio sp., a Bacterial Symbiont of Marine Sponges</td>
</tr>
<tr>
<td>Summerlin</td>
<td>Matthew</td>
<td>22</td>
<td>2</td>
<td>SORF Proteins as Newcomers in Double-Strand Break Repair by Classical Non-Homologous End Joining</td>
</tr>
<tr>
<td>Tovar</td>
<td>Kayleigh</td>
<td>11</td>
<td>1</td>
<td>Elucidating Rgg-mediated Quorum Sensing Networks in Streptococcus pneumoniae and Testing their Contributions in Pathogenesis</td>
</tr>
<tr>
<td>Author's Last Name</td>
<td>Author's First Name</td>
<td>Poster Number</td>
<td>Poster Session</td>
<td>Abstract Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Veenstra</td>
<td>Jacob</td>
<td>68</td>
<td>2</td>
<td>Evaluating Mediterranean Herb Extracts and Selected Phytochemicals for the Reversal of Oxidative Stress in Colon Cells</td>
</tr>
<tr>
<td>Wolf</td>
<td>Nina</td>
<td>80</td>
<td>1</td>
<td>Mutagenesis and Structures of the <em>Mycobacterium tuberculosis</em> Class II Fructose-1,6-Bisphosphatase: Implications for the Active Oligomeric State, Catalytic Mechanism and Possible Regulatory Controls of this Enzyme Class</td>
</tr>
<tr>
<td>Won</td>
<td>Kyoung-Jae</td>
<td>81</td>
<td>1</td>
<td>atRA-Induced Cholesterol Accumulation is Mediated by CYP7A1 Repression in the Liver</td>
</tr>
<tr>
<td>Young</td>
<td>Alexandria</td>
<td>43</td>
<td>1</td>
<td>Phyllanthusmins Induce Apoptosis and Reduce Tumor Burden in High Grade Serous Ovarian Cancer by Late-stage Autophagy Inhibition</td>
</tr>
</tbody>
</table>

Chemistry: Discovery, Modeling, Design & Evaluation of Novel Drugs; Detection; Delivery Systems

<table>
<thead>
<tr>
<th>Author's Last Name</th>
<th>Author's First Name</th>
<th>Poster Number</th>
<th>Poster Session</th>
<th>Abstract Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bugno</td>
<td>Jason</td>
<td>10</td>
<td>2</td>
<td>Engineered Ultrasmall Nanoparticles for Controlled Tumor Penetration</td>
</tr>
<tr>
<td>Choules</td>
<td>Mary</td>
<td>8</td>
<td>2</td>
<td>HiFSA Sequencing Bioactive Peptides by $^1$H-NMR for Quality Assurance</td>
</tr>
<tr>
<td>Clark</td>
<td>Chase</td>
<td>60</td>
<td>2</td>
<td>Innovating Microbial Libraries for Drug Discovery Using MALDI-TOF-MS and the Cultivable Freshwater Sponge Microbiome.</td>
</tr>
<tr>
<td>Cleary</td>
<td>Jessica</td>
<td>49</td>
<td>1</td>
<td>Cheese Rinds as a Model to Study the Chemistry of Complex Microbial Communities</td>
</tr>
<tr>
<td>Condren</td>
<td>Alanna</td>
<td>59</td>
<td>1</td>
<td>Bile Acid Exposure Alters Specialized Metabolism Leading to Biofilm Inhibition in <em>Pseudomonas aeruginosa</em></td>
</tr>
<tr>
<td>Costa</td>
<td>Maria</td>
<td>47</td>
<td>1</td>
<td>A MALDI-TOF MS Platform to Discover Understudied Actinomycetes from Icelandic Waters</td>
</tr>
<tr>
<td>Crnkovic</td>
<td>Camila M.</td>
<td>53</td>
<td>1</td>
<td>Metabolomics Guided the Discovery of New Natural Products from Cyanobacteria</td>
</tr>
<tr>
<td>David</td>
<td>Brian</td>
<td>20</td>
<td>2</td>
<td>Label-Free Visualization of Peptides and Small Molecules in Tumor Explants Using Mass Spectrometry Imaging</td>
</tr>
<tr>
<td>Esparza</td>
<td>Karina</td>
<td>28</td>
<td>2</td>
<td>Thioestrepton in Sterically Stabilized Phospholipid Micelles: A Promising Antibacterial Nanomedicine</td>
</tr>
<tr>
<td>Galey</td>
<td>Melissa</td>
<td>56</td>
<td>2</td>
<td>Small Molecule Interactions from the Cheese Microbiota: <em>Pseudomonas</em> vs. <em>Candida</em></td>
</tr>
<tr>
<td>Guo</td>
<td>Brian</td>
<td>30</td>
<td>2</td>
<td>Phytochemical Exploration of Medicinal Tuber Native to West Africa</td>
</tr>
<tr>
<td>Jastaniah</td>
<td>Ammar</td>
<td>62</td>
<td>2</td>
<td>Design and Synthesis of Peptidomemitics with Attenuated Reactivity in the Treatment of Neurodegenerative Diseases</td>
</tr>
<tr>
<td>Jayawardena</td>
<td>Dulari</td>
<td>13</td>
<td>1</td>
<td>Local Colonic Delivery of Vasoactive Intestinal Peptide (VIP) Nanomedicine Alleviates Colitis in Mice</td>
</tr>
<tr>
<td>Langridge</td>
<td>Timothy</td>
<td>67</td>
<td>1</td>
<td>Micelle Stability varies in Biologic Fluid Identity</td>
</tr>
<tr>
<td>Lee</td>
<td>Jeongho</td>
<td>82</td>
<td>1</td>
<td>Identification of Multiple Phytoprostegins with Mixed Agonist Activity in Red Clover</td>
</tr>
<tr>
<td>Lewandowski</td>
<td>Cutler</td>
<td>45</td>
<td>1</td>
<td>Development of Tissue-Selective ABCA1 Agonists as Potential Therapeutics for Alzheimer’s Disease</td>
</tr>
<tr>
<td>May</td>
<td>Daniel</td>
<td>23</td>
<td>1</td>
<td>A Bioinformatic and Metabolomic Strategy to Discover New Natural Products from Cultured Cyanobacteria</td>
</tr>
<tr>
<td>Nepomuceno</td>
<td>Vanessa</td>
<td>18</td>
<td>2</td>
<td>A <em>Streptomyces tendae</em> Specialized Metabolite Interferes with Quorum Sensing in Group A <em>Streptococcus</em></td>
</tr>
<tr>
<td>Petukhova</td>
<td>Valentina</td>
<td>39</td>
<td>1</td>
<td>A Mass Spectrometry Fingerprinting Technique as a Robust Tool for Differential Profiling of Mammalian Cells Lines</td>
</tr>
<tr>
<td>Richardson</td>
<td>Benjamin</td>
<td>32</td>
<td>2</td>
<td>Replacement of a Naphthalene Scaffold in Keap1/Nrf2 Inhibitors</td>
</tr>
<tr>
<td>Siddiqui</td>
<td>Zamia</td>
<td>4</td>
<td>2</td>
<td>Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer</td>
</tr>
<tr>
<td>Sokolowski</td>
<td>Karol</td>
<td>9</td>
<td>1</td>
<td>Investigating Glutathione-S-Transferase Induced Glutathione-Micelle Sol-Gel Phenomenon</td>
</tr>
<tr>
<td>Speltz</td>
<td>Thomas</td>
<td>29</td>
<td>1</td>
<td>Functionalized Hydrocarbon Stapled Peptides for the Estrogen Receptor/Coactivator Interaction</td>
</tr>
<tr>
<td>Author's Last Name</td>
<td>Author's First Name</td>
<td>Poster Number</td>
<td>Poster Session</td>
<td>Abstract Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Sullivan</td>
<td>Peter</td>
<td>48</td>
<td>2</td>
<td>Correlating Phylogeny and Chemistry to Improve the Cyanobacterial Natural Product Drug Discovery Pipeline</td>
</tr>
<tr>
<td>Taha</td>
<td>Taha</td>
<td>7</td>
<td>1</td>
<td>Design, Synthesis, and Biological Evaluation of Tetrahydroisoquinoline-Based Histone Deacetylase 8 Selective Inhibitors</td>
</tr>
<tr>
<td>Weber</td>
<td>Sara</td>
<td>34</td>
<td>2</td>
<td>Antimycobacterial Compounds from Plants and Microbes Reported Between 2000-2017</td>
</tr>
<tr>
<td>Zink</td>
<td>Katherine</td>
<td>57</td>
<td>1</td>
<td>Developing a Novel Imaging Mass Spectrometry Method to Detect Chemical Communication Driving Metastasis in Ovarian Cancer</td>
</tr>
<tr>
<td>Alsowaida</td>
<td>Yazed</td>
<td>75</td>
<td>1</td>
<td>Evaluation of Quality Improvement Initiatives for Monitoring of Novel Oral Anticoagulants in Patients with Atrial Fibrillation at an Academic Medical Center</td>
</tr>
<tr>
<td>Asfaw</td>
<td>Alemseged</td>
<td>Ayele</td>
<td>54</td>
<td>2</td>
</tr>
<tr>
<td>Capulong</td>
<td>Jeremy</td>
<td>2</td>
<td>2</td>
<td>The Impact of Health Literacy and Numeracy on Quality of Anticoagulation Control in Minority Patients</td>
</tr>
<tr>
<td>Cha</td>
<td>Ashley</td>
<td>3</td>
<td>1</td>
<td>American Perceptions of Health Then and Now: Comparing the United States General Adult Population in 2002 and 2017</td>
</tr>
<tr>
<td>Elfeki</td>
<td>Maryam</td>
<td>14</td>
<td>2</td>
<td>Assessing the Efficiency of Cultivation Techniques to Recover Natural Product Biosynthetic Gene Populations from Sediment</td>
</tr>
<tr>
<td>Guo</td>
<td>Yukuang</td>
<td>64</td>
<td>2</td>
<td>The role of Gut Microbiota in Tacrolimus Metabolism</td>
</tr>
<tr>
<td>Harrigan</td>
<td>Katherine</td>
<td>79</td>
<td>2</td>
<td>Long-term Cost-effectiveness of Valbenazine and Deutetrabenazine for Tardive Dyskinesia</td>
</tr>
<tr>
<td>Harrington</td>
<td>Rachel</td>
<td>12</td>
<td>2</td>
<td>A Case-crossover Study Examining the Association Between Oseltamivir and Suicide among Pediatric Patients, 2009-2014</td>
</tr>
<tr>
<td>Khudeira</td>
<td>Noor</td>
<td>72</td>
<td>2</td>
<td>Efficacy of Combination Therapy or Varenicline on Smoking Cessation in Light Smokers</td>
</tr>
<tr>
<td>Lei</td>
<td>Liyu Elise</td>
<td>73</td>
<td>1</td>
<td>The Impact of a Patient-Centered Self-Care Behavioral Intervention on Clinical Outcomes in a Minority Population</td>
</tr>
<tr>
<td>Meyer</td>
<td>Kevin</td>
<td>74</td>
<td>2</td>
<td>Ex vivo Urinary Pharmacodynamics of Repeated Doses of Fosfomycin Against 8 Typical Uropathogens</td>
</tr>
<tr>
<td>Okoroike</td>
<td>Henry</td>
<td>76</td>
<td>2</td>
<td>A Pilot Study Evaluating Potential Predictors of Readmission in Hospitalized Medicine Patients</td>
</tr>
<tr>
<td>Polley</td>
<td>Ellyn</td>
<td>33</td>
<td>1</td>
<td>Fibrosis Criteria Comparison across State Medicaid Programs to Qualify for Direct-acting Antiviral Treatment in Patients with Hepatitis C</td>
</tr>
<tr>
<td>Rue</td>
<td>Emily</td>
<td>77</td>
<td>1</td>
<td>Fentanyl Analogues: Instrumental Future of Illicit Drug Identification</td>
</tr>
<tr>
<td>Sadhu</td>
<td>Nilanjana</td>
<td>51</td>
<td>1</td>
<td>Single Nucleotide Polymorphisms of GCH1 Associates with Sickle Cell Disease Pain in African Americans</td>
</tr>
<tr>
<td>Saffore</td>
<td>Christopher</td>
<td>17</td>
<td>1</td>
<td>Racial Differences in the Prevalence of Cognitive Impairments and Dementia, Utilization of Chemo-immunotherapy and Mortality in Elderly Diffuse Large b-Cell Lymphoma Patients</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>36</td>
<td>2</td>
<td>Similar Survival but Increased Toxicity with a Sequential Versus Concurrent FluBu4 Regimen</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>37</td>
<td>1</td>
<td>Acute Kidney Injury before Day 90 Predicts for Both Early and Late Mortality after FluBu4</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>38</td>
<td>2</td>
<td>Collaborative Physician-Pharmacist Multiple Myeloma Autologous Transplant Clinic Improves Guideline Adherence and Prevents Treatment Delays</td>
</tr>
<tr>
<td>Talon</td>
<td>Brian</td>
<td>42</td>
<td>2</td>
<td>A Work-Sampling Study of an Innovative Pediatric Care-Coordination Program</td>
</tr>
<tr>
<td>Author’s Last Name</td>
<td>Author’s First Name</td>
<td>Poster Number</td>
<td>Poster Session</td>
<td>Abstract Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Tompkins</td>
<td>Danielle</td>
<td>83</td>
<td>2</td>
<td>Impact of Obesity on Propofol Utilization and Adverse Effects from a Large De-Identified Database</td>
</tr>
<tr>
<td>Underwood</td>
<td>Hannah</td>
<td>84</td>
<td>2</td>
<td>Clinical Response to Salvage Bortezomib Therapy for Antibody Mediated Rejection and Mixed Acute Rejection in a High Immunologic Risk Renal Transplant Population</td>
</tr>
<tr>
<td>Wu</td>
<td>Zhaoju</td>
<td>6</td>
<td>2</td>
<td>Risk of Non-Hodgkin Lymphoma with Use of TNF-Alpha Inhibitors among Adult Patients with Rheumatologic Conditions</td>
</tr>
<tr>
<td>Yan</td>
<td>Connie</td>
<td>40</td>
<td>2</td>
<td>Patients’ Self-reported Experience of Community Healthcare Worker Support in Type 2 Diabetes Management</td>
</tr>
<tr>
<td>Zhou</td>
<td>Jifang</td>
<td>46</td>
<td>2</td>
<td>Impact of Delayed Anticoagulant Initiation in Patients with Sickle Cell Disease and Newly Diagnosed Venous Thromboembolism: A Population-Based Cohort Study</td>
</tr>
</tbody>
</table>

**CCTS Multidisciplinary Team Science Category**

<table>
<thead>
<tr>
<th>Author’s Last Name</th>
<th>Author’s First Name</th>
<th>Poster Number</th>
<th>Poster Session</th>
<th>Abstract Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asfaw</td>
<td>Alemseged Ayele</td>
<td>54</td>
<td>2</td>
<td>Patient-Reported Barriers to Medication Adherence and Perspectives on Sensored-medication Devices in Patients from Lower Socioeconomic Background with Multiple Myeloma</td>
</tr>
<tr>
<td>Choules</td>
<td>Mary</td>
<td>8</td>
<td>2</td>
<td>HiFSA Sequencing Bioactive Peptides by ¹H-NMR for Quality Assurance</td>
</tr>
<tr>
<td>Esparza</td>
<td>Karina</td>
<td>28</td>
<td>2</td>
<td>Thiostrrepton in Sterically Stabilized Phospholipid Micelles: A Promising Antibacterial Nanomedicine</td>
</tr>
<tr>
<td>Guo</td>
<td>Yukuang</td>
<td>64</td>
<td>2</td>
<td>The role of Gut Microbiota in Tacrolimus Metabolism</td>
</tr>
<tr>
<td>Gutgesell</td>
<td>Lauren</td>
<td>55</td>
<td>1</td>
<td>Profiling Endocrine-therapy Resistance and Novel Treatment Options in Multiple in vitro Models of ER+ Breast Cancer</td>
</tr>
<tr>
<td>Harrington</td>
<td>Rachel</td>
<td>12</td>
<td>2</td>
<td>A Case-crossover Study Examining the Association Between Oseltamivir and Suicide among Pediatric Patients, 2009-2014</td>
</tr>
<tr>
<td>Jayawardena</td>
<td>Dulari</td>
<td>13</td>
<td>1</td>
<td>Local Colonic Delivery of Vasoactive Intestinal Peptide (VIP) Nanomedicine Alleviates Colitis in Mice</td>
</tr>
<tr>
<td>Karthikeyan</td>
<td>Subbulakshmi</td>
<td>15</td>
<td>1</td>
<td>Prolactin Pathways Contributing to Tumorigenesis in Fallopian Tube-derived Spontaneous Model of Ovarian Cancer</td>
</tr>
<tr>
<td>Knopp</td>
<td>Rachel</td>
<td>61</td>
<td>1</td>
<td>Selective Calpain-1 versus Calpain/Cathepsin-B Dual Inhibition as a Therapeutic Approach to AD</td>
</tr>
<tr>
<td>Lee</td>
<td>Sue Hyun</td>
<td>21</td>
<td>1</td>
<td>Novel Model of Accelerated Cognitive Deficits Induced by Oxidative Stress and Traumatic Brain injury with Exacerbated Neuropathology</td>
</tr>
<tr>
<td>Lewandowski</td>
<td>Cutler</td>
<td>45</td>
<td>1</td>
<td>Development of Tissue-Selective ABCA1 Agonists as Potential Therapeutics for Alzheimer’s Disease</td>
</tr>
<tr>
<td>Polley</td>
<td>Ellyn</td>
<td>33</td>
<td>1</td>
<td>Fibrosis Criteria Comparison across State Medicaid Programs to Qualify for Direct-acting Antiviral Treatment in Patients with Hepatitis C</td>
</tr>
<tr>
<td>Sadhu</td>
<td>Nilanjana</td>
<td>51</td>
<td>1</td>
<td>Single Nucleotide Polymorphisms of GCH1 Associates with Sickle Cell Disease Pain in African Americans</td>
</tr>
<tr>
<td>Siddiqui</td>
<td>Zamia</td>
<td>4</td>
<td>2</td>
<td>Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer</td>
</tr>
<tr>
<td>Talon</td>
<td>Brian</td>
<td>42</td>
<td>2</td>
<td>A Work-Sampling Study of an Innovative Pediatric Care-Coordination Program</td>
</tr>
<tr>
<td>Underwood</td>
<td>Hannah</td>
<td>84</td>
<td>2</td>
<td>Clinical Response to Salvage Bortezomib Therapy for Antibody Mediated Rejection and Mixed Acute Rejection in a High Immunologic Risk Renal Transplant Population</td>
</tr>
<tr>
<td>Weber</td>
<td>Sara</td>
<td>34</td>
<td>2</td>
<td>Antimycobacterial Compounds from Plants and Microbes Reported Between 2000-2017</td>
</tr>
<tr>
<td>Zhou</td>
<td>Jifang</td>
<td>46</td>
<td>2</td>
<td>Impact of Delayed Anticoagulant Initiation in Patients with Sickle Cell Disease and Newly Diagnosed Venous Thromboembolism: A Population-Based Cohort Study</td>
</tr>
<tr>
<td>Author's Last Name</td>
<td>Author's First Name</td>
<td>Poster Number</td>
<td>Poster Session</td>
<td>Abstract Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Anand</td>
<td>Jay</td>
<td>31</td>
<td>1</td>
<td>Repair of Top2-mediated DNA Damage by DNA Polymerase β</td>
</tr>
<tr>
<td>Asfaw</td>
<td>Alemseged Ayele</td>
<td>54</td>
<td>2</td>
<td>Patient-Reported Barriers to Medication Adherence and Perspectives on Sensored-medicatin Devices in Patients from Lower Socioeconomic Background with Multiple Myeloma</td>
</tr>
<tr>
<td>Bugno</td>
<td>Jason</td>
<td>10</td>
<td>2</td>
<td>Engineered Ultrasmall Nanoparticles for Controlled Tumor Penetration</td>
</tr>
<tr>
<td>Colina</td>
<td>Jose</td>
<td>70</td>
<td>2</td>
<td>Loss of PAX2 Recapitulates Secretory Cell Outgrowths (SCOUTs), Precursors to High-Grade Serous Ovarian Cancer and Potentiates Aberrant AKT and Steroid Signaling</td>
</tr>
<tr>
<td>David</td>
<td>Brian</td>
<td>20</td>
<td>2</td>
<td>Label-Free Visualization of Peptides and Small Molecules in Tumor Explants Using Mass Spectrometry Imaging</td>
</tr>
<tr>
<td>Dean</td>
<td>Matthew</td>
<td>41</td>
<td>1</td>
<td>Colonization of the Ovary During Ovulation and Metastasis of Fallopian Tube Derived Ovarian Cancer</td>
</tr>
<tr>
<td>Gilbertson</td>
<td>Matthew</td>
<td>27</td>
<td>1</td>
<td>Batteries Sold Separately: A Link between Etoposide Hypersensitivity of Human Top2α Mutant Proteins and the ATP Requirement for Activity</td>
</tr>
<tr>
<td>Gutgesell</td>
<td>Lauren</td>
<td>55</td>
<td>1</td>
<td>Profiling Endocrine-therapy Resistance and Novel Treatment Options in Multiple in vitro Models of ER+ Breast Cancer</td>
</tr>
<tr>
<td>Hitzman</td>
<td>Ryan</td>
<td>58</td>
<td>2</td>
<td><em>Humulus lupulus</em> (Hops) Activation of AhR Promotes Estrogen (E2) Detoxification</td>
</tr>
<tr>
<td>Howell</td>
<td>Caitlin E.</td>
<td>16</td>
<td>2</td>
<td>The Use of Mammospheres as Models for Predicting P450 1A1/1B1 Metabolism?</td>
</tr>
<tr>
<td>Karthikeyan</td>
<td>Subbulakshmi</td>
<td>15</td>
<td>1</td>
<td>Prolactin Pathways Contributing to Tumorigenesis in Fallopian Tube-derived Spontaneous Model of Ovarian Cancer</td>
</tr>
<tr>
<td>Rosales</td>
<td>Carlo</td>
<td>65</td>
<td>1</td>
<td>3D Spheroid Cultures of Resistant Breast Cancer Cell Lines as <em>in vitro</em> Models for Drug Discovery</td>
</tr>
<tr>
<td>Saffore</td>
<td>Christopher</td>
<td>17</td>
<td>1</td>
<td>Racial Differences in the Prevalence of Cognitive Impairments and Dementia, Utilization of Chemo-immunotherapy and Mortality in Elderly Diffuse Large b-Cell Lymphoma Patients</td>
</tr>
<tr>
<td>Siddiqui</td>
<td>Zamia</td>
<td>4</td>
<td>2</td>
<td>Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer</td>
</tr>
<tr>
<td>Speltz</td>
<td>Thomas</td>
<td>29</td>
<td>1</td>
<td>Functionalized Hydrocarbon Stapled Peptides for the Estrogen Receptor/Coactivator Interaction</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>36</td>
<td>2</td>
<td>Similar Survival but Increased Toxicity with a Sequential Versus Concurrent FluBu4 Regimen</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>37</td>
<td>1</td>
<td>Acute Kidney Injury before Day 90 Predicts for Both Early and Late Mortality after FluBu4</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>38</td>
<td>2</td>
<td>Collaborative Physician-Pharmacist Multiple Myeloma Autologous Transplant Clinic Improves Guideline Adherence and Prevents Treatment Delays</td>
</tr>
<tr>
<td>Taha</td>
<td>Taha</td>
<td>7</td>
<td>1</td>
<td>Design, Synthesis, and Biological Evaluation of Tetrahydroisoquinoline-Based Histone Deacetylase 8 Selective Inhibitors</td>
</tr>
<tr>
<td>Wu</td>
<td>Zhaoju</td>
<td>6</td>
<td>2</td>
<td>Risk of Non-Hodgkin Lymphoma with Use of TNF-Alpha Inhibitors among Adult Patients with Rheumatologic Conditions</td>
</tr>
<tr>
<td>Young</td>
<td>Alexandria</td>
<td>43</td>
<td>1</td>
<td>Phyllanthusmins Induce Apoptosis and Reduce Tumor Burden in High Grade Serous Ovarian Cancer by Late-stage Autophagy Inhibition</td>
</tr>
<tr>
<td>Zink</td>
<td>Katherine</td>
<td>57</td>
<td>1</td>
<td>Developing a Novel Imaging Mass Spectrometry Method to Detect Chemical Communication Driving Metastasis in Ovarian Cancer</td>
</tr>
<tr>
<td>Author's Last Name</td>
<td>Author's First Name</td>
<td>Poster Number</td>
<td>Poster Session</td>
<td>Abstract Title</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Aleksashin</td>
<td>Nikolay</td>
<td>66</td>
<td>2</td>
<td>Fully Orthogonal Translation System Built on the Dissociable Ribosome</td>
</tr>
<tr>
<td>Alsowaida</td>
<td>Yazed</td>
<td>75</td>
<td>1</td>
<td>Evaluation of Quality Improvement Initiatives for Monitoring of Novel Oral Anticoagulants in Patients with Atrial Fibrillation at an Academic Medical Center</td>
</tr>
<tr>
<td>Alsuhебany</td>
<td>Nada</td>
<td>1</td>
<td>1</td>
<td>Interactions Between Ketolide Antibiotics and the Ribosome Important for Antibacterial Activity</td>
</tr>
<tr>
<td>Anand</td>
<td>Jay</td>
<td>31</td>
<td>1</td>
<td>Repair of Top2-mediated DNA Damage by DNA Polymerase β</td>
</tr>
<tr>
<td>Asfaw</td>
<td>Alemseged Ayele</td>
<td>54</td>
<td>2</td>
<td>Patient-Reported Barriers to Medication Adherence and Perspectives on Sensored-medication Devices in Patients from Lower Socioeconomic Background with Multiple Myeloma</td>
</tr>
<tr>
<td>Austin</td>
<td>Julia</td>
<td>69</td>
<td>1</td>
<td>Identification and Characterization of Synergistic Phytoprostagin Compounds in Herbal Supplements</td>
</tr>
<tr>
<td>Bondoc</td>
<td>Jasper Marc</td>
<td>78</td>
<td>2</td>
<td>Inositol Monophosphatase, a Bifunctional Enzyme in <em>Mycobacterium smegmatis</em></td>
</tr>
<tr>
<td>Bugno</td>
<td>Jason</td>
<td>10</td>
<td>2</td>
<td>Engineered Ultrasmall Nanoparticles for Controlled Tumor Penetration</td>
</tr>
<tr>
<td>Capulong</td>
<td>Jeremy</td>
<td>2</td>
<td>2</td>
<td>The Impact of Health Literacy and Numeracy on Quality of Anticoagulation Control in Minority Patients</td>
</tr>
<tr>
<td>Cha</td>
<td>Ashley</td>
<td>3</td>
<td>1</td>
<td>American Perceptions of Health Then and Now: Comparing the United States General Adult Population in 2002 and 2017</td>
</tr>
<tr>
<td>Cho</td>
<td>Sungjoon</td>
<td>19</td>
<td>1</td>
<td>Differential Microbiota in the Gut Modulates Susceptibility to Acetaminophen-induced Hepatotoxicity in C57BL/6 Mice</td>
</tr>
<tr>
<td>Choules</td>
<td>Mary</td>
<td>8</td>
<td>2</td>
<td>HiFSA Sequencing Bioactive Peptides by 1H-NMR for Quality Assurance</td>
</tr>
<tr>
<td>Clark</td>
<td>Chase</td>
<td>60</td>
<td>2</td>
<td>Innovating Microbial Libraries for Drug Discovery Using MALDI-TOF-MS and the Cultivable Freshwater Sponge Microbiome</td>
</tr>
<tr>
<td>Cleary</td>
<td>Jessica</td>
<td>49</td>
<td>1</td>
<td>Cheese Rinds as a Model to Study the Chemistry of Complex Microbial Communities</td>
</tr>
<tr>
<td>Colina</td>
<td>Jose</td>
<td>70</td>
<td>2</td>
<td>Loss of PAX2 Recapitulates Secretory Cell Outgrowths (SCOUTs), Precursors to High-Grade Serous Ovarian Cancer and Potentiates Aberrant AKT and Steroid Signaling</td>
</tr>
<tr>
<td>Condren</td>
<td>Alanna</td>
<td>59</td>
<td>1</td>
<td>Bile Acid Exposure Alters Specialized Metabolism Leading to Biofilm Inhibition in <em>Pseudomonas aeruginosa</em></td>
</tr>
<tr>
<td>Costa</td>
<td>Maria</td>
<td>47</td>
<td>1</td>
<td>A MALDI-TOF MS Platform to Discover Understudied Actinomycetes from Icelandic Waters</td>
</tr>
<tr>
<td>Crnkovic</td>
<td>Camila M.</td>
<td>53</td>
<td>1</td>
<td>Metabolomics Guided the Discovery of New Natural Products from Cyanobacteria</td>
</tr>
<tr>
<td>David</td>
<td>Brian</td>
<td>20</td>
<td>2</td>
<td>Label-Free Visualization of Peptides and Small Molecules in Tumor Explants Using Mass Spectrometry Imaging</td>
</tr>
<tr>
<td>Dean</td>
<td>Matthew</td>
<td>41</td>
<td>1</td>
<td>Colonization of the Ovary During Ovulation and Metastasis of Fallopian Tube Derived Ovarian Cancer</td>
</tr>
<tr>
<td>Elfeki</td>
<td>Maryam</td>
<td>14</td>
<td>2</td>
<td>Assessing the Efficiency of Cultivation Techniques to Recover Natural Product Biosynthetic Gene Populations from Sediment</td>
</tr>
<tr>
<td>Esparza</td>
<td>Karina</td>
<td>28</td>
<td>2</td>
<td>Thiostrepton in Sterically Stabilized Phospholipid Micelles: A Promising Antibacterial Nanomedicine</td>
</tr>
<tr>
<td>Florin</td>
<td>Tanja</td>
<td>50</td>
<td>2</td>
<td>Global Analysis of Protein Synthesis Arrest Induced by the Translation Termination Inhibitor Apidaecin</td>
</tr>
<tr>
<td>Galey</td>
<td>Melissa</td>
<td>56</td>
<td>2</td>
<td>Small Molecule Interactions from the Cheese Microbiota: <em>Pseudomonas vs. Candida</em></td>
</tr>
<tr>
<td>Name</td>
<td>Last Name</td>
<td>First Name</td>
<td>ID</td>
<td>Page</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>Gilbertson</td>
<td>Matthew</td>
<td></td>
<td>27</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guo</td>
<td>Brian</td>
<td></td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Guo</td>
<td>Yu Kuang</td>
<td></td>
<td>64</td>
<td>2</td>
</tr>
<tr>
<td>Gutgesell</td>
<td>Lauren</td>
<td></td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardy</td>
<td>Laura</td>
<td></td>
<td>44</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harrigan</td>
<td>Katherine</td>
<td></td>
<td>79</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harrington</td>
<td>Rachel</td>
<td></td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hitzman</td>
<td>Ryan</td>
<td></td>
<td>58</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howell</td>
<td>Caitlin E.</td>
<td></td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huang</td>
<td>Shijie</td>
<td></td>
<td>85</td>
<td>1</td>
</tr>
<tr>
<td>Jastaniah</td>
<td>Ammar</td>
<td></td>
<td>62</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jayawardena</td>
<td>Dulari</td>
<td></td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karthikeyan</td>
<td>Subbulakshmi</td>
<td></td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khudeira</td>
<td>Noor</td>
<td></td>
<td>72</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knopp</td>
<td>Rachel</td>
<td></td>
<td>61</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Langridge</td>
<td>Timothy</td>
<td></td>
<td>67</td>
<td>1</td>
</tr>
<tr>
<td>Lee</td>
<td>Jeongho</td>
<td></td>
<td>82</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lee</td>
<td>Sue Hyun</td>
<td></td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lei</td>
<td>Liyu Elise</td>
<td></td>
<td>73</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lewandowski</td>
<td>Cutler</td>
<td></td>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mangano</td>
<td>Kyle</td>
<td></td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marks</td>
<td>James</td>
<td></td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathes</td>
<td>Kyle</td>
<td></td>
<td>63</td>
<td>1</td>
</tr>
<tr>
<td>May</td>
<td>Daniel</td>
<td></td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meydan</td>
<td>Sezen</td>
<td></td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Meyer</td>
<td>Kevin</td>
<td></td>
<td>74</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nepomuceno</td>
<td>Vanessa</td>
<td></td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okoroike</td>
<td>Henry</td>
<td></td>
<td>76</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petukhova</td>
<td>Valentina</td>
<td></td>
<td>39</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polley</td>
<td>Ellyn</td>
<td>33</td>
<td>1</td>
<td>Fibrosis Criteria Comparison across State Medicaid Programs to Qualify for Direct-acting Antiviral Treatment in Patients with Hepatitis C</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------</td>
<td>----</td>
<td>----</td>
<td>---------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Richardson</td>
<td>Benjamin</td>
<td>32</td>
<td>2</td>
<td>Replacement of a Naphthalene Scaffold in Keap1/Nrf2 Inhibitors</td>
</tr>
<tr>
<td>Rosales</td>
<td>Carlo</td>
<td>65</td>
<td>1</td>
<td>3D Spheroid Cultures of Resistant Breast Cancer Cell Lines as in vitro Models for Drug Discovery</td>
</tr>
<tr>
<td>Rue</td>
<td>Emily</td>
<td>77</td>
<td>1</td>
<td>Fentanyl Analogues: Instrumental Future of Illicit Drug Identification</td>
</tr>
<tr>
<td>Sadhu</td>
<td>Nilanjana</td>
<td>51</td>
<td>1</td>
<td>Single Nucleotide Polymorphisms of GCH1 Associates with Sickle Cell Disease Pain in African Americans</td>
</tr>
<tr>
<td>Saffore</td>
<td>Christopher</td>
<td>17</td>
<td>1</td>
<td>Racial Differences in the Prevalence of Cognitive Impairments and Dementia, Utilization of Chemo-immunotherapy and Mortality in Elderly Diffuse Large b-Cell Lymphoma Patients</td>
</tr>
<tr>
<td>Siddiqui</td>
<td>Zamia</td>
<td>4</td>
<td>2</td>
<td>Olefin-Lactam Double Stapled Peptides as Novel Chemical Probes for Estrogen Receptor-Positive Breast Cancer</td>
</tr>
<tr>
<td>Socco</td>
<td>Samantha</td>
<td>5</td>
<td>1</td>
<td>Nitric Oxide Regulates DNA Methyl Adducts: Implications for Cancer Etiology</td>
</tr>
<tr>
<td>Sokolowski</td>
<td>Karol</td>
<td>9</td>
<td>1</td>
<td>Investigating Glutathione-S-Transferase Induced Glutathione-Micelle Sol-Gel Phenomenon</td>
</tr>
<tr>
<td>Soriagalvarro</td>
<td>Julio C.</td>
<td>52</td>
<td>2</td>
<td>A Nonribosomal Peptide Promotes Motility in Pseudovibrio sp., a Bacterial Symbiont of Marine Sponges</td>
</tr>
<tr>
<td>Speltz</td>
<td>Thomas</td>
<td>29</td>
<td>1</td>
<td>Functionalized Hydrocarbon Stapled Peptides for the Estrogen Receptor/Coactivator Interaction</td>
</tr>
<tr>
<td>Sullivan</td>
<td>Peter</td>
<td>48</td>
<td>2</td>
<td>Correlating Phylogeny and Chemistry to Improve the Cyanobacterial Natural Product Drug Discovery Pipeline</td>
</tr>
<tr>
<td>Summerlin</td>
<td>Matthew</td>
<td>22</td>
<td>2</td>
<td>SORF Proteins as Newcomers in Double-Strand Break Repair by Classical Non-Homologous End Joining</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>36</td>
<td>2</td>
<td>Similar Survival but Increased Toxicity with a Sequential Versus Concurrent FluBu4 Regimen</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>37</td>
<td>1</td>
<td>Acute Kidney Injury before Day 90 Predicts for Both Early and Late Mortality after FluBu4</td>
</tr>
<tr>
<td>Sweiss</td>
<td>Karen</td>
<td>38</td>
<td>2</td>
<td>Collaborative Physician-Pharmacist Multiple Myeloma Autologous Transplant Clinic Improves Guideline Adherence and Prevents Treatment Delays</td>
</tr>
<tr>
<td>Taha</td>
<td>Taha</td>
<td>7</td>
<td>1</td>
<td>Design, Synthesis, and Biological Evaluation of Tetrahydroisoquinoline-Based Histone Deacetylase 8 Selective Inhibitors</td>
</tr>
<tr>
<td>Talon</td>
<td>Brian</td>
<td>42</td>
<td>2</td>
<td>A Work-Sampling Study of an Innovative Pediatric Care-Coordination Program</td>
</tr>
<tr>
<td>Tompkins</td>
<td>Danielle</td>
<td>83</td>
<td>2</td>
<td>Impact of Obesity on Propofol Utilization and Adverse Effects from a Large De-Identified Database</td>
</tr>
<tr>
<td>Tovar</td>
<td>Kayleigh</td>
<td>11</td>
<td>1</td>
<td>Elucidating Rgg-mediated Quorum Sensing Networks in Streptococcus pneumoniae and Testing their Contributions in Pathogenesis</td>
</tr>
<tr>
<td>Underwood</td>
<td>Hannah</td>
<td>84</td>
<td>2</td>
<td>Clinical Response to Salvage Bortezomib Therapy for Antibody Mediated Rejection and Mixed Acute Rejection in a High Immunologic Risk Renal Transplant Population</td>
</tr>
<tr>
<td>Veenstra</td>
<td>Jacob</td>
<td>68</td>
<td>2</td>
<td>Evaluating Mediterranean Herb Extracts and Selected Phytochemicals for the Reversal of Oxidative Stress in Colon Cells</td>
</tr>
<tr>
<td>Weber</td>
<td>Sara</td>
<td>34</td>
<td>2</td>
<td>Antimycobacterial Compounds from Plants and Microbes Reported Between 2000-2017</td>
</tr>
<tr>
<td>Wolf</td>
<td>Nina</td>
<td>80</td>
<td>1</td>
<td>Mutagenesis and Structures of the Mycobacterium tuberculosis Class II Fructose-1,6-Bisphosphatase: Implications for the Active Oligomeric State, Catalytic Mechanism and Possible Regulatory Controls of this Enzyme Class</td>
</tr>
<tr>
<td>Name</td>
<td>Last Name</td>
<td>Age</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>-----</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Won</td>
<td>Kyoung-Jae</td>
<td>81</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wu</td>
<td>Zhaoju</td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Yan</td>
<td>Connie</td>
<td>40</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>Alexandria</td>
<td>43</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Zhou</td>
<td>Jifang</td>
<td>46</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Zink</td>
<td>Katherine</td>
<td>57</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **Won Kyoung-Jae**: atRA-Induced Cholesterol Accumulation is Mediated by CYP7A1 Repression in the Liver
- **Wu Zhaoju**: Risk of Non-Hodgkin Lymphoma with Use of TNF-Alpha Inhibitors among Adult Patients with Rheumatologic Conditions
- **Yan Connie**: Patients’ Self-reported Experience of Community Healthcare Worker Support in Type 2 Diabetes Management
- **Young Alexandria**: Phyllanthusmins Induce Apoptosis and Reduce Tumor Burden in High Grade Serous Ovarian Cancer by Late-stage Autophagy Inhibition
- **Zhou Jifang**: Impact of Delayed Anticoagulant Initiation in Patients with Sickle Cell Disease and Newly Diagnosed Venous Thromboembolism: A Population-Based Cohort Study
- **Zink Katherine**: Developing a Novel Imaging Mass Spectrometry Method to Detect Chemical Communication Driving Metastasis in Ovarian Cancer
1st Floor Poster Locations:

Posters 1-85

Coffee/Water Station

Registration Desk
We’re driven to improve people’s lives.

Takeda strives toward better health for people worldwide through leading innovation in medicine. At Takeda, we make a commitment to make a difference.
SOLVING THE WORLD’S TOUGHEST HEALTH CHALLENGES TAKES ALL OF US.

AbbVie starts with research and innovation to develop and deliver new treatments to manage some of the world’s most difficult diseases.

Our global biopharmaceutical company builds our pipeline to provide solutions in therapeutic areas served by our proven expertise.

To make new solutions available to patients, we team with our scientific peers, physicians, governments and advocacy groups.

When we work together, the result is a remarkable impact on patients’ lives and the healthcare systems which serve them.

abbvie.com

170+ Countries
28,000+ Employees
21 R&D and Manufacturing Sites
ONE Priority: Our Patients
As a global biopharmaceutical company focused on providing innovative therapies, Horizon Pharma is proud to support the 2018 UIC College of Pharmacy Research Day.

Innovative therapies for life

www.horizonpharma.com