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Clinical Pharmacy Department
University of Michigan College of Pharmacy
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EDUCATION

April 2014 **Doctor of Pharmacy with Distinction**
University of Michigan College of Pharmacy
Ann Arbor, MI

May 2010 **Bachelor of Science in Chemistry**
University of Michigan College of Literature, Science and the Arts
Ann Arbor, MI

RESEARCH EXPERIENCE AND TRAINING

June 2019 **Metabolomics Course**
Cold Spring Harbor Laboratory
Cold Spring Harbor, NY

August 2018 **Health Science Teaching Academy**
University of Michigan Center for Research on Learning and Teaching
Ann Arbor, MI

June 2018 **Pathway and Network Analysis of –omics Data**
Bioinformatics.ca
Toronto, ON

March – June 2018 **Interactive Visualization with R**
Sage Campus
Online course

May 2014 – September 2017 **Postdoctoral Research Fellow in Pharmacogenomics**
University of Michigan College of Pharmacy
Ann Arbor, MI
Primary mentor: Vicki Ellingrod, Pharm.D., FCCP

November 2017 **Propensity Score Analysis Workshop**
Statistical Horizons
Chicago, IL

March 2015 **Responsible Conduct of Research Training for K Awardees**
Michigan Institute for Clinical and Health Research
Ann Arbor, MI

December 2014 **“Statistical Analysis for Next Generation Sequencing”**

*University of Alabama at Birmingham's Section on Statistical Genetics
Birmingham, AL*

October 2014

“Statistical Analysis with R” Workshop

*University of Michigan Center for Statistical Consultation and Research
Ann Arbor, MI*

June 2014

Metabolomics Summer Workshop

*Michigan Regional Comprehensive Metabolomics Resource Core
Ann Arbor, MI*

May 2012 – November 2013

Pharm.D. Investigations Research Project in Medicinal Chemistry

*University of Michigan College of Pharmacy
Ann Arbor, MI*

Preceptor: George Garcia, PhD

June 2012 - August 2012

Clinical Research Summer Program: Michigan Institute for Clinical and Health Research (MICHR)

Ann Arbor, MI

Preceptor: Alan Prossin, MD

TEACHING AND MENTORING EXPERIENCE

August 2020 – Present

Pharmacy 723 Co-Course Coordinator and Instructor

- Co-coordinated a course for third year pharmacy students on blood pressure, asthma, and diabetes medication and device management
- Developed a mental health module with pharmacy residents on mood symptom tracking, suicidal ideation assessment, and tardive dyskinesia side effect monitoring

*University of Michigan College of Pharmacy
Ann Arbor, MI*

August 2020 – Present

Pharmacy 702 Instructor

- Instructed students on medication management of depression, anxiety, schizophrenia, bipolar disorder, ADHD and insomnia

*University of Michigan College of Pharmacy
Ann Arbor, MI*

January 2020 – Present

Medical Genetics Seminar Guest Lecturer

- Guided a discussion on pharmacogenetics application in psychiatry through review of basic concepts, key studies, and potential opportunities for collaboration between medical genetics and pharmacy

*University of Michigan Genetics Counseling Program
Ann Arbor, MI*

August 2020 – Present

Pharmacy 621 Instructor

- Instruct nursing students on antipsychotic and lithium medication management

*University of Michigan College of Pharmacy
Ann Arbor, MI*

August 2019 – Present

APPE Preceptor

- Primary preceptor for a rotation in pharmacogenetics
- Michigan Medicine
Ann Arbor, MI*

August 2019 – Present

Residency Rotation Preceptor

- Secondary preceptor on a pharmacogenetics rotation for pharmacists
 - Secondary preceptor for second year pharmacy residents in ambulatory psychiatry
- Michigan Medicine
Ann Arbor, MI*

February - April 2020

Pharmaceutical Science 718 Co-Course Coordinator and Instructor

- Assisted with the design and execution of the pharmacogenetics portion of this course. Roles included syllabus design, course topic selection, presentation of 5 lectures, and homework and exam construction
- University of Michigan College of Pharmacy
Ann Arbor, MI*

October 2018

Study Section Reviewer

- Participated as primary reviewer for a university-sponsored clinician seed grant award program (PORT grant)
- MICHR, University of Michigan
Ann Arbor, MI*

January 2018 – Present

PharmD Investigations Mentor

- Mentored pharmacy students through design, initiation, and data analysis of capstone research projects for the Doctor of Pharmacy degree
- University of Michigan College of Pharmacy
Ann Arbor, MI*

May 2014 – Present

Laboratory Mentor

- Trained pharmacy and undergraduate students on PCR and sequencing techniques
- Ellingrod Lab, University of Michigan College of Pharmacy
Ann Arbor, MI*

CERTIFICATIONS AND LICENSURE

June 2014 – Present

Michigan Board of Pharmacy
Pharmacist, License No. 5302040196

April 2013

American Pharmacists Association
Pharmacy-Based Immunization Delivery Certification

PHARMACY PRACTICE EXPERIENCE

November 2018 – Present

Michigan Medicine

Pharmacogenomics Implementation Pharmacist

- Lead pharmacogenomics implementation efforts in ambulatory psychiatry, and work with a team to assist with pharmacogenomics implementation across the health system

Ann Arbor, MI

May 2014 – Present

University of Michigan Ambulatory Psychiatry

Ambulatory Care Pharmacist

- Collaborate with a team of physicians, nurses, and social workers by providing drug information and contacting patients to assess efficacy and tolerability of medication changes between therapy visits

Ann Arbor, MI

October 2014 – October 2017

Schmidt & Sons Pharmacy

Pharmacist

Tecumseh, MI

May 2014 – May 2015

Progenity

Psychiatric Pharmacogenomics Consultant

- Reviewed pharmacogenomic test results with physicians who ordered the Progenity psychiatric panel
- Consulted on revisions of the psychiatric pharmacogenomic test panel

Ann Arbor, MI

PROFESSIONAL MEMBERSHIPS

College of Psychiatric and Neurologic Pharmacists

American Society of Clinical Psychopharmacology

American College of Clinical Pharmacy

American Association of Colleges of Pharmacy, PGx Sig Committee for PGx Cases, Member

Metabolomics Society

PUBLICATIONS

Journal Articles

Ward KM, Burghardt KJ, Kraal AZ, Jaeger A, Yeomans L, Mchugh C, Karnovsky A, Stringer KA, Ellingrod VL. Genetic and Metabolite Variability in One-Carbon Metabolism Applied to an Insulin Resistance Model in Patients with Schizophrenia Receiving Atypical Antipsychotics. *Frontiers in Psychiatry, Schizophrenia Section*. *Under Revision*

Burghardt KJ, **Ward KM**, Howlett BH, et al. Personal genotyping and student outcomes in genetic and pharmacogenetic teaching: a systematic review and meta-analysis. *Pharmacogenomics* 2021; 22: 423–433.

Ward KM, Taubman DS, Pasternak AL, Burghardt KJ, Ellingrod VL, Parikh S V, et al. Teaching psychiatric pharmacogenomics effectively: Evaluation of a novel interprofessional online course. *J Am Coll Clin Pharm*. 2020;4(2):176–83.

Pasternak AL, **Ward KM**, Ateya MB, Choe HM, Thompson AN, Clark JS, et al. Establishment of a pharmacogenetics service focused on optimizing existing pharmacogenetic testing at a large academic health center. *J Pers Med*. 2020;10(4):1–10.

Ward KM, Citrome L. The treatment of acute agitation associated with schizophrenia or bipolar disorder: investigational drugs in early stages of their clinical development, and their clinical context and potential place in therapy. *Expert Opinion on Investigational Drugs* 2020; 29: 245–257.

Castellani LN, Costa-Dookhan K, McIntyre W, Wright DC, Flowers SA, Hahn M, **Ward, KM**. Preclinical and Clinical Sex Differences in Antipsychotic-Induced Metabolic Disturbances: A Narrative Review of Adiposity and Glucose Metabolism. *J Psychiatry Brain Sci*. 2019;4:e190013.

Ward KM. & Citrome, L. Brexpiprazole for the maintenance treatment of adults with schizophrenia: an evidence-based review and place in therapy. *Neuropsychiatr. Dis. Treat*. Volume 15, 247–257 (2019).

Flowers SA, Baxter NT, **Ward KM**, et al. Effects of Atypical Antipsychotic Treatment and Resistant Starch Supplementation on Gut Microbiome Composition in a Cohort of Patients with Bipolar Disorder or Schizophrenia. *Pharmacother J Hum Pharmacol Drug Ther*. 2019 Feb;39(2):161-170.

Ward KM, Citrome L. Antipsychotic-Related Movement Disorders: Drug-Induced Parkinsonism vs. Tardive Dyskinesia—Key Differences in Pathophysiology and Clinical Management. *Neurol Ther*. 2018 Jul 19.

Burghardt K, **Ward K**, Sanders E, et al. Atypical Antipsychotics and the Human Skeletal Muscle Lipidome. *Metabolites* 2018; 8: 64.

Ward KM, Yeomans L, McHugh C, Kraal AZ, Flowers SA, Rothberg AE, et al. Atypical Antipsychotic Exposure May Not Differentiate Metabolic Phenotypes of Patients with Schizophrenia. *Pharmacotherapy*. 2018 Jun 38(6):638-650.

Lindell VA, Stencil NL, Ives RC, **Ward KM**, Fluent T, Choe HM, et al. A Pilot Evaluating Clinical Pharmacy Services in an Ambulatory Psychiatry Setting. *Psychopharmacol Bull*. 2018 Feb 5;48(2):18–28.

Albano ME, Bostwick JR, **Ward KM**, Fluent T, Choe HM. Discrepancies Identified Through a Telephone-Based, Student-Led Initiative for Medication Reconciliation in Ambulatory Psychiatry. *J Pharm Pract*. 2018 Jun 20;31(3):304–11.

Soreide KK, **Ward KM**, Bostwick JR. Strategies and Solutions for Switching Antidepressant Medications. *Psychiatric Times*. 2017 Dec 15. <http://www.psychiatristimes.com/articles/strategies-and-solutions-switching-antidepressant-medications/page/0/1>.

Ward K, Citrome L. Lisdexamfetamine: chemistry, pharmacodynamics, pharmacokinetics, and clinical efficacy, safety, and tolerability in the treatment of binge eating disorder. *Expert Opin Drug Metab Toxicol*. 2018 Feb 4;14(2):229–38.

Pasternak AL, **Ward KM**, Luzum JA, Ellingrod VL, Hertz DL. Germline Variants with Implications for Disease Risk and Therapeutic Outcomes. *Physiol Genomics*. 2017 Oct 1;49(10):567-581.

Hertz DL, Luzum JA, Pasternak AL, **Ward KM**, Zhu H-J, Rae JM, et al. Institutional profile of pharmacogenetics within University of Michigan College of Pharmacy. *Pharmacogenomics*. 2017 Aug 26;18(12):2017-0107.

Tang SS, BS, Jaward L, **Ward KM**, Parikh SV, Bostwick JR, Impact of a Student Pharmacist Driven Medication Reconciliation and Antidepressant Treatment History Project at a Depression Clinic: A Pilot Study. *Psychopharmacol Bull*. 2017 May 15;47(2):36-41.

Connarn JN, Flowers S, Kelly M, Luo R, **Ward KM**, Harrington G, et al. Pharmacokinetics and Pharmacogenomics of Bupropion in Three Different Formulations with Different Release Kinetics in Healthy Human Volunteers. *AAPS J*. 2017 Sep 6;19(5):1513–22.

Kraal AZ, **Ward KM**, Ellingrod VE. Sex Differences in Antipsychotic Related Metabolic Functioning in Schizophrenia Spectrum Disorders. *Psychopharmacology Bull*. 2017 May 15;47(2):8-21.

Ward KM, Kraal AZ, Flowers SA, Ellingrod VE. Cardiovascular Pharmacogenomics and Cognitive Function in Schizophrenia Patients Grouped by Educational Level. 2017. *Pharmacotherapy*. 2017 Sep;37(9):1122-1130.

Flowers SA, Evans SJ, **Ward KM**, McInnis MG, Ellingrod VL. Interaction between Atypical Antipsychotics and the Gut Microbiome in a Bipolar Disease Cohort. *Pharmacotherapy*. 2017 Mar;37(3):261-267.

Wiese KM, Ellingrod VL. Do glutamatergic drugs have a role in treating depression? *Current Psychiatry*. 2015;14(2):14-27.

Wiese KM, Ellingrod VL. Avoiding common drug-drug interactions. *Current Psychiatry*. 2015;14(7):21-32.

Burghardt KJ, Evans SJ, **Wiese KM**, Ellingrod VL. An Untargeted Metabolomics Analysis of Antipsychotic Use in Bipolar Disorder. *Clin Transl Sci*. 2015;5:432-40.

Book Chapter

Wiese KM, Flowers SA, Ellingrod VL. 2016. Pharmacogenomics. In: Jann MW, Penzak SR, and Cohen LJ ed. *Applied Clinical Pharmacokinetics and Pharmacodynamics of Psychopharmacological Agents* (121-135). New York: Adis.

Continuing Education

Wiese KM. Pharmacotherapeutic Agents for Smoking Cessation. Written for Power-Pak C.E. 2016.

POSTERS AND PRESENTATIONS

Dean M, Michalski K, Shakeel F, **Ward KM**. Impact of CYP2C19 polymorphisms in the treatment of anxiety and depression with sertraline, escitalopram, or citalopram. College of Psychiatric and Neurologic Pharmacists. Virtual. April 2021.

Aroh C, Erickson S, **Ward KM**. Association Between Antidepressant Adverse Effects and Pharmacogenetics in Patients with Neurodevelopmental Disorders. College of Psychiatric and Neurologic Pharmacists. Virtual. April 2021.

Pasternak A, **Ward KM**. A Pharmacist's Guide to Applying Pharmacogenetics in Practice. Rowe Lecture Series, University of Michigan College of Pharmacy, Ann Arbor, MI. October 2019.

Ward KM, Kraal AZ, Das A, Stringer KA, Ellingrod VE. Variable Free Fatty Acid Composition Associated with *SREBF* variant in Schizophrenia Participants Taking Atypical Antipsychotics. American Society of Clinical Psychopharmacology, Miami, FL. May 2019.

Ward KM. Drug Interactions and Pharmacogenomics. Michigan Medicine ePsychopharmacology Course. Ann Arbor, MI. April 2017.

Ward KM, Kraal AZ, Yeomans L, McHugh C, Karnovsky A, Stringer KA, Ellingrod VE. Genetic and Metabolite Variability in Folate Metabolism Applied to an Insulin Resistance Model in Patients With Schizophrenia on Atypical Antipsychotics. American Society of Clinical Psychopharmacology, Miami, FL. May 2018

Tang SS, Jaward L, **Ward KM**, Parikh SV, Bostwick JR. Antidepressant Treatment History Project at a Depression Clinic: A Pilot Study. American College of Clinical Pharmacy. Virtual Poster Symposium. May 2017.

Ward KM, Stringer KA, Ellingrod VE. Variable Free Fatty Acid Composition Associated with *SREBF* in Schizophrenia Participants Taking Atypical Antipsychotics. American Society of Clinical Psychopharmacology, Miami, FL. May 2017.

Wiese KM, McHugh CE, Yeomans L, Flowers SA, Kraal AZ, Huddle B, Karnovsky A, Ellingrod VL, Stringer KA. Serum Metabolomics of Schizophrenia Participants by Fasting Insulin Reveals a Broad Metabolic Range Not Associated with Current Atypical Antipsychotic Therapy. 3rd Metabolomics Conference, Boston, MA. May 2016.

Wiese KM, McHugh CE, Yeomans L, Flowers SA, Kraal AZ, Huddle B, Karnovsky A, Ellingrod VL, Stringer KA. Serum ¹H-Nuclear Magnetic Resonance (NMR) Metabolomics Reveals Differentiating Phenotypes of Variable Cardiovascular Disease Risk in Schizophrenia Patients Receiving Atypical Antipsychotics. Australasian Schizophrenia Conference, Melbourne Australia. September 2015.

Kraal AZ, **Wiese KM**, Dougherty RJ, Grove TB, Ellingrod VL. Antipsychotic and sex differences in metabolic functioning in schizophrenia. 26th annual Albert J. Silverman Research Conference, Ann Arbor, MI. May 2015.

Bostwick JR, Bowling A, Albano M, **Wiese KM**, Choe HM, Fluent TE. A pharmacist-led initiative for telephone medication reconciliation in the setting of an ambulatory psychiatry clinic. College of Psychiatric and Neurologic Pharmacists Annual Meeting, Tampa, FL. April 2015.

Kaplow JB, Burnside AN, **Wiese KM**, Abelson J, Prossin AR. Biological and Environmental Markers of Grief-Related Psychiatric Symptoms in Parentally Bereaved Children: The Interplay of Hormones, Inflammation, and Cause of Death. American Academy of Child and Adolescent Psychiatry Annual Meeting, October 2013.

Wiese KM, Garcia G. PharmD Investigations Project: Development of a High Throughput Screening Assay for Novel Inhibitors of the *Mycobacterium tuberculosis* RNA Polymerase. University of Michigan College of Pharmacy, Ann Arbor, MI. November 2013.

HONORS AND AWARDS

March 2021

Making a Difference Award
Michigan Medicine, Department of Psychiatry
Ann Arbor, MI

November 2020

Making a Difference Award

*Michigan Medicine, Department of Psychiatry
Ann Arbor, MI*

March 2019

Helmsley Fellowship
*Cold Spring Harbor Laboratory
Cold Spring Harbor, NY*

July 2018 – June 2020

National Institute of Health Loan Repayment Program Awardee
National Institute of General Medical Sciences

May 2017

New Investigator Award
*American Society of Clinical Psychopharmacology
Miami, FL*

September 2012 and 2013

Walgreens' Family Alumni Scholarship
*University of Michigan College of Pharmacy
Ann Arbor, MI*

February 2013

Officer of the Month Award
*Phi Delta Chi, Alpha Chapter, University of Michigan
Ann Arbor, MI*

April 2012

Rho Chi Recognition Certificate
*Rho Chi, University of Michigan
Ann Arbor, MI*

November 2011

Brother of the Month Award
*Phi Delta Chi, Alpha Chapter, University of Michigan
Ann Arbor, MI*

September 2011

Dean's Scholarship
*University of Michigan College of Pharmacy
Ann Arbor, MI*

GRANT PROPOSALS AND RESEARCH PROJECTS

Eisenberg Translational Award (Ward) 8/1/20 – 7/31/21
University of Michigan Depression Center

- The goal of this research project is to collaborate with psychiatrists and bioinformatics faculty to describe metabolomics changes associated with risperidone-induced weight gain

MCubed Collaborative Research Project (Ward) 3/1/19-5/31/20
University of Michigan Office of the Provost

- The goal of this study is to work with Co-Investigators in Pharmacy and Psychiatry to implement, and provide education, around a gene-drug pair with relevant dosing guidelines in psychiatry and cardiology (CYP2C19). There is a paired retrospective component to this analysis that we hope will be an indicator of the potential for pre-emptive testing in patients prescribed select antidepressants.

Psychiatric Pharmacogenomics: A Practical Guide to Gene – Drug Interactions and Tests 3/1/19-2/28/20
University of Michigan Medical School Office of CME and Lifelong Learning (Parikh and Ward)

- The goal of this study is to assess outcomes of webinar-based CE for prescribers on a local, state-wide, and national level

KL1 TR002241-01 (Ward) 8/1/17-2/28/20

Michigan Institute for Clinical and Health Research

Pharmacometabolomic Mechanisms of Atypical Antipsychotic-Induced Adverse Events

Role: Primary Investigator

- The primary goal of this study is to identify changes in the metabolome associated with variable adverse metabolic response to atypical antipsychotics, as measured by change in fasting insulin from baseline to 3 months post treatment in patients with schizophrenia and minimal previous antipsychotic exposure

R01 MH082784 (Ellingrod)

5/1/08 – 6/30/18

National Institute of Mental Health

Antipsychotic and Folate Pharmacogenetics

Role: Investigator

- The major goal of this study is to examine folate pharmacogenomics in relation to metabolic syndrome, insulin resistance, and endothelial dysfunction from atypical antipsychotic use in schizophrenia and to determine the utility of folate supplementation in attenuation of these complications.

National Institute of Mental Health

06/01/14-05/31/2015

Antipsychotic and Folate Pharmacogenetics (R01 MH082784) Metabolomics Supplement (Ellingrod)

Role: Investigator

- The purpose of this supplement is to generate metabolomics data that can be used to identify correlational relationships between metabolic profiles and clinical phenotypes of schizophrenia patients treated with AAPs.

FDA HHSF223201310164C (Sun)

9/27/13-11/15/15

Investigation of Release Profiles of Bupropion and Pharmacogenomics of Metabolism Enzymes for

Bioequivalence of Generic Bupropion Products in Healthy Volunteers

Role: Co-Investigator

- The objectives of this project are to understand whether and how the release pattern of bupropion HCl products and the genotype of metabolic enzyme affect the bioequivalence conclusions across different dose strengths within one product line due to the saturation of intestinal metabolism.