

ECP Gazette

Fall 2023



COLLEGE OF PHARMACY

UNIVERSITY OF MINNESOTA

Driven to DiscoverSM

ECP Gazette

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Professor

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Professor; Weaver Endowed Chair; Director,
Center for Orphan Drug Research

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Elizabeth Hirsch, PharmD

Associate Professor

R. Stephanie Huang, PhD

Professor

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ECP Gazette is published by the University of Minnesota College of Pharmacy's Department of Experimental and Clinical Pharmacology for faculty, staff, students, alumni, and friends of the department. Send correspondence to Becky Palapala, 7-115 Weaver-Densford Hall, 308 Harvard Street, SE, Minneapolis, MN 55455. This publication is available in alternative formats upon request. Contact 612-624-7639 for more information.

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DEAR FRIENDS,

The excitement of fall semester is palpable. Incoming professional students are beginning the College of Pharmacy's newly-minted MNspire program, and along with an outstanding new cohort of graduate students, they inspire us all to provide the best environment possible for training the next generation of pharmacists and experimental and clinical pharmacologists. As we reflect upon our accomplishments in the first half of 2023 and project forward to the latter half, it is important to acknowledge that our research, educational activities, and service commitments have taken on an added layer of intensity with the launch of our new curriculum and preparations for an upcoming accreditation visit in October. I am confident our ECP faculty will rise to the challenge.

Our department looks forward to the results of an ongoing search for a new faculty position in pharmacometrics. We hope that filling this critical position will further our department's historical reputation as a leading entity training the experts in the use of pharmacometrics as a critical component to enhance our translational research initiatives.

Current global events, including those shaping our political, economic climate and societal environment, underscore the importance of our mission and commitment to improving healthcare for Minnesotans and those beyond our borders. As we grapple with challenges to reconcile the appropriate roles of judicial and government regulatory agencies in the guidance of optimal healthcare for members of our society, our department prides itself on contributing to the education of future leaders to advance new knowledge through discovery and expertise, developed through education and practice. Through our people, our work helps inform society of the optimal use of medications to improve the health and wellbeing of members of our community.

ECP's accomplishments are possible because of our outstanding laboratory staff and scientists and dedicated graduate students and post-doctoral trainees. Our department is grateful for the administrative support afforded us by competent individuals including Zack McGough, Becky Palapala, Susan Williford and Lori Endsley. In staffing updates, we extend our hearty congratulations to Reena Kartha on her promotion to associate professor, and bid farewell to Katherine Goffin, who recently departed ECP to take on a new role within the College of Pharmacy. She will be missed, and we wish her success.

I hope you enjoy reading our ECP faculty spotlight and a profile of our innovative PGx Clinical Workforce Training Program, along with other news and developments from spring and summer around the department.

I bid you all a safe, healthy, and productive fall and winter season as you enjoy this edition of our ECP newsletter.

Sincerely,

A handwritten signature in dark ink that reads "Robert J. Straka". The signature is fluid and cursive, with a large, stylized 'R' and 'S'.

Robert Straka, PharmD
Professor and Department Head

RECENT PROMOTIONS



REENA KARTHA, PHD

Dr. Reena Kartha was promoted to associate professor in the Department of Experimental and Clinical Pharmacology. Her expertise in translational research exploring the roles of therapeutic agents which modulate oxidative stress and inflammation represents important work to advance therapies to treat select rare diseases. Her scholarly achievements include over 35 refereed research publications, many as senior or corresponding author in high-impact journals, and receipt of national grants from NIH and other sources that fuel new discoveries in her field. Dr. Kartha's teaching contributions are significant at each of the undergraduate, professional, and graduate levels of instruction--noting her recognition as an "outstanding junior mentor award from the CTSI in 2017" and offering of a "Grand Challenge Honors Course on Rare Diseases" in particular. Her recognition on a national and international basis continues to grow as is evident from her invited speaking engagements as well as her service commitments to the field of rare diseases and her leadership in advancing diversity, equity and inclusion initiatives at the College of Pharmacy and beyond.

WELCOME NEW ECP GRAD STUDENTS!



Kuber Bajgain

Advisor: Advisor: Ling Li, DVM, PhD

Jo Calihan

Advisor: Angela Birnbaum, PhD

Tiffany Chang

Advisors: Elizabeth Hirsch, PharmD, RPh and
Melanie Nicol, PharmD, PhD

Mary Raphel Daniel

Advisor: Beshay Zordoky, PhD

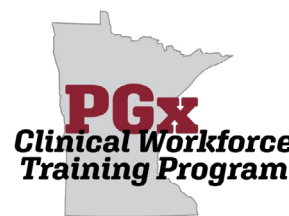
Nathan Phan

Advisors: Reena Kartha, PhD and Jim Cloyd, PharmD

Bovornpat Suriyapakorn

Advisor: Lisa Coles, PhD

PGX CLINICAL WORKFORCE TRAINING PROGRAM



Preparing early leaders in PGx implementation and practice

As a profession, pharmacy is in the early stages of readying its current workforce for Pharmacogenomics-guided healthcare. Pharmacogenomics (PGx)--a field of practice and research focused on how a person's genes affect how they respond to medications--is not yet used clinically in most healthcare organizations, but access to the PGx training, research, and program support necessary to implement PGx is especially lacking in rural areas and those primarily caring for underserved groups. The challenge of advancing training while working full-time can be costly for practicing pharmacists and—for those not in the Twin Cities metro or southeastern regions of Minnesota—can mean traveling great distances at substantial cost to reach training opportunities.

Pharmacogenomics experts, the University of Minnesota, and the State of Minnesota recognized that to fully and equitably realize the benefits of PGx, all of Minnesota's current pharmacists need access to top-quality PGx training. To that end, the University of Minnesota College of Pharmacy created the PGx Clinical Workforce Training Program. This 9-month program is supported by a 3-year workforce education grant from the Minnesota Department of Health's Office of Rural Health and Primary Care and consists of a 16-week, self-paced online didactic course in PGx, an 8-hour case-based training workshop at the University of Minnesota, and a 2-day national PGx conference at the University of Minnesota. Upon completing the program, participating pharmacists receive a certificate in PGx from the University of Minnesota College of Pharmacy.

Now in its second year, the program has wide interest from pharmacists across the state in a number of clinical settings, including hospital, retail pharmacy, clinics, managed care, and long term care. Although most pharmacists stated their institutions had not yet implemented a PGx program, around one third of the second cohort indicated their organization either had a PGx program or were currently in the process of implementing one, which will ultimately require greater depth and breadth of PGx knowledge from practitioners in those systems. Most participants expected their organizations would increase their use of PGx testing services over the next 3 years. The cost of training and implementation, reimbursement issues,

and lack of support from leadership are barriers most noted by pharmacists who engaged with the program. The Workforce Training Program addresses financial barriers directly by reimbursing its trainees for their time and compensating them for travel costs, conference registration, and continuing education fees.

“

I enjoyed this course immensely! It was informative and fun to connect with pharmacists from across the state. Overall, I felt it was a great use of my time and look forward to following the development and implementation of PGx programs at my site and beyond.

2023 program participant

On June 15th and 16th, 2023, 21 pharmacists from the second cohort traveled to the University of Minnesota-Twin Cities campus for the 8-hour workshop portion of the training program. The workshop was hosted by UMN Pharmacy faculty Jacob Brown, PharmD, MS and Pamala Jacobson, PharmD, as well as graduate student Moataz Mohamed, MSc.

The cohort had recently completed their 16-week course in advanced PGx, along with supplementary educational opportunities. The trainees visited OneOme, a local PGx testing company based in Northeast Minneapolis, and participated in an all-day, on campus, case workshop where they discussed clinical PGx cases and learned from experts in the field about relevant applications.

The program will conclude along with the grant after the third year, but Jacob Brown, one of the project leads, is optimistic for other opportunities going forward: “We are continuing to explore ways to offer PGx education to pharmacists in Minnesota, and with [the College of Pharmacy's] new MNspire PharmD curriculum, we hope to increase the amount of PGx training and education our students receive, with the long-term goal that any pharmacist will be capable of utilizing PGx when available.”

ECP SPOTLIGHT: FACULTY



LISA COLES, MS, PHD

Please describe your academic background and how you came to the faculty of ECP.

One thing I love about the ECP department is that the faculty have a very diverse academic background. My educational journey began at Iowa State University where I obtained a BS in chemical engineering. I then moved on to the University of Minnesota where I received a MS in biomedical engineering from the University of Minnesota. Upon graduating with an MS degree and prior to my doctoral training, I spent 4+ years at 3M Pharmaceuticals directing preclinical and phase I clinical PK and PD studies, participating in discovery/development teams, and preparing regulatory documents. This experience exposed me to pharmaceutical drug development and regulatory processes and increased my expertise in preclinical and clinical study design as well as PK and PD modeling and simulation.

I then completed a PhD at the University of Maryland, School of Pharmacy in Pharmaceutical Sciences with an emphasis on pharmacokinetics/pharmacodynamic modeling and simulation. While in Maryland, I also had the opportunity to complete an internship at the FDA. These experiences prepared me for a post-doctoral fellowship at the Center for Orphan Drug Research (CODR). During my fellowship, I gained experience working with multi-disciplinary teams in clinical research with an emphasis on using mathematical models to explain results of clinical trials with the aim of optimizing pharmacotherapy. Upon completing my fellowship, I transitioned to a research position within CODR and an adjunct Research Assistant Professor position in ECP. This afforded me the opportunity to develop new collaborations, increase teaching responsibilities and build my own research program.

What types of projects are you currently working on?

My research and teaching interests are in the areas of translational and clinical neuropharmacology and pharmacometrics. I use pharmacokinetic and exposure-response models to aid in the research and development of novel therapies and to improve the use of currently available drugs in neurological and endocrine disorders. My research program focuses on three therapeutic areas: epilepsy, adrenal insufficiency, and impaired awareness of hypoglycemia.

In the epilepsy space, I am working to identify new therapies for seizure emergencies and to prevent the development of epilepsy following traumatic brain injury. For example, I am part of a research team that is developing a project to study the efficacy of ketamine as adjuvant therapy to levetiracetam for treatment of established status epilepticus. I am the pharmacometrician on an NIH-funded clinical study aimed to evaluate the efficacy of levetiracetam for neonatal seizures. For both of these projects, my role is to develop and use exposure-response models that may be used to explain successes and failures among patients, enable precision dosing for subpopulations, and generate post-treatment management tools.

In parallel with clinical research, I am conducting translational research as an investigator in the multi-national, multi-disciplinary projects (NINDS- and DOD-grant numbers) aimed at identifying biomarkers that will help determine whether individuals will go on to develop epilepsy following traumatic brain injury and develop therapies to prevent epileptogenesis--the process by which a previously normal brain is functionally altered towards the generation of the abnormal electrical activity that subserves chronic seizures.

How did you arrive at these topics as a focus for your research? What makes them appealing to you?

I have always been interested in using quantitative tools to help make decisions. The use of mathematical models has been a constant in my education and experiences. Integrating pharmacometric approaches into my research has allowed me to expand my approach to tackling questions around dose optimization. Epilepsy is a vastly heterogeneous disorder. Incorporating sources of variability will be critical for identifying the most appropriate therapies and optimal dosing regimens.

What is your vision for the way your research might affect patient care or outcomes? What topics/research paths would you like to explore next?

Identification of anti-epileptogenic therapies will not only be critical for treatment of traumatic brain injuries but these findings may also be translated into other epilepsies. Lastly, the modeling conducted with animal data will be scaled to aid in the design of the clinical studies. In terms of seizure management, I hope that my research plays a critical role in identifying new therapies for seizure emergencies, enabling precision dosing for subpopulations, and generating post-treatment management tools.



FACULTY NEWS



Jeffery Bishop



R. Stephanie Huang



Pamela Jacobson



Ling Li



Melanie Nichol



Beshay Zordoky

GRANTS

Jeffrey Bishop is the recipient of a College of Pharmacy STRIDES award for “Pharmacogenomics to guide antidepressant selection in adolescents.”

R. Stephanie Huang was awarded an NIH/NCI Innovation Pilot Project. This was an outcome from receiving a new RO1 grant from NIH/NCI (RO1CA174777, PI Scott Dehm) as a co-PI.

Pamala Jacobson received a grant entitled “Pharmacogenomic (PGx) Locker: Development of a Participant-Controlled PGx Data Repository for Drug Biomarker Discovery” from the University of Minnesota Informatics Institute. The object of the grant is to develop a pharmacogenomics (PGx) research repository (PGxLocker) that will obtain, store and make available for research a large and diverse collection of de-identified clinical PGx genotyping results, medication records and health outcomes from electronic health records (EHR). The project will create the necessary governance and researcher access policies, and obtain IRB approval from the University of Minnesota. The feasibility of the repository to provide data and consent processes will be tested by enrolling 50 participants who have PGx test results connecting to their medication and EHR data, and identify a project for submission for federal funding using the PGxLocker.

Ling Li received several recent grants. She is PI on a CoP SURGE (Strategic Use of Resources for Revenue Generating Enterprise) award for the research project entitled “HDL Mimetic Peptides to Mitigate SARS-CoV-2 Infection-Induced Neuroinflammation and Cerebrovascular Injury.” She is PI and Contact PI with Danni Li (MPI; Medical School), on a new NIH/NIA RO1 grant AG081426 entitled “Impact of Mitochondrial Lipidomic Dynamics and its Interaction with APOE Isoforms on Brain Aging and Alzheimer’s Disease.” Additionally, Dr. Li is a co-investigator on the NIH/NIA supplemental grant 5RO1AG069768-03S entitled “MUFA-SIRT1 signaling as a central node regulating healthspan” (PI: Mashek), to investigate the effects of MUFA and SIRT1 on cognitive function and Alzheimer’s disease. She is also a co-investigator on the NIH supplemental grant 5RO1ES023350-10S entitled “DNA Protein Cross-Links: Cellular Effects and Repair Mechanisms” (PI: Tretyakova), to investigate the role of DNA-Protein Cross-linking in aging and Alzheimer’s disease. Last, Dr. Li is a mentor on the NIH/NIA training grant T32 AG029796 entitled “Functional Multi-omics of Aging Training Grant” (MPIs: Lowe; Arriaga; Niedernhofer).

Melanie Nichol is co-investigator on a newly funded R21 grant entitled “Identifying CMV Retinitis as a Reversible Cause of Vision Loss in Persons with HIV-associated Meningitis” from the National Eye Institute. PI is Caleb Skipper from the Division of Infectious Disease and International Medicine.

Beshay Zordoky is the PI on a new CoP award entitled “Deciphering the Role of AMPK in Carfilzomib-induced Cardiovascular Dysfunction.”

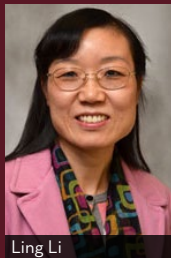
FACULTY NEWS



Reena Kartha



Melanie Nicol



Ling Li

AWARDS AND RECOGNITION

Reena Kartha was invited to serve on the External Advisory Committee of the 2023 National Organization of Rare Disorders (NORD) Rare Diseases and Orphan Products Breakthrough Summit.

Melanie Nicol was appointed to the ASCPT Scientific Programming Committee. Dr. Nicol has also been appointed as ECP's Associate Director for Graduate Studies as of July 2023.

MEDIA AND PUBLICATIONS

Reena Kartha was interviewed by Drug Discovery News along with **James Cloyd**. The article, entitled "Finding a Home for Orphan Diseases," was published online in their April issue.

Ling Li presented her team's research findings on long COVID, APOE genotype, and risk of Alzheimer's disease at the International Conference on Alzheimer's and Parkinson's Diseases 2023 (AD/PD 2023) and her presentation was highlighted by a major news Forum on Alzheimer's disease, AlzForum.

STUDENT NEWS



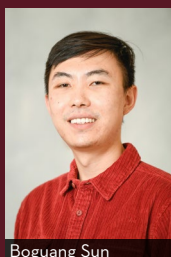
Charul Avachat



Morgan Bixby



Abdelrahman Saqr



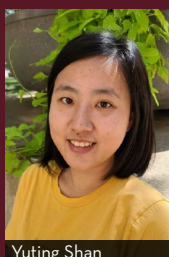
Boguang Sun



Jessica Barry



Yuhan Long



Yuting Shan



Lusi Zhang

Charul Avachat's ASCPT 2024 annual meeting proposal was accepted and was scored among the top proposals submitted this year.

Jessica Barry was awarded an American Foundation for Pharmaceutical Education (AFPE) Pre-Doctoral Fellowship.

Morgan Bixby, PhD candidate in the Hirsch lab, was awarded an IDWeek Kass abstract award to help defray the costs of traveling to IDWeek in Boston in October. Her abstract was accepted for oral presentation.

Yuhan Long's Abstract "Characterization of Estradiol, Estrone, and Progesterone Concentrations in Subpopulations of Pregnant Patients with Epilepsy on Lamotrigine" was selected for a platform presentation in addition to the basic poster presentation. Yuhan also had his abstract selected as a poster presentation at the Broadening Representation and Inclusion by Growing Diversity and Equity (BRIDGE) poster session at the American Epilepsy Society Annual Meeting in addition to the basic poster session.

Chandini Nair (2023 PharmD graduate) received the Class of 2023 Izaak M. Kolthoff Research Award. Chandini was on the ECP Research Emphasis Track (Advisor: Beshay Zordoky).

Abdelrahman Saqr attended the Uppsala Pharmacometrics Summer School in Uppsala, Sweden. The Pharmacometrics Summer School is a prestigious training program, where only 30 PhD students are selected worldwide to participate in a 2-week intensive summer program. All students present a poster from their PhD work and participate in applying knowledge and science they gain during the 2 weeks in a group project that is also presented by the students on the last day of the summer school. Saqr was also selected for a summer internship at Eli Lilly in the global PKPD and pharmacometrics department.

Yuting Shan was selected to receive the PGRN Presidential Abstract Award. She presented her abstract orally at the PGRN 2023 annual meeting. Shan was also selected to give a flash talk at the MCC Microbiome & Cancer Symposium.

Boguang Sun's project, "Development of pharmacological statin-associated muscle symptoms phenotyping algorithms using electronic health records data," has been selected as a podium presentation out of over 1400 submissions at the American Medical Informatics Association Annual Symposium.

Lusi Zhang is the recipient of a Pharmacogenomics Research Network (PGRN) travel award. She was also awarded a 2023 Spring Council of Graduate Students (COGS) Conference Grant.

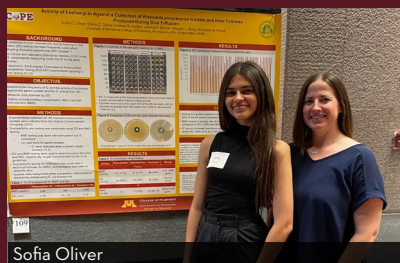
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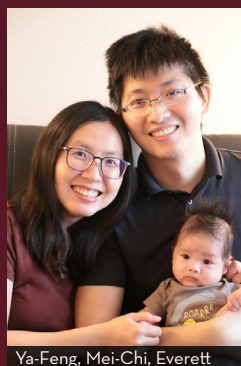
Natalie, Betsy, and Diana



Usha Mishra



Sofia Oliver



Ya-Feng, Mei-Chi, Everett

During spring semester, the **ECP Diversity, Equity, and Inclusion (DEI) Task Force** hosted a special panel discussion on bullying and bias in science. Panelists **Elizabeth Hirsch, PharmD, FCCP, FIDSA**; Raquel Rodriguez, PhD; and **Susan Marino, PhD** shared personal experiences and insights on the impacts of this pervasive issue. The seminar aimed to continue a dialogue about the ways our scientific community can better foster a more diverse, inclusive, and equitable environment for all. The ECP DEI task force is committed to continued efforts to organize and promote future educational opportunities for upcoming semesters. Task force meetings are open to all ECP faculty, staff, post-docs, and students.

Dr. Diana Langworthy (PCHS), **Dr. Betsy Hirsch (ECP)**, and Natasha Bellefeuille (Student Advisor & Student Support Services Coordinator) at the College's Ice Cream social on Sept 5. Dr. Hirsch serves as the Twin Cities faculty advisor for the incoming PD1 cohort beginning in the new MNspire curriculum.

Allison Chang, a 3rd year Neuroscience PhD student in the Li Lab, received the predoctoral fellowship from the NIH T32 Training Grant "Functional Multi-omics of Aging" (FMATG). The period of support is effective July 1, 2023 through June 30, 2024, with opportunity for a full second year of support pending adequate progress toward degree.

Zack McGough received a College of Pharmacy Above and Beyond Award for his work in 2021-2022.

Usha Mishra was elected as the current president of the Minnesota Mass Spectrometry Society.

Sofia Oliver, summer SCoPE student from the University of Puerto Rico in the **Hirsch** lab, presented her research poster entitled "Activity of Fosfomycin Against a Collection of Klebsiella pneumoniae Isolates and Inner Colonies Produced During Disk Diffusion" at the UMN Summer Undergraduate Research Symposium on August 10, 2023.

Marcia Terluk, Research Scientist, was selected for a platform presentation entitled "Targeting Mitochondrial Metabolism using Nervonic Acid in Adrenoleukodystrophy" at the United Mitochondrial Disease Foundation Mitochondrial Medicine 2023 Symposium in Charlotte, NC, USA June 28-July 1.

Alumnus Ya-Feng (Jay) Wen and current grad student **Mei-Chi (Judy) Su** are now proud parents of Everett (Hao-Yun) Wen Born June 5, 2023. All doing very well.

ECP Graduate Program Coordinator **Susan Williford** received a College of Pharmacy Meritorious Service Award for her work in 2022.

ECP OUTING: LAKEFRONT PARK, HUDSON, WI | Aug. 9, 2023

