

Indispensable News

MinneCeutics

PHARMACEUTICS FACULTY

William F. Elmquist

Carolyn A. Fairbanks

Karunya K. Kandimalla

Jayanth Panyam

Henning Schroeder

Ronald A. Siegel

Changquan Calvin Sun

Raj G. Suryanarayanan

Timothy S. Wiedmann

AFFILIATE FACULTY

Walid M. Awni, AbbVie

Richard C. Brundage, Dept. of Experimental and Clinical Pharmacology, University of Minnesota

Lester R. Drewes, Dept. of Biochemistry and Molecular Biology, University of Minnesota Duluth

Michael D. Karol, Synta Pharmaceuticals

David A. Largaespada, Genetics, Cell Biology, and Development, University of Minnesota

Z. Jane Li, Boehringer-Ingelheim Pharmaceuticals, Inc.

Swayam Prabha, Dept. of Experimental and Clinical Pharmacology, University of Minnesota

Theresa M. Reineke, Dept. of Chemistry, University of Minnesota

Jann N. Sarkaria, Dept. of Radiation Oncology, Mayo Clinic

Ronald J. Sawchuk, emeritus

Evgeniy Y. Shalaev, Allergan

Chun Wang, Dept. of Biomedical Engineering, University of Minnesota

Joseph A. Zasadzinski, Dept. of Chemical Engineering and Materials Science, University of Minnesota

From the Department Head

Greetings Dear Friends!

I hope you had a wonderful summer and are ready to embrace the excitement of fall! As warm weather gives way to cooler temperatures and colorful trees, and jackets make their reappearance alongside sandals worn defiantly over socks, the most notable adjustment for me is getting my kids settled into their new school routines.

The same is true for the new batch of graduate students settling in on campus. The opportunity to watch these incoming students mature into scientists during their time at the University is always a rewarding experience, for myself and other faculty.

While the Department looks forward to what these new students will achieve, it also prides itself on the accomplishments of this past year. Most notably, the external peer review and strategic planning for the next five years.

The external departmental review (EDR) was conducted due to recent and upcoming leadership changes and the need to articulate a cohesive departmental vision prior to the new deanship. Reviewers praised the Department for its strong reputation in pharmaceutical technology and PK-PD; its evolving strength in neuroscience research; its near 100% job placement for graduates; its diverse collaborations; and its leadership in the AeroCore and CTDD programs. Nonetheless, there is still room for growth. Several suggested areas of improvement were increasing the recruitment of domestic students, re-engaging PharmD students in Pharmaceutics curriculum, building more internal collaborations, and developing a clear succession plan.

Based on the EDR report, the resulting five main goals of the 2016-2021 strategic plan are 1) to retain expertise and diversify the research scope via new hires; 2) expand influence and gauge impact; 3) diversify the student base; 4) embrace flexible course delivery; and 5) create and maintain an innovative curriculum. A detailed strategic plan document will soon be sent to all our stakeholders.

This year we also celebrated the highly productive career of Professor Cheryl Zimmerman. While her research significantly impacted the areas of drug metabolism and tobacco carcinogenesis, Cheryl's teaching impacted people. Many of her laboratory alumni returned to help celebrate her retirement and lauded her as a superb colleague and mentor. You can see some pictures from the event on page 20.

Also soon to be leaving the College of Pharmacy is Dean Marilyn Speedie, who has decided to step down after twenty years of outstanding leadership. Candidate interviews for the new deanship are scheduled for the first two weeks of November and we expect to have a new dean in office sometime next year.

Before that happens though, we have a busy year ahead. In addition to hiring for a new faculty line (the position description can be found at www.pharmacy.umn.edu/departments/pharmaceutics), we are also seeking avenues to establish another faculty position in materials science aspects of macromolecules. This position, along with the other position in quantitative macromolecular delivery, will nicely complement the existing strengths of the Department and further enhance industry ties. Any ideas for funding this position are encouraged from our alumni and friends.

As always, I welcome your feedback on any Department-related activity, including the strategic plan, and hope to see many of you at various professional meetings soon. If you plan to be in the Twin Cities, please stop by for a visit!

Until then,

Jayanth Panyam, PhD

Professor and Department Head



Alumni News (cont.)

Amardeep Bhalla, PhD [2007], has joined Celgene Corporation as a senior manager, working in biologics drug product development.

Makarand Jawadekar, PhD [1982], spent his entire professional tenure after earning his degree at Pfizer Global Research and Development. He worked for Pfizer for over 28 years and took an early retirement in 2010. Since then he has been on the boards of directors for various pharmaceutical and biotech companies. In August 2016, Mak was nominated as the new chief science officer for PreveCeutical Medical Inc., a health and wellness company based in Vancouver, British Columbia, Canada. He will be leading the company's pre-clinical evaluation program and will be instrumental with external partnerships and alliances for research and drug development.

Mak also received a Lifetime Achievement Award from the Marathi Literary Society (known locally as the Annual Marathi Sahitya Sammelan). The event took place in January 2016 in Pune, Maharashtra State, India with a live audience of 10,000 people and televised nationally all over India.

Khushboo Kothari, PhD [2014], and her husband, Amit Gangar, Medicinal Chemistry PhD [2013], welcomed their daughter, Mishka Amit Gangar, on August 5, 2016.

Mehak Mehta, PhD [2016], recently accepted a position in the Protein Drug Development Group at Biogen in Cambridge, Massachusetts. She and Kshitij Jerath were married on July 14, 2016 in New Delhi, India.

Swati Nagar, PhD [2003], was elected to chair the 2018 Gordon Research Conference on Drug Metabolism. She will serve as the vice-chair in 2017.

Lin Niu, PhD [2015], and his wife, Jinny, welcomed their son, Raymond Niu, on August 6, 2016. Ray has the same pronunciation as his Chinese character given name.

Karen Parrish, PhD [2016], joined the Metabolism and Pharmacokinetics Group at Bristol-Myers Squibb in New Jersey after graduation. She and her husband, Anthony, welcomed a daughter, Clare Rose Parrish, on September 3, 2016.

Nidhi Sharda, PhD [2016], has joined Bristol-Myers Squibb as a research investigator in the Department of Metabolism and Pharmacokinetics.

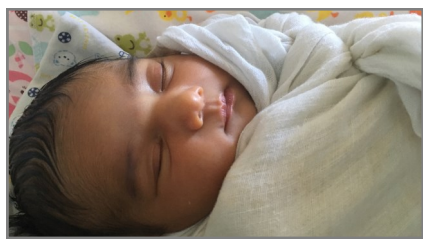
Send your alumni news and pictures to pceuts@umn.edu!



Makarand Jawadekar and his team



Makarand Jawadekar accepts award



Mishka Amit Gangar



Raymond Niu



Clare Rose Parrish

From the Director of Graduate Studies

Dear Friends and Colleagues,

How time flies! I feel the 2015 article should still be in my “recently” used computer folder. During the exciting past year, I have learned many things as DGS, enjoying the experience of closely working with our students and faculty. Here, I would like to thank my assistant, Ms. Katie James, for her exceptional work. Although we were both new on the job, Katie and I have worked seamlessly as a team to serve our faculty, students, and the College. I am also grateful for the support from Pharmaceutics faculty, especially Professor Timothy Wiedmann, who facilitated the transition.

We have substantially updated the Pharmaceutics Graduate Program Handbook to reflect the faculty’s current philosophies and policies that guide graduate education. Major changes include refinement of the MS degree program (now available for direct admission) and in the required modules. The latter are intended to build a solid foundation in pharmaceutical sciences for all students in our program. You can access the updated handbook here: www.pharmacy.umn.edu/departments/pharmaceutics/pharmaceutics-graduate-program.



On the student front, we graduated seven PhD students and three MS students in the past year. The Department continues its tradition of 100% job placement with five PhD graduates joining pharmaceutical companies, one going on to pursue an MD, and one becoming a post-doctoral fellow to pursue further academic training. All three MS graduates successfully matriculated to our PhD program. This year, we also welcomed seven new students (six PhD and one MS). Currently, we have 25 students in our program, 22 PhD and three MS.

Our graduate program has enjoyed an excellent reputation for years. The quality was once again highly praised by reviewers during our intensive evaluation and external review this past summer. The reviewers affirmed that we are one of the leading pharmaceutical sciences graduate program in the nation. Several suggestions were given for improving our graduate program. One of them is to do more active recruiting for graduate students, especially from reputable colleges and universities in the Midwest, including University of Minnesota. Work is under way to implement this recommendation.

We continue to evolve under recent and major changes in leadership. These changes, coupled with the external review, paved the way for our current search for an additional faculty member with a research emphasis in the delivery of macromolecules. This new faculty member is expected to significantly expand and strengthen our research and graduate education endeavors. We must also anticipate further change. While our graduate program is fortunate to have the services of distinguished senior faculty, a succession plan is needed so that our Department can maintain its stature with their departure. The retirement of Professor Cheryl Zimmerman this year was a significant loss. Her caring, student-first approach to graduate and professional education set a high standard for all of us to emulate. You also may know of Dean Marilyn Speedie’s retirement plan in the coming academic year. A new dean will certainly bring changes, but will hopefully continue her strong advocacy of graduate education in the College. We are looking forward to working together with the new dean to enhance the prestige and impact of our graduate program for the benefit of the College.

Looking forward, we definitely have impending challenges that can be used to create new opportunities. We always want to hear the perspectives and insights of our alumni in shaping the future of our graduate program. It is you upon which our reputation is built, so please let us know how we can work together to enhance graduate education in the Pharmaceutics Graduate Program at the University of Minnesota.

Sincerely,

Chanquan Calvin Sun, PhD

Associate Professor and Director of Graduate Studies

Graduate Student News



Degrees Earned in 2015-2016

Stephen M. Kalscheuer, PhD

Thesis: *Humanized Antibody Development Using Phage Display: Applications to Solid Tumor Metastasis*

Advisor: Dr. Jayanth Panyam

Vidhi Devendra Khanna, MS

Thesis: *Antibody Conjugated Nanoparticles for Targeting Metastatic Triple Negative Breast Cancer*

Advisor: Dr. Jayanth Panyam

Garvey Liu, PhD

Thesis: *Role of β -Glucuronidase in the Chemopreventive Efficacy of Oral Curcumin: A Prodrug Hypothesis*

Advisor: Dr. Jayanth Panyam

Mehak Mehta, PhD

Thesis: *Molecular Mobility in Pharmaceutical Glasses: Implications on Physical Stability*

Advisor: Dr. Raj Suryanarayanan

Pinal Mistry, PhD

Thesis: *Strength of Drug-Polymer Interactions: Implications on Molecular Mobility and Crystallization in Amorphous Dispersions*

Advisor: Dr. Raj Suryanarayanan

Shail Panchamia, MS

Thesis: *To Investigate the Impact of Gut Bacteria on Efflux Transporter Expression and Function*

Advisor: Dr. Karunya Kandimalla

Karen Eileen Parrish, PhD

Thesis: *Delivery and Efficacy of CDK4/6 Inhibitors in the Treatment of Brain Tumors*

Advisor: Dr. William Elmquist

Saif Shahriar Rahman, MS

Thesis: *Design, Development, and Characterization of Imiquimod-loaded Chitosan Films*

Advisor: Dr. Swayam Prabha

Nidhi Sharda, PhD

Thesis: *Trafficking of Amyloid Beta Protein at the Blood Brain Barrier: Novel Insights in Alzheimer's Disease Pathogenesis*

Advisor: Dr. Karunya Kandimalla

2015-2016 Graduate Fellowship Recipients

The *David J.W. Grant and Marilyn J. Grant Fellowship in Physical Pharmacy* is awarded to students whose research is focused in physical pharmacy. **Wei-Jhe Sun** (Advisor: Dr. Changquan Calvin Sun) was this year's recipient.

The *Edward G. Rippie Fellowship in Pharmaceutics* is awarded to students with a consistent and outstanding academic record. It has been awarded to **Jiangnan Dun** (Advisor: Dr. Changquan Calvin Sun).

The *Ronald J. Sawchuk Fellowship in Pharmacokinetics* is awarded to a graduate student whose research is focused in pharmacokinetics. **Gautham Gampa** (Advisor: Dr. William Elmquist) received this year's award.

The *Rory P. Remmel and Cheryl L. Zimmerman Fellowship in Drug Metabolism and Pharmacokinetics* is awarded to students that have chosen a thesis advisor whose research encompasses drug metabolism or pharmacokinetics. This year **Janice Laramy** (Advisor: Dr. William Elmquist) was selected to receive the award.

The *Bighley Graduate Fellowship* was awarded to **Pinal Mistry** (Advisor: Dr. Raj Suryanarayanan). She was selected to receive this award for her significant

Graduate Student News (cont.)

collaborative/interdisciplinary research in the fields of basic and applied pharmaceutical sciences.

The *Theodore H. Rowell Graduate Fellowship* is awarded to graduate students who have completed at least two years of study in a pharmaceutical sciences program with a preference given to students interested in nutrition or drug delivery systems. The recipient this year was **Michelle Fung** (Advisor: Dr. Raj Suryanarayanan).

The *3M Science and Technology Fellowship* is awarded to a promising student with interests in drug development. This year's recipient was **Vidhi Khanna** (Advisor: Dr. Jayanth Panyam).

The *Pharmaceutical Research and Manufacturers of America (PhRMA) Pre-Doctoral Fellowship* was awarded to **Michelle Fung** (Advisor: Dr. Raj Suryanarayanan) for her project, "Rational Design of Amorphous Solid Dispersions with Considerations on Physical Stability During Storage and Dissolution."

The *American Foundation for Pharmaceutical Education (AFPE) Pre-Doctoral Fellowship in Pharmaceutical Sciences* is awarded to students who possess the skill and aptitude to become outstanding scientists and leaders. This year **Janice Laramy** (Advisor: Dr. William Elmquist) received this award.

The *National Institute on Drug Abuse (NIDA) Pre-Doctoral Fellowship* was awarded to **Kelsey Pflipsen** (Advisor: Dr. Carolyn Fairbanks) which will support her neuroscience training in drug abuse research.



From left to right: Drishti Sehgal, Vidhi Khanna, Krutika Jain, Yafan Su, Navpreet Kaur, Yiwang Guo, and Ling Zhu

Welcome New Students!

Yiwang Guo

- MMed in Pharmaceutics, Beijing University of Chinese Medicine
- BE in Pharmaceutical Engineering, Shandong University of Traditional Chinese Medicine

Krutika Jain

- MS in Pharmaceutical Sciences, University of Southern California
- BPharm in Pharmacy, Manipal University

Navpreet Kaur

- MS in Pharmaceutics, National Institute of Pharmaceutical Education and Research
- BPharm in Pharmaceutical Sciences, Panjab University

Vidhi Khanna

- MS in Pharmaceutics, University of Minnesota
- BPharm in Pharmacy, Institute of Chemical Technology

Drishti Sehgal

- BTech in Biotechnology, D.Y. Patil University

Yafan Su

- BS in Pharmacy, Shenyang Pharmaceutical University

Ling Zhu

- BS in Pharmaceutics Science, Secondary Military Medical University

Graduate Student Activities

Michelle Fung has been selected to receive the 2016 American Association of Pharmaceutical Scientists (AAPS) Graduate Student Research Award in Analysis and Pharmaceutical Quality (APQ) for her poster, “The Use of Small Molecule Excipients for Improving the Physical Stability and Dissolution Performance of Ketoconazole Spray Dried Dispersions.”

Gautham Gampa presented his research at the 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Third Minnesota Neuro-Oncology Symposium 2016, and the 2016 Gordon Research Conference: Barriers of the CNS. He also served as the Treasurer of the University of Minnesota AAPS Student Chapter for the 2015-2016 academic year and represented the University of Minnesota Table Tennis team at the 2016 College Table Tennis National Championships.

Sampada Koranne has been selected to receive the 2016 American Association of Pharmaceutical Scientists (AAPS) Graduate Student Research Award in Formulation Design and Development (FDD) for her poster abstract, “Investigation of the Spatial Heterogeneity of Salt Disproportionation in Tablet Formulations.” This award is designed to recognize excellence in graduate education in the formulation design and development areas, including pre-formulation, biopharmaceutics, formulation strategies and technologies, and manufacturing process optimization. She will present her poster at the 2016 AAPS Annual Meeting and Exposition in Denver, Colorado in November.

Christina Larson has joined Dr. Fairbanks’ lab. She earned her DVM from the University of Minnesota and is currently pursuing a PhD in Comparative Molecular Biosciences in the College of Veterinary Medicine. She has also been selected as one of ten participants in the American Veterinary Medical Association’s Future Leaders program for 2016-2017.

Pinal Mistry is a recipient of the 2016 American Association of Pharmaceutical Scientists (AAPS) Analysis and Pharmaceutical Quality (APQ) Travelship Award for her poster abstract, “Molecular Mobility as a Polymer



Selection Tool for Amorphous Solid Dispersions.” She was also selected as a winner of the AAPS Physical Pharmacy and Biopharmaceutics (PPB) Best Manuscript Contest for her manuscript, “Role of the Strength of Drug-Polymer Interactions on the Molecular Mobility and Crystallization Inhibition in Ketoconazole Solid Dispersions.” The paper was published in the September 2015 issue of *Molecular Pharmaceutics*.

Vidur Sarma presented a talk titled “Alzheimer’s Disease A β Peptides Disrupt the Dynamics of Insulin Transport Across the Blood-Brain Barrier” at the 2016 Pharmaceutics Graduate Student Research Meeting (PGSRM) held in Kansas City, Missouri. He also presented a poster with the same title at the 2015 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition in Orlando, Florida.

Nidhi Sharda received the Pharmacokinetics, Pharmacodynamics, and Drug Metabolism (PPDM) Travelship Award to attend the 2015 AAPS Annual Meeting for her poster, “Trafficking Kinetics of Amyloid

Graduate Student Activities (cont.)

Beta Protein at the Blood-Brain Barrier.” She also received the Graduate Student Research Award in Pharmaceutical Sciences from the American Association of Indian Pharmaceutical Scientists (AAiPS) 2015 for her thesis work. In March 2016, Nidhi won the Best Poster Presentation Award at the Advanced Imaging Microscopy Meeting at the University of California, Berkley. Her poster was titled “Amyloid Beta Interferes with SNAREs Exocytosis Machinery.” In May 2016, Nidhi was nominated by the graduate student class to give the student commencement speech at the 2016 commencement ceremony.

Wei-Jhe Sun has been selected to receive the 2016 American Association of Pharmaceutical Scientists

(AAPS) Graduate Student Research Award in Manufacturing Science and Engineering (MSE) for his poster abstract, “Enabling Direct Compression of Low Dose Sustained-Release Tablets by Integrated Particle Engineering.” He will present his poster at the 2016 AAPS Annual Meeting and Exposition in Denver, Colorado in November.

Kunlin Wang presented on “Differential Surface and Bulk Crystallization Behavior of Amorphous Celecoxib” at the Midwest Organic and Solid State Chemistry Symposium (MOSSCS) at the University of North Dakota in June 2016.

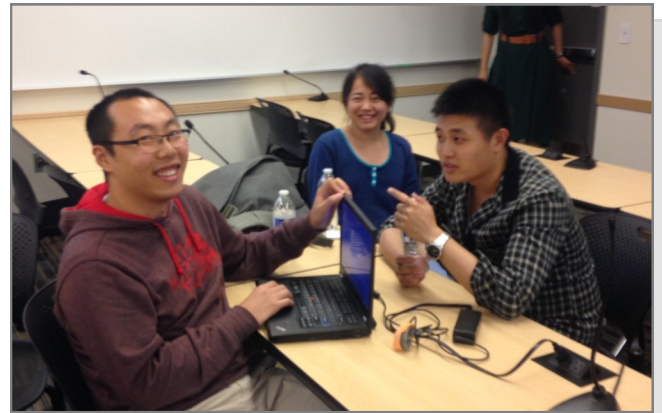
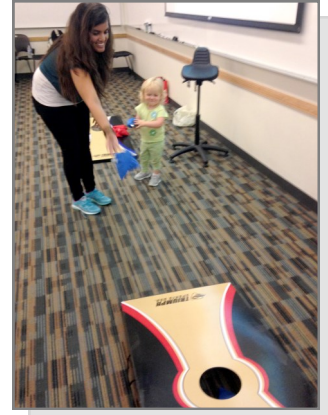


The banner features the University of Minnesota logo on the left, which consists of a stylized 'M' and 'U' in maroon and gold, with the text 'UNIVERSITY OF MINNESOTA' below it. To the right, the text 'PGSRM 2018' is written in large, bold, maroon letters. Below this, 'Pharmaceutics Graduate Student Research Meeting' is written in a smaller maroon font, followed by '50TH ANNUAL CONFERENCE' in large, bold, maroon letters. The main title 'BRIDGING THERAPEUTICS AND TECHNOLOGY' is in large, bold, maroon letters. Below the title, a paragraph of text in maroon font reads: 'The Department of Pharmaceutics is excited to announce that we will be hosting the 2018 50th annual PGSRM conference in Minneapolis, MN. We are planning a captivating, relevant, and rewarding conference. We look forward to hosting this conference, which has a long-standing tradition of excellence.' At the bottom, a silhouette of the Minneapolis skyline is shown in maroon, with the dates 'June 7-9, 2018' and the location 'Minneapolis, MN' written in gold text over it.

Graduate Student Organizations

2016 Fall Picnic Hosted by the 2015-2016 Pharmaceutics Graduate Student Representatives Janice Laramy and Saif Rahman

Pharmaceutics Department students, faculty, and staff along with their families and friends enjoyed excellent food and fun activities at this year's annual picnic! Even though inclement weather forced the event inside, everyone had a great time!



Graduate Student Organizations (cont.)

AAPS Student Chapter News

The AAPS Student Chapter continued work on their mission to increase awareness of career opportunities in pharmaceutical sciences, support professional advancement, provide leadership development, and foster development of values of integrity and teamwork at the University of Minnesota during the 2015-2016 academic year! The chapter supported their mission through the offering of several professional development seminars on a variety of topics including networking skills, presentations, work-life balance, academia and industry careers, and mentoring as well as co-sponsoring the Pharmaceutical Patents and Regulatory Exclusivity seminar and Rho Chi Research Day. They also hosted a number of social events like the annual kick-off meeting, meet and greet happy hours, Skate with a Date, and their annual bowling event.

The AAPS Student Chapter is looking forward to presenting a series of professional development seminars with invited speakers as well as social and charity events during the 2016-2017 academic year!



Pharmaceutics Graduate Student Representatives 2016-2017

Shenye Hu

Kunlin Wang

Council of Graduate Students (COGS) Pharmaceutics Representative 2016-2017

Jiangnan Dun

AAPS Student Chapter Officers 2016-2017

Chair: **Sampada Koranne** (Pharmaceutics)

Chair-Elect: **Drishti Sehgal** (Pharmaceutics)

Treasurer: **Vidhi Khanna** (Pharmaceutics)

Secretary: **Navpreet Kaur** (Pharmaceutics)

Social Media Coordinator: **Yafan Su** (Pharmaceutics)

Student Outreach Officer: **Vaishnavi Soundararajan** (Experimental and Clinical Pharmacology)

People

Jiamei Chen is a visiting scholar in Dr. Sun's lab. She is a professor from Sun Yat-Sen University in Guangzhou, China.

Naga Kiran Duggirala joined Dr. Sury's lab as a post-doctoral associate in March 2016. He obtained his PhD from the University of Limerick's Crystal Engineering Research Group in Professor Mike Zaworotko's lab.

Samuel Erb, a recent PhD graduate of the Department of Pharmaceutical Sciences at the University of Illinois-Chicago, joined Dr. Fairbanks' lab as a post-doctoral associate.

William H. Frey II, a former adjunct faculty member, was featured in a *Neurology Reviews* cover story written by their editor. The article, "Intranasal Drug Delivery Bypasses the Blood-Brain Barrier," describes intranasal treatments Dr. Frey has developed for Alzheimer's, Parkinson's, multiple sclerosis, stroke, traumatic brain injury, spinal cord injury, and other central nervous system disorders.

Takehisa Hanawa, a former visiting scientist in Dr. Siegel's lab, is currently a Professor of Pharmaceutical Sciences at the University of Tokyo in Chiba, Japan. His research interests are in preparing hydrogels by neutron beam irradiation of various water soluble polymers and the development of the method to improve the solubility of water insoluble active pharmaceutical ingredients using wet-milling. There are currently 15 undergraduate students and five graduate students in his lab. His wife, Tomoko, works at the School of Medicine at Kyorin University in Tokyo, Japan as an associate professor; his son, Takanori, is studying fluid mechanics at Osaka University's Graduate School of Technology; and his daughter, Nozomi, entered the University of Tokyo last year and will join the Pharmaceutical Sciences department next year.

Amanda Hokanson joined the Pharmaceutics departmental office as an executive office and administrative specialist in December 2015. She settled right in with the international members of the department upon arrival, having taught English in France for four years

prior. She now uses her skills to assist with writing projects and event planning, and handles general financial and purchasing needs. Et, bien sûr, elle adore parler le français!

Hassaan Khan, a master's student with the Medical Devices Center, is working in Dr. Siegel's lab on shape-shifting hydrogels.

Buddhadev Layek, a post-doctoral associate working in Dr. Prabha's lab, was selected to receive the Baxter Young Investigator Award. This award program was developed to stimulate and reward research that can be directly used for critical care therapies and the development of medical products that save and sustain patients' lives.

Samuel Lee, an undergraduate student, is working in Dr. Siegel's lab on shape-shifting hydrogels.

Shuyu Liu is a visiting scholar in Dr. Sun's lab. She is a professor from Shanghai University of Engineering Science in Shanghai, China.

Sidhartha Jena, a former visiting scientist in Dr. Siegel's lab, joined as a senior scientist in the Indira Gandhi Center for Atomic Research's Material Science Division. After working there for about three years, he then joined the Physics and Astronomy Department at the National Institute of Technology Rourkela, where he currently works as an associate professor. He and his wife, Suman, have a six-year old son, Ishaan.

Eric Nuxoll, a former post-doctoral associate in Dr. Siegel's lab, has been promoted to associate professor with tenure in the Department of Chemical and Biochemical Engineering at the University of Iowa.

Rajesh Omtri successfully defended his thesis and joined Dr. Kandimalla's lab as a post-doctoral associate.

Swayam Prabha, a former research assistant professor, recently accepted a tenure-track assistant professor position in the University of Minnesota Department of Experimental and Clinical Pharmacology. Dr. Prabha will continue as an adjunct faculty member in the Department of Pharmaceutics.

People (cont.)

Subarna Samanta, a post-doctoral associate who joined Dr. Sury's lab in April 2016, received the Debye Award at the Broadband Dielectric Spectroscopy Meeting in Pisa, Italy in recognition of his doctoral dissertation research. The Peter Debye Prize for Young Investigators for Excellence in Dielectric Research is established to encourage and support young scientists to continue research in dielectric spectroscopy and its applications. Dr. Samanta has played an essential role in studying the effects of a dc bias, rather than ac electric field, on the dielectric response of supercooled liquids as motivated by the notion that high field reduces the entropy, which in turn increases the viscosity and relaxation times. He has performed research at the forefront of the field and has demonstrated his creativity and in-depth understanding of the science involved. He earned his PhD from Arizona State University in Professor Ranko Richert's lab.

Amy Sun has joined Dr. Sun's lab as lab manager.

Suresh Swaminathan, a researcher in Dr. Kandimalla's lab, presented a poster titled "Insulin Mediated Regulation of the Beta Amyloid Peptide Trafficking at the Blood-Brain Barrier" at the 2015 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition in Orlando, Florida. He and his wife, Sambhavi, welcomed their first child, a baby boy, who they named Tharun in 2016.

Naveen Thakral left Dr. Sury's lab in April 2016 and joined Amgen in Los Angeles, California as a scientist in Materials Chemistry and Characterization.



Seema Thakral, a research associate in Dr. Sury's lab, presented a poster on "Inhibition of Crystallization of Citric Acid by Co-Lyophilization with Cationic Polymer" at the International Society for Lyophilization and Freeze-Drying in Chicago. She also presented a poster titled "Estimation of Grain Size by Two-Dimensional X-Ray Diffractometry: Applications to Powders and After Compression into Tablets" at the Pharmaceutical Powder X-Ray Diffraction Symposium (PPXRD) in Florida. Seema participated in the research project titled "Formulation Optimization for a Low-Volume Resuscitation Fluid for Hemorrhagic Shock" which was presented by Andrea Wolf at Translation Science in Washington, D.C. Seema was selected as a winner of the AAPS Physical Pharmacy and Biopharmaceutics (PPB) Best Manuscript Contest for her manuscript, "Salt Formation During Freeze-Drying: An Approach to Enhance Indomethacin Dissolution." The paper was published in the November 2015 issue of *Pharmaceutical Research*.

Jon Urban, a 2008 Biomedical Engineering PhD graduate and former advisee of Dr. Siegel, is a lead research and development engineer for FocusStart, LLC, a medical device company in the Minneapolis/St. Paul area, that licenses technologies at the feasibility stage and develops them for strategic sale, licensing, or formal spinout. Current partners include the University of Minnesota and Mayo Clinic.

Harsha Verma has joined Dr. Fairbanks' lab in the Department of Genetics, Cell Biology, and Development as a post-doctoral associate.

Amber Vyas joined Dr. Sury's lab as a University Grants Commission (UGC) Raman Fellow in August 2016. He was an Assistant Professor at the University Institute of Pharmacy, Pandit Ravishankar Shukla University, Raipur, Chhattisgarh, India. He obtained his PhD from the University Institute of Pharmacy, Pandit Ravishankar Shukla University under the supervision of Professor Swarnlata Saraf and Professor Shailendra Saraf. He completed his MPharm degree at the Karnataka Lingayat

People (cont.)

Education Society's (K.L.E.S.) College of Pharmacy in Belgaum, Karnataka, India, and BPharm at the B.R. Nahata College of Pharmacy in Mandsaur, Madhya Pradesh, India. He received the Young Scientist Award for Medical Sciences, including Pharmaceutical Sciences, in 2010 from the Chhattisgarh Council of Science and Technology's Eighth Young Scientist Congress was also recommended for the UGC Research Award for 2013-2014 and 2014-2015. He currently has 30 research and review papers, three book chapters, two books, and funding for two research projects to his credit. He advises one PhD student and nine Master's students; two of his former PhD advisees have graduated and are working in the field.

Chenguang Wang joined Dr. Sun's lab in July 2016 as a post-doctoral associate. He earned his PhD from the Huazhoag University of Science and Technology in Hubei, China. His research interest is in design and characterization of new solid form drugs.

Mingjun Wang is a visiting scholar in Dr. Sun's lab. He is a professor from Xiamen Medical College in Xiamen, Fujian, China.

Wenxi Wang is a visiting scholar in Dr. Sun's lab. He is a professor from Zhejiang University of Technology in Hangzhou, China.

Hiroyuki Yamashita is a visiting scientist in Dr. Sun's lab from Astellas, Japan.

Shuangling Zhang, a former post-doctoral associate in Dr. Elmquist's lab, has begun her new career in Salubris-Genekey Biotech Co., Ltd. located in Chengdu, China. She is working on pre-clinical efficacy studies of therapeutic gene and antibodies intended to treat cancer, diabetes, osteoporosis, and cardiovascular diseases. She also attended the American Association for Cancer Research (AACR) Annual Meeting and the Annual Protein and Antibody Engineering Summit (PEGS), both in April 2016.

Dean Marilyn Speedie



In February 2016, Marilyn Speedie announced her plan to retire as Dean of the University of Minnesota College of Pharmacy in early 2017 or when a replacement is in place. For more than 20 years, Dr. Speedie has served as the dean of the College of Pharmacy, which is currently ranked second in the nation among 134 pharmacy schools by U.S News and World Report.

Some of her notable accomplishments include expanding the college to the Duluth campus, which helped solve the then-serious pharmacist shortage in the state; implementing the Doctor of Pharmacy as the only professional degree for pharmacists; working with professional organizations in the state to develop cutting-edge practices of pharmacy throughout Minnesota; creating practice environments where pharmacists use their clinical knowledge to provide compensated medication management to patients; leading the way for the passage of legislation in Minnesota that allows pharmacists to administer immunizations and recognizes pharmacists as health care providers; expanding the number of faculty from 35 to 105; growing the college's research productivity almost ten-fold in funding; increasing the college's endowment significantly which now supports eight endowed chairs; building modern classrooms; and implementing a new curriculum that serves as a model for others around the country.

A national search for the new dean is currently underway.

Source: www.pharmacy.umn.edu/news-and-events/marilyn-speedie-retire-dean

Faculty News & Activities

Professor William F. Elmquist



Dr. Elmquist was selected as a Distinguished Professor under the Pharmacy Scholars program in 2016. This program is designed to recognize senior faculty members who are leaders in their discipline with a "Distinguished Professor" title and a salary augmentation. They are appointed for a five-year period. The principal criteria for the award are the duration and significance of the person's contributions to the development of his/her discipline, and the impact of the person's scholarly endeavors on a national and international level. Selection was made by a panel of outside reviewers who were nominated by the department heads.

Dr. Elmquist was invited to give the following presentations this year:

- *Drug Delivery Across the BBB and Drug Efficacy at the Target: Inseparable Partners*. SNO-SCIDOT Joint Conference, Society of Neuro-Oncology, San Antonio, Texas (November 2015).
- *Role of Efflux Transporters in CNS Drug Delivery*. Scandinavian Blood-Brain Barrier Network Meeting, Uppsala University, Uppsala, Sweden (January 2016).
- *Role of Efflux Transporters in CNS Drug Delivery*. Department of Pharmaceutical Biosciences, Uppsala University, Uppsala, Sweden (January 2016).
- *Impact of Blood-Brain Barrier on Efficacy of Targeted Therapy in Brain Tumors*. Masonic Cancer Center Seminar Series, University of Minnesota, Minneapolis, Minnesota (February 2016).
- *Small Molecule Permeability Across an Intact BBB: Necessary for Effective Treatment of Brain Tumors?* Blood-Brain Penetrant Inhibitors Conference, Drug Discovery Chemistry, Cambridge Healthtech Institute (CHI), San Diego, California (April 2016).
- *BBB Permeability of Molecularly-Targeted Anti-Tumor Agents: Necessary for Effective Treatment of Brain Tumors?* Third Neuro-Oncology Symposium,

Brain Tumor Program, University of Minnesota, Minneapolis, Minnesota (May 2016).

- *Influence of BBB Transporters on the Delivery of Molecularly-Targeted Agents to Primary and Secondary Brain Tumors*. Second Annual Blood Brain Barrier Conference, Preclinical World Congress, Cambridge Healthtech Institute (CHI), Boston, Massachusetts (June 2016).
- *Impact of Focal Changes in the BBB in Treating Brain Tumors: Where, When, and How?* Barriers of the CNS Gordon Research Conference, Colby-Sawyer College, New London, New Hampshire (June 2016).

Dr. Elmquist received the following funding this year:

- NIH-NS077921, *Influence of Anti-Angiogenic Therapy on Drug Delivery to Brain Tumors* (2012-2017)
- NIH-NS073610-05, *Targeting Kif11 to Treat Glioblastoma Invasion and Proliferation* (2016-2021)
- NIH-U54CA210180-01, *MIT/Mayo Physical Sciences Center for Drug Distribution and Efficacy in Brain Tumors* (2016-2021)
- Strategia Therapeutics, *Blood-Brain Barrier Penetration of E6201: A Novel MEK1 Inhibitor* (2016-2017)

Professor Carolyn A. Fairbanks



In 2015-2016, Dr. Fairbanks and her research team continued to contribute their expertise in intrathecal and epidural drug delivery for translational research collaborations with industry and other academic groups (e.g., the University of Minnesota Center for Translational Medicine). Her research interests focus on targeted delivery of gene therapeutics to specific CNS neuronal subpopulations. This research is supported in part by the National Institute on Drug Abuse (NIDA) to investigate mechanisms of inhibition of opioid-induced tolerance. Her program also includes a strategy to develop

Faculty News & Activities (cont.)

gene therapeutics for the treatment of opioid addiction, an effort generously supported by another gift from the Noble Family to the College of Pharmacy. Additionally, in September 2015, Dr. Fairbanks received a three-year Neurosensory and Rehabilitation Research Award from the Department of Defense for her study, "Controlling Neuropathic Pain by Novel Non-Opioid Pharmacological and Gene Therapeutic Approaches." Collaborators include Professor R. Scott McIvor (Genetics, Cell Biology, and Development), Professor Lucy Vulchanova (Neuroscience), and Professor Herb Nagasawa (Medicinal Chemistry).

One of Dr. Fairbanks's team members, Ms. Kelsey Pflepsen, a second year Pharmaceutics graduate student, received a Pre-Doctoral Fellowship in the NIDA Training grant "Neuroscience Training in Drug Abuse Research" which will span the duration of her training.

In 2016 Dr. Fairbanks welcomed several new members to her lab including Dr. Samuel Erb, PhD, a recent graduate of the Department of Pharmaceutical Sciences of University of Illinois-Chicago; Dr. Harsha Verma, PhD, Department of Genetics, Cell Biology, and Development; and Dr. Christina Larson, DVM, who is pursuing her PhD in Comparative Molecular Biosciences in the College of Veterinary Medicine.

Dr. Fairbanks is currently being featured in the University of Minnesota's 2016-2017 "Driven to Discover" campaign for her contributions to addiction research and development of gene therapeutics and peripherally restricted analgesic medications. You can view her story at z.umn.edu/fairbanksdriven.



Professor Karunya Kandimalla



Dr. Kandimalla will be organizing a Sunrise Session at the 2016 AAPS Annual Meeting and Exposition: "More Than a Gut Feeling: Role of Microbiome in Health, Disease, and Drug Therapy." He hopes to see you there on Tuesday, November 15, 2016

from 7:30 to 8:45 AM.

Dr. Kandimalla gave the following invited presentations this year:

- *Amyloid-Beta and Insulin Interactions at the Blood-Brain Barrier: Intimacy or Intrigue?* Citywide Endocrine Conference, Minneapolis, Minnesota (November 2015).
- *Plasma Amyloid Beta Levels: Does the Tail Wag the Dog?* Institute of Translational Neuroscience Conference, University of Minnesota, Minneapolis, Minnesota (December 2015).
- *Impaired Trafficking of Insulin and Amyloid Beta Proteins in Alzheimer's Brain: Under Explored Dimension of Blood-Brain Barrier Dysfunction.* Doctoral College of Metabolic and Cardiovascular Disease, Medical University of Graz, Graz, Austria (July 2016).

Dr. Kandimalla received the following grants this year:

- Minnesota Partnership grant to develop molecular imaging probes to detect brain insulin resistance in Alzheimer's disease patients.
- U01 grant from the Food and Drug Administration to investigate lidocaine transdermal drug delivery systems.
- University of Minnesota College of Pharmacy Grants Award Program to study the impact of gut microbiota on the bioavailability and disposition of orally administered drugs.

Faculty News & Activities (cont.)

- Mayo Clinic research contract to evaluate the effect of gut microbiota on the gastrointestinal permeability.

The Kandimalla lab submitted several publications this year. Partnering with their Mayo Clinic collaborators, they also developed a research database that harbors salient features of the blood-brain barrier genomic landscape: bioinformaticstools.mayo.edu/bbbomics.

Dr. Kandimalla and Dr. Les Drewes, Professor of Biomedical Sciences at the University of Minnesota Duluth and Pharmaceutics adjunct professor, represented the Brain Barriers Research Center (BBRC) at the 2016 Discovery Across Disciplines showcase sponsored by the University of Minnesota Graduate School.



Dr. Kandimalla was also promoted to Associate Professor this year.

Professor Jayanth Panyam



Dr. Panyam was invited to these talks this year:

- *Inhalation Delivery of Magnetic Nanoparticles for Treating Lung Cancer*. American Lung Association Expo, Minneapolis, Minnesota (October 2015).

- *Phage Display Based Antibody Development for Detection of Circulating Tumor Cells in Breast Cancer*. Divisional Seminar Series, University of Missouri-Kansas City School of Pharmacy, Kansas City, Missouri (January 2016).
- Kim H., et al. *Nanoparticle Based Vaccine for Anti-Cancer Immune-Therapy*. Upsher-Smith, Minneapolis, Minnesota (February 2016).

Dr. Panyam contributed to the following posters and podiums:

- Kim H., et al. *Nanovaccine: A Novel Immunotherapeutic Strategy to Treat Bladder Cancer*. American Association of Cancer Research (AACR) Annual Meeting, New Orleans, Louisiana (April 2016).
- Chen C-L, Swaminathan S, Kirtane A, Panyam J, Machida K. *Selective Inhibitors Epigenetically Modify and Eradicate Tumor-Initiating Stem-Like Cells Through Downregulating MicroRNA 22-Mediated TET Induction and Apoptosis*. American Association of Cancer Research (AACR) Annual Meeting, New Orleans, Louisiana (April 2016).
- Machida K, Chen C-L, Uthaya Kumar DB, Swaminathan S, French SW, Panyam J. *Selective Inhibitors Epigenetically Modify and Eradicate Tumor-Initiating Stem-Like Cells Through Downregulating MicroRNA 22-Mediated TET Induction and Apoptosis*. Experimental Biology 2016 Meeting, San Diego, California (April 2016).
- Khanna V, Kalscheuer S, Panyam P. *Antibody Conjugated Nanoparticles for Metastatic Breast Cancer*. Pharmaceutics Graduate Student Research Meeting (PGSRM) 2015, Lexington, Kentucky (June 2015).
- Khanna V, Kalscheuer S, Panyam P. *Antibody Conjugated Nanoparticles for Metastatic Breast Cancer*. Pharmaceutics Graduate Student Research Meeting (PGSRM) 2016, Kansas City, Missouri (June 2016).

Faculty News & Activities (cont.)

Professor Swayam Prabha



Dr. Prabha received the following funding this year:

- Wallin Neuroscience Award (co-investigator), *Nanoliposomes for Delivery of Aminoguanidine in Diabetic Reinopathy*, \$100,000 (2016-2017).
- College of Pharmacy GAP Award (principal investigator), *Targeting Solid Tumors Using Nano-Engineered MSCs*, \$40,000 (2016-2017).
- Minnesota Ovarian Cancer Alliance (principal investigator), *Glycoengineered Mesenchymal Stem Cells for Targeting Platinum Resistant Ovarian Tumors* (2016-2017).
- Department of Defense (consultant), *Immunotherapy and Targeted Therapy Using Gold Nanoparticles to Treat Metastatic Colon Cancer*, \$400,000 (2017-2020).
- NIH-R01EB022558 (principal investigator), *Targeting Solid Tumors Using Nanoengineered MSCs*, \$1,318,000 (2016-2020).

Dr. Prabha gave the following presentations this year:

- Layek B, Prabha S. *Glycoengineered Mesenchymal Stem Cells for Targeting Platinum Resistant Ovarian Tumors*. Minnesota Ovarian Cancer Alliance Annual Meeting, Bloomington, Minnesota (May 2016).
- Layek B, Sadhukha T, Prabha S. *Glycoengineered Mesenchymal Stem Cells as an Enabling Platform for Two-Step Targeting of Solid Tumors*. Pharmaceutics Graduate Research Student Meeting (PGRSM), University of Missouri-Kansas City, Kansas City, Missouri (June 2016).
- Layek B, Sadhukha T, Prabha S. *Glycoengineered Mesenchymal Stem Cells for Two-Step Targeting of Solid Tumors*. Globalization of Pharmaceutics Education Network (GPEN), University of Kansas, Lawrence, Kansas (November 2016).

Dr. Prabha accepted a tenure-track assistant professor position in the University of Minnesota Department of Experimental and Clinical Pharmacology. She will continue as an adjunct faculty member in the Department of Pharmaceutics.

Professor Ronald A. Siegel



Dr. Siegel presented invited lectures at the Harvard University School of Engineering and Applied Sciences and at Draper, both in Cambridge, Massachusetts; at the PacificChem Conference in Honolulu, Hawaii; at the “From Nano to Macrostructures

Design and Characterisation of Soft Materials” Conference in Strömstad, Sweden; at EcoLab in St. Paul, Minnesota; at the University of Maryland College Park Chemical and Biomolecular Engineering; and at the National Institutes of Child Health and Human Development.

Dr. Siegel was chair of the College of Fellows Selection Committee for the Controlled Release Society this past year. He also continues to direct the Biomaterials and Pharmaceutical Materials program for IPRIME (Industrial Partners for Research in Interfacial and Materials Engineering) at the University of Minnesota and is on the International Scientific Advisory Board for SuMo, a consortium of Swedish universities, companies, and government, which focuses its research on biomaterials and other soft materials.

Dr. Siegel co-edited, with Dr. SuPing Lyu of Medtronic, a new book titled [Drug-Device Combinations for Chronic Disease](#) (Wiley-Society for Biomaterials).



Faculty News & Activities (cont.)

Professor Chanquan Calvin Sun



Dr. Sun gave the following presentations this year:

- *Comprehensive Characterization of Mechanical Properties of Pharmaceutical Solids*. AAPS Short Course: Material Characterizations and Associated in Silico Modeling Approaches for Rational Design of Drug Product with Robust Manufacturability, Denver, Colorado (November 2016).
- *The Materials Science Tetrahedron: The Academic Vision*. Academy of Pharmaceutical Sciences Symposium, University of Leeds, England, United Kingdom (July 2016).
- *Expanding Solid-State Landscape of Drugs*. Joint 12th International Workshop of the Crystal Growth of Organic Materials and 47th Annual British Association of Crystal Growth Conference, University of Leeds, England, United Kingdom (June 2016).
- *Mechanical Properties of Amorphous Solid Dispersions*. Third David Grant Symposium, University of Minnesota, Minneapolis, Minnesota (June 2016).
- *Strategies to Expand Solid-State Landscapes of Drugs to Enable Successful Tablet Formulation Development*. Pharmaceutical Powder X-Ray Diffraction Symposium (PPXRD), Fort Myers, Florida (June 2016).
- *Development of Cocrystal Based Drug Products*. University of Macau, Macau, China (October 2016).

Dr. Sun obtained the following grants:

- Eli Lilly LRAP Grant (Lilly collaborator: Dr. Aktham Aburub)
- AstraZeneca Grant (AstraZeneca collaborator: Dr. Pirjo Tarjarobi)

Dr. Sun has been named an AAPS Fellow and will be recognized on November 13 at the 2016 AAPS Annual

Meeting and Exposition in Denver, Colorado. Recognition as a fellow is awarded to faculty who have sustained remarkable scholarly and research contributions to the pharmaceutical sciences. He was also selected as a “2016 Top Reviewer” for the Journal of Pharmaceutical Sciences and received the University of Minnesota Distinguished Chinese Alumni Award this year.

Professor Raj G. Suryanarayanan



The International Pharmaceutical Excipients Council (IPEC) Foundation presented Dr. Sury with the 2015 Ralph Shangraw Memorial Award at the 2015 Annual Meeting of the American Association of Pharmaceutical Scientists in Orlando,

Florida. The award is presented to any person who, in the opinion of the board, has provided outstanding research contributions in the study of excipients or excipient-related technology over a number of years. The goal of Dr. Sury's research is developing a fundamental understanding of the material science properties of pharmaceuticals (both drugs and excipients) to prepare dosage forms with reproducible and predictable properties.



Dr. Sury was invited to give the presentations this year:

- *Crystallinity Evaluation by Powder X-Ray Diffraction*. Allergan, Irvine, California (January 2016).

Faculty News & Activities (cont.)

- Suryanarayanan R, Munson E. *Advanced Characterization of Drug Substances and Drug Product*. NIPTE/FDA Formulation Seminar, Silver Springs, Maryland (March 2016).
 - *Molecular Mobility in Pharmaceuticals and its Relevance to Predicting Stability of Solid Dispersions*. American Association of Pharmaceutical Scientists (AAPS) Arden Conference, Baltimore, Maryland (April 2016).
 - *Monitoring Phase Transitions in Frozen Systems and During Freeze-Drying*. Bristol-Myers Squibb, New Brunswick, New Jersey (April 2016).
 - *Molecular Mobility in Pharmaceuticals and its Relevance to Predicting Stability of Solid Dispersions*. Bristol-Myers Squibb, New Brunswick, New Jersey (April 2016).
 - *Profiling Phase Transformations in Different Regions of Tablets by Two-Dimensional X-Ray Diffractometry*. Third David Grant Symposium, University of Minnesota, Minneapolis, Minnesota (June 2016).
 - *Roundtable Discussion*. Third David Grant Symposium, University of Minnesota, Minneapolis, Minnesota (June 2016).
 - *Characterization of Spatial Phase Heterogeneity in Tablets by X-Ray Diffractometry*. Pharmaceutical Powder X-Ray Diffraction (PPXRD) Symposium, Fort Myers, Florida (June 2016).
 - *Diffraction Methods for In-Situ Tablet Characterization*. 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
- Dr. Sury contributed to the following abstracts this year:
- Kulkarni S, Rinella Jr J, Suryanarayanan R, Bogner R. *Mannitol Crystallization Does Not Always Reduce Reconstitution Time for High Concentration Lyophilized Protein Formulations*. 2016 AAPS National Biotechnology Conference, Boston, Massachusetts (May 2016).
 - Thakral S, Suryanarayanan R. *Estimation of Grain Size by Two-Dimensional X-Ray Diffractometry: Applications to Powders and After Compression into Tablets*. Pharmaceutical Powder X-Ray Diffraction (PPXRD) Symposium, Fort Myers, Florida (June 2016).
 - Mohapatra S, Mistry P, Samanta S, Suryanarayanan R. *Effect of Polymer Molecular Weight and Concentration on Crystallization Behavior of Indomethacin-PVP Amorphous Solid Dispersions: Role of Drug-Polymer Interaction and Viscosity*. Ninth International Conference on Broadband Dielectric Spectroscopy and its Applications, Pisa, Italy (September 2016).
 - Mistry P, Suryanarayanan R. *Molecular Mobility as a Polymer Selection Tool for Amorphous Solid Dispersions*. 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
 - Koranne S, Suryanarayanan R. *Investigation of the Spatial Heterogeneity of Salt Disproportionation in Tablet Formulations*. 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
 - Thakral S, Suryanarayanan R. *Estimation of Grain Size by Two-Dimensional X-Ray Diffractometry: Applications to Powders and After Compression into Tablets*. 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).
 - Fung M, Berzins K, Suryanarayanan R. *The Use of Small Molecule Excipients for Improving the Physical Stability and Dissolution Performance of Ketoconazole Spray-Dried Dispersions*. 2016 American Association of Pharmaceutical Scientists (AAPS) Annual Meeting and Exposition, Denver, Colorado (November 2016).

Faculty News & Activities (cont.)

Dr. Sury received the following grants this year:

- \$70,000 grant from Allergan, Plc for his “Characterization of Amorphous Solid Dispersions” project.
- \$85,365 grant from Pfizer, Inc. for his “Accelerating Solid Form and Drug Product Design of Solid Oral Dosage Forms” proposal.
- \$55,000 grant from Celistra Pharmaceuticals for his “Development of Topical, Injectable, and Oral Dosage Forms” project.
- \$78,947 from Allergan, Plc for his “Crystallinity of API and Excipients in Drug Delivery Systems” project.
- \$69,156 from Sun Pharma for the his “Development of NIPTE Industrial Training Program” project (co-investigator).

Professor Timothy S. Wiedmann



Dr. Wiedmann completed a semester leave last fall as a visiting professor at Shenyang Pharmaceutical University (SPU), Liaoning Province in Northeast China. He assisted in teaching biopharmaceutics in their five year BS program, which is an English-based curriculum. While there, he gave an invited talk at the Asian Inhalation Society, Shenyang, “Magnetic Hyperthermia for Lung Cancer.” This research was done in collaboration with Dr. Jayanth Panyam. At SPU, he advised students interested in pursuing graduate students in the US. This coming fall, Dr. Wiedmann will assist in the implementation of an internship program for SPU students who will spend the spring semester at the University of Minnesota doing research.

Also during his stay in China, he gave an invited talk at the Chinese Academy of Science, Beijing, “Magnetic Particles for the Treatment of Lung Cancer.” He was hosted by Dr. Liang Wei, a former post-doctoral fellow at the University

of Minnesota. He met with Dr. Dandan Yi at the Tongji Medical College, Wuhan, to establish a collaboration involving inhalation treatment of lung cancer. In Wuhan, he gave a presentation to the Department of Pharmaceutics, “Inhalation Treatment of Lung Cancer.”

Dr. Wiedmann returned to Shenyang in spring 2016 to give a presentation at the Fourth Asian Symposium on Pharmaceutical Science and Technology, “Pharmaceutical Salts.” He agreed to be an assistant editor of the Asian Journal of Pharmaceutical Sciences and participated in the board meeting during his stay. He gave a joint presentation with Dr. Ray Wood to pharmacy students at SPU on graduate education, where industrial and academic perspectives were given.

He continues to manage activities in AeroCore, an internal/external research organization at the University of Minnesota that conducts inhalation research studies. AeroCore is currently supporting a project with Dr. Lisa Peterson, “Interactions Between Tobacco Smoke Constituents in Rodent Tumor Models.” New ventures include a contract with the Milwaukee Medical College, which was coordinated by Dr. Frank Ondrey, University of Minnesota Department of Otolaryngology. A new grant began in September 2016, “e-Cigarettes: Formaldehyde DNA Adducts, Oxidative Damage, and Potential Toxicity and Carcinogenesis,” with Dr. Stephen Hecht, University of Minnesota Cancer Center, as principal investigator.



Faculty News & Activities (cont.)

Professor Cheryl L. Zimmerman

In July 2016, colleagues and students came together to wish Dr. Zimmerman a happy retirement and thank her for over 30 years of service to the University of Minnesota Department of Pharmaceutics! Former lab members shared the impact that she has had on their education and lives and colleagues shared the numerous ways she has impacted research and the industry. Alumni speakers included Swati Nagar [PhD 2003], Yazdi Pithavala [PhD 1995], Cristina Castelli [Post-Doctoral Associate 1994-1996], Prajakti Kothare [PhD 2001], Manthena Varma [Post-Doctoral Associate 2006-2008], Jing Wang [PhD 2012], and Brian Willis [PhD 2007]. Special presentations and reflections were given by Dr. K. Sandy Pang, Professor at University of Toronto, and Dr. Kenneth Thummel, Professor and Department Chair at the University of Washington, and reflections were shared by Dean Marilyn Speedie, Dr. Jayanth Panyam, Dr. William Elmquist, and many of the attendees.



Recent Publications

- Beilman G, Wolf A, Suryanarayanan R, Thakral S. Resuscitation Composition and Methods of Making and Using. US Provisional Patent 62,397,211 filed September 20, 2016.
- Drees J, Mertensotto M, Liu G, Panyam J, Leonard A, Augustin L, Schottel J, Saltzman D. (2015) Attenuated Salmonella Enterica Typhimurium Reduces Tumor Burden in an Autochthonous Breast Cancer Model. *Anticancer Res*, 35 (2):843-9.
- Fernández-Gallardo J, Elie BT, Sadhukha T, Prabha S, Sanaú M, Rotenberg SA, Ramos JW, Contel M. (2015) Heterometallic Titanium-Gold Complexes Inhibit Renal Cancer Cells In Vitro and In Vivo. *Chem Sci*, 6:5269-83.
- Han J, Michel AR, Lee HS, Kalscheuer S, Wohl A, Hoyer TR, McCormick AV, Panyam J, Macosko CW. (2015) Nanoparticles Containing High Loads of Paclitaxel-Silicate Prodrugs: Formulation, Drug Release, and Anticancer Efficacy. *Mol Pharmaceutics*, 2 (12):4329-35.
- Hirschberg C, Sun CC, Rantanen J. (2016) Analytical Method Development for Powder Characterization: Visualization of the Critical Drug Loading Affecting the Processability of a Formulation for Direct Compression. *J Pharm Biomed Anal*, 128:462-8.
- Hu LS, Ning S, Eschbacher JM, Baxter LC, Gaw N, Ranjbar S, Plasencia J, Dueck AC, Peng S, Smith KA, Nakaji P, Karis JP, Quarles C, Wu T, Loftus J, Jenkins R, O'Neill BP, Elmquist WF, Hoxworth JM, Frakes D, Sarkaria JN, Swanson KR, Tran N, Li J, Mitchell JR. (2016) Radiogenomics to Characterize Regional Genetic Heterogeneity in Glioblastoma. *Neuro Oncol*, pii: now135. [Epub ahead of print]
- Hu LS, Ning S, Eschbacher JM, Gaw N, Dueck AC, Smith KA, Nakaji P, Plasencia J, Ranjbar S, Price SJ, Tran N, Loftus J, Jenkins R, O'Neill BP, Elmquist W, Baxter LC, Gao F, Frakes D, Karis JP, Zwart C, Swanson KR, Sarkaria J, Wu T, Mitchell JR, Li J. (2015) Multi-Parametric MRI and Texture Analysis to Visualize Spatial Histologic Heterogeneity and Tumor Extent in Glioblastoma. *PLoS One*, 24;10(11):e0141506
- Jena S, Suryanarayanan R, Aksan A. (2016) Mutual Influence of Mannitol and Trehalose on Crystallization Behavior in Frozen Solutions. *Pharm Res*, 33(6):1413-25.
- Jing Y, Liu J, Ji WH, Wang W, He SH, Jiang XZ, Wiedmann TS, Wan, C, Wang JP. (2015) Biocompatible Fe-Si Nanoparticles with Adjustable Self-Regulation of Temperature for Medical Applications. *ACS Applied Materials and Interfaces*, 7(23):12649-54. DOI: 10.1021/acsami.5b01680
- Kalari KR, Thompson KJ, Nair AA, Tang X, Bockol MA, Jhavar N, Swaminathan SK, Lowe VJ, Kandimalla KK. (2016) BBBomics-Human Blood Brain Barrier Transcriptomics Hub. *Front Neurosci*, 10:71.
- Kapoor M, Cheryala N, Rautiola D, Georg G, Cloyd JC, Siegel RA. (2016) Chirally Pure Prodrugs and Their Converting Enzymes Lead to High Supersaturation and Rapid Transcellular Permeation of Benzodiazepines. *J Pharm Sci*, 105, 2365-71. DOI: 10.1016/j.xphs.2016.05.011
- Kapoor M, Cloyd JC, Siegel RA. (2016) A Review of Intranasal Formulations for the Treatment of Seizure Emergencies. *J Control Rel*, 237:147-59. DOI: 10.1016/j.jconrel.2016.07.001
- Khorasani M, Amigo J, Sun CC, Bertelsen P, Rantanen J. (2016) Process Optimization of Dry Granulation Based Tableting Line: Extracting Physical Material Characteristics from Granules, Ribbons, and Tablets Using Near-IR (NIR) Spectroscopic Measurement. *Powder Technol*. 300:120-5. DOI:10.1016/j.powtec.2016.03.004

Recent Publications (cont.)

- Kirtane A, Lis L, Georg G, Gurvich V, Panyam J. (2015) Reformulating Tylocrebrine in EGFR Targeted Polymeric Nanoparticles Improves its Therapeutic Index. *Mol Pharmaceutics*, 12(8):2912-23.
- Kirtane A., Siegel AR, Panyam J. (2015) A Pharmacokinetic Model for Quantifying the Effect of Vascular Physiology on the Choice of Drug Carrier: A Framework for Personalized Nanomedicine. *J Pharm Sci*, 104(3):1174-86.
- Kothari K, Suryanarayanan R. (2016) Influence of Disorder on Dissolution. *Disordered Pharmaceutical Materials*, Descamps M (ed.). Wiley, New York.
- Kou X, Chan LW, Sun CC, Heng PWS. (2016) Development of Slab-Shaped Lactose Carrier Particles by Air Jet Milling. *Asian J Pharm Sci*. DOI: 10.1016/j.ajps.2016.09.002
- Layek B, Sadhukha T, Prabha S. (2016) Glycoengineered Mesenchymal Stem Cells as an Enabling Platform for Two-Step Targeting of Solid Tumors. *Biomaterials*, 88:97-109.
- Levin VA, Tonge PJ, Gallo JM, Birtwistle MR, Dar AC, Iavarone A, Paddison PJ, Heffron TP, Elmquist WF, Lachowicz JE, Johnson TW, White FM, Sul J, Smith QR, Shen W, Sarkaria JN, Samala R, Wen PY, Berry DA, Petter RC. (2015) CNS Anticancer Drug Discovery and Development Conference White Paper. *Neuro Oncol*, 17 Suppl 6:vi1-vi26. DOI: 10.1093/neuonc/nov169
- Lyu S, Siegel RA. (2016) Drug-Material Interactions, Materials Selection, and Manufacturing Methods. *Drug-Device Combinations for Chronic Disease*, Lyu S, Siegel RA, eds., Wiley-Society for Biomaterials, pp. 89-116.
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- Mehta M, McKenna GB, Suryanarayanan R. (2016) Molecular Mobility in Glassy Dispersions. *J Chem Phys*, 144 (20):204506.
- Mehta M, Ragoonanan V, McKenna GB, Suryanarayanan R. (2016) Correlation Between Molecular Mobility and Physical Stability in Pharmaceutical Glasses. *Mol Pharm*, 13(4):1267-77.
- Mehta M, Suryanarayanan R. (2016) Accelerated Physical Stability Testing of Amorphous Dispersions. *Mol Pharm*, 13 (8):2661-6.
- Mistry P, Chakravarty P, Lubach JW. (2016) Probing the Distribution of Water in a Multi-Component System by Solid-State NMR Spectroscopy. *Pharm Res*, 33:2470-80.
- Mistry P, Mohapatra S, Gopinath T, Vogt FG, Suryanarayanan R. (2015) Role of the Strength of Drug-Polymer Interactions on the Molecular Mobility and Crystallization Inhibition in Ketoconazole Solid Dispersions. *Mol Pharm*, 12(9):3339-50.
- Mistry P, Suryanarayanan R. (2016) Strength of Drug-Polymer Interactions: Implications for Crystallization in Dispersions. *Cryst Growth Des*, 16(9):5141-9.
- Mittapalli RK, Chung AH, Parrish, KE, Crabtree D, Halvorson KG, Hu G, Elmquist WF, Becher OJ. (2016) ABCG2 and ABCB1 Limit the Efficacy of Dasatinib in a PDGF-B Driven Brainstem Glioma Model. *Mol Cancer Ther*, 15(5):819-29. DOI: 10.1158/1535-7163.MCT-15-0093

Recent Publications (cont.)

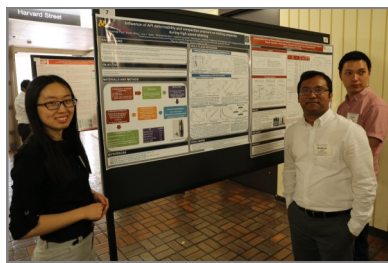
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- Osei-Yeboah F, Chang S-Y, Sun CC. (2016) A Critical Examination of the Phenomenon of Bonding Area: Bonding Strength Interplay in Powder Tableting. *Pharm Res*, 33:1126-32.
- Osei-Yeboah F, Lan Y, Sun CC. (2016) A Top Coating Strategy with Highly Bonding Polymers to Enable Direct Tableting of Multiple Unit Pellet System (MUPS). *Powder Technol*. DOI: 10.1016/j.powtec.2016.10.039
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- Parrish KE, Pokorny J, Mittapalli RK, Bakken K, Sarkaria JN, Elmquist WF. (2015) Efflux Transporters at the Blood-Brain Barrier Limit Delivery and Efficacy of CDK4/6 Inhibitor Palbociclib (PD-0332991) in an Orthotopic Brain Tumor Model. *J Pharmacol Exp Ther*, 355(2):264-71. DOI: 10.1124/jpet.115.228213
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Symposiums

David J.W. Grant Symposium



The David Grant Symposium, held in honor of late Professor David J.W. Grant, a leader who helped to define the field of solid-state science, took place on June 22, 2016 at the University of Minnesota Twin Cities campus. It was attended by 74 active researchers and leaders in the field of pharmaceutical solid-state sciences. These leading researchers, from both academia and industry, gathered to share their most cutting edge research and exchange stimulating ideas. The symposium covered current topics that are of importance to different aspects of drug product development and clarified future directions in this field through a round table discussion.

Brain Barriers Research Center (BBRC) Symposium



The inaugural Brain Barriers Research Center (BBRC) Symposium took place on October 26, 2016 at the Commons Hotel in Minneapolis, Minnesota. It featured speakers from the University of Minnesota, Mayo Clinic Rochester, and University of Wisconsin-Madison and was attended by over 100 participants from a variety of research backgrounds. The objective of the symposium was to stimulate collaboration across various departments and institutions on issues related to brain barriers, especially the blood brain barrier, that interconnect both CNS drug delivery and CNS pathophysiology.

You're Invited!

MINNESOTA ALUMNI BREAKFAST

Monday, November 14, 2016

7:00 to 8:00 AM

Hyatt Regency Denver

Mineral Room

(third floor)

AAPS Annual Meeting and Exposition

Denver, Colorado

November 13-17, 2016

University of Minnesota College of Pharmacy Ranks Second in Nation

U.S. News and World Report Rankings Reflect Peer Assessments of the Program



The University of Minnesota College of Pharmacy ranked second in this year's *U.S. News and World Report's* ranking of pharmacy schools. The college moved up one spot from its third place ranking in 2012, the last time *U.S. News* ranked pharmacy schools. The rankings are based upon the results of peer assessment surveys sent to leaders in pharmacy schools across the country.

"We are extremely proud to be recognized as one of the very best pharmacy schools in the nation. This ranking reflects our exceptional work, dedication and high standards our students, faculty, and staff of the College of Pharmacy set for themselves and their colleagues," said Marilyn Speedie, dean. "Cutting-edge research by world-renown faculty enhances our excellent education program."

The University of Minnesota has the only college of pharmacy in the state of Minnesota, and offers its doctor of pharmacy (PharmD) program on both the Twin Cities and Duluth campuses. Faculty researchers in the college are known for their expertise in drug design, delivery, therapy, and policy.

The college enrolls 640 doctor of pharmacy students in the four-year professional program and offers five graduate programs to 120 graduate students, along with several post-doctoral fellowships.

"The ranking of the college among the top in the country further supports our excellent work by attracting outstanding faculty and students," Speedie said. "Every day our researchers and students find new ways to improve the health of Minnesotans."

Source: www.pharmacy.umn.edu/news-and-events/u-mn-college-pharmacy-ranks-second-nation



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