

Indispensable News

MinneCeutics

University of Minnesota

Fall 2011

Department of Pharmaceutics

PHARMACEUTICS FACULTY

William F. Elmquist
Carolyn A. Fairbanks
Jayanth Panyam
Ronald J. Sawchuk
Henning Schroeder
Ronald A. Siegel
Calvin Changquan Sun
Raj G. Suryanarayanan
Timothy S. Wiedmann
Cheryl L. Zimmerman

AFFILIATE FACULTY

Walid M. Awni, Abbott Laboratories. **Richard C. Brundage**, Dept. of Experimental and Clinical Pharmacology, University of Minnesota. **Belinda Cheung**, Graduate School, University of Minnesota. **Lester R. Drewes**, Dept. of Biochemistry and Molecular Biology, University of Minnesota-Duluth. **William H. Frey, II**, Alzheimer's Institute, Regions Hospital, St. Paul, Minnesota. **Z. Jane Li**, Pfizer, Inc. **John R. Ohlfest**, Dept. of Neurosurgery and Pediatrics, University of Minnesota. **Theresa M. Reineke**, Dept. of Chemistry, University of Minnesota. **Evgeniy Y. Shalae**v, Pfizer, Inc. **Timothy S. Tracy**, College of Pharmacy, University of Kentucky. **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

Dear Friends,

It is a pleasure for me to greet you again this year. The department remains active in all facets of the academic mission, including our teaching, service, and, of course, our scholarly and research efforts. We have been an integral part of the College's efforts to revise the professional program curriculum, incorporating our innovative teaching techniques and our dedication to the fundamentals of pharmaceutical sciences. The department faculty is producing exciting new knowledge in many diverse areas of pharmaceutics, such as solid state characterization, biopharmaceutics, targeted delivery, and pharmacokinetics-pharmacodynamics. As always, these cutting-edge contributions to the literature are made possible by our incredibly talented and hardworking graduate students and postdocs.

Of note, Professor Cheryl Zimmerman, after about thirty years as a leader in the department, has decided to begin a five-year phased retirement period beginning this year. During the phase, she will remain active in her collaborative research and in the teaching of our professional and graduate students. Along these lines, she will be establishing a modeling and simulation core laboratory to further the strong teaching and research in pharmacokinetics/dynamics for which we have always been known. Cheryl will pursue other interests upon retirement and we all wish her continued great success in those endeavors. Her contributions to the department, the College and the pharmaceutics community have been tremendous. We appreciate her efforts as Director of Graduate Studies, and we are pleased Tim Wiedmann has graciously accepted the role as we move forward.

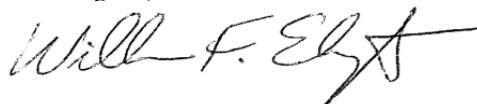
As some faculty move on, it is always important to move forward with new faces and new ideas. The department welcomes Dr. Karunya Kandimalla as a new tenure-track faculty member studying drug delivery to the brain as it relates to Alzheimer's disease. The department has other hiring initiatives underway to strengthen our expertise in the Brain Barriers Research Center. Moreover, we welcome new university-wide leadership in Dr. Eric Kaler, recently inaugurated as the University of Minnesota's 16th president.

The department looks forward to a sustained relationship with NIPTE (National Institute for Pharmaceutical Technology and Education) with Calvin Sun and Raj Sury leading the way. NIPTE is a consortium of several schools of pharmacy and was recently funded by the FDA.

I personally would like to thank all of you, our friends and alumni, who have supported our fellowships and initiatives, and helped the department in many ways by being strong ambassadors of good will and through helping us with your time and talent.

This has been both a rewarding and challenging year. We send our best regards to our colleagues in Japan that were affected by the earthquake and tsunami in March. Best wishes to all for a safe and productive year ahead.

With kind regards,



William F. Elmquist, Pharm.D., Ph.D.
Professor and Head, Dept. of Pharmaceutics



ALUMNI NEWS

Sagar Agarwal, Ph.D. [2011], participated in the University's 4th Annual Graduate School Doctoral Research Showcase in April 2011 with a research poster on his thesis, *Improving Delivery of Molecularly Targeted Agents to Glioma*. Sagar was a recipient of the 2010-11 Doctoral Dissertation Fellowship. His advisor was Prof. William Elmquist.

Richard Brundage, Ph.D. [1996], was appointed to the Board of Directors for the newly established American Society of Pharmacometrics.

Paroma Chakravarty, Ph.D. [2010], accepted a position as Associate Scientist in the Small Molecule Pharmaceutical Sciences Division of Genentech, Inc., in South San Francisco, California.

Ying Chen, Ph.D. [2009], is a pharmacokinetics scientist at ImClone Systems in the division of Global Clinical Pharmacology in Branchburg, New Jersey.

Nagdeep Giri, Ph.D. [2008] and Marta Ruohoniemi were married in the Twin Cities on September 3, 2010 in two ceremonies – one Hindu, the other Christian. **Naveed Shaik, Ph.D.** [2008] served as best man. Both Nagdeep and Naveed are clinical pharmacology managers at Pfizer in San Diego, California.

Luna Musib, Ph.D. [2000], and her husband, Deepankar Das, welcomed their first child, a daughter named Antara, on August 22, 2011. Luna is employed at Genentech, Inc. in South San Francisco, California.

Swati Nagar, Ph.D. [2003], was promoted to Associate Professor with tenure at Temple University in Philadelphia, Pennsylvania in the Dept. of Pharmaceutical Sciences. Swati graduated her first Ph.D. student, Dr. Otito Iwuchukwu, this year.

Yuanyuan Xie, Ph.D. [2008], was recently promoted to Senior Formulation Scientist in June 2011 at Astrazeneca Pharmaceuticals R&D in Boston, Massachusetts. Daughter Emily is 5 years old and began Kindergarten this fall.

Geoff G.Z. Zhang, Ph.D. [1998], was elected to Fellowship status in the American Association of Pharmaceutical Scientists and will be recognized at the AAPS Annual Meeting in Washington, DC during the opening session on October 23. Geoff is Materials Science Project Leader at Abbott Laboratories in the area of Global Pharmaceutical R&D.

Tong Zhu, Ph.D. [2002], is now Associate Director of Global Clinical Pharmacology and Exploratory Development at Astellas Pharma, Inc., in Deerfield, Illinois.

GRADUATE STUDENT ORGANIZATIONS

2011-2012 Pharmaceutics Graduate Student Representatives: Ameya Kirtane, Mehak Mehta

2011-2012 AAPS Student Chapter Officers: Chair: Sayantan Chattoraj (Pharmaceutics)
Chair-Elect: Khushboo Kothari (Pharmaceutics)
Secretary: Maggie Olson (Medicinal Chemiatry)
Treasurer: Akshanth Polepally (Experim. & Clin. Pharmacology)
Web Coordinator: Ahmed Soliman (Social & Administrative Pharmacy)
Social Outreach/HR: Ameya Kirtane (Pharmaceutics)

The AAPS Student Chapter organized several social activities in 2011. A campus Bowling Nite was held in February at Goldy's Gameroom in Coffman Union, and everyone enjoyed an evening of bowling, pizza and conversation. The AAPS Annual Kick-off Meeting was held in September to welcome new students to the chapter, with a focus of developing of strategies to enhance student diversity in the day-to-day operations of the Chapter.

The Chapter has continued to be active in inviting outside speakers to meet with students and faculty members. In April 2011 **Dr. Christopher Lipinski**, Scientific Advisor at Melior Discovery, was invited to meet with students and faculty and present *Assessing Hits On Pharmacological Screening: A Medicinal Chemist's View on Structures and Filters*. **Dr. Bradley D. Anderson** of the University of Kentucky was invited to visit in October 2011 and presented a seminar on *Understanding Chemical Reactivity in Amorphous Solids — Applications of Mechanism-Based Kinetic Models*. Dr. Anderson is the H.B. Kostenbauder Professor of Pharmaceutical Sciences, and is Director of the Drug Development Division at the University of Kentucky College of Pharmacy. In March 2012 the Chapter will host **Dr. Reinhart Gabathuler** from Videotron, Canada. During his visit, Dr. Gabathuler will meet with students and faculty members, and will offer a research presentation on drug delivery to the central nervous system.

FROM THE DIRECTOR OF GRADUATE STUDIES

Dear Alumni, Students, Colleagues, and Friends,

Well, I am back as Director of Graduate Studies for another tour of duty.

In coming back, I note that there have been many changes for our program, yet many things are the same as when I previously served as DGS, perhaps even the same as when many of the alumni were here. The College of Pharmacy has a new Associate Dean of Research and Graduate Education, Esam El-Fakahany, who is providing leadership and support for our program. His position is critical, as many of the functions of the Graduate School have been transferred to the College. He led the effort to examine the annual reviews for the College's four graduate programs, which was used to determine the financial support given through block grants. Needless to say, the accomplishments of our faculty and students as overseen by Professor Zimmerman, whose term as DGS recently concluded, were viewed in a very favorable light. This sets a high standard for the program looking into the future.

An opportunity resulting from the transfer of graduate administrative responsibility to the College will be greater freedom in determining the requirements of a doctoral degree. Rest assured we will still require students do research and write a thesis, but the number of classes required will be a topic of future discussion. I hope the alumni will be proactive in letting us know what was done well and what we should try to do differently in the future to prepare our graduates for the shifting sands encountered in the industry.



It has also become necessary to draft policies for our College and programs that were previously owned by the Graduate School. While at times this amounts to a 'cut and paste' process of changing the names, it has also necessitated the College's program DGSs to meet together. The up side is that this interaction and sharing of ideas will certainly lead to improved delivery and structure for our graduate program.

What hasn't changed is the commitment of the Pharmaceutics faculty and students to quality research. I have really enjoyed the opportunity to reconnect with the students in my capacity as DGS to find out how things are really going. Candy and Erica are still doing outstanding jobs in welcoming the new students with smiles and guidance through the maze of processes, and now also the construction of the light rail down Washington Avenue. Professor Elmquist continues on as a stalwart leader through the difficult financial times of the U as a public institution dependent on the state for support.

As we move forward, we seek to build upon our strengths, identify opportunities for growth, and improve upon our reputation as a top graduate program.

A handwritten signature in black ink, appearing to read 'Timothy S. Wiedmann'. The signature is fluid and cursive, with a large loop at the end.

Timothy S. Wiedmann, Ph.D.
Professor and Director of Graduate Studies

GRADUATE STUDENT NEWS

DEGREES EARNED

Sagar Suresh Agarwal, Ph.D. in Pharmaceutics, 2011. *Thesis:* Improving Delivery of Molecularly Targeted Agenda to Glioma (Advisor: Dr. William Elmquist). He is Senior Clinical Pharmacokineticist in the Dept. of Clinical Pharmacology and Pharmacometrics at Abbott Laboratories in Abbott Park, Illinois.

Tianli Wang, Ph.D. in Pharmaceutics, 2011. *Thesis:* Mechanisms and Analysis of the CNS Distribution of Cediranib, A Molecularly Targeted Anti-Angiogenic Agent (Advisor: Dr. William Elmquist). She is Senior Clinical Pharmacokineticist at Abbott Laboratories in Abbott Park, Illinois in the Dept. of Clinical Pharmacology and Pharmacometrics.

Tate Nicholas Winter, Ph.D. in Pharmaceutics, 2011. *Thesis:* Identification and Characterization of Carrier Transport Systems Influencing Agmatine Disposition (Advisor: Dr. Carolyn Fairbanks). Tate is currently a postdoctoral associate in Dr. Ronald Siegel's lab.

NEW GRADUATE STUDENTS

The Department welcomed these new students in fall 2011:

Garvey Liu received his B.S. in Chemistry and Asian Studies, with a concentration in China Studies, in 2011 from St. Olaf College in Northfield, Minnesota.

Pinal Mistry received her B.Pharm. in 2009 from the University of Mumbai, India. After completing her B.Pharm, she received her M.S. in Pharmaceutical Sciences in 2011 from Creighton University in Omaha, Nebraska.

Karen Riedl received her B.S. in Biochemistry from the University of Notre Dame in 2011, and is excited to be returning to her home state of Minnesota to pursue her Ph.D. degree.



(L to R: Garvey Liu, Pinal Mistry, Karen Riedl)

2011-2012 FELLOWSHIPS AWARDED TO PHARMACEUTICS GRADUATE STUDENTS

The University of Minnesota Graduate School awards the *Doctoral Dissertation Fellowship* to graduate students in their final year, as they are preparing to defend their Ph.D. theses.

One of these highly competitive fellowships was awarded to **Sayantana Chattoraj** to support his dissertation work titled "Milling-induced Amorphization of Pharmaceutical Crystals." (Advisor: Dr. Changquan Sun).

The *David J.W. Grant and Marilyn J. Grant Fellowship in Physical Pharmacy* is awarded to students whose research is focused in physical pharmacy. **Sayantana Chattoraj** received the award. (Advisor: Dr. Calvin Sun).

The *Edward G. Rippie Fellowship* is awarded to students with a consistent and outstanding academic record. It has been awarded to **Jing Wang**. (Advisor: Dr. Cheryl Zimmerman)

The *Ronald J. Sawchuk Fellowship in Pharmacokinetics* is awarded to a graduate student whose research is focused in pharmacokinetics. It was awarded to **Ramola Sane**. (Advisor: Dr. William Elmquist).

GRADUATE STUDENT ACTIVITIES AND AWARDS

Sayantana Chattoraj was invited to present *Mode of Non-isothermal Crystallization of Glass depends on Crystallization Temperature Relative to T_g* at the 13th International Workshop on Physical Characterization of Pharmaceutical Solids in June 2011 in Indianapolis, Indiana. He received the 2011 AAPS Graduate Student Symposium Award in Manufacturing Science and Engineering sponsored by Bristol-Myers Squibb. The topic of his podium presentation at the upcoming October AAPS meeting in Washington, DC is *Unimodal and Bimodal Non-isothermal Crystallization of Organic Glasses Explained by a Unified Seed-facilitated Surface Crystallization Model*.

Isha Koonar presented a poster titled *Characterization of Phase Transition of Aqueous Poly(NiPAAm-co-acrylic Acid) at IPRIME 2011* at the University of Minnesota. She also presented research posters at PGSRM 2011 (University of Wisconsin-Madison) and CRS 2010 (Portland, Oregon). Her research is focused on multiblock polymers for temperature and pH-modulated drug delivery. She is the outgoing chair of the Minnesota AAPS Student Chapter.

Khushboo Kothari participated in a summer internship in 2011 at Pfizer, Inc. in Groton, Connecticut under the guidance of Dr. Evgenyi Shalaev and Dr. Ravi Shankar. Her research involved comparison of spray-drying and freeze-drying processes for amorphous formulations.

Lin Niu presented *Intracellular Distribution of PLGA Based Vaccine Carrier in Dendritic Cells* for a nanoimaging class in 2011. He also gave a poster presentation on *Rapamycin Delivery to Dendritic Cell by PLGA Nanoparticles* at the June 2011 Pharmaceutics Graduate Student Research Meeting in Madison, Wisconsin.

Graduate Student Awards and Activities, continued

Tanmoy Sadhukha gave several research presentations: *Magnetic Hyperthermia for Lung Cancer*

- Nano Drug Delivery Symposium 2010, Omaha, Nebraska (poster presentation)
- Minnesota Nanotechnology Conference 2010, Minneapolis, Minnesota (poster presentation)
- Globalization of Pharmaceutics Education Network 2010, Chapel Hill, North Carolina (poster presentation)
- Rho Chi Research Symposium 2011, Minneapolis, Minnesota (Poster presentation)

Magnetic Hyperthermia as an Effective Approach to Kill Cancer Stem Cells

- Masonic Cancer Center Research Symposium 2011, Minneapolis, Minnesota (poster presentation)

- Pharmaceutics Graduate Student Research Meeting 2011, Madison, Wisconsin (oral presentation)
Targeted Magnetic Hyperthermia for Lung Cancer
- IPRIME 2010, Minneapolis, Minnesota (oral presentation)
Are Cancer Stem Cells Susceptible to Magnetic Hyperthermia?
- IPRIME 2011, Minneapolis, Minnesota (oral presentation)

Jing Wang spent the summer and early fall of 2011 on an internship at Genentech in San Francisco, California. He received the 2011 AAPS Graduate Student Symposium Award in Pharmacokinetics Pharmacodynamics, Drug Metabolism and Clinical Pharmacology and Translational Research, and will present his work at the AAPS Annual Meeting in October in Washington, DC. The title of Jing's presentation will be *The Use of a Two-Step Diagnostic Plot Approach to Identify Lung Cancer Susceptible Subjects*.

SCHOLARS

André Huss Eriksson, Ph.D., a former postdoctoral associate in Prof. Zimmerman's group, is a Research Scientist at LEO Pharma A/S in Copenhagen, Denmark in the DMPK and Safety Department. His work focuses on ADME and PK studies supporting discovery of new topical drugs. His wife, Nina, is at the Botanic Gardens in Copenhagen. "Our son Eivin is now six and started school this August. He likes school, is very inquisitive and wants to know everything. Who would have thought with those parents of his! Our daughter Estrid is now three and is very much a three-year-old girl! She likes all things pink, fluffy and princess-like – occasionally spiced up with her brother's Darth Vader mask and a light sabre."

Xiang Kou, Ph.D., joined Sun lab as a postdoctoral associate in summer 2011.

Dora Babu Madhura, Ph.D., and his wife, Omana, welcomed a baby girl named Lavishka (meaning 'lovely') born April 5, 2011. Dora Babu is a former postdoctoral associate for Dr. Ronald Sawchuk.

Raj Mittapalli, Ph.D., joined Dr. Elmquist's group as a postdoctoral associate after earning his Ph.D. degree in Pharmaceutical Sciences at Texas Tech University Health Sciences Center.

Guoyu Pan, Ph.D., is a Principal Investigator at Shanghai Institute of Materia Medica's Chinese Academy of Science. He was a postdoctoral associate in Dr. William Elmquist's lab.

Daughter Emily is five years old and began Kindergarten this fall.

Sarsvat Patel, Ph.D., and his wife Bhavana Patel, welcomed their first child, a daughter named Tanvi, in June 2011. Sarsvat is a postdoctoral associate in Dr. Changquan Sun's lab.

Komal Shahani, Ph.D., a research associate in Dr. Panyam's lab, joined Avantor (Mallinckrodt Baker) in 2010.

Limin Shi, Ph.D., received the 2011 AAPS Postdoctoral Fellowship. He is currently a postdoc in Dr. Changquan Sun's lab.

Dr. Eric Shusta, University of Wisconsin-Madison, spent a year-long research sabbatical in Prof. Elmquist's lab working on *in vitro* models of the blood-brain barrier from human progenitor cells.

Dr. Seema Thakral joined Prof. Raj Suryanaryanan's lab as a visiting research scholar for BOYSCAST (Better Opportunities for Young Scientists in Chosen Areas of Science and Technology), sponsored by the government of India's Dept. of Science and Technology, for a tenure of 9 months. She is pursuing research studies on *Process Induced Phase Transformations of Active Pharmaceutical Ingredients*.

Visiting scholars have been involved in Dr. Calvin Sun's group this year: **Ye Hao, Byoung Hwa Son** and **Qun Zhou**.

STAFF NEWS

Erica Flynn and Edvard Stapić were married on May 7, 2011 in Bloomington, Minnesota. Erica manages the purchasing and payments for the department, and Edvard is a software engineer for Siemens Energy.

Courtney Meeker joined Dr. Raj Suryanarayanan in 2011 as Assistant to the Peters Endowed Chair. She holds a B.A. in

English from the University of Michigan, enjoys knitting and cats, and is a state fair enthusiast. Courtney succeeded **Sarah Johnson Sexton**, who accepted a position in the College of Pharmacy's Institute for Therapeutic Discovery and Development.

FACULTY NEWS AND ACTIVITIES

PROFESSOR WILLIAM F. ELMQUIST was invited to give the following research presentations:

- *Drug Delivery to the Site of Action: Necessary, But Often Forgotten, in Drug Development*, Life Sciences Alley, Minneapolis, Minnesota, October 2010.
- *Applying Systems Biology Ideas to Study CNS Drug Delivery: The Case of Drug Transporters at the Blood Brain Barrier*, Center for Drug Design, University of Minnesota, Minneapolis, Minnesota, January 2011.
- *Targeted Bioavailability: Necessary, but Often Forgotten, in Drug Development*, WuXiAppTec, Mendota Heights, Minnesota, January 2011.
- *Factors Influencing Drug Delivery to the Brain: Multiple Mechanisms at Multiple Barriers*, North Jersey Drug Metabolism Discussion Group, Spring Symposium, Somerset, New Jersey, April 2011.
- *Improving Delivery of Molecularly-Targeted Agents to Brain Tumors*, Bristol-Myers Squibb, Princeton, New Jersey October, 2011.
- *Factors Influencing Drug Delivery to the Brain: Multiple Mechanisms at Multiple Barriers*, Novartis Pharmaceuticals, Florham Park, New Jersey, October 2011.

Dr. Elmquist also presented his recent research findings at the 9th International Conference on Cerebral Vascular Biology, Leiden, the Netherlands in June 2011.

PROFESSOR CAROLYN A. FAIRBANKS joined the 2011-2012 cohort of AACP's Academic Leadership Fellows Program, which is a year-long national program designed to prepare the next generation of leaders for colleges of pharmacy. Dean Marilyn Speedie and the U's Vice President for Research, Tim Mulcahy, serve as co-mentors for this program.

Dr. Fairbanks continues to focus on targeted delivery of gene therapeutics to specific CNS neuronal subpopulations and on delineating divergent and convergent mechanisms underlying the development of chronic pain and of addiction. She received an Engebretson Drug Design and Development Grant to develop a new gene therapeutic strategy by targeting the choroid plexus. A new line of investigation includes evaluation of the requirement of NR2B receptor subunit of the NMDA receptor for the inhibitory neuromodulatory impact of agmatine on neuroplasticity underlying development of opioid tolerance, addiction and the development of chronic pain. She is currently editing a volume for Springer for their clinical neurosciences series on *Chronic Pain and Addiction*.

For the College of Pharmacy's curriculum revision effort, Dr. Fairbanks has been leading the development of the pharmacology content (with Dr. Earl Dunham) and for neurology (with Dr. Jim Cloyd).

Dr. Fairbanks continues to work with the Office of the VP of Research as IACUC Vice-Chair for Biomedical sciences with the unwavering goal of improving the research environment at

the University of Minnesota. She also continues her activities as a Director of the Board of Directors of the American Pain Society where she is liaison to the Basic Science Interest Group and the Complementary and Alternative Medicine Task Force.

PROFESSOR JAYANTH PANYAM, wife Prabha and son Sami were blessed with the arrival of a baby girl, Aanya, on November 16, 2010.

Along with Drs. Vadim Gurvich and Gunda Georg, Dr. Panyam (Principal Investigator) was awarded a contract from the National Cancer Institute to study polymeric nanoparticles for tumor targeted delivery of tylocrebrine.

Dr. Panyam was invited to give the following presentations: *Targeted Nanoparticles for Drug Resistant Cancer*, 6th Annual Minnesota Nanotechnology Conference, Minneapolis, Minnesota (November 2010). *Polymeric Systems for Enhanced Cancer Chemoprevention and Treatment*, Department of Pharmaceutical Sciences, University of Nebraska Medical Center, Omaha, Nebraska (May 2011).

PROFESSOR RONALD A. SIEGEL serves as Director of the Biomaterials and Pharmaceutical Materials program in IPRIME (Industrial Partners for Research in Interfacial and Materials Engineering), an academic/industrial consortium at the University of Minnesota.

Dr. Siegel, along with Drs. Gunda Georg, James Cloyd and Ilo Leppik, received a faculty development research grant from the University's Academic Health Center to study diazepam prodrugs for the treatment of seizure emergencies.

For the past two years, Dr. Siegel has participated in an NIH consortium grant, *Nanodiagnostics and Nanotherapeutics: Building Research Ethics and Oversight*, chaired by Prof. Susan M. Wolf in the Law School.

Prof. Siegel is co-editor of a book titled *Fundamentals and Applications of Controlled Release Drug Delivery* to appear in December 2011, published by Springer.

PROFESSOR CALVIN SUN was invited to give the following presentations:

- *Sticking Problem Interrogated* (C.C. Sun and S. Patel), Cima Laboratories, Brooklyn Park, Minnesota, March 2011.
- *Understanding Mechanically-induced Crystal Disorder: Kinetic, Thermodynamic and Molecular Predictors* (C.C. Sun), Boehringer Ingelheim Pharmaceuticals Inc., Ridgefield, Connecticut, April 2011.
- *A Scientific Path to Quality-By-Design of Pharmaceutical Tablets* (C.C. Sun), IWPCPS-13, Indianapolis, Indiana, June 2011.
- *Recrystallization of Amorphous Solids* (C.C. Sun), General Mills, Inc., Minneapolis, Minnesota, August 2011.

Professor Calvin Sun, continued

- *Overcoming Powder Flow and Tableting Problems Through Crystal and Particle Engineering* (C.C. Sun), Bristol-Myers Squibb, New Brunswick, New Jersey, August 2011.
- *Mechanical Properties of Solid Dispersions* (C.C. Sun), Abbott Laboratories, Abbott Park, Illinois, September 2011.

PROFESSOR RAJ G. SURYANARAYANAN was invited to give lectures at universities and pharmaceutical companies:

- *Processing-induced API Phase Transformations*, Merck Research Laboratories, Rahway, New Jersey, October 15, 2010.
- *Processing-induced Phase Transformations: Potential Implications on Product Performance*, University of Wisconsin, Madison, Wisconsin, October 20, 2010.
- *Solid State Form Screening and Selection Methodologies and Applications and Lyophilization: Excipient Selection, Potential Form Changes, and Impact on Critical Quality Attributes*, CACO Pharmaceutical and BioScience Society Bay Area Workshop: CMC Strategies for Robust Product Development and NDA Submissions, Foster City, California, June 13, 2011.
- *Strategies for Controlling Mannitol Hemihydrate Formation During Freeze-drying and Phase Transitions During Pharmaceutical Processing – Potential Implications on Performance*, Amgen in Thousand Oaks, California on August 31, 2011.

PROFESSOR TIMOTHY WIEDMANN guided undergraduate students in his laboratory in 2011: Aerie Thuo (UROP); Andrew Keogh (1 cr of directed studies, B.S. thesis, Kansas State University); Joanna Fakhoury (STAR Program).

Dr. Wiedmann was invited to give the following research presentations:

- *Toward the Development of a Theragnostic System for Lung Disease*, University of Iowa in Iowa City
- *Inhalation Systems for Cancer Prevention*, SUNY-Stony Brook, New York (2010)
- *Respiratory Drug Delivery to an Animal Model of Pulmonary Arterial Hypertension*, Pulmokyne in Cooperstown, New York (2010)

PROFESSOR CHERYL L. ZIMMERMAN began a five-year phased retirement program starting July 1, 2011. She will have a 0.75-time appointment until July 2013, then a 0.5-time appointment until July 2016. She is focusing her efforts on teaching at both the undergraduate and graduate levels, continuing her research collaborations, and developing a modeling and simulation core facility for the Department of Pharmaceutics.

Dr. Zimmerman was a guest of the University of Wisconsin AAPS Student Chapter in April 2011 as part of the AAPS Visiting Scientists program. She met with the graduate students and faculty at the School of Pharmacy and delivered a seminar entitled *Stereoselective Biological Disposition of Tobacco-Specific Nitrosamines*.

Dr. Zimmerman also participated in an educational symposium sponsored by the Pharmacology Education Division of the American Society for Pharmacology and Experimental Therapeutics (ASPET) as a part of the Experimental Biology 2011 meeting in Washington, DC. Her topic was *Pharmacokinetics: A Review of the Basics*.

A course on

**BASIC PHARMACOKINETIC CONCEPTS
FOR THE PHARMACEUTICAL SCIENTIST
July 9-13, 2012**

will again be offered by the Department of Pharmaceutics, College of Pharmacy. The three-day course is designed and presented by Professors Richard Brundage, William Elmquist and Cheryl Zimmerman for academic and industrial scientists seeking a basic understanding of pharmacokinetics and pharmacodynamics essential to the evaluation of traditional dosage forms and innovative medical delivery systems and devices. This short course has been considered a great success by the attendees and presenters alike. For information regarding specific topics and registration, please visit <http://z.umn.edu/kinetics>.

RECENT PUBLICATIONS

Agarwal S, Hartz AM, Elmquist WF and Bauer B. Breast cancer resistance protein and P-glycoprotein in brain cancer: two gatekeepers team up. *Curr. Pharm. Des.* Aug 9. [Epub ahead of print] 2011.

Agarwal S, Sane R, Oberoi R, Ohlfest JR and Elmquist WF. Delivery of molecularly targeted therapy to malignant glioma, a disease of the whole brain. *Expert Rev. Mol. Med.* May 13;13:e17, 2011.

Agarwal S, Sane R, Ohlfest JR and Elmquist WF. Role of breast cancer resistance protein (ABCG2/BCRP) in the distribution of sorafenib to the brain. *J. Pharmacol. Exp. Ther.* **336(1)**: 223-33, 2011.

Arora KK, Tayade NG and Suryanarayanan R. Unintended water mediated cocrystal formation in carbamazepine and aspirin tablets. *Mol. Pharm.* **8(3)**: 982-989 (2011).

Bhatnagar BS, Martin SWH, Hodge TS, Das TK, Joseph L, Teagarden DL, Shalaev EY and Suryanarayanan R. Investigation of PEG crystallization in frozen and freeze-dried PEGylated recombinant human growth hormone-sucrose systems - Implications on storage stability. *J. Pharm. Sci.* **100(8)**: 3062-3075 (2011).

Bi M, Sun CC, Alvarez F and Alvarez-Nunez F. The manufacture of low-dose oral solid dosage form to support early clinical studies using an automated micro-filing system. *AAPS PharmSciTech.* **12**: 88-95 (2011).

Chattoraj S, Shi L and Sun CC. Profoundly improving flow properties of a cohesive cellulose powder by surface coating with nano silica through comilling. *J. Pharm. Sci.* DOI: 10.1002/jps.22677 (2011).

Chuealee R, Wiedmann TS, Suedee R and Srichana T (2010) Interaction of amphotericin B with cholesteryl palmityl carbonate ester. *J. Pharm. Sci.* **99**: 4658-4668.

Feldstein MM, Bermesheva EV, Jean Y-C, Misra GP and Siegel RA. Free volume, adhesion and viscoelastic properties of model nanostructured pressure-sensitive adhesive based on stoichiometric complex of poly(N-vinyl pyrrolidone) and poly(ethylene glycol) of disparate chain lengths. *J. Appl. Polym. Sci.* **119**: 2408-2421 (2010).

Kaushal AM, Vangala VR and Suryanarayanan R. Unusual effect of water vapor pressure on dehydration of dibasic calcium phosphate dihydrate. *J. Pharm. Sci.* **100(4)**: 1456-1466 (2011).

Li L, Sham YY, Bikadi Z and Elmquist WF. pH-Dependent transport of pemetrexed by breast cancer resistance protein (BCRP). *Drug Metab. Dispos.* May 31. [Epub ahead of print] 2011.

Lohani S, Nesmelova IV, Suryanarayanan R and Grant DJW. Spectroscopic characterization of molecular aggregates in solutions: Impact on crystallization of indomethacin polymorphs from acetonitrile and ethanol. *Cryst. Growth Des.* **11(6)**: 2368-2378 (2011).

Mohammad M, Grill A, Panyam J and Khair A. Cancer Therapeutics and Tumor Drug Resistance. In: *Targeted Drug Delivery in Cancer Therapeutics* (M. Firer, Ed). Research Signpost, 2010.

Motion JPM, Huynh GH, Szoka FC and Siegel RA. Convection and retro-convection enhanced delivery: some theoretical considerations related to drug targeting. *Pharmaceut. Res.* **28**: 472-479 (2011).

Patel S, Dahiya S, Sun CC and Bansal AK. Understanding size enlargement and hardening of granules on tableability of unlubricated granules prepared by dry granulation. *J. Pharm. Sci.* **100**: 758-766 (2011).

Richardson ES, Rolfes C, Woo OS, Elmquist WF, Benditt DG and Iazzo PA. Cardiac responses to the intrapericardial delivery of metoprolol: targeted delivery compared to intravenous administration. *J. Cardiovasc. Transl. Res.* 2011 Aug. 30 [Epub ahead of print] 2011.

Roerig JL, Steffen K, Zimmerman C, Mitchell JE, Crosby RD and Cao L. Preliminary comparison of sertraline levels in postbariatric surgery patients versus matched nonsurgical cohort. *Surgery for Obesity and Related Diseases* in press, (2011). Epub ahead of print 2010 Dec 15. PMID: 21256091.

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