

## Indispensable News

# MinneCeutics

University of Minnesota

Fall 2003

Department of Pharmaceutics

### REGULAR FACULTY:

William F. Elmquist  
Carolyn A. Fairbanks  
David J.W. Grant  
Ronald J. Sawchuk  
Ronald A. Siegel  
Raj G. Suryanarayanan  
Timothy S. Wiedmann  
Cheryl L. Zimmerman

### AFFILIATE FACULTY:

Walid M. Awni, Abbott Laboratories  
Rene A. Braeckman, Pan Pacific Pharmaceuticals, Inc.  
Keith K.H. Chan, GloboMax LLC  
Belinda W.Y. Cheung, University of Minnesota  
Janet M. Dubinsky, University of Minnesota  
William H. Frey, II, Alzheimer's Institute at Regions  
Hospital

Michael D. Karol, Abbott Laboratories  
Aldo Rescigno, University of Parma, Italy  
Evgenyi Y. Shalaev, Pfizer Pharmaceuticals  
Ray Skwierczynski, 3M Pharmaceuticals  
Timothy S. Tracy, University of Minnesota  
Lian Yu, Eli Lilly and Company

## MESSAGE FROM THE DEPARTMENT HEAD

Last year I ended this message telling you about two major undertakings in the College of Pharmacy, and hence the Department of Pharmaceutics. First, our professional pharmacy program was visited by an accreditation panel of the American Association of Colleges of Pharmacy. We presented a detailed self study to the panel, and met with them for two days. We passed with flying colors! The accreditation process, which occurs on a seven-year cycle, is designed to ensure that we are keeping up with the field.

The second major undertaking has been the opening of a branch of the College of Pharmacy in Duluth to accommodate the high demand for pharmacists, particularly in rural areas. We now lecture to students on two campuses, and are becoming acquainted with the ins and outs of distance learning and teleconferencing. As you might guess, there are a few bugs to be worked out, but all in all the process is going smoothly. A search is underway for a faculty member in Duluth who will teach pharmaceutics courses.

We celebrated the 50<sup>th</sup> birthdays of two beloved members of our Department, Cheryl Zimmerman and Candy McDermott! Cheryl had an evening soiree, and a canoe trip was organized for Candy. Similar milestones will be reached by others in the next couple of years. We'll keep you posted!

We also congratulate Candy for receiving a much-deserved Outstanding Employee Award from the College of Pharmacy, in which her service to the Pharmaceutics Graduate Program was cited.

The University of Minnesota, like many institutions, has faced severe budget cuts this year, with more cuts to come next year. The cuts result from a \$5 billion shortfall in the state treasury. A particularly unfortunate consequence is that \$1 billion in tobacco settlement money, which was targeted to cover recurring costs in the Academic Health Center (AHC), was immediately taken away to meet the state's

shortfall. To compensate, a portion of the cigarette tax revenues will be used to support the AHC. Of course, one of our missions in the AHC is to convince people to stop buying cigarettes.

Despite the bleak state funding picture in the near future, there is plenty of cause for optimism. Ground will be broken for a new Translational Research Building this November, with completion targeted for 2005. This building, to be situated near the athletic complex, will house 33 researchers and staff, and is intended to speed the translation of research from bench to bedside. This building will be funded primarily by private donations, including a \$10 million gift from the McGuire Foundation.

As another note of optimism, the University has exceeded its goal by raising \$1.6 billion through its Capital Campaign. Much of this money is specifically targeted and cannot be used to relieve the shortfall in state funding which supports ongoing needs, but it is essential for the long-term health of the University, which must constantly innovate and respond to new needs.

Finally, a search is underway for the Weaver Chair in Orphan Drugs and Rare Diseases. The home department for the Chair will depend on the successful candidate, who will be expected to build and lead a center with international standing. A symposium was held at the University in June to initiate the search and obtain guidance from national experts.

See you soon!



Ronald A. Siegel, Sc.D.  
Professor and Head  
Department of Pharmaceutics

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## MESSAGE FROM THE DIRECTOR OF GRADUATE STUDIES

Dear Alumni, Students, Colleagues, and Friends,

This has been a quiet but productive year in the Pharmaceutics graduate program. The Graduate School adopted a new Constitution, which identified a number of areas requiring changes in Pharmaceutics. The appointments to our graduate faculty were clarified and new titles introduced, and our program developed a policy for recommending appointments to the newly designated positions.

We have streamlined the application process and selection of students for admission into Pharmaceutics. While admissions requirements remain the same, more attention is being paid to applicants whose research interests match those of faculty who are able to take on new students. We also have compressed the application processing time in order to offset delays introduced by immigration and visa requirements following the establishment of the Department of Homeland Security.

Our program restored the Tuition Fellowship Grant to Pharmaceutics, which is made available by the Graduate School on a competitive basis. Tuition Fellowship funds can be used to cover the cost of tuition for students who receive fellowships/scholarships/grants from external organizations. This will be a great help in subsidizing those who have received USP and AFPE fellowships.

We're doing what we can to raise money for fellowships for students. Along with the Novartis Fellowship provided by the Novartis Corporation, for which we continue to be grateful, we continue to build the Edward G. Rippie Fellowship in Pharmaceutics, the Ronald J. Sawchuk Fellowship in Pharmacokinetics, and now the David J.W. Grant Fellowship in Physical Pharmacy. These fellowships will contribute to the health of the graduate program, and we appreciate the support of those who have contributed.

Looking into my glass sphere, I see a continued importance of drug therapy and an increasing demand for research and development of pharmaceutical products with the aging population. Meeting this demand will require that a steady stream of imaginative and skilled workers be supplied to the pharmaceutical industry and to government regulatory agencies. As our understanding of biology increases, pharmaceutical and biological agents of increased complexity will be needed, and this will present intellectual challenges to the whole discovery and development enterprise. We see our role in training tomorrow's pharmaceutical scientists as essential.



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

We have a new website:

***[www.pharmacy.umn.edu/pharmaceutics](http://www.pharmacy.umn.edu/pharmaceutics)***

If you wish to include a link to your company's website,  
please send the information to:  
*[mcd002@umn.edu](mailto:mcd002@umn.edu)*

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## THE DAVID J. W. GRANT GRADUATE FELLOWSHIP IN PHYSICAL PHARMACY

Since 1988, Dr. Grant has been a member of the College's faculty, has taught numerous graduate students, holds an endowed chair in pharmaceuticals, and conducts compelling research in the field of physical pharmacy. These research innovations have not only benefited the College but the world of pharmacy at large. The primary focus of Professor Grant's research is the development and evaluation of the engineering of properties of drugs in the solid or semi-solid state to optimize and control performance and quality of pharmaceutical dosage forms. Among methods under study is crystallization of the drug under various conditions, sometimes including a trace of a non-toxic additive that may be taken up by the bulk and/or surface of the crystals.

Professor Grant was also instrumental in the formation and founding of the Drug Delivery Center at the University of Minnesota. As Director, he leads a multidisciplinary center devoted to graduate education and research in the design and optimization of therapeutic delivery systems. Current investigations are focused on the defined area of commonality between the disease state, especially cancers, infections, inflammation and restenosis; the therapeutic agent, especially nitric oxide donors, nucleosides and peptides, and the delivery system, local and systemic, especially polymeric and biodegradable systems, new biomaterials, and infusion pumps.

A fellowship in honor of Professor David Grant marks his contributions to pharmaceutical research and 15 years of teaching at the University of Minnesota, and will support promising students studying physical pharmacy at the Ph.D. level. Once established, the fellowship can support an individual student for one or more years, and would be an incentive to attract the very best applicants to the University of Minnesota. Dr. Grant's graduates have accepted positions in industry and academia the world over, and it is our desire to ensure continued preparation of these students in his name for years to come.

Your support will have broad implications because it will ensure advances in physical pharmacy and sustain the burgeoning fields of solid-state pharmaceuticals and crystal engineering. Please join the Grant Fellowship Committee, which includes Drs. Raj Suryanarayanan (University of Minnesota), Hak-Kim Chan (University of Sydney), Sarma Duddu (Nektar Therapeutics), and Gary Liversidge (Elan Drug Delivery) in making a contribution that recognizes Dr. Grant's outstanding scholarship and to ensure that future generations of scientists may benefit from his legacy.

As part of the University's 21<sup>st</sup> Century Matching Funds initiative, there are dollars available to double the impact of contributions made to this named fellowship. We hope you will take advantage of this opportunity to honor Professor Grant and recognize his many contributions to pharmacy.

If you have questions about contributing to this important graduate fellowship, please contact:

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## DRUG DELIVERY CENTER

The Drug Delivery Center's Open House was held this year on October 3, beginning with a poster session by University of Minnesota faculty, postdoctorals and graduate students, and was followed by a seminar presentation by Dr. Philip Low of Purdue University, West Lafayette, Indiana, titled "Receptor-Mediated Targeting of Therapeutic and Imaging Agents to Cancer and Inflammatory Diseases." Dr. Low is the Joseph F. Foster Distinguished Professor of Chemistry in the School of Science at Purdue. As in previous years, this lecture was part of a monthly series sponsored by the Academic Health Center's Advanced Therapies Initiative, the Drug Delivery Center, and the Center for Cellular and Molecular Therapies.

In addition to the Open House, the Drug Delivery Center sponsored the following seminars during the year: "Aerosol Delivery of Drugs to the Lung: Implications for Tuberculosis Therapy," by Dr. Anthony Hickey, University of North Carolina; "Modified Polyethylenimines for Gene Delivery," by Dr. Thomas Kissel, Philipps Universität, Marburg, Germany; "Viral Vector Delivery of Genes to the Rostral Agranular Insular Cortex: Implications for Pain Management," by Dr. Luc Jasmin, Dept. of Neurological Surgery, University of California, San Francisco; "Biophysical Methods of Drug Delivery Using Ultrasound and Microneedles," by Dr. Mark Prausnitz, Dept. of Chemical and Biomedical Engineering, Georgia Institute of Technology; and "Applications of Raman Spectroscopy with Pharmaceutical Development," by Dr. Lynne Taylor, Purdue University. These seminars were also a part of the University's Advanced Therapies Initiative.

Present membership in the Drug Delivery Center comprises nineteen scientists representing five academic departments, and thirteen companies. The Drug Delivery Center continues to bring together disparate faculty and groups having a common interest in drug delivery.



David J.W. Grant, D.Phil., D.Sc.  
*Professor and Director*

**UNIVERSITY OF MINNESOTA MEMBERS:** ♦ Pharmaceuticals ♦ Biomedical Engineering ♦ Electrical and Computer Engineering ♦ Laboratory Medicine and Pathology ♦ Regions Hospital in St. Paul, MN. **INDUSTRIAL ADVISORY BOARD:** ♦ Antares Pharma, Inc. ♦ Birchpoint Medical ♦ CIMA Laboratories ♦ Comedicus ♦ General Mills ♦ Hosokawa Bepex ♦ LecTec Corporation ♦ Medtronic ♦ 3M Pharmaceuticals ♦ Minnesota Technologies, Inc., Academic Health Center, University of Minnesota ♦ TSI, Inc. ♦ Upsher-Smith Laboratories, Inc. ♦ Amir Naqwi, Ph.D., Powerscope, Inc. ♦ David Madsen, Ph.D.

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## ALUMNI NEWS

**Richard J. Hunt** [Ph.D. 1976] is Associate Director of Regulatory Affairs at Bracco Diagnostics, Inc., in Princeton, NJ.

**Makarand S. Jawadekar** [Ph.D. 1982] is Assistant Director in the Pharmaceutical Sciences Division of Pfizer Global R&D, and is currently responsible for technology assessment function involving external drug delivery technologies. Among his many activities in the last decade, he has been extensively engaged in coordinating activities with Pfizer's R&D operations in Japan. He was recently elected to the board of directors for a New York City based non-profit organization called Just One Break (JOB), helping those with disabilities to network and find suitable employment opportunities.

**Ajit K. Shah** [Ph.D. 1989] is Director of Pharmacokinetics and Drug Metabolism at MGI PHARMA, Inc. in Bloomington, MN.

**Srini Venkatesh** [Ph.D. 1993] received an MBA with Honors from the Wharton School, University of Pennsylvania. He is director of Pharmaceutical Candidate Optimization at Bristol-Myers Squibb in Wallingford, CT.

**Devalina Law** [Ph.D. 1994] has been inducted as a member of the prestigious Volwiler Society at Abbott Laboratories. Membership in this society is a recognition of Devalina's scientific excellence and leadership. Abbott Laboratories established the Volwiler Society in 1985 to recognize the company's most distinguished scientists and engineers. Named for the late Dr. Ernest H. Volwiler, Ph.D., a scientist and former Abbott president and chairman of the board, the society encourages professional growth and constant pursuit of innovation and scientific discovery. Volwiler is recognized in the National Inventors Hall of Fame by the U.S. Patent Office for his part in the discovery of sodium pentothal.

**Derek V. Moe** [Ph.D., 1994] is Director of Formulation Development at CIMA Laboratories in Brooklyn Park, Minnesota. "My son Charlie just started first grade, and my other son Sam started pre-school this fall. Charlie played golf, soccer and baseball this summer and is looking forward to his second season of hockey. Probably the most noteworthy thing that I've done since I've moved back to Minnesota was to get hauled off a softball field in an ambulance last summer after attempting to slide into third base. I was safe, but after the dust settled, my left foot was pointing the exact opposite of where it was supposed to. Thirteen months later my leg sets off metal detectors in some airports, but other than it's back to where it is supposed to be. I've gone back to golf."

**Yanfeng Wang** [Ph.D. 1994] is working as a clinical pharmacokineticist in Clinical Pharmacology, Oncology BU

at Novartis Pharmaceuticals Corporation in East Hanover, NJ. He and his wife Jane now have 3 children: Sophia, 8, Mira, 7, and Ted, 5 years old.

**Mark A. Sorenson** [Ph.D. 1995] is Director of Product Development at MGI PHARMA, Inc. in Bloomington, MN.

**Neelima V. Phadnis** [Ph.D. 1997] accepted a position at Schering-Plough Corporation in Memphis, TN where she supports the introduction of innovative products and growth of brands such as Coricidin, Claritin, Chlortrimeton and Drixoral. Prior to joining Schering-Plough, she played a significant role in the development and national/international launches of GlaxoSmithKline-branded products such as TUMS, Nicorette/NiQuitin and Panadol.

**Jim Haijian Zhu** [Ph.D. 1997] recently joined Forest Laboratories, Inc. on Long Island, NY.

**Raghu K. Cavatur** [Ph.D. 1999] is a Senior Scientist at Aventis Pharmaceuticals in Bridgewater, NJ.

**Linna Chen** [Ph.D. 1999] is currently attending Lewis and Clark Law School in Portland, OR and working part-time for Klarquist Sparkman LLP as a patent agent.

**Suneel K. Rastogi** [Ph.D. 2000] and his wife, Preeti, welcomed their first child, a daughter named Shreya, on July 27. Suneel is employed at Forest Laboratories, Inc., Inwood, NY.

**Ivy Heng Song** [Ph.D. 2000] is currently working at GlaxoSmithKline in Research Triangle Park, NC as a Senior Clinical Pharmacokineticist. "Dear all, a lot of you knew me as Song in 'those old days' and you may still call me Song since it makes me feel more closely connected with UMN. I graduated from Professor Zimmerman's lab. My days in Minnesota were really enjoyable and still bring back a lot of good memories. I have a lovely daughter who will turn three this upcoming Halloween. I wish you all the best."

**Calvin Changquan Sun** [Ph.D. 2000] remains at Pfizer, Inc. in Kalamazoo, MI, and on October 1 joined the Parenteral Group. "My family is doing well: Amy takes care of the two kids, a tiring job that requires love, patience, and skill. Fortunately, she does it well. David always amazes me on how quickly a kid can learn new things. He is going to daycare halftime and has a lot of fun there. Adrianne is starting to stand up and is sort of playing with David. Amy and I hope soon they can play together."

**Yue Huang** [Ph.D. 2001] joined the Clinical Pharmacology Department of Roche Palo Alto, LLC in California. He and his wife, Chunbin Li, welcomed their first child, a daughter named Ally Yunjia Huang, on March 9, and hopes everyone in Minnesota is enjoying the always beautiful fall season.

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## GRADUATE STUDENT ACTIVITIES

### **Smita Ramkanai Debnath, Ph.D.**

Thesis: An Approach to Identify Drugs for Physical Characterization (Advisor: Prof. Raj Suryanarayanan). Smita is a Senior Research Pharmacist at Merck Frosst in Kirkland, Quebec, a suburb of Montreal.

### **Yuandong (Alex) Gu, Ph.D.**

Thesis: Swelling Properties of Phenylboronic Acid-Containing Hydrogels and Their Application in Microfluidic Drug Delivery Devices (Advisor: Prof. Ronald Siegel). Alex is employed at Honeywell in Plymouth, MN.

### **Swati Nagar, Ph.D.**

Thesis: Metabolism of Opioid Analgesics in Transgenic Sick Cell Mice (Advisor: Prof. Cheryl Zimmerman). Swati is currently a post-doctoral fellow at Fox Chase Cancer Center in Philadelphia, PA.

### **Deliang Zhou, Ph.D.**

Thesis: Molecular Mobility and Physical Stability of Amorphous Pharmaceuticals (Advisor: Prof. David Grant). Deliang is employed at Boehringer-Ingelheim Pharmaceuticals, Inc. in Ridgefield, CT.

Formulation Research and Development Department. Under the mentorship of Drs. Nancy Barbour and Dilbir Bindra, he worked on a project titled "Characterization of the Wet Masses Using FT3 Powder Rheometer."

**Mr. Koustuv Chatterjee** received the Doctoral Dissertation Fellowship from the University of Minnesota Graduate School. He and Ms. Kiran Gupta were married on January 22, 2003.

**Ms. Sharmistha Datta** is this year's recipient of the Novartis Award from Novartis Pharmaceutical Corporation of East Hanover, NJ. Candidates for the award are nominated and selected by the Pharmaceutics faculty.

**Mr. Wei Liu** received an award from the AAPS Graduate Student Symposium in Pharmacokinetics, Pharmacodynamics, Drug Metabolism and Clinical Sciences sponsored by Eli Lilly & Co. He will present "Efflux Transport of Cethromycin Following Direct Intra-bulla Dosing in the Chinchilla Middle Ear" at the upcoming 2003 AAPS Annual Meeting in Salt Lake City.

**Ms. Swati Nagar** was a finalist for best presentation by a graduate student at the 11<sup>th</sup> North American ISSX Meeting in Orlando, Florida.

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## NEW GRADUATE STUDENTS

The Department welcomed these new students in Fall 2003:

**Mr. Sisir Bhattacharya** brought to the University of Minnesota both a Bachelors and Masters degree in Pharmacy from Jadavpur University in Calcutta, India.

**Ms. Ying Chen** holds both a B.E. in pharmaceutical preparation and an M.S. in pharmaceutics from China Pharmaceutical University in Nanjing.

**Ms. Shyeilla Dhuria** holds a B.A. degree in chemistry from Carleton College and was employed at CIMA Labs, Inc. as a research chemist in research and development before joining the Pharmaceutics graduate program.

**Mr. Gaurav Tolia** holds a B.Pharm. degree in pharmaceutical sciences from the Bharati Vidyapeeth College of Pharmacy in Mumbai, India, a post-graduate degree in pharmaceutical management from SIES School of Management in India, and a M.S. degree in cosmetic sciences from the University of Cincinnati. He is currently employed at 3M Drug Delivery Systems.

**Mr. John Roberts**, a first-year Pharmaceutics graduate student with Prof. Carolyn Fairbanks, has been awarded a pre-doctoral fellowship from the National Institute on Drug Abuse's University of Minnesota Training Grant in Neuroscience. This fellowship will fully support his appointment for the remainder of his doctoral training. John also attended the *Basic Science of Pain and Analgesia Conference* in Stockholm, Sweden in May.

**Mr. Agam Sheth** was nominated by peers for inclusion in *Who's Who Among Students in American Universities and Colleges*.

**Ms. Chitrlekha Telang** is the recipient of the 2003 Perkin Elmer Student Award, awarded by the North American Thermal Analysis Society (NATAS) and presented at the *Annual NATAS Conference* in September 2003 in Albuquerque, New Mexico.

**Mr. Jon Urban**, a doctoral student in Biomedical Engineering, received a poster award for "The Effect of Polymer Acid Content in a Charged Polymer Membrane of a Drug Delivery Oscillator," presented at the Biomedical Engineering Institute's *Medical Alley Device Conference*, 2002. The poster was co-authored by **Mr. Anish Dhanarajan** and their advisor, **Prof. Ronald Siegel**. He also received the St. Jude Poster Award at the conference.

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## GRADUATE STUDENT ACHIEVEMENTS

**Mr. Amardeep Bhalla** interned this summer at Bristol-Myers Squibb Company, New Brunswick, NJ, in the

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## SCHOLARS

**Ms. Gwendolyn Athman**, a fourth-year Pharm.D. student in the College of Pharmacy, spent her first rotation continuing her research in Dr. Fairbanks's laboratory from May until September 2003. Her studies involve the mechanisms underlying transeletrical nerve stimulation (TENS) to identify the  $\alpha_2$  adrenergic receptor subtypes involved in that process. This project will form the basis of her Pharm.D. thesis.

**Mr. Haiqing Dai**, a visiting scholar working with Dr. William F. Elmquist, will graduate from the University of Nebraska Medical Center this fall, and has accepted a position in the Department of Clinical Pharmacokinetics at Quintiles in Kansas City.

**Ms. Cory Goracke**, who until July 2003 was laboratory coordinator with Dr. Fairbanks's group, has recently joined the Graduate Program in Neuroscience as a first-year student. She is looking forward to returning to Dr. Fairbanks's group in January to continue her work on the pharmacokinetics and dynamics of agmatine, and to contribute to the growing neuropharmaceutics research community in our program.

**Ms. Hao (Helen) Hou**, a Materials Science graduate student, joined Dr. Ronald Siegel's laboratory this year. She is working on microfabricated, hydrogel-based drug delivery systems.

**Dr. Sidhartha Jena** recently joined Dr. Ronald Siegel's laboratory as a post-doctoral fellow. Dr. Jena, who is trained in biophysics, is investigating protein transport through hydrogels using light-scattering and fluorescence recovery after photobleaching.

**Ms. Lori Kaminski**, a third-year Pharm.D. student in the College of Pharmacy, received a Curtis Carlson U of M/KI Scholar Travel Award to attend an international week-long course in *Pain and Analgesia* in Stockholm, Sweden. This course was offered as a joint effort of the Karolinska Institute and the University of Minnesota. She also received a Melendy Research Scholarship to continue her research with Dr. Fairbanks's laboratory from May until January 2004. Lori returned to her studies of the role of agmatine and its degradative enzyme in pain processing and opioid tolerance. This project will form the basis of her Pharm.D. thesis.

**Ms. Megan McInnis** has recently transferred from the doctoral program in Pharmacology to become a first-year Pharm.D. student in the College of Pharmacy. Last year she rotated with Dr. Fairbanks's group as a first-year graduate student; she will continue her research on a part-time basis in Dr. Fairbanks's laboratory. She will be joining the TENS research team, which is a collaborative effort between the laboratories of Dr. Fairbanks and Dr. Kathleen Sluka of the University of Iowa.

**Ms. H. Oanh Nguyen** remains the senior neuropharmaceutics coordinator for Dr. Fairbanks's research program. She leads the molecular biology protocol development area

of the lab. In May, Oanh received a full Curtis Carlson U of M/KI Scholar Travel Award to attend the U of Minnesota/Karolinska Institute joint course on *Pain and Analgesia* in Stockholm, Sweden. Oanh also attended the College of Pharmacy's course on *Molecular Genetic Methodologies for Pharmaceutical Sciences*. She is looking forward to contributing the College's pharmacogenomics focus.

**Mr. Aaron Overland**, a recent graduate of the University of Minnesota's Neuroscience program in the College of Biological Sciences, has joined Dr. Fairbanks's group as a laboratory coordinator. He will be working primarily on the HPLC experiments of Dr. Fairbanks's R21 Cutting Edge Basic Research Award to identify the role of endogenous agmatine in opioid tolerance and drug addiction.

**Dr. Meena Rani** joined Dr. Raj Suryanarayan's group as a post-doctoral fellow last November. She obtained her Ph.D. degree in pharmaceutics from Banaras Hindu University's Institute of Technology at Varanasi, India where she received recognition and awards for academic excellence. Her thesis project addressed studies on development and biopharmaceutical evaluation of potential prolonged and controlled-release oral delivery systems of diclofenac sodium.

**Dr. Jaidev Tantry** is the newest post-doctoral fellow to join Dr. Raj Suryanarayan's research group. He earned his B.Pharm., M.Pharm. and Ph.D. degrees from the University of Mumbai's College of Pharmacy. He also holds an academic staff appointment at the University of Minnesota's Characterization Facility.

Five summer undergraduate students worked in Dr. Ronald Siegel's laboratory. **Mr. Clint Jones**, a Chemical Engineering major from Brigham Young University-Idaho, measured solubility and precipitation from supersaturated solutions of a drug in cosolvent mixtures. He was funded by the Life Sciences Summer Undergraduate Research Program. **Mr. Rachit Jain**, an Electrical Engineering/Computer Science major at the University of Michigan, worked on computer models of drug tolerance. He was funded as a summer intern by the Minnesota Supercomputing Institute. **Ms. Sarah Hruby**, a Chemical Engineering major at Minnesota, and **Ms. Amy Gjoraas**, a Biomedical Engineering major at Iowa State University, worked on a microfluidic delivery system. **Ms. Dominique Seetapun**, who is now a Biomedical Engineering graduate student at Minnesota, performed mechanical characterizations of glucose-sensitive hydrogels.

*"An investment in knowledge  
always pays the best interest."*

*— Benjamin Franklin*

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## FACULTY NEWS AND ACTIVITIES

**PROFESSOR WILLIAM F. ELMQUIST** was invited to present "In Vivo Models and Drug Transport in the CNS" at the *Globalization of Pharmaceutics Education Network* at GPEN 2002 in Ann Arbor, MI in November 2002.

In January he presented "Role of Drug Transporters in Drug Distribution to the Brain" to the Minneapolis Medical Foundation, Hennepin County Medical Center in Minneapolis, MN.

Prof. Elmquist traveled to Peachtree City, GA in February 2003 to present "In Vivo Techniques to Study Drug Transporters in the CNS," an *AAPS Workshop in Drug Transport: From the Bench to the Bedside*. He was organizer and moderator for a workshop on "In Vivo Techniques" (for Transporter Research) and "In Vivo Consequences of Drug Transport Protein Expression in the Brain and Intestine."

He presented "Role of Drug Efflux Transporters in Drug Delivery to the CNS" in April 2003 at the Center for Clinical Assessment, Abbott Laboratories, Chicago, IL.

In May the Office of Generic Drugs at the Food and Drug Administration in Rockville, MD invited Prof. Elmquist to present "Principles and Applications of Microdialysis Sampling for Targeted Bioavailability/ Bioequivalence Studies". He also presented a research seminar at the 36<sup>th</sup> *Annual Higuchi Conference/Meeting* in Lawrence, KS.

Prof. Elmquist was invited to present "Influence of Active Capillary Efflux on the Microdialysis Extraction Fraction" at Pfizer Central Research in Groton, CT in June 2003.

**PROFESSOR CAROLYN A. FAIRBANKS** continues to develop her research program in the neuropharmaceutics of pain and analgesia, which is supported by the National Institute on Drug Abuse (NIDA).

This year Dr. Fairbanks received full member status in the Graduate Program in Neuroscience, joining Profs. Ron Sawchuk, William Frey, and Janet Dubinsky in the neuropharmaceutics interest area of that program. She was also appointed as a trainer to the psychoneuroimmunology training grant provided also by NIDA. Dr. Fairbanks contributes to the University community as a member of the Institutional Animal Care and Use Committee, and the College of Pharmacy as a member of the Weaver Endowed Chair Search committee as well as the Pharmacogenomics Interest Group.

In January, Prof. Fairbanks was session organizer and presenter in a panel presentation on best experimental pharmacogenetic and drug delivery practices at the *Winter Conference on Brain Research* held in Snowbird, UT.

Prof. Fairbanks received the John C. Liebeskind 2003 Early Career Scholar Award in March from the *American Pain*

*Society* at the annual meeting in Chicago in March. The award recognizes exceptional accomplishment and promise in pain scholarship, and is one of the two highest awards a new principal investigator can receive in the field of pain studies.

In April, Dr. Fairbanks served as a session moderator and a presenter for "The Role of Agmatine in Pain and Opioid Addiction: Neuropharmacokinetic and Dynamic Studies" at the 4<sup>th</sup> *International Symposium on Agmatine and Imidazoline Systems* in San Diego, CA. Also in April Prof. Fairbanks was invited to present "Spinal Therapeutic Development" at Medtronic in Fridley, MN.

In May, Prof. Fairbanks was invited to present "Genetics of Pain" at the *Basic Science of Pain and Analgesia Conference* in Stockholm, Sweden. This conference is part of an ongoing exchange program between scientists at the University of Minnesota and the Karolinska Institute, a relationship conceived by former Minnesota governor Wendell Anderson and Professor Steven Juhn, and supported by an endowment provided by Mr. Curt Carlson, founder of the Carlson Companies.

**PROFESSOR DAVID J.W. GRANT** was voted Teacher of the Semester for Fall 2002 by the first-year Pharm.D. students in the College of Pharmacy.

He was invited to present "Molecular Basis of Polymorph Screening: Influence of Solvents and Impurities on Sulfamerazine Polymorphism" at the *Conference on Polymorphism in Crystals: Fundamentals, Prediction, and Industrial Practice* as part of the ACS ProSpectives Series at Tampa, FL in February 2003.

Dr. Grant was invited to present "Crystallization of Polymorphs and Methods of Analysis" at the *AAPS Workshop on Particle Size Analysis* in Arlington, VA in April-May 2003. The workshop was co-sponsored by the FDA, PQRI, and USP.

In May he presented a lecture at the Institute for Pharmacy, University of Innsbruck, Austria on "Molecular Basis of Polymorph Screening: Influence of Solvents and Impurities on Sulfamerazine Polymorphism".

Also in May Dr. Grant gave several presentations in Germany: "Pseudopolymorphism: Characterization and Structure of Pharmaceutical Hydrates" at the *Arbeitsgemeinschaft für Pharmazeutische Verfahrenstechnik (APV), Königswinter*; "Characterization and Structure of Pharmaceutical Hydrates" at the Institute for Pharmacy, University of Frankfurt; and "Influence of Solvents and Impurities on the Crystallization of Polymorphic Forms" at the Institute for Pharmacy, University of Berlin.

Dr. Grant was invited by the students of the University of Cincinnati's College of Pharmacy in May 2003 to present

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“Screening of Drug Polymorphs for Formulation and Manufacturing.”

He was invited by the Barnett International Conference Group in June 2003 to the *Conference on Polymorphism and Crystallization* held in Philadelphia, PA, to present lectures on “Analyzing the Theory and Thermodynamics of Polymorphism” and “Polymorphism Involving a Racemic Conglomerate and a Racemic Compound.”

**PROFESSOR RONALD J. SAWCHUK** received, along with Dr. G. Scott Giebink and Prof. William Gleason of the University Medical School, a Faculty Research Development Grant from the University of Minnesota’s Academic Health Center for the development and testing of formulations for trans tympanic membrane delivery of antibiotics to the middle ear.

Prof. Sawchuk and **Belinda Cheung, Ph.D.** received an award from Abbott Laboratories for a project titled, “Effect of p-Glycoprotein Inhibitor on the Middle Ear Distribution of Clarithromycin.” He also received a grant from Abbott Laboratories for a project titled, “A New Approach for the Therapy of Otitis Media.”

In November Prof. Sawchuk traveled to South Korea where he was invited to give several presentations: “Microdialysis in the Study of Drug Delivery to the Central Nervous System,” Department of Pharmaceutics, Seoul National University; “Investigating Antibiotic Delivery to the Middle Ear Fluid,” Chong Kun Dang Pharmaceuticals in Chonan; and “Microdialysis and its Application in Preclinical Pharmacokinetic and Drug Delivery Investigation” at the *32nd Annual Meeting of the Korean Society of Pharmaceutics* in Seoul.

He presented “Characterizing Antibiotic Delivery to the Middle Ear for the Treatment of Otitis Media” at the *Biomedical Simulations Resource Workshop: Advanced Methods of PK/PD Systems Analysis* in Marina del Rey, CA in June 2003.

Prof. Sawchuk was invited to present “Cerebrospinal Fluid Distribution of Intrathecally Administered Antiviral Nucleosides: Monitoring Molecules in Neuroscience” at the *10th International Conference on In Vivo Methods* at Karolinska Institute’s Department of Neuroscience in Stockholm, Sweden in June 2003.

**PROFESSOR RONALD A. SIEGEL** received the 2002 Jorge Heller *Journal of Controlled Release* Outstanding Paper Award, sponsored by the Controlled Release Society and Elsevier Science B.V., for his paper “A New Mode of Drug Delivery: Long-Term Autonomous Rhythmic Hormone Release Across a Hydrogel Membrane.” The award was presented at the Controlled Release Society International Symposium held in Glasgow, Scotland in July 2003.

He received two NIH grants this year. The first grant is to study novel methods for delivering hormones, particularly

reproductive hormones. The second grant deals with novel microfabricated (MEMS) and microfluidic platforms for drug delivery.

In July 2003 Prof. Siegel delivered a plenary lecture to the *26th Australasian Polymer Symposium* in Noosa, Australia titled “Novel Behaviors of Responsive Hydrogels: Applications in Drug Delivery and Microfluidics.”

He continues his service as Book Review Editor for the *Journal of Controlled Release*.

**PROFESSOR RAJ G. SURYANARAYANAN** was voted Teacher of the Semester for Spring 2003 by the College’s first-year Pharm.D. students taking his “Drug Delivery II” course.

Prof. Suryanarayanan attended the *Science Symposium on Material Science: Polymorphism and Hydration* hosted by the British Pharmaceutical Conference and Exhibition, and delivered an invited lecture entitled, “Characterization and the Stability Assessment of Pharmaceutical hydrates” in Manchester, UK in September 2002.

The United States Pharmacopeia in Rockville, MD invited Prof. Suryanarayanan to present “Use of X-ray Powder Diffractometry to Monitor Phase Transitions During Processing,” Rockville, MD, in September 2002.

He was also invited to make a presentation at the *ACS ProSpectives Conference Series* in February 2003 at the Saddlebrook Resort in Tampa, FL on “Polymorphism in Crystals: Fundamentals, Prediction and Industrial Practice.” He delivered a lecture entitled “Phase Transitions During Freeze-Drying.”

He is the Past Chair of the Preformulation Focus Group of AAPS. He is also Chair of the AAPS Section of Pharmaceutics Teachers.

Prof. Suryanarayanan attended the August 2003 *Denver X-ray Conference*, sponsored by the International Centre for Diffraction Data, in Denver, CO. He delivered an invited lecture entitled “Use of X-ray Powder Diffractometry to Monitor Phase Transitions During Processing.”

Prof. Suryanarayanan attended the *31st Annual Conference on Thermal Analysis and Applications* sponsored by the North American Thermal Analysis Society (NATAS) held in September 2003 in Albuquerque, NM. He delivered the plenary lecture entitled “Applications of Differential Scanning Calorimetry to Pharmaceutical Development,” and an invited lecture entitled “The Use of DSC and XRD to Characterize Phase Transitions During Freeze-Drying.”

**PROFESSOR TIMOTHY S. WIEDMANN** was invited by the British Columbia Fox Cancer Center in Vancouver, BC, Canada to present “Design of Aerosol Exposure Chamber for Testing Chemopreventive Agents.”

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Prof. Wiedmann is co-principal investigator on an NIH Program Project Grant titled "Chemoprevention of Lung Cancer." As principal investigator of the Aerosol Core, he will be responsible for designing, implementing, and testing respiratory delivery methodology for evaluation of the safety and efficacy of agents that may be effective in preventing lung cancer. He is a member of the Special Emphasis Panel of NIH to evaluate proposals submitted in the area of drug delivery.

Prof. Wiedmann is co-author of an abstract titled "Inhibition of Adenocarcinoma Formation in A/J Mice by Difluoromethylornithine and Budesonide Administered by Aerosol" that will be presented by Dr. Lee Wattenberg at the *Frontiers in Cancer Prevention Meeting*.

Prof. Wiedmann was invited to give a presentation on "Respiratory Drug Delivery for the Chemoprevention of Lung Cancer" by the Biomedical Engineering Graduate Program at the University of Minnesota.

At the 2003 AAPS Annual Meeting in Salt Lake City, Prof. Wiedmann will present "Reflux Drying of Aerosols" that was co-authored by Cory Hitzman. Prof. Wiedmann co-authored two presentations that will be given by Dr. Xiangmin Liao: "Characterization of Pharmaceutical Solids by Atomic Force Microscopy," and "Analysis of the Pressure and Time Dependence of Force Displacement Profiles of Acetaminophen".

Prof. Wiedmann is a member of the University Senate Committee on Faculty Affairs. He also serves on the Graduate School's Policy and Review Council, which evaluates and approves policy in graduate programs in the area of biological sciences.

**PROFESSOR CHERYL L. ZIMMERMAN** presented "Morphine Disposition and Response in Sickle Cell Transgenic Mice" at the 36th Annual Higuchi Research Seminar in Lawrence, KS.

She was invited to present "The Role of Enzyme Localization in the Intestinal Metabolism of Drugs" at Eli Lilly & Co., Indianapolis, IN in March 2003.

In May Prof. Zimmerman was invited to present "Pulmonary-Specific and Stereoselective Retention of an NNK Metabolite" by the Carcinogenesis and Chemoprevention Program, Cancer Center, University of Minnesota.

Prof. Zimmerman gave a lecture series on "Pharmacokinetics and ADME" at the Residential School on Medicinal Chemistry at Drew University in Madison, NJ in June 2003.

She attended the *Molecular Biotechnology Workshop* in the College of Veterinary Medicine on the University's St. Paul campus in July 2003. The workshop included lectures and laboratory techniques for DNA isolation, restriction analysis, RT-PCR, recombinant protein expression, etc.

Prof. Zimmerman presented "The Invader<sup>®</sup> Genotyping System" at the College of Pharmacy's *Pharmacogenomics Mini-Course on Pharmacogenetics of Drug Metabolizing Enzymes* in August 2003.

Prof. Zimmerman was elected Member-at-Large to the Board by the 2004 American Association of Pharmaceutical Scientists (AAPS). She served as Member of the AAPS Fellows Task Force and the Diversity Task Force, and is a Member of the AAPS PPDM Abstract Screening Committee for the annual meeting.

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## RECENT PUBLICATIONS

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- Fairbanks CA. Spinal delivery of analgesics in experimental models of pain and analgesia. *Advanced Drug Delivery Reviews* 55(8): 1007-1014, 2003.
- Gu C-H and Grant DJW. "Physical Properties and Crystal Structures of Chiral Drug," Chapter 5 in *Handbook of Experimental Pharmacology*, Vol. 153, entitled "Stereochemical Aspects of Drug Action and Disposition" (M. Eichelbaum, B. Testa and A. Somogyi, eds.), Springer Verlag, Heidelberg, Germany, pp. 113-139, 2003.
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- Pyne A, Chatterjee K and Suryanarayanan R. Solute crystallization in mannitol-glycine systems: implications on protein stabilization in freeze-dried formulations. *J. Pharm. Sci.* 92: 2272-2283, 2003.
- Pyne A and Suryanarayanan R. The effect of additives on the crystallization of cefazolin sodium during freeze-drying. *Pharm. Res.* 20: 283-291, 2003.
- Rastogi S, Zakrzewski M and Suryanarayanan R. Investigation of solid-state reactions using variable temperature X-ray powder diffractometry II. Aminophylline monohydrate. *Pharm. Res.* 19: 1262-1270, 2002.
- Sawchuk RJ. (Book review). The Blood-Brain Barrier and Drug Delivery to the CNS (DJ Begley, MW Bradbury and J Kreuter, eds.). *J. Controlled Release* 86: 373, 2003.
- Song H, Johns R, Griesgraber GW, Wagner CR and Zimmerman CL. Disposition and oral bioavailability in rats of an antiviral and antitumor amino acid phosphoramidate prodrug of AZT-monophosphate. *Pharm. Res.* 20: 448-451, 2003.
- Stone LS, Wilcox GL and Fairbanks CA. Moxonidine, a mixed  $\alpha_2$ -adrenergic and imidazoline receptor, identifies a novel adrenergic target for spinal analgesia. *Annals of the New York Academy of Sciences* (in press).
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We invite you to join us !

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***MONDAY, OCTOBER 27, 2003***

***7:00 - 8:00 a.m.***

**Grand America Hotel**

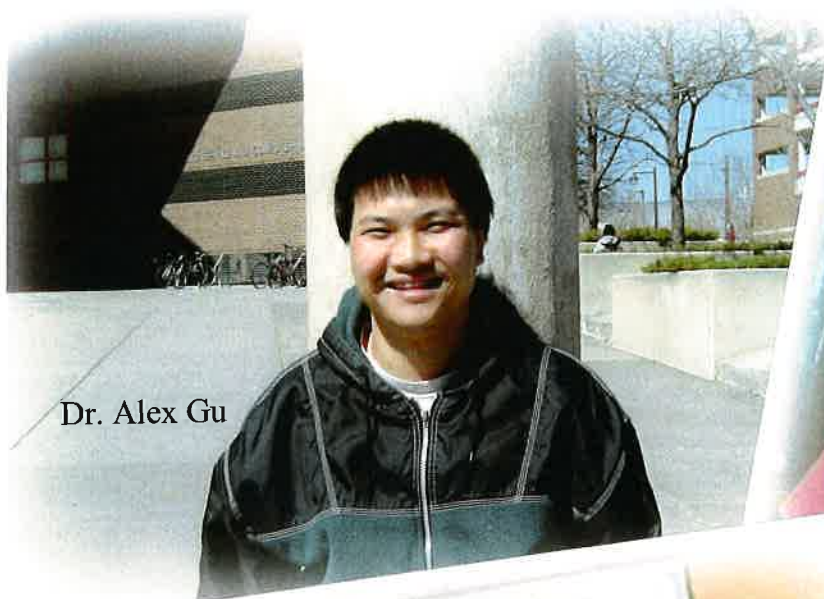


AAPS Annual Meeting and Exposition

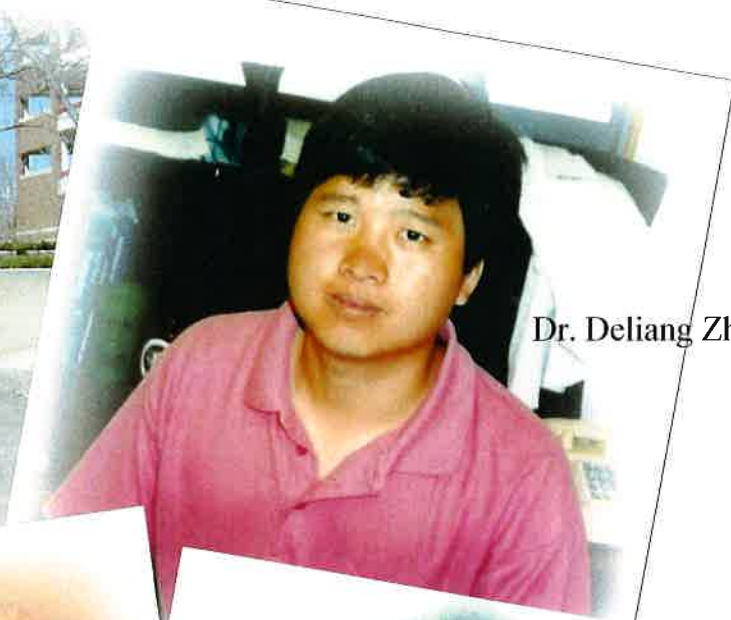
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## 2002-2003 *Pharmaceutics Graduates*



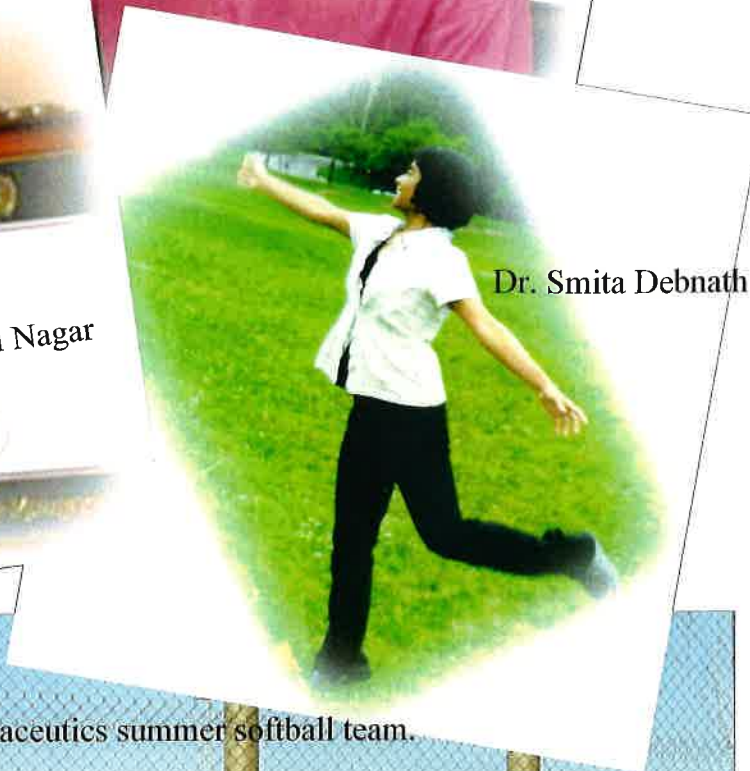
Dr. Alex Gu



Dr. Deliang Zhou

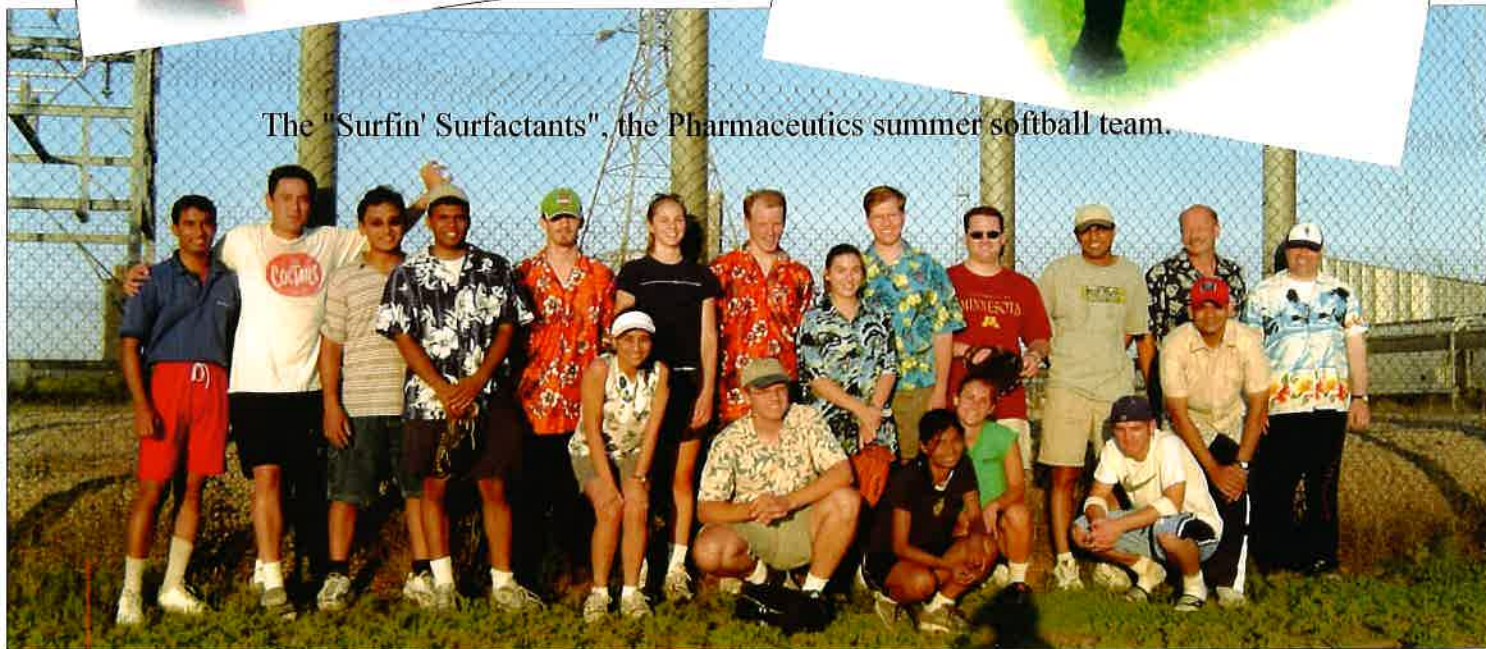


Dr. Swati Nagar



Dr. Smita Debnath

The "Surfin' Surfactants", the Pharmaceutics summer softball team.



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