

MinneCeutics

Indispensable News

Department of Pharmaceutics

Fall 1995

University of Minnesota

Regular Faculty:

Jane Pei-Fan Bai, Gary H. Carlson, David J. W. Grant, Masoud Jafari, Yueh-Erh Rahman, Edward G. Rippie, Ronald J. Sawchuk, Raj G. Suryanarayanan, Timothy S. Wiedmann, Cheryl L. Zimmerman.

Adjunct Faculty:

Walid M. Awni, Abbott Laboratories. Keith K.H. Chan, U.S. Food and Drug Administration. Michael D. Karol, Abbott Laboratories. Michael J. Pikal, Eli Lilly and Company. Aldo Rescigno, University of Parma, Italy. Robert K. Schultz, Dura Pharmaceuticals.

MESSAGE FROM THE DEPARTMENT HEAD

GREAT NEWS: The College of Pharmacy at the University of Minnesota has a new dean — Dr. Marilyn Speedie.

Dr. Speedie is from the University of Maryland at Baltimore where she has been Chair of the Department of Pharmaceutical Sciences and Professor at the School of Pharmacy. The entire body of faculty, staff and students at our College of Pharmacy are eagerly awaiting the arrival of Dr. Speedie on January 1, 1996. Dean-Elect Speedie has been making frequent trips to the College this fall, and the momentum of moving the College forward under her leadership has already started. We look forward to working with Dr. Speedie.

Under the leadership of Provost William Brody, the Academic Health Center, of which the College of Pharmacy is a segment, is undergoing a re-engineering debate. The final outcome of this debate is uncertain at this time, but with Dr. Speedie as our spokesperson, I am confident that the College of Pharmacy will play an important role in determining the direction and future of the Academic Health Center of Minnesota, and that the College of Pharmacy will continue to grow in the new environment.

The College started the all-Pharm.D. single-degree program this fall quarter. For the first academic year, the Department of Pharmaceutics

faculty is responsible for courses related to principles of drug delivery. A new laboratory course integrating the theory and practice of processes controlling drugs and dosage forms is being offered. We hope this new course will bridge the gap between the theoretical and practical worlds, and lead to an increase of student appreciation of the importance of the basic sciences in a pharmacist's training. We foresee the necessity of continuously evaluating such a course in order to ensure that the experience gained by the students fits the demand of the changing health care scene.

The graduate students in the Pharmaceutics program continue to be successful in competing for fellowships and awards at the national level (see list of awards on page 5). Again, two of our graduate students have been selected to present their Ph.D. thesis work at the Graduate Student Symposium at the AAPS annual meeting to be held in November in Miami Beach, Florida.

The Director of Graduate Studies, Dr. Raj Suryanarayanan, will replace me as your host at the Minnesota Alumni Breakfast on Monday, November 6, 1995 at the Fontainebleau Hilton Hotel in Miami Beach. Have an enjoyable time at the alumni reunion.

Best regards,

—(Jady) Yueh-Erh Rahman, M.D.
Professor and Head

THANK YOU

We again thank the generous individuals and companies for their continued support for the Graduate Program in Pharmaceutics.

3M Pharmaceuticals presented a fellowship check to the Department of Pharmaceutics on January 5, 1995. College of Pharmacy Interim Dean Lawrence Weaver accepted the check on behalf of the Department of Pharmaceutics. The 3M Fellowship was established in the fall of 1994.

MORE ON RE-ENGINEERING OF THE U of MINNESOTA ACADEMIC HEALTH CENTER (AHC)

The AHC is in the "middle of a revolution," said Provost William Brody. "This is not an evolution. It is not a temporary dip in revenue." No matter what happens politically, he said, "health care reform is happening" and is "driven by corporations." He predicted that a similar revolution may be coming in a few years for the rest of the campus, with consumers wanting education at lower prices and in more convenient locations.

The U of MN Hospital is in good shape financially and its rates are competitive, Brody said, but it may be frozen out by the corporate networks, which want to keep patients within their systems. The need to keep an academic health center alive is "one of the most important issues for the state of Minnesota right now."

Health of the AHC was a major topic at the Board of Regent's meeting in early September.

"The state cannot afford to lose this resource. We have to unleash every force we have to make that point," said President Nils Hasselmo. The AHC is at the epicenter of an earthquake, Brody said, because Minnesota has moved faster than any other state toward managed care. In 18 months, the AHC "will be a completely transformed organization."

A cure cannot be found within the University alone, Brody said; partnership is needed with the state, the business community, and private health providers. A competitive model will no longer work, he said. The University Hospital is the only hospital in the state owned by all Minnesotans, he said, and they need access to it. The University trains more than 60% of the state's health care professionals and 80% of the practicing physicians.

IN MEMORIAM

We are saddened to report that **Ebtsam Abd El Azeem**, predoctoral student from the University of Mansoura, Egypt, died in an automobile accident in Montana on August 16, 1995. Ebtsam was completing a research project in the laboratory of Dr. David Grant that studied the controlled release of certain drugs from micro-dispersed delivery systems. Also killed were her 3-year-old son, Amro, and a friend, Elizabeth Winters. Ebtsam is survived by her husband, Mourad Zeyada, and 6-year-old son, Mohamed, as well as her family in Egypt, mentor Farid Badria, and many friends from around the world.

FACULTY NEWS AND ACTIVITIES

JANE PEI-FAN BAI presented the following invited lectures:

"Nonparenteral insulin" at Genentech, Inc., South San Francisco, CA, November 1994.

"Targeting Peptide and Protein Drugs to Specific Sites: Consideration of Cellular Peptidases in the Small Intestine and Colon" at AAPS Symposium, San Diego, CA, November 1994.

"The Impact of Efflux Pump, Transporters, and Proteolytic Enzymes in Intestinal Enterocytes on Oral Absorption of Drugs and Peptide Drugs" at Biopharmaceutics Section, Pfizer Central Research, Groton, CT, February 1995.

"A Mechanistic Understanding of Pulmonary and Intestinal Absorption of Drugs and Therapeutic Proteins/Peptides" at 3M Pharmaceuticals, St. Paul, MN, February 1995.

DAVID J. W. GRANT became a member of the Editorial Advisory Board for *Pharmaceutical Development and Technology*, a new journal sponsored by the American Association of Pharmaceutical Scientists starting on May 1, 1995. He is a member of the USP Convention Subcommittee on Excipients and the Advisory Panel on Physical Test Methods-Functionality.

Grant was a member of the organizing committee for the 5th Annual Meeting of the Association for Crystallization Technology (ACT) held in Charlottesville, VA. He was organizer and chair of two sessions at the 1995 International Conference on Pharmaceutical Sciences and Technology and the 26th Annual Meeting of the Fine Particle Society in August 1995 in Chicago, Illinois, and at the 3rd International Workshop on Crystal Growth of Organic Materials in August 1995 in Washington, DC.

The following selected invited lectures were given:

"Effects of Chiral Purity on the Thermodynamic Properties and Dissolution Rate of Salts of Ephedrine and Pseudoephedrine" at the Department of Pharmaceutical Chemistry, University of Pavia, Pavia, Italy in October 1995.

"Characterisation and Reactivity of Pharmaceutical Solids: An Overview" and "Spectroscopic Analysis (X-rays, NMR, IR)". Solid State Pharmaceutics sponsored and organized by the Italian Association of Pharmaceutical Sciences in Milan, Italy, October 1995.

"Influence of Impurity-Induced Crystal Defects on Tableting Indices" at the Department of Industrial and Physical Pharmacy, Purdue University, West Lafayette, IN in February 1995.

MASOUD JAFARI began his duties as the first program director of the College's new pharmaceutical care teaching laboratory. The new laboratory was fully funded and furnished through the support of Paddock Laboratories, The Upjohn Company Foundation, Upsher-Smith Laboratories, Inc., and a major gift from Mildred Peters prior to her death. Jafari's first duty was to secure and organize the necessary equipment to ready the lab for the fall quarter classes.

Y. E. RAHMAN has been invited to participate in November as a member of a delegation to visit South Africa to establish objectives for future exchanges in education, science and technology between the U.S. and South Africa. Sponsored by the recently established United States-South Africa Binational Commission and the U.S. Information Agency, the visit is being organized by the Citizen Ambassador Program.

At the 9th Annual AAPS Meeting in San Diego, CA in November 1994, Rahman met with reporters to discuss the following paper on the administration of nerve growth factor by the olfactory bulb pathway (not nasal), which was selected for a news release and reported in *Pharmaceutical News*, Vol. 2, No. 1, 1995. The research, jointly carried out with Dr. W.H. Frey, Director of the Alzheimers Research Institute in St. Paul, Minnesota, demonstrates that this new path delivers a significantly higher concentration of nerve growth factor to the brain than does an intravenous dose. L. Jia, W.H. Frey and Y.E. Rahman. "New approach to Alzheimers therapy: delivery of nerve growth factor (NGF) to the brain through the olfactory pathway and assessment of NGF integrity." *Pharm. Res.* 11: S-208, 1994.

EDWARD G. RIPPPIE has been appointed to the Editorial Board of the *Journal of Pharmaceutical Development and Technology*, a new journal devoted to the spectrum of pharmaceuticals research ranging from basic to applied.

Donald J. Miller and Tim Affeldt, Pharm.D. students at the University of Minnesota, held undergraduate UROP fellowships in Rippie's lab. As a consequence of his research interest in tablet physics, Miller went on to do a summer 1995 research fellowship at Pfizer, Inc., in Groton, Connecticut.

RONALD J. SAWCHUK was invited to present the following lectures:

"Assessing Drug Transport in the brain with Microdialysis" at the 9th Annual AAPS Meeting, San Diego, CA, November 1994.

"Applications of Microdialysis in Preclinical Pharmacokinetic Studies" at 3M Pharmaceuticals, 3M Center, St. Paul, MN, November 1994.

"Selected Preclinical Pharmacokinetic Studies with Tacrine" at Parke-Davis Pharmaceuticals, Ann Arbor, MI, May 1995.

"Brain Distribution and Metabolism Studies with Tacrine and Two Hydroxylated Metabolites" at the Department of Pharmaceutics and Pharmacodynamics, University of Illinois, Chicago, IL, July 1995.

"Microdialysis and its Application in Preclinical Drug Distribution and Absorption Studies" at Chiron Corporation, Emeryville, CA, August 1995.

"Microdialysis and its Application in Preclinical Pharmacokinetics" at Genentech, Inc., South San Francisco, CA, October 1995.

RAJ G. SURYANARAYANAN was invited to present a lecture entitled "Qualitative and quantitative applications of powder X-ray diffractometry" at the 1995 Conference on Pharmaceutical Science and Technology in conjunction with the 26th Annual Meeting of the Fine Particle Society, Chicago, IL, August 1995. He was also invited to present the lecture at Warner-Lambert Company in Morris Plains, New Jersey in October 1995, and a lecture entitled "Solid state properties of drugs" by Glycomed, Inc., Alameda, CA in October 1995.

TIMOTHY S. WIEDMANN was appointed to the Editorial Advisory Board of *Pharmaceutical Research*. He is Chair of the PDD section of the Midwest Regional AAPS Meeting Planning Committee.

Wiedmann is a member of the University of Minnesota's Center for Gene Therapy for Fibrotic Lung Disease. He has implemented in the fall quarter 1995 an innovative approach to a graduate course, "Readings in Pharmaceutics", to simulate the process of manuscript reviewing and editing. He has also been an active member of the Save Our School Committee that will examine how the College of Pharmacy should be reengineered with the University of Minnesota's Academic Health Center to meet the rapid changes in delivery of health care.

CHERYL L. ZIMMERMAN received the Teacher of the Year Award from the Pharmacy B.S. graduating class of 1995, and has been elected Secretary/Treasurer of the PPDM section of AAPS.

Zimmerman was an invited speaker at the North Jersey ACS Drug Metabolism Discussion Group Symposium in September 1995 in Somerset, NJ. Her presentation was entitled "Drug Absorption and Metabolism in the Gastrointestinal Tract." She also presented a seminar entitled "Influence of Chemical Structure on the Gastrointestinal Absorption of Retinoids" at the Facolta' di Farmacia, Universita' degli Studi di Parma, Parma, Italy in September 1995.

RECENT COURSES TAUGHT BY FACULTY

Dr. David Grant and Dr. Raj Suryanarayanan were invited to teach a short course at Abbott Laboratories in North Chicago, Illinois in August 1995 on "Qualitative and Quantitative Characterization of Crystalline Solids".

Dr. Ron Sawchuk, Dr. Cheryl Zimmerman, Dr. Aldo Rescigno, and Ph.D. graduate student Dr. Richard Brundage presented a 5-day short course entitled "Pharmacokinetics for the Pharmacist and Pharmaceutical Scientist" at the University of Milan in Varese, Italy in September 1995. This new course was designed to address fundamental principles and applications of pharmacokinetics in pharmacy and the pharmaceutical sciences.

Adjunct faculty have been active in the Department during 1994-95 in presenting the following:

MICHAEL KAROL:

Mini-course entitled "Convolution and Deconvolution in Pharmacokinetic and Applications"

MICHAEL PIKAL :

Mini-course entitled "Formulation Issues with Proteins"

ALDO RESCIGNO:

Course entitled "Convolution, Deconvolution, and Linear Systems"

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GRADUATE STUDENT NEWS

The Department welcomes two new students this year: **Jie Sheng** and **Heng Song**. Ms. Sheng holds a Master's degree from Beijing Medical University, China. Ms. Song, who obtained a Bachelor's degree from Beijing Medical University, transferred to the University of Minnesota from West Virginia University.

AWARDS

AAAS William D. Carey Science Award:
Mark Sorenson

AFPE Fellowships:
Belinda Cheung, Joel Moore, Mark Sorenson

Melendy Graduate Summer Fellowships:
Xueqing Chen, Xiaorong He

PhRMA Predoctoral Fellowship in Pharmaceutics:
Suzanne Leung

USP Fellowship: **Raghu Cavatur**

AAPS Graduate Student Symposium in Drug Delivery and Pharmaceutical Technologies, Miami Beach, Florida, November 1995:

Ching-Yuan "Rebecca" Li: "Diffusivity of Bile Salt/Phospholipid Aggregates in Mucin."

Neelima Phadnis: "In Situ Phase Transition in Theophylline Tablets: Effect on Dissolution Rate."

Joel Moore received a Podium Presentation Award (2nd place) at the Western Regional AAPS meeting in San Jose, California in March 1995 for a presentation entitled "Respiratory Drug Delivery by Hydraulic High-Pressure Nebulization."

Neelima Phadnis received Best Poster Award for a poster entitled "Use of High-Temperature Powder X-ray Diffractometry for the Identification of a New Polymorph of Anhydrous Theophylline", presented at the 44th Annual Denver X-Ray Conference, Colorado Springs, Colorado, July-August 1995.

Haijian "Jim" Zhu earned Best Podium Award at the 27th Annual Pharmaceutics Graduate Student Research Meeting held in Ann Arbor, Michigan in June 1995 for a presentation entitled "Influence of Water Activity in Organic Solvent + Water Mixtures on the Nature of the Crystallizing Drug Phase. I. Theophylline."

SUMMER INDUSTRY INTERNS AND TRAINEES

Jitesh Tank worked with project advisor Dr. Ashok Gore on a project entitled "Compazine® Spansules (SKF 4657). Optimization of spray rate, atomization air pressure, curing method and temperature in a Wurster fluidization process used for aqueous-based eudragit coating" at SmithKline Beecham Pharmaceuticals, King of Prussia, Pennsylvania.

Aparna Lakkaraju conducted preformulation studies under the guidance of Dr. Abu Serajuddin, Pharmaceutical Research and Development at Bristol-Myers Squibb, New Brunswick, New Jersey.

Suneel Rastogi worked with Dr. David Rolf at LecTec Corporation in Minnetonka, Minnesota to develop standard procedures for thermal analysis of some newly developed adhesive polymers which will be used in skin patches.

Guangzhong "Geoff" Zhang studied characterization of pharmaceutical lyophiles and dehydration of cyclophosphamide monohydrate with Dr. Sarma Duddu at Smith-Kline Beecham Pharmaceuticals, King of Prussia, Pennsylvania.

1994-1995 DEGREES AWARDED

CHENG-PANG "MATT" HSU, M.S.

Thesis: "Insulin-degrading Enzyme in Cultured Type II Pneumocytes: Implication for Pulmonary Delivery of Insulin."

JIA LIU, M.S.

Thesis: "Intranasal Delivery of Nerve Growth Factor to the Brain Through Olfactory Pathway."

YU-LI "GRACE" LO, Ph.D.

Thesis: "Studies of Protein-Lipid Interactions by Differential Scanning Calorimetry (DSC) and Fourier Transform Infrared (FT-IR) Spectroscopy."

MARINA MATHEW, M.S.

Thesis: "Evaluation of Ester Prodrugs of (-)-Carbovir."

YAZDI K. PITHAVALA, Ph.D.

Thesis: "The Absorption of Retinoid Analogs from Micellar Systems in the Rat Intestine."

MARK A. SORENSON, Ph.D.

Thesis: "Production and Evaluation of an Emulsion-Based Drug Carrier System for Interleukin-2."

YANDONG WEN, Ph.D.

Thesis: "Brain Uptake and Presystemic Disposition of 6-Aminocarbovir as a Prodrug of (-)-Carbovir."

UNDERGRADUATE ACTIVITIES

Undergraduate students were active in the Department. The following students were involved in research, and faculty in advising activities:

Eric Hausmann, second-year Pharmacy student, received a Margaret Mitchell Research Scholarship from the American Cancer Society, Minnesota Division. He will be working with Dr. Cheryl Zimmerman on a project studying the pharmacokinetics of budesonide in mice following aerosol administration for cancer chemoprevention.

Phuc Vinh Tran, a medical school student, also obtained a Margaret Mitchell Research Scholarship and will be working with Dr. Jane Bai on a research project relating to cancer.

Ceaminia Yuen, second-year pharmacy student, holds a PhRMA Undergraduate Research Fellowship in Pharmaceutics and will be working with Dr. David Grant on a project entitled "Control and Prediction of Drug Hydrate Phase Crystallized from Water and Organic Solvent Mixtures."

Melendy Undergraduate Research Awards:

Tamim A. Saidi, first-year pharmacy student. "Uptake of Drug-Carrier Complex by Platelets" (Dr. Y. E. Rahman)

Meheretab Abraha, first-year pharmacy student. "Development of a Methodology to Reliably Model and Predict Oral Absorption" (Dr. Raj Suryanarayanan)

UROP (Undergraduate Research Opportunities Program) Awards:

Marina Baum, chemistry student. "Predicting Oral Bioavailability of Water Insoluble Drugs" (Dr. Timothy Wiedmann)

Donald J. Miller and Tim Affeldt, second-year pharmacy students. "Dynamic Viscoelastic Analysis of Compressed Tablets" (Dr. Edward Rippie)

Reza Taheri, first-year pharmacy student. "Toxicity of Triglyceride Emulsions to a Murine Cytotoxic Lymphocyte Cell Line" (Dr. Y. E. Rahman)

Tamim A. Saidi, first-year pharmacy student. "Uptake of Drug-Carrier Complex by Platelets" (Dr. Y. E. Rahman)

President's Distinguished Faculty Mentor Program:

Thirakul Phonekeo, second-year CLA student admitted to College of Pharmacy Fall 1995 (Dr. Y. E. Rahman)

Thanh Vo, second-year pharmacy student (Dr. Raj Suryanarayanan)

Hao Vu, first-year CLA student (Dr. Y. E. Rahman)

HAPPENINGS

Mark your calendars for the 1995 AAPS Annual Meeting and Exposition at the Miami Beach Convention Center and Fontainebleau Hotel in Miami Beach, Florida on November 4-9, 1995. We invite you to attend our *MINNESOTA ALUMNI BREAKFAST* to be held this year at the Fontainebleau Hilton Hotel on **MONDAY, NOVEMBER 6, 1995** from 7:00 to 8:00 a.m. It's a great way to catch up with news of your fellow Minnesota graduate students. Please join us.

Preparations have begun for the **28th Annual Pharmaceutics Graduate Student Research Meeting** to be held **June 28-30, 1996**. The Department of Pharmaceutics at the University of Minnesota will be hosting the event.

PEOPLE

Dr. David Grant, associate editor of the *Journal of Pharmaceutical Sciences*, welcomes Ruth Keenan Ryan to the editorial office, where she will provide secretarial support for the journal.

Amir Salmon, Ph.D., performed research in the laboratory of Dr. Timothy Wiedmann, attempting to utilize solid-state NMR on model skin lipids to determine extent of ionization of the fatty acids from which the surface charge may be deduced.

ALUMNI NEWS

Keith K.H. Chan, Ph.D. ['80] has joined the Food and Drug Administration in Rockville, Maryland.

Yazdi Pithavala, Ph.D. ['95] is a postdoctoral fellow at University of North Carolina at Chapel Hill.

Steve Hoag, Ph.D. ['90] has joined the University of Maryland at Baltimore.

Robert Schultz, Ph.D. ['93] has recently been promoted to Vice President at Dura Pharmaceuticals in San Diego, California.

Cheng-Pang "Matt" Hsu, M.S. ['95] is pursuing a Ph.D. degree at the University of Michigan at Ann Arbor.

Srinivasan Venkatesh, Ph.D. ['93] has accepted a position at Bristol-Myers Squibb in Princeton, New Jersey.

Raj Khankari, Ph.D. ['93] has recently joined Cima Laboratories in Minneapolis, Minnesota.

Shifeng Wei, Ph.D. ['91] has joined Johnson & Johnson in Raritan, New Jersey.

Jia Liu, M.S. ['95] has accepted a research position at Agouron Pharmaceuticals in San Diego, California.

Yandong Wen, Ph.D. ['95] is a postdoctoral fellow at the University of Minnesota.

Yu-Li "Grace" Lo, Ph.D. ['95] has joined the faculty at Chia Nan Junior College of Pharmacy in Tainan Hsien, Taiwan. As a note of interest, in Taiwan, colleges of pharmacy conferring only professional degrees are called junior colleges.

LOST ALUMNI. Will you help us locate these individuals?

Marina Mathew, M.S. ['94] is currently involved in studying the biochemistry of the blood-brain barrier at the Huntsman Cancer Institute, University of Utah in Salt Lake City.

Derek Moe, Ph.D. ['94] is with Roche Bioscience in Palo Alto, California.

Cheng-Hsing Chou. Mahmood Falamauzian. John H. Herath. Hussein Goma Ibrahim. Weining Ma. Bruce M. Martin. Maturu K. Pramoda. M. Pyron. Gautam Supta Sen. Lucy Tadros. Joseph G. Turcotte. Dilip Vishwasrao. Sue-Chi Hsu Wu.

RECENT PUBLICATIONS

Abdennebi E.H., Sawchuk R.J. and Stowe C.M. Thiamphenicol pharmacokinetics in beef and dairy cattle. *J. Vet. Pharmacol. Therap.* 17: 365-368, 1994.

Bai J.P.F. and Chang L.L. Transepithelial transport of insulin. I. Insulin degradation by insulin-degrading enzyme in small intestinal epithelium. *Pharm. Res.* 12: 1171-1175, 1995.

Bai J.P.F. and Chang L.L. Metabolism of acetyl neurotensin(8-13) by proteolytic activities of intestinal enterocytes. *Pharm. Res.* 12: 164-167, 1995.

Bai J.P.F. Colonic delivery of peptide and protein drugs: consideration of intracellular proteolytic enzymes. *s.t.p. Pharma Sci.* 5: 30-35, 1995.

Bai J.P.F. and Chang L.L. The involvement of dipeptidyl peptidase IV in brush-border degradation of GRF(1-29)NH₂ by intestinal mucosal cells. *J. Pharm. Pharmacol.* 47: 698-701, 1995.

Bai J.P.F. Effects of bile salts on proteolytic activities of enterocytes. *Inter. J. Pharm.* 111: 147-152, 1994.

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Bai J.P.F., Hsu M.C.P. and Shier W.T. Insulin-degrading enzyme in a human colon adenocarcinoma cell (Caco-2). *Pharm. Res.* 12: 513-517, 1995.

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Elmqvist W.F., Chan K.K.H. and Sawchuk R.J. Transsynovial drug distribution: synovial mean transit time of diclofenac and other non-steroidal antiinflammatory drugs. *Pharm. Res.* 11(12): 1689-1697, 1994.

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Ghosh S. and Grant D.J.W. Determination of the solubilities of crystalline solids in solvent media that induce phase changes: solubilities of 1,2-Dialkyl-3-hydroxy-4-pyridones and their formic acid solvates in formic acid and water. *Int. J. Pharmaceutics* 114: 185-196, 1995.

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Grant D.J.W. and Brittain H.G. Solubility of Pharmaceutical Solids. In *Physical Characterization of Pharmaceutical Solids*, Brittain H.G. (ed.), Marcel Dekker, New York, 1995, Chapter 11, pp 321-386.

Han C.-H., Sanftleben R. and Wiedmann T.S. Phase properties of mixtures of ceramides. *Lipids* 30: 121-128, 1995.

Hoag S.W. and Rippie E.G. Thermodynamic analysis of energy dissipation by pharmaceutical tablets during stress unloading. *J. Pharm. Sci.* 83: 903-908, 1994.

Khankari R.K. and Grant, D.J.W. Water determination (a) physical methods. In *Encyclopedia of*

Analytical Science, Townshend A. (editor-in-chief), Academic Press, New York, NY, 1995, pp 1-7.

Lo Y.-L. and Rahman Y.E. Protein location in liposomes, a drug carrier: a prediction by differential scanning calorimetry. *J. Pharm. Sci.* 84: 805-814, 1995.

Pithavala Y.K., Odishaw J.L., Han S., Wiedmann T.S. and Zimmerman C.L. Retinoid absorption from simple and mixed micelles in the rat intestine. *J. Pharm. Sci.*, 1995.

Riad L.E., Sawchuk R.J., MacAlary M.M. and Chan K.K.H. Effect of food on the multiple peak behavior of diclofenac sodium slow release tablets in humans. *Amer. J. Therap.* 2: 1-6, 1995.

Sawchuk R.J., Maloney J.A., Cartier L.L., Rackley R.J., Chan K.K.H. and Lau H.S.L. Analysis of diclofenac and four of its metabolites in human urine by HPLC. *Pharm. Res.* 12: 756-752, 1995.

Shah A.K., Brundage R.C., Lake K.D. and Sawchuk R.J. The estimation of the plasma free fraction of cyclosporine in rabbits and heart transplant patients: the application of a physiologic model of renal clearance. *Biopharm. Drug Disp.* 16: 59-70, 1995.

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Soria I. and Zimmerman C.L. Pharmacokinetics and hepatic first-pass effect of (-)-carbovir in the anesthetized rat. *Biopharmaceutics and Drug Disposition* 116: 313-318, 1995.

Suryanarayanan R. Powder X-ray diffractometry. In *Physical Characterization of Pharmaceutical Solids*, HG Brittain (ed.), Marcel Dekker, 1995.

Wang Y. and Sawchuk R.J. Zidovudine transport in rabbit brain during intravenous and intracerebroventricular infusion. *J. Pharm. Sci.* 84: 871-876, 1995.

Wen Y., Remmel R.P., Pham P.T., Vince R. and Zimmerman C. L. Comparative Brain Exposure to (-)-carbovir after (-)-carbovir or (-)-6-aminocarbovir intravenous infusion in rats. *Pharm. Res.* 12: 911-915, 1995.

In addition to the regularly scheduled seminar series, the following visiting speakers delivered lectures:

- KEITH K.H. CHAN, Ph.D., U.S. Food and Drug Administration, Rockville, Maryland. "The Spirit of cGMP/GLP/GCP" and "GLP Workshop".
- WILLIAM F. ELMQUIST, Ph.D., University of Nebraska Medical Center, Omaha, Nebraska. "Preliminary Evidence for P-glycoprotein Mediated Efflux of Rhodamine-123 from Rat Brain: An *In Vivo* Microdialysis Study."
- JOSEPH D. FENSTERMACHER, Ph.D., Henry Ford Hospital, Detroit, Michigan. "The Rapid, Often Odd Distributions of Materials including Amyloid β Peptide Among Cerebrospinal Fluid, Brain, Blood and Cerebral Blood Vessels."
- JIM FORT, Ph.D., Abbott Laboratories, North Chicago, Illinois. "The Polymorphism of Abbott 79175."
- KEVIN GARREN, Ph.D., Abbott Laboratories, North Chicago, Illinois. "Overview of Product Development at Abbott Laboratories."
- BRIAN H. KAYE, Ph.D., Laurentian University, Sudbury, Ontario, Canada. "Fractal Horizons in Pharmaceuticals."
- THEODORE P. LABUZA, Ph.D., Food Science and Nutrition, University of Minnesota. "Water and Stability of Biological Systems."
- HENRY MANTSCH, Ph.D., National Research Council, Winnipeg, Manitoba, Canada. "A Look at the Mystery of Protein Folding by Infrared Spectroscopy."
- TERRY R. STOUCHE, Ph.D., Bristol-Myers Squibb, Princeton, New Jersey. "Biomembrane Studies by Atomic-Level Computer Simulation: Drug Permeation and Membrane Protein Structure."
- RUBEN DARIO SINISTERA, Ph.D., Universidade Federal de Minas Gerais, Bel Horizonte, Brazil. "Characterization of Inclusion Compounds with Cyclodextrins."
- JEFFREY L. TATE, Ph.D., Institute for Advanced Studies in Biological Process Technology, University of Minnesota. "Training for Work in the GMP Environment: Development of Coursework at the University of Minnesota."

As with most/all other U.S. institutions, we are relying more frequently upon computer communication. Please send us your e-mail and FAX addresses if you'd like us to correspond electronically.

Name _____

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It's always a lift to learn about good things happening to former colleagues, so please send news about yourself that we can include in the next newsletter. Any promising students to whom we can send graduate program application materials? We'll be happy to send information about the Department and University. We'd like to hear from you!

Please mail this form to:
Department of Pharmaceutics, College of Pharmacy
University of Minnesota
308 Harvard Street S.E.
Minneapolis, MN 55455

