

# Department of Pharmaceutics & Pharmaceutical Chemistry

University of Utah

Volume 7

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## From the Chair



Welcome to the 7<sup>th</sup> issue of the Department of Pharmaceutics Newsletter. It has been a great year for the Department. We have commenced our search for the first holder of the George S. and Dolores Doré Eccles Presidential Chair in Pharmaceutics and Pharmaceutical Chemistry. We look forward to bringing in a new faculty member who will continue our strong tradition of academic and research excellence in pharmaceutics and drug delivery and lead us in our next era. You may recall from last year's newsletter that we were fortunate to receive an endowed chair from the Eccles Foundation. This is the first endowed chair in the College of Pharmacy and a tremendous honor for our department.

As you will see from the faculty pages, the department continues to maintain a high level of research productivity, receiving a number of new extramural funding awards and continuing to publish high quality research. Our graduate student population continues to be strong as we are attracting students from across the world and across many disciplines. Along with students from undergraduate programs in chemistry, we have also attracted students with degrees in pharmacy, bioengineering, biology, medicine, and biochemistry. This breadth of experience in many ways is indicative of the broad appeal our program has to student interested in fundamental aspects of drug delivery and drug discovery. Our continued ability to provide students with challenging opportunities to develop as scientists helps us to maintain a competitive recruiting effort for the best and brightest graduate students.

We are grateful to the continued support of

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Dr. Dinesh and Mrs. Kalpana Patel who have again provided support for a first year graduate student in the program. The department also received support again from the Novartis Corporation for first year student support. We extend our thanks to Dr. Yatindra Joshi for his support and assistance to our program. In addition, support from our alumni base has been matched with department resources to continue the Alumni fellowship for a first year graduate student. These fellowships are crucial to our continued success as they allow students to enter our program and explore different research options before deciding on a specific research path. They offer a competitive opportunity for continuing to attract good quality graduate support. Please continue supporting these efforts if you have already done so and consider joining this opportunity if you have not been able to in the past.

As always, we continue to benefit from your interactions with the department, and we hope that you do also! This year's AAPS Alumni Breakfast brought together approximately 40 alumni with current faculty and students for a lively gathering. The students certainly benefit from an opportunity to meet with you at these events and the faculty are excited to see old friends and make new acquaintances. This event is annually held on the Tuesday morning of the AAPS meeting. We hope to have the opportunity to meet you at this event in the future.

Though we have had a successful year, it has not all been positive. This year, we lost one of our department's long standing supporters and community assets, Mrs. Setsuko Higuchi after a valiant battle with cancer. Sets, as you will remember her, was a great presence in the department and a tremendous support for our distinguished former chair, Bill Higuchi, who continues to maintain a strong departmental presence, even though he will officially "retire" in the beginning of the 2007

academic year. If you would like to honor Sets, contributions to the Heart Mountain Foundation in Wyoming are requested. Please contact the department for more information in this regard.

Please do keep in contact with us, as we benefit from your input and association on a number of levels. Your financial support is also crucial to the department. It is clear that the future of strong academic departments rests not only on the productivity of their faculty but also on the support and generosity of the alumni who have helped make the department known in the world. You are truly assets to us and we thank you for your support.

On behalf of the faculty, staff, and students in the Department of Pharmaceutics, we wish you the best for this Holiday Season with hope for a Happy New Year. Please visit if your travels bring you to Utah.

With best regards,

Steven E. Kern  
Assistant Professor and Interim Chair

### DONOR HIGHLIGHTS

The generosity of our donors helps to sustain and expand the excellence of our graduate program. We are grateful for continuing support. THANK YOU ALL!!

**FELLOWSHIPS** for first year graduate students are funding their rotations in several laboratories before they decide on the dissertation topic and mentor. Thanks to all Fellowship sponsors!

**Novartis Fellowship**  
**Dinesh and Kalpana Patel Fellowship**  
**Alumni and Friends Fellowship**

The contributions from individual donors –

our alumni and friends – helped to establish the new ALUMNI AND FRIENDS FELLOWSHIP. Thanks for your support!

**David Grainger**  
**Ping Yeh**

More contributions are needed for full one-year student support. We appreciate your contributions.

*SYMPOSIUM ON RECENT ADVANCES IN DRUG DELIVERY SYSTEMS*

Mark your calendar for the Thirteenth Symposium to be held February 26-28, 2007, at the Little America Hotel, Salt Lake City, UT. We look forward to presenting another “state-of-the-art, cutting-edge” Symposium.

*NEW STUDENTS*

The following students joined our Department in the Fall Semester of 2005:

**Rian Davis:** Rian has joined the Department as part of the Pharm.D./Ph.D. program. He received a B.S. in Biology from the University of Utah in 2004. He most recently joined Dr. Carol Lim’s group.

**Kristina Giantsos:** Kristina graduated from the University of Utah in 2005 with a B.S. in Chemistry. She is now working in Dr. Bruce Yu’s lab.

**Casey Hughes:** Casey graduated from the University of Utah in 2005 with an M.S. in Bioengineering. Prior to that, he received a B.S. in Bioengineering from the University of Utah in 2004. Casey has joined Dr. Zheng-Rong Lu’s group. He enjoys motorcycle racing, snowboarding, and hiking.

**Mohanad Mossalam:** Mohanad received a

B.S. in Biological Chemistry (2005) from the University of Utah. He is a student of Dr. Sung Wan Kim. He enjoys playing soccer, squash, and doing community service.

**Mei Ou:** Mei received her B.S. Preventive Medicine from Fudan University in 2001. In 2004 she received an M.S. in Toxicology from the same university. Mei is the recipient of the Patel Fellowship. She enjoys tennis, running, hiking, and cooking.

**Shawn Owen:** Shawn received a B.A. in Chinese and a B.S. in Biochemistry from the University of Utah in 2005. He is the recipient of the Novartis Fellowship. He enjoys playing soccer, fishing, video games, and traveling.

**Shelly Roalstad:** Shelly received her B.S. in Chemistry from Boise State University in 1994. She is currently a student in Dr. Thomas Cheatham’s lab. She enjoys any activity outdoors, socializing, and cooking.

**Kuangshi Wu:** Kuangshi received his B.S. in Pharmacy (2000) and M.S. in Pharmaceutics (2003) from the Peking University Health Sciences Center (formerly Beijing Medical University). He is a member of Dr. Jindřich Kopeček’s lab. Kuangshi’s project focuses on the structure and properties of hydrogels self-assembled from copolymers containing coiled-coil grafts. He enjoys sports, classical music, and international relations.

**Weiwei Yuan:** Weiwei joined the University of Utah Biological Chemistry Program in 2004. She received a B.S. in Biochemistry (2003) from the University of Nanjing, China. After rotation through several research groups Weiwei joined Dr. Jindřich Kopeček’s laboratory and the Department of Pharmaceutics and Pharmaceutical Chemistry in May 2005. She studies hydrogels self-assembled from genetically engineered block

copolymers. Weiwei enjoys music, badminton, and Tai Chi.

### RECENT GRADUATES

**Matthew Fidler:** Matt was a student in Dr. Steven Kern's lab. His Ph.D. dissertation is entitled, "Statistically Testable Parameter Interaction Modeling." He is pursuing job opportunities in Chicago and the east coast.

**Kosalaram Goteti:** Ram was a student in Dr. Steven Kern's lab. His Ph.D. dissertation is entitled, "Tissue Pharmacokinetics for Prevention of Hemodialysis Vascular Access Stenosis." He accepted a fellowship at Roche Pharmaceuticals.

**Jeremy Guo:** Jeremy was a student in Dr. James Herron's lab. His Ph.D. dissertation is entitled, "Rapid Throughput Solubility Screening Assay Development and its Applications in Preformulation." He is currently a research scientist at Amgen.

**Henan Li:** Henan was a student in Dr. Carol Lim's lab. Her Ph.D. dissertation is entitled, "Progesterone Receptor Localization, Import Kinetics and Correlation with Transcriptional Activity Studies." She is currently living in Salt Lake City, UT.

**Aparna Nori:** Aparna was a student of Dr. Jindřich Kopeček. Her Ph.D. dissertation is entitled, "Design, Synthesis and Evaluation of HPMA Copolymers-TAT Conjugates as Potential Carriers for Drug Delivery." Aparna accepted a postdoctoral position at Johns Hopkins University in Dr. K. Leong's laboratory.

### STUDENT ACTIVITIES

The new Student Advisory Committee (SAC) for the year 2005-2006 was elected in August. This year's SAC members are Mudit

Kakar, Sivakumar Ramachandran and Weiwei Zhu. Traditionally SAC is involved in working for the students. Its activities include promoting interaction among students and representing their problems in front of faculty. SAC is involved in organizing activities which would make the whole graduate school experience more wholesome and less tedious. The current SAC also aspires to work for the students by continuing the programs started by previous SACs and initiating new programs to add to overall grad. school experience. The main goal of SAC still remains to bring students of all communities and ethnic backgrounds together, and create a stronger and cordial department.

The first major activity that the SAC organized this year was the annual department picnic. It was a nice evening up in the Milcreek Canyons attended and enjoyed both by the faculty and students alike. The mentor program initiated by previous SAC was continued this year as well. Senior students were assigned as mentors to incoming first year students. This year, SAC was also involved with the department chair search. SAC members along with senior students had lunches with all the chair candidates and made their recommendations. For the first time SAC hosted the fall open house in October. Students discussed their concerns regarding classes and journal club. They also made suggestions to SAC for its working and what they expect of it. Dr. Steve Kern addressed the concerns of students at the open house. This year SAC also sponsored a pharmaceuticals soccer team captained by Kongnara Pampangorn. Our department team reached the semi-finals of the intramural tournament. In November, the SAC chair represented the AAPS University of Utah chapter at the AAPS annual conference in Nashville, TN. Owing to its membership, a \$1500 funding was given by the AAPS for our student chapter activities for 2005-2006. In December,

right before the holidays, SAC got the opportunity to host the annual Christmas party. It was quite a fun event attended by most of the department members. In the coming spring SAC proposes to continue on its work. We will continue to sponsor our soccer team as well as other sports teams as needed. SAC has also enrolled in AAPS visiting scientist program and has requested for speakers to visit the U. We would also invite speakers from local industries and take interested students there for tours. SAC also intends to continue with its traditional work such as department hike, fundraiser etc. With the support of the faculty and the students this year's SAC will strive to work on its goals to make our graduate school experience more enjoyable and less stressful.

Mudit Kakar  
(on the behalf of SAC)

### AWARDS AND HONORS

#### *Students*

**Pad Chivukula** was awarded the APFE Pre-doctoral Fellowship for the 2nd year.

**Mudit Kakar** received the AAiPS (AAPS Indian Student ) Award at the AAPS National Meeting for his poster, "Localization Controlled Protein Constructs and their Application in Gene Therapy".

**Henan Li** received the Jeffrey L. Fox Memorial Award.

**Aaron Mohs** is the recipient of the PhRMA Foundation Fellowship.

**Mei Ou** is the recipient of the Patel Fellowship.

**Shawn Owen** received the Novartis Fellowship.

### GRANTS

#### You Han Bae

NIH Grant 1R01 CA101850; Engineered Intelligent Micelle for Tumor pH Targeting; Y.H. Bae, PI.

NIH Grant 2R01 DK 56884-05; Bioactive Polymers for Effective Islet Delivery System; Y.H. Bae, PI.

#### Thomas Cheatham

University of Utah, Funding Incentive Seed Grant; Integration of Computer-aided Drug-design Tools with Biomolecular Simulation: Flexibility and Scoring Through Iterative Molecular Dynamics and Docking Simulations on Computational Grids; T. Cheatham, PI.

Office of Naval Research funded a large collaborative effort between Utah (Greg Voth, PI; Cheatham), Wayne State University (Bernie Schlegel), Scripps (Dave Case) and Berkeley (Bill Miller) to enhance the AMBER biomolecular simulation code with capabilities for accurate representation of chemical dynamics in a ~\$3.2 million dollar project over 4 years entitled "A new research tool for the computer simulation of chemical dynamics in complex systems".

Work also continues on the "CSEO" (computational science and engineering online) environment in a collaboration with Thanh Truong (Chemistry), Julio Facelli (Center for High Performance Computing), James Lewis (BYU, Physics) and Cheatham funding in a large grant from the NSF (through 2007) to provide a WWW based environment for simulation, thermodynamics and kinetics as can be observed at [www.cseo.net](http://www.cseo.net).

This year Cheatham was also involved in a

ACS PRF funded summer school on computation, simulation, and theory in chemistry, biological chemistry and materials chemistry with Jack Simons (Chemistry, PI), T. Seideman (Northwestern U), K. Jordan (U Pittsburgh), E. Carter (UCLA), J. Shea (UCSB), J. Tully (Yale), E. Heller (Harvard), M. Head-Gordon (Berkeley), J. Doll (Brown), and B. Garrison (Penn State U) held this summer with ~30 students ranging from graduate students to faculty and held up in Park City.

### **James Herron**

U.S. Army, Dugway Proving Grounds; Planar Waveguide Sensors for Toxin Detection; J. Herron, Co-PI; D.A. Christensen, Co-PI.

### **William Higuchi**

NIH Grant DEO6569; Quantitation of Enamel Demineralization Mechanisms; W.I. Higuchi, PI.

NIH Grant RO1 GM063559; Methods to Control Transdermal Iontophoresis Variability; S.K. Li, PI; W.I. Higuchi, Co-I.

NIH Grant EYO 15181; Methods and Noninvasive Pharmacokinetics Studies to Improve Iontophoresis; S.K. Li, PI; W.I. Higuchi, Co-I.

### **Steven Kern**

NIH/NICHD Grant 1U10 HD45986-01; NIH Pediatric Pharmacology Research Unity at University of Utah; R Ward, PI; S. Kern, Consultant.

NIH/NIAID Grant U54AI065357-01; Region VIII Center in Biodefense and Emerging Infectious Disease; B. Beaty, PI; S. Kern, Project Lead.

### **Sung Wan Kim**

NIH/NHLBI Grant HL065477; Functional and Targeting Polymeric Gene Carriers; S.W. Kim, PI.

NIH/NID Grant DK65739; Functional Biomaterials for Antisense Delivery to Islet; S.W. Kim, PI.

NIH/NCI Grant CA10707; RGD-Polymer Targeting Plasmid to Angiogenic Endothelium; S.W. Kim, PI.

NIH/NHLBI Grant HL071541; Polymer Carrier for Ischemia-Inducible Gene Therapy; D. Bull, PI; S.W. Kim, Co-PI.

### **Jindřich Kopeček**

NIH Grant RO1 CA51578; Polymeric Drug Delivery System for Cancer Therapy; J. Kopeček, PI.

NIH Grant RO1 EB005288; Hybrid Hydrogels Self-Assembled from Graft Copolymers; J. Kopeček, PI.

NIH Grant RO1 GM069847; Bone Targeted Delivery of Anabolic Agents; J. Kopeček, PI.

DOD (CDMRP) Grant W81XWH-04-10900; Double-Targeted Macromolecular Therapeutics for the Treatment of Ovarian Cancer; J. Kopeček, PI.

NIH Grant RO1 CA88047; Targeting to Lymphocytes Mediated by Synthetic Epitopes; J. Kopeček, PI.

NIH/FIC (FIRCA) Grant TW006260; Immunotherapy for Ovarian Cancer; J. Kopeček, PI.

NIH Grant R21 GM072875; Dynamically Crosslinked Hydrogels; R. Stewart, PI; J. Kopecek, Co-PI.

Multiple Myeloma Research Foundation (MMRF) Grant; Development of Novel Targeted Therapy for Multiple Myeloma; R. Lee, PI; J. Kopecek, Co-PI.

### **Carol Lim**

NIH Grant R21DK070060-01; Controlled Targeting of Proteins to Cell Compartments; C. Lim, PI.

### **Zheng-Rong Lu**

NIH/NIBIB Grant R01 EB000498-01; Biodegradable Macromolecular Blood Pool Contrast Agents; Z.R. Lu, PI.

NIH/NCI Grant R33 CA095873-01; Biodegradable Macromolecular MRI Contrast Agents; Z.R. Lu, PI.

NIH/NCI Grant R01 CA097465; Polymer Chelate Conjugates for Diagnostic Cancer Imaging; Z.R. Lu, PI.

University of Utah Technology Commercialization Projects, Preclinical Development of Biodegradable Macromolecular MRI Contrast Agents; Z.R. Lu, PI.

### **Bruce Yu**

NIH Grant R21 EB002880; Molecular Docking and Imaging Devices for Drug Delivery; B. Yu, PI.

NIH Grant R01 EB004416; Engineering Peptide-based Biomaterials; B. Yu, PI.

Cancer Research Grant from the Sidney Kimmel Foundation for Cancer Research; An Integrated Docking/Imaging Device for Can-

cer Radioimmunotherapy; B. Yu, PI.

## **PUBLICATIONS**

### **You Han Bae**

J.-H. Kim, Y.H. Bae, "Albumin Loaded Microsphere of Amphiphilic Poly(ethylene glycol)/aliphatic poly(ester) Multiblock Copolymer," *Eur. J. Pharm. Sci.*, 23, 245-251 (2004).

S. Kim, S.W. Kim, Y.H. Bae, "Synthesis, Bioactivity, and Specificity of Glucagons-like Peptide-1/polymer Conjugate," *Biomaterials*, 26, 3597-3606 (2005).

E.S. Lee, K. Na, Y.H. Bae, "Ultra pH-sensitive Multifunctional Polymeric Micelles," *Nano Lett.*, 5, 325-329 (2005).

E.S. Lee, K. Na, Y.H. Bae, "Doxorubicin Loaded Smart Polymeric Micelles for Reversal of Resistant MCF-7 Tumor," *J. Control. Release*, 103, 405-418 (2005).

M.I. Whang, J.M. Suh, Y.H. Bae, S.W. Kim, B. Jeong, "Caprolactonic Poloxamer Analogue, PEG-PCL-PEG," *Biomacromolecules*, 6, 885-890 (2005).

H.C. Kang, S. Kim, M. Lee, Y.H. Bae, "Polymeric Gene Carrier for Insulin Secreting Cells: Poly(L-lysine)-g-sulfonylurea for Receptor Mediated Transfection," *J. Control. Release*, 105, 164-176 (2005).

B. Jeong, S.J. Bae, J.M. Suh, Y.H. Bae, S.W. Kim, "Thermogelling Poly(caprolactone-b-ethylene glycol-b-caprolactone) Aqueous Solution," *Macromolecules*, 38, 5260-5265 (2005).

W.J. Sung, Y.H. Bae, "Glucose Oxidase, Lactate Oxidase, and Galactose Oxidase Enzyme Electrode Based on Polypyrrole with Polyan-

ion/PEG/enzyme Conjugate Dopant,” *Sensors and Actuators. B. Chemical* (in press).

Y.Y. Kim, S.Y. Chae, S. Kim, Y.R. Byun, Y.H. Bae, “Improved Phenotype of Macroencapsulated Rat Islets by Co-encapsulation with Cross-linked Hb,” *J. Biomater. Sci. Polym. Ed.* (submitted 09/15/04, revised 03/01/05, accepted 05/13/05, in press).

W.S. Shim, J.S. Yoo, Y.H. Bae, D.S. Lee, “Novel Injectable pH and Temperature Sensitive Block Copolymer Hydrogel,” *Biomacromolecules*, 6, 2930-2934 (2005).

Z.G. Gao, D.H. Lee, D.I. Kim, Y.H. Bae, “Doxorubicin Loaded pH-sensitive Micelle Targeting Acidic Extracellular pH of Human Ovarian A2780 Tumor in Mice,” *J. Drug Target.*, 13, 391-397 (2005).

J.-H. Kim, A. Taluja, K. Knutson, Y.H. Bae, “Stability of Bovine Serum Albumin Complexed with PEG-poly(L-histidine) Diblock Copolymer in PLGA Microspheres,” *J. Control. Release*, 109, 86-100 (2005).

### **Thomas Cheatham**

T.E. Cheatham, III, “Molecular Modeling and Atomistic Simulation of Nucleic Acids,” in *Annual Reports in Computational Chemistry*, Edited by D. Spellmeyer., Elsevier Press, Vol. 1, pp. 75-89 (2005).

D. A. Case, T.E. Cheatham, III, T.A. Darden, H. Gohlke, R. Luo, K. M. Merz, Jr., A. Onufriev, C. Simmerling, B. Wang, R. Woods, “The AMBER Biomolecular Simulation Programs,” *J. Comp. Chem.*, 26, 1668-1688 (2005).

T.E. Cheatham, III, D.A. Case, “Applying AMBER Biomolecular Simulation Methods to DNA and RNA: Insight into the Dynamics, Interactions and Energetics of Varied Nucleic

Acid Structures,” in *Computational Studies of DNA and RNA*, Edited by J. Spomer, Wiley Press, (in press) (2006).

S.B. Dixit, D.L. Beveridge, D.A. Case, T.E. Cheatham III, E. Giudice, F. Lankas, R. Lavery, J. Maddocks, R. Osman, H. Sklenar, K.M. Thayer, P. Varnai, “Molecular Dynamics Simulations of the 136 Unique Tetranucleotide Sequences of DNA Oligonucleotides. II. Sequence Context Effects on the Dynamical Structures of the 10 Unique Dinucleotide Steps,” *Biophys. J.* 89, 3721-3740 (2005).

### **James Herron**

W. Jiskoot, A.J.W.G. Visser, J.N. Herron, M. Sutter, “Fluorescence Spectroscopy,” in *Methods for Structural Analysis of Protein Pharmaceuticals*, Edited by W. Jiskoot and D. Crommelin, AAPS Press, Arlington, VA, pp. 27-82 (2005).

J.N. Herron, H.-K. Wang, L. Tan, S.Z. Brown, A.H. Terry, J.D. Durtschi, S.E. Tolley, E.M. Simon, M.E. Astill, R.S. Smith, D.A. Christensen, “Planar Waveguide Biosensors for Point-Of-Care Clinical and Molecular Diagnostics,” in *Fluorescence Sensors and Biosensors*, Edited by R.B. Thompson, Taylor & Francis CRC Press, New York, pp. 283-332 (2005).

W.M. Reichert, J.N. Herron, D.A. Christensen, H.-K. Wang, J. D. Durtschi, “Composite Waveguide for Solid Phase Binding Assays,” U.S. Patent 6,911,344 (issued on 6/28/05).

### **William Higuchi**

G. Yan, S.K. Li, K.D. Peck, H. Zhu, W.I. Higuchi, “Quantitative Study of the Electrophoretic and Electroosmotic Effects during Alternating Current Iontophoresis using Nuclepore Membranes,” *J. Pharm. Sci.*, 93, 2895-2908 (2004).

G. Yan, K.D. Peck, H. Zhu, W.I. Higuchi, S.K. Li, "Effects of Electrophoresis and Electroosmosis during Alternating Current Iontophoresis across Human Epidermal Membrane," *J. Pharm. Sci.*, 94, 547-558 (2005).

N. He, K.S. Warner, W.I. Higuchi, S.K. Li, "Model Analysis of Flux Enhancement Across Hairless Mouse Skin Induced by Chemical Permeation Enhancers," *Int. J. Pharm.*, 297, 9-21 (2005).

S.K. Li, Y. Zhang, H. Zhu, W.I. Higuchi, H.S. White, "Influence of Asymmetric Donor-Receiver Ion Concentration upon Transcleral Iontophoretic Transport," *J. Pharm. Sci.*, 94, 847-860 (2005).

D.D. Heslop, Y. Bi, A.A. Baig, M. Otsuka, W.I. Higuchi, "A Comparative Study of the Metastable Equilibrium Solubility Behavior of Low-Crystallinity and High-Crystallinity Carbonated Apatites using pH and Solution Strontium as Independent Variables," *J. Colloid Interface Sci.*, 289, 14-25 (2005).

S. K. Li, W.I. Higuchi, "Mechanistic Studies of Permeation Enhancers," in *Percutaneous Penetration Enhancers*, Edited by E.W. Smith and H.I. Maibach, CRC Press, Inc., Boca Raton, FL (2005).

S. K. Li, W.I. Higuchi, "Quantitative Structure-Enhancement Relationships and the Microenvironment of the Enhancer Site of Action," in *Percutaneous Penetration Enhancers*, Edited by E.W. Smith and H.I. Maibach, CRC Press, Inc., Boca Raton, FL (2005).

### **Steven Kern**

R.A. Lugo, S.E. Kern, "The Pharmacokinetics of Oxycodone," *J. Pain Palliat. Care Pharmacother.*, 18, 17-30 (2004).

T. Masaki, R. Rathi, G. Zentner, J.K. Ley-

poldt, S.F. Mohammad, G.L. Burns, L. Li, S. Zhuplatov, T. Chiranthavath, S.J. Kim, S. Kern, J. Holman, S.W. Kim, A.K. Cheung, "Inhibition of Neointimal Hyperplasia in Vascular Grafts by Sustained Perivascular Delivery of Paclitaxel," *Kidney Int.*, 66, 2061-2069 (2004).

M. Bikram, M. Lee, C.W. Chang, M.M. Janat-Amsbury, S.E. Kern, S.W. Kim, "Long-circulating DNA-complexed Biodegradable Multiblock Copolymers for Gene Delivery: Degradation Profiles and Evidence of Dysopsonization," *J. Control. Release*, 103(1), 221-233 (2005).

S.R. Arain, S. Kern, D.J. Ficke, T.J. Ebert, "Variability of Duration of Action of Neuro-muscular-blocking Drugs in Elderly Patients," *Acta Anaesthesiol. Scand.*, 49(3), 312-315 (2005).

M.M. Janat-Amsbury, J.W. Yockman, M. Lee, S. Kern, D.Y. Furgeson, M. Bikram, S.W. Kim, "Local, Non-viral IL-12 Gene Therapy Using a Water Soluble Lipopolymer as Carrier System Combined with Systemic Paclitaxel for Cancer Treatment," *J. Control. Release*, 101(1-3), 273-285 (2005).

S. Sikharam, T.D. Egan, S.E. Kern, "Cyclodextrins as New Formulation Entities and Therapeutic Agents," *Curr. Opin. Anaesthesiol.*, 18, 392-395 (2005).

P.A. Murphy, S.E. Kern, F.Z. Stanczyk, C.L. Westhoff, "Interaction of St. John's Wort with Oral Contraceptives: Effects on the Pharmacokinetics of Norethindrone and Ethinyl Estradiol, Ovarian Activity and Breakthrough Bleeding," *Contraception*, 71, 402-408 (2005).

S.E. Kern, D. Jaron, "Complementary and Alternative Medicine in the Technology Age. Applying Bioengineering to Understand and

Evaluate the Efficacy of Age-old Remedies,” *IEEE Eng. Med. Biol. Mag.*, 24, 28-29 (2005).

W. Zhu, T. Masaki, Y.H. Bae, R. Rathi, A.K. Cheung, S.E. Kern, “Development of a Sustained-release System for Perivascular Delivery of Dipyridamole,” *J. Biomed. Mater. Res. B Appl. Biomater.*, in press (2005).

R.A. Lugo, K.L. Satterfield, S.E. Kern, “The Pharmacokinetics of Methadone,” *J. Pain Palliat. Care Pharmacother.* in press (2005).

### **Sung Wan Kim**

S. Choi, S. Oh, M. Lee, S.W. Kim, “Glucagon-Like Peptide-1 Plasmid Construction and Delivery for the Treatment of Type 2 Diabetes,” *Molecular Therapy*, 12, 885-891 (2005).

J.H. Jeong, S. H. Kim, S.W. Kim, T.G. Park, “In Vivo Tumor Targeting of ODN-PEG-Folic Acid/PEI Polyelectrolyte Complex Micelles,” *J. Biomater. Sci. Polym. Ed.*, 16, 1409-1420 (2005).

J.H. Jeong, M. Lee, W.J. Kim, J.W. Yockman, T.G. Park, Y.H. Kim, S.W. Kim, “Anti-GAD Antibody Targeted Non-Viral Gene Delivery to Islet Beta Cells,” *J. Control. Release*, 107, 562-570 (2005).

W.J. Kim, J.W. Yockman, M. Lee, J.H. Jeong, Y.-H. Kim, S.W. Kim, “Soluble Flt-1 Gene Delivery Using PEI-g-PEG-RGD Conjugate for Anti-angiogenesis,” *J. Control. Release*, 106, 224-234 (2005).

M. Lee, J.-K. Ryu, S.-M. Oh, E. Lee, H.-Y. Shin, S.U. Song, S.W. Kim, J.-K. Suh, “Water Soluble Lipopolymer as a Gene Carrier to Corpus Caverosum,” *Int. J. Impotence Res.*, 17, 326-334 (2005).

J.H. Jeong, S.H. Kim, S.W. Kim, T.G. Park, “Polyelectrolyte Complex Micelles Composed of c-rat Antisense Oligodeoxynucleotide-Poly(ethylenimine): Effect of Systemic Administration on Tumor Growth,” *Bioconjugate Chem.*, 16, 1034-1037 (2005).

S.H. Kim, J.H. Jeong, K.C. Cho, S.W. Kim, T.G. Park, “Target-Specific Gene Silencing by siRNA Plasmid DNA Complexed with Folate-Modified Poly(ethylenimine),” *J. Control. Release*, 104, 223-232 (2005).

J.J. Hwang, J.M. Suh, Y.H. Bae, S.W. Kim, B. Jeong, “Caprolactonic Poloxamer Analog: PEG-PCL-PEG,” *Biomacromolecules*, 6, 885-890 (2005).

S.J. Bae, J.Y. Suh, Y.S. Sohn, Y.H. Bae, S.W. Kim, B. Jeong, “Thermogelling Poly(caprolactone-b-ethylene glycol-b-caprolactone) Aqueous Solutions,” *Macromolecules*, 38, 5260-5265 (2005).

M. Bikram, M. Lee C.-W. Chang, M.-M.J. Amsbury, S.E. Kern, S.W. Kim, “Long-Circulating DNA-Complexed Biodegradable Multiblock Copolymers for Gene Delivery: Degradation Profiles and Evidence of Dysopsonization,” *J. Control. Release*, 103, 221-233 (2005).

Y.H. Kim, J.H. Park, M. Lee, Y.H. Kim, T.G. Park, S.W. Kim, “Polyethylenimine with Acid-Labile Linkages as a Biodegradable Gene Carrier,” *J. Control. Release*, 103, 209-219 (2005).

S. Kim, S.W. Kim, Y.H. Bae, “Synthesis, Bioactivity and Specificity of Glucagons-Like Peptide-1 (7-37/Polymer Conjugate to Isolated Rat Islets,” *Biomaterials*, 26, 3597-3606 (2005).

Y. Yi, J.H. Kim, H-W. Kang, H.S. Oh, S.W. Kim, M. H. Seo, “A Polymeric Nanoparticle

Consisting of mPEG-PLA-Toco and PLMA-COONa as a drug Carrier: Improvements in Cellular Uptake and Biodistribution,” *Pharm. Res.*, 22, 200-208 (2005).

M. Lee, S.W. Kim, “Polyethylene Glycol Conjugated Copolymers for Plasmid DNA Delivery,” *Pharm. Res.*, 22, 1-11 (2005).

M.M. Janat, J.W. Yockman, M. Lee, S. Kern, D.Y. Furgeson, M. Bikram, S.W. Kim, “Local, Non-viral IL-12 Gene Therapy Using a Water Soluble Lipopolymer as Carrier System Combined with Systemic Paclitaxel for Cancer Treatment,” *J. Control. Release*, 101, 273-285 (2005).

K.C. Cho, J.H. Jeong, H.J. Chung, C.O. Jeo, S.W. Kim, T.W. Park, “Folate Receptor-Mediated Intracellular Delivery of Recombinant Caspase-3 for Inducing Apoptosis,” *J. Control. Release*, 108, 121-131 (2005).

### **Jindřich Kopeček**

C. Xu, V. Breedveld, J. Kopeček, “Reversible Hydrogels from Self-Assembling Genetically Engineered Protein Block Copolymers,” *Biomacromolecules*, 6, 1739-1749 (2005).

A. Nori, J. Kopeček, “Intracellular Targeting of Polymer-Bound Drugs for Cancer Chemotherapy,” *Adv. Drug Delivery Rev.*, 57, 609-636 (2005).

T. Merdan, K. Kunath, H. Petersen, U. Bakkowsky, K.H. Voigt, J. Kopeček, T. Kissel, “PEGylation of Poly(ethylene imine) Affects Stability of Complexes with Plasmid DNA Under In Vivo Conditions in a Dose-Dependent Manner after Intravenous Injection into Mice,” *Bioconjugate Chem.*, 16, 785-792 (2005).

S.C. Miller, D. Wang, P. Kopečková, J. Kopeček, “Biopolymer-Based Delivery System

for Advanced Imaging and Skeletal Tissue-Specific Therapeutics,” *J. Bone Miner. Metab.*, 23(suppl), 103-108 (2005).

D. Wang, S. Miller, P. Kopečková, J. Kopeček, “Bone-Targeting Macromolecular Therapeutics,” *Adv. Drug Delivery Rev.*, 57, 1049-1076 (2005).

P. Chivukula, K. Dusek, D. Wang, M. Duskova-Smrckova, P. Kopečková, J. Kopeček, “Synthesis and Characterization of Novel Aromatic Azo Bond-Containing pH-Sensitive and Hydrolytically Cleavable IPN Hydrogels,” *Biomaterials*, 27, 1140-1151 (2006).

S. Gao, Z.-R. Lu, B. Petri, P. Kopečková, J. Kopeček, “Colon-specific 9-Aminocamptothecin-HPMA Copolymer Conjugates Containing a 1,6-Elimination Spacer,” *J. Control. Release*, 110, 323-331 (2006).

### **Carol Lim**

H. Li, M.L. Fidler, C.S. Lim, “Effect of Initial Subcellular Localization of Progesterone Receptor on Import Kinetics and Transcriptional Activity,” *Molecular Pharmaceutics*, in press, (2005).

### **Zheng-Rong Lu**

Z.-R. Lu, “Stability of Proteins and Nucleic Acids,” *Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids*, R. I. Mahato, Ed., CRC Press, New York, NY, 352-377 (2005).

Y. Zong, X. Wang, K. C. Goodrich, A.M. Mohs, D. L. Parker, Z.-R. Lu, “Contrast Enhanced Tumor MRI with New Biodegradable Macromolecular Gd(III) Complexes in Mice,” *Magn. Reson. Med.*, 53, 835-842 (2005).

X. Wang, H.Y. Feng, T. Ke, M. Schable, Z.-R. Lu, "Pharmacokinetics and Long-term Gd Tissue Accumulation of (Gd-DTPA)-cystamine Copolymers, a Biodegradable Macromolecular MRI Contrast Agent," *Pharm. Res.*, 22, 596-601 (2005).

A.M. Mohs, Y. Zong, J. Guo, D. L. Parker, and Z.-R. Lu, "PEG-g-Poly(GdDTPA-co-L-cystine): Effect of PEG Chain Length on in vivo Contrast Enhancement in MRI," *Bio-macromolecules*, 6, 2305-2311 (2005).

### **Bruce Yu**

S. Ramachandran, Y. Tseng, Y.B. Yu, "Repeated Rapid Shear-Responsiveness of Peptide Hydrogels with Tunable Shear Modulus," *Biomacromolecules*, 6, 1316-1321 (2005).

S. Ramachandran, P. Flynn, Y. Tseng, Y.B. Yu, "Electrostatically-Controlled Hydrogelation and Protein Entrapment," *Chem. Mater.*, 17, 6583-6588 (2005).

### **TRAVEL**

#### **You Han Bae**

Dr. You Han Bae has been on the road nine times this year: two international travels and seven domestic trips. The first international trip was from May 24 to June 4 to discuss the progress of an industrial project sponsored by Youl Chon Chem. Inc. At Inha University Hospital (Korea) he gave seminars and at Nongshim Co. he attended a workshop and gave a talk. The second visit to Korea was from Nov. 29 to Dec. 18 because of a death in the family and for Youl Chon Project meetings. Dr. Bae traveled three times to Washington D.C. to attend NIH study sections: (NIH Developmental Therapeutics Study Section (Feb. 23-25); NIH Special Emphasis Panel (NCI) (ZCA1 GRB-S (01)), Centers of

Cancer Nanotechnology Excellence, (July 19-22); NIH Special Emphasis Panel (SBIR); Cancer Drug Development and Therapeutics (ZRG1 ONC-T(10)) (Nov.6-8)). In June (18-23) Dr. Bae was in Miami for the 32nd CRS annual meeting to fulfill duties as session moderator, award committee chair meeting, and Young Investigator Awardee Presentation Moderator. Two lectures were presented at Virginia Commonwealth University for 2005 ACS Short Course: Introduction to Polymers in Medicine (Richmond, Virginia, June 7-10, 2005). Two more trips to Wayne State University (Oct. 4-5) and Purdue University (Nov. 14-16) were made to present seminars.

#### **Thomas Cheatham**

Unlike previous years, Cheatham severely cutback travel this year to focus efforts on developing the lab and obtaining sufficient extramural funding to support the recent growth. In May, he traveled to the University of Minnesota for the ABC meeting on DNA simulation. In June he traveled to the large bi-annual DNA conference organized by Sarma. Otherwise, travel involved a series of NSF and NIH review panels in Washington (Sept, Oct), San Diego (Dec), Chicago (June), and Las Vegas (March).

#### **James Herron**

In May 2005, Prof. Herron traveled to Lawrence, KS to participate in a Kansas Technology Enterprise Corporation (KTEC) review of the Higuchi Biosciences Center. He traveled to Kauai in July to present a talk entitled "Real-Time Detection of Single Base Extension Reactions using Planar Waveguide Fluorescence Sensors" at the 6<sup>th</sup> International Weber Symposium on Innovative Fluorescence Methodology in Biochemistry and Medicine. This past November, he traveled to Lawrence Livermore Laboratory to participate in a bio-

detection workshop.

### **Steven Kern**

Steve's most interesting academic travels included a trip to Honolulu to participate in the International Anesthesia Research Society's annual meeting. Two graduate students also attended and had the opportunity to present their research projects and take in some snorkeling at Hanama Bay. He also participated in as an invited speaker for an international conference on closed loop drug delivery systems in Anesthesia that was held at Monte Verita, Switzerland. Monte Verita is a wonderful conference facility maintained by the Swiss Federal Institutes for focused conferences that bring together investigators from throughout the world around a common topic. If you have an opportunity to attend one of these conferences, I highly recommend it to you.

### **Sung Wan Kim**

Dr. Kim presented the Plenary Lecture, October 27, 2005, at the International Pharmaceutical Symposium, Shanghai, China. He presented lectures at the University of Wisconsin, a pharmaceutical sciences symposium honoring the career of Professor Joseph R Robinson, Pohang Institute of Technology, Yonsei University, Soonchun National University and Hanyang University. Following that, Professor Kim presented an invited lecture on Gene Delivery for the Treatment of Diabetes at the 8th USA-Japan Symposium on Drug Delivery Systems in December 2005. The Twelfth International Symposium on Recent Advances in Drug Delivery Systems Symposium (in honor of Professor Jan Feijen) organized by Professors Kim and Kopecek was held February 21-24, 2005, at the Grand America Hotel. Robert Langer opened the Symposium presenting the plenary lecture

to 375 attendees.

### **Jindřich Kopeček**

In February, Kopecek's group took part in the Twelfth International Symposium on Recent Advances in Drug Delivery Systems in Salt Lake City. Henry was one of the co-organizers, Chunyu Xu, Aparna Nori, Jane Yang, and Sasha Malugin presented posters. In April Henry presented lectures at the Department of Chemical and Biomolecular Engineering, Tulane University in New Orleans; Department of Materials Science and Engineering, Johns Hopkins University in Baltimore; Huntsman Cancer Institute, University of Utah; and was a member of the Department of Defense Review Panel of the Ovarian Cancer Research Program in Vienna, Virginia. In May, Pavla and Henry traveled to Brno, Czech Republic, where Henry gave a lecture at the College of Pharmacy of the Veterinary University. In June Henry presented an invited lecture at the Gordon Conference "Chemistry of Supramolecular Assembly" at the Colby College, Maine. After the Conference Henry visited the beautiful Acadia National Park. From Maine Henry traveled to Miami Beach, Florida to take part in the Annual Meeting of the Controlled Release Society. Aparna Nori and Sasha Malugin joined him there and presented posters at the meeting. In July Pavla, Henry, Jane Yang, and Pad Chivukula took part in the 44th Microsymposium on "Polymer Gels and Networks" in Prague, Czech Republic. Henry presented an invited lecture; Jane and Pad presented posters. The Symposium honored Dr. Karel Dusek, our long-time collaborator. It took place in the building where Henry and Pavla spent 20+ years of their scientific career. In September both Colleges we are associated with organized scientific meetings. The College of Pharmacy Scientific Meeting was in Salt Lake City. Henry presented a lecture.

The Bioengineering Department, College of Engineering organized the 1st Mountain West Biomedical Engineering Conference in Snowbird, Utah. Jon Callahan, Russell Johnson, and Vaikunth Cuchelkar presented posters. At the end of the month, Henry and Pavla traveled to Baltimore to take part in the 3rd International Nanomedicine and Drug Delivery Symposium in Baltimore. The main organizer of the Symposium was Hamid Ghandehari (Ph.D. 1996). Henry presented an invited lecture. In November, Henry traveled to Nashville, TN to present an invited lecture at the AAPS Annual Meeting. In December Pavla and Henry participated in the Pacific Polymer Federation Meeting in Maui, Hawaii. Henry presented an invited lecture. After the meeting, Henry and Pavla will visit the Big Island to check out the volcano activity. Henry also chaired three meetings of the NIH Biomaterials and Biointerfaces Study Section in February, June, and October and spent two months in Prague on sabbatical leave (parts of March, May, and July).

### **Carol Lim**

Dr. Lim traveled to Nashville, TN for the AAPS National Meeting. Her student, Mudit Kakar, received the AAiPS (AAPS Indian Student ) Award at the meeting for his poster, "Localization Controlled Protein Constructs and their Application in Gene Therapy".

### **Zheng-Rong Lu**

In March, Dr. Zheng-Rong Lu traveled to Gaithersburg, MD to participate in the NIBIB/NIH Innovation in Molecular Imaging Probes Roadmap Grant Review Special Emphasis Panel. In April, he traveled to Chicago, IL to review grant applications for the American Heart Association. The following month, Dr. Lu and his colleagues, Dr. Tianyi Ke, Yuda Zong and Yi Feng, attended the 13th Scientific Meeting and Exhibition of In-

ternational Society for Magnetic Resonance in Medicine in Miami, FL. In June, Dr. Lu, Todd Kaneshiro, Aaron Mohs and Anagha Vaidya attended the 32nd International Symposium on Controlled Release of Bioactive Materials again in Miami, FL. Two months later, Dr. Lu was invited to give a lecture at Northwestern University in Chicago, IL. He presented at the Fourth Annual Meeting of the Society for Molecular Imaging in Cologne, Germany, and was then invited to speak at the XV Annual International Workshop on MRA in Beijing, China in September. He also gave a lecture at the College of Pharmacy, Shanghai Jiaotong University, Shanghai, China in between the two meetings. His last meeting of the year was to the AAPS Annual Meeting and Exposition in Nashville, TN in October. Dr. Lu was invited to speak at Cornell University, Ithaca, NY in November. Finally, Dr. Lu concluded his travels for the year with a collaboration trip to Stanford University, Alto Palo, CA in December, where he also gave a lecture.

### **Bruce Yu**

In March, Dr. Bruce Yu went to Arlington, Virginia to participate in an NSF Nanotechnology and Interdisciplinary Research Initiative review panel. In August, he gave a presentation entitled "Engineering peptide-based Biomaterials" in Washington, D.C at the Second Annual NIBIB Grantee Meeting sponsored by the National Institute of Bioengineering and Biomedical Imaging. In November, Dr. Yu attended a conference in Philadelphia, sponsored by Strategic Research Institute and gave a presentation entitled "Peptide-based Viscoelastic Matrices for Drug Delivery and Tissue Repair". The conference theme was Peptides & Therapeutic Proteins. There were many industrial participants. It is obvious to DR. Yu that peptides and proteins are attracting a lot of attention from the pharmaceutical and biotech industries. Dr. Yu's

most memorable trip was made this year to attend the last annual meeting of the Canadian Protein Engineering Network of Centres of Excellence (PENCE) in Toronto in May. After fifteen years, PENCE completed its natural lifespan and closed shop. Dr. Yu received his postdoctoral training under the PENCE banner, and this meeting certainly brought back lots of fond memories and mixed emotions.

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