Nucleus

The newsletter of the School of Pharmacy's Office of Research

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April 2007

AACP RANKING; SOP Placed 6th in the Nation

Over the past few years, the Texas Tech Health Sciences Center School of Pharmacy Research Program has made great strives not only in terms of research, but also in funding. Recently, the American Association of Colleges of Pharmacy ranked the nation's 101 pharmacy schools for 2006. Thanks to all the hard work and effort, TTUHSC—SOP was placed 6th for the percent of Ph.D. level faculty that have funding through the National Institutes of Health. 45% (9 out of 20) of our Ph.D. have funding through them. Not only did the school rank high in NIH funded Ph.D.s, but we also ranked high in the non-NIH Federal Agency Awards category; we placed 10th. Overall, the school placed 30th in Total Amount of Grants and Contract Awards.

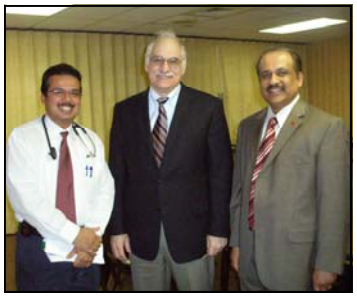
Although all our faculty are worthy of recognition for their areas of research, this issue of the newsletter is dedicated to those faculty and their research which made the AACP ranking possible. We have listed all those PI's and their projects that received NIH funding in 2006. Congratulations to all who have worked so hard and to those who have been so dedicated to help accomplish this great feat! ▪

10th Annual Wendy & Stanly Marsh 3 Endowed Lectureship

Michael Kuhar, Ph.D. presented the 10th Annual Wendy and Stanley Marsh 3 Endowed Lectureship in Pharmacology and Neurochemistry of Substance Abuse/Addiction. Dr. Kuhar, a Charles Howard Candler Professor, is the Chief of the Neurosciences Division at the Yerkes National Primate Center and the Department of Pharmacology at Emory University in Atlanta, Georgia. His main area of interest is brain structure and function, neuropsychiatric disease, and drugs that affect the brain.

Dr. Kuhar presented "CART – a gene for addiction and appetite" for the lecture on March 27th. Afterwards, attendees had the opportunity to talk with Dr. Kuhar during a cookie and punch reception. On March 28th, Dr. Kuhar presented the Grand Round "Discoveries in Basic Sciences and New Understandings of Addiction." Both the School of Medicine and the School of Pharmacy offered CME credits to attendees.

Dr. Kuhar & Dean Nelson



Dr. Khandheria (SOM), Dr. Kuhar, Dr. Thekkumkara

During Dr. Kuhar's time at TTUHSC, he had the opportunity to meet with several of the distinguished SOP faculty members. During individual office visits, Dr. Kuhar had the chance to learn about the exciting strives we are making in our research; in return, faculty also got input from an internationally know scientist. Dr. Bharat Khandheria, M.D., Associate Program Director for the School of Medicine, invited Dr. Kuhar to talked to SOM residents about the clinical benefits he hopes to achieve with his research. Both the students and faculty complemented how personable and interesting Dr. Kuhar was.

Our thanks go out to Dr. Kuhar for taking the time to come speak about his research, and for being such a wonderful guest. Also, we would like to thank Wendy and Stanley Marsh 3 for their continuing support of this event. ▪

Myelin Project Moves to Amarillo

The Myelin Project, a mission aimed at accelerating research on myelin repair, is moving it's main office to Amarillo. Diseases such as multiple sclerosis and leukodystrophy are hereditary disorders that affect more than 2 million people worldwide. This organization connects a group of scientists across the globe who are continuously in search of the cure for these demyelinating diseases. Texas Tech's very own **Dr. Margret Weis** has been named the President of the Myelin Project. The administration will be moved to Texas later this year. For more information on the project and it's history, visit www.myelin.org.

Thomas Abbruscato, Ph.D.
Grant : R01NS046526
Title: *Tobacco Smoke Chemicals and Stroke Alter Brain K+ Efflux*

Summary: In terms of cost to society and disability to patients, stroke ranks with Alzheimer's disease as the 2 most important neurological disorders. Nicotine, a major constituent of tobacco smoke, has been shown to have important effects on neuronal injury and brain edema formation in stroke and hampers brain recovery after stroke. It is know that the blood-brain barrier (BBB), which is formed by the cerebral endothelium, plays a critical role in the regulation of water and electrolyte balance within the central nervous system. With respect to brain ischemia, maintenance of low brain extracellular potassium concentration is necessary for proper neuronal conduction and recovery after stroke. *In vitro* and *in vivo* investigations into smoke constituent alteration of BBB properties is critically important and is the focus of his research. The objective of Dr. Abbruscato's research is to systematically test the effects of nicotine and smoke constituents on BBB potassium transport during stroke conditions and determine the physiological role of nAChRs on BBB ion transport. The central hypothesis of his lab is that nicotine decreases brain-to-blood potassium transport through nicotinic acetylcholine receptor (nAChR) activation at the blood-brain barrier that impairs ion transport necessary for stroke adaption. He plans to utilize sophisticated, well characterized *in vivo* models designed to mimic nicotine and tobacco smoke constituent exposure coupled to validated models of stroke. This focused research will identify possible therapeutic targets at the blood-brain barrier to prevent brain edema and altered central nervous system potassium homeostasis during nicotine or smoke constituent exposure coupled to stroke conditions. He hope that new stroke treatments will utilize a combination of agents that modulate multiple processes (both BBB breakdown and ischemic neuronal death) providing the most efficacious treatment of stroke for both smoking and non-smoking patients. ▪

Fakhrul Ahsan, Ph.D.
Grant: R15HL077133
Title: *Long Circulating Low Molecular Weight Heparins Pulmonary*

Summary: Venous thromboembolism (VTE) is a fatal blood clotting disorder that affects up to two people per 1000 each year in the United States resulting in more than 600,000 hospitalizations and 60,000 deaths. Venous thromboembolism may manifest as deep vein thrombosis or pulmonary embolism. Drugs that have traditionally been used for the short and long term treatment of VTE include unfractionated heparin and warfarin. However, treatment of VTE using these traditional drugs has many limitations, including the requirement of needles in the administration of heparin, unpredictable pharmacological response, frequent monitoring and dosage adjustments, and poor safety profiles. Because of the limitations of traditional anti-coagulant therapy for VTE, low molecular weight heparin (LMWH), which are smaller fragments of unfractionated heparin, has recently been used as a drug of choice for the short term treatment of VTE. Although LMWHs offer several advantages over unfractionated heparin, the clinical usefulness of these drugs has been limited because of two important disadvantages: [1] like unfractionated heparins, LMWHs still need to be administered by subcutaneous injections and [2] LMWHs have a relatively short duration of action. These limitations can be addressed by administering LMWHs formulated in long circulating drug carriers via the pulmonary route. The hypothesis to be tested in his proposal is: Long circulating LMWHs administered via the pulmonary route is a noninvasive and viable anticoagulant therapy for the short and long term management of venous thromboembolism. The goal of Dr. Ahsan's proposal will be accomplished by formulating enoxaparin, a widely used LMWH, with long circulating liposomes and nanoparticles in the presence or absence of absorption enhancers. The safety will be investigated in a series of studies including cytotoxicity studies in human bronchial epithelial cells, analysis of bronchoalveloar lavage fluid and measurement of mucociliary clearance rate in frog palate models. The long term goal of his project is to generate preclinical data on the safety and efficacy of the proposed delivery system .▪

Dr. Moridani Receives Funding

2007 looks to be a very promising year for Dr. Majid Moridani. He recently was awarded an R15 NIH grant for his project titled "A tyrosinase-targeted drug design for the treatment of melanoma." The grant for $222,750 (4/1/2007-3/30/2009) is to further study the hypothesis that phenolic agents that are metabolized by tyrosinase but not by liver P450 enzymes will be effective against melanoma with no significant toxicity towards liver.

Earlier this year, he received Seed Grants in the amount of $14,500 from the Office of Research for his project titled "P450 inhibition prevents 4-hydroxyanisole induced liver toxicity *in vivo*" and $10,000 from the Southwest Cancer Research Center (SCTRC) Seed Grant for his research with "4-Hydroxybenzyl alcohol based prodrugs as anti-melanoma agents." Most recently, Dr. Moridani, in conjunction with Randy Schiffer, received a $20,000 (4/2007-3/2008) from the WHRI to study their project "Cytochrome P450 Expression & Genotypes in Women with Alzheimer's Disease."

Dr. Moridani was invited to present in the School of Pharmacy, Tehran Medical Sciences University, in Tehran this past January; he also was an honored guest at the 2006 American Association of Clinical Chemistry (AACC) in Chicago, IL. It has already been an exciting year for Dr. Moridani. Congratulations for all his new funding! ▪

Farewell to Dr. Klein

Dr. Jochen Klein accepted a position at the University of Frankfurt College of Pharmacy in Germany. He had been with the Texas Tech School of Pharmacy since March of 2002. Dr. Klein was an Associate Professor and had been awarded tenure in February 2006. While it is a loss for the TTUHSC family, we wish Dr. Klein the best in all his endeavors.

Ulrich Bickel, M.D.
Grant: R01NS045043
Title: *Targeting the Blood-Brain Barrier in Neuroinflammation*

Summary: Dr. Bickel's proposal explores a novel use of transferring receptor mediated drug delivery. An oligonucleotide (ODN) based drug will be targeted to brain microvascular endothelial cells, with the goal to inhibit inflammatory responses in these cells. The approach could have broad applicability for diseases affecting the blood-brain barrier and the central nervous system. Here, Dr. Bickel will focus on experimental autoimmune encephalomyelitis (EAE), an animal model of multiple sclerosis to demonstrate the feasibility of the vascular targeting strategy. Crucial events in the pathogenesis of that disease affect function and integrity of the BBB. The endothelial cells forming the BBB express adhesion molecules affecting lymphocyte transmigration, and enzymes such as inducible NO-synthase and cyclooxygenase-2 contributing to inflammation. Expression of these proteins is under control of the transcription factor NF-kappaB. Therefore, preventing NF-kappaB activation could be a promising

[Continued on Page 4]

Jochen Klein, Ph.D.
Grant: R21AT003399
Title: *Anti-edema and neuroprotective effects of Ginkgo extract EGb761 and bilobalide*

Summary: Extracts of Ginkgo biloba and Hypericum perforatum (St. John's wort, SJW) herbal medicines that are widely used for the treatment of cognitive dysfunctions and for mild to moderate depression, respectively. The constituents (one or many) that are responsible for therapeutic effects are under intensive scrutiny. Over the last few years, Dr. Klein has collected novel evidence for neuroprotective properties of two major constituents of these two plants: bilobalide (from Ginkgo) and hyperforin (from Hypericum). The present proposal is based on the hypothesis that Ginkgo and SJW extracts, and their constituents, have neuroprotective properties in acute models of brain ischemia. He will use *in vitro*-studies in brain slices to study edema formation and anti-edema effects of Ginkgo and SJW extracts and their pure constituents. For *in vivo*-studies, they will employ middle cerebral artery occlusion (MCAO) in mice to test effects of extracts and pure compounds on infarct area and edema formation. In addition, the uses of microdialysis in combination with stroke to monitor metabolic parameters of ischemia (glucose, lactate, glutamate, potassium, glycerol, choline), and then test the effects of pretreatment with botanicals on these parameters. These experiments will (a.) investigate the potential clinical utility of neuroprotective effects of two widely used herbal extracts and (b.) define the role of bilobalide and hyperforin for neuroprotective effects of Ginkgo and SJW extracts,

Names in the News

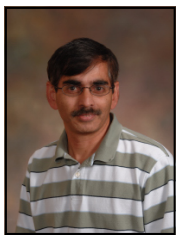
Dr. Kalkunte Srivenugopal has been invited to be a guest speaker at the 2nd International Conference on MGMT and Alkylating Drug Resistance. The conference will be held in Mainz, Germany from June 13th through the 16th. Congratulations to Dr. Srivenugopal and good luck!

[Continued from Dr. Bickel, Page 3]

therapeutic strategy. An elegant way to inhibit a transcription factor is the cellular delivery of decoy ODNs, short double stranded ODNs containing the consensus binding sequence of that factor. Unfortunately, decoy ODNs face similar problems as related antisense approaches, namely poor permeability through cell membranes. The receptor-mediated endocytosis provided by the transferring-receptor system can overcome the obstacle. Here, the 8D3 antibody specific for the mouse transferring receptor will serve as the vector for delivery of a NF-kappB decoy ODN. The polyanionic ODN will be bound in a complex by the cationic polymer polyethylenimne, and then coupled to the 8D3 antibody via an avidin-biotin bridge. Polyethylenimine is an attractive carrier for DNA due to its capacity to mediate "endosomal escape," thus enabling the ODNs to reach their cytosolic or nuclear sites of action. The specific aims of the project comprise (i) the determination of the cellular uptake and pharmacological activity of the ODN delivery system in the *in vitro* model with a murine brain endothelial cell line: (ii) determining the *in vivo* pharmacokinetics of the delivery in normal mice; and (iii) evaluating *in vivo* pharmacological effects of vector-mediated ODN delivery in the mouse EAE-model. ▪

Reza Mehvar, Pharm.D., Ph.D.
Grant: R01GM069869
Title: *Local Immunosuppression for Liver Transplantation*

Summary: Introduction of new immunosuppressive drugs has transformed liver transplantation from an experimental procedure to a successful solution for patients who are otherwise doomed to death. Tthe use of these drugs has resulted in significant morbidity and mortality due to their toxicity. Recent data indicates that local immunosuppression at the site of transplanted graft will increase graft survival and reduce the toxicity of immunosuppressive agents in other organs. Current methods of local immunosuppression have several limitations, which seriously hamper their clinical use. Dr. Mehvar's proposal is to use macromolecular prodrugs of immunosuppressants for the purpose of local immunosuppression in liver transplantation. His hypothesis is that the dextran prodrug of MP will preferentially accumulate in the liver, where it gradually regenerates the active drug, resulting in sustained local immunosuppression in liver transplantation. Prodrugs will be synthesized by attaching dextran to MP via various linkers, and an optimum linker will be selected. The pharmacokinetics of the selected prodrug will then be tested in rats with respect to the dose and frequency of prodrug administration. The effectiveness of the prodrug in prevention of allograft rejection will be compared with those of the parent drug in an orthotopic rat liver transplantation model. It is Dr. Mehvar's expectation that this approach will substantially reduce the drug dose needed for effective immunosuppression of transplanted livers in rats. These studies are significant because it will eventually lead to a substantial reduction in morbidity and mortality associated with the current immunosuppressive protocols used in liver transplantation. ▪



US Rao, Ph.D.
Grant: R01CA106625
Title: *A Novel Ring Finger Protein in Cancer Drug Resistance*

Summary: During chemotherapy, many cancers develop multidrug resistance (MDR). One key protein underlying MDR is the MDR1-protein (commonly known as P-glycoprotein (Pgp)), which extrudes multiple drugs from the cancer cells utilizing ATP. The functional characteristics of Pgp have been extensively characterized. The mechanism by which anticancer drugs induce the expression of Pgp; the mechanism by which the activity of Pgp is regulated in cancers, are unknown. Dr. Rao's lab has identified a new gene that codes for a (38 kDa RING finger protein, termed MDR1Pi. This protein is highly expressed in drug-resistant cancer cells. Anticancer drugs further increase the expression of this protein. They show that MDR1Pi interacts with Pgp, specifically the linker region, which is known to join the NH2- and COOH-halves of Pgp. These findings suggest that MDR1Pi is an important protein, which regulates the Pgp function through its interactions with the linker region. To this end, they will evaluate the function of MDR1Pi in breast and in prostate cancer cells. Dr. Rao's research has defined three specific objectives to address the functional role of MDR1Pi in the development of MDR, which are to: 1). determine the effects of MDR1Pi on the ATPase and drug transport functions of Pgp; 2). determine the role of MDR1Pi in the development of MDR; 3). determine the role of MDR1Pi in the MDR1 gene expression. Characterization of MDR1Pi, the first known interactor of Pgp, will unravel the mechanisms by which the function and expression of Pgp are regulated. This data will be key to the future designs of re-sensitizing the anticancer drug-refractory cancers. ▪

Quentin Smith, Ph.D.
Grant: R01NS052484
Title: *Role of plasma protein binding in brain drug delivery*

Summary: Drug delivery to brain is limited by the blood-brain barrier (BBB) (i.e., neurovascular unit) which markedly impacts treatment for many central nervous system (CNS) diseases. Of the various BBB factors that limit brain drug delivery, one of the least well understood is the contribution of plasma protein binding, which involves a complex interplay between brain blood flow, the brain capillary glycocalyx and plasma membrane, and the free and bound drug concentrations in the capillary circulation. The great majority of BBB drug transport studies report greater brain uptake than can be accounted for based upon the free Fraction of drug in plasma and have suggested that special interactions occur in the capillary circulation leading to "enhanced dissociation" in vivo. The net effect is that this has impeded understanding and prediction of CNS drug penetration in drug development and clinical analysis. The primary hypothesis of this grant is that brain uptake for many drugs can be predicted using a modified Crone-Renkin model that incorporates drug dissociation and rebinding to plasma proteins in the brain capillary in addition to free drug uptake and exchange with brain. His hypothesis will be pursued through four specific aims: (1) to confirm using a carefully controlled in situ rat brain perfusion technique that initial, unidirectional drug uptake into brain can be predicted for many drugs with a simple model based upon four readily determined parameters - the arterial input drug concentration, the free fraction (fu) of drug in the arterial input, the apparent BBB permeability-surface area product (PSU) to free (unbound) drug, and the flow rate of fluid through the brain vasculature (F); (2) to evaluate the rates of drug dissociation and rebinding to plasma protein and their influence on initial drug uptake into brain for drugs that exhibit high capillary extraction at defined flow rate; (3) to show using the perfusion technique that plasma protein binding directly affects the steady state distribution of drug in brain; and (4) to validate using the Nagase albumin knockout rat that this same relationship holds in vivo and that brain drug concentration at steady state is driven ultimately by the plasma free drug concentration and the brain drug distribution volume. His research will provide a novel mechanism to distinguish drugs that exhibit restrictive vs nonrestrictive plasma protein binding effects on brain uptake, will provide a rational means upon which to base CNS drug-dosing for agents that bind significantly to plasma proteins, and will assist in selection of agents with optimal brain delivery in CNS drug development. ▪

Thomas Thekkumkara, Ph.D.
Grant: R01DK072140
Title: *Role of Glucose in hAT1 gene expression therapy*

Summary: Hypertension and diabetes are two major risk factors in the pathogenesis of diabetic nephropathy. Angiotensin converting enzyme inhibitor therapy is broadly effective in patients with diabetic nephropathy suggesting an important role for renin angiotensin system in the progression of this disorder. Angiotensin II, the active component of the renin angiotensin system, acts primarily through angiotensin type 1 (AT1) receptors. Reduction in AT1 receptors could not be reversed by ACE inhibitors demonstrating that the receptor downregulation was not mediated by the up-regulation of angiotensin II. The molecular mechanisms leading to AT1 receptor down-regulation in diabetes are not known. Any alterations (increase/decrease) in AT1 gene expression in proximal tubule have significant pathophysiological consequences. Dr. Thekkumkara's hypothesizes that in normal physiology, expression of the AT1 receptor is achieved by normalized interactions between glucose and insulin on AT1 gene transcription. Recently, his laboratory has identified a specific sequence in the AT1 gene promoter required for its basal transcription and functions as an insulin response (enhancer) element. Additional studies revealed a repressor element upstream of the enhancer that can respond to normal/high levels of extracellular glucose. Their observations are that in the presence of glucose (normal/high), insulin has no enhancer effect on AT1 transcriptional repression, where as in the absence of glucose or presence of low glucose insulin enhances the AT1 gene transcription. In addition, they have evidence that these regulatory elements recognize specific nuclear transacting factors induced by glucose and insulin. His observation is the first evidence that physiological levels of AT1 gene transcription is controlled by a represser element perhaps through an interplay between glucose and insulin. In his study he is proposing to identify the regulation of the receptor gene and factors that are controlled by high glucose in the kidney. With this information he hopes to obtain a better understanding of the receptor action, and also a direction in the management and treatment of kidney diseases in diabetes. ▪

2007 Research Days

The date has been set and preparations have begun. Dr. Ken Miller, Senior Vice President of the American Association of Colleges of Pharmacy will be this years keynote speaker. The event will begin Thursday, August 2nd with a luncheon, followed by poster presentations, the keynote speaker, and a social dinner. Wednesday, August 3rd will begin with a breakfast provided by the Office of Research. Afterwards, podium presentations will begin, followed by lunch and the 2nd group of poster presentations. The event will end that evening with the Award Ceremony. Those interested in participating this year…..start getting ready!

ABRI Program

This year's Amarillo Biomedical Research Internships are soon to start. 6 qualified students will have the opportunity to work with mentors such as Dr. Richard Leff, Dr. Majid Moridani, Dr. US Rao, Dr. Quentin Smith, Dr. Thomas Thekkumkara, and Dr. Margaret Weis. Each student will work in a lab where they will have chance to experience what a career in research would be like. The ten week program will begin May 25th and end with the interns presenting their scientific findings the the 2007 Research Days. Be sure to welcome the interns to the SOP family!

Margret Weis, Ph.D.
Grant: R21AG028901
Title: Age-related hypertension & endothelial LCFACoAS medicated eNOS palmitoylation

Summary: Hypertension is an age-related condition, affecting fewer than 10% of young adults but more than 70% of those in their 7th and 8th decades. The disease predisposes its victims to cardiovascular disease and stroke. Interestingly, among those over 75, hypertension affects significantly more women than men. In both men and women, age-related hypertension has been linked to endothelial dysfunction, associated with decreased availability of nitric oxide (NO), an important regulator of vascular smooth muscle tone. Endothelial nitric oxide synthase (eNOS) cycles from membrane (inactive) to cytoplasm (active) and back, a process facilitated by cyclic depalmitoylation/repalmitoylation. The PI recently identified a long-chain fatty acyl CoA synthetase that is highly expressed in the endothelium (eLCFACoAS). Preliminary evidence shows that eLCFACoAS expression and activity is elevated in ovariectomized female rats, suggesting that it plays a role in postmenopausal hypertension. Triacsin C, an inhibitor of eLCFACoAS, inhibits eNOS palmitoylation, increases NO synthesis in cultured endothelial cells, and enhances both release of NO and vascular smooth muscle relaxation in rat aortic rings. The proposed work tests the hypothesis that palmitoyl CoA availability is rate-limiting in eNOS repalmitoylation, and that endothelial long chain fatty acyl CoA synthetase (as opposed to other LCFACoASs) is the enzyme that supplies palmitoyl CoA. The hypothesis suggests that inhibiting eLCFACoAS will enhance eNOS activity *in vivo*, opening a new therapeutic category for treating hypertension. Accomplishing these aims will establish the role for eLCFACoAS mediated palmitoylation in eNOS function, and provide lead information for the synthesis of highly specific, potent inhibitors of eLCFACoAS enabling future studies of eLCFACoAS inhibitors as potential therapeutic agents. ▪

Invited Talks

Dr. Paula Grammas. *Vascular Mechanisms in Alzheimer's Disease.* Institute of Aging TTUHSC Lubbock, Texas. December 11, 2006.

Mustafa F. Lokhandwala, **Ph.D.** *Role of Oxidative Stress in Defective Renal Dopamine Receptor G-Protein Coupling and Function in Experimental Diabetes.* Heart & Kidney Institute College of Pharmacy University of Houston, Texas. January 22, 2007.

Steven A. Giannos, M.S., M.S.B. *Current and Future Trends for Transdermal Drug Delivery Technologies.* Chrono Therapeutics, Inc., Trenton, New Jersey. February 26, 2007.

Anthony Hickey, Ph.D., D.Sc. *Particulate Systems for Pulmonary Drug and Vaccine Delivery.* UNC School of Pharmacy, Chapel Hill, North Carolina. March 5, 2007.

Dr. George Gokel. *Synthetic Ion Channels that Function in Phospholipid Bilayer Membranes.* Distinguished Professor of Science, Department of Chemistry and Biochemistry, University of Missouri - St. Louis. March 12, 2007.

Marla Gearing, Ph.D. *Alzheimer's Disease and the Apolipoprotein E Receptor LR11.* Emory University School of Medicine, Atlanta, GA. March 19, 2007.

Jayarama Gunaje, Ph.D. *Aspirin Induces Acetylation of Tumor Suppressor Protein p53 and Inhibits p21WAF1/CIP1 Expression.* Associate Professor, TTUHSC SOP, Amarillo, Texas. March 26, 2007.

Graduate Student Seminars

Imam Shaik. *Reduction of Warm Ischemia-Reperfusion Injury in Rat Livers by the CYP 2E1 Inhibitor Di-allyl Sulfide.* February 5, 2007.

Jiukuan Hao. *Comparable effects of memantine and NGP1-01 in a murine stroke model.* February 5, 2007.

Shuhua Bai. *Pegylated Dendrimers in Enhancing Circulation Time of LMWH.* February 12, 2007.

Jim Egbert. *Blood to Brain Permeability In a Metastatic Breast Cancer Model Using Flourescence Microscopy.* February 12, 2007.

Jennifer Paulson. *Brain endothelial cell isolation method to detect stroke induced changes in protein expression.* February 19, 2007.

Lloyd Alfonso. *Aspirin Induces the Acetylation of Multiple Proteins: Identification of Novel Targets.* February 26, 2007.

Publications

Krishna SB, Alfonso LF, **Thekkumkara TJ**, **Abbruscato TJ**, **Bhat GJ.** Angiotensin II induces phosphorylation of glucose-regulated protein-75 in WB rat liver cells. *Arch Biochem Biophys*. 2007 Jan 1;457(1):16-28.

Bai S, Thomas C, **Ahsan F**. Dendrimers as a carrier for pulmonary delivery of enoxaparin, a low-molecular weight heparin. *J Pharm Sci*. 2007 Feb 7;

Niture SK, Velu CS, **Smith QR**, **Bhat GJ, Srivenugopal KS**. Increased expression of the MGMT repair protein mediated by cysteine prodrugs and chemopreventative natural products in human lymphocytes and tumor cell lines. *Carcinogenesis*. 2007 Feb;28(2):378-89.

Mehvar R, Elliott K, Parasrampuria R, Eradiri O. Stereospecific high-performance liquid chromatographic analysis of tramadol and its O-demethylated (M1) and N,O-demethylated (M5) metabolites in human plasma. *J Chromatogr B Analyt Technol Biomed Life Sci*. 2007 Jan 13;

Parasrampuria R, Vuppugalla R, Elliott K, **Mehvar R**. Route-dependent stereoselective pharmacokinetics of tramadol and its active O-demethylated metabolite in rats. *Chirality*. 2007 Mar;19(3):190-6.

Canales AE. OTC device: temporal scanner TAT-2000C. *J Am Pharm Assoc* (Wash DC). 2007 Jan-Feb;47(1):112.

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