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Four Faculty Receive NIH Grants

Four faculty at the College of Pharmacy have received funding this past six months from the National Institutes of Health in excess of $4,946,163 for up to five years.

**El-Remessy receives NIH grant to study molecular mechanisms of diabetic retinopathy**

Azza El-Remessy, associate professor of clinical and administrative pharmacy and head of the College’s Clinical and Experimental Therapeutics program in Augusta, has received $315,000 for the first year of funding on a five-year RO1 grant from the National Institutes of Health to study molecular mechanisms of diabetic retinopathy (DR). The grant is expected to continue at an additional $315,000 per year, for an overall total of $1,575,000.

Diabetic retinopathy is the leading cause of blindness in working age adults in the U.S. Characterized by neurodegeneration, glial reactivity, inflammation and acellular capillary formation, it can eventually lead to retinal neovascularization and blindness.

“Given the limited and invasive treatments available only for advanced stages of DR, there is a great need to identify novel molecular targets for earlier therapeutic intervention,” said El-Remessy. “Our long term goal is to identify such targets for DR by probing the relationships between glial inflammation and vascular injury.”

**Segar continues study of vascular phenotypic regulation by growth factors, insulin and glucose**

Lakshman Segar, associate professor of clinical and administrative pharmacy, will receive $946,682 (and possibly an additional $167,000) in funding over the next three years to study the role of platelet-derived growth factors (PDGF), insulin and glucose transporters on the phenotypic characteristics of vascular smooth muscle cells (VSMCs). The RO1 grant from the National Institutes of Health/National Heart, Lung and Blood Institute was funded two years ago when Segar was a faculty member at Pennsylvania State University College of Medicine; he transferred the remaining funds to the College after he joined the faculty last year.

“The overall goal of this project is to gain new understanding into the mechanisms of coronary artery disease,” said Segar. “The specific objective is to investigate how platelet-derived growth factor (PDGF) regulates glucose transport and insulin receptor signaling to influence phenotypic changes in vascular smooth muscle cells. The development of vascular complications in nondiabetic and diabetic patients correlates closely with increased VSMC glucose metabolism and dysregulated insulin receptor signaling.

**Liu’s grant funds study of image-guided hydrodynamic gene delivery**

Dexi Liu, professor and head of pharmaceutical and biomedical sciences, is working on a research project that ultimately seeks the development of a safe and effective method for gene therapy.

Liu has transferred two NIH grants to the University of Georgia within the year from the University of Pittsburgh where he was previously a faculty member. The first grant, entitled “Image-guided
Hydrodynamic Gene Delivery is from the National Institute of Biomedical Image and Bioengineering and has been awarded for the development of an image-guided, site-specific gene delivery system. This grant is in its fifth year and has an annual budget of $613,572.

The second grant, “Computer-Assisted Hydrodynamic Gene Delivery for Hemophilia Gene Therapy,” is an RO1 grant from the National Heart, Lung and Blood Institute for the demonstration of the safety and effectiveness of an image-guided, computer controlled injection device for treatment of hemophilia, using dogs as an animal model. The grant is in its third year and has an annual budget of $903,271. The projected budget for 2013-2014 is $324,000.

“We developed the concept of hydrodynamic gene delivery some time ago and have been working on its clinic applications,” said Liu. “Our goal is to combine the technology of image-guided catheter insertion with our recently developed computer-controlled injection system to achieve site-specific gene delivery for gene therapy. Current research focuses on optimization of various parameters for safe and effective gene transfer using pigs, dogs and baboons as animal models. We are at the last stage of testing before we move to clinic.”

Weng continues studies of glial-cytokine-neuronal interactions in neuropathic pain

Han-Rong Weng joined the faculty last year as an assistant professor of pharmaceutical and biomedical sciences from the University of Texas M.D. Anderson Cancer Center where he had been principal investigator on a four-year RO1 National Institutes of Health grant. He was able to transfer $583,638 of the grant for the last two years of his study on glial-cytokine-neuronal interactions in neuropathic pain.

How dysfunctional glial cells, which provide support and protection for neurons in the brain and in other parts of the nervous system, lead to abnormal pain signaling in the spinal dorsal horn in neuropathic pain remains a mystery, said Weng. Activation of glutamate receptors by glutamate is a key step for acute pain transmission and activation of signal transduction pathways leading to initiation and maintenance of pathological pain.

“We hypothesize that activation of glial cells induced by nerve injury results in dysfunction of glial glutamate transporters, which leads to abnormal activation of ionotropic glutamate receptors in the spinal dorsal horn and behavioral hypersensitivity,” he said.