DEPARTMENT OF PHYSIOLOGY & PHARMACOLOGY

Annual Report

July 1, 2006 - June 30, 2007

1. EXECUTIVE SUMMARY

The reporting year, 2006-2007, was the second year of the combined Physiology & Pharmacology Department since the merger. We have accomplished many positive things during this year, and I believe we are heading in the right direction. Renovations of offices and laboratory space on the 2nd and 3rd floors of BHS have been completed. The office staff are now located in one central office and functioning. We have identified shared equipment in the former Physiology and Pharmacology Departments and established a shared equipment facility for all faculty and staff in the Department to use, which is located on the 2nd floor of BHS. The renovations for the new Center for Diabetes and Endocrine Research (CeDER), which Dr. Sonia Najjar directs, has been completed on the first floor of BHS, and the grand opening was held in May 2007. Dr. Najjar continues to recruit faculty for this new Center. The new Cardiac and Vascular Phenotyping Core Laboratory, which Dr. Sandrine Pierre directs, is being established and will be functioning very soon. We hired several new faculty during this fiscal year. Dr. Guillermo Vazquez was hired to establish a research program in vascular and endothelial biology; Dr. William Jacobus was hired as a Professor on a part-time basis and has taken on a large teaching load; and Dr. Beata Lecka-Czernik was hired as a Professor with a primary appointment in Orthopedics and a joint appointment in Physiology & Pharmacology, and will collaborate with Dr. Najjar. We are still in the process of moving faculty and laboratory assignments; this takes time, but we are nearing the end stages of our moves. The outstanding teaching programs have been maintained and improved.

2. CHAIR'S SELF ASSESSMENT

The goal for 2006-2007 was to continue the amalgamation of the functions of the two previous Departments. With faculty support, and the invaluable assistance of the capable, loyal, and overworked administrative staff, a consolidated new Department has been attained. My major goals for 2007-2008 are (a) to prompt Dr. Gold to initiate the search for a new Chair; and (b) to provide effective academic and managerial leadership to the Department until this responsibility is assigned to the new Chair.

3. DEPARTMENT HIGHLIGHTS & NOTABLE EVENTS

Dr. Andrew Beavis received the Dean's Award for teaching excellence.

Dr. Joana Chakraborty was selected to review abstracts submitted to the "4th IAS Conference on HIV, Pathogenesis, Treatment and Prevention", Sydney Australia, July 22-25, 2007. Dr. Chakraborty also reviewed 12 abstracts.

Dr. George T. Cicila was an Invited Speaker at the Rat Genome Workshop meeting, *The Rat Genome – New Findings, New Approaches* session, at The Australian Medical Congress held in Melbourne, Australia, December 2006. "Complex Traits: Looking Beyond the Rat Nuclear Genome".

Dr. Bina Joe was an Invited Speaker at the Australian Medical Congress held in Melbourne, Australia, December 2006. A Provisional Patent was filed on gene discovery for hypertension. Two students completed dissertation work for their Masters degree; and a promotion to Associate Professor (Tenure Track) was approved by the APT Committee.

Dr. Sonia Najjar served as a regular member of the NIH Study Section "Integrative Physiology of Obesity and Diabetes". She also served as an ad hoc member of three other study sections during the year.

Dr. Sandrine Pierre became Director of the Cardiac and Vascular Phenotyping Core Laboratory.

Dr. Yasser Saad prepared and submitted a Scientist Development Grant to the American Heart Association, status pending (notification December 2007).

Dr. Edwin Sanchez was an invited speaker at Case Western Reserve University, Department of Pharmacology, March 2007, "TPR Proteins in Steroid Receptor Signaling and Physiology"; Endocrine Society Annual Meeting, Toronto, Canada, June 2007, "TPR Proteins in Steroid Receptor Signaling and Physiology".

Dr. John W. Turner, Jr. was the Recipient of the 2006 UTCOM Career Sustained Research Award (September 2006); papers were presented at: International meeting (Virgin Islands National Park 50th Anniversary Conference) entitled: "Comparison of Cortisol-Indexed Stress Levels in Parrotfishes Inhabiting Developed vs. Undeveloped Bays on St. John, U.S. Virgin Islands", St. John, U.S.V.I., November 2, 2006; International meeting (Virgin Islands National Park 50th Anniversary Conference) entitled: "Immunocontraception in Free-Roaming Feral Burros" St. John, U.S.V.I., November 2, 2006; and at National Meeting (32nd Eastern Fish Conference) entitled: "Fecal Cortisol Monitoring of Fish Stress: Effect of Nitrate", Gettysburg, Pennsylvania, June 19, 2007.

Dr. Guillermo Vazquez was hired as an Assistant Professor in February 2007 to establish an independent research program in the area of endothelial dysfunction and inflammatory cardiovascular disease.

Dr. Zi-Jian Xie was invited to the Golden Conference (February 2007) and FASEB Summer Conference (June 2007), and presented seminars at University of Kansas and Case Western.

4. DETAILS OF EDUCATION, RESEARCH, CLINICAL SERVICES, AND ADMINISTRATIVE & UNIVERSITY SERVICES

4a. Education:

Twenty one of our 28 faculty members contributed a total of 612.5 hours of didactic teaching to various formal courses of the COM, CHS, CGS, and CON. We also devoted 180 contact hours to the PBL course in the COM. The details of these contributions are presented in Table 1. It is appropriate to note that we have not gathered information on "preparation/grading" time, and the faculty time spent advising/instructing individual students.

4b. Research:

Effort/time: Estimate of faculty effort devoted to research is included in Table 2. There were also 21 postdoctoral fellows and technical staff in the Department who devoted 100% effort to research.

Space: All space for Physiology & Pharmacology is accounted for in Table 3.

Funding:

The amount of the Department's extramural research funds is summarized in Table 4, provided by our Research and Sponsored Programs Office.

Description of Research & Results:

The nature of the active research programs, and the recent findings, of our faculty are described below, as summarized by each member.

Dr. Nisar Ahmad - The long-term goal of my research is to define the physiological role of mammalian BetaM in placental mammals. During the last year we were able to decipher some of the functions of the BetaM protein. We have shown that BetaM inhibits TGF- β signaling pathway by up regulating gene expression of inhibitory Smad7. We have determined that BetaM is involved in transcriptional regulation of muscle-specific transcription factors myogenin and MyoD. We have also shown that BetaM expression is strictly confined to atrial myocytes in mouse heart and regulates the expression of atrial natriuretic factor (ANF) and Nkx genes. These properties suggest that BetaM plays an important role in gene expression and signaling during heart and skeletal muscle development. My future plan is to determine the downstream gene targets of BetaM and to investigate the mechanism of its gene regulation and signaling in heart and skeletal muscle development.

Dr. Amir Askari - The laboratory has had a long-standing interest in the mechanism of ion transport across biological membranes, with a major emphasis on the properties and functions of (Na^+,K^+)-ATPase (the sodium pump) of the eucaryotic plasma membrane. Current work of the laboratory is primarily on the digitalis-induced interactions of (Na^+,K^+)-ATPase with non-ATPase proteins, leading to the newly discovered functions of (Na^+,K^+)-ATPase as a signal transducer that regulates growth of the cardiac myocyte. Recent findings include the discovery that digitalis drugs induce cardiac hypertrophy through the activation of PI3K/Akt signaling pathways, and that this drug-induced hypertrophy is akin to physiological rather than pathological cardiac hypertrophy.

Dr. Joana Chakraborty - Currently, I am working on two major projects: a) educational and epidemiological studies and b) biomedical research on HIV/AIDS development of a mouse model. The goals of the first project are: to develop educational materials, to offer courses to medical, nursing, allied health students and practicing physicians and to provide opportunities to interact with people living with AIDS, and also to conduct epidemiological studies on HIV infection in developing countries and the impact of AIDS on women and children. The goal of my second project is to develop an animal model to study the transmission of retroviruses and their effects. This model has been developed by using the ts-1 virus in BALB/c mouse. We have further established that this model can be useful for the study of AIDS related malignancy, such as lymphoma. Currently we are studying the common integration sites (CIS) of the viral genome into mouse genome causing lymphoma. Thus far we have identified 209 viral genome integration sites (IS) on 16 different chromosomes with 30% located within the genes (intra-genic). We are now planning to extend this work in patients with AIDS and lymphoma.

Dr. George Cicila - Our laboratory is focused on the study of cardiovascular quantitative traits. The first project involves studying blood pressure (BP) in the Dahl rat model where Dr. Soon Jin Lee and I have used congenic strains and substrains to characterize multiple BP quantitative trait loci (QTLs) at the q-terminus of rat chromosome 3 (RNO3). Dr. Lee and I have bred and tested additional congenic substrains to further delimit the RNO3 BP QTL-containing intervals and are using gene expression profiling of kidneys from these congenic strains (with the parental S strain) to identify superior candidate genes. In collaboration with Dr. Bina Joe, Dr. Lee and I are examining the interactions of multiple BP QTL-containing congenic intervals that were introgressed into a Dahl S rat.) The goal of this project is to examine the interactions of genes responsible for the different BP QTLs and to use such information to identify and define specific pathways through which they influence BP, as well as the responsible gene(s). We are studying mutations in one candidate gene, regulator of telomere length 1 (*Rtel1*) in detail, including the identification of modifier genes. The second project involves study of aerobic running capacity (ARC) and related quantitative traits (cardiac performance, lipid metabolism/obesity, and methylation) using the high performing DA rat strain in conjunction with the low performing Copenhagen (COP) and Buffalo (BUF) rat strains. Dr. Lee and I are using congenic strains bred from DA and COP rats to examine ARC quantitative trait loci on rat chromosomes 16 and 3, and the effects of these congenic regions on ARC, fat metabolism and depots, and cardiac performance. Dr. Lee and I are also studying a segregating population of F_2(BUFxDA) rats to identify QTLs for ARC, abdominal fat depots, methylation potential, circulating factors (free fatty acids, triglycerides, etc.), and organ weights. We have identified an association between the DA-rat and BUF-rat mitochondrial DNA and ARC, subcutaneous fat

weight, and liver S-adenosyl methionine and S-adenosyl homocysteine levels. Naturally occurring mutations in mitochondrial DNA have not previously been associated with alterations in quantitative traits in rodent genetic models.

Dr. Bina Joe - The ongoing research in my laboratory is focused on the genetic dissection of inherited hypertension. During the last year, we have (1) successfully identified a potential candidate gene in rats and obtained evidence for the association of this gene in human essential hypertension; (2) located two other regions on the rat genome that are a few kilobases in size containing < 15 genes each. This resolution is considered significant in the field; (3) identified transcriptional networks as potential underlying phenomena controlling a gene-gene interaction in blood pressure regulation. Future plans include continuing our efforts to positionally clone genes for hypertension and extend our studies to humans wherever applicable. Grant renewals will be sought from the NIH.

Dr. Soon Jin Lee - *Project 1*: Rat chromosome 3 (RNO3) blood pressure (BP) quantitative trait loci [QTL(s)] in collaboration with Dr. George Cicila. At least two BP QTL have been identified within a ~3.3 cM region using 6 congenic substrains. I am using differential gene expression in key organs, such as the kidney, as a tool to identify possible candidate genes. Rtel1 (regulator of telomere length 1) is found as a candidate gene for RNO3 BP QTL. Its differential expression was confirmed in qRT-PCR and sequence differences in S and R allele is found. *Project 2*: Gene expression study in koi fish under stress. I am collaborating with Dr. John Turner on a gene expression study of fish under stress, a model he has developed. We collected tissue samples from fish under nitrate stressor and control group. RNA were isolated from these samples and ready to do qRT-PCR to study expression of stress-related genes. *Project 3*: Virus induced lymphoma in a mouse model. I am collaborating with Drs. Chakraborty and Duggan to identify common integration sites (CIS) of viral genome in T-cell lymphoma model that she has developed. We identified over 90 independent viral integration sites on mouse genome and examined the expression of 28 genes located at or near CIS. We found several candidate genes that are involved in development of lymphoma in this model.

Dr. Lijun Liu - I am working with Dr. Askari on an NIH Program Project Grant: Cardiac Na/K-ATPase. We found Na/K-ATPase interacted with PI3K. Ouabain (Na/K-ATPase inhibitor) could stimulate activation of Akt and might induce physiological hypertrophy. My future plan is to renew the PPG funding so that we can further re-test our finding and provide pharmacological basis for digitalis drug therapy.

Dr. Ronald Mellgren - In collaboration with Dr. Paul McNeil, an expert on plasma membrane repair at the Medical College of Georgia, I have found that the conventional calpains are required to repair damaged cell membranes of fibroblasts and several other cell types (JBC 282: 2567, 2007). A second manuscript is in final draft form & will be submitted to JBC by the end of August. It describes the ability of the serum glycoprotein fetuin A to stabilize the activity of purified m-calpain in mM calcium. Fetuin A also facilitated plasma membrane repair of wild-type mouse fibroblasts, but not those derived from calpain-knockout embryos. This is the first example of an extracellular protein that facilitates plasma membrane repair, and we propose that it does so, in part, by its ability to stabilize m-calpain in the presence of extracellular calcium. Another manuscript has been accepted for publication in the Journal of Biochemical and Biophysical Methods. This study shows that the classical preparation of "detergent-resistant membranes" or DRMs, is actually composed of several subfractions of ordered-lipid complexes derived from plasma membrane, mitochondria, and internal membrane fractions. Vigorous homogenization with a ground glass homogenizer separated the subfractions at different buoyant densities on sucrose gradient flotation and allowed us to identify organelle-specific protein components in each DRM subfraction. In order of increasing buoyant density, DRM subfraction A contained markers for endoplasmic reticulum and intracellular acidic vesicles; subfraction B contained plasma membrane markers; and subfraction C comprised several mitochondrial membrane proteins. The subfractions could be isolated under gentle homogenization conditions (Teflon pestle homogenizer) when cells were preincubated with f-actin disrupting agents. Disruption of microtubules or intermediate filaments did not separate the DRM subfractions,

so the latter seem to be interconnected by actin microfilaments. The method for generating DRM subfractions should facilitate studies of communication between ordered-lipid structures in different organelles, a topic that has been approached in several recent journal articles. At the Calpain FASEB Summer Research Conference in July, I became aware of new opportunities to collaborate on studies that should increase likelihood of funding. In particular, Peter Greer, Queen's University, Kingston, Ontario, reported the generation of CNS-targeted conditional calpain knockout mice. I have e-mailed him and he is willing to generate skeletal muscle conditional calpain knockouts for our studies of calpain in sarcolemma repair, if funding becomes available for my R21 grant proposal.

Dr. Nikolai Modyanov - My current research is focused on functional characterization of the BetaM proteins encoded by orthologous ATP1B4 genes, which were discovered in my laboratory. Previously we demonstrated that physiological functions of BetaMs radically changed during evolution of vertebrates. In fish, amphibian and avian species, BetaMs are authentic Na,K-ATPase β-subunits. In placental mammals BetaMs lost their ancestral functions and function as regulators of gene expression and signal transduction in perinatal skeletal muscle. During the report year we determined that BetaM is a negative regulator of TGF- β signaling pathway and is involved in regulation of activity of muscle-specific transcription factor myogenin. We also show that BetaM expression in heart is strictly confined to atrial myocytes where it affects atrial natriuretic factor gene expression. These properties of BetaM suggest its important role in gene expression during heart and skeletal muscles development. The long term goal of the studies is to define physiological role of mammalian BetaM and to reveal the nature of evolutionary forces that underlie the necessity and physiological importance of ATP1B4 gene co-option in placental mammals.

Dr. Sonia Najjar - I have focused on studying the role of an insulin receptor substrate, termed CEACAM1, in insulin action, clearance, obesity, fatty liver disease and cancer. In this venue, we have established many novel mouse models of obesity and diabetes and advanced many novel findings in the field. Because of the motivation and the hard work of my graduate students, I have made substantial impact on the field of metabolism. I have gained numerous federal and non-federal funds, and published several papers in journals with high impact factor. I have trained my graduate students by working closely with them, conducting weekly data club, and carrying out daily individual scientific discussions, during which we derive and redefine the hypothesis and analyze experimental observations. I believe that this training style helps them develop into reliable independent scientists.

Dr. Ana Maria Oyarce - *Menkes trafficking*: We have recently demonstrated that this copper transporter is localized to secretory granules in endocrine cells. Future studies will address the trafficking and sorting of MNK in PC12 cells. *Effect of PCB in adrenal gland*: We have preliminary data indicating that polychlorinated compounds (PCB) regulate catecholamine enzymes in adrenal gland. Affimetrix studies have been done to determine novel mRNA that could be regulated by PCB. Future studies will address the proteins regulated by PCB as well as the mechanism by which this regulation occurs. *Cross-talk between Gabaergic and dopaminergic systems:* Recent studies have indicated that dopamine may modulate excitatory and inhibitory neurotransmission through cross-talk between the dopaminergic, glutaminergic and GABAergic systems with significant implications for neurological disease states. Future studies will aim at investigating this effect.

Dr. Sumudra Periyasamy - *The Role of Tetratricopeptide Repeat (TPR) Proteins in Prostate Cancer*: Prostate cancer is the most frequently diagnosed cancer among men and the second leading cause of male cancer death. Androgens and androgen receptor (AR) are known to regulate the growth of malignant prostate epithelial cells, as documented by the initial growth arrest of metastatic prostate tumors by androgen ablation. Frequently, prostate cancer patients become resistant to therapy that blocks androgen-mediated cell proliferation. This suggests that AR contributes to growth of prostate cancer even under conditions of androgen ablation. Since a majority of androgen ablation-resistant tumors still express AR, it is likely that factors other than androgens may activate AR and contribute to prostate cancer progression. The FK506-binding proteins (FKBP52, FKBP51) and the cyclosporine A (CsA)-binding protein (Cyp40) are tetratricopeptide repeat (TPR) proteins

that have been shown to form hetercomplex with AR. We have recently shown that the expression levels of FKBP52, FKBP51, Cyp40 and PP5 were higher in prostate cancer cell lines compared to normal prostate epithelial cells suggesting that over-expression of TPR proteins may contribute to the etiology of prostate cancer. Moreover, treatment of prostate cancer cells with TRP ligands, FK506 and CsA inhibited androgen-dependent stimulation of cell proliferation and transcription. Based on these findings, we hypothesize that the TRP proteins are involved in the initiation and progression of prostate cancer. We will use FKBP52, FKBP51, Cyp40 and PP5 wild and knockout animals, animal tumor xenograft model as well as prostate cell model systems to test the above hypothesis.

Dr. Sandrine Pierre - *Physiological Significance of Na,K-ATPase Diversity:* In addition to the heterogeneity in their response to PKC, we have obtained evidence that Na,K-ATPase alpha isoforms may play different roles in signal transduction. We are developing a mammalian cell model where fluorescence-tagged alpha 2-4 isoforms can be studied without interference of alpha1. We plan to use this model to characterize isoform-specific protein-protein interactions and variations in intracellular trafficking that may explain this functional heterogeneity. *Cardiac Na,K-ATPase in Ischemia-Reperfusion (I/R) Injury:* Transient exposure to low concentration of ouabain triggers a cardioprotective signaling cascade initiated at the plasma membrane by the Na,K-ATPase receptor complex and relayed to the mitochondria. We are focusing on the characterization of the intermediate sequence of events and proteins involved. We have also obtained evidence that although ischemia itself does not alter the Na,K-ATPase receptor, it is internalized early at reperfusion. This somehow leads to degradation, which becomes detectable at 30 min of reperfusion. These alterations are prevented by ouabain preconditioning. We will further investigate the mechanisms involved in both I/R-induced alteration and ouabain protection.

Dr. Yasser Saad - I am currently continuing my work refining the rat blood pressure quantitative trait locus found on rat chromosome 1, 9, and 10. Two manuscripts, discussing the work done on rat chromosome 1, are currently in preparation. Another manuscript for the work on rat chromosome 9 is also in preparation. I submitted a manuscript for the work on rat chromosome 10 and another manuscript for the work on rat chromosome 10 is also being prepared. I plan to continue working on the rat blood pressure projects. Also, in collaboration with Dr. Michael Garrett, another manuscript, related to the work that Dr. Garrett and I have previously done, is currently being prepared. My collaboration with Dr. Karnik, from the Cleveland Clinic, has also resulted in another manuscript that will be submitted soon. Assuming that my grant is funded, starting in January of 2008 I will be actively pursuing my interests in the angiotensin II receptor/cardiac hypertrophy project.

Dr. Edwin Sanchez - My laboratory investigates the mechanism of steroid hormone action, with an emphasis on the roles played by molecular chaperones in control of steroid receptor function. We study these events at the molecular, cellular and physiological levels. Our recent findings indicate that the TPR molecular chaperone FKBP52 is essential to steroidal control of both male and female fertility, by controlling the actions of androgen and progesterone receptors, respectively. We have begun studies on two related TPR proteins: FKBP51 and PP5. Future studies will investigate all three TPR proteins with respect to molecular and physiological events.

Dr. Elizabeth Tietz - We are in the third year of a 5-year NIDA grant to study the mechanisms underlying the withdrawal-anxiety associated with benzodiazepine dependence. We have recently published two manuscripts related to this work. One paper will appear in the August issue of the J. of Pharmacol Exp. Ther. The second is in press in a Special issue of Behavioural Pharmacology devoted to the hippocampus. My recent Ph.D. graduates, Jun Song and Kun Xiang, published these papers, respectively. We will also present 3 new abstracts at the upcoming Society for Neuroscience meeting. Dr. Paromita Das, my Postdoctoral Fellow, will present our collaborative electron microscopic work with Dr. Francisco Alvarez, Department of Neurosciences, Cell Biology, and Physiology. She is currently writing a manuscript detailing her positive findings indicating increased GuR1 but not GluR2-containing AMPAR receptors at hippocampal CA1 synapses. Guofu Shen, who passed his Ph.D. qualifying exam in October 2006, has shown that the mechanisms underlying AMPA receptor

trafficking/conductance are similar to a prominent model of learning and memory (long-term potentiation, LTP), suggesting that the brain uses similar strategies to respond to a variety of activity-dependent events. Unlike with LTP, my student Kun Xiang, has found that voltage-gated calcium (VGCC) channels, rather than NMDA receptors, mediate the calcium signaling related to the functional and structural changes in AMPA receptor channels. He has joined my lab as a part-time Postdoctoral Fellow and is finishing up two manuscripts. Interestingly, increased VGCCs-mediated calcium influx, perhaps mediated by a direct effect of benzodiazepines on VGCCs, may underlie the delayed regulation of GABA receptor function, which contributes to benzodiazepine tolerance. These latter studies served as the basis for the competitive renewal of my 15-year NIDA grant, which I have just resubmitted. Collaborators on this grant include Dr. L.J. Greenfield Jr., (10%), Dr. D. Giovannucci (10%) and Dr. W. Gunning (2%). The GABA receptor single-channel studies of Dr. Das, also in preparation**,** will likely serve as the basis for a K99/R00 Grant. My lab, and the lab of Dr. Greenfield, has also formally established a collaborative relationship with Dr. Peter Lu from Bowling Green State University, for study of GABA receptor biophysics.

John W. Turner, Jr., Ph.D. - Research is environmentally oriented, with 2 major directions: 1) development and testing of a multi-year duration, reversible wildlife immunocontraceptive and 2) assessment of deterioration of marine environments and their inhabitants via cortisol measurement in fishes. The contraceptive studies currently focus on use of controlled-release bioerodable polymers to sequester booster doses of contraceptive under in vitro and in vivo field conditions. Future studies are planned to determine contraceptive impact on population growth and its application to wildlife management. The fish studies, both current and planned, involve laboratory and field components. The lab effort is to determine a hierarchy of aquatic stressors and to identify possible impact of these stressors on genes regulating cortisol production. The field effort is directed at use of fish fecal cortisol monitoring as an early-warning indicator of aquatic stress.

Dr. Guillermo Vazquez - Main research interest in the lab is aimed at understanding the role of calcium signaling, with emphasis on calcium entry, in endothelial dysfunction and endothelial response to vascular inflammation associated to cardiovascular, metabolic and endocrine-related diseases. We recently found that Canonical Transient Receptor Potential (TRPC) channel forming proteins, particularly those from the TRPC3/6/7 subfamily, form calcium-permeable channels that take part in the action of nucleotides and vascular endothelial growth factor on inflammatory signaling and nitric oxide metabolism, both in coronary artery and umbilical cord vein endothelium. Current and future efforts are directed to: (1) identify the individual TRPC proteins that build up receptor-regulated channels in endothelial cells from those vascular beds; (2) characterize the receptor-associated signaling fundamental to regulation of channel activity; and (3) understand the signaling consequences of TRPC-mediated calcium entry within the context of endothelial dysfunction and endothelial response in vascular inflammation.

Dr. Xiaodong Wang - My laboratory's long term interest is in the mechanism of folding, assembly and trafficking of cell surface transporters or receptors. These cellular processes deeply penetrate into many different areas of physiology, pharmacology, metabolism and cardiovascular sciences and are highly related to the pathogenesis and treatment of a growing new category of human diseases known as protein conformational diseases which include cystic fibrosis (CF), long QT syndrome, diabetes and renal diseases. The current research is focused on the machinery and mechanism involved in the ER-associated protein folding as related to the exocytic trafficking of ion channels. We utilize CF transmembrane conductance regulator (CFTR) as our model molecule to understand the interaction between the folding machinery and the client molecule. We have performed functional characterization of various components of the ER-associated folding machinery and are trying to map out the conformational maturation pathway as well as important regulators for the refolding of mutant CFTR in an attempt to develop novel therapeutics for treating CF patients.

Dr. Zi-Jian Xie - My laboratory has been interested in how Na/K-ATPase functions as signaling receptor and an important cellular scaffolding protein in organization of membrane microdomains and protein complexes. Recent work has identified several protein domains from the a1 subunit of the Na/K-ATPase that play an

important role in mediating protein interactions. We have documented that the activation of the receptor function by ouabain can protect the heart from ischemia/reperfusion injury. In addition, in collaboration with Dr. Joseph Shapiro's laboratory, we have found that the Na/K-ATPase and its ligands are important regulators of collagen synthesis. Based on these new findings, we will focus our effort to further reveal the molecular mechanism of Na/K-ATPase-mediated signal transduction, and assess role of this newly identified cellular signal transduction mechanism in cardiovascular biology and metabolic diseases.

Research goals and future plans:

Most of our faculty members who are involved in research are interested in remaining involved and advancing their research programs along the above-indicated lines. Changing directions may be necessary for some in order to keep up with the rapidly changing trends and to increase chances of obtaining the necessary extramural support. The Department's plan is to use its limited available resources to maintain all existing productive programs, but to attempt the expansion of those focused on cardiovascular and metabolic diseases.

4d. Administrative & University Services

The Department faculty, excluding those who have primary administrative assignments (Chairs, Vice Presidents and Deans), estimated and reported that they spend 5,400 hours/year on UT administrative duties and committee work, and about 1,800 hours/year on such service work (grant and manuscript review, etc.) for external organizations.

5. PUBLICATIONS & GRANTS

5a. Publications

Publications printed or in press are attached (Attachment 1). Abstracts and presentations are not listed because these have lost much of their professional value, at least in the "basic science" world.

5b. Grants

Funded grants are listed in Table 4 and were provided by Research and Sponsored Programs. Table 5 provides a list of proposals that were submitted during the report year and were also provided by Research and Sponsored Programs.

6. FACULTY TIME & EFFORT - SEE TABLE 2

7. PROJECTED 2007/2008 KEY PERFORMANCE METRICS FOR THE AGGREGATE DEPARTMENT

This information has not been obtained. We are waiting to hear from the Office of the Associate Vice President/Finance and Strategic Planning on how this should be done.

PUBLICATIONS

Bonello, O.L., Sbragia, P., Amabile, N., Com, O., Pierre, S.V., Levy, S., Paganelli, F. (2007) Protective effect of an acute oral loading dose of trimetazidine on myocardial injury following percutaneous coronary intervention. Heart 93, 703-707.

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Periyasamy, S., Warrier, M., Tillekeratne, M.P., Shou, W., and Sanchez, E.R. (2007) The immunophilin ligands cyclosporin A and FK506 suppress prostate cancer cell growth by androgen receptor-dependent and –independent mechanisms. Endocrinology doi:doi:10.1210/en.2007-0145.

Pestov, N.B., Ahmad, N., Korneenko, T.V., Zhao, H., Radkov, R., Schaer, D., Roy, S., Bibert, S., Geering, K., and Modyanov, N.N. (2007) Evolution of Na,K-ATPase betam-subunit into a coregulator of transcription in placental mammals. Proc. Natl. Acad. Sci. U.S.A. 104, 11215-11220.

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For the information of the reader, below you will find a complete list of Faculty, Staff and Students who, at the time of this report, are working in Physiology and Pharmacology.

FACULTY

Nisar Ahmad, Ph.D., Assistant Professor
Amir Askari, Ph.D., Professor & Chair
Andrew Beavis, Ph.D., Associate Professor & Education Director
Paul Brand, Ph.D., Associate Professor
Joana Chakraborty, Ph.D., Professor
George T. Cicila, Ph.D., Associate Professor
William E. Jacobus, Ph.D., Professor
Bina Joe, Ph.D., Associate Professor
Soon Jin Lee, Ph.D., Assistant Professor
Lijun Liu, M.D., M.S., Assistant Professor
Ronald Mellgren, Ph.D., Professor & Director of Research Resources
Patricia Metting, Ph.D., Professor & Associate Dean for Student Affairs, College of Medicine
Nikolai Modyanov, Ph.D., Professor
Sonia Najjar, Ph.D., Professor & Director of CeDER
Ana Maria Oyarce, Ph.D., Assistant Professor
Sumudra Periyasamy, Ph.D., Assistant Professor
Sandrine Pierre, Ph.D., Assistant Professor
Howard Rosenberg, M.D., Ph.D., Professor
Yasser Saad, Ph.D., Assistant Professor
Edwin Sanchez, Ph.D., Professor
Elizabeth Tietz, Ph.D., Professor & Vice Chair
John W. Turner, Jr., Ph.D., Professor
Guillermo Vazquez, Ph.D., Assistant Professor
Xiaodong Robert Wang, Ph.D., Assistant Professor
R. Douglas Wilkerson, Ph.D., Professor, Associate Vice President for Research, Associate Dean COM Graduate Program
Zi-Jian Xie, Ph.D., Professor

OFFICE STAFF

Elizabeth Akeman, Administrative Assistant (CeDER)
Anita Easterly, Administrative Secretary 2
Karen Edwards, Assistant to the Chairman
Martha Heck, Data Systems Coordinator 1
Debra Meyer, Administrative Secretary 2
Marianne Miller Jasper, Administrative Secretary 2
Shirley Wozniak, Research Assistant

VISITING SCIENTISTS

Dr. David Lichtstein
Dr. Luis Eduardo M. Quintas

RESEARCH STAFF

Elaine Chalfin, Research Assistant
Jackie Clark, Temporary Research Technician
Kris Farms, B.S., Sr. Research Technician
William Ferencak III, Research Assistant
Mats Fernstrom, Biomedical Research Assistant
Marge Gable, Biomedical Research Assistant
Jennifer Kalisz, Biomedical Research Assistant
Megan Metting, Temporary Lab Assistant
Kimberly Morton, Temporary Research Assistant
Henry Okonta, CQI Coordinator
Krista Pettee, Research Technician
Elisabeth Philbrick, Laboratory Assistant
Yoann Sottejeau, Temporary Research Assistant
Manoranjani Tillekeratne, Biomedical Research Assistant
Joseph Xie, Research Assistant
Shane Yerga-Woolwine, Sr. Research Technician
Xiaochen Zhao, Biomedical Research Assistant

POSTDOCTORAL FELLOWS

Ting Cai, M.D.
Paromita Das, Ph.D.
Kun Xiang, Ph.D.

GRADUATE STUDENTS

Hussein Bagalb (MSBS)
Yeshavanth Banasavadi-Siddegowda (Ph.D.)
Thomas Bowman (Ph.D.)
Yiliang Chen (Ph.D.)
Ying Chen (Ph.D.)
Damien Earl (Ph.D.)
Tanoya Harris (Ph.D.)
Garrett Heinrich (Ph.D.)
Terry Hinds (Ph.D.)
Kelly Ledford (Ph.D.)
Zhichuan Li (Ph.D.)
Jehnan Liu (M.D./Ph.D.)
Samuel Lupica (Ph.D.)
Andrew McSweeney (MSBS)
Payal Patel (Ph.D.)
Carmen Quatman (M.D./Ph.D.)
Rossen Radkov (Ph.D.)
Sima Rahman (Ph.D.)
Sadeesh Ramakrishnan (Ph.D.)
Gargi Roy (Ph.D.)
Anita Saxena (Ph.D.)
Guofu Shen (Ph.D.)

Kathryn Smedlund (Ph.D.)
Cory Stebal (Ph.D.)
Edward Toland (Ph.D.)
Manya Warrier (Ph.D.)
Shadi Zahedi (Ph.D.)

WORK STUDY STUDENTS

Anthony DeAngelis
William Schnackel

VOLUNTEERS

Akram Alhusini
Noha Elnagar
Michael Garrett, Ph.D., M.B.A.
Matthew Gibson
Kevin Gusmann
Naila Jaloudi
Nicole McKenzie
Kevin Okapal
Eugene Orlowski
Anish Purohit
Eric Roche
Chintan Shah
Gang Wang

				COM	College of Medicine													
Faculty Full Name	Total hr	Other	MD hr	GS hr	OS1	OS2	OS3	OS4	OS5	OS6	USMLE	OS total	CMB	I and I	FCP	PBL		MP
Amir Askari, Ph.D.	0	0	0	0	0							0						
Nisar Ahmad, PhD	0	0	0	0								0						
Andrew D. Beavis, Ph.D.	172.5	128	37	7.5	6	4		8	7	4	4	33		4		18		
Paul H. Brand, Ph.D.	73	25	47	1	0	11	3	11	4			29				18		
Joana Chakraborty, Ph.D.	84.5	32	46	6.5	0					1		1	12		1			18
George T. Cicila, Ph.D.	19	0	9	10	0							0	9			36		
Michael R. Garrett, M.S., M.B.A.	0	0	0	0	0							0	0			18		
Bina Joe, Ph.D.	5.5	0	2	3.5	0							0	2			18		
Soon Jin Lee, Ph.D.	4	0	1	3	0							0	1					
	0	0	0	0								0						
Lijun Liu, M.D., M.S.	0	0	0	0	0							0						
Ronald L. Mellgren, Ph.D.	45	15.5	19	10.5	7						2	9		10				
Patricia J. Metting, Ph.D.	24	0	24	0	0			24				24						
Nikolai Modyanov, Ph.D.	6	0	0	6	0							0				18		
Sonia M. Najjar, Ph.D.	10	0	2	8	0				2			2						
Ana Maria Oyarce, Ph.D.	4	0	0	4	0							0						
Sumudra Periyasamy, Ph.D.	0	0	0	0	0							0						
Nikolay Pestov, Ph.D.	0	0	0	0								0						
Sandrine Pierre, Ph.D.	0	0	0	0	0							0						
Howard C. Rosenberg, M.D., Ph.D.	46.5	23	23.5	0	2.5	4	12			1	4	23.5				54		
Yasser Saad, Ph.D.	5	0	5	0	0							0	5					
Edwin R. Sanchez, Ph.D.	23	4	7	12	3				2	2		7						
Keith K. Schlender, Ph.D.	4	0	2	2	0					2		2						
Elizabeth I. Tietz, Ph.D.	12.5	0	3	9.5	0		3					3						
John W. Turner Jr., Ph.D.	32	0	26	6	0				14	12		26						
Xiaodong Wang, Ph.D.	4	0	2	2	0				2			2						
David A. Weaver, D.D.S., Ph.D.	1	0	0	1	0							0						
Robert D. Wilkerson, Ph.D.	17	0	17	0	3	12	2					17						
Zi-Jian Xie, Ph.D.	20	11	7	2	0		6		1			7						
	0	0	0	0								0						
				0														
Total Hours	612.5	238.5	279.5	94.5	22	31	26	43	32	22	10	185.5	29	14	1	180	0	18
John Greenfield (Joint Appointment)						2												
Didactic Hours included in "Total hr" (Excludes small group PBL)																		

TABLE 1

		College of Health Sciences and HS					COM Graduate Studies										EVU	EVU
MSBS		PA Pharm	PA Phys	PT Phys	HDS Pharm	NP Pharm	MCB	Methods	Signals	MBD	Bioinf	CMN	Mol Epi	OBS	GW	GWSM	MD	GS
																	0	45
																	0	0
		75			26	27	7.5										693	135
18			17	8						1							560	10
14			18	14			1.5			5							868	355
								3		3	2		2			4	270	1195
																	90	0
							1.5				2					4	110	835
								3									10	210
																	0	0
																	0	100
		11				4.5	4.5		6								211	460
										0							240	0
							6										90	355
										2			2		4		29	3510
									4								30	490
																	3	15
																	0	0
																4	0	195
		14				9											1358	45
																	50	280
		4							10						2	4	70	1710
									2								20	50
									4			4		1.5		4	30	1805
										6							278	490
									2							4	20	750
											0		1				0	10
																	170	0
		11							2								70	2370
																	0	0
32		115	35	22	26	40.5	21	6	30	17	4	4	5	1.5	6	24	5270	15420

EVU Other	EVU Total	EVU Total/2000	Block dir	Block Hr	ECC	AD Com	MD Inte	Prog D	CD COM	CD other	#Rotations	# Students	#Stud Comm.	# Res Sem	#Platf Pres
0															
0	45	2.25%											3		2
0	0	0.00%													
1280	2108	105.40%				1	36			4			4		
250	820	41.00%													
320	1543	77.15%	1	175			11		2	2	2		6		
0	1465	73.25%										4	5		
0	90	4.50%													
0	945	47.25%										3	2	2	1
0	220	11.00%									3		2		
0	0	0.00%												1	
0	100	5.00%									2				3
155	826	41.30%					7					1	7		
0	240	12.00%													
0	445	22.25%										1	3		
0	3539	176.95%					3	1	1		5	9	32	9	9
0	520	26.00%					10				1	1	10		
0	18	0.90%					1						1		
0	0	0.00%													
0	195	9.75%									2		5	1	1
230	1633	81.65%	1	399	1	1	33						3		
0	330	16.50%									5		2		1
40	1820	91.00%							1		3	5	8	3	2
0	70	3.50%											2		
0	1835	91.75%						1			4	4	6	3	1
0	768	38.40%					6		1		2	1	2	2	1
0	770	38.50%									3	2	4		
0	10	0.50%													
0	170	8.50%													
110	2550	127.50%									4	8	10	4	3
0	0	0.00%													
											Education			Research	
2385	23075		2	574	1	2	107	2	5	6	36	39	117	25	24

			Additional Faculty Units			
				Education	Research	
#NIH Stdy Sec	Member Ed Bd	#Manscrpt Rev	#Rev Panel Mtgs.			
	N=Blank; Y=1					
1		10		45	77.5	
				0	0	
	1			293	15	
				0	0	
				698	0	
		1		1075	3.5	
1	1	10		0	67.5	
1	1	10	1	780	110	
				180	0	
				0	10	
		2		100	44.5	
	1	40		376	155	
				0	0	
		4		295	14	
3	1	16	2	3439	346	
				480	0	
		3		18	10.5	
				0	0	
		2		175	29.5	
		1		898	3.5	
		1		280	16	
1	1	11	2	1570	146	
				30	0	
		3		1690	53	
0	0	6	1	448	63.5	
				710	0	
				0	0	
				0	0	
4		8		2350	175.5	
				0		
11	6	128	6	15980	1340.5	

Block/Course Director (PPMCVS)	ABBR.	Course	Hours	Hr Dir	Blocks Dir	# courses
Chakraborty (175 hr)	CMB	Cellular and Molecular Biology (COM)	29	172	1	
Rosenberg (399 hr)	OS	Organ Systems (COM)	185.5	399	1	
	I and I	Immunity and Infection (COM)	14			
Chakraborty (6 hr unit director)	FCP	Fundamentals of Clinical Practice	1			
	PBL	Integrative Pathophysiology I (COM) - small group	180			
Chakraborty (18 hr course director)	MP	Anatomy/Physiology - Medical Physics (CGS)	18	70		1
Chakraborty (30 hr)	GCMS	Human Physiology - Masters in Medical Science (CGS)	32			1
	MCB	Molecular and Cellular Biology (PhD CGS)	21			
Turner (62 hr)	MBD	Molecular Basis of Disease (PhD, CGS)	17			1
	CMN	Principles of Cellular and Molecular Neurobiology (PhD, CGS)	4			
Sanchez (42 hr)	Signals	Receptors and Signal Transduction (PhD, CGS)	30			1
	Methods	Methods in Molecular Cell Biology (PhD, CGS)	6			
	Bioinf	Fundamentals of Bioinformatics, Proteomic and Gemomics (PhD, COM)	4			
Joe (24 hr)		Grant Writing Workshop (PhD, COM)	6			1
		Grant Writing Workshop Small Group (PhD, COM)	24			
	OBS	On Being a Scientist (PhD, COM)	1.5			
Beavis (66 hr)	PA Pharm	Fundamentals of Pharmacology I, spring (PA Program) (CHS)	115			1
Beavis (40 hr)	PA Pharm	Fundamentals of Pharmacology II, summer (PA Program) (CHS)				1
Beavis (27 hr)	PA Pharm	Fundamentals of Pharmacology III, fall (PA Program) (CHS)				1
Chakraborty (36 hr)	PA Phys	Human Physiology (PA program) (CHS)	35			1
Chakraborty (36 hr)	PT Phys	Clinical Pathophysiology (Physical Therapy Program) (CHS)	22			1
Beavis (25 hr unit director)	HDS Pharm	Scientific and Clinical Foundations for Human Organ Donation and Transplantation (Human Donation Science Certificate program) (CHS)	26			
	Mol epi	Molecular Epidemiology (CHS?)	5			
Beavis (47 hr)	NP Pharm	Advanced Pharmacotherapeutics (MSN, CON)	40.5			1
		Total	816.5	641	2	11
		Total minus Small Gp	612.5			

Course number
INDI 775
INDI 780
INDI 783
INDI 786
INDI 777
MPHY 631.001
PHYS 505.002
INDI 684
MBDP 603
CMNP 601
PHRM 607
MCBP 601
BIPG 510
INDI 602
PHYA 551
PHYA 552
PHYA 553
PHYS 505.001
PT511
HDSC 521
NURS 569.01

FACULTY TIME & EFFORT

NAME	RESEARCH	TEACHING	SERVICE	TOTAL
Nisar Ahmad, Ph.D.	100%	0%	0%	100%
Amir Askari, Ph.D.	40%	0%	60%	100%
Andrew Beavis, Ph.D.	0%	56%	44%	100%
Paul Brand, Ph.D.	0%	100%	0%	100%
Joana Chakraborty, Ph.D.	25%	65%	10%	100%
George Cicila, Ph.D.	70%	27%	3%	100%
Bina Joe, Ph.D.	70%	10%	20%	100%
Soon Jin Lee, Ph.D.	94%	5%	1%	100%
Lijun Liu, M.D., M.S.	100%	0%	0%	100%
Ronald Mellgren, Ph.D.	40%	40%	20%	100%
Nikolai Modyanov, Ph.D.	60%	25%	15%	100%
Sonia Najjar, Ph.D.	40%	20%	40%	100%
Ana Maria Oyarce, Ph.D.	75%	15%	10%	100%
Sumudra Periyasamy, Ph.D.	80%	0%	20%	100%
Sandrine Pierre, Ph.D.	70%	15%	15%	100%
Howard Rosenberg, M.D., Ph.D.	0%	95%	5%	100%
Yasser Saad, Ph.D.	82%	11%	7%	100%
Edwin Sanchez, Ph.D.	30%	40%	30%	100%
Elizabeth Tietz, Ph.D.	30%	30%	40%	100%
John W. Turner, Jr., Ph.D.	50%	35%	15%	100%
Guillermo Vazquez, Ph.D.	65%	20%	15%	100%
Xiaodong Wang, Ph.D.	75%	20%	5%	100%
Zi-Jian Xie, Ph.D.	45%	30%	25%	100%

DEPARTMENT OF PHYSIOLOGY & PHARMACOLOGY

FY07 SPACE

Please note: The indicated size of space has been provided by Facilities. We are certain that some of these are inaccurate. These inaccuracies have been pointed out.

1st FLOOR BHS - CeDER		
ROOM NUMBER	ROOM USE	SQUARE FEET
139	Lab	657
141	Lab	1,623
142	Lab	1,575
142A	Office	138
142B	Office	162
144	Lab	323
145	Lab	205
146	Lab	234
147	Lab	189
2nd FLOOR BHS		
ROOM NUMBER	ROOM USE	SQUARE FEET
202	Lab	653
203	Lab	648
204	Lab	642
206	Office	153
209	Office	534
213	Office	102
214	Office	209
217	Dark Room	78
222	Lab	504
223	File Room	92
224	Common Area	396
226	Lab	120
226A	Lab	100
227	Lab	255
228	Office	157
231	Lab	268
233	Lab	635
233A	Lab	219
234	Lab	130
234A	Lab	188
235	Lab	234
235A	Lab	106

235B	Lab	515
237	Conference Room	647
238	Lab	355
238A	Lab	502
239	Lab	320
239B	Lab	431
240	Lab	422
242	Office	154
244	Office	154
246	Office	156
247	Office	159
248	Office	156
249	Office	202
254	Lab	143
255	Lab	267
255A	Lab	213
255B	Lab	119
255C	Lab	138
256	Lab	153
257	Lab	184
259	Lab	259
262	Lab	264
263	Lab	253
265	Lab	643
266	Lab	648
267	Lab	652
268	Office	182
269	Office	110
270	Office	105
271	Office	106
3rd FLOOR BHS		
ROOM NUMBER	ROOM USE	SQUARE FEET
301A/B	Office	184
301D	Office	104
301E	Office	108
307	Office	132
310	Office	154
312	Office	157
313	Office	157
314	Office	155
315	Shared Room	112
317	Shared Room	78
319	Office	103
320	Office	99
321	Xerox Room	77
325	Lab	451
327	Office	131
329	Lab	160

331	Shared Room	255
332	Office	156
334	Lab	270
336	Lab	859
337	Lab	319
338	Lab	867
339	Conference Room	647
341	Lab	593
341A	Office	121
341B	Lab	142
342	Shared Room	121
343	Lab	767
343A	Lab	90
343B	Office	192
346	Office	208
348	Office	101
349	Office	156
351	Microscope Room	107
351A	Office	206
352	Office	103
353	Shared Room	284
354	Lab	249
361	Shared Room	270
364	Lab	210
366	Lab	158
368	Lab	154
368A	Lab	152
369	Lab	641
370	Shared Room	648
371	Shared Room	647

THE UNIVERSITY OF TOLEDO
Research Sponsored Programs

Preliminary Award Rpt for Dept of Physiology Pharmacology
FY 07
7/1/06 to 6/30/07

Project Title	Status	Class	Agency Name(s)	Agency Acct #	Agency Type	Project Period Begin Date to Funding Cycle End Date	Current Year Award		
							Direct Cost	F&A Cost**	Total Cost
Askari, Amir									
Control Mechanisms of Cardiac Proteins & Enzymes	Funded	C	National Heart, Lung & Blood Institute	5 - P01 - HL - 036573 - 20	Federal	Jul 1 1986 to Feb 28 2008	$1,015,475	$354,701	$1,370,176
Joe, Bina									
Biochemistry and Genetics of Hypertension	Funded	C	National Heart, Lung & Blood Institute	5 - R01 - HL - 020176 - 30	Federal	Jun 1 1986 to Nov 30 2008	$421,688	$198,193	$619,881
Functional Genomic Dissection of Rat Blood Pressure QTL	Funded	C	National Heart, Lung & Blood Institute	5 - R01 - HL - 075414 - 04	Federal	Jul 1 2004 to May 31 2008	$284,051	$55,618	$339,669
Najjar, Sonia									
Ceacam and Insulin Action	Funded	C	National Institute of Diabetes, Digestive & Kidney Diseases	5 - R01 - DK - 054254 - 07	Federal	Mar 1 2000 to Feb 28 2009	$208,600	$100,754	$309,354
Dietary and Genetic Risk Factors in Obesity and Diabetes	Funded	R	U.S. Department of Agriculture through University of Toledo, Main Campus	2005-38903-02315	Federal	Sep 1 2005 to Aug 31 2007	$166,989	$63,011	$230,000
Pierre, Sandrine									
Physiological Significance of Na, K-pump Diversity	Expired	C	National Center for Research Resources through Texas Tech University	5 - R01 - RR - 10799 - 11	Federal	Sep 26 2005 to Jun 30 2007	$37,574	$18,148	$55,722
Pittman, Douglas L									
Characterizing the RAD51D E233G High-Risk Breast Cancer Allele	Funded-X	C	Ohio Cancer Research Associates		Non-Profit	Jul 1 2005 to Jun 30 2008	$22,727	$2,273	$25,000
Sanchez, Edwin									
TPR Proteins in Steroid Receptor Signaling and Physiology	Expired	C	National Institute of Diabetes, Digestive & Kidney Diseases	5 - R01 - DK - 070127 - 02	Federal	Aug 1 2005 to Jun 30 2010	$191,266	$56,640	$247,906
Role of FKBP52 in Androgen Signaling and Hypospadias	Funded	C	National Institute of Diabetes, Digestive & Kidney Diseases through Indiana University	5 - R01 - DK - 073402 - 02	Federal	Feb 1 2006 to Dec 31 2007	$53,945	$26,055	$80,000

TABLE 4

*Facilities and Administrative Costs
**Awards Reported as Cash Received
***Cancer Institute Affiliation

THE UNIVERSITY OF TOLEDO
Research Sponsored Programs

Preliminary Award Rpt for Dept of Physiology Pharmacology
FY 07
7/1/06 to 6/30/07

Project Title	Status	Class	Agency Name(s)	Agency Acct #	Agency Type	Project Period Begin Date to Funding Cycle End Date	Current Year Award		
							Direct Cost	F&A Cost**	Total Cost
Role of FKBP52 in Androgen Signaling and Hypospadias	Expired	N	National Institute of Diabetes, Digestive & Kidney Diseases through Indiana University	1 - R01 - DK - 073402 - 01 - A 1	Federal	Feb 1 2006 to Dec 31 2006	$57,145	$27,601	$84,746
Tietz, Elizabeth									
Benzodiazepine-induced Glutamate Receptor Plasticity	Funded	C	National Institute on Drug Abuse	5 - R01 - DA - 018342 - 03	Federal	Apr 1 2005 to Mar 31 2010	$189,636	$77,988	$267,624
Vazquez, Guillermo									
Receptor Dependent Regulation of Calcium Permeable TRPC1 and TRPC3 Cation Channels in Human Coronary Artery Endothelium	Funded	N	American Heart Association - National	0635250N - 01	Non-Profit	Apr 1 2007 to Mar 28 2011	$59,091	$5,909	$65,000
Wang, Xiaodong									
Mechanism Of Temperature-Dependent Export of DeltaF508 CFTR	Funded	C	Cystic Fibrosis Foundation	WANG06G0 - 02	Non-Profit	Apr 1 2006 to Mar 31 2008	$90,000	$7,200	$97,200
Immunophillins Regulate the Export of Ion Channels from the Endoplasmic Reticulum	Funded	N	American Heart Association - National	0730019N	Non-Profit	Jan 1 2007 to Dec 31 2010	$59,091	$5,909	$65,000
Xie, Zi-Jian									
The Role of ROS and Na/K-ATPase in Uremic Cardiomyopathy	Funded-X	C	National Heart, Lung & Blood Institute	5 - R01 - HL - 067963 - 05	Federal	Jul 25 2002 to Jun 30 2008	$170,888	$80,317	$251,205
Preliminary Grand Totals for Department of Physiology, Pharmacology, Metabolism, & Cardiovascular Science for Current Y							**$3,028,166**	**$1,080,317**	**$4,108,483**

*Facilities and Administrative Costs
**Awards Reported as Cash Received
***Cancer Institute Affiliation

Class Key - AWARDS	
C	NON-COMPETING RENEWAL - Used to indicate non-competing renewals of a multi-year grant.
N	NEW - Used to indicate the first year of a proposal.
R	COMPETING RENEWAL - Used to indicate the FIRST YEAR of each Competing Renewal of a multi-year grant.
S	SUPPLEMENT - Used to indicate records that represent a competing supplement for existing grants.
T	TRANSFER - Used to indicate the FIRST UT Year of a grant which has been transferred to UT from another institution.

THE UNIVERSITY OF TOLEDO

Research and Sponsored Programs

Department of Physiology, Pharmacology, Metabolism, and Cardiovascular Science

Submissions for Fiscal Year 07

7-1-06 to 6-30-07

Proposal #	Due Date	Title	Status	Agency Name(s)	Agency Acct #	Agency Type	Project Period Start Date to Funding Cycle End Date	PROPOSED		
								Total Direct Cost	F&A	Total Cost
Askari, Amir										
C-010087-20	01/01/2007	Control Mechanisms of Cardiac Proteins & Enzymes	Funded	National Heart, Lung & Blood Institute	5 - P01 - HL - 036573 - 20	Federal	07/01/1986 to 02/28/2008	$1,011,819	$349,725	$1,361,544
L-010087-21	03/12/2007	The New Biology of Na+/K+ - ATPase Mechanisms of Cardiac Actions of Digitals	Preproposal	National Heart, Lung & Blood Institute		Federal	07/01/1986 to 02/28/2008	$1,050,000	$0	$1,050,000
Bowman, Thomas A										
N-101395-01-A1	01/10/2007	Metabolic Regulation of Vascular Function	Pending	American Heart Association-Ohio Valley Affiliate		Non-Profit	07/01/2007 to 06/30/2009	$21,000	$0	$21,000
Cicila, George										
N-101566-01	01/10/2007	Cardiac Performance and Aerobic Running Capacity QTL's in DA and DA.COP (chr 16) Consomic Rats	Pending	American Heart Association-Ohio Valley Affiliate		Non-Profit	07/01/2007 to 06/30/2009	$55,000	$5,500	$60,500
N-101626-01	04/11/2007	Rtel1 Allelic Differences Associated with Telomere Length Differences in a Rat Genetic Model	Funded-AR	American Cancer Society - Ohio Division		Non-Profit	09/01/2007 to 08/31/2008	$27,273	$2,727	$30,000
R-100112-05-A2	11/01/2006	Aerobic Running Capacity QTL's and Cardiac Performance	Dead	National Heart, Lung & Blood Institute	2 - R01 - HL - 067276 - 05 - A 2	Federal	07/01/2007 to 08/30/2012	$250,000	$120,750	$370,750
Das, Paromita										
N-101499-01	09/01/2006	Chronic Benzodiazepine-induced Alterations in GABA-A Receptor Single Channel Characteristics	Pending	Epilepsy Foundation of America		Non-Profit	01/01/2007 to 12/31/2007	$40,000	$0	$40,000
Garrett, Michael										
N-101520-01	10/01/2006	Genetic Dissection of Hypertension Related Renal Disease Using the Dahl S Rat	Withdrawn	National Institutes of Health	1 - R01 - 01	Federal	07/01/2007 to 08/30/2012	$250,000	$120,750	$370,750

TABLE 5

Proposal #	Due Date	Title	Status	Agency Name(s)	Agency Acct #	Agency Type	Project Period Start Date to Funding Cycle End Date	PROPOSED Total Direct Cost	F&A	Total Cost
Heinrich, Garrett										
N-101393-01-A1	01/10/2007	A Novel Molecular Link Between Vascular and Metabolic Diseases	Funded-AR	American Heart Association - Great Rivers Affiliate		Non-Profit	07/01/2006 to 06/30/2009	$21,000	$0	$21,000
Joe, Bina										
C-010310-30	10/01/2006	Biochemistry and Genetics of Hypertension	Funded	National Heart, Lung & Blood Institute	5 - R01 - HL - 020176 - 30	Federal	06/01/1986 to 11/30/2008	$444,732	$214,806	$659,538
C-100722-04	04/16/2007	Functional Genomic Dissection of Rat Blood Pressure QTL	Funded	National Heart, Lung & Blood Institute	5 - R01 - HL - 075414 - 04	Federal	07/01/2004 to 05/31/2008	$292,535	$57,279	$349,814
Liu, Jehnan										
N-101576-01	01/15/2007	CEACAM2: A Novel Mechanism of Diabetes and Complications	Funded-AR	American Diabetes Association-National	7-07-PST-08	Non-Profit	07/01/2007 to 06/30/2010	$30,000	$0	$30,000
Mellgren, Ronald										
N-101406-01-A1	03/16/2007	Role of Calpains in Plasma Membrane Repair	Pending	National Institute of Neurological Disorders and Stroke	1 - R21 - AR/NS - 054427 - 01	Federal	12/01/2007 to 11/30/2008	$162,681	$65,369	$228,050
N-101592-01	02/13/2007	Role of Calpain in Br Ca Cell Membrane Repair	Dead	U. S. Army Medical Research and Materiel Command	BC062594	Federal	07/01/2007 to 06/30/2009	$250,000	$120,750	$370,750
Modyanov, Nikolai										
N-101487-01	08/01/2006	Physiological Role of Nongastric HK-ATPase in Prostrate Gland in Connection with Mechanisms of Mammalian Evolution and Development of New Prostate Cancer Assays	Dead	U.S. Civilian Research & Development Foundation		Non-Profit	02/02/2007 to 02/01/2009	$54,800	$5,417	$60,217
N-119906-01	03/16/2007	BetaM A Mammalian Muscle-Specific Transcriptional Co-Regulator	Pending	National Institute of Arthritis & Musculoskeletal & Skin Diseases	1 - R21 - AR - 056011 - 01	Federal	04/01/2008 to 03/31/2010	$150,000	$72,450	$222,450
Najjar, Sonia										
C-010991-07	01/01/2007	Ceacam and Insulin Action	Funded	National Institute of Diabetes, Digestive & Kidney Diseases	5 - R01 - DK - 054254 - 07	Federal	03/01/2000 to 02/28/2009	$220,000	$106,260	$326,260

Proposal #	Due Date	Title	Status	Agency Name(s)	Agency Acct #	Agency Type	Project Period Start Date to Funding Cycle End Date	PROPOSED Total Direct Cost	PROPOSED F&A	PROPOSED Total Cost
N-101352-01-A1	11/15/2006	Novel Mechanisms of Diet-Induced Insulin Resistance	Dead	National Institute of Diabetes, Digestive & Kidney Diseases	1 - R01 - DK - 075903 - 01 - A 1	Federal	07/01/2007 to 06/30/2012	$250,000	$120,750	$370,750
N-101577-01	01/16/2007	CEACAM in the Regulation of Insulin Action	Pending	American Diabetes Association-National	7-07-MN-47	Non-Profit	07/01/2007 to 06/30/2010	$45,000	$0	$45,000
Oyarce, Ana Maria										
N-101482-01	07/12/2006	Phosphorylation of D2 Receptor in Intermediate Pituitary	Dead	National Science Foundation	0641822	Federal	12/01/2006 to 11/30/2009	$174,080	$84,081	$258,161
Patel, Payal										
N-101572-01	01/10/2007	CEACAM1-Mediated Cardio-Protection in a Model of a Metabolic Syndrome	Pending	American Heart Association-Ohio Valley Affiliate		Non-Profit	07/01/2007 to 06/30/2009	$21,000	$0	$21,000
Pierre, Sandrine										
C-100917-12	06/30/2007	Physiological Significance of Na,K-pump Diversity	Funded-AR	National Center for Research Resources through Texas Tech University	5 - R01 - RRR - 010799D - 12	Federal	07/01/2004 to 06/30/2008	$32,739	$15,813	$48,552
Sanchez, Edwin										
C-100995-03	05/16/2007	TPR Proteins in Steroid Receptor Signaling and Physiology	Funded	National Institute of Diabetes, Digestive & Kidney Diseases	5 - R01 - DK - 070127 - 03	Federal	08/01/2005 to 06/30/2010	$190,000	$63,872	$253,872
C-101192-02	12/31/2006	Role of FKBP52 in Androgen Signaling and Hypospadias	Funded	National Institute of Diabetes, Digestive & Kidney Diseases through Indiana University	5 - R01 - DK - 073402 - 02	Federal	02/01/2006 to 12/31/2007	$53,945	$26,055	$80,000
Tietz, Elizabeth										
C-100889-03	02/01/2007	Benzodiazepine-induced Glutamate Receptor Plasticity	Funded	National Institute on Drug Abuse	5 - R01 - DA - 018342 - 03	Federal	04/01/2005 to 03/31/2010	$195,300	$80,317	$275,617
R-010016-16	07/01/2006	Synaptic Mechanisms of Hippocampal Benzodiazepine Tolerance	Dead	National Institute on Drug Abuse	2 - R01 - DA - 004075 - 16	Federal	07/01/1966 to 03/31/2012	$250,000	$120,750	$370,750
Turner, John										
S-100902-01-S4	04/20/2007	PZP Immunocontraception in Free-Roaming Feral Horses	Funded	Bureau of Land Management	FAA040011	Federal	05/26/2004 to 09/30/2009	$47,906	$7,186	$55,092

Proposal #	Due Date	Title	Status	Agency Name(s)	Agency Acct #	Agency Type	Project Period Start Date to Funding Cycle End Date	PROPOSED		
								Total Direct Cost	F&A	Total Cost
Vazquez, Guillermo										
N-101555-01	01/08/2007	Receptor Dependent Regulation of Calcium Permeable TRPC1 and TRPC3 Cation Channels in Human Coronary Artery Endothelium	Funded	American Heart Association - National	0635250N - 01	Non-Profit	04/01/2007 to 03/28/2011	$61,600	$3,400	$65,000
Wang, Xiaodong										
C-101321-02	01/01/2007	Mechanism Of Temperature-Dependent Export of DeltaF 508 CFTR	Funded	Cystic Fibrosis Foundation	WANG06G0 - 02	Non-Profit	04/01/2006 to 03/31/2008	$90,000	$7,200	$97,200
N-101479-01	07/11/2006	Immunophillins Regulate the Export of Ion Channels from the Endoplasmic Reticulum	Funded	American Heart Association - National	0730019N	Non-Profit	01/01/2007 to 12/31/2010	$59,091	$5,909	$65,000
N-101483-01	07/18/2006	CAREER: Functional Genomic Characterization of the ER-Associated Folding Machinery	Dead	Molecular & Cellular Biosciences	0642593	Federal	02/01/2007 to 01/31/2012	$111,400	$49,942	$161,342
N-101507-01	10/01/2006	Mechanism Underlying the Defective ER-to-Golgi Trafficking of Delta F508 CFTR	Dead	National Heart, Lung & Blood Institute	1 - R01 - HL - 089339 - 01	Federal	09/01/2007 to 08/31/2012	$250,000	$120,750	$370,750
N-101570-01	01/12/2007	Rescuing Delta F508 CFTR: Targeting the ER-Associated Fol	Pending	National Institutes of Health		Federal	01/01/2008 to 12/31/2012	$250,000	$120,750	$370,750
Weaver, David										
N-101553-01	12/29/2006	Genomics Core Lab	Withdrawn	Department of Defense through Central State University		Federal	01/01/2007 to 12/31/2007	$45,000	$0	$45,000
Xie, Zi-Jian										
N-101353-01-A1	07/15/2006	Na,K-ATPase as an Integrator of the Calcium Signaling Machinery	Funded	National Institute of General Medical Sciences	1 - R01 - GM - 078565 - 01 - A 1	Federal	07/01/2006 to 06/30/2011	$225,000	$108,675	$333,675
N-119869-01	05/22/2007	The Na/K-ATPase/Src Complex as a Functional Receptor	Pending	National Heart, Lung & Blood Institute	1 - R01 - HL - 092485 - 01	Federal	04/01/2008 to 03/31/2013	$250,000	$120,750	$370,750
R-100186-06	11/15/2006	The Non-Pumping Na/K-ATPase and CTS-Activated Signal Transduction	Dead	National Heart, Lung & Blood Institute	2 - R01 - HL - 067963 - 06	Federal	07/25/2002 to 06/30/2012	$250,000	$120,750	$370,750

Class Key – SUBMISSIONS ("Class" appears on report as first character in the Proposal #)	
C	NON-COMPETING RENEWAL - Used to indicate non-competing renewals of a multi-year grant.
L	PRE-PROPOSAL - Used to indicate that a letter of intent was submitted.
N	NEW - Used to indicate the first year of a proposal.
R	COMPETING RENEWAL - Used to indicate the FIRST YEAR of each Competing Renewal of a multi-year grant.
S	SUPPLEMENT - Used to indicate records that represent a competing supplement for existing grants.
T	TRANSFER - Used to indicate the FIRST UT Year of a grant which has been transferred to UT from another institution.