# Department of

# Physiology & Pharmacology

# Annual Report

# July 1, 2012 – June 30, 2013

## 1. EXECUTIVE SUMMARY FOR 2012-2013

By the usual measures, this was a successful year for the department, with substantial accomplishments in education, research productivity, and service to the institution and to the scientific community. On the other hand, there were also unanticipated challenges, including the loss of services of two of our senior teaching faculty, and then the fairly abrupt departure of our chair. In spite of these changes, and in spite of fiscal challenges, our faculty, students and staff showed what a true culture of dedication to excellence looks like.

This department, and its predecessor departments, has a long history of educational excellence and leadership. With the hard work and enthusiasm of our teachers this past year, we were able to maintain this tradition. The department faculty provided significant teaching in several programs during the past year, and also directed many courses, including courses in the M.D. curriculum, PA studies, MSBS program for students seeking entry to medical school, and graduate studies in Biomedical Sciences. The outcomes, as shown by examination results and by student ratings of our efforts, have been quite positive. Standardized examinations, such as the USMLE step-1 exam and the Physician Assistant National Certifying Exam, support the impression that we have done a good job, along with the faculty in other departments. This past year did provide some potentially serious challenges to our teaching. Two semi-retired professors who carried a significant load and who brought much experience and expertise to the classroom were not re-hired, and the course directors had very little warning. The biggest loss was that of Dr. Paul Brand, who had a very large teaching load. All of his teaching in several programs was given to Dr. Nitin Puri, who rose to the challenge and has proven to be a very talented and dedicated teacher. The other teaching loss was Dr. Ron Mellgren, whose topics were given to Dr. Terry Hinds. This proved to be a good choice as Dr. Hinds also showed himself to be a talented and dedicated teacher who is well-received by the students. Much of the success of these junior faculty is the result of their own hard work and dedication, but is also a result of the efforts of the previous and current chairs and other senior faculty to help ensure continued success.

Our department faculty and students were quite productive in their research activities. This is reflected in the number of papers published, grant funding, and presentations locally and at national and international meetings. We had more than 60 publications and over $5,000,000 in research expenditures from extramural funding awarded to our faculty. Of course, losing Dr. Abraham has made a difference. But other than that, our core, extramurally funded research strength remained intact. Closely related to our successful research programs, six graduate students defended their Ph.D. dissertations during the past year.

The faculty provided a significant level of institutional service, serving on numerous college and university committees. In addition, we served the scientific community as reviewers for many manuscripts, served as members of editorial boards, served on expert review panels for research grant proposals, and served as session chairs at meetings and otherwise provided service to professional societies.

**Goals for 2013-2014.** With an active chair search commencing at the time this report is being written, an important goal is to focus on our work; it is not a time to pause to wait and see what happens. We will continue to provide excellence in teaching in the various programs, directing several courses as noted in this report, and participating in committees that govern the educational programs. At the end of the academic year, Dr. Metting's retirement marked the loss of yet another experienced teacher. Plans are already in place to ensure continued excellence in the teaching of Respiratory Physiology. In research, we need to maintain or even increase our level of extramural funding and research productivity. The department has lost several faculty members with active research programs, including our chair. As we enter the new academic year, we are faced with another loss as Dr. Xie will be leaving soon. Even with these changes we will still be a leading department for research productivity and funding within the University. However, the next year will begin a critical time during which the College of Medicine will need to support our new chair to rebuild toward maintaining that strength. Working with the administration to achieve that goal is a critical goal for our faculty in the new academic year. Those senior faculty with research experience and expertise will need to continue to provide guidance and assistance to the junior faculty, especially regarding application for funding. Each member of the department should provide whatever assistance we can to the chair search committee and administration, and later provide all assistance to that chair to foster our common goals of excellence in education, research, and service.

## 2. CHAIR'S SELF ASSESSMENT

On February 1, 2013, I became the interim chair, and returned to a full-time appointment. For about a month before that, I was the *de facto* interim chair. At that time, I was a semi-retired, non-tenured Professor with a 0.7 FTE appointment.

### 2012-2013 Accomplishments:

Directing the Organ Systems Block for the second year medical students: This course runs from August to about the beginning of May, and provides approximately half of the contact hours to our second year students. Once again, we had a successful year. I was able to coordinate the teaching of faculty from our department, Pathology, and several other departments to deliver a course of which we can be proud. Student feedback continued to be quite positive, as in previous years.

Teaching medical and PA students was an important part of my efforts. Student feedback and exam results indicate that I did a good job.

Committee Service responsibilities grew along with taking the chair position, but I continued serving on those committees to which I was previously appointed. An additional task this past year was related to working on a committee for the LCME self-study, and meetings during the site visit. The total amounted to many more hours than anticipated, but I feel it provided an important service to the college.

Interim Chair of the department: Though I did not seek this position, I accepted Dr. Gold's request to take over while a search process could take place. The rather precipitous change in leadership was a distraction to our faculty, as was the unknown future of the department. I attempted to provide as much stability and calm as possible. My main goals were to provide support and guidance to faculty in an effort to sustain the department's excellent productivity in research and in teaching, and I believe that this was accomplished. I have also tried to provide guidance to some junior faculty related to research, teaching, and their careers, with the welcome and invaluable help of some senior colleagues. I also was able to straighten out a couple of financial issues related to grant over-spending, and related to confusion over the terms of a previous recruitment package. I do feel that I have been able to provide a period during which our faculty could focus on their academic lives with as few distractions as possible, as evidenced by their continued success in research, teaching and institutional service.

**2013-2014 Goals**

It is expected that my tenure as interim chair will end with the appointment of a new chair. Prior to that time, I will continue to provide whatever support I can to the faculty, students and staff so that we remain productive. Once the new chair is in place, I hope to be able to continue to work with the junior faculty as they develop into effective teachers, especially for medical students, and provide guidance toward building their careers.

After my interregnum, if the new chair is in agreement, I would like to remain in the department, but return to part-time status. As I will no longer be director of the Organ Systems Block, my roles will be in teaching medical students and PA students, and any other role that may be needed. I would also like to continue to serve on committees, especially those related to medical education and our M.D. program. Aside from striving for excellence in these roles, I would like to be able to provide any service needed by the new chair and by the new director of Organ Systems. In this way, I may be able to help with the transition process. Finally, I hope to work with these leaders to find junior faculty to take over my teaching for the following year.

## 3. DEPARTMENT HIGHLIGHTS & NOTABLE EVENTS

**Comings and Goings.** Several of our faculty retired or took another position during the 2012-2013 academic year.

> **Dr. Nader Abraham**, Professor and Chair, became the Vice Dean for Research at the Joan C. Edwards School of Medicine of Marshall University. Also moving to Marshall as an Assistant Professor was **Dr. Danny Kim. Dr. Robert Wang** left to become an Associate Professor at Samford University McWhorter School of Pharmacy in Birmingham Alabama**. Dr. Edith Mensah-Osman** also left the university faculty.
>
> Retiring faculty included **Drs. Elizabeth Tietz, Ron Mellgren, Joana Chakraborty, and Patricia Metting**.
>
> **Drs. Terry Hinds and Nitin Puri** were appointed as Assistant Professors.

Six doctoral students successfully defended their dissertations, completing the work for their Ph.D. degrees.

**Lance Stechschulte**, Ph.D., a doctoral student working with **Dr. Edwin Sanchez**, attended two international meetings during his final year: at the Endocrine Society Meeting, 2013, San Francisco, Lance received a travel scholarship and his poster was selected for Oral Presentation; at the 5th Biennial Great Lakes Nuclear Receptor Conference, Lance's work was selected for Oral Presentation.

**Latrice Faulkner**, a doctoral student working with **Dr. Jennifer Hill**, was selected by the National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development to work at the NIH as a Summer Student Intramural Research Training Award (IRTA) Fellow. Latrice was also awarded a 3-year Research Fellowship Grant from the NIH for her project titled, "Simultaneous Insulin and Leptin Signaling in POMC Neurons Promotes Fertility and Metabolic Homeostasis in Male Rodents.

**Resmi Pillai and Harshal Waghulde,** doctoral students working with **Dr. Bina Joe,** had their work selected for oral presentation at the 2012 American Physiological Society-Experimental Biology meeting held in San Diego, CA. **Harshal Waghulde** won a Research award for his research presentation at the Experimental Biology meeting 2013.

**Dr. Terry Hinds,** Assistant Professor, was chosen to attend the 2013 PRIDE-Functional and Applied Genomic Disorder Program at the Georgia Regents University. The PRIDE program, sponsored by the National Heart, Lung, and Blood Institute (NHLBI), seeks to increase diversity among individuals engaged in health-related research with

opportunities to gain the knowledge and tools needed for independent and meaningful research and career advancement.

**Dr. Jennifer Hill**, Assistant Professor, received an Early Investigator Award from the Endocrine Society.

**Dr. Edwin Sanchez,** Professor, was invited to serve on the editorial board of *Steroids*. He also served on NIH review panel for K99 awards.

**Dr. Bina Joe** completed the Leadership Development Program for Academic Change Leaders funded by the NSF-ADVANCE grant 'Institutions Developing Excellence in Academic Leadership" awarded to Case Western Reserve University. She was also appointed as Section Editor, Physiological Genomics - a Journal of the American Physiological Society; Section on 'Molecular Genetics of Complex Traits'. In addition, Dr. Joe was selected as organizer of the prestigious Cold Spring Harbor Laboratory International Meeting- Rat Models and Genomics Meeting. She served as Session Chair for many International meetings. Dr. Joe was appointed as **Director, Center for Hypertension and Personalized Medicine**, University of Toledo. During the year, the center focused on establishing both intramural and extramural collaborative research.

**Dr. Sonia M, Najjar,** Professor and Director of the **Center for Diabetes and Endocrine Research** (CeDER) has initiated an exciting collaboration with the American University of Beirut, to establish the Middle East Diabetes Research Center.

**Dr. Lucia Russo**, postdoctoral fellow with **Dr. Sonia Najjar** received the 2013 American Liver Foundation Postdoctoral Research Fellowship Award.

**Dr. Kathryn Smedlund**, postdoctoral fellow with **Dr. Guillermo Vazquez,** was awarded the Great Rivers Affiliate Winter 2012 Postdoctoral Fellowship Grant from the American Heart Association.

**Dr. Sivarajan Kumarasamy**, postdoctoral fellow working with **Dr. Bina Joe**, was selected for an oral presentation at the 2012 Physiological Genomics Trainee Highlight Session of the American Physiological Society- Experimental Biology meeting held in San Diego, CA.

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

## 4.a. EDUCATION

The department faculty were actively engaged teaching students in multiple programs. Details of faculty teaching efforts are presented in Table 1, near the end of this report. In the M.D. program, our main responsibility was running the Organ Systems Block in the second year (course director, Dr. Rosenberg), and providing a substantial portion of the content. Organ Systems runs from mid-August to about the end of April each year, provides approximately half the contact hours for the sophomore year of our M.D. program, and involves faculty from our department, the Pathology Department, and several other departments. We also teach several topics in the Immunity and Infection block, and cover the genetics content in the Cell and Molecular Biology Block. Another important responsibility is teaching the Fundamentals of Pharmacology course for students in the Physician Assistant (PA) Studies Program (course director, Dr. Beavis). Also of note, Dr. Cicila is course director for Advanced Human Physiology for students in the MSBS program, for the Human Physiology course for our PA students, and for the Basic Genetics course for the PA students. Dr. Beavis directs the Pharmacology unit of the "Scientific Foundations" course in the Human Donations Science program, and Dr. Modyanov directs a graduate course in Protein Structure and Catalysis.

The department is also home to the Cardiovascular and Metabolic Diseases [CVMD] track in the biomedical sciences graduate program (Track Director, Dr. Beavis). During the past year CVMD students presented 27 oral or poster abstracts locally and 19 at national or international meetings and were authors on 29 publications. Seven students successfully completed the qualifying exam and 6 students successfully defended their Ph.D. dissertations. The Physiology and Pharmacology faculty teach core courses for the CVMD track, including Advanced Topics in CVMD (Dr. Puri, course director) and the seminar course (Dr. Kumar, course director). We teach the Systems Pathophysiology course, which is directed by Dr. Lecka-Czernik who has a joint appointment in the department. Other important courses in the overall biomedical sciences graduate program are directed by Dr. Joe (Grants Writing Workshop) and Dr. Sanchez (Cell Biology and Signaling).

Reviewing our faculty teaching, it can be seen that we are heavily involved in teaching students in multiple programs and, as noted above, have provided significant service in our roles as course directors. Other educational leadership is shown by our service on various education committees in the College of Medicine and in the Graduate School, listed in in Section 4.d., Administrative and University Services.

## 4.b. RESEARCH

The department had success in our research endeavors, as noted by our many publications and by extramural funding, and by the recognition of the scientific community when we receive invitations to serve as peer reviewers for research grant proposals and manuscripts, and requests to present research findings and to chair sessions at scientific conferences. The following sections provide the details.

**Faculty Effort for Research** is included in the table below.
Effort for research technical staff and postdoctoral fellows was 100% for each.

| NAME | TEACHING | RESEARCH | SERVICE |
|---|---|---|---|
| Nader G. Abraham, Ph.D. | 3% | 70% | 50% |
| Andrew Beavis, Ph.D. | 43% | - | 66% |
| Joana Chakraborty, Ph.D. | 3% | 68% | 10% |
| George T. Cicila, Ph.D. | 46% | - | 30% |
| Kathirvel Gopalakrishnan, Ph.D. | - | 100% | - |
| Jennifer Hill, Ph.D. | 17% | 74% | 10% |
| Terry Hinds, Ph.D. | 20% | 48% | 10% |
| Sudhir Jain, Ph.D. | 3% | 74% | 10% |
| Bina Joe, Ph.D. | 5% | 87% | 30% |
| Meenakshi Kaw, Ph.D. | - | 100% | - |
| Dong Hyun Kim, Ph.D. | - | 100% | - |
| Ashok Kumar, Ph.D. | 3% | 94% | 5% |
| Edith Mensah-Osman, M.D., Ph.D. | 16% | 13% | 10% |
| Patricia Metting, Ph.D. | 6% | - | 80% |
| Nikolai Modyanov, Ph.D. | 10% | 11% | 50% |
| Brahma Raju Mopidevi, Ph.D. | - | 100% | - |
| Sonia Najjar, Ph.D. | 5% | 83% | 30% |
| Nitin Puri, M.D., Ph.D. | 30% | 32% | 25% |
| Phillip T. Robinson, D.V.M., MS | - | - | 100% |
| Howard C. Rosenberg, M.D., Ph.D. | 14% | - | 80% |
| Edwin Sanchez, Ph.D. | 27% | 15% | 25% |
| John W. Turner, Jr., Ph.D. | 5% | 87% | 10% |
| Guillermo Vazquez, Ph.D. | 12% | 86% | 4% |
| Zi-Jian Xie, Ph.D. | 12% | 83% | 10% |

**Space:** All space for Physiology & Pharmacology is accounted for in Table 2.

**Funding:** The Department's extramural research funds are included in the information shown in Table 3, which was provided by our Research and Sponsored Programs Office. Grants Accounting provided "expenditures" for FY13 and the 3 years prior which are shown in Table 4. During the 2012-2013 academic year, our department had $5,157,045 in expenditures from extramural funding. Associated with that was approximately $2,500,000 in Facilities and Administrative costs awarded to the University of Toledo.

**Brief Description of department research programs:** The research programs for each of the faculty are described below. We have two centers within the department, the Center for Diabetes and Endocrine Research, and the Center for Hypertension and Personalized Medicine. The presence of these centers is the result of the forward thinking and enthusiasm for science of the directors. Many of our department faculty are members of one or both of these centers, as are faculty from other departments and colleges. These provide a focus for collaborative work, sharing of ideas, and graduate education. The names of the centers also provide an overview of the thrust of much of our work, though we also have other significant areas of work, including signaling mechanisms related to the sodium pump, biomarkers of stress, immunocontraception, vascular mechanisms of atherosclerosis, hypothalamic mechanisms related to obesity and fertility, and others. These are described in the next paragraphs.

[Please note that Drs. Abraham and Kim left the institution during the course of this past year. Dr. Chakraborty retired at the end of the academic year. Though Dr. Lecka-Czernik's primary appointment is in another department, we have included her research because of the strong collaborations with several of our faculty and because she does this work in our department.]

**Nader G. Abraham, Ph.D., Dr.H.C. F.A.H.A., Professor and Chair -** Research programs in Dr. Abraham's laboratory are focused on vascular dysfunction which are a prelude to cardiovascular and metabolic diseases including hypertension, stroke, diabetes and obesity, the role of oxidative stress, inflammatory cytokines, hypoadiponectinemia and lipid-derived from arachidonic acid in the initiation of vascular dysfunction. The central hypothesis focuses on heme oxygenase (the most potent anti-oxidant gene in human body)-adiponectin-EET plays an essential role in vascular function. We believe that heme oxygenase acts as a molecular "switch" to genetically reprogram stem cells and subsequently vascular endothelium through activation of a unique signaling cascade with amplification of protective circuits to provide resistance to vascular dysfunction. Heme oxygenase also serves as the mediator of cross-talk between adipose tissue and the vasculature. Studies in his lab focus on the impact of adipocyte stem cell dysfunction on vascular endothelial integrity through the prism of heme oxygenase.

Human biological materials and experimental animal models of diabetes and obesity are used to examine the use of stem cell interventions and molecular, gene therapy that amplify the heme oxygenase system. Additionally, one of our research approaches represents a powerful tool to identify therapeutic strategies and novel biomarkers for cardiovascular and metabolic diseases (e.g. circulating endothelial cells and progenitor stem cells [EPCs] for better prognosis). We believe that the effect of anti-diabetic drugs alone or in combination with the antioxidant genes, have a differential impact on stem cell function and vascular diseases as well as on stem cells differentiation into adipocyte and osteoblast. The genomic approach and gene array analysis described in various publications from our laboratory represents a powerful tool to systematically investigate therapeutic approaches, and hence, facilitate translational research in hypertension, diabetes and the metabolic syndrome using stem cells and or gene therapy. Additionally, our lab is developing genetic testing for several human genetic diseases to predict future pathophysiological conditions using cell therapy for disease prevention.

**Joana Chakraborty, Ph.D., Professor –** Since 1991, Dr. Chakraborty has been working on two major projects: one on transmission of mouse retrovirus and the other one is on HIV/AIDS. My research effort has been concentrated into two areas:

1. Development of a mouse model to study the perinatal transmission of a retrovirus causing lymphoma in pups.
2. Educational and epidemiological studies on HIV/AIDS and cancer.

Project #1: Title – Development of a Mouse Model to Study the Perinatal Transmission of a Retrovirus

Project #2: Title – Education and Epidemiological Research on HIV/AIDS and Cancer

This is an educational and epidemiological project on HIV/AIDS and cancer. The purpose of this project is to develop and implement a specialized curriculum for the medical students and other health care workers to provide them with extensive training, so that they can serve as effective cancer and HIV prevention educators. The goals of this project are: i) to develop and update educational materials, to offer courses to medical, nursing, allied health students and practicing physicians and to provide opportunities to interact with people living with cancer and AIDS; ii) to conduct epidemiological studies on HIV infection in developing countries and the impact of AIDS and cancer on women and children. In 1994 and 1997, I organized HIV/AIDS educational workshops in India. This work was funded by the World AIDS Foundation. Part of this work was reported in a symposium during the 1998 XII International AIDS

Conference in Geneva, Switzerland. In February, 2000, I went to India for three weeks to collect data on impact of AIDS on orphans in India. Results of my study were published in XIII International AIDS Conference in Durban, South Africa. This work was funded by FXB-US Foundation. Currently I am trying to develop a cancer center in a remote village of India and spread cancer education.

**Kathirvel Gopalakrishnan, Ph.D., Research Assistant Professor –** Dr. Gopalakrishnan's current research is focused on understanding the genetic components of pathophysiological conditions of the cardiovascular, renal complications. The most prominent of all complex traits investigated in our laboratory is blood pressure regulation using hypertensive rat models. Understanding the genetics of hypertension in humans is complicated by a number of genetic and non-genetic confounding factors. Rat models serve as valuable alternatives to human studies for the identification and characterization of genetic factors/genes. The main strategy is to identify the disease causative genetic factor/gene based on its location on the rat genome by linkage analysis and substitution mapping. BP QTLs (blood pressure quantitative trait loci) are genetic elements that causally contribute to the development of high BP. Using the congenic approach; we have generated several congenic strains and mapped BP QTLs to various resolutions on rat chromosome 1, 9 and 10. The highest resolutions of mapping ranges from <805kb, <81kb and <42.5Kb. The interesting aspects of these important studies are that 1) they contain novel genes *Adamts16* (A Disintegrin-like metalloproteinase with thrombospondin motifs-16), *Rffl* (Rififylin) and Long non coding RNAs (LncRNAs) previously not known to function in BP control; and 2) These novel genes are homologous to human genes associated with BP control. We have successfully created the genetically-engineered rat *Adamts16* gene knockout rat model using zinc-finger nucleases (ZFN) and this model is very valuable tool for further mechanistic studies. My primary research is utilizing this rat knockout model to determine the functional significance of *Adamts16*, from our congenic analyses with respect to blood pressure regulation. Very recently I have initiated the investigation of the genetic and molecular role of Long non coding RNAs (LncRNAs) with respect to cardio vascular disease. The results from The next generation RNA sequencing (NGS) and LncRNA microarray on the hypertensive rats strains ( Dahl S, R and SHR rats) revealed several differentially expressed LncRNA candidates (*Asb3, Chac2, Pex11b, Sp5, Scand1* and *Bcl6*) related to cardiovascular disease and those candidates are also have association in human GWAS studies related to cardiovascular disease. We have fine mapped 42.5 Kb QTL region on rat chromosome 10 and this region contains one gene Rififylin (*Rffl*) and up-regulation of *Rffl* is linked to hypertension, cardiac hypertrophy and Short QT interval and delayed endocytic recycling within cardiomyocytes in the S.LEW congenic rat compared to the Dahl S rat. The mechanism mediating up-regulation of *Rffl* is unknown. Recently I have identified that the critical genomic region of 42.5kb contains two novel long non coding RNA (LncRNA)

SNRRL1&2 using the next generation RNA sequencing. Both are predicted to be targeting *Rffl* gene and DNA sequencing of the critical region revealed polymorphisms within the LncRNAs. The overall hypothesis is that the impaired action of novel long non-coding RNA molecule/s resulting in altered protein expression of rififylin is mechanistically linked to the development of hypertension. My future goal will be investigating functional mechanisms of these several candidates with respect to cardiovascular disease. The expectation is to be able to translate my observations in rat models to disease causative mechanisms in humans and try to develop LncRNA biomarkers for cardiovascular disease.

**Jennifer Hill, Ph.D., Assistant Professor –** Dr. Hill's laboratory's interests lie in understanding hypothalamic homeostatic mechanisms controlling body weight and fertility and the interactions between these two systems. The brain blocks reproduction in animals under metabolic stress. Within the hypothalamus, energy deficits suppress gonadotropin-releasing hormone (GnRH) release from a sub-population of neurons that maintain fertility. Anorexia, cachexia, and excessive exercise suppress reproductive cyclicity in humans and with it the estrogen release essential for bone health. Fully 5% of women of reproductive age suffer from infertility related to eating disorders. Furthermore, the incidence of exercise-related anovulation may reach as high as 61% in gymnasts and 78% in runners. On the opposite end of the spectrum, obesity and diabetes also negatively affect fertility. As rates of these diseases rise, it is urgent that we unravel the hypothalamic homeostatic mechanisms controlling body weight and fertility and the interactions between these two systems.

The hypothesis underlying my research is that circulating metabolic factors (such as leptin, insulin, ghrelin, glucose, LC-FAs or $PYY_{3-36}$) are perceived directly or indirectly by GnRH neurons of the hypothalamus and convey information that prevents GnRH release during a state of negative energy balance. Determining the mechanisms behind this metabolic-reproductive connection will provide much needed targets for medical treatment. The cornerstone of my laboratory's efforts is timed, targeted genetic manipulation using the power of tissue-specific gene deletion. Combined with anatomical, electrophysiological, and physiological techniques this approach offers a powerful tool for investigating the hypothalamic control of metabolism and fertility.

**Terry D. Hinds, Jr., Ph.D., Assistant Professor -** The focus of Dr. Hind's research is on heme oxygenase (HO) reduction of obesity induced fatty liver, which can prevent cardiovascular disease. Diet induced obesity results in elevated levels of glucose and fatty acids in liver, resulting in enhanced production of reactive oxygen species (ROS). The heme oxygenase enzyme is functionally important for reducing ROS by increasing production of the antioxidant, bilirubin. His studies show that increasing HO activity attenuates the development of NAFLD in obese mice by significantly increasing

expression of the nuclear receptor, peroxisome proliferator-activated receptor alpha (PPARalpha), resulting in the reversal of hepatic steatosis, increased energy expenditure, and decreased body weight. Dr. Hinds and co-workers have recently published a manuscript in the journal *Obesity,* elucidating the HO-1-PPARalpha-FGF21 axis as a new signaling paradigm that can manage obesity induced NAFLD, resulting in the lowering of cardiovascular disease.

**Sudhir Jain, Ph.D., Research Assistant Professor -** Human essential hypertension affects one billion people worldwide and is implicated in about 7 million deaths each year from ischaemic heart disease and stroke. In United States, the prevalence of hypertension is 50% greater in blacks than in whites. In blacks, hypertension appears earlier, is generally more severe, and results in high rates of morbidity and mortality from stroke, heart failure, left ventricular hypertrophy, and end stage renal disease. Hypertension is a polygenic disease, and it has been estimated by segregation analysis and twin studies that approx. 45% of inter-individual differences in blood pressure can be accounted by genetic differences. In the past two decades, many genes that were implicated in simple (Mendelian) diseases have been identified by using genetic linkage and positional cloning methods. Although these methods have been remarkably successful in identifying high relative risk genes, they have not been successful in identifying genes that are involved in the complex forms of disease, such as hypertension and diabetes type-2. Moreover, hypertension is an arbitrary definition and not a quantitative trait that appears relatively late in life. Not much is known about the number of genes involved, their mode of transmission, their quantitative effect on blood pressure, their interaction with other genes, or their modulation by environmental factors. Parameters such as ethnicity and body weight increase the genetic heterogeneity and the difficulty of replication from one study to another. A number of whole-genome analyses have been performed to identify different chromosomes involved in human hypertension. However, these studies are often non reproducible and genes involved in hypertension remain to be identified. Despite the characterization of cellular and physiological mechanisms that regulate blood pressure and alterations that contribute to hypertension, the genetic and molecular basis of this pathophysiology remains poorly understood.

Dr. Jain’s current research interest is to understand molecular mechanisms involved in hypertension and hypertrophy with special emphasis on the role of the renin-angiotensin system (RAS) which plays an important role in the regulation of blood pressure. The Octapeptide Angiotensin-II is one of the most potent vaso-active substances known and is synthesized from its precursor molecule, angiotensinogen, which is primarily synthesized in the liver and to a lesser extent , in the kidney, brain, heart, adrenal, fat and vascular walls by the combined proteolytic action of renin and angiotensin converting enzyme. Recent studies have shown that patients with essential

hypertension have higher plasma angiotensinogen levels and linkage studies have confirmed a direct relationship between angiotensinogen gene (AGT), its receptor gene AT1R and essential hypertension. However, molecular mechanisms involved in this process are not known. In addition, molecular mechanisms involved in tissue and hormone specific expression of these genes remain to be identified.

**Bina Joe, Ph.D., FAHA, Professor –** Dr. Joe's current research is focused on understanding the genetic component of blood pressure regulation using hypertensive rat models. Rat models serve as valuable alternatives to human studies for the identification and characterization of genetic factors/genes. The main strategy is to identify the disease causative genetic factor/gene based on its location on the rat genome by linkage analysis and substitution mapping. To this end, we have identified at least 16 different genomic regions that harbor quantitative trait loci (QTLs) for hypertension in rats. Recent integrated studies combining genetic and genomic approaches have resulted in the positional cloning of several novel genes implicated in BP control. Some of these are also detected to be linked to human essential hypertension. The expectation is to be able to translate our observations in rat models to disease causative mechanisms in humans.

**Meenakshi Kaw, M.D., Ph.D., Research Assistant Professor –** Dr. Kaw's research is focused on genetics of hypertension. Hypertension is one of the important components of metabolic syndrome. Obesity and metabolic syndrome is occurring in epidemic proportions now in adult population and is afflicting the children and young adults too. My interest in particular involves around the role of introns and promoter regions of angiotensinogen gene. We want to understand the role of single nucleotide polymorphisms in the angiotensinogen gene in the pathology of essential hypertension. In addition to genetics, I also want to understand the role of environment (diet, life style, and stress) in the occurrence of essential hypertension.

**Dong Hyun Kim, Ph.D., Assistant Professor -** Biochemistry, Stem Cell Biology, Adipogenesis related Obesity, Osteogenesis related Arthritis, Gene Therapy with Adeno-, Lenti-Virus, Heme Oxygenase-1 system Biology, Obesity related Cardiovascular Disease, Type II Diabetes Research

I have extensive work experience in the field of stem cell biology and application, as it pertains to stem cell therapy in chronic path-physiological disease states. My contributions to the field include paradigm shifting approach to the culture and differentiation of human adult stem cells in to mature adipocytes and osteoblasts. My current research at the University of Toledo entails allograft/autograft use of mesenchymal stem cells towards bone repair and regeneration. I am also working on understanding the mechanisms involved in dysregulation of stem cell-derived adipocytes and their contributions to the development of obesity and metabolic

syndrome. Human biological materials and experimental animal models of diabetes and obesity are used to examine the use of molecular, gene therapy and stem cell interventions that amplify the heme oxygenase system. Additionally, one of our research approaches represents a powerful tool to identify therapeutic strategies and novel biomarkers for cardiovascular and metabolic diseases (e.g. circulating endothelial cells and progenitor stem cells for better prognosis). I believe that the effect of anti-diabetic drugs alone or in combination with the antioxidant genes, have a differential impact on stem cell function and vascular diseases as well as on stem cells differentiation into adipocytes and osteoblasts. The genomic approach and gene array analysis described in these studies represents a powerful tool to systematically investigate therapeutic approaches, and hence, facilitate translational research in hypertension, diabetes and the metabolic syndrome. Also, I strongly believe that developing genetic testing for several human genetic diseases to predict future patho-physiological conditions using cell therapy for disease prevention.

**Ashok Kumar, Ph.D., F.A.H.A., Professor –** Dr. Kumar's current research interest is to understand molecular mechanisms involved in hypertension and other cardiovascular diseases with special emphasis on the role of renin-angiotensin system. Angiotensin-II is one of the most potent vaso-active substances known and is synthesized from its precursor molecule, angiotensinogen, by the combined proteolytic action of renin and angiotensin converting enzyme. Recent studies have shown that patients with essential hypertension have higher plasma angiotensinogen levels and linkage studies have suggested an association between angiotensinogen gene and essential hypertension. However, molecular mechanisms involved in increased plasma angiotensinogen level in hypertensive patients have not been clarified. The human angiotensinogen gene contains six polymorphic sites located between one Kb of its promoter. Recent studies from our group have shown that these single nucleotide polymorphisms form distinct haplotypes that are associated with hypertension in Caucasian and African-American hypertensive subjects. Our recent studies have shown that certain haplotypes of human angiotensin receptor gene are also associated with essential hypertension especially in female Caucasian subjects. Our transient transfection and gel shift analyses have identified transcription factors that bind to these polymorphic sites so as to understand their role in transcriptional regulation.

In order to understand molecular mechanisms involved in hypertension in an in vivo situation, we have generated transgenic mice that contain wild type and modified BACs containing different haplotypes of human angiotensinogen and angiotensin receptor genes. These BACs (containing 160-180 Kb of DNA) presumably contain 50-80 Kb of the promoter sequences that are required for tissue specific expression of these genes but differ only in specific single nucleotide polymorphic sites. Therefore these transgenic mice are unique to understand the role of single nucleotide polymorphisms in the

promoter region of these genes on transcriptional regulation in an in vivo situation. Our studies have shown that certain haplotypes of angiotensinogen and angiotensin receptor genes increase the blood pressure in transgenic mice. Our in vivo chromatin immunoprecipitation studies have shown that increased blood pressure is correlated with increased transcription of these genes in the liver and kidney of transgenic mice. Since renin-angiotensin system plays an important role in hypertension as well as Cardiac Hypertrophy and Renal Disease, these transgenic mice will be useful to identify novel agents to reduce hypertension and other cardiovascular diseases.

**Beata Lecka-Czernik, Ph.D., Professor -** Diabetes, obesity, and osteoporosis are major public health concerns due to their prevalence in our increasingly sedentary and aging society. The peroxisome proliferator-activated receptor-gamma (PPARγ) transcription factor is a key regulator of glucose metabolism and energy expenditure. This protein also regulates lineage commitment of bone marrow mesenchymal stem cells (MSC). We have demonstrated that PPARg protein is involved in changing of MSC phenotype observed during aging and diabetic disease. Changes in the MSC phenotype include shifting of the MSC differentiation potential toward adipocyte (fat cells) and away of osteoblasts (bone forming cells), which leads to the bone loss with simultaneous accumulation of fat in bone cavities. PPAR protein is a target for a class of anti-diabetic drugs TZDs, which decrease glucose levels and increase insulin sensitivity. Although their beneficial anti-diabetic profile, prolonged treatment with these drugs leads to the bone loss and increased number of bone fractures in diabetic patients. We have demonstrated that similar to aging, TZDs affect bone mass by changing differentiation pattern of bone marrow MSC. The research in our laboratory is dedicated to: i) understanding and manipulating molecular mechanisms which are responsible for age- and diabetes-related changes in MSC potential to for new bone; ii) development of new methods to improve bone fracture healing in diabetic patients by means of stem cell-based and siRNA-based therapies; iii) testing of different methods of therapeutic interventions to prevent bone loss associated with an anti-diabetic TZD therapy.

**Nikolai Modyanov, Ph.D., Professor -** The overall goal of my current research is to understand the physiological role of the unique BetaM proteins encoded by ATP1B4 genes, which were originally discovered in my laboratory. We determined that ATP1B4 genes represent a rare instance of vertebrate gene co-option that radically changed functions of BetaM during the evolution. In lower vertebrates BetaM is a subunit of Na,K-ATPase. In placental mammals BetaM-proteins lost their ancestral functions and became the only currently known skeletal and atrial cardiac muscle-specific protein of the inner nuclear membrane, where it capable to function as a regulator of gene expression and signal transduction.

We developed *Atp1b4* knockout mouse model and determined that loss of BetaM strongly reduced level of expression of a major myogenic regulatory factors and

resulted in growth retardation leading to high mortality of neonatal knockout mice. These findings point to the important role of BetaM in development of heart and skeletal muscles.

During the report period we have discovered that knockout mice exhibit enhanced insulin sensitivity and improved glucose tolerance and are resistant to high-fat diet-induced obesity, thereby demonstrating a role for BetaM in metabolic control.

We are currently performing comparative analysis of gene expression in skeletal muscles of knockout and wild type mice using mRNA-seq technology, which will expose a global picture of the effect of BetaM ablation on gene expression. These experiments will generate critically important preliminary data needed for successful submission of application to the recent NIH FOA, "*Functions of Skeletal Muscle beyond Contraction"*, which specifies support for exploratory projects focused on functions of skeletal muscle including its role in regulation of systemic metabolism as it relates to obesity and diabetes.

**Brahma Raju Mopidevi, Ph.D., Research Assistant Professor -** Hypertension is a serious risk factor for myocardial infarction, heart failure, vascular disease, stroke, and renal failure. Like other complex diseases, hypertension is caused by a combination of genetic and environmental factors. It has been estimated by segregation analysis and twin studies that approximately 45% of the inter-individual differences in blood pressure can be accounted by genetic differences. However, molecular mechanisms involved in pathophysiology of hypertension are not clear.

Aldosterone synthase, the rate limiting enzyme in the biosynthesis of aldosterone, is encoded by Cyp11B2 gene. This gene is expressed mainly in adrenal cortex and to some extent in kidney, brain, and adipose tissue. The epidemiological studies have suggested that -344T/C polymorphism is shown to be associated with increased aldosterone level and increased blood pressure. The hCyp11B2 gene has 3 SNPs in 1 Kb of its promoter and these polymorphisms are in almost complete linkage dis-equilibrium. These SNPs are rs1799998 (T/C at -344), rs10087214 (C/T at -470), and rs28659182 (C/A at -663). Thus variant -344T almost always occurs with variants -470C and -663A (named haplotype-I), and variant -344C almost always occurs with variants, -470T and -663T (named haplotype-II) in human subjects. In order to understand the physiological role of these haplotypes on transcriptional regulation of hCyp11B2 gene and blood pressure regulation in an *in vivo* situation, we have generated transgenic mice by *knocking in* hCyp11B2 gene containing either haplotype-I or haplotype-II at the HPRT locus. Currently our group actively engaged in studying the molecular mechanism by which these promoter polymorphisms alter the binding of the transcription factors and regulate the blood pressure. Further we have extended our research interests to micro RNA and shown that the microRNA miR-31 and miR-584 bind strongly to the human angiotensinogen (hAGT) 3'UTR containing 11525C-allele as compared to 11525A-allele and down-regulate the hAGT mRNA and protein levels in human liver cells. These studies not only provide new insight into understanding the

molecular basis of hypertension, but will also have significant clinical relevance to develop new therapeutic strategies for hypertension.

**Sonia M. Najjar, Ph.D., Professor, Department of Physiology & Pharmacology Director, CeDER -** Dr. Najjar's research focuses on identifying the genetic and environmental interactions underlying obesity, type 2 diabetes and their cardiovascular complications, including atherosclerosis and hypertension.

The laboratory pioneered the finding that CEACAM1 plays a key role in regulating insulin action by promoting insulin clearance in liver. By generating mouse models of loss- or gain-of function of this protein, the Najjar team observed that genetic inactivation/deletion of this protein causes insulin resistance, obesity and fatty liver disease, in addition to predisposing to type 2 diabetes and Non-alcoholic steatohepatitis (NASH) in response to high-fat diet. Using this model, the laboratory found that hyperinsulinemia causes insulin resistance and is not a marker thereof.

The Najjar laboratory also investigates the central role of hypothalamic CEACAM2 proteins in energy balance, and of gut CEACAM2 in insulin secretion via regulating GLP1 secretion.

Moreover, current studies focus on the role of CEACAM1 in the pathogenesis of atherosclerosis and common types of cancer.

**Nitin Puri, M.D., Ph.D., Assistant Professor –** Dr. Puri's research interest lies in the investigation of role of redox molecules in the (dys)functional regulation of cardio-vascular and metabolic homeostasis. We also examine the contributions of chronic oxidative stress and metabolic imbalance, as it pertains to the development of obesity and diabetes with associated long-term complications. In this regard, the principal focus of my investigation is the heme-heme oxygenase system. This antioxidant enzyme system is one of the principal cellular defenses against redox imbalance and also plays a central role in cardio-vascular function via its product generation, i.e. carbon monoxide and biliverdin. We have found that chronic oxidative stress has reciprocal effects on HO expression and activity; where a strong transcriptional activation of HO is seen by reactive oxygen species (ROS), emerging evidence shows an inhibitor effect of ROS on HO activity. In this context, we examine the differential cardio-vascular and metabolic effects of oxidants, including hydrogen peroxide and superoxide anion, in affecting HO system and examining how this translates to development of a clinical syndrome. Our experimental model systems include resistance arteries, animal models of hypertension (2K1C), animal models of diabetes and metabolic syndrome and in vitro models of human mesenchymal stem cells and mouse pre-adipocytes. Recently, we have shown that cellular overexpression of Sirt1 protects against patho-physiological effects of oxidative stress and are currently exploring the regulatory crosstalk between HO system and Sirt1 & 6. An equally exciting focus my research entails examining HO-dependent regulation of eicosanoids and their physiological effects, particularly in the vasculature and perivascular adipocytes. We have made significant headway in this direction where we have shown existence of a feedback loop between epoxides and HO whose

stimulation by either of the two systems attenuates oxidative stress and adipocyte dysfunction in *in vitro* as well as *in vivo* models

**Edwin R. Sanchez, Ph.D., Professor -** Research in Dr. Sanchez's lab focuses on the nuclear receptors, with an emphasis on the tetratricopeptide repeat (TPR) proteins that act as molecular chaperones to the receptors. These chaperone proteins include: FK506-binding protein 52 (FKBP52), FKBP51, protein phosphatase 5 (PP5) and cyclophilin 40 (Cyp40).

Nuclear receptors act as hormone-activated transcription factors. Many important endocrine and physiological processes are controlled by these receptors, including immunity and inflammation, glucose and fatty acid metabolism, male and female reproduction, and blood pressure

Nuclear receptors can be activated by steroid hormones, such as progestins, estrogens, androgens, mineralocorticoids and glucocorticoids. But they can also be activated by a variety of lipophilic, organic molecules, such as fatty acids, prostaglandins and their derivatives. The central thrust of the research program is to understand how the TPR chaperones described above contribute to the actions of steroid receptors at the molecular, cellular and physiological level.

The most recent findings at the Sanchez laboratory suggest that the TPR chaperones act as tissue-selective modulators of steroid receptor physiology. FKBP52 was found to exert a stimulatory effect on progesterone receptor action only in the uterus and not in other female reproductive organs. Similarly, FKBP52 is needed for the androgen receptor contribution to embryonic development of select male reproductive organs, such as the prostate gland, but not others. Both FKBP51 and Cyp40 were found to be critically important to androgen receptor action in the adult prostate gland, and may be key factors necessary for the onset and progression of prostate cancer. Most recently, the laboratory has uncovered an interesting and unique reciprocal relationship between FKBP52 and FKBP51 on the activities of glucocorticoid receptor in liver, muscle and adipose tissues. Reciprocal modulation of the glucocorticoid receptor is such that these two chaperones serve to either increase or decrease the involvement of glucocorticoid receptors in development of metabolic syndrome and propensity to type 2 diabetes. In the case of FKBP51, we now know that it is also an essential regulator of the peroxisome proliferator-activated receptor (PPARγ), a nuclear receptor critically important to lipid metabolism and to the prevention of type 2 diabetes. FKBP51 promotes PPARγ activity by inhibiting the kinases which target PPARγ. More importantly, studies in cells and mice have shown that FKBP51 is essential for PPARγ mediated development of adipose tissue and the storage of lipid. Indeed, loss of FKBP51 protein in mice leads to greater insulin and glucose sensitivity, hallmarks of the "anti-diabetic" state. Interestingly, our studies with PP5 deficient cells and mice have

shown that this chaperone also regulates PPARγ. Not surprisingly, PP5 cells are resistant to differentiation into adipocytes and PP5 deficient mice are lean, with greatly reduced fat mass, are more insulin sensitive and exhibit highly elevated bone mineral density. These are all hallmarks of animals with a healthy lipid profile. Lastly, the laboratory has discovered a novel isoform of the glucocorticoid receptor (GRβ) in the mouse and its potential role in insulin action.

Taken as a whole, this investigative effort has identified TPR proteins as novel and potentially important targets for drug development against male and female infertility, prostate cancer, and metabolic disorders, such as diabetes and obesity.

**John W. Turner, Jr., Ph.D., Professor –** Dr. Turner's research focuses in 2 areas:
1) Development of biomarkers for environmental stress
2) Development of multi-year controlled-release contraceptive vaccines
Regarding biomarker studies, the effort is directed at the use of the stress hormone cortisol as a reference base for assessing effects of environmental stressors on gene expression, with emphasis on stress-related and reproduction-related genes. The experimental model is stress in fish associated with environmental compromises in coral reef ecosystems. These studies advance knowledge regarding stress and gene expression while addressing a critical problem of environmental stressors causing worldwide declines in coral reef ecosystems.

Regarding contraception studies, the effort is directed at multi-year contraception achieved with a single immunization and employs a polymer-based, controlled-release component in the vaccine to provide boostering. The controlled-release aspect allows for multiple boostering across a 3-20 month period and yields vaccines enduring for up to 3 years. The experimental model for these studies is the horse, with application to limit free-roaming wildlife populations to match their habitat capacity. Controlled-release boostering has potential for use with a number of animal and human vaccines.

Continued expansion of the *reefmonitor.org* website launched by J. Turner and S. Sloan in February 2009 through iTunes U Ohio. In 2011/2012 we developed and uploaded a new 6-segment series on the Wild Horse Fertility Control Project. The iTunes U site offers >200,000 programs, and our series has been as high as #11 in viewed programs in this list.

Continued development of a UT on-line 2000-level course in coral reef ecology in collaboration with T. Bridgeman, PhD in the UT Dept. of Environmental Science and D. Bowers, MS Ed., Bellevue HS, OH. Course completion is expected in Dec. 2012.

**Guillermo Vazquez, Ph.D., Associate Professor -** Research in Dr. Vazquez's lab is focused on molecular and cellular aspects associated to the pathogenesis of atherosclerosis, with emphasis on the role of non-selective cation channels, such as

Transient Receptor Potential Canonical (TRPC) channels and alpha-7 nicotinic acetylcholine receptors. Atherosclerosis is a disease of the arterial wall with a dominant and maladaptive inflammatory response. It represents the major cause of coronary artery disease, the leading cause of death in western societies. In addition, atherosclerosis is the main vascular complication of metabolic diseases such as diabetes, obesity and metabolic syndrome. Over recent years Dr. Vazquez's group has discovered that endothelial TRPC3 channels are obligatory components of the signaling underlying regulated expression of cell adhesion molecules and monocyte recruitment to the subintima, two critical events throughout all stages of atherosclerotic lesion development. Dr. Vazquez's laboratory has also discovered a novel nicotinic acetylcholine receptor-dependent survival pathway in coronary endothelium. More recently, his lab has shown that TRPC3 contributes to mechanisms of macrophage survival and efferocytosis. Recent in vivo studies using a mouse model of atherosclerosis and a bone marrow transplantation strategy show that macrophage deficiency of TRPC3 improves indicators of plaque stability in advanced lesions, suggesting that TRPC3 could represent a promising molecular target in strategies aimed at stabilizing advanced lesions and minimizing the risk of acute coronary syndromes. To study this, our lab makes use of in vitro (primary and immortalized cell lines) and in vivo (global and conditional transgenic and knockout mice; bone marrow transplantation) models of endothelial and macrophage dysfunction, and a number of techniques (including patch-clamp electrophysiology, real-time camera-based fluorescence imaging, real-time amperometry, protein chemistry/molecular biology, morphometric and immunohistochemical analysis of atherosclerotic lesions in mice).

**Zi-Jian Xie, Ph.D., Professor -** The Na/K-ATPase in Signal Transduction and its significance in physiology, disease and drug development.

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**Research Results:** These can be surmised from the list of publications shown in Section 6, "Publications". In that listing, please note the 58 papers published or in press during the year. In addition, as of the end of the reporting period, we had another 27 manuscripts in various stages of preparation, submission, or re-submission after review, which indicates an on-going, robust research enterprise. Our faculty and students presented work at various national and international meetings, as represented by 27 published abstracts. We also published 3 book chapters and 4 expert reviews.

**Research Goals and Future Plans:** Each active researcher has his or her goals. These are not easily summarized. Departmental goals are to provide the support needed for the faculty and students to continue their work. In the coming year, with the naming of a chair, we should look toward adding new faculty to sustain the research productivity which is so vital to the research and education missions of the university.

## 4.c. Clinical Service – The department provides no clinical service

## 4.d. ADMINISTRATIVE AND UNIVERSITY SERVICES

Our department faculty provided service to the College of Medicine, the Graduate School of Biomedical Sciences, and the University of Toledo. We also provided significant service to the scientific community, shown below in Section 4.d. part 2.

## 4.d. part 1. COLLEGE AND UNIVERSITY SERVICE

**Andrew Beavis, Ph.D., Professor**
Track Director: Biomedical Sciences Graduate Program Cardiovascular and Metabolic Diseases Track
Chairman: Institutional Animal Care and Use Committee (IACUC)
Member: Medical School Admissions Committee
Member: Executive Curriculum Committee (COMLS)
Member: Graduate Executive Committee (COGS)
Member: Preclinical Curriculum Committee
Member: Graduate Student Advisory Committees (for 8 Students)
Course/Block Associate Director: Organ Systems
Course Director: Fundamentals of Pharmacology I
Course Director: Fundamentals of Pharmacology II
Course Director: Fundamentals of Pharmacology III

**Joana Chakraborty, Ph.D., Professor**
Student Promotion Committee (1990-present)
Member, Curriculum Subcommittee on Year 1 and Year 2 (1998-present)
Member of Block 1 Committee (2011-present)

**George T. Cicila, Ph.D., Associate Professor**
Course Director: Basic Genetics (PHYA6010), 36 hours
Member of IACUC Committee, 42 hours
Course Director: MSBS-MS Physiology (INDI5250), 40 hours
Course Director: Human Physiology (PHSL5050), 34 hours
Physician Assistant Program Advisory Committee, 3 hours

**Jennifer Hill, Ph.D., Assistant Professor**
College of Medicine Council Secretary/Treasurer
College of Medicine Council, Department of Physiology & Pharmacology Representative
CeDER Journal Club, Director
Interviewer, UT Medical School
Graduate Student Advisor: Latrice Faulkner
CeDER Faculty Workshop, Director
Chair, Center for Diabetes and Endocrine Research (CeDER) steering committee 2012-2013

**Bina Joe, Ph.D., Professor**
Director, Center for Hypertension and Personalized Medicine
Graduate Students Admissions Committee
Faculty Rules and Regulations Committee, University of Toledo College of Medicine
LCME self study group member- FA-2, 5, 11 and 15
Thesis Advisory Committee Member for: Gaurav Mehta, Varunkumar Pandy, Sumit Ranjan,
Sumit A. Solanki , Yanling Yan, Jiyoun Yeo and Xiaolu Zhang

**Ashok Kumar, Ph.D., Professor**
Department of Physiology and Pharmacology APT Committee
Director, CVMD Seminar Series

**Patricia J. Metting, Ph.D., Professor**
*Leadership Teams:*
President's Leadership Forum
Chancellor's Advisory Council
Council of Deans, Health Science Campus
Strategic Planning Committee of the Whole
President's Diversity Council
President's Committee on African-American Recruitment, Retention, and Scholarships
Enterprise Applications Sponsor Group
ADA and Title VII Advisory Committees
Athletics Committee
Student Experience Steering Body
President's Club/Dean's Club, Office of Institutional Advancement and UT Foundation

*Student Affairs and Services:*
Office of Student Affairs, HSC and College of Medicine
Office of the University Registrar
Academic Enrichment Center, HSC

Academic Test Center, HSC
Office of Student Life, HSC
Student Disability Services, HSC
Student Health and Disability Insurance Programs
Common Calendar and Semester Preparation Committee
Student Appeals and Grievances, HSC
Classroom Scheduling, Health Science Campus
Student Facilities, Health Science Campus

*Faculty Affairs and Governance:*
Review of Promotion, Tenure, and Renewal recommendations of HSC faculty members in AAUP Collective Bargaining Unit
Co-Chair, Academic Honors Committee

*Community Wellness and Health Promotion:*
Rocket Wellness™ branding and programming
Morse Center, HSC, operated by YMCA of Greater Toledo

**Nikolai Modyanov, Ph.D., Professor**
Director of Graduate School Core Curriculum Course, "Current Problems and Research Approaches in Protein Structure and Catalysis"
Member of Institutional Animal Care and Use Committee
Member of 3 Graduate Student Advisory Committees

**Sonia Najjar, Ph.D., Professor**
Search Committee for Chief of the Endocrine Division-Department of Medicine
Search Committee for Chief of Pediatric Endocrinology-Department of Pediatrics
Thesis Advisory Committee Member: Xiaoliang Qiu, Lance Stechschulte and Rui Zheng

**Nitin Puri, M.D., Ph.D., Assistant Professor**
Group & Individual discussions with medical, PA, MSBS and graduate students, 60 hours
Module Director Systems Pathophysiology I, 12 hours
Module Director Systems Pathophysiology II, 12 hours
Course Director Advanced Topics in CVMD, 48 hours
Contributions to the Peer Review Process, 20 hours

**Howard Rosenberg, Ph.D., M.D., Professor and Interim Chairman**
Block Director, Organ Systems
Interim Chair, Department of Physiology and Pharmacology
Student Promotions Committee
COM Admissions Committee
COM Pre-clinical Curriculum Committee
COM Executive Curriculum Committee
COM Executive Committee
Research Advisory Committee
Biomedical Sciences Graduate Executive Committee

**Edwin Sanchez, Ph.D., Professor**
Assistant Director, Center for Diabetes and Endocrine Research (CeDER)
Director, Cell Biology & Signaling Course (attended by all Biomedical Sciences Graduate Students)
Director, Systems Pathophysiology II, CVMD Module
Dept. Phys. & Pharm. Appointment, Promotions & Tenure Committee
COM Council Representative
Cardiovascular and Metabolism Diseases Program Steering Committee
Ph.D. Advisory Committees (5)

**John W. Turner, Jr., Ph.D., Professor**
Department of Physiology and Pharmacology APT Committee
Department of Physiology and Pharmacology Curriculum Committee
Medical School Applicant Interviews
Molecular Basis of Disease Ph.D. Program Steering Committee
Coral Reef On-Line Course (EEES2720) 48 hours

**Guillermo Vazquez, Ph.D., Associate Professor**
Member, Council of the University of Toledo College of Medicine
Member, Advisory Committees: Qiming Duan, Sumit Monu, Resmi Pillai, Gurpanna Saggu and Harshal Waghulde
Member, BRIM Committee
Member, CVMD Admissions Committee
Membership Committee of the Graduate Council
Health Science Campus Graduate Executive Committee
Member, The University of Toledo Research Council

**Zi-Jian Xie, Ph.D., Professor**
COM Appointment, Promotions, and Tenure Committee
Member, Graduate Student Advisory Committees: Qiming Duan, Sumit Monu, Akshada Sawant, Moustafa Sayed and Jian Wu

**4.d. part 2. EXTRAMURAL SERVICE**

**Andrew Beavis, Ph.D., Professor**

**Journal Peer Review:**

Journal of Biological Chemistry
Journal of Bioenergetics and Biomembranes
Archives of Biochemistry and Biophysics
Life Sciences
Molecular Pharmacology
Biochimica et Biophysica Acta
American Journal of Physiology
Biochemical Pharmacology

**Joana Chakraborty, Ph.D., Professor**

**Abstract Reviewer**: Washington, D.C., 2012

**George T. Cicila, Ph.D., Associate Professor**

**Journal Peer Review:**

Abstract Reviewer, Peer review for journals, 12 hours

Hypertension
Circulation Research
Physiological Genomics
Nature Reviews Genetics
Mammalian Genome
Journal of Hypertension
Frontiers in Genomic Physiology
Kidney International
Chronobiology International

**Editorial Board:**

Chief Section Editor, *Frontiers in Genomic Physiology*

**Advisory Board and Grant Peer Review:**

Ad-hoc reviewer, American University of Beirut, Faculty of Medicine Research Grant

**Kathirvel Gopalakrishnan, Ph.D., Assistant Professor**

**Manuscript review:**

American Medical Journal (AMJ)
Colloids and surfaces B: Biointerfaces
Frontiers in Genomic Physiology
Physiological Genomics

**Jennifer Hill, Ph.D., Assistant Professor**

**NIH Review Panels:**

External Expert Reviewer for NICHD Fertility and Infertility Branch U54 Specialized Cooperative Centers Program in Reproduction and Infertility Research (SCCPIR) program (3/2013)

**Ad hoc journal reviewing**

BBA Molecular Basis of Disease
Endocrinology
Endocrine
Cell & Tissue Research
Reproductive Sciences
Neuroendocrinology
Neuropeptides
Frontiers in Neuroendocrinology
Experimental and Clinical Endocrinology & Diabetes
Obesity
Physiological Genomics
PLoS One
Cell Metabolism

Invited commentator for The Endocrine Society clinical practice guideline on the diagnosis and treatment of Polycycstic Ovary Syndrome, February 2013

Invited commentator for The Endocrine Society clinical practice guideline on The Adverse Health Consequences of the Use of Performance Enhancing Drugs by Recreational Weightlifters and Athletes, February 2013

**Terry Hinds, Jr., Ph.D., Assistant Professor**

**Ad hoc Manuscript Review:**

Diabetologia, Life Sciences, PPAR Research and Cellular Physiology and Biochemistry

**Sudhir Jain, Ph.D., Assistant Professor**

**Journal Reviewer:**

American Journal of Physiology: Heart and Circulatory Physiology
American Journal of Physiology: Endocrinology and Metabolism
American Journal of Physiology: Physiological Genomics
American Journal of Hypertension
Molecular Biology Report

**Bina Joe, Ph.D., Professor**

**Chief Editorial Positions:**

Editor, Physiological Genomics- A Journal of the American Physiological Society; Section on 'Molecular Genetics of Complex Traits'; 2012-present
Associate Editor, Frontiers in Genomic Physiology; 2010-2012

**Editorial Board Member:**

Physiological Genomics; 2004-2012
Hypertension; 2010-present
International Scholarly Research Network (ISRN) Genomics; 2012-present

**Journal Peer Review:**

Nature Genetics,
Genomics, Hypertension,
American Journal of Physiology-Renal Physiology,
American Journal of Hypertension,
American Journal of Physiology-Regulatory, Integrative and Comparative Physiology,
Obesity Research,
Critical Reviews in Biotechnology,
Heredity,
Diabetes,
Critical Care Medicine,
Clinica Chimica Acta,
Mammalian Genome,
Physiological Genomics,
Journal of the American Society of Nephrology,
Nephron,
Journal of Biomedical Semantics,
British Journal of Nutrition,
PlosONE,
Briefings in Bioinformatics,
Clinical and Experimental Hypertension

**Study Sections:**

Regular Member of the Hypertension ad Microcirculation study section of NIH (7/2010-6/2013)

**International Thesis Evaluator:**

University of Madras, India (2013)

**Ashok Kumar, Ph.D., Professor**

**Study Sections, Review Panels:**

Ad Hoc Member: NIH: Heart, Blood and Lung Institute Study Section
Reviewer: Phillip Morris Research Grants
Reviewer: Wellcome Trust Grants
Ad. Hoc. Member: Study Section of American Heart Association.
Member: Hypertension and Microcirculation study section of NIH
Ad. Hoc Member: GM study section of NIH

**Journal Peer Review:**

Journal of Biological Chemistry
American Journal of Hypertension
Hypertension
Hypertension Research
American Journal of Physiology
Nucleic Acids Research
Human Genetics

**Nikolai Modyanov, Ph.D., Professor**

**Journal Peer Review:**

Journal of Biological Chemistry
Biochemistry, Molecular Pharmacology
Biochimica et Biophysica Acta (Bioenergetics, Biomembranes, Gene Structure and Expression)
FEBS Letters
Biophysical Journal

**Editorial Board:**

Member of Editorial Board of "Biochemistry Research International"
Member of Editorial Board of "International Journal of Clinical Pharmacology and Toxicology (IJCPT)"
Member of Advisory Board of International Journal, "OA Biochemistry" (London, UK)

**Sonia Najjar, Ph.D., Professor**

**Academic Board Membership:**

Member, Authority Board Edison Biotechnology Institute (EBI), Athens, Ohio (2006-present)

**Academic Consulting:**

American University of Beirut, Establishing the Middle East Diabetes Research Center (2012-present)

**Board Membership in Professional Associations:**

Board member, Juvenile Diabetes Research Foundation local chapter (2007-present)

**Membership in Professional Associations:**

American Liver Foundation (2012-present)

**Study Sections *(Ad Hoc)*:**

NIH-NIDDK: Hepatobiliary Pathophysiology Study Section (2012)
NIH-NIDDK: Diabetes, Endocrinology and Metabolic Diseases B Subcommittee (2012)
NIH- ZRG1 F06-T 20 L., Fellowships: Endocrinology, Metabolism, Nutrition and Reproductive Sciences (2013)
NIH-NIDDK: Molecular and Cellular Endocrinology Study Section Endocrinology, Metabolism, Nutrition and Reproductive Sciences IRG (EMNR) (2013)
NIDDK DDK-B1 Section; Diabetes, Endocrinology and Metabolic Diseases B Subcommittee (2013)

**Editorial Board**

Honorary Editorial Board Member: “Hepatic Medicine: Evidence and Research” (2009-present)
International Scholarly Research Network-Hepatology (2012-present)
Topic editor: Molecular Metabolism (2012-present)

**Manuscript Reviews**
Journal of Cellular Biochemistry
Cell Metabolism
Journal of Clinical Investigation
Molecular Cancer
FEMS Immunology & Med. Microbiology
Gastroenterology

**Annual Meetings Program Planning**
The American Diabetes Association annual meeting (2011-present)

**Organizer of International Meetings**
24th International CEA Workshop, Toledo, Ohio (2013)

**Nitin Puri, M.D., Ph.D., Assistant Professor**
**Peer Review Contributions:**
Editorial Board Member: Journal of Hypertension and cardiology

**Peer review process:**
Ad hoc manuscript reviewer for the American Journal of Physiology-heart and circulatory
physiology
Ad hoc manuscript reviewer for the International Journal of Hypertension
Ad hoc manuscript reviewer for the Journal of Prostaglandins and Other Lipid Mediators

**Edwin Sanchez, Ph.D., Professor**
**Editorial Boards:**
Cell Stress & Chaperones
International Journal of Biochemistry and Cell Biology
Journal of Steroid Biochemistry and Molecular Biology
Molecular Endocrinology
Hormone Molecular Biology and Clinical Investigation
Steroids

**Paper Reviews:**
Journal of Biological Chemistry
Biochemistry
Molecular Pharmacology
Molecular Endocrinology
Endocrinology
Cell Stress & Chaperones
Journal of Steroid Biochemistry and Molecular Biology
Proceedings of the Society for Experimental Biology and Medicine
Periodicum Biologorum
International Journal of Biochemistry and Cell Biology
Biology of Reproduction
Molecular Biology of Cancer (Encyclopedia)

American Journal of Physiology - Endocrinology & Metabolism
Journal of Cell Science
Hormone Molecular Biology and Clinical Investigation
Trends in Endocrinology and Metabolism
FEBs Letters
Biochemical Pharmacology
Brain Research
Cell Biology International
British Journal of Pharmacology
Experimental Biology and Medicine
Journal of Molecular Biology
Journal of Neurochemistry
Journal of Neuroscience
Molecular and Cellular Biology

**Book Reviews:**
Trends in Endocrinology and Metabolism

**Grant Reviews:**
NIH Special Emphasis Panel – Career Awards (K Applications) (ad hoc), 2013

**John W. Turner, Jr., Ph.D., Professor**
**Wildlife Management Consultant (1991-present):**

A. For 20 parks and preserves, including:
   1. Kruger National Park, South Africa (elephants)
   2. Virgin Islands National Park, United State Virgin Islands (burros)
   3. Assateague Island National Seashore (wild horses)
   4. Cumberland Island National Seashore (wild horses)
   5. Parco de La Maremma, Italy (fallow deer)
   6. Fire Island National Seashore, New York (white-tailed deer)
   7. Pt. Pelee National Park, Canada (white-tailed deer)
   8. Pt. Reyes National Seashore, California (tule elk)

B. For >25 urban areas regarding white-tailed deer, including Boston, Philadelphia, Pittsburgh, Cleveland, Columbus, Toledo, Detroit and Chicago.
C. For U.S. Department of Interior, Bureau of Land Management, National Wild Horse and Burro Program (wild horses)

Animal Care Committee member, Toledo Zoological Society (2005-present)
Toledo Zoo Programs Committee member (2006-present)
Marine Research Permitee, Commonwealth of the Bahamas (2007-present)

**Research Reviewer:**
Ad Hoc Peer Reviewer, National Science Foundation (NFS) (1985-present)
Ad Hoc Peer Reviewer, U.S. Department of Agriculture Small Grants Program (1994-present)
Peer Reviewer, NSF, Marine Sciences Program (2005-present)
Peer Reviewer, U.S. Department of Agriculture, SBIR Wildlife Program (2005-present)

**Guillermo Vazquez, Ph.D., Associate Professor**

**Editorial Service:**

Managing Editor, Frontiers in Bioscience
Editorial Board Member, Frontiers in Bioscience
Editorial Board Member, Cardiovascular and Hematological Agents in Medicinal Chemistry

Ad hoc reviewer for
European Journal of Neuroscience;
Cancer Therapy;
Neuroscience;
FEBS Letters;
Journal of Biological Chemistry;
Journal of Cellular and Molecular Medicine;
Arteriosclerosis Thrombosis and Vascular Biology;
Circulation Research.

**Zi-Jian Xie, Ph.D., Professor**

**Study Sections, Review Panels:**

NIH
Ad Hoc
2012-2013

## 5. SUMMARY AND ASSESSMENT OF DEPARTMENT'S PRODUCTIVITY BASED ON THE FACULTY EFFORT REPORTS

### Productivity of Department Faculty

As a group, we made considerable contributions in teaching, research and service to the institution and to the scientific community. Among the accomplishments are 58 published papers as well as book chapters, expert reviews and published abstracts, with many additional manuscripts in various stages of preparation or under review. Our research was supported by extramural funds, with $5,157,045 in research expenditures from extramural funding. The graduate program continued to enjoy success, and we had six newly-graduated doctoral students. We also provided successful teaching and leadership in several U.T. educational programs, and were actively involved in the university and scientific communities. Several members of the department have accomplishments in multiple areas, while others were more focused on one or a few aspects of our collective work. Everyone has made an honest effort at being a productive and valued part of our academic community. As a group, we can be proud of our accomplishments.

## 6. PUBLICATIONS AND GRANTS

### Published Manuscripts

1. Atanur, S.S., Diaz, A.G., Maratou, K., Sarkis, A., Rotival, M., Game, L., Tschannen, M.R., Kaisaki. P.J., Otto, G.W., Ma, M.C.J., Keane, T.M., Hummel, O., Saar, K., Chen, W., Guryev, V., **Gopalakrishnan, K.**, Garrett, M.R., **Joe, B.**, Citterio, L., Bianchi, G., McBride, M., Dominiczak, A., Adams, D.J., Serikawa, T., Flicek, P., Cuppen, E., Hubner, N., Petretto, E., Gauguier, D., Kwitek, A., Jacob, H. and Aitman TJ. (2013) Genome sequencing reveals loci under artificial selection that underlie disease phenotypes in the laboratory rat. *Cell* **154**:691-703. PMID: 23890820.

2. Baylan, N., Bhat, S., Ditto, M., Lawrence, J.G., **Lecka-Czernik, B.** and Yildirim-Ayan, E. (2013) Polycaprolactone nanofiber interspersed collagen type-I scaffold for bone regeneration: a unique injectable osteogenic scaffold. *Biomed Mater* 8:045011.

3. Bredella, M.A., Fazeli, P.K., **Lecka-Czernik, B.,** Rosen, C.J., and Klibanski**,** A. (2013) IGFBP-2 is a negative predictor of cold-induced brown fat and bone mineral density in young non-obese women. *Bone* **23**:336-339.

4. Cao, J., **Puri, N.**, Sodhi, K., Bellner, L., Abraham, N.G. and Kappas, A. (2012) Apo A1 mimetic rescues the diabetic phenotype of HO-2 knockout mice via an

increase in HO-1 adiponectin and LKBI signaling pathway. *Int. J. Hypertens.* 2012:628147. Epub Apr 4. PMID: 22577519

5. Cao, J., Vecoli, C., Neglia, D., Tavazzi, B., Lazzarino, G., Novelli, M., Masiello, P., Wang, Y.T., **Puri, N.**, Paolocci, N., L'abbate, A. and Abraham, NG. (2012) Cobalt-protoporphyrin improves heart function by blunting oxidative stress and restoring no synthase equilibrium in an animal model of experimental diabetes. *Front Physiol.* **3**:160. Epub 2012 Jun 4. PMID: 22675305.

6. Chen, X.-Y., Gu, X.-T., Saiyin, H., Wan, B., Zhang, Y.-J., Li, J., Wang, Y.-L., Gao, R., Wang, Y.-F., Dong, W.-P., **Najjar, S.M.,** Zhang, C.-Y., Ding, H.-F., Liu, J.O. and Yu, L. (2012) Brain selective kinase 2 (BRSK2) phosphorylation on PCTAIRE1 negatively regulates glucose-stimulated insulin secretion in pancreatic β-cells. (2012) *J. Biol. Chem.* **287(36)**:30368-30375. PMID: 22798068.

7. Duggan, J.M., Okonta, H. and **Chakraborty, J.** (2012) Hematopoietic stem and progenitor cell populations in MoMuLV-tsl induced lymphoma in a murine model. *Virology* **433**:377-384.

8. Duggan, J.M., Okonta, H., Elnaggar, D., French, J., West, R. and **Chakraborty, J.** (2012) Retrovirus induced lymphomagenesis – A correlation between disease pathogenesis and flow cytometric analysis. *J. Gen. Virol*. **93**:2028-2036.

9. Ebke LA, Slotterbeck BD, Nestor-Kalinoski AL, Al Dieri AG, Lester SG, Russo L, Najjar SM, von Grafenstein H, and McInerney MF. Tight Association between Macrophages and Adipocytes in Obesity: Implications for Adipocyte Preparation (2013) *Obesity, in press*

10. Fedorova LV, Sodhi K, Gatto-Weis C, **Puri N**, **Hinds TD Jr**, Shapiro JI, Malhotra D. Peroxisome proliferator-activated receptor δ agonist, HPP593, prevents renal necrosis under chronic ischemia. PLoS One. 2013 May 15;8(5):e64436. Doi:10.1371/journal.pone.0064436. Print 2013. PMID: 23691217.

11. Friedman T.C., Sinha-Hikim, I., Parveen, M., **Najjar, S.M.,** Liu, Y., Mangubat, M., Shin, C.-S., Lyzlov, A., Ivey, R., Shaheen, M., French, S.W. and Sinha-Hiki,, A.P. (2012) Additive effects of nicotine and high-fat diet on hepatic steatosis in male mice. *Endocrinology* **153(12)**:5809-20. PMID: 23093702.

12. **Gopalakrishnan, K.**, Kumarasamy, S., Abdul-Majeed, S., Kalinoski A., Morgan, E.E., Gohara, A.F., Nauli, S.M., Filipiak, W.E., Saunders, T.L. and **Joe, B.** (2012) Targeted disruption of *Adamts16* gene in a rat genetic model of hypertension. *Proc. Natl. Acad. Sci.* **109**:20555-20559.

13. **Gopalakrishnan, K.**, Kumarasamy, S., Yan, Y., Liu, J., Kalinoski, A., Kothandapani, A., Farms, P. and **Joe, B.** (2012) Increased expression of rififylin in a <330kb congenic strain is linked to impaired endosomal recycling in proximal tubules. *Front Genet* **3**:138.

14. Gupta, S., Yan, Y., Malhotra, D., Liu, J., **Xie, Z.**, **Najjar, S.M.** and Shapiro, J.I. (2012) Ouabain and insulin induce sodium pump endocytosis in renal epithelium. *Hypertension* **59(3)**:665-672. PMID: 22311908. PMCID: PMC3336087.

15. **Hinds, T.D., Jr.**, Sodhi, K., Meadows, C., Fedorova, L., **Puri, N.**, Kim, D.H., Peterson, S.J., Shapiro, J., Abraham, N.G. and Kappas, A. (2013) Increased HO-1 levels ameliorate fatty liver development through a reduction of heme and recruitment of FGF21. *Obesity* (Silver Spring). Jul 9. doi: 10.1002/oby.20559. [Epub ahead of print] PubMed PMID: 23839791.

16. Huang, J., Ledford, K.J., Pitkin, W.B., Russo, L., **Najjar, S.M.** and Siragy, H.M. (2013) Targeted deletion of murine carcinoembryonic antigen-related cell adhesion molecule 1 activates PI3K-Akt signaling and contributes to the expression of (Pro) renin receptor via transcription factors CREB family and NF-κB transcription factors. *Hypertension* **62**:317-323. PMID: 23734002.

17. **Joe, B.** and Shapiro, J.I. (2012) Molecular Mechanisms of Experimental Salt-Sensitive Hypertension. *JAHA* **1**:e002121.

18. Kennedy, D.J., Chen, Y., Huang, W., Viterna, J., Liu, J., Westfall, K., Tian, J., Bartlett, D.J., Tang, W.H., **Xie, Z.**, Shapiro, J.I. and Silverstein, R.L. (2013) CD35 and Na/K-ATPase-α1 form a proinflammatory signaling loop in kidney. *Hypertension* 61:216-224. PMID: 23172921

19. **Kim, D.H**., Liu, J., Bhat, S., Benedict, G., **Lecka-Czernik, B.**, Peterson, S.J., Ebraheim, N.A. and Heck, B.E. (2013) Peroxisome proliferator-activated receptor delta agonist attenuates nicotine suppression effect on human mesenchymal stem cell-derived osteogenesis and involves increased expression of heme oxygenase-1. *J. Bone Miner. Metab.* **31**:44-52.

20. **Kim, D.H**., **Puri, N.**, Sodhi, K., Falck, J.R., **Abraham, N.G**., Shapiro, J., Schwartzman, M.L. (2013) Cyclooxygenase-2 dependent metabolism of 20-HETE increases adiposity and adipocyte enlargement in mesenchymal stem cell-derived adipocytes. *J. Lipid Res.* **54(3)**:786-93. doi: 10.1194/jlr.M033894. Epub 2013 Jan 4.

21. Kothandapani, A., **Gopalakrishnan, K.**, Kahali, B., Reisman, D. and Patrick, S.M. (2012) Downregulation of SWI/SNF chromatin remodeling factor subunits modulate cisplatin cytotoxicity. *Exp. Cell Res.* **318(16)**:1973-86.

22. Krings, A., Rahman, S., Huang, S., Lu, Y., Czernik, P.J. and **Lecka-Czernik, B.** (2012) Bone marrow fat has brown adipose tissue characteristics, which are attenuated with aging and diabetes. *Bone* **50**:546-552. PMID21723971.

23. Kumarasamy, S., **Gopalakrishnan, K.**, Abdul-Majeed, S., Partow-Navid, R., Farms, P. and **Joe, B.** (2013) Construction of two novel reciprocal conplastic rat strains and characterization of cardiac mitochondria. *Am. J. Physiol. Heart Circ. Physiol.* **304**:H22-32.

24. Lai, F., Madan, N., Ye, Q., Duan, Q., Li, Z., Wang, S., Si, S., **Xie, Z.** (2013) Identification of a mutant α1 Na/K-ATPase that pumps but is defective in signal transduction. *J. Biol. Chem. In Press*.

25. **Lecka-Czernik, B.** (2012) Marrow fat metabolism is linked to the systemic energy metabolism. *Bone* **50**:534-539. PMID 21757043.

26. **Lecka-Czernik, B.** (2012) Safety of antidiabetic therapies on bone. *Clinical Reviews of Bone and Mineral Metabolism* DOI 10.1007/s12018-012-9129-7.

27. **Lecka-Czernik, B.** and Fowlkes, J. (2013) *Bone and Diabetes*. Meeting report from the 43rd International Sun Valley Workshop. *BoneKEY*. *in press*

28. Liu, C., Bai, Y., Chen, Y., Wang, Y., Sottejeau, Y., Liu, L., Li, X., Lingrel, J.B., Malhotra, D., Cooper, C.J., Shapiro, J.I., **Xie, Z.J.** and Tian, J. (2012) Reduction of Na/K-ATPase potentiates marinobufagenin-induced cardiac dysfunction and myocyte apoptosis. *J. Biol. Chem.* 287:16390-16398. PMCID: PMC3351339.

29. Liu, L., Aronson, J., Huang, S., Lu, Y., Czernik, P.J., Rahman, S., Kolli, V., Suva, L.J. and **Lecka-Czernik, B.** (2012) Rosiglitazone inhibits bone regeneration and causes significant accumulation of fat at sites of new bone formation. *Calcified Tissue International* 91:139-148. PMID 22752619.

30. Liu, L., Aronson, J. and **Lecka-Czernik, B.** (2013) Rosiglitazone inhibits endosteal bone formation during distraction osteogenesis by local adipocytic infiltration. *Bone* **52**:247-258.

31. Mantripragada, V.P., **Lecka-Czernik, B.**, Ebraheim, N.A. and Jayasuriya, A.C. (2013) An overview of recent advances in designing orthopedic and craniofacial implants. *J. Biomed. Mater. Res. A.* Jun 14:NA. doi: 10.1002/jbm.a.34605. [Epub ahead of print]. PMID: 2376613.

32. Marino, J.S., Iler, J., Dowling, A.R., Chua, S., Bruning, J.C., Coppari, R. and **Hill, J.W.** (2012) Adipocyte dysfunction in a mouse model of polycystic ovary syndrome (PCOS): Evidence of adipocyte hypertrophy and tissue-specific inflammation. *PLoS One* 7(10):e48643. PMID: 23119079.

*33.* Marino, J.S., Peterson, S.J., Li, M., Vanella, L., Sodhi, K., **Hill, J.W.** and Abraham, N.G. (2012) ApoA-1 mimetic restores adiponectin expression and insulin sensitivity independent of changes in body weight in female obese mice. *Nutrition and Diabetes* March 2, e33. PMID: 23169576.

34. Mehotra, A., **Joe, B.** and de la Serna, I.L. (2013) Enhanced SWI/SNF enzyme recruitment and chromatin remodeling on fetal cardiac gene promoters is associated with cardiac hypertrophy in a genetic rat model of hypertension. *J. Cell. Physiol.* 2013 *In press*. PMID: 23702776.

35. Monu, S.R., Pesce, P., Sodhi, K., Boldrin, M., **Puri, N.**, Fedorova, L., Sacerdoti, D., Peterson, S.J., **Abraham, N.G**. and Kappas, A. (2013) HO-1 induction improves the type-1 cardiorenal syndrome in mice with impaired angiotensin II-induced lymphocyte activation. *Hypertension* Aug;62(2):310-6. doi:10.1161/HYPERTENSIONAHA.111.00495. Epub Jun 10. PubMed PMID: 23753410; PubMed Central PMCID: PMC3771397.

36. **Mopidevi, B**., Ponnala, M. and **Kumar, A.** (2013) Human Angiotensinogen +11525 C/A Polymorphism Modulates Its Gene Expression Through MicroRNA Binding. *Physiological Genomics.* (Epub ahead of Print).

37. **Najjar, S.M.**, Ledford, K.J., Abdallah, S.L., Paus, A., Russo, L., **Kaw, M.**, Ramakrishnan, S.K, Muturi, H.T., Raphael, C.K., Lester, S.G, Heinrich, G., Pierre, S.V., Benndorf, R., Kleff, V., Jaffa, A., Lévy. A., **Vazquez, G.**, Goldberg, I.J, Beauchemin, N., Scalia, R. and Ergün, S. (2013) *Ceacam1* deletion causes vascular alterations in large vessels. *Am. J. Physiol. Endocrinol. Metab.* **305(4)**:E519-E529. PMID: 23800882

38. Nostramo, R., Tillinger, A., Saavedra, J.M., **Kumar, A.**, **Pandey, V**., Serova, L., Kvetnansky, R. and Sabban, E.L. (2012) Regulation of angiotensin II type 2 receptor gene expression in the adrenal medulla by acute and repeated immobilization stress. *J. Endocrinol.* 215:291-301.

39. Patel, P.R., Ramakrishnan, S.K., **Kaw, M.K.**, Raphael, C.K., Ghosh, S., Marino, J.S., Heinrich, G., Lee, S.J., Bourey, R.E., **Hill, J.W**., Jung, D.Y., Morgan, D.A., Kim, J.K., Rahmouni, K., and **Najjar, S.M.** (2012) Increased metabolic rate and insulin sensitivity in male mice lacking the carcinoembryonic antigen-related cell adhesion molecule 2. *Diabetologia* **55(3)**:763-772. PMID: 22159884.

40. Pestov, N.B., Dmitriev, R.I., Kostina, M.B., Korneenko, T.V., Shakhparonov, M.I. and **Modyanov, N.N.** (2012) Structural evolution and tissue-specific expression of tetrapod-specific second isoform of secretory pathway Ca(2+)-ATPase. *Biochem. Biophys. Res. Commun.* 417:1298-303.

41. Pillai, R., Waghulde, H., Nie, Y., **Gopalakrishnan, K.**, Kumarasamy, S., Farms, P., Garrett, M.R., Atanur, S.S., Maratou, K., Aitman, T.J. and **Joe, B.** (2013) Isolation and high-throughput sequencing of two-closely linked epistatic hypertension susceptibility loci with a panel of bicongenic strains. *Physiol Genomics. In press*. PMID: 23757393.

42. **Puri, N.,** Fan, Z., Komal, S., Lamon, B.D. and Nasjletti, A. (2012) Antioxidants condition pleiotropic vascular responses to exogenous H2O2: role of modulation of vascular TP receptors and the heme oxygenase system. *Antioxid. Redox Signal* Aug 7. [Epub ahead of print].

43. Qiu, X., Dowling, A., Marino J., Faulkner L., Brüning, J., Elias, C.F., Bryant, B. and **Hill, J.W.** (2013) Delayed puberty but normal fertility in mice with selective

deletion of insulin receptor from Kiss1 cells. *Endocrinology* 154(3**)**:1337-48. PMID: 23392256

44. Rahman, S., Czernik, P.J., Lu, Y. and **Lecka-Czernik, B.** (2012) β-Catenin Directly SequestersAdipocytic and Insulin Sensitizing Activities but not Osteoblastic Activity of PPARγ2 in Marrow Mesenchymal Stem Cells. *PLOS One* 7:e51746.

45. Rahman, S., Lu, Y., Czernik, P.J., Rosen, C.J., Enerback, S. and **Lecka-Czernik, B.** (2013) Inducible brown adipose tissue or beige fat is anabolic for the skeleton. *Endocrinology* **154**:2687-701.

46. Rutberg, A.T., Naugle, R.E., **Turner, J.W., Jr.**, Fraker, M.A. and Flanagan, D.R. (2013) Efficacy tests of one-treatment porcine zona pellucida vaccines on white-tailed deer (*Odocoileus virginianus*) on Fripp Island, South Carolina. *Wildlife Research*. *In Press*.

47. Rutberg, A.T., Naugle, R.E., **Turner, J.W., Jr.**, Fraker, M.A. and Flanagan, D.R. (2013) Field testing of single-administration porcine zona pellucida contraceptive vaccines in white-tailed deer (*Odocoileus virginianus*). *Wildlife Research* **40(4)**:281-288, published online 18 June 2013. http://dx.doi.org/10.1071/WR12117.

48. Salhi, A., Lamouroux, C., Pestov, N.B., **Modyanov, N.N.**, Doucet, A. and Crambert, G. (2013) A link between fertility and K+ homeostasis: Role of the renal H,K-ATPase type 2. *Pflügers Archiv – European Journal of Physiology* [Epub ahead of print].

49. Sjogren, B., Parra, S., Heath, L.J., Atkins, K.B., **Xie, Z.** and Neubig, R. (2012) Cardiotonic steroids stabilize RGS2 protein levels. *Mol. Pharmacol.* **82**:500-509. PMCID: PMC3422705.

50. Smedlund, K., Bah, M. and **Vazquez, G.** (2012) On the role of endothelial TRPC3 channels in endothelial dysfunction and cardiovascular disease. *Cardiovasc. Hematol. Agents Med. Chem.* **10**:265-274. PMID:22827251.

51. Sodhi, K., **Puri, N.**, Kim, D.H., **Hinds, T.D.**, Stechschulte, L.A., Favero, G., Rodella, L., Shapiro, J.I., Jude, D. and Abraham, N.G. (2013) PPARδ binding to heme oxygenase 1 promoter prevents angiotensin II-induced adipocyte dysfunction in Goldblatt hypertensive rats. *Int. J. Obes.* (Lond). Jun 19. doi: 10.1038/ijo.2013.116. [Epub ahead of print]. PMID: 23779049.

52. Sun, Z., Moreno, C., Zhuo, J.L. and **Joe, B.** (2012) Celebrating physiological genomics at the 125th anniversary of the American Physiological Society. *Physiol. Genomics* 44:699-701.

53. Tano, J.Y., Lee, R.H. and **Vazquez, G.** (2012) Involvement of calmodulin and calmodulin kinase II in tumor necrosis factor alpha-induced survival of bone

marrow derived macrophages. *Biochemical and Biophysical Research Communications*, **427**:178-184. PMID: 22989752.

54. Tano, J.Y., Lee, R.H. and **Vazquez, G.** (2012) Macrophage function in atherosclerosis: potential roles of TRP channels. *Channels (Austin)* 6:141-148. PMID: 22909953.

55. Vanella, L., Sodhi, K., Kim, D.H., **Puri, N.**, Maheshwari, M., **Hinds, T.D., Jr.**, Bellner, L., Goldstein, D., Peterson, S.J., Shapiro, J.I. and Abraham, N.G. (2013) Increased heme-oxygenase 1 expression decreases adipocyte differentiation and lipid accumulation in mesenchymal stem cells via upregulation of the canonical Wnt signaling cascade. *Stem. Cell. Res. Ther.* **4(2)**:28. [Epub ahead of print].

56. **Vazquez, G.** (2012) TRPC Channels as Prospective Targets in Atherosclerosis: terra incognita. *Frontiers in Bioscience (Schol. Ed.)* 4:157-166. PMID: 22202050.

57. Yan, Y., Haller, S., Shapiro, A., Malhotra, N., Tian, J., **Xie, Z.**, Malhotra, D., Shapiro, J.I. and Liu, J. (2012) Ouabain-stimulated trafficking regulation of the Na/K-ATPase and NHE3 in renal proximal tubule cells. *Mol. Cell. Biochem.* 367:175-183, mcbi-5426

58. Ye, Q., Lai, F., Banerjee, M., Duan, Q., Li, Z., Si, S. and **Xie, Z**. (2013) Expression of Mutant α1 Na/K-ATPase Defective in Conformational Transition Attenuates Src-mediated Signal Transduction. *J. Biol. Chem.* 288:5803-5814.

## CHAPTERS IN BOOKS

1. Albers, R.W., Siegel, G.J. and **Xie, Z.**, Chapter 5, Membrane Transport. (2012) In: Basic Neurochemistry, molecular, cellular, and medical aspects. 8th edition, Editor-in-Chief: GJ Siegel. 2012.

2. **Joe, B.** and Rapp J.P. (2012) 2012 Congenic Strain. Brenner's Online Encyclopedia of Genetics (Elsevier). Maloy S and Hughes K (Editors).

3. Bourey, R.E., **Kaw, M.K.**, Lesler, S.G., Ghanem, S.S. and **Najjar, S.M.** (2013) Diabetes. In: "Diet, Exercise, and Chronic Disease: The Biological Basis of Prevention". (C. Murray Ardies, Ed). CRC Press; pp76-96.

## REVIEWS

1. **Hill, J.W.** (2012) PVH Pathways Controlling Energy Homeostasis. (Invited Review) *Indian Journal of Endocrinology and Metabolism.* Dec;16(Suppl 3):S627-36. PMID: 23565499.

2. **Hill, J.W.**, Alreja, M. and Elias, C.F. (2013). From precocious puberty to infertility: metabolic control of the reproductive function (invited review) *Frontiers in Systems and Translational Endocrinology,* March. PMID: 23565110.

3. **Turner, J.W., Jr.** (2013) From the Pens to the Field: Real World Wildlife Contraception. *Journal of Zoo and Wildlife Medicine: Supplement***.** *In Press*.

## ABSTRACTS

1. **Ashok Kumar**, **Brahma Raju Mopidevi,** Varunkumar Pandey, Andrej Tillinger, and **Sudhir Jain**. Transgenic Mice with angiotensinogen gene have increased blood pressure as compared to -6G haplotype. HBPR Meeting (This abstract was ranked in top 10% and was invited for presentation at American Heart Association Meeting in Chicago).

2. **Brahma Raju Mopidevi**, Madhusudhan Ponnala, and **Ashok Kumar.** Human Angiotensinogen +11525 C/A Polymorphisms Modulates Its Gene Expression Through MicroRNA Binding. 2013.

3. **Brahmaraju Mopidevi,** Shreekrishna Maharjan, **Sudhir Jain,** Varunkumar G. Pandey, **Ashok Kumar.** MicroRNAs has-miR-584 and has-miR-31 Regulate Expression of Human Angiotensinogen Gene. AHBPR (Annual High Blood Pressure Research ) Conference, September 19-22, 2012, Washington D.C.

4. **CiCila, G.T**., McSweeney, A., Pettee, K.M., Yang, S., Khuder, S.A. and Lee, S.J. (2012) Identification of *Rtel1, Edn3,* and *Dnajc5* as candidate genes for rat chromosome 3 blood pressure Quantitative Trait Loci (QTLs) by gene expression profiling under multiple salt-loading conditions. Poster. Experimental Biology Meeting, San Diego, CA, April 21-25.

5. **CiCila, G.T**., Yerga-Woolwine, S., Farms, P., Lee, S.J. and **Joe, B.** ( 2012) Epistatic effects of multiple congenic regions on blood pressure and heart weight in Dahl rats under salt-loading conditions. Poster. Experimental Biology Meeting, San Diego, CA, April 21-25.

6. Dowling, A.R., Nedorezov, L.B., Marino, J.S., Qiu, X.L. and **Hill, J.W.** (2012) Effects of genetic background on insulin resistance and fertility in a polycystic ovarian syndrome mouse model. Poster, Endocrine Society 2012 Annual Meeting.

7. Dowling, A.R., Nedorezov, L.B., Marino, J.S., Qiu, X.L. and **Hill, J.W.** (2012) Effects of genetic background on insulin resistance and fertility in a polycystic ovarian syndrome mouse model. Symposium: The developmental origins of disease, University of Michigan. October.

8. Duggan, J., Okonta, H. and **Chakraborty, J**. (2012) Stem cell and progenitor cell populations in breast milk transmitted retrovirus-induced lymphoma. ID Week, October 17-21, San Diego, CA.

9. Duggan, J., Okonta, H., Nickolov, R.Z., Khoo, S.K. and **Chakraborty, J**. (2013) Gene expression of retrovirus-induced malignancy in pups of infected BALB/c mice. 112th meeting of American Society of Microbiology, May 18-21, Denver, CO.

10. Duggan, J, Okonta, H., Stuber, M., Manilukas, T.J., and **Chakraborty, J**. (2013) Lymphoma in a mouse model – alteration in mRNA expression and cellular changes. The American Society of Cell Biology, December 14-18, New Orleans, Louisiana.

11. Faulkner, L.D., Dowling, A.R. and **Hill, J.W.** (2013) Simultaneous insulin and leptin signaling in POMC neurons promotes fertility and metabolic homeostasis in male rodents. Poster, Endocrine Society Annual Meeting June.

12. Faulkner, L.D., Dowling, A.R. and **Hill, J.W.** (2013) Simultaneous insulin and leptin signaling in POMC neurons promotes fertility and metabolic homeostasis in male rodents. Poster, Keystone Conference on Neuronal Control of Appetite, Metabolism and Weight, March.

13. **Hinds, T.D., Jr.** and Abraham, N.G. (2012) Heme oxygenase-PPARα induction of FGF21 in hepatocytes recruits pAMPK/pAKT and attenuates insulin resistance in obese mice. High Blood Pressure Research American Heart Association. Washington, D.C. *Oral Presentation.*

14. **Jain, S.**, Prater, A., Pandey, V.G., Arudra, S.K.C., Mopidevi, B., Maharjan, S. and **Kumar, A.** (2012) Differential regulation of blood pressure in transgenic mice containing two haplotypes of human angiotensin receptor type 1. AHBPR (Annual High Blood Pressure Research) Cnference, September 19-22, Washington DC.

15. Kumarasamy, S., **Gopalakrishnan**, K., Yerga-Woolwine, S., Farms, P. and **Joe, B.** (2012) Novel conplastic strains reveal direct and independent effects of mitochondrial genomic variants on intrinsic aerobic fitness. *FASEB J.* **26**:1098.7, March 29.

16. Kumarasamy, S., **Gopalakrishnan**. K., Yerga-Woolwine, S., Farms, P., Liu, J. and **Joe, B.** (2012) Mapping a genetic biomarker of blood pressure to <807.3kb using two genetically hypertensive rats. *FASEB J.* **26**:874.6, March 29.

17. Lance A. Stechschulte, **Terry D. Hinds Jr.**, Manya Warrier, **Sonia Najjar,** and **Edwin R. Sanchez**. FKBP51 chaperoning of GR and PPARγ is required for diet-induced visceral adiposity and cellular adipogensis. ENDO 2013. San Franciso, California. Featured Poster. Oral Presentation.

18. Lance A. Stechschulte, **Terry D. Hinds Jr**., Manya Warrier, **Sonia Najjar,** and **Edwin R. Sanchez.** FKBP51 of GR and PPARγ is required for diet-induced visceral adiposity and cellular adipogenesis. ENDO 2013. San Francisco, California. Featured Poster Presentation.

19. Lance A. Stechschulte, **Terry D. Hinds Jr.**, Manya Warrier, **Sonia Najjar,** and **Edwin R. Sanchez**. FKBP51 of GR and PPARγ is required for diet-induced visceral adiposity and cellular adipogenesis. Graduate Research Forum. University of Toledo, Ohio. Poster Presentation.

20. Lance A. Stechschulte, Manya Warrier, Terry D. Hinds, and Edwin R. Sanchez. The nuclear receptor cochaperone FKBP51 is required for diet-induced visceral adiposity. 5th Biennial Great Lakes Nuclear Receptor Conference. Chicago campus of Northwestern University, Chicago, Illinois. Oral Presentation 2012.

21. Liu, L., Aronson, J., Czernik, P., Huang, H., Lu, Y., Rahman, S., Petluru, V., Suva, L. and **Lecka-Czernik, B.** (2012) Anti-diabetic drug rosiglitazone inhibits bone regeneration and causes massive accumulation of fat at sites of new bone formation. 34rd Annual Meeting of the American Society for Bone and Mineral Research, Minneapolis, MI. *J. Bone Miner. Res.* 27.

22. Maharjan, S., Mopidevi, B., Pandey, V.G., **Jain, S.** and **Kumar, A.** (2012) The role of MicroRNAs in the regulation of human aldosterone synthase gene expression. AHBPR (Annual High blood Pressure Research) Conference, September 19-22, Washington, DC.

23. Mopidevi, B., Maharjan**,** S., **Jain**, S., Pandey, V.G. and **Kumar, A.** (2012). MicroRNAs hsa-miR-584 and hsa-miR-31 regulate expression of human angiotensnogen gene. AHBPR (Annual High Blood Pressure Research) Conference, September 19-22, 2012, Washington, DC.

24. Petluru, V., Lu, Y., Czernik, P., Rahman, S., and **Lecka-Czernik, B.** (2012) Anti-Hypertensive drug telmisartan is a selective PPARγ agonist with anti-diabetic but not anti-osteoblastic activity. 34rd Annual Meeting of the American Society for Bone and Mineral Research, Minneapolis, MI. *J. Bone Miner. Res.* 27.

25. Pillai, R., Kumarasamy, S., Nie, Y., Yerga-Woolwine., S., Farms, P., **Gopalakrishnan, K.** and **Joe, B.** (2012) Mapping a novel blood pressure quantitative trait locus within a congenic strain spanning a single annotated gene containing segment on rat chromosome 10. *FASEB J.* **26**:874.2, March 29.

26. **Puri, N.**, Sodhi, K. and Abraham, N. (2012) Inhibition of HO-adiponectin-dependent pathways contributes to metabolic syndrome like phenotype in

spontaneously hypertensive rats on a high fat diet. Physiology & Pharmacology, University of Toledo, Toledo, OH.

27. **Puri, N.**, Sodhi, K., Falck, I.K., Jr., Schwartzman, M.L. and Abraham, N.G. (2012) EET agonist attenuates nuclear Bach1 via p-GSK-β/p-AKT-dependent pathways: Thus increasing HO1 levels and alleviating adiposity and vascular dysfunction in rats fed a high fat diet. *Winter Eicosanoid Conference*.

28. Qiu, X., Dowling, A., Marino, J., Faulkner, L, Nedorezov, L. and **Hill, J**. Insulin and leptin action on Kiss1 neurons and the regulation of puberty and reproduction. Poster, Endocrine Society 2012 Annual Meeting.

29. R. Lee and **G. Vazquez**. α7 nicotinic acetylcholine receptor protects M2 macrophages against ER stress-induced apoptosis. Experimental Biology Conference, Boston, MA, April 2013

30. Rahman, S., Lu, Y., Czernik, P., Enerback, S., Rosen, C. and **Lecka-Czernik, B.** (2012) Metabolically Active Brown Adipose Tissue (BAT) Has anabolic effects on bone through endocrine/paracrine activity including production of IGFBP2. 34rd Annual Meeting of the American Society for Bone and Mineral Research, Minneapolis, MI. *J. Bone Miner. Res.* 27.

31. Shreekrishna Maharjan, **Brahmaraju Mopidevi,** Varunkumar G. Pandey, **Sudhir Jain, Ashok Kumar.** The Role of MicroRNA's in the Regulation of Human Aldosterone Synthase Gene Expression. AHBPR (Annual High Blood Pressure Research) Conference, September 19-22, 2012, Washington, D.C.

32. Shiny Titus, Deeksha Saxena, Jaya Nautiyal, **Brahma Raju Mopidevi,** Pradeep G. Kumar, Samuel S. Koide, and Malini Laloraya (2013). "Implantin" progesterone regulated novel DNA binding factor intercedes embryo implantation.

33. Smedlund K., Ampem, P., Ingels, M, and **Vazquez G.** Role of Endothelial TRPC3 Channels in Endoplasmic Reticulum Stress Induced Apoptosis in Human Coronary Endothelial Cells". Experimental Biology Conference, Boston, MA, April 2013.

34. Solanki S., Tano JY, **Vazquez G**. Role of TRPC3 channels in survival and efferocytosis of polarized macrophages. Graduate Research Forum, University of Toledo, Toledo OH, March 2013

35. Solanki S., Tano JY., **Vazquez G**. Role of TRPC3 channels in survival and efferocytosis of polarized macrophages. Pharmacology Colloquium, Wayne State University, Detroit, MI, June 2013

36. **Sudhir Jain,** Alicia Prater, Varunkumar G. Pandey, SKC Arudra, **Brahmaraju Mopidevi**, Shreekrishna Maharjan, **Ashok Kumar.** Differential Regulation of Blood Pressure in Transgenic Mice Containing two Haplotypes of Human

angiotensin Receptor Type 1. AHBPR (Annual High Blood Pressure Research) Conference, September 19-22, 2012, Washington, D.C.

37. **Sudhir Jain**, **Brahma Raju Mopidevi**, Varunkumar Pandey, Andrej Tillinger, and **Ashok Kumar**. Three new polymorphisms in the promoter of human angiotensinogen gene that explain the assocation of -6A allele with hypertension. HBPR Meeting.

38. **Sudhir Jain**, Varunkumar G. Pandey, **Ashok Kumar.** Transgenic Mice Containing two Haplotypes of Human Angiotensin Receptor Type 1 Shows Differential Gene Expression and Regulation of Blood Pressure. EB (Experimental Biology) April 20-24, 2013, Boston.

39. **Turner, J.W., Jr.** (2012) Invited speaker: Controlled-release contraceptive vaccines for wild horses, presented at The Wild Horse Symposium, Jackson Hole, WY, August 28.

40. **Turner, J.W., Jr.** (2012) Invited speaker: Porcine zona pellucida vaccine for wild horse contraception. Presented at National Academy of Sciences Conference, Spokane, WA, January 26-28.

41. **Turner, J.W., Jr.** and Rutberg, A.T. (2012) Invited speaker: From the pens to the field: real-world wildlife contraception. Presented at 7th International Conference on Fertility Control in Wildlife. Jackson Hole, WY, August 29-31.

42. Varunkumar G. Pandey, **Sudhir Jain** and **Ashok Kumar**. Dexamethasone Differentially Modulates the Human Angiotensinogen Gene (hAGT) Expression and Blood Pressure in Transgenic Mice Containing -6A and -6G Haplotype of the hAGT Gene. EB (Experimental Biology) April 20-14, 2013, Boston.

43. Waghulde, H., Pillai, R., Nie, Y., **Gopalakrishnan, K.**, Kumarasamy, S., Farms, P., Garrett, M.R., Atanur, S., Aitman. T.J. and **Joe, B.** (2013) Epistasis involving variations within noncoding elements accounts for 'missing heritability' of two closely-linked blood pressure Loci. *FASEB J.* **27**:955.3

## GRANTS

New Grants and Competing Renewals Awarded July1, 2012 – June 30, 2013

PI: **Bina Joe**
Agency: NIH/NHLBI
Grant Number: RO1- HL020176
Period of Support: 09/01/13 – 08/31/2018
Annual Award excluding indirect costs: $365,774
CSR-IRG review completed; Percentile scored = 4
Disposition: Funded

Continuing Grants

PI: **Joana Chakraborty**
Agency: F.M. Douglass Foundation
Grant Number: N-123776-01
Period of Support: 01/01/2013 – 12/31/2013
Annual Award excluding indirect costs: $25,000
Disposition: Funded

PI: Damien Earl, M.D., Ph.D. student
Sponsor: **Elizabeth I. Tietz**
Agency: NIH
Grant Number: F30-DA-026675-05
Period of Support: 04/01/2009 – 05/31/2013
Annual Award excluding indirect costs: $12,372
Disposition: Funded

PI: **Latrice Faulkner**, Graduate Student
Sponsor: **Jennifer Hill**
Agency: NIH
Grant Number: F31-HD-75608-01
Period of Support: 01/01/2013 – 12/31/15
Annual Award excluding indirect costs: $42,232
Disposition: Funded

PI: **Bina Joe**
Agency: NIH/NHLBI
Grant Number: RO1-HL11264-01
Period of Support: 12/01/2011- 11/30/2016
Annual Award excluding indirect costs: $439,765
Disposition: Funded

PI: Harold G. Klemcke
Contractor: **Bina Joe**

Agency: US Army Institute of Surgical Research, San Antonio, Texas
Contract Number: W81XWH-12-0052
Period of Support: 12/01/2011 - 01/13/2014
Annual Award excluding indirect costs: $42,724
Disposition: Funded

PI: Michal Schwartzman
Consultant: **Bina Joe**
Agency: NIH/NHLBI
Grant Number: PO1-HL034300
Period of Support: 2011-2016
Disposition: Funded

PI: **Ashok Kumar**
Agency: NIH
Grant Number: R01-HL-092558-02
Period of Support: 02/02/2012 – 06/30/2014
Annual Award excluding indirect costs - $247,500
Disposition: Funded

PI: **Ashok Kumar**
Agency: NIH
Grant Number: R01-HL105113-03
Period of Support: 12/01/2011 – 11/30/2014
Annual Award excluding indirect costs: $238,000
Disposition: Funded

PI: **Jennifer Hill**
Agency: NIH
Grant Number: R21-HD-071529-02
Period of Support: 03/08/2012 – 02/28/2014
Annual Award excluding indirect costs: $118,418
Disposition: Funded

PI: **Sonia M. Najjar**
Agency: NIH/NHLBI
Grant Number: R01-HL-112248-02
Period of Support: 01/01/2012 – 12/31/2016
Annual Award excluding indirect costs: $252,853
Disposition: Funded

PI: **Sonia M. Najjar**
Co-Investigator: **Edwin R. Sanchez**
Agency: NIH/NIDDK
Grant Number: R01-DK-054254-12
Period of Support: 03/01/2000 – 02/28/2015

Annual Award excluding indirect costs: $206,376

PI: Amir Askari
Leader of Project 2: **Sonia M. Najjar**
Agency: NIH/NHLBI
Grant Number: 5-P01-HL-036573-25
Period of Support: 04/15/2009 – 03/31/2014
Annual Award excluding indirect costs: $1,077,410
Disposition: Funded

PI: **Kathryn Smedlund**
Sponsor: **Guillermo Vazquez**
Agency: American Heart Association (AHA)
Grant Number: 12POST11910042
Period of Support: 07/01/2012 – 06/30/2014
Annual Award excluding indirect costs: $43,000
Disposition: Funded

PI: **John W. Turner, Jr.**
Agency: Bureau of Land Management
Grant Number: L10AC20431
Period of Support: 10/01/2010 – 09/30/2015
Annual Award excluding indirect costs: $476,984
Disposition: Funded

PI: **John W. Turner, Jr.**
Agency: Stranahan Foundation
Grant Number: 203397
Period of Support: 07/01/2009 – 06/30/2015
Total Award excluding indirect costs: $31,873
Disposition: Funded

PI: **John W. Turner, Jr.**
Agency: Humane Society of U.S.
Grant Number: N-120280-01
Period of Support: 12/21/2007 – 12/31/2013
Total Award excluding indirect costs: $67,235
Disposition: Funded

PI: **Guillermo Vazquez**
Agency: NIH
Grant Number: R01-HL-111877-02
Period of Support: 12/15/2011 – 11/30/2015
Annual Award excluding indirect costs: $238,000

PI: **Zi-Jian Xie**
Agency: NIH
Grant Number: 1R01HL109015-01
Period of Support: 08/08/2011 – 05/31/2015
Annual Award excluding indirect costs: $381,281
Disposition: Funded

PI: Jiang Tian
Co-investigator: **Zi-Jian Xie**
Agency: NIH
Grant Number: HL105649-01A1
Period of Support: 12/15/2011 – 11/30/2016
Annual Award excluding indirect costs: $238,000
Disposition: Funded

PI: **Zi-Jian Xie**
Agency: Mudanjian Youbo Pharmaceutical Co. Ltd.
Grant Number: N-123329-01
Period of Support: 05/15/2012 – 11/01/2013
Annual Award excluding indirect costs: $115,385
Disposition: Funded

PI: Zichuan Li
Co-Investigator: **Zi-Jian Xie**
Agency: University of Toledo Foundation
Grant Number: N-123983-01
Period of Support: 04/01/2013 – 03/31/2014
Annual Award excluding indirect costs: $25,000
Disposition: Funded

Grants Applied for July 1, 2012 – June 30, 2013

PI: **Ashok Kumar**
Agency: NIH/NHLBI
Period of Support: 04/01/2014 – 03/31/2019
Annual Award excluding indirect costs: $427,427
Disposition: Submitted

PI: **Guillermo Vazquez**
Agency: NIH/NHBLI
Period of Support: 12/15/2011 – 11/30/2015
Annual Award excluding indirect costs: $238,000
Disposition: Funded

**Table 1**

| | | | | BMS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | 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 | MSBS-MS | | PA Pharm |
| Nader Abraham | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Andrew D. Beavis, Ph.D. | 188 | 120 | 46 | 22 | 13 | 4 | 4 | 4 | 7 | 8 | 2 | 42 | | 4 | | 40 | | | | | 92 |
| Joana Chakraborty, Ph.D. | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| George T. Cicila, Ph.D. | 77 | 26 | 30 | 21 | | | | | | | | | 20 | | | 40 | | | 10 | | |
| Debra Gmerek | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Jennifer Hill | 24 | 4 | 6 | 14 | | | | | | | | | | | | 12 | | | 6 | | |
| Bina Joe, Ph.D. | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Dong Hyun Kim | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Beata Lecka-Czernik | 4 | 0 | 0 | 4 | | | | | | | | | | | | | | | | | |
| Terry Hinds | 29 | 12 | 13 | 4 | 4 | | | | 2 | | | 6 | | 7 | | | | | | | 12 |
| Sudhir Jain | 6 | 0 | 0 | 6 | | | | | | | | | | | | | | | | | |
| Edith Mensah-Osman | 4 | 0 | 0 | 4 | | | | | | | | | | | | | | | | | |
| Patricia J. Metting, Ph.D. | 22 | 0 | 22 | 0 | | | | 22 | | | | 22 | | | | | | | | | |
| Nikolai Modyanov, Ph.D. | 30 | 0 | 0 | 30 | | | | | | | | | | | | | | | | | |
| Sonia M. Najjar, Ph.D. | 6 | 0 | 0 | 6 | | | | | | | | | | | | | | | | | |
| Nitin Puri | 92 | 18 | 58 | 16 | | 18 | 12 | | 10 | | | 40 | | | | | | | 18 | | |
| Phillip Robinson | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Howard C. Rosenberg, M.D., Ph.D. | 59 | 14 | 45 | 0 | 3 | 16 | 4 | 18 | | 2 | 2 | 45 | | | | | | | | | 14 |
| Edwin R. Sanchez, Ph.D. | 31 | 4 | 8 | 19 | 2 | | | | 2 | 2 | | 6 | 2 | | | | | | | | 4 |
| John W. Turner Jr., Ph.D. | 32 | 6 | 26 | 0 | | | | | 14 | 12 | | 26 | | | | | | | | | |
| Guillermo Vazquez | 15 | 0 | 4 | 11 | | | 4 | | | | | 4 | | | | | | | | | |
| Xiaodong Wang, Ph.D. | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Zi-Jian Xie, Ph.D. | 20 | 9 | 4 | 7 | | | 3 | | 1 | | | 4 | | | | | | | | | 9 |
| | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | |
| Total Hours | 639 | 213 | 262 | 164 | 22 | 38 | 27 | 44 | 36 | 24 | 4 | 195 | 22 | 11 | 0 | 92 | 0 | 0 | 34 | | 131 |

*, Didactic Hours included in "Total hr"; excludes small group

| **KEY** | | | |
|---|---|---|---|
| CMB | Cellular and Molecular Biology | OBAS | On Being a Scientist (Taught 2x per year) |
| OS | Organ Systems | Seminar | Seminars in CVMD |
| I and I | Immunity and Infection | PA Pharm | Fundamentals of Pharmacology I, spring (PA Program) |
| FCP | Fundamentals of Clinical Practice | PA Pharm | Fundamentals of Pharmacology II, summer (PA Program) |
| PBL | Clinical Decision Making I - small group | PA Pharm | Fundamentals of Pharmacology III, fall (PA Program) |
| MSBS | Advanced Human Physiology - MSBS | PA Phys | Human Physiology (PA program) |
| CPRA | CPRA Protein Structure and Catalysis | PT Phys | Clinical Pathophysiology (Physical Therapy Program) (HSHS) |
| SPI | Systems Pathophysiology, I | PA Gen | Basic Genetics |
| SPII | Systems Pathophysiology, II | HDS Pharm | Scientific and Clinical Foundations for Human Organ Donation and Transplantation\ |
| Signals | CPRA Cell Biology and Signaling | CVMD | Advanced Topics in CVMD |
| Methods | Methods in Biomedical Sciences | GenEpi | Genetic Epidemiology |
| Bioinf | Fund. Bioinformatics, Proteomic and Genomics | PTL | Pharmacology and Toxicology Laboratory |
| GWW | Grant Writing Workshop | BRIM | Biomarkers and Individualized Medicine |
| NND | NND Systems Pathology | IBR | Introduction to Biomedical Research |

**Table 1**

| | | | | COP | HSHS | COM Graduate Studies | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PA Phys | PA Gen | HDS Pharm | PTL | PT Phys | CPRA | Methods | Signals | SPII | Bioinf | SPI | BRIM | CVMD | IBR | OBAS | NND | GWW | Gen Epi |
| Nader Abraham | | | | | | | | | | | | | | | | | | |
| Andrew D. Beavis, Ph.D. | | | 26 | 2 | | 8 | | 2 | 10 | | | | 2 | | | | | |
| Joana Chakraborty, Ph.D. | | | | | | | | | | | | | | | | | | |
| George T. Cicila, Ph.D. | 8 | 18 | | | | 2 | 5 | | | 4 | | 2 | 2 | | | | 2 | 4 |
| Debra Gmerek | | | | | | | | | | | | | | | | | | |
| Jennifer Hill | 4 | | | | | | | | 2 | | 2 | | 2 | 1 | | 2 | 5 | |
| Bina Joe, Ph.D. | | | | | | | | | | | | | | | | | | |
| Dong Hyun Kim | | | | | | | | | | | | | | | | | | |
| Beata Lecka-Czernik | | | | | | | | | 1 | | 1 | | 2 | | | | | |
| Terry Hinds | | | | | | | | 2 | | | | | 2 | | | | | |
| Sudhir Jain | | | | | | | | | | | 2 | 2 | 2 | | | | | |
| Edith Mensah-Osman | | | | | | | | | 1 | | 1 | | 2 | | | | | |
| Patricia J. Metting, Ph.D. | | | | | | | | | | | | | | | | | | |
| Nikolai Modyanov, Ph.D. | | | | | | 22 | | | | 8 | | | | | | | | |
| Sonia M. Najjar, Ph.D. | | | | | | | | | 2 | | | | 2 | | | | 2 | |
| Nitin Puri | 18 | | | | | | | | 4 | | 4 | 2 | 6 | | | | | |
| Phillip Robinson | | | | | | | | | | | | | | | | | | |
| Howard C. Rosenberg, M.D., Ph.D. | | | | | | | | | | | | | | | | | | |
| Edwin R. Sanchez, Ph.D. | | | | | | | | 14 | 2 | | | | 2 | | | | 1 | |
| John W. Turner Jr., Ph.D. | 6 | | | | | | | | | | | | | | | | | |
| Guillermo Vazquez | | | | | | | | 4 | 2 | | | | 2 | | | | 3 | |
| Xiaodong Wang, Ph.D. | | | | | | | | | | | | | | | | | | |
| Zi-Jian Xie, Ph.D. | | | | | | 2 | | 2 | 1 | | | | 2 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | 36 | 18 | 26 | 2 | 0 | 34 | 5 | 24 | 25 | 12 | 10 | | 28 | | 0 | | 13 | 4 |

**Table 2**

**DEPARTMENT OF PHYSIOLOGY & PHARMACOLOGY**

**2012-2013 SPACE**

**1st FLOOR BHSB - CEDER**

| Room Number | Room Use | Square Feet |
|---|---|---|
| 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 BHSB**

| Room Number | Room Use | Square Feet |
|---|---|---|
| 202 | Lab | 653 |
| 203 | Lab | 648 |
| 204 | Lab | 642 |
| 206 | Office | 153 |
| 213 | Office | 154 |
| 214 | Office | 153 |
| 217 | Dark Room | 78 |
| 223 | File Room | 92 |
| 226 | Lab | 120 |
| 226A | Lab | 100 |
| 227 | Lab | 255 |
| 228 | File Room | 157 |
| 231 | Lab | 268 |
| 233 | Lab | 635 |
| 237 | Office | 161 |
| 237A | Office | 302 |
| 237B | Office | 170 |
| 238 | Lab | 355 |
| 238A | Lab | 502 |
| 239 | Lab | 320 |
| 239B | Lab | 431 |
| 240 | Lab | 422 |

**Table 2**

| | | |
|---|---|---|
| 242 | Office | 154 |
| 247 | Office | 159 |
| 248 | Office | 156 |
| 249 | Office | 92 |
| 251 | Lab | 180 |
| 253 | Lab | 50 |
| 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 | 68 |
| 269 | Office | 113 |
| 270 | Office | 105 |
| 271 | Office | 106 |
| 275 | Common Area | 362 |
| 276 | Storage Room | 79 |
| 277 | Office | 138 |
| 278 | Office | 130 |
| 282 | Office | 763 |
| 283 | Office | 126 |
| 284 | Office | 271 |
| 285 | Office | 110 |
| 286 | Office | 119 |
| 287 | Office | 120 |
| 288 | Office | 98 |
| 289 | Conference Room | 317 |

**3RD FLOOR BHSB**

| | | |
|---|---|---|
| 307 | Lab | 132 |
| 308 | Office | 154 |
| 310 | Office | 154 |
| 312 | Office | 157 |

**Table 2**

| | | |
|---|---|---|
| 315 | Shared Room | 112 |
| 317 | Shared Room | 78 |
| 320 | Office | 99 |
| 321 | Xerox Room | 77 |
| 329 | Lab | 160 |
| 331 | Shared Room | 255 |
| 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 | Office | 107 |
| 351A | Office | 206 |
| 364 | Lab | 210 |
| 366 | Lab | 158 |
| 368 | Lab | 154 |
| 368A | Lab | 152 |
| 369 | Lab | 641 |
| 375A | Conference Room | 375 |
| 375B | Conference Room | 327 |
| 376 | Common Area | 99 |
| 378 | Office | 130 |
| 381 | Office | 190 |
| 382 | Office | 125 |
| 383 | Office | 125 |
| 384 | Office | 125 |
| 385 | Office | 125 |
| 386 | Office | 134 |
| 387 | Office | 154 |

## Medicine, College of

| | | Cash? | Direct Cost | Indirect Cost | Total Award | Dept Award Credit |
|---|---|---|---|---|---|---|

### Pediatrics, Department of

| | | | | | | |
|---|---|---|---|---|---|---|
| **N-123834-01** | **MSV - A Randomized, Multi-Center, Parallel-Group, Single-Dose, Pharmacokinetics and Pharmacodynamics Study of Dapaglifozin in Children and Adolescents Aged 10 to 17 Years with Type 2 Diabetes Melitus** | **Yes** | **$6,654** | **$1,996** | **$8,650** | **$8,650** |
| *1/1/14 to 12/31/14* | *Bristol-Myers Squibb* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Blumer, Jeffrey L. | Pediatrics, Department of | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **N-123835-01** | **Evaluation of the Pharmacokinetics of Saxagliptin, 5·Hydrcxy Saxagiiptin, and Metformin in Children and Adolescents Aged 10 to 17 Years with Type 2 Diabetes Metilitus Following Oral Administration of Saxagliptin and Metformin XR Fixed Dose Combination Tablet and Co-Administration of ...** | **Yes** | **$6,654** | **$1,996** | **$8,650** | **$8,650** |
| *10/16/12 to 10/15/13* | *Bristol-Myers Squibb* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Blumer, Jeffrey L. | Pediatrics, Department of | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **N-123836-01** | **A Multicenter, Randomized, Observer Blinded, Active-Controlled Study Evaluating the Safety, Tolerability, Pharmacokinetics, and Efficacy of Ceftaroline Versus Ceftriaxone in Pediatric Subjects With Community-acquired Bacterial Pneumonia Requiring Hospitalization** | **Yes** | **$6,750** | **$2,025** | **$8,775** | **$8,775** |
| *8/22/12 to 8/21/14* | *Cerexa, Inc.* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Blumer, Jeffrey L. | Pediatrics, Department of | 100 |

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|---|---|---|---|---|---|---|
| **T-122287-02** | **Identification of New Mechanistic Biomarkers of Adverse Responses to Acetaminophen** | **Yes** | **$1,412** | **$703** | **$2,115** | **$2,115** |
| *4/1/10 to 3/31/11* | *National Institutes of Health through Arkansas Children's Hospital Research Institute* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Blumer, Jeffrey L. | Pediatrics, Department of | 100 |

Sum of Department (**Pediatrics, Department of**) Award Count: **34.00** **$720,901**

### Phys Pharm Met/Cardio Science, Department of

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|---|---|---|---|---|---|---|
| **C-010087-25** | **Digitalis-Induced Signaling by Cardiac Na+/K+-ATPase** | **No** | **$1,077,410** | **$375,943** | **$1,453,353** | |
| *4/1/13 to 3/31/14* | *National Heart, Lung & Blood Institute* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Askari, Amir | Biochemistry & Cancer Biology, Department of | 100 |
| Co-I | Liu, Lijun | Biochemistry & Cancer Biology, Department of | |
| Co-I | Najjar, Sonia | Phys Pharm Met/Cardio Science, Department of | |
| Co-I | Pierre, Sandrine V. | Phys Pharm Met/Cardio Science, Department of | |

**Phys Pharm Met/Cardio Science, Department of**

| | | Cash? | Direct Cost | Indirect Cost | Total Award | Dept Award Credit |
|---|---|---|---|---|---|---|
| **C-010991-12** | **CEACAM and Insulin Action** | **No** | **$206,376** | **$104,468** | **$310,844** | **$310,844** |
| *5/1/13 to 4/30/14* | *National Institute of Diabetes, Digestive & Kidney Diseases* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Najjar, Sonia | Phys Pharm Met/Cardio Science, Department of | 90 |
| Co-I | Sanchez, Edwin | Phys Pharm Met/Cardio Science, Department of | 10 |

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|---|---|---|---|---|---|---|
| **C-120298-05** | **Choose Ohio First Scholarship Program** | **No** | **$37,600** | **$0** | **$37,600** | |
| *7/1/12 to 6/30/14* | *Ohio Board of Regents through Ohio University* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Blumenthal, Robert | Med Microbiology & Immunology, Department of | 100 |
| Co-I | Chin, Khew-Voon | Medicine, Department of | |
| Co-I | Fedorov, Alexei | Medicine, Department of | |
| Co-I | Khuder, Sadik | Medicine, Department of | |
| Co-I | Trumbly, Robert | Biochemistry & Cancer Biology, Department of | |
| Co-I | Weaver, David | Phys Pharm Met/Cardio Science, Department of | |

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|---|---|---|---|---|---|---|
| **C-120629-05** | **Regulation of Voltage-gated Calcium Channels During Chronic BZ Treatment in Rats** | **No** | **$12,372** | **$0** | **$12,372** | **$12,372** |
| *4/1/13 to 5/31/13* | *National Institute on Drug Abuse* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| Stdnt Schol | Earl, Damien E. | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-121746-02** | **Na/K-ATPase Reduction in Renal Disease-Related Cardiac Dysfunction** | **No** | **$238,000** | **$118,524** | **$356,524** | |
| *12/15/12 to 12/14/13* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Tian, Jiang | Medicine, Department of | 100 |
| Co-I | Liu, Jiang | Medicine, Department of | |
| Co-I | Liu, Lijun | Biochemistry & Cancer Biology, Department of | |
| Co-I | Xie, Zi-Jian | Phys Pharm Met/Cardio Science, Department of | |

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|---|---|---|---|---|---|---|
| **C-122145-03** | **Development of a 3- to 4-year Controlled-Release PZP Contraceptive Vaccine For Wild Horses** | **No** | **$119,048** | **$30,952** | **$150,000** | **$150,000** |
| *8/27/12 to 9/29/13* | *Bureau of Land Management* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Turner, John | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122214-03** | **Receptor Na/K-ATPase Antagonists As Novel Therapeutics For Renal/Cardiac Diseases** | **No** | **$381,281** | **$156,066** | **$537,347** | **$537,347** |
| *6/1/13 to 5/31/14* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Xie, Zi-Jian | Phys Pharm Met/Cardio Science, Department of | 100 |
| Co-I | Liu, Lijun | Phys Pharm Met/Cardio Science, Department of | |
| Co-I | Tian, Jiang | Medicine, Department of | |

## Medicine, College of

### Phys Pharm Met/Cardio Science, Department of

| | | Cash? | Direct Cost | Indirect Cost | Total Award | Dept Award Credit |
|---|---|---|---|---|---|---|
| **C-122444-02** | **TRPC3 Protein in Molecular and Cellular Events During Atherogenesis** | **No** | **$238,000** | **$118,524** | **$356,524** | **$356,524** |
| *12/1/12 to 11/30/13* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Vazquez, Guillermo | Phys Pharm Met/Cardio Science, Department of | 100 |
| Co-I | Abraham, Nader G. | Phys Pharm Met/Cardio Science, Department of | |
| Co-I | Pierre, Sandrine V. | Phys Pharm Met/Cardio Science, Department of | |
| Co-I | Wooten, Ronald Mark | Med Microbiology & Immunology, Department of | |

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|---|---|---|---|---|---|---|
| **C-122477-02** | **Inflammatory Triggers of Polycystic Ovarian Syndrome** | **No** | **$118,418** | **$58,972** | **$177,390** | **$177,390** |
| *3/1/13 to 2/28/14* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Hill, Jennifer E.W. | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122488-02** | **CEACAM1: A link between metabolic and cardiovascular diseases** | **No** | **$252,853** | **$104,468** | **$357,321** | **$357,321** |
| *1/1/13 to 12/31/13* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Najjar, Sonia | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122616-02** | **Innovative Models for Mechanistic Studies of Novel Hypertension Genes** | **No** | **$439,765** | **$219,003** | **$658,768** | **$658,768** |
| *12/1/12 to 11/30/13* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Joe, Bina | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122885-03** | **Genetics of Hypertension** | **No** | **$238,000** | **$118,524** | **$356,524** | **$356,524** |
| *12/1/12 to 11/30/13* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Kumar, Ashok | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122938-02** | **Breeding of Specific Inbred Rat Strains** | **No** | **$42,724** | **$21,277** | **$64,001** | **$64,001** |
| *1/14/13 to 1/13/14* | *U. S. Army Medical Research and Materiel Command* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Joe, Bina | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-122950-05** | **Transcriptional Regulation of Angiotensinogen Gene** | **No** | **$247,500** | **$123,255** | **$370,755** | **$370,755** |
| *7/1/12 to 6/30/13* | *National Heart, Lung & Blood Institute* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Kumar, Ashok | Phys Pharm Met/Cardio Science, Department of | 100 |

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|---|---|---|---|---|---|---|
| **N-123776-01** | **Cellular Mechanisms of Retrovirus Induced Breast Milk Transmitted Lymphoma Development** | **No** | **$25,000** | **$0** | **$25,000** | **$25,000** |
| *1/1/13 to 12/31/13* | *F.M. Douglass Foundation* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Chakraborty, Joana | Phys Pharm Met/Cardio Science, Department of | 100 |
| Co-I | Duggan, Joan | Medicine, Department of | |

## Medicine, College of

**Phys Pharm Met/Cardio Science, Department of**

| | | Cash? | Direct Cost | Indirect Cost | Total Award | Dept Award Credit |
|---|---|---|---|---|---|---|
| **N-123983-01** | **Na/K-ATPase/Src receptor as a target for novel therapeutics in systemic sclerosis** | **No** | **$25,000** | **$0** | **$25,000** | **$10,000** |
| *4/1/13 to 3/30/14* | *University of Toledo Foundation* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Li, Zhichuan | Medicine, Department of | 60 |
| Co-I | Xie, Zi-Jian | Phys Pharm Met/Cardio Science, Department of | 40 |

Sum of Department (**Phys Pharm Met/Cardio Science, Depa** Award Count: **12.40** **$3,386,846**

**Psychiatry, Department of**

| | | | | | | |
|---|---|---|---|---|---|---|
| **C-121274-03** | **ACT Great Lakes Regional Center** | **No** | **$15,000** | **$0** | **$15,000** | **$15,000** |
| *2/1/12 to 1/31/13* | *MetLife Foundation through American Psychological Association* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Knox, Michele | Psychiatry, Department of | 100 |

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|---|---|---|---|---|---|---|
| **C-121274-04** | **ACT Great Lakes Regional Center** | **No** | **$16,500** | **$0** | **$16,500** | **$16,500** |
| *2/1/13 to 1/31/14* | *MetLife Foundation through American Psychological Association* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Knox, Michele | Psychiatry, Department of | 100 |

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|---|---|---|---|---|---|---|
| **N-122910-01-A1** | **Longitudinal MRI study of PTSD development from days to weeks after trauma** | **No** | **$156,558** | **$77,966** | **$234,524** | **$211,072** |
| *4/1/13 to 3/31/14* | *National Institutes of Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Wang, Xin | Psychiatry, Department of | 50 |
| Co-I | Brickman, Kristopher R. | Surgery, Department of | 5 |
| Co-I | Dennis, Michael | Radiology, Department of | 0 |
| Co-I | Elhai, Jon D. | Psychology, Department of | 0 |
| Co-I | Smirnoff-Poling, Jennifer Boyd | Psychiatry, Department of | |
| Co-I | Tamburrino, Marijo | Psychiatry, Department of | 40 |
| Co-I | Xie, Hong | Neurosciences, Department of | 5 |

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|---|---|---|---|---|---|---|
| **N-123542-01** | **ACT: Promoting Healthy, Nonviolent Relationships for Teen Parents** | **No** | **$15,000** | **$0** | **$15,000** | **$15,000** |
| *10/24/12 to 6/30/14* | *Verizon Foundation* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Knox, Michele | Psychiatry, Department of | 100 |

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|---|---|---|---|---|---|---|
| **R-010532-18** | **Adult Psychiatry Residency and Training Program** | **No** | **$38,096** | **$1,905** | **$40,001** | **$40,001** |
| *7/1/12 to 6/30/13* | *Ohio Department of Mental Health* | | | | | |

| Role | Name | Department | % Credit |
|---|---|---|---|
| PI/PD | Smith, Mary Kay | Psychiatry, Department of | 100 |

**DEPARTMENT OF PHYSIOLOGY AND PHARMACOLOGY TOTAL EXPENDITURES BY FISCAL YEAR**

| Fiscal Year | Total Expenditures |
|---|---|
| 2010 | $3,425,519 |
| 2011 | $4,552,541 |
| 2012 | $5,553,815 |
| 2013 | $5,157,045 |