Graduate School of Biomedical Sciences

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Insulin regulates blood sugar levels. Oxidative stress inactivates insulin signaling. This causes insulin resistance in part due to activation of the stress-response pathways. My results show the importance of oxidative stress in the development of insulin resistance and diabetes.
Preterm births constitute the largest obstetrical problem in America. A preterm birth presents an extraordinary life situation for fathers, whose voices are rarely heard. I explored the experience of parenting preterm infants from the fathers’ perspectives.
I used ultrasound imaging to evaluate various methods of assessing amniotic fluid as a predictor of neonatal outcomes. None of the fluid assessment methods tested proved predictive of adverse neonatal outcomes, indicating they should not be used as the sole indicator for elective induction.
My research focused on a potential therapeutic treatment to enhance the immune system after a severe burn injury. The hope is that my research will lead to new clinical therapies that will prevent victims of severe burn injuries from acquiring deadly bacterial infections.
Pancreatic cancer is a deadly disease resistant to current drug therapy. We have identified molecules from natural products that can inhibit pancreatic cell growth and may prove useful therapeutically.
Tourists to Cusco, Peru (3,310 m) were unprepared for the stresses of high altitude travel. They experienced a high prevalence of significant altitude illness. Coca leaf products were commonly used despite their unproven effectiveness and possible deleterious effects. Acetazolamide prophylaxis was underutilized.
Infection with Hepatitis C Virus (HCV) induces liver damage by the production of reactive oxygen species (ROS) and the induction of cell death. I investigated how HCV and ROS act together to cause such damage and, in addition, studied the antiviral effect of an antioxidant.
My study explored secondary stress in caregivers of persons with oral cancer. I investigated the physical, psychological, and interpersonal hardships the caregivers experienced.
Cocaine memories provoke cravings and a return to drug-taking in addicts. I studied the behavioral and brain changes involved in the learning of cocaine memories. I found that only a sub-group of subjects formed cocaine memories and those that do had a distinct pattern of brain protein expression.
HIV infects over 40 million people worldwide. HIV requires host proteins to successfully replicate and cause disease. I have shown that a human protein ADAM10 moves the viral genetic information to the cell nucleus and is required to establish infection. Therefore targeting this virus-host protein interaction could lead to new treatments.
With increasing age there is a characteristic loss of skeletal muscle mass in humans. I explored the effect of different exercise techniques on the regulation of muscle protein synthesis in older persons. These results helped to identify interventions, such as blood flow restriction, that stimulate muscle growth in older adults.
Natural Killer (NK) cells are one of our bodies primary defenses to infection. My research shows that NK cells are protective during Anthrax infection. Modifying NK cells to have increased antibacterial activity may lead to enhanced protection to Anthrax infection.
Adaptation to the U. S. way of life may cause stress in Hispanic groups. I studied how immigrant groups adapt to the U.S. and how this related to intimate partner violence. Findings from this study suggest that cultural attitudes are important in the study of intimate partner violence in Hispanics.
There is a disability gap among older minority groups in the U.S. I investigated whether social support and networks affected that gap. I found that social support reduces this disability gap. Social networks and support are complex, and may act differently among disparate groups of older adults.
I focused on understanding the replication of Hepatitis C virus, a causative agent of hepatitis. My results increased our understanding of how the virus utilizes two host factors to promote its own growth. This can potentially lead to novel therapies for Hepatitis C virus.
Despite the availability of medications for treating genital herpes, these infections remain common and problematic. Vaccine development is hampered by our incomplete understanding of immune responses to this virus. My work was directed at influencing and directing immune responses to enhance potential vaccines to Herpes virus.
Alzheimer’s disease (AD) is the most common cause of dementia. One feature of AD is the presence of aggregates of protein tau in the brain. The correlation between aggregates and AD disease progression remains contentious. I studied the relevance of tau aggregate subunits in AD.
Anthrax infection leads to severe changes in the human body that can result in illness and death. Disease progression can affect multiple organs including the heart. Both the bacteria and its toxins can change normal cardiac function and cellular function in heart tissue.
I explored the support that nurses provide to women anticipating a preterm birth, from the nurses’ perspectives. My findings provide a novel description of the essence of such support that will help nursing practice professionals, educators, and policy makers.
Mutations in the polycystin-1 gene can cause Autosomal Dominant Polycystic Kidney Disease. Using the combination of molecular biology and atomic force microscopy, I examined missense mutations and effects of osmolytes on mechanical properties of the polycystin-1 protein, which acts as a mechanosensor in kidney.
Recombination is a mechanism for the exchange of genetic information between mosquito-transmitted viruses. It may result in new viruses of public health concern. I evaluated the potential for and consequences of recombination between mosquito-borne viruses. Recombination between wild-type and vaccine viruses does not lead to new viruses that would be public health threats.
Eliciting potent immune cells (CD8+ T cells) will be important for the development of an effective vaccine to control genital herpes. I showed that CD8+ T cells are necessary and can be induced by immune stimulating agents. This may lead to new effective vaccines.
There are cell proteins that detect viral infections. These proteins send signals to trigger antiviral responses. I discovered Hepatitis A virus produces two proteins which degrade cell proteins that initially detect viral infections. This discovery may lead to new ways to fight viral infections.
Chemokines are proteins that play a role in host defense against infection by binding to receptors on immune cells. This study focused on how chemokines IL-8 and MGSA bind and interact with their receptors. This knowledge is essential for designing drugs for several infectious and autoimmune diseases.
Alzheimer’s Disease (AD) is a progressive, neurodegenerative disorder and the most prevalent senile dementia. I examined a subset of the signaling pathways which result in memory dysfunction in the early stages of the disease, using several models of AD as well as human brain tissue.
My studies revealed that treatment with the anti-diabetic drug rosiglitazone prevents age-dependent memory deficits in Alzheimer’s disease (AD). Treatment with rosiglitazone activates peroxisome proliferated-activated receptor gamma (PPARγ) in brain areas important for learning and memory. Our studies suggest that PPARγ is a novel target for the treatment of AD.
The death rate from breast cancer among African American women is almost double that of White women. Understanding the beliefs and practices of African American women regarding screening may help explain why their tumors are found late when the cancer is large and has spread.
Positive emotions (i.e., hope, optimism) has been linked to enhanced recovery after stroke. My study showed that positive emotions can change over time, and that a change in these positive emotions (increase or decrease) can influence recovery after a stroke in the elderly.
Some antibodies to the cell surface protein CD4 can specifically kill certain immune cells that express this protein. These antibodies cause a specific kind of cell death, known as apoptosis, which occurs through interactions with receptors on other immune cells.
Patients who survive severe burn injuries and smoke inhalation may not regain normal lung function. One reason is the excess lung deposition of collagen. I demonstrated that smoke-induced lung dysfunction is mediated through oxidative stress. Anti-oxidants such as vitamin E may be potential therapies for management of burns patients with inhalation injury.
My study examined personal experiences and concerns of nurses who worked during Hurricane Ike in a hospital that was damaged by the storm. The study documented their experiences and uncovered needs and concerns that can be used to improve future performance and patient outcomes.
Sepsis is a severe illness in which the bloodstream is overwhelmed by bacteria. This project enhances our understanding of the roles of adipose tissue in increased sensitivity to sepsis in the elderly. It provides information for the development of treatments and preventative therapies to decrease incidence rates and deaths related to sepsis in the aged.
Cervical cancer is the second most common cancer of women worldwide. The primary route of spread is by the lymphatic system. Results from this study supported the role of tumor secreted growth factors in the formation of new lymphatic ducts and in the eventual metastasis of the cancer.
Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's Disease, is a fatal neurodegenerative disease that causes progressive muscle weakness, atrophy and paralysis. I studied the potential applications for human neural stem cells in modeling disease mechanisms, drug screening and therapy for ALS.
Dengue and West Nile are closely related viruses for which there are no human-approved vaccines or antiviral drugs. I have identified 10 small molecules that inhibit the proteases of both viruses that are required for viral replication. They are potential broad spectrum antivirals to which viruses are unlikely to become resistant.
Incorporating literature into the study of medicine is important in the holistic education of physicians. I developed a teaching program in which students of medicine read stories from different cultures and think about their profession and themselves to better serve their patients and society.
Patients and families were interviewed after being involuntarily discharged from hospice. They felt abandoned, angry, insecure and frustrated. My findings may promote review of hospice policies and guidelines for enrollment.
Tamoxifen is a drug that interferes with the activity of estrogen and is used to treat breast cancer but increases the risk for endometrial cancer. I investigated the mechanisms underlying tamoxifen-induced endometrial cancer. I also investigated the differences of tamoxifen and raloxifene, another estrogen modulator, on endometrial cancer risk and estrogen metabolism.
Yellow fever virus (YFV) causes significant human liver pathology. I examined host responses of human liver cell types to wild-type and vaccine strain YFV infections. My results suggest that the YFV vaccine strain stimulates an appropriate and regulated antiviral inflammatory response while the wild-type virus attenuates the host response.
The Hepatitis C virus (HCV) p7 protein is critical for virus production and an attractive antiviral target. We show that p7 prevents acidification in intracellular compartments. This loss of acidification is required for productive HCV infection, possibly through protecting virus particles during maturation.