SPRING 2009 SEMINAR SERIES
GUEST SPEAKERS

Dr. Omar A. Oyarzaba, Associate Professor,
Department of Poultry Science
Auburn University

And

Dr. Jong W. Hong, Assistant Professor,
Materials Research and Education Center
Auburn University

Seminar Title: Nanofluidic Devices for the Detection of Bacterial Foodborne Pathogens
Date: February 5, 2009

Abstract: The applications of small volumes can be organized in very-large-scale-integrated (VLSI) nanofluidic devices. These devices can take advantage of the polymerase chain reaction (PCR) assays, which are widely-used to identify bacterial pathogens through the amplification of specific DNA fragments. If the volumes of DNA amplification reactions, such as PCR, reduced to nanoliters or picoliters, the reaction efficiency can be dramatically increased due to faster convective and diffusive mass and heat transfer of a small volume. By reducing the reaction volume of PCR with nano/microfluidics, we can accomplish single template DNA amplification without any pure culture of cells. Yet, several limitations have to be overcome for the full performance of these devices. This seminar will review the ongoing efforts at Auburn University to develop nano/picoliter fluidic systems to detect foodborne pathogens, mainly *Campylobacter jejuni* and *Listeria monocytogenes*.

Seyhan Boyoglu, Graduate Student-Ph.D. Microbiology
Alabama State University

Seminar Title: Evaluation of the Encapsulated DNA Vaccine against RSV
Date: March 19, 2009

Abstract: This study evaluated the efficiency of chitosan encapsulated DNA based RSV vaccine. Antigenic regions of RSV F, M2, and G genes were cloned into the phCMV1 vector resulting in a DNA vaccine vector named DR-FM2G. This vector was used to formulate DNA/Chitosan nanoparticles (DCNP) using a complex coacervation process that yielded an encapsulation efficiency of 94.7%. The DCNP sizes ranged from 80-150 nm with uniform size distribution and spherical shape. DNA release was between 50-60% when DCNP was incubated with Similar Gastrointestinal Fluid (SGF), while 21-25% of DNA was released from DCNP in 30 min at pH 10. Differential Scanning Calorimetry (DSC) showed DCNP to be more stable than naked DNA or chitosan, offering protection of DNA degradation by nucleases. DCNP was not toxic to cells when used at concentrations $\leq$ 400 µg/ml. Immunohistochemical and real-time PCR results showed a higher level of RSV protein expression in mice tissues given when DCNP was injected via i.v.as compared to naked DNA. Subsequently, five groups of BALB/c female mice were immunized with either the DR-FM2G DNA, DCNP, DNA+Protein boost, PBS or RSV. Serum and saliva samples were collected on days 0, 14, 28 and 49 to assess the antibody response. Two immunogens, DR-FM2G DNA and DCNP, yielded a very high serum Ab titer. At least two fold higher serum IgG titers were observed in the DCNP group compared to the naked DNA group. Antibody isotyping, cellular immune response are being carried out to assess the effectiveness of the nanoencapsulated multivalent DNA vaccine.

Dr. Berhanu Tameru, Associate Professor of Epidemiology-
Director, Center for Computational Epidemiology, Bioinformatics & Risk Analysis and Biomedical Information management Systems
Tuskegee University

Seminar Title: Risk Analysis and Modeling for Managing Risk
Date: April 2, 2009

Abstract: The new landscape of the 21st century, while promising unparalleled advancements and growth, is fraught with a variety of hazards and risks. As multinational companies operate across borderless and timeless dimensions of the international market place, coupled with rapid transportation systems, the risks of introduction and spread of emerging and re-emerging diseases and other risks continue to expand across the globe.

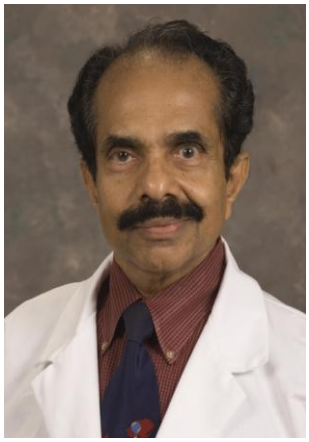
Recent examples of emerging/re-emerging diseases and pests of livestock and crops include Highly Pathogenic Avian Influenza (HPAI) (H5N1), E. Coli (O157), foot and mouth disease (FMD), bovine spongiform encephalopathy (BSE), West Nile Virus (WNV), New Castle Disease, to name a few. Once introduced into a country or region, the concentration of large agricultural enterprises and intensive production systems and global distribution of foods further hastens the spread of diseases and pests. The US food and agricultural system constitutes the largest positive element in the US international trade balance and involves assets in excess of a trillion dollars. Most significantly too, recent threats from bioterrorism have added a more urgent dimension to either prevent and/or minimizing the catastrophic consequences that may arise as a result of introduction of such dangerous diseases and pests.

In order to counter such on-going threats and challenges, it is important to be able to measure and quantify the degree of threat or challenge, so that decision makers can take appropriate measures. For example, could foot and mouth disease (FMD) virus or citrus canker (CC) bacteria be introduced into the United States of America (USA)? The United States Deaprtment of agriculture (USDA) has previously asked Tuskegee University to conduct quantitative risk assessments and this seminar presents the generic epidemiologic modelling steps and compares its usefulness and applications in either plant or animal population via case studies.

Dr. Asheber Abebe, Associate Professor,
Department of Mathematics and Statistics
Auburn University

Seminar Title: Making Causal Inference with Observational Data
Date: April 7, 2009

Abstract: Making erroneous cause-and-effect type inferences on the basis of observational studies is fairly common. This can be very costly. The conventional method of making a reasonably correct inferences based on observational data involves matching observations based on certain pre-treatment variables using propensity scores. This method, however, is very sensitive to outlying observations. A version of propensity score matching that is less sensitive to the effects of outlying observations is proposed. The robustness of the proposed method is illustrated using a Monte Carlo simulation study.



Dr. Changaram Venugopal, Professor
Veterinary Clinical Sciences
Louisiana State University

Seminar Title: Equine Model of Human Asthma
Date: April 23, 2009

Abstract: Human asthma is a chronic inflammatory disease characterized by airway obstruction, airway inflammation and bronchial hyperresponsiveness. The symptoms are caused by the release of inflammatory mediators resulting in airway smooth muscle contraction, mucus hyper-secretion, epithelial damage, microvascular leakage, influx of inflammatory cells, edema and airway thickening as the disease progresses. Several mediators (more than 50) have been identified which include histamine, serotonin, leukotrienes and prostaglandin. The more recent ones that received careful attention are Endothelins and Neurokinins.

Equine recurrent airway obstruction (RAO) is a common "asthma-like" seasonal pulmonary disease affecting mostly mature horses. There are two forms of RAO. One form is chronic obstructive pulmonary disease (COPD) which develops in horses housed in stables and fed hay during winter months. This type is seen most often in northern regions of the United States. The other form is known as the summer pasture-associated obstructive pulmonary disease (SPAOPD) and mainly develops during the summer months in grazing horses in the Southeastern United States. The patho-physiological changes of these two types of diseases are very similar. RAO can be induced by allergens such as fungal spores and proinflammatory agents such as dust-derived bacterial endotoxins. Once the disease is initiated, it progresses through various stages based on host's response eventually reaching remission or fatality. The disease is severely debilitating, devastating and is often career ending or life-threatening. Similar to asthma, it is characterized by airway inflammation, frequent bronchoconstriction and spasm, hypersecretion of mucus, chronic coughing, exercise intolerance and dyspnea. The eThe current therapeutic measures for RAO are avoidance of potential causative agents if identified, immunotherapy if an allergic component is identified, and control of the disease by symptomatic treatments.

In this seminar, the speaker will make a comparison of human asthma with equine recurrent airway obstruction; discuss molecular mediators and the potential role for nanotechnology in airway inflammation.