

Ongoing Research

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We are a virology research laboratory focusing on viral pathogenesis and host-pathogen interactions. Currently, we have a diverse number of research projects ranging from vaccine development to the use of viruses to selectively target cancer cells.

Project 1: Viral Vaccine Development

We have developed a novel vaccine technology, which has broad applicability to virtually any enveloped viral pathogen. Specifically, we have developed a system in which membrane-bound forms of immuno-stimulatory molecules such as cytokines and chemokines are directly incorporated into virus particles as they bud from infected cells. These immunostimulatory molecules serve as potent adjuvants augmenting the immune response to the viral antigens. Currently we have several vaccines in development targeting:

- *Human and Avian Influenza Virus
- *HIV using Virus-like Particle Production
- *Ebola/Marburg using Virus-like Particle Production

Project 2: Host Pathogen Interactions and Viral:Bacterial Synergy in Disease Exacerbation

The purpose of this project is to elucidate and characterize the mechanisms of viral:bacterial synergistic exacerbation of respiratory disease. Most influenza-associated deaths result from secondary bacterial infections (superinfections), which exacerbate disease symptoms, particularly inflammatory responses. We have a mouse model of dual viral and bacterial infections that allows us to examine the host immune response (innate and adaptive) to superinfections. Understanding the mechanisms of how viruses predispose to secondary bacterial infections, will allow us to develop more effective treatment regimens. Currently, we have projects examining Influenza virus, human Metapneumovirus and Streptococcus pneumoniae/Staphylococcus aureus and Group A Strep (GAS) synergistic interactions.

Project 3: Immunotherapy and Virotherapy targeting Ovarian Cancer

We have developed a mouse syngeneic ovarian cancer model which mimics four transitional states of tumorigenesis ranging from preneoplastic to highly aggressive. We are currently evaluating the use of immunotherapy and virotherapy as novel treatment regimens to combat ovarian cancer. In addition, in a jointly funded project with Dr. Eva Schmelz, (HNFE, College of Agriculture and Life Sciences) we are examining regulation of epigenetic gene silencing using these novel cell lines.