Undergraduate Research Symposium May 17, 2013 Mary Gates Hall

Online Proceedings

POSTER SESSION 3

Commons East, Easel 44

2:30 PM to 4:00 PM

Site Directed Mutagenesis as a Strategy to Understand Viral Protein: Cell Protein Interactions

Alyssa Sandner, Junior, Biological Sciences with teaching , Montana State University

McNair Scholar

Mentor: Michele Hardy, Immunology and Infectious Diseases, Montana State Unversity

Rotavirus is particularly important to viral research because it is known to cause diarrhea in small children, usually leading to death. Viruses that are able to infect mammals have created mechanisms to evade host response by antagonizing cellular antiviral responses such as interferon response. Interferon Regulatory Factors initiate the immune response cascade by detecting the viral presence. Rotavirus NSP1 protein causes the dismantling of certain antiviral Interferon Regulatory factors depending on the particular strain. Antiviral Interferon Regulatory Factors 3 and 7 are important to initiate interferon creation, and post infection NSP1 induces degradation. We compared three strains from bovine, Human and porcine sources and used *in vitro* Site Directed Mutagenesis to try and investigate what about the protein causes such specificity in its selection of which antiviral Interferon Regulatory factor to break down. The overall test was to determine if mutagenizing NSP1 from one strain to another would change the substrate the NSP1 selects to degrade. This leaves the question, what does the transition from OSU to W161 mean? Site directed Mutagenesis changes nucleotides to create a mutation. These amino acids they code for are thought to be important to protein function. With such a detrimental virus, more research is necessary to discover more about the virus' actions.

POSTER SESSION 4

MGH 241, Easel 147

4:15 PM to 5:45 PM

Re-Programming Tumor-Specific T Cells for Cancer Immunotherapy

Varintra Edlyn (Varintra) Krisnawan, Senior, Neurobiology, Biochemistry

Mary Gates Scholar

Mentor: Andrea Schietinger, Immunology

Mentor: Philip Greenberg, Medicine and Immunology

The immune system has evolved to achieve a fine balance between recognizing and attacking foreign pathogens and preserving unresponsiveness to self-antigens. T cells that are unresponsive to self-antigens are called self-tolerant T cells and a hallmark of such tolerant T cells is their inability to attack cells expressing self-antigens in order to prevent autoimmunity. However, tolerance to these proteins impedes anti-tumor T cell immune responses because many cancer antigens that are targeted in immunotherapy are in fact self-antigens. Thus, a critical challenge in tumor immunology is to develop strategies that break T cell tolerance to tumor antigens without causing unacceptable autoimmune injury. It has been shown that tolerant T cells lack important proteins normally required for T cell effector functions, including two master transcription factors, Tbet and Eomes, which have been found to be critical for T cell function by repressing the expression of inhibitory molecules and mediating the expression of effector molecules. Therefore, the decreased expression of Tbet and Eomes in tolerant T cells might cause their functional unresponsiveness. Using a transgenic tumor mouse model, my research project investigates if enforced over-expression of Tbet and/or Eomes in tolerant tumor-specific T cells can re-program such tolerant T cells and restore effector functions, allowing re-programmed T cells to recognize and attack cancer cells. Tolerant T cells will be isolated from spleens of transgenic mice, retrovirally transduced *in vitro* to over-express Tbet and Eomes, and subsequently transferred into tumor-bearing mice. The main focus of my research will then be to analyze Tbet-, Eomes-, and/or control-transduced donor T cells for anti-tumor effector function *in vivo* to understand if and by what mechanism(s) T cells can be re-programmed via the over-expression of the master transcription factors and whether such re-programming could possibly become an effective strategy for the treatment of cancers in humans.