

Dr. Eric Lazear

Research Areas:

- Herpesvirus tegument biology
- Herpesvirus cell entry
- Engineered Immunotherapies

Techniques: Mammalian cell culture, forward genetic screens, PCR, antibody/protein engineering, ELISA, flow cytometry, protein expression and purification, immunoprecipitation, molecular virology.



Viruses depend on host cells in order to replicate, and viral infection involves a vast array of interactions between viral and cellular proteins. Many fundamental cellular processes were originally discovered by studying viruses and viruses continue to be a source of basic discoveries as well as important tools for biotechnology. Restriction enzymes, site-specific recombination, reverse transcription, splicing, siRNA, and CRISPR-Cas9 are just some of the examples of transformative molecular biology tools that have their origins in strategies used by viruses to manipulate their host cells. Herpesviruses are among the most successful families of viruses, and have co-evolved with their hosts for millions of years. This long evolutionary history has resulted in complex interactions between herpesviruses and their hosts which, combined with their large viral genomes, makes them likely sources for new discoveries in biology and biotechnology.

When a herpesvirus infects a cell, it delivers ~20 viral proteins (the “tegument”) into the cytoplasm which immediately begin transforming the host cell to facilitate viral infection. One project focuses on better understanding tegument protein function.

In addition to understanding the natural functions of tegument proteins in viral infection, I am interested in engineering the tegument to incorporate non-herpesviral proteins so that the virus can be used to introduce proteins to susceptible cells. In order to more effectively do this, the tropism (i.e. what cells are infected) of the virus must be altered. Another project will focus on using forward genetic screens to elucidate the interactions between proteins that control the entry of herpesviruses.

Because herpesviruses cause life-long infections in their host they encode an many proteins that counter the host immune response. Another project focuses on engineering viral (or host) immunomodulatory proteins that will allow for fine-tuning of our immune system for therapeutic effect.

Students working on of these projects will gain expertise in many key biochemistry and molecular biology techniques as well as basic virology assays. Students will work with me to develop our experiments and will help guide the direction of the projects.