Alphaviruses are globally distributed, mosquito borne pathogens that cause death and disease in vertebrates, including humans. Therapeutics to combat alphaviral disease are non-existent and only a handful of IND status vaccines are available. Of the available vaccines most are associated with a poor immunological response and a high rate of reactivity, and none protects against more than a single alphavirus species. We designed and tested novel alphavirus vaccines comprised of the E1 glycoproteins of western equine encephalitis virus (WEEV) or Venezuelan equine encephalitis virus (VEEV). Immunization with cationic lipid nucleic acid complexes (CLNCs) and alphavirus E1ecto mixture (lipid-antigen-nucleic acid complexes:LANACs) provided significant protection in mice challenged with either WEEV, VEEV or eastern equine encephalitis virus (EEEV) regardless of challenge route. LANAC immunized mice mount a strong humoral immune response lacking neutralizing antibody. Passive transfer of immune sera from LANAC immunized mice to non-immunized mice confers protection to challenge, indicating that non-neutralizing antibody is sufficient for protection. In summary, our LANAC vaccine has both therapeutic and prophylactic potential and is able to offer protection against distinct alphavirus species irrespective of the route of infection.

Detection of Immunodominant Proteins of Felis catus Gammaherpesvirus 1

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We recently identified and sequenced a novel herpesvirus of domestic cats, Felis catus gammaherpesvirus 1 (FcaGHV1). FcaGHV1 is a member of the gammaherpesvirus subfamily which also includes the human cancer-associated herpesviruses, Epstein-Barr virus (EBV) and Kaposi’s sarcoma-associated herpesvirus (KSHV). As a first step toward developing a serologic assay to detect exposure to FcaGHV1, we are seeking to determine which viral proteins elicit an antibody response in naturally occurring domestic cat infections. We cloned selected FcaGHV1 genes into mammalian expression vector and performed transfections of a feline cell line for expression of recombinant FcaGHV1 proteins. We fixed cells with paraformaldehyde and methanol-acetone and tested reactivity to serum from cats naturally infected with FcaGHV1 using immunofluorescence antibody staining. An FIV immunofluorescence test was developed as a positive control for transfection and assay function. Serum from specific pathogen-free laboratory cats served as negative controls. Preliminary data from 9 cats with FcaGHV1 infection indicates that capsid protein ORF 65 and tegument protein ORF38 may elicit antibodies during naturally occurring FcaGHV1 infection. Results of this study will suggest which FcaGHV1 proteins are immunodominant during natural infection. With this information we plan to develop a serologic assay and further evaluate FcaGHV1 as a model for EBV and KSHV.

Further Characterization of Rio Grande Virus and Potential for Serological Cross Reactivity with other Phleboviruses

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Members of the genus Phlebovirus (family Bunyaviridae) are new and emerging disease pathogens of humans and animals. Newly identified viruses include Heartland virus (HRTV), Lone Star virus in the USA, and Severe Fever with Thrombocytopenia Syndrome virus in Asia. Assays to support surveillance, epidemiologic studies, and diagnosis of these viruses may also detect related viruses within the genus, confounding interpretation. Rio Grande virus (RGV) was isolated in 1973 from southern plains