INNOVATING CROSS-DOMAIN SOLUTIONS TO DETECT EMERGING BIOLOGICAL THREATS

Development Of Immunoassays For CCHFV Proteins

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Introduction: Crimean-Congo hemorrhagic fever virus (CCHFV) is the causative agent of the deadliest tick-borne viral disease, with a case fatality rate of 10% - 40%. It is a negative-strand RNA virus of the Orthonairovirus genus. The RNA genome of CCHFV is organized in three segments, small, medium, and large, with the medium segment encoding the glycoprotein precursor complex. The expressed precursor complex is hydrolyzed by host proteases to form several mature proteins, one of which is the secreted 38-kDa glycoprotein, GP38. To date, the function of GP38 is not known, however convalescent human sera show high α-GP38 titers and the only known protective monoclonal antibody against CCHFV infection targets GP38. As such, there is need to develop an assay to detect and quantitate GP38 to support therapeutic studies.
Additionally, fieldable assays for CCHFV are needed to support Force Health Protection as well as public health surveillance. To that end, we employed a new luminescence-based assay approach to detect CCHFV Np, the most highly expressed protein in infection. The luminescence assay was then compared to other immunoassay modalities.
Methods: This work describes the development of an immunofluorescent assay on the Magpix platform to detect and quantify GP38. The assay was tested against various strains of GP38 and applied to an animal model of infection. Assays against Np were also developed on numerous platforms, including a novel luminescence-based system, and compared to enable detection of CCHFV in various settings.
Results: An immunofluorescent assay was developed with sub-ng/mL sensitivity, and an immunoluminesence assay was developed for Np.