

## **Development of Rapid and Inexpensive Diagnostic Kits for Foot-and-Mouth Disease and Rift Valley Fever**

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**Project scope (FMD):** Foot-and-mouth disease (FMD) is one of the most economically devastating vesicular diseases of livestock. Rapid detection of FMD virus (FMDV) infection is essential for prompt identification and prevention of the spread of an outbreak. We are currently developing a rapid diagnostic kit for detection of FMDV based on a chromatographic strip test that can be used in the field by technicians.

**Recent progress (FMD):** For the detection of the viral antigen, specific monoclonal antibodies to the viral RNA polymerase (3D protein) will be used. Since this protein is highly conserved among all seven types of FMDV, a single kit will be able to detect all FMDV serotypes. We have developed six monoclonal antibodies that successfully recognize our baculovirus recombinant 3D protein by ELISA and western blot.

**Future plans (FMD):** Mixtures of our monoclonal antibodies will be tested at the PIADC to confirm that they recognize all 7 types of FMD before being used to capture P3D antigen from serum samples in a chromatographic strip test.

**Project scope (RVFV):** Rift Valley fever virus (RVFV), a member of the Bunyaviridae, infects most mammalian species including humans, causing high morbidity and mortality. The virus is transmitted and maintained by numerous mosquito genera including several native to North America (*Aedes*, *Culex*, and *Anopheles*). Thus, if RVFV is accidentally or deliberately introduced into this country, the disease is very likely to become endemic in North America. In addition, this virus has enormous potential to be used as a bioterrorist agent. In the event of an outbreak of Rift Valley fever in the US, the availability of a rapid diagnostic kit will facilitate the control of the disease.

**Recent progress (RVFV):** We have expressed the N protein of RVFV in a baculovirus expression system. The authenticity of our baculovirus recombinant N protein was confirmed by western blot using blood serum from mice vaccinated with MP12 vaccine strain of RVFV. The N protein antigen was then used for an indirect ELISA and successfully tested for the detection of antibodies to the virus in mouse sera vaccinated with RVFV MP12.

**Future plans (RVFV):** Validation of the RVFV N ELISA antibody detection test kit with target species serum samples (cattle, sheep and goats) will be conducted in collaboration with the University of Texas Medical Branch.

**Relevance to DHS priority research areas:** In case of an accidental or deliberate introduction of FMDV or RVFV into the USA, our detection kits will be highly reliable tools in the agro-defense and food security systems for rapid detection, monitoring, and warning, as well as in the establishment of the appropriate biological countermeasures.