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Diagnostic Development at the CDC: Update 2008 – antibodies and protein based diagnostics

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Since 2002, development and validation, as well as performance analysis of diagnostic real time PCR orthopoxvirus assays has continued at the CDC. As additional clinical samples have been tested using the orthopoxvirus assays, and additional real time PCR devices have been reviewed by FDA, progress has been made to approach the Food and Drug Administration for "approval" of at least one real time PCR nucleic acid test assay; a "510K" application is under additional discussion with the FDA. A laboratory testing algorithm, designed for triaging and testing febrile vesiculo-pustular rash illness specimens was posted on the CDC and Association for Public Health Laboratories websites; proficiency testing of laboratories using these assays and the algorithm was completed in 2005 and 2006.

There remains a clear need for protein based methods of diagnosing poxvirus infections as indicated by rash illness cases in remote areas of the Democratic Republic of Congo, Republic of Congo, Sudan and recently Cameroon, from which rash sampling was problematic in terms of timing or testing or both. The efficacious use of ELISA for orthopoxvirus infection diagnosis has been presented for Monkeypox outbreaks as well as piloted in Variola non-human primate infection models to define kinetics of infection. Additionally, expeditions to Central Africa have provided further evidence and opportunity for piloting rapid protein based assays for viral detection (from lesion) or serology (from human blood) as evidence of viral infection. Laboratory efforts continue to provide promising new assays for viral specific detection such as the use of monoclonal antibodies for Variola specific antigen detection. Novel protein array development also expands this effort to defining immune-dominant and virus specific biomarkers of infection as targets for diagnostic tests as well as potential therapeutic targets. Biomarker discovery from arrays and monoclonal analysis will allow piloting of Variola specific testing for both antigen and immune response to infection in a virus specific manner.