INNOVATING CROSS-DOMAIN SOLUTIONS TO DETECT EMERGING BIOLOGICAL THREATS

Far-forward Real-time Pcr Assay Manufacturing For Rapid Pathogen Detection In Austere Or Contested Locations

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The rapid design, development, and deployment of assays for infectious diseases is an essential element for the identification, treatment, and management of an outbreak or exposure. Resources will likely be limited due to supply chain logistics, at both production and transportation to the point of need. These factors would restrict the capability to effectively respond, as demonstrated during the SARS-CoV-2 pandemic. Further, the ability to address natural or area denial threats in contested space, militarily or otherwise, is further complicated by the inability to access and transport samples and reagents. Far-forward manufacturing and assay fielding capabilities have the potential to mitigate these challenges. Pathogen identification through the DRAGON MEDIC strategy (point of need real-time PCR, targeted next-generation sequencing, and agnostic next-generation sequencing) will lead to assay design, far forward assay manufacturing, in-field assay development and verification for fielding. This Assays on Demand effort is designed to utilize current synthetic biology capabilities to produce reagents (primers, probes, and synthetic positive controls) needed for assay development and characterization on site. Utilizing the Special Pathogens Laboratory (SPL) and the current assay development pipeline at USAMRIID to synthesize and characterize in-house assays, we will compare the performance of these tests to traditionally procured real-time PCR reagents to identify potential differences in sensitivity and specificity of the in-house generated reagents. We will compare multiple production runs to determine lot-to-lot variability and manufacturing yields to better understand the limitations of this approach and to develop operating procedures for far-forward assay manufacturing and development. We will utilize this approach to develop datasets for laboratory developed tests (LDTs) and pre-Emergency Use Authorization (PEUA) assays. We will perform a bridging study with the LDTs based on assay modification to incorporate novel target pathogen sequences. Finally, we intend to assess these newly developed capabilities in austere environments such as extreme cold weather locations to determine the feasibility of far-forward assay development.

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