INNOVATING CROSS-DOMAIN SOLUTIONS TO DETECT EMERGING BIOLOGICAL THREATS

Development Of Untargeted Nanopore-based Systems For Agnostic Biological Threat Identification In The Field

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Nanopore sequencing technology has enabled numerous applications for rapidly identifying and characterizing biological threats, including those that are emerging and/or genetically modified. Systems have been developed for use in far-forward and mobile laboratory environments. Military operators are being trained to execute DNA and RNA sequencing protocols, which will revolutionize biothreat identification in the field. Methods for sample and library preparation have been simplified and are being automated for use by non-laboratory trained operators, and bioinformatics software has been designed to automatically identify biothreats as the sequencer is running. Once the bioinformatics software reports the result to the operator, additional software has been designed to immediately send the result to the command center and for integrating into various command and control networks and architectures to enable situational awareness and informed decision making. An additional benefit with these systems is that they can be used on-the-move, which broadens the concept of operations (CONOPS) aperture. In addition, recent advancements have enabled the use of nanopore technology for untargeted protein identification, which can be applied to protein toxins. The end goal is to have a single nanopore device for the identification of DNA-based threats, RNA-based threats, and toxins, which would serve as an all-in-one agnostic biothreat identifier.

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