

Identification of Zika Virus on Firefly Dx

SUMMARY

A recent pandemic outbreak of Zika virus has raised concerns to the public health. Zika virus disease is caused by a virus transmitted primarily by *Aedes* mosquitoes. Currently, Zika virus infections have been associated with Guillain-Barre syndrome in adults and microcephaly in babies. The rapid spread of the mosquito-borne flavivirus has claimed many lives and poses a great threat to pregnant women and their unborn babies. Prevention, transmission, vaccination and many other questions about Zika virus are still being observed and studied. Zika virus infection is often assumed based on symptoms and travel history, but at present, a confirmed diagnosis of Zika infection can only be completed through laboratory tests on blood or other bodily fluids.

PositveID is developing Firefly Dx, a handheld device offering rapid sample-to-result detection in less than 30 minutes using real-time polymerase chain reaction (PCR) chemistry. Firefly Dx is capable of multiplex assays and utilizes lyophilized reagents on a single-use, disposable cartridge for lab-quality results at the point of need (PON). The Firefly Dx system combines sample lysis, purification, real-time PCR analysis, and reporting of results. The system will process a variety of sample types, including whole blood, buccal and nasopharyngeal swabs, urine, and environmental field samples.

Recently in a collaborated effort with GenArraytion Inc., PositveID successfully detected Zika virus on the Firefly Dx prototype system. Two different strains of Zika virus were tested at low number of copies via PCR and the growth curves showed a Ct of 25. The automated runs successfully synthesized cDNA using a reverse transcriptase (RT) step and then completed a 45-cycle PCR to produce the detected target results depicted in figure 1 and figure 2. Even in an early stage of development, the Firefly Dx system has consistently shown its effectiveness and repeatability through a wide range of organisms.

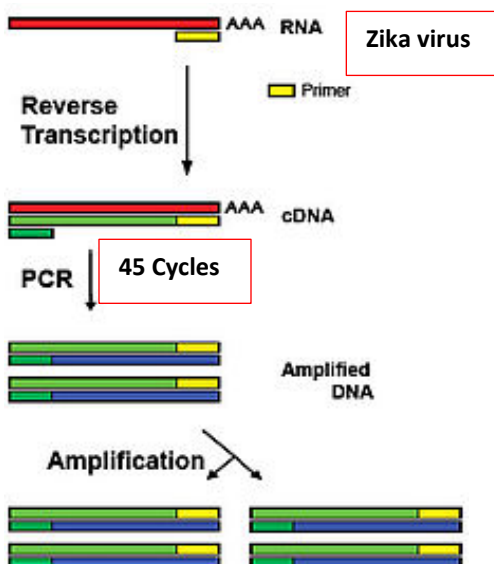


Figure 1. A sample of Zika virus is used first in reverse transcription step to produce cDNA. Once cDNAs are made, PCR occurred in amplifying more fluorescent labeled DNA. The fluorescent signals are captured in real time.

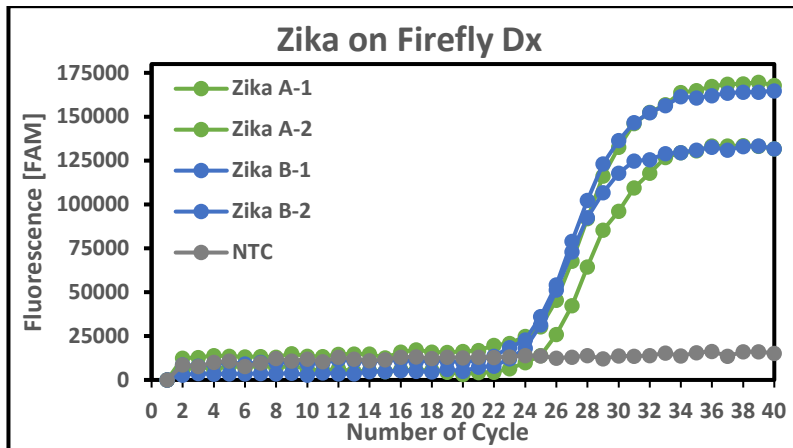


Figure 2. Two different strains of Zika virus (A & B) along with the no template control (NTC) are being detected real time on Firefly Dx

DISCUSSION

Given reports on Zika virus, it has been declared a public health emergency. So many lives in America and around the world are relying on more information of this deadly virus. Prevention of transmitting this virus is still being discovered and unfortunately no vaccine has yet been created. Existing methods of laboratory-based testing can take hours to deliver results and cost hundreds of dollars per test.

According to laboratory testing guidance from the World Health Organization (WHO), it is not cost effective to test every suspected case of Zika virus infection. WHO has suggested that the testing strategy employed by labs should be determined by available resources and workflow. Further, WHO has stated that there is a strong interest and need for rapid and simple-to-use in vitro diagnostics for Zika virus infection at or near the point of care.

PositiveID Corporation is developing a PON system for cost effective, rapid detection of this virus (as well as any other biological pathogen) which can narrow down and track the source of the virus upon transmission. The Firefly Dx can provide aid to medical and public health personnel in locating and setting up quarantine locations of the source of transmission to prevent more outbreaks.

REFERENCES

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