

LABSTRACT – November 2019

Zika, Chikungunya and Dengue viruses PCR Panel

Audience

Health care providers caring for patients suspected of having Zika, Chikungunya and/or Dengue virus infection and laboratories involved in submission of specimens for testing for these pathogens.

Overview

Starting on December 2, 2019 Public Health Ontario (PHO) Laboratory will commence performing a real-time PCR (polymerase chain reaction) panel which simultaneously tests for Zika, Chikungunya and Dengue virus targets. Dengue virus serogroups 1 to 4 can be detected but are not distinguished by the assay.

Specimens submitted for PCR detection of any of the three virus targets will be tested using the panel and all three virus results will be reported. Travel history to endemic areas (including dates of departure and return) AND date of collection of samples should be clearly indicated on the requisition. Zika virus requests must meet additional requirements, as outlined in the [Zika Virus Test Information Sheet](#).

This PCR panel for Zika, Chikungunya and Dengue viruses is a laboratory developed test (LDT) validated for clinical testing at PHO Laboratory.

Background information

Zika virus, a *flavivirus* first detected in Uganda in 1947, re-emerged in 2015 in South and Central America, resulting in a large multinational outbreak. Clinical manifestations, which only occur in 20% of persons infected, include low grade fever, maculopapular rash, conjunctivitis and arthralgia.

In late 2015, associations were made between Zika virus infection and both Guillain-Barré Syndrome and congenital infection (Congenital Zika Syndrome), the latter characterized by microcephaly, intracranial calcifications, other brain anomalies, and eye abnormalities.

Laboratory testing assays for the detection and diagnosis of Zika virus infection include molecular testing (by PCR) and serology. Zika virus PCR has been performed at PHO Laboratory since March 2016; detection of Zika virus RNA by PCR result is considered confirmatory.

Infection with Chikungunya virus (CHIKV), an alphavirus in the *Togaviridae* family, is characterised by fever accompanied by skin rashes and joint pain, often followed by persistent rheumatic symptoms. Chikungunya virus infection can be difficult to clinically distinguish from co-endemic diseases such as malaria or dengue.

Dengue is caused by Dengue virus (DENV), a flavivirus. DENV causes a wide range of diseases in humans, from asymptomatic, to a mild febrile illness or in some cases to a life-threatening syndrome called Dengue Haemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS).

Serology testing is also available for Dengue virus and Chikungunya virus, and should be conducted on all patients undergoing laboratory testing for these viruses, in particular when conducted more than 7 days after symptom onset, when viremia is usually resolved and detection by PCR is less likely.

Testing Algorithm

For detailed information on Zika virus testing at PHO Laboratory, including testing indications, specimen collection, submission guidance and the Zika virus testing algorithm, please refer to the PHO Laboratory [Zika Virus Test Information Sheet](#).

Molecular PCR testing will be performed for patients suspected of having Dengue or Chikungunya virus infection if specimens are collected within 14 days of symptom onset – yield from PCR is much higher when testing is done as soon as possible after symptom onset, preferably within 7 days of symptom onset. Further is available from the [Dengue Virus Test Information Sheet](#) and the [Chikungunya Test Information Sheet](#).

Implementation of the PCR panel does not affect the current Zika virus testing algorithm, which is based on current Canadian guidelines, featured in the [Canadian Zika Virus Prevention and Treatment Guidelines](#), developed by the [Committee to Advise on Tropical Medicine and Travel \(CATMAT\)](#). Additional information provided by the Public Health Agency of Canada on Zika virus, including laboratory testing, is available within the document [Zika virus: For Health Professionals](#).

For Chikungunya and Dengue:

1. Documentation of travel history to endemic areas (including dates of departure and return)

AND
2. Date of symptom onset and date of specimen collection should be clearly indicated on the laboratory requisition.

Specimens with appropriately documented travel history, and collected within 14 days of symptom onset will be approved for PCR testing.

Specimens submitted for testing of any of the three virus targets will be tested as a panel and all three virus results will be reported.

Test Performance

The Zika PCR limit of detection is estimated to be between 500 to 5000 RNA copies per ml of serum (primary specimen).

The Chikungunya PCR limit of detection is estimated to be between 7600 to 76000 RNA copies per ml of serum (primary specimen).

The Dengue PCR limit of detection is estimated to be between 720 to 36000 RNA copies per ml of serum (primary specimen).

The assay displayed excellent specificity, precision, and accuracy during the validation process.

References

1. Simultaneous detection of Zika, Chikungunya and Dengue viruses by a multiplex real-time RT-PCR assay. Pabbaraju K, Wong S, Gill K, Fonseca K, Tipples GA, Tellier R. J Clin Virol. 2016 Oct;83:66-71. doi: 10.1016/j.jcv.2016.09.001. Epub 2016 Sep 1

Additional Resources

1. [Zika Virus Test Information Sheet](#).
2. [Dengue Virus Test Information Sheet](#)
3. [Chikungunya Test Information Sheet](#)
4. [Canadian Zika Virus Prevention and Treatment Guidelines](#)
5. [Zika Virus: For Health Professionals](#)
6. [CDC Zika Virus Web Page](#)

For Further Information

- Contact the PHO Laboratory Customer Service Centre at 416-235-6556 or 1-877-604-4567 (toll-free), or by email at customerservicecentre@oahpp.ca
- For PHO Laboratory specimen collection information and previous Lababstracts, refer to [publichealthontario.ca/test directory](http://publichealthontario.ca/test-directory)
- The current version of the PHO Laboratory General Test Requisition and other forms are available at publichealthontario.ca/Requisitions
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