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Dengue Fever Virus & Chikungunya Virus Real Time RT-PCR Kit
User Manual

LT021140RE

For use with ABIPrism®7000/7300/7500/7900/Step One Plus, iCycler iQ™4/iQ™5; Smart Cycler II, Bio-Rad CFX 96; Rotor Gene ™6000; Mx3000P/3005P; MJ-Option2/Chromo4; LightCycler®480 Instrument

Life Technologies (India) Pvt. Ltd.
306, Aggarwal City Mall, Opposite M2K Pitampura, Delhi – 110034 (INDIA). Ph: +91-11-42208000, 42208111, 42208222, Mobile: +91-9810521400, Fax: +91-11-42208444
Email: customerservice@lifetechindia.com Website: www.lifetechindia.com

Σ25 −30 °C CE

1. Intended Use
Dengue Fever Virus & Chikungunya Virus Real Time RT-PCR Kit is used for the detection of dengue fever virus and chikungunya virus in serum, plasma or insect vector by using real time PCR systems.

2. Principle of Real-Time PCR
The principle of the real-time detection is based on the fluorogenic 5'nuclease assay. During the PCR reaction, the DNA polymerase cleaves the probe at the 5' end and separates the reporter dye from the quencher dye only when the probe hybridizes to the target DNA. This cleavage results in the fluorescent signal generated by the cleaved reporter dye, which is monitored real-time by the PCR detection system. The PCR cycle at which an increase in the fluorescence signal is detected initially is proportional to the amount of the specific PCR product. Monitoring the fluorescence intensities in real-time allows the detection of the accumulating product without having to re-open the reaction tube after the amplification.

3. Product Description
Dengue fever and dengue hemorrhagic fever (DHF) are viral diseases transmitted by *Aedes* mosquitoes, usually *Aedes aegypti*. It is caused by one of four closely related virus serotypes of the genus *Flavivirus*, family Flaviviridae, each serotype is sufficiently different that there is no cross-protection and epidemics caused by multiple serotypes (hyperendemicity) can occur. It is found in most tropical and subtropical areas of the world, and has become the most common arboviral disease of humans.

Chikungunya virus (CHIK) is a member of the *Alphavirus* genus of the family *Togaviridae*. The alphaviruses consist of 30 species of arthropod-borne viruses, which are further subgrouped into seven serocomplexes based on serological data (Porterfield, 1980; Strauss & Strauss, 1994; Van Regenmortel *et al*., 2000). CHIK was first isolated from the serum of a febrile patient during a dengue epidemic that occurred in the Newala district, Tanzania, in 1953 (Ross, 1956).

Dengue Fever Virus & Chikungunya Virus Real Time RT-PCR Kit contains a specific ready-to-use system for the detection of the chikungunya virus and dengue fever virus by using Reverse Transcription Polymerase Chain Reaction in the real-time PCR system. The master contains a Super Mix for the specific amplification of virus RNA. The reaction is done in one step real time RT-PCR. The first step is a reverse transcription (RT), during which the virus RNA is transcribed into cDNA. Afterwards, a thermostable DNA polymerase is used to amplify the specific gene fragments by means of polymerase chain reaction. Fluorescence is emitted and measured by the real time systems´ optical unit during PCR. The detection of amplified virus DNA fragment is performed in fluorimeter **channel FAM and HEX/VIC/JOE** the fluorescent quencher BHQ1. In addition, the kit contains a system to identify possible PCR inhibition by measuring the the Cal Red 610/ROX/TEXAS RED fluorescence of the internal control (IC). An external positive control (1×10^7copies/ml) contained, allows the determination of the gene load. For further information, please refer to section 9.3 Quantitation.

4. Kit Contents

Ref.	Type of reagent	Presentation 25rxns
1	D&C Super Mix	1 vial, 480µl
2	RT-PCR Enzyme Mix	1 vial, 28µl
3	Molecular Grade Water	1 vial, 400µl
4	Internal Control (IC)	1 vial, 30µl
5	D&C Positive Control (1×10^7copies/ml)	1 vial, 30µl

Analysis sensitivity: 1×10^3copies/ml LOQ: 2×10^3~1×10^8copies/ml

Note: Analysis sensitivity depends on the sample volume, elution volume, nucleic acid extraction methods and other factors .If you use the RNA extraction kits recommended, the analysis sensitivity is the same as it declares. However, when the sample volume is dozens or even hundreds of times greater than elution volume by some concentrating method, it can be much higher.

5. Storage
- All reagents should be stored at -20°C. Storage at +4°C is not recommended.
- All reagents can be used until the expiration date indicated on the kit label.
- Repeated thawing and freezing (> 3x) should be avoided, as this may reduce the sensitivity of the assay.
- Cool all reagents during the working steps.
- Super Mix should be stored in the dark.

6. Additionally Required Materials and Devices
- Biological cabinet
- Real time PCR system
- Desktop microcentrifuge for "eppendorf" type tubes (RCF max. 16,000 x g)
- Vortex mixer
- RNA extraction kit
- Real time PCR reaction tubes/plates
- Cryo-container
- Pipets (0.5 µl – 1000 µl)
- Sterile filter tips for micro pipets
- Sterile microtubes
- Disposable gloves, powderless
- Biohazard waste container
- Refrigerator and freezer
- Tube racks

7. ⚠Warnings and Precaution
- Carefully read this instruction before starting the procedure.
- For in vitro diagnostic use only.
- This assay needs to be carried out by skilled personnel.
- Clinical samples should be regarded as potentially infectious materials and should be prepared in a laminar flow hood.
- This assay needs to be run according to Good Laboratory Practice.
- Do not use the kit after its expiration date.
- Avoid repeated thawing and freezing of the reagents, this may reduce the sensitivity of the test.
- Once the reagents have been thawed, vortex and centrifuge briefly the tubes before use.
- Prepare quickly the Reaction mix on ice or in the cooling block.
- Set up two separate working areas: 1) Isolation of the RNA/ DNA and 2) Amplification/ detection of amplification products.
- Pipets, vials and other working materials should not circulate among working units.
- Use always sterile pipette tips with filters.
- Wear separate coats and gloves in each area.
- Do not pipette by mouth. Do not eat, drink, smoke in laboratory.
- Avoid aerosols.

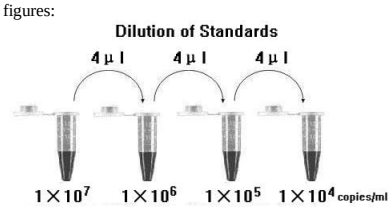
8. Sample Collection, Storage and transport
- Collected samples in sterile tubes.
- Specimens can be extracted immediately or frozen at -20°C to -80°C.
- Transportation of clinical specimens must comply with local regulations for the transport of etiologic agents.

9. Procedure
9.1 RNA-Extraction
RNA extraction kits are available from various manufacturers. You may use your own extraction systems or the commercial kit based on the yield. For the RNA extraction, please comply with the manufacturer's instructions. The recommended extraction kit is as follows:

Nucleic Acid Isolation Kit	Cat. Number	Manufacturer
RNA Isolation Kit	GEN 52-904 LT	Life Technologies

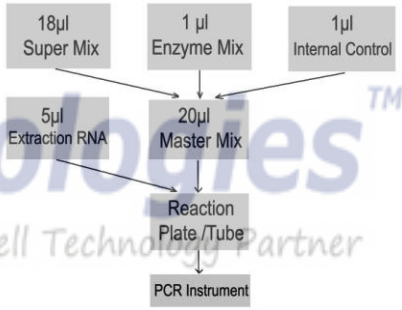
9.2 Internal Control
It is necessary to add internal control (IC) in the reaction mix. Internal control (IC) allows the user to determine and control the possibility of PCR inhibition.
Add the internal control (IC) 1µl/rxn and the result will be shown the Cal Red 610/ROX/TEXAS RED.

9.3 Quantitation
The kit can be used for **quantitative** or **qualitative** real-time RT-PCR.
For performance of quantitative real-time PCR, standard dilution must be prepared first as follows. Molecular Grade Water is used for dilution.
Dilution is not needed for performance of qualitative real-time PCR.
Take positive control (1×10^7copies/ml) as the starting high standard in the first tube. Respectively pipette **36ul** of Molecular Grade Water into next three tubes. Do three dilutions as the following figures:



To generate a standard curve on the real-time system, all four dilution standards should be used and defined as standards with specification of the corresponding concentrations.

Attention:
A. Mix thoroughly before next transfer.
B. The positive control (1×10^7copies/ml) contains high concentration of the target DNA. Therefore, be careful during the dilution in order to avoid contamination.

9.4 RT-PCR Protocol


The Master Mix volume for each reaction should be pipetted as follows:

※PCR system without Cal Red 610/ROX/TEXAS RED channel may be treated with 1µl Molecular Grade Water instead of 1µl IC.

1) The volumes of Super Mix and Enzyme Mix per reaction multiply with the number of samples, which includes the number of controls, standards, and sample prepared. Molecular Grade Water is used as the negative control. For reasons of unprecise pipetting, always add an extra virtual sample. Mix completely then spin down briefly in a centrifuge.
2) Pipet **20µl** Master Mix with micropipets of sterile filter tips to each of the real time PCR reaction plate/tubes. Separately add **5µl** RNA sample template, positive and negative controls to different plate/tubes. Immediately close the plate/tubes to avoid contamination.
3) Spin down briefly in order to collect the Master Mix in the bottom of the reaction tubes.
4) Perform the following protocol in the instrument:

45°C for 10min	1cycle
95°C for 15min	1cycle
95°C for 15sec, 60°C for 1min (Fluorescence measured at 60°C)	40cycles

Selection of fluorescence channels	
FAM	Dengue Fever Virus
HEX/VIC/JOE	Chikungunya Virus
Cal Red 610	IC

5) ⚠ If you use ABI Prism® system, please choose **"none"** as **passive reference** and **quencher**.

10. Threshold setting: just above the maximum level of molecular grade water.

11.Calibration for quantitative detection: Input each concentration of standard controls at the end of run, and a standard curve will be automatically formed.

12.Quality control:
Negative control, positive control, internal control and QS curve must be performed correctly, otherwise the sample results is invalid.

Control \ Channel	Ct value		
	FAM	HEX/VIC/JOE	Cal Red 610/ROX/ TEXAS RED
Molecular Grade Water	UNDET	UNDET	25~35
Positive Control(qualitative assay)	≤35	≤35	——
QS（quantitative detection）	Correlation coefficient of QS curve≤−0.98		

13. Data Analysis and Interpretation
The following sample results are possible:

	Ct value			Result Analysis
	FAM	HEX	Cal Red 610	
1#	UNDET	UNDET	25~35	Below the detection limit or negative
2#	≤38	UNDET	——	Dengue Fever Virus positive; and the software displays the quantitative value
3#	UNDET	≤38	——	Chikungunya Virus positive; and the software displays the quantitative value
4#	38~40		25~35	Re-test; If it is still 38~40, report as 1#
5#	UNDET		UNDET	PCR Inhibition; No diagnosis can be concluded.