HCV Real Time RT-PCR Kit User Manual

LT028000RH

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

CE 25 -20°C

1. Intended Use
HCV real time RT-PCR kit is used for the detection of HCV in serum or plasma by using real time PCR systems.

Its characteristics:
High sensitivity: lower detection line 10^3 IU/ml
High specificity: test result will be positive, only to hepatitis C virus.
Short operating time: 2 and a half hours totally
Good stability: kept for 12 months at –20℃; CV≤5%;

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 (Ct) is proportional to the amount of the specific PCR product. Monitoring the fluorescence intensities during Real Time allows the detection of the accumulating product without having to re-open the reaction tube after the amplification.

3. Product Description
HCV is an enveloped RNA virus in the flaviviridae family which appears to have a narrow host range. It is a major cause of acute hepatitis and chronic liver disease, including cirrhosis and liver cancer. Globally, an estimated 170 million persons are chronically infected with HCV and 3 to 4 million persons are newly infected each year. Twenty percent of persistently infected individuals will develop liver cirrhosis, and hepatocellular carcinoma occurs in up to 2.5% .HCV is spread primarily by direct contact with human blood. The major causes of HCV infection worldwide are use of unscreened blood transfusions, and re-use of needles and syringes that have not been adequately sterilized.
HCV real time RT-PCR kit contains a specific ready-to-use system for HCV detection (for genotype Ⅰ～Ⅵ) by Reverse Transcription Polymerase Chain Reaction (RT-PCR) in the real-time PCR system. The master contains Super Mix for the specific amplification of HCV RNA. The reaction is done in one step real time RT-PCR. The first step is a reverse transcription (RT): HCV RNA is transcribed into cDNA. Then, a thermostable DNA polymerase is used to amplify the specific gene fragments by polymerase chain reaction. Fluorescence is emitted and measured by the real time systems´ optical unit. The detection of amplified HCV DNA fragment is performed in fluorimeter channel FAM with the fluorescent quencher BHQ1. In addition, the kit can be used for identification of possible PCR inhibition by measuring the HEX/VIC/JOE fluorescence of the internal control (IC). An external positive control defined as $1×10^7$IU/ml is supplied to allow 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	HCV 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	HCV Positive Control (1×10⁷IU/ml)	1 vial, 30μl

Analysis sensitivity: $1×10^3$ IU/ml;   **LOQ：** $2×10^3$～$1×10^8$ IU/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
• Vortex mixer
• Cryo-container
• Sterile filter tips for micro pipets
• Disposable gloves, powderless
• Refrigerator and Freezer
• Desktop microcentrifuge for "eppendorf" type tubes (RCF max. 16,000 x g)
• Real time PCR system
• Real time PCR reaction tubes/plates
• Pipets (0.5μl – 1000μl)
• Sterile microtubes
• Biohazard waste container
• 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, and 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
Different brands of RNA extraction kits are available. You may use your own extraction systems or the commercial kit based on the yield. For RNA extraction kit, please comply with manufacturer's instructions. The recommended extraction kit is as follows:

| Nucleic Acid Isolation Kit	Cat. Number	Manufacturer
RNA Extraction 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 in the HEX/VIC/JOE.
9.3 Quantitation
The kit can be used for **quantitative** or **qualitative** real-time RT-PCR detection.
For performance of quantitative real-time PCR, standard dilutions must be prepared firstly as follows. Molecular Grade Water is used as the dilution.
Dilution is not needed for performance of qualitative real-time PCR detection.

Take positive control ($1×10^7$ IU/ml) as the starting high standard in the first tube. Respectively pipette **36ul** Molecular Grade Water into next three tubes. Do three dilutions as the following figures:

Dilution of Standards

4 μl   4 μl   4 μl

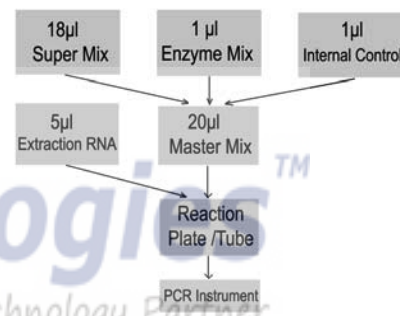$1×10^7$ $1×10^6$ $1×10^5$ $1×10^4$ IU/ml
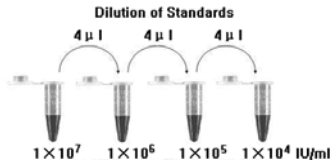
To generate a standard curve on the real-time system, all four dilution standards should be used and defined as standard with specification of the corresponding concentrations.
Attention:
A. Mix thoroughly before next transfer.
B. The positive control contains high concentration of the target DNA. Therefore, 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:

18μl Super Mix	1 μl Enzyme Mix	1μl Internal Control

5μl Extraction RNA	20μl Master Mix

Reaction Plate /Tube

PCR Instrument

※PCR system without HEX/VIC/JOE 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 in sterile filter tips to each *Real time* PCR reaction plate/tubes. Separately add **5μl** RNA sample, positive and negative controls to different reaction 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	Target Nucleic Acid
HEX/VIC/JOE	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.

Channel	Ct value	
Control	FAM	HEX/VIC/JOE
Molecular Grade Water	UNDET	25~35
Positive Control(qualitative assay)	≤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/VIC/JOE	
1#	UNDET	25~35	Below the detection limit or negative
2#	≤38	—	Positive; and the software displays the quantitative value
3#	38~40	25~35	Re-test: If it is still 38~40, report as 1#
4#	UNDET	UNDET	PCR Inhibition; No diagnosis can be concluded.