**Rotavirus Real Time RT-PCR Kit**

Cat. No.: DR-0044-01

For Use with LightCycler 1.0/LightCycler2.0/LightCycler480 (Roche) Real Time PCR Systems

(Pls ignore the Internal Control if you use the LightCycler 1.0)

User Manual

For in vitro Diagnostic use only

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1. Intended Use
Rotavirus real time RT-PCR kit is used for the detection of Rotavirus in excreta by using real time PCR systems.

2. Introduction
Rotavirus is a genus of double-stranded RNA virus in the family Reoviridae. It is the leading cause of severe diarrhea among infants and young children. By the age of five, nearly every child in the world has been infected with rotavirus at least once. However, with each infection, immunity develops and subsequent infections are less severe. There are seven species of this virus, referred to as A, B, C, D, E, F and G. Rotavirus A, the most common, causes more than 90% of infections in humans.

Rotavirus is transmitted by the faecal-oral route. It infects cells that line the small intestine and produces an enterotoxin, leading to severe diarrhea and sometimes death through dehydration. Although rotavirus was discovered in 1973 and accounts for up to 50% of hospitalisations for severe diarrhea in infants and children, its importance is still not widely known within the public health community, particularly in developing countries. In addition to its impact on human health, rotavirus also infects animals, and is a pathogen of livestock.

The genome of rotavirus consists of 11 unique double helix molecules of RNA which are 18,555 nucleoside base-pairs in total. Each helix, or segment, is a gene, numbered 1 to 11 by decreasing size. Each gene codes for one protein, except genes 9 and 11, which each code for two. The RNA is surrounded by a three-layered icosahedral protein capsid. Viral particles are up to 76.5 nm in diameter and are not enveloped.

3. 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.

4. Product Description
The Rotavirus real time RT-PCR kit contains a specific ready-to-use system for the detection of the Rotavirus (for genotype A and B) using RT-PCR (Reverse Transcription Polymerase Chain Reaction) in the real-time PCR system. The master contains a Super Mix for the specific amplification of the Rotavirus RNA. The reaction is done in one step real time RT-PCR. The first step is a reverse transcription (RT), during which the Rotavirus RNA is transcribed into cDNA. Afterwards, a thermostable DNA polymerase is used to amplify the specific gene fragments by means of PCR (polymerase chain reaction). Fluorescence is emitted and measured by the real time systems’ optical unit during the PCR. The detection of amplified Rotavirus DNA fragment is performed in fluorimeter channel FAM with the fluorescent quencher BHQ1. In addition, the kit contains a system to identify possible PCR inhibition by measuring the VIC/JOE fluorescence of the internal control (IC). An external positive control defined as $1 \times 10^7$ copies/ml is supplied which allow the determination of the gene load. For further information, please refer to section 10.3 Quantitation.

5. Kit Contents
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Type of reagent</th>
<th>Presentation 25rxns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rotavirus Super Mix</td>
<td>1 vial, 350µl</td>
</tr>
<tr>
<td>2</td>
<td>RT-PCR Enzyme Mix</td>
<td>1 vial, 28µl</td>
</tr>
<tr>
<td>3</td>
<td>Molecular Grade Water</td>
<td>1 vial, 400µl</td>
</tr>
<tr>
<td>4</td>
<td>Internal Control (IC)</td>
<td>1 vial, 30µl</td>
</tr>
<tr>
<td>5</td>
<td>Rotavirus Positive Control(1×10^7 copies/ml)</td>
<td>1 vial, 30µl</td>
</tr>
</tbody>
</table>

6. 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 assay sensitivity.
- Cool all reagents during the working steps.
- Super Mix should be stored in the dark.

7. 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

8. 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.
- Quickly prepare 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
9. 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

10. Procedure

10.1 RNA-Extraction
Different brand RNA extraction kits are available. 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:

<table>
<thead>
<tr>
<th>Nucleic Acid Isolation Kit</th>
<th>Cat. Number</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNA Isolation Kit</td>
<td>ME-0001</td>
<td>ZJ Biotech</td>
</tr>
<tr>
<td>QIAamp Viral RNA Mini Extraction Kit (50)</td>
<td>52904</td>
<td>QIAGEN</td>
</tr>
</tbody>
</table>

10.2 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 VIC/JOE channel.

10.3 Quantitation
The kit can be used for quantitative or qualitative real-time RT-PCR. A positive control defined as \(1 \times 10^7\) copies/ml is supplied in the kit.

For performance of quantitative real-time PCR, Standard dilutions must prepare first as follows. Molecular Grade Water is used for dilution.
The step of dilution is not needed for performance of qualitative real-time PCR.
Take positive control \((1 \times 10^7\) copies/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 standard with specification of the corresponding concentrations.

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

10.4 RT-PCR Protocol
The Master Mix volume for each reaction should be pipetted as follows:

1) The volumes of Super Mix and Internal Control 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. (n: the number of reaction).

<table>
<thead>
<tr>
<th>Reaction Volume</th>
<th>Master Mix Volume</th>
<th>Master Mix Volume (Only for Lightcycler1.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Mix</td>
<td>13µl × (n+1)</td>
<td>14µl × (n+1)</td>
</tr>
<tr>
<td>Enzyme Mix</td>
<td>1µl × (n+1)</td>
<td>1µl × (n+1)</td>
</tr>
<tr>
<td>Internal control (IC)</td>
<td>1µl × (n+1)</td>
<td>——</td>
</tr>
</tbody>
</table>

Mix completely then spin down briefly in a centrifuge.

2) Pipet 15µl Master Mix with micropipets of sterile filter tips to each the Real time PCR reaction plate/tube. Then separately add 5µl RNA sample supernatant, positive and negative controls into different plates/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 10 min, 1 cycle;

95°C for 15 min, 1 cycle;
11. Data Analysis and Interpretation

The following results are possible:

1) A signal is detected in channel FAM. **The result is positive: The sample contains Rotavirus RNA.**
   In this case, the detection of a signal in channel VIC/JOE (Internal control) is dispensable, as high initial concentrations of Rotavirus cDNA can lead to a reduced or absent fluorescence signal of the internal control (competition).

2) In channel FAM no signal is detected, at the same time, a VIC/JOE signal from the Internal Control appears. **The sample does not contain any Rotavirus RNA. It can be considered negative.**
   In the case of a negative Rotavirus RT-PCR the detected signal of the internal control rules out the possibility of PCR inhibition.

3) Neither in channel FAM nor in channel VIC/JOE is a signal detected. **A diagnostic statement can not be made.** Inhibition of the RT-PCR reaction.

For further questions or problems, please contact our technical support at trade@liferiver.com.cn