RealStar®

HSV PCR Kit 1.1

For research use only!

(RUO)
1. **Application**

The RealStar® HSV PCR Kit 1.1 is a reagent system, based on real-time PCR technology, for the simultaneous detection and quantification of herpes simplex virus 1 (HSV-1) and herpes simplex virus 2 (HSV-2) specific DNA.

For research use only (RUO)! Not for use in diagnostic procedures.

2. **Kit Components**

<table>
<thead>
<tr>
<th>Lid Color</th>
<th>Component</th>
<th>Number of Vials</th>
<th>Volume [µl/Vial]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Master A</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>Purple</td>
<td>Master B</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>Green</td>
<td>Internal Control</td>
<td>1</td>
<td>1000</td>
</tr>
<tr>
<td>Red</td>
<td>HSV-1 QS1-4*</td>
<td>4</td>
<td>250</td>
</tr>
<tr>
<td>Orange</td>
<td>HSV-2 QS1-4*</td>
<td>4</td>
<td>250</td>
</tr>
<tr>
<td>White</td>
<td>Water (PCR grade)</td>
<td>1</td>
<td>500</td>
</tr>
</tbody>
</table>

* The RealStar® HSV PCR Kit 1.1 contains four HSV-1 Quantification Standards as well as four HSV-2 Quantification Standards.

3. **Storage**

- The RealStar® HSV PCR Kit 1.1 is shipped on dry ice. The components of the kit should arrive frozen. If one or more components are not frozen upon receipt, or if tubes have been compromised during shipment, contact altona Diagnostics GmbH for assistance.
- All components should be stored between -25°C and -15°C upon arrival.
- Repeated thawing and freezing of Master reagents (more than twice) should be avoided, as this might affect the performance of the assay. The reagents should be frozen in aliquots, if they are to be used intermittently.
- Storage between +2°C and +8°C should not exceed a period of two hours.
- Protect Master A and Master B from light.
4. Product Description

The RealStar® HSV PCR Kit 1.1 is a reagent system, based on real-time PCR technology, for the simultaneous detection and quantification of herpes simplex virus 1 (HSV-1) and herpes simplex virus 2 (HSV-2) specific DNA. The assay includes a heterologous amplification system (Internal Control) to identify possible PCR inhibition and to confirm the integrity of the reagents of the kit.

Real-time PCR technology utilizes polymerase chain reaction (PCR) for the amplification of specific target sequences and target specific probes for the detection of the amplified DNA. The probes are labelled with fluorescent reporter and quencher dyes.

Probes specific for HSV-1 DNA are labelled with a fluorophore showing similar characteristics to Cy®5 whereas the probes specific for HSV-2 DNA are labelled with the fluorophore FAM™. The probe specific for Internal Control (IC) is labelled with a fluorophore showing similar characteristics to Cy®3.

Using probes linked to distinguishable dyes enables the parallel detection of HSV-1 and HSV-2 specific DNA as well as the detection of the Internal Control in corresponding detector channels of the real-time PCR instrument.

The test consists of two processes in a single tube assay:

- PCR amplification of target DNA and Internal Control
- Simultaneous detection of PCR amplicons by fluorescent dye labelled probes

The RealStar® HSV PCR Kit 1.1 consists of:

- Two Master reagents (Master A and Master B)
- Internal Control (IC)
- Four HSV-1 specific Quantification Standards (QS1-QS4)
- Four HSV-2 specific Quantification Standards (QS1-QS4)
- PCR grade water

4.1 Real-Time PCR Instruments

The RealStar® HSV PCR Kit 1.1 can be used with the following real-time PCR instruments:

- LightCycler® 1.2/1.5/2.0 Instruments (Roche)

Master A and Master B contain all components (buffer, enzymes, primers and probes) to allow PCR mediated amplification and target detection of HSV-1 and HSV-2 specific DNA and Internal Control in one reaction setup.

The Quantification Standards contain standardized concentrations of HSV-1 and HSV-2 specific DNA. The Quantification Standards can be used individually as positive controls, or together to generate a standard curve, which can be used to determine the concentration of HSV-1 and/or HSV-2 specific DNA in the sample.

The Quantification Standards have the following concentrations:

<table>
<thead>
<tr>
<th>Quantification Standard</th>
<th>Concentration [copies/µl]</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS1</td>
<td>1.00E+04</td>
</tr>
<tr>
<td>QS2</td>
<td>1.00E+03</td>
</tr>
<tr>
<td>QS3</td>
<td>1.00E+02</td>
</tr>
<tr>
<td>QS4</td>
<td>1.00E+01</td>
</tr>
</tbody>
</table>

NOTE

Please ensure that all instruments used have been installed, calibrated, checked and maintained according to the manufacturer’s instructions and recommendations.
5. Procedure

5.1 Sample Preparation

Extracted DNA is the starting material for the RealStar® HSV PCR Kit 1.1.

The quality of the extracted DNA has a profound impact on the performance of the entire test system. It has to be ensured that the system used for nucleic acid extraction is compatible with real-time PCR technology. The following kits and systems are suitable for nucleic acid extraction:

- QIAamp® DNA Mini Kit (QIAGEN)
- QIAsymphony® (QIAGEN)
- NucliSENS® easyMag® (bioMérieux)
- MagNa Pure 96 System (Roche)
- m2000sp (Abbott)
- Maxwell® 16IVD Instrument (Promega)
- VERSANT® kPCR Molecular System SP (Siemens Healthcare)

Alternative nucleic acid extraction systems and kits might also be appropriate.

If using a spin column based sample preparation procedure including washing buffers containing ethanol, it is highly recommended to perform an additional centrifugation step for 10 min at approximately 17000 x g (~ 13000 rpm), using a new collection tube, prior to the elution of the nucleic acid.

CAUTION

If your sample preparation system is using washing buffers containing ethanol, make sure to eliminate any traces of ethanol prior to elution of the nucleic acid. Ethanol is a strong inhibitor of real-time PCR.

5.2 Master Mix Setup

All reagents and samples should be thawed completely, mixed (by pipetting or gentle vortexing) and centrifuged briefly before use.

The RealStar® HSV PCR Kit 1.1 contains a heterologous Internal Control (IC), which can either be used as a PCR inhibition control or as a control of the sample preparation procedure (nucleic acid extraction) and as a PCR inhibition control.

► If the IC is used as a PCR inhibition control, but not as a control for the sample preparation procedure, set up the Master Mix according to the following pipetting scheme:

<table>
<thead>
<tr>
<th>Number of Reactions (rxns)</th>
<th>1</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master A</td>
<td>5 µl</td>
<td>60 µl</td>
</tr>
<tr>
<td>Master B</td>
<td>10 µl</td>
<td>120 µl</td>
</tr>
<tr>
<td>Internal Control</td>
<td>1 µl</td>
<td>12 µl</td>
</tr>
<tr>
<td>Volume Master Mix</td>
<td>16 µl</td>
<td>192 µl</td>
</tr>
</tbody>
</table>

The use of carrier RNA is crucial for extraction efficiency and stability of the extracted nucleic acid.

For additional information and technical support regarding pre-treatment and sample preparation please contact our Technical Support (see chapter 8. Technical Assistance).
If the IC is used as a control for the sample preparation procedure and as a PCR inhibition control, add the IC during the nucleic acid extraction procedure.

No matter which method/system is used for nucleic acid extraction, the IC must not be added directly to the sample. The IC should always be added to the sample/lysis buffer mixture. The volume of the IC which has to be added, always and only depends on the elution volume. It represents 10% of the elution volume. For instance, if the nucleic acid is going to be eluted in 60 µl of elution buffer or water, 6 µl of IC per sample must be added into the sample/lysis buffer mixture.

If the IC was added during the sample preparation procedure, set up the Master Mix according to the following pipetting scheme:

<table>
<thead>
<tr>
<th>Number of Reactions (rxns)</th>
<th>1</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master A</td>
<td>5 µl</td>
<td>60 µl</td>
</tr>
<tr>
<td>Master B</td>
<td>10 µl</td>
<td>120 µl</td>
</tr>
<tr>
<td>Volume Master Mix</td>
<td>15 µl</td>
<td>180 µl</td>
</tr>
</tbody>
</table>

**CAUTION**

*If the IC (Internal Control) was added during the sample preparation procedure, the Master Mix for the controls must be prepared including the IC.*

**CAUTION**

*No matter which method/system is used for nucleic acid extraction, never add the IC directly to the sample.*

### 5.3 Reaction Setup

- Pipette 15 µl of the Master Mix into each required LightCycler® capillary.
- Add 10 µl of the sample (eluait from the nucleic acid extraction) or 10 µl of the controls (Quantification Standard, Positive or Negative Control).

<table>
<thead>
<tr>
<th>Reaction Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Mix</td>
</tr>
<tr>
<td>Sample or Control</td>
</tr>
<tr>
<td>Total Volume</td>
</tr>
</tbody>
</table>

- Make sure that each Positive Control (QS) and at least one Negative Control is used per run.
- For quantification purposes all of each (HSV-1 and HSV-2) Quantification Standards (QS1 to QS4) should be used.
- Thoroughly mix the samples and controls with the Master Mix by pipetting up and down.
- Close the LightCycler® capillary with the appropriate plastic stopper.
- Centrifuge the LightCycler® capillaries using an appropriate centrifuge for 30 seconds at approximately 400 x g (~ 2000 rpm).
6. Programming the Real-Time PCR Instrument

For basic information regarding the setup and programming of the different real-time PCR instruments, please refer to the user manual of the respective instrument. For detailed programming instructions regarding the use of the RealStar® HSV PCR Kit 1.1 on specific real-time PCR instruments please contact our Technical Support (see chapter 8. Technical Assistance).

6.1 Settings

► Define the following settings:

<table>
<thead>
<tr>
<th>Settings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Volume</td>
<td>25 µl*</td>
</tr>
<tr>
<td>Ramp Rate</td>
<td>Default</td>
</tr>
</tbody>
</table>

* The reaction volume has to be defined as 20µl, if using a LightCycler® 2.0 Instrument (Roche).

6.2 Fluorescence Detectors (Dyes)

► Define the fluorescence detectors (dyes):

<table>
<thead>
<tr>
<th>Target</th>
<th>LightCycler® 1.2/1.5</th>
<th>LightCycler® 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSV-2 specific DNA</td>
<td>F1</td>
<td>530</td>
</tr>
<tr>
<td>Internal control</td>
<td>F2</td>
<td>610</td>
</tr>
<tr>
<td>HSV-1 specific DNA</td>
<td>F3</td>
<td>705</td>
</tr>
</tbody>
</table>

6.3 Temperature Profile and Dye Acquisition

► Define the temperature profile and dye acquisition:

<table>
<thead>
<tr>
<th></th>
<th>Analysis Mode</th>
<th>Cycle Repeats</th>
<th>Acquisition</th>
<th>Temperature [°C]</th>
<th>Time [min:sec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denaturation</td>
<td>None</td>
<td>1</td>
<td>-</td>
<td>95</td>
<td>02:00</td>
</tr>
<tr>
<td>Amplification</td>
<td>Quantification</td>
<td>45</td>
<td>Single</td>
<td>60</td>
<td>00:30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>None</td>
<td>72</td>
<td>00:10</td>
</tr>
<tr>
<td>Cooling</td>
<td>None</td>
<td>1</td>
<td>-</td>
<td>40</td>
<td>00:30</td>
</tr>
</tbody>
</table>

CAUTION

For accurate data analysis on the LightCycler® Instruments a specific Color Compensation File might be needed. Please contact altona Diagnostics GmbH for assistance.

CAUTION

If using the LightCycler® 2.0 Instrument, only the detection channel 530, 610 and 705 should be activated for color compensation.
7. Data Analysis

For basic information regarding data analysis on specific real-time PCR instruments, please refer to the user manual of the respective instrument.

For detailed instructions regarding the analysis of the data generated with the RealStar® HSV PCR Kit 1.1 on different real-time PCR instruments please contact our Technical Support (see chapter 8. Technical Assistance).

7.1 Interpretation of Results

7.1.1 Qualitative Analysis

<table>
<thead>
<tr>
<th>Detection Channel</th>
<th>Result Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3/705  F1/530  F2/610</td>
<td></td>
</tr>
<tr>
<td>+      -       +*</td>
<td>HSV-1 specific DNA detected.</td>
</tr>
<tr>
<td>-      +       +*</td>
<td>HSV-2 specific DNA detected.</td>
</tr>
<tr>
<td>-      -       +</td>
<td>Neither HSV-1 nor HSV-2 specific DNA detected. The sample does not contain detectable amounts of HSV-1 or HSV-2 specific DNA.</td>
</tr>
<tr>
<td>-      -       -</td>
<td>PCR inhibition or reagent failure. Repeat testing from original sample or collect and test a new sample.</td>
</tr>
</tbody>
</table>

Detection of the Internal Control in the F2/610 detection channel is not required for positive results either in the F1/530 detection channel or in the F3/705 detection channel. High HSV-1 or HSV-2 DNA load/s in the sample can lead to reduced or absent Internal Control signals.

C<sub>t</sub> = Threshold Cycle  
\[ C_t = m \cdot \log (N_0) + b \]  
\[ m = \text{Slope} \]  
\[ N_0 = \text{Initial Concentration} \]  
\[ b = \text{Intercept} \]

Derived from the standard curve positive samples of unknown concentrations can be quantified.

\[ N_0 = 10^{(C_t - b)/m} \]

Figure 1: Quantification Standards (black), a positive (red) and a negative sample (blue) displayed in the Amplification Plot [A] and Standard Curve analysis [B]
To determine the **viral load of the original sample**, the following formula has to be applied:

\[
\text{Viral load (Sample)} \left( \frac{\text{copies}}{\mu l} \right) = \frac{\text{Volume (Eluate)} \left( \mu l \right) \times \text{Viral load (Eluate)} \left( \frac{\text{copies}}{\mu l} \right)}{\text{Sample Input} \left( \mu l \right)}
\]

**NOTE**

The concentration of the "Sample" is displayed in copies/µl and refers to the concentration in the eluate.

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8. **Technical Assistance**

For technical advice, please contact our Technical Support:

- **e-mail:** support@altona-diagnostics.com
- **phone:** +49-(0)40-5480676-0

9. **Trademarks and Disclaimers**

RealStar® (altona Diagnostics); LightCycler® (Roche); Maxwell® (Promega); NucliSENS®, easyMag® (bioMérieux); VERSANT® (Siemens Healthcare); QIAamp®, QIAsymphony® (QIAGEN); FAM™ (Life Technologies); Cy® (GE Healthcare).

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10. Explanation of Symbols

For research use only
Batch code
Cap color
Product number
Content
Number
Component
Version
Consult instructions for use
Contains sufficient for “n” tests/reactions (rxns)
Temperature limit
Use-by date
Manufacturer
Caution
Note
always a drop ahead.