

HSV I / HSV II / T. pallidum Real-TM

Handbook

Multiplex Real Time PCR kit for qualitative detection
of HSV I, HSV II and Treponema pallidum

REF B87-100FRT

REF TB87-100FRT

Σ 100

NAME

HSV I/HSV II/T. pallidum Real-TM

INTRODUCTION

STDs (sexually transmitted diseases) refer to a variety of bacterial, viral and parasitic infections that are acquired through sexual activity. Some STDs, such as syphilis and gonorrhea, have been known for centuries — while others, such as HIV, have been identified only in the past few decades. STDs are caused by more than 25 infectious organisms. As more organisms are identified, the number of STDs continues to expand. Common STDs include: chlamydia, gonorrhea, herpes, HIV, HPV, syphilis, gardnerella and trichomoniasis.

The development of tests based on nucleic acid amplification technology has been the most important advance in the field of STD diagnosis. Because nucleic acid amplification is exquisitely sensitive and highly specific, it offers the opportunity to use noninvasive sampling techniques to screen for infections in asymptomatic individuals who would not ordinarily seek clinical care.

INTENDED USE

HSV I/HSV II/T. pallidum Real-TM PCR kit is an *in vitro* nucleic acid amplification test for multiplex detection of HSV I, HSV II and *Treponema pallidum* DNA in clinical materials (urogenital, rectal and pharyngeal swabs; conjunctival discharge; prostate gland secretion; urine samples) by using real-time hybridization-fluorescence detection.



The results of PCR analysis are taken into account in complex diagnostics of disease.

PRINCIPLE OF ASSAY

HSV I, HSV II and *Treponema pallidum* detection by the multiplex polymerase chain reaction (PCR) is based on the amplification of pathogen genome specific region using specific HSV I, HSV II and *Treponema pallidum* primers. In real-time PCR, the amplified product is detected using fluorescent dyes. These dyes are linked to oligonucleotide probes which bind specifically to the amplified product during thermocycling. The real-time monitoring of the fluorescence intensities during the real-time PCR allows the detection of accumulating product without re-opening the reaction tubes after the PCR run. **HSV I/HSV II/T. pallidum Real-TM** PCR kit is a qualitative test that contains the Internal Control (IC). It must be used in the extraction procedure in order to control the extraction process of each individual sample and to identify possible reaction inhibition. **HSV I/HSV II/T. pallidum Real-TM** PCR kit uses “hot-start”, which greatly reduces frequency of nonspecifically primed reactions. “Hot-start” is guaranteed by chemically modified polymerase (TaqF), which is activated by heating at 95 °C for 15 min.

MATERIALS PROVIDED

Module No.1: Real Time PCR kit (B87-100FRT)

Part N° 2 – “**HSV I/HSV II/T. pallidum Real-TM**”: Real Time amplification kit

- **PCR-mix-1-FRT**, 1,2 ml;
- **PCR-mix-2-FRT**, 2 x 0,3 ml;
- **TaqF Polymerase**, 2 x 0,03 ml;
- **Pos C+**, 0,2 ml;
- **Negative Control C-***, 1,2 ml;
- **Internal Control IC****, 1,0 ml;
- **DNA-buffer**, 0,5 ml;

Contains reagents for 110 tests.

Module No.2: Complete Real Time PCR test with DNA purification kit (TB87-100FRT)

Part N° 1 – “**DNA-Sorb-B**”: Sample preparation kit

- **Lysis Solution**, 2 x 15 ml;
- **Washing Solution 1**, 2 x 15 ml;
- **Washing Solution 2**, 2 x 50 ml;
- **Sorbent**, 2 x 1,25 ml;
- **DNA-eluent**, 2 x 5 ml.

Contains reagents for 100 tests.

Part N° 2 – “**HSV I/HSV II/T. pallidum Real-TM**”: Real Time amplification kit

- **PCR-mix-1-FRT**, 1,2 ml;
- **PCR-mix-2-FRT**, 2 x 0,3 ml;
- **TaqF Polymerase**, 2 x 0,03 ml;
- **Pos C+**, 0,2 ml;
- **Negative Control C-***, 1,2 ml;
- **Internal Control IC****, 1,0 ml;
- **DNA-buffer**, 0,5 ml;

Contains reagents for 110 tests.

**must be used in the isolation procedure as Negative Control of Extraction.*

***add 10 µl of Internal Control during the DNA isolation directly to the sample/lysis mixture (see DNA-Sorb-B REF K-1-1/B protocol).*

MATERIALS REQUIRED BUT NOT PROVIDED

Zone 1: sample preparation:

- DNA extraction kit (Module No. 1)
- Biological cabinet
- Desktop microcentrifuge for “eppendorf” type tubes
- Dry heat block
- Vortex mixer
- Pipettes
- Sterile pipette tips with filters
- 1,5 ml polypropylene sterile tubes
- Biohazard waste container
- Refrigerator, freezer

Zone 2: Real Time amplification:

- Real Time Thermal cycler
- Reaction tubes
- Workstation
- Pipettes (adjustable)
- Sterile pipette tips with filters
- Desktop centrifuge with rotor for 1,5/2,0 ml tubes
- Vortex mixer
- Freezer, refrigerator

STORAGE INSTRUCTIONS

All components of the **HSV I/HSV II/T. pallidum Real-TM** PCR kit (except for polymerase TaqF and PCR-mix-2-FRT) are to be stored at the temperature 2–8 °C when not in use. All components of the **HSV I/HSV II/T. pallidum Real-TM** PCR kit are stable until labeled expiration date. The shelf life of reagents before and after the first use is the same, unless otherwise stated.



PCR-mix-1-FL is to be kept away from light.



Polymerase (TaqF) and PCR-mix-2-FRT are to be stored at ≤ -16 °C

Store **DNA-Sorb-B** at 2–8 °C.

STABILITY

HSV I/HSV II/T. pallidum Real-TM is stable up to the expiration date indicated on the kit label. The product will maintain performance through the control date printed on the label. The shelf life of reagents before and after the first use is the same, unless otherwise stated. Exposure to light, heat or humidity may affect the shelf life of some of the kit components and should be avoided.


Repeated thawing and freezing of these reagents should be avoided, as this may reduce the sensitivity.

QUALITY CONTROL

In accordance with Sacace's ISO 13485-Certified Quality Management System, each lot is tested against predetermined specifications to ensure consistent product quality.

WARNINGS AND PRECAUTIONS

The user should always pay attention to the following:

-  Lysis Solution contains guanidine thiocyanate*. Guanidine thiocyanate is harmful if inhaled, or comes into contact with skin or if swallowed. Contact with acid releases toxic gas. (Xn; R: 20/21/22-36/37/38; S: 36/37/39).
- Use sterile pipette tips with aerosol barriers and use new tip for every procedure.
- Store extracted positive material (samples, controls and amplicons) away from all other reagents and add it to the reaction mix in a separate area.
- Thaw all components thoroughly at room temperature before starting an assay.
- When thawed, mix the components and centrifuge briefly.
- Use disposable gloves, laboratory coats and eye protection when handling specimens and reagents. Thoroughly wash hands afterwards.
- Do not eat, drink, smoke, apply cosmetics, or handle contact lenses in laboratory work areas.
- Do not use a kit after its expiration date.
- Dispose of all specimens and unused reagents in accordance with local authorities' regulations.
- Specimens should be considered potentially infectious and handled in a biological cabinet in accordance with appropriate biosafety practices.
- Clean and disinfect all sample or reagent spills using a disinfectant such as 0.5% sodium hypochlorite, or other suitable disinfectant.
- Avoid sample or reagent contact with the skin, eyes, and mucous membranes. If skin, eyes, or mucous membranes come into contact, rinse immediately with water and seek medical advice immediately.
- Material Safety Data Sheets (MSDS) are available on request.
- Use of this product should be limited to personnel trained in the techniques of DNA amplification.
- The laboratory process must be one-directional, it should begin in the Extraction Area and then move to the Amplification and Detection Areas. Do not return samples, equipment and reagents to the area in which the previous step was performed.



Some components of this kit contain sodium azide as a preservative. Do not use metal tubing for reagent transfer.

*** Only for Module No.2**

PRODUCT USE LIMITATIONS

All reagents may exclusively be used in in vitro diagnostics. Use of this product should be limited to personnel trained in the techniques of DNA amplification (UNI EN ISO 18113-2:2012). Strict compliance with the user manual is required for optimal PCR results. Attention should be paid to expiration dates printed on the box and labels of all components. Do not use a kit after its expiration date.

SAMPLE COLLECTION, STORAGE AND TRANSPORT

HSV I/HSV II/T. pallidum Real-TM can analyze DNA extracted from:

- *cervical, urethral swabs, conjunctival swabs**: insert the swab into the nuclease-free 1,5 ml tube and add 0,2 ml of Transport medium. Vigorously agitate swabs in medium for 15-20 sec;
- *whole blood* collected in either ACD or EDTA tubes;
- *serous exudation from primary syphilis hard chancre and other syphilitic lesions*: insert the swab into the nuclease-free 1,5 ml tube and add 0,2 mL of Transport medium or sterile Saline solution. Agitate swabs in medium for 15-20 sec;
- *plasma* collected blood in ACD or EDTA tubes;
- *liquor* stored in "Eppendorf" tube;
- *amniotic liquid* stored in "Eppendorf" tube;
- *seminal liquid*: transfer about 30 µl of seminal liquid to a polypropylene tube (1,5 ml) and add 70 µl of sterile saline solution;
- *tissue* (≈1,0 gr) homogenized with mechanical homogenizer or scalpel, glass sticks, teflon pestles and dissolved in 1,0 ml of saline water or PBS sterile. Vortex vigorously and incubate 30 min at room temperature. Transfer the supernatant into a new 1,5 ml tube;

It is recommended to process samples immediately after collection. Store samples at 2–8 °C for no longer than 24 hours, or freeze at –20/80°C. Transportation of clinical specimens must comply with country, federal, state and local regulations for the transport of etiologic agents.

* recommended kit for DNA extraction: DNA-Sorb-A (REF K-1-1/A)

DNA ISOLATION

The following kit are recommended:

- ⇒ **DNA-Sorb-B** (Sacace, REF K-1-1/B);
- ⇒ **SaMag Viral Nucleic Acids Extraction Kit** (Sacace, REF SM003) for liquor and cell free body fluids;
- ⇒ **SaMag STD DNA Extraction Kit** (Sacace, REF SM007) for swabs, seminal liquid.

Please carry out DNA extraction according to the manufacture's instruction. Add 10 µl of Internal Control during DNA isolation procedure directly to the sample/lysis mixture.

SPECIMEN AND REAGENT PREPARATION (reagents supplied with the module no.2)

1. **Lysis Solution** and **Washing Solution** (in case of their storage at +2-8°C) should be warmed up to 60–65°C until disappearance of ice crystals. Prepare required quantity of 1.5 ml polypropylene tubes including one tube for **Negative Control of Extraction**.
2. Add to each tube **300 µl** of **Lysis Solution** and **10 µl** of **Internal Control**.
3. Add **100 µl** of **Samples** to the appropriate tube.
4. Prepare Controls as follows:
 - add **100 µl** of **C– (Neg Control)** provided with the amplification kit) to the tube labeled *Cneg*.
5. Vortex the tubes and incubate for 5 min at 65°C. Centrifuge for 7-10 sec. If the sample is not completely dissolved it is recommended to re-centrifuge the tube for 5 min at a maximum speed (12000-16000 g.) and transfer the supernatant into a new tube for DNA extraction.
6. Vortex vigorously **Sorbent** and add **25 µl** to each tube.
7. Vortex for 5-7 sec and incubate all tubes for 3 min at room temperature. Repeat this step.
8. Centrifuge all tubes for 30 sec at 8000g and using a micropipette with a plugged aerosol barrier tip, carefully remove and discard supernatant from each tube without disturbing the pellet.
9. Add **300 µl** of **Washing Solution 1** to each tube. Vortex vigorously and centrifuge for 30 sec at 8000g. Remove and discard supernatant from each tube.
10. Add **500 µl** of **Washing Solution 2** to each tube. Vortex vigorously and centrifuge for 30 sec at 8000g. Remove and discard supernatant from each tube.
11. Repeat step 10 and incubate all tubes with open cap for 5 min at 65°C.
12. Resuspend the pellet in **50 µl** of **DNA-eluent**. Incubate for 5 min at 65°C and vortex periodically.
13. Centrifuge the tubes for 1 min at maximum speed (12000-16000 g). The supernatant contains DNA ready for amplification. If amplification is not performed in the same day of extraction, the processed samples can be stored at 2-8°C for a maximum period of 5 days or frozen at –20°/-80°C.

PROTOCOL

The total reaction volume is **25 µl**, volume of DNA sample - **10 µl**.

1. Prepare required quantity of reaction tubes for samples (N) and controls (N+2).
2. Prepare in the new sterile tube **10*N µl** of **PCR-mix-1-FRT**, **5*N µl** of **PCR-mix-2-FRT** and **0,5*N µl** of **TaqF DNA Polymerase**. Vortex and centrifuge briefly.
3. Add to each tube **15 µl** of **Reaction Mix** and **10 µl** of **extracted DNA**. Mix by pipetting.
4. Prepare for each panel 2 controls:
 - add **10 µl** of **DNA-buffer** to the tube labeled NCA (Negative Control of Amplification);
 - add **10 µl** of **Positive Control C+** to the tube labeled C+ (PCR Positive Control);
5. Insert the tubes in the thermalcycler.

Amplification

1. Create a temperature profile on your instrument as follows:

Step	Rotor type instruments ¹			Plate or modular type instruments ²		
	Temperature, °C	Time	Cycles	Temperature, °C	Time	Cycles
Hold	95	15 min	1	95	15 min	1
Cycling	95	5 s	5	95	5 s	5
	60	20 s		60	20 s	
	72	15 s		72	15 s	
Cycling 2	95	5 s	40	95	5 s	40
	60	20 s (fluorescence detection)		60	30 s (fluorescence detection)	
	72	15 s		72	15 s	

¹ For example Rotor-Gene™ 3000/6000/Q (Corbett Research, Qiagen)

² For example, SaCycler-96™ (Sacace), CFX/iQ5™ (BioRad); Mx3005P™ (Agilent), ABI® 7500 Real Time PCR (Applied Biosystems), SmartCycler® (Cepheid)

The results are interpreted by the device software by the crossing (or not crossing) of the fluorescence curve with the threshold line.

Fluorescence is detected at the 2nd step of Cycling 2 stage (60 °C) in FAM/Green, JOE/Yellow/HEX/Cy3, ROX/Orange/Texas Red, and Cy5/Red fluorescence channels.

INSTRUMENT SETTINGS

Rotor-type instruments (RotorGene 6000/Q)

Channel	Threshold	More Settings/ Outlier Removal	Slope Correct
FAM/Green	0.1	5 %	Off
JOE/Yellow	0.1	5 %	Off
Rox/Orange	0.1	5 %	Off
Cy5/Red	0.1	5 %	On

Plate- or modular type instruments (iQ5, Mx300P, ABI 7500, SmartCycler)

For result analysis, set the threshold line at a level corresponding to 10–20% of the maximum fluorescence signal obtained for Pos C+ sample during the last amplification cycle.

DATA ANALYSIS

- **HSV II DNA** amplification product is detected in the **FAM** fluorescence channel,
- **HSV I DNA** amplification product is detected in the **JOE** fluorescence channel,
- ***Treponema pallidum* DNA** is detected in the **ROX** channel,
- **Internal Control DNA** is detected in the **Cy5** channel.

The results of the analysis are considered reliable only if the results obtained for both Positive and Negative Controls are correct.

Table 1. Results for controls

Control	Stage for control	Ct channel FAM/Green, JOE/Yellow/HEX, ROX/Orange	Ct channel Cy5/Red	Interpretation
NCE	DNA extraction	Neg	Pos (< 33)	OK
NCA	Amplification	Neg	Neg	OK
C+	Amplification	Pos (< 33)	Pos (< 33)	OK

1. The sample is considered to be **positive** for **HSV II** if its Ct value is detected in the results grid in the FAM channel. Moreover, the fluorescence curve should cross the threshold line in the region of exponential fluorescence growth.
2. The sample is considered to be **positive** for **HSV I** if its Ct value is detected in the results grid in the JOE channel. Moreover, the fluorescence curve should cross the threshold line in the region of exponential fluorescence growth.
3. The sample is considered to be **positive** for ***Treponema pallidum*** if its Ct value is detected in the results grid in the ROX channel. Moreover, the fluorescence curve should cross the threshold line in the region of exponential fluorescence growth.
4. The sample is considered to be **negative** for HSV II, HSV I and *Treponema pallidum* if its Ct value is not detected in the results grid in FAM, JOE, and ROX channels and the Ct on the Cy5 channel is less than 36.

QUALITY CONTROL PROCEDURE

A defined quantity of Internal Control (IC) is introduced into each sample and control at the beginning of sample preparation procedure in order to control the extraction process of each individual sample and to identify possible reaction inhibition.

A negative control of extraction (NCE), negative amplification control (NCA), positive amplification control (C+) are required for every run to verify that the specimen preparation, the amplification and the detection steps are performed correctly.

If the controls are out of their expected range (see table Results for Controls), all of the specimens and controls from that run must be processed beginning from the sample preparation step.

SPECIFICATIONS

Sensitivity

Clinical material	Extraction kit	Microorganism	Sensitivity, copies/ml
Urogenital swabs	DNA-sorb-B	HSV I	5×10^2
		HSV II	5×10^2
		<i>T.pallidum</i>	5×10^2



Analytical Sensitivity of each microorganism does not change even at high concentrations of two other microorganisms (to 10^9 GE/ml).

Specificity










The analytical specificity of **HSV I/HSV II/T. pallidum Real-TM** PCR kit is ensured by selection of specific primers and probes as well as stringent reaction conditions. The primers and probes were checked for possible homologies to all sequences published in gene banks by sequence comparison analysis.

Nonspecific responses were absent in tests of human DNA samples and DNA of the following microorganisms: *Gardnerella vaginalis*, *Lactobacillus* spp., *Escherichia coli*, *Staphylococcus* spp., *Streptococcus* spp., *Candida albicans*, *Neisseria urealyticum*, *Neisseria parvum*, *Mycoplasma hominis*, *Chlamydia trachomatis*, *Mycoplasma genitalium*, *Neisseria* spp., *Ureaplasma urealyticum*, *Trichomonas vaginalis*, *Toxoplasma gondii*, *CMV*, and *HPV*.

TROUBLESHOOTING

1. Weak or no signal of the IC (Cy5 channel) for the Negative Control of extraction.
 - The PCR was inhibited.
 - ⇒ Make sure that you use a recommended DNA extraction method and follow to the manufacturer's instructions.
 - ⇒ Re-centrifuge all the tubes before pipetting of the extracted DNA for 2 min at maximum speed (12000-16000 g) and take carefully supernatant. Don't disturb the pellet, sorbent inhibit reaction.
 - The reagents storage conditions didn't comply with the instructions.
 - ⇒ Check the storage conditions
 - The PCR conditions didn't comply with the instructions.
 - ⇒ Check the PCR conditions and select for the IC detection the fluorescence channel reported in the protocol.
 - The IC was not added to the sample during the pipetting of reagents.
 - ⇒ Make attention during the DNA extraction procedure.
2. Weak or no signal of the Positive Control.
 - The PCR conditions didn't comply with the instructions.
 - ⇒ Check the amplification protocol and select the fluorescence channel reported in the manual.
3. Any signal on Fam(Green), Joe (Yellow)/Hex/Cy3, Rox (Orange)/TexasRed channels with Negative Control of extraction.
 - Contamination during DNA extraction procedure. All samples results are invalid.
 - ⇒ Decontaminate all surfaces and instruments with sodium hypochlorite and ethanol.
 - ⇒ Use only filter tips during the extraction procedure. Change tips between tubes.
 - ⇒ Repeat the DNA extraction with the new set of reagents.
4. Any signal with Negative Control of PCR (DNA-buffer).
 - Contamination during PCR preparation procedure. All samples results are invalid.
 - ⇒ Decontaminate all surfaces and instruments with sodium hypochlorite and ethanol or special DNA decontamination reagents.
 - ⇒ Pipette the Positive control at last.
 - ⇒ Repeat the PCR preparation with the new set of reagents.

KEY TO SYMBOLS USED

	List Number		Caution!
	Lot Number		Contains sufficient for <n> tests
	Expiration Date		Version
	Store at	NCA	Negative Control of Amplification
	Manufacturer	NCE	Negative control of Extraction
	Consult instructions for use	C+	Positive Control of Amplification
IC	Internal Control	RUO	For Research Use Only

* SaCycler™ is a registered trademark of Sacace Biotechnologies
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 * Rotor-Gene™ is a registered trademark of Qiagen
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