

# Ureaplasma parvum/Ur.urealyticum Real-TM Quant

## Handbook

Real Time PCR Kit for quantitative detection of  
Ureaplasma parvum and urealyticum

**REF** B19-100FRT Q

 **100**

## NAME

### U.parvum/U.urealyticum Real-TM Quant

## 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.

Bacterial vaginosis (BV) is a lower genital tract infection characterized by the presence of thin, white, homogeneous, fishy-smelling vaginal discharge. This discharge is present in the absence of signs of vaginal irritation, such as pain, itching, burning, soreness, and dyspareunia. As such, in reference to the lack of demonstrable inflammatory response, the term 'vaginosis' was adopted instead of vaginitis. Bacterial vaginosis is characterized by a disruption of the normal vaginal equilibrium. The lactobacilli population decreases, which leads to an increase in vaginal pH (as high as 7.0) and overgrowth of and replacement by vaginosis-associated anaerobic microorganisms. Up to 90% of women with bacterial vaginosis harbor *Gardnerella vaginalis*. Other associated microbial populations identified include *Prevotella bivia*, *Mobiluncus* species, Gram-positive cocci, *Bacteroides*, *Mycoplasma hominis*, *Ureaplasma*, *Megasphaera*, and *Leptotrichia*. *Atopobium vaginae*, *Streptococcus*.

The development of tests based on nucleic acid amplification technology has been the most important advance in the field of STD and BV 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

Kit **U.parvum/U.urealyticum Real-TM Quant** is a multiplex Real Time PCR test for the quantitative detection of *Ureaplasma parvum* and *Ureaplasma urealyticum* in the urogenital swabs, urine, prostatic liquid and other biological materials.

## PRINCIPLE OF ASSAY

*U. parvum*, *U.urealyticum* detection by the multiplex polymerase chain reaction (PCR) is based on the amplification of pathogen genome specific regions using specific 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 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.

Kit **U.parvum/U.urealyticum Real-TM Quant** is based on two major processes: isolation of DNA from specimens and Real Time amplification.

**U.parvum/U.urealyticum Real-TM Quant** kit allows to make the quantitative detection in two ways:

1. *Absolute quantification* which gives absolute results of copies in 1 ml of clinical sample
2. *Relative quantification* which gives the results of the ratio between copies of *U.parvum*, *U.urealyticum* and the quantity of human cells. To obtain this result the primers and probes against specific regions of *U.parvum* and *U.urealyticum* against human  $\beta$ -globin gene were added to the PCR mix. Furthermore to obtain a quantitative result of human cells, QS standards contain human DNA calibrators. The obtained results of the ratio between the concentration of *U.parvum*, *U.urealyticum* and human DNA evaluate the level of the presence of these microorganisms among a population of human cells.

## MATERIALS PROVIDED

### Module No.1: Real Time PCR kit (B19-100FRT Q)

- **PCR-mix-1**, 1,2 ml
- **PCR-mix-2**, 2 x 0,3 ml
- **TaqF Polymerase**, 2 x 0,03 ml
- **TE-buffer**, 0,5 ml
- **Negative Control C-\***, 1,2 ml
- **Standard**
  - **QSG1**, 0,1 ml
  - **QSG2**, 0,1 ml

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

## MATERIALS REQUIRED BUT NOT PROVIDED

- DNA extraction kit.
- Transport medium.
- Disposable powder-free gloves.
- Pipettes (adjustable).
- Sterile pipette tips with aerosol barriers up to 200 µl.
- Tube racks.
- Vortex mixer.
- Desktop centrifuge with rotor for 2 ml reaction tubes.
- PCR box.
- Real Time PCR instrument.
- Disposable polypropylene microtubes for PCR or PCR-plate.
- Refrigerator for 2–8 °C.
- Deep-freezer for ≤ –16 °C.
- Waste bin for used tips.

## STORAGE INSTRUCTIONS

**U.parvum/U.urealyticum Real-TM Quant** must be stored at 2-8°C except for **PCR-mix-2** and **TaqF Polymerase** that must be stored at -16°C. The kit can be shipped at 2-8°C but should be stored at 2-8°C and -16°C immediately on receipt.

## STABILITY

**U.parvum/U.urealyticum Real-TM Quant** 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. 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

**IVD**

### ***In Vitro* Diagnostic Medical Device**

For *In Vitro* Diagnostic Use Only

The user should always pay attention to the following:

- 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.

## 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

**U.parvum/U.urealyticum Real-TM Quant** can analyze DNA extracted from:

- *cervical, urethral swabs*: insert the swab into the nuclease-free 1,5 ml tube and add 0,5 ml of Transport medium (can be ordered separately, Sacace REF R12-Stab). Vigorously agitate swabs in medium for 15-20 sec.
- *urine sediment* : collect 10-20 ml of first-catch urine in a sterile container. Centrifuge for 30 min at 3000 x g, carefully discard the supernatant and leave about 500 µl of solution. Resuspend the sediment. Use the suspension for the DNA extraction.

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.

## DNA ISOLATION

Any commercial RNA/DNA isolation kit, if IVD-CE validated for the specimen types indicated herein at the “SAMPLE COLLECTION, STORAGE AND TRANSPORT” paragraph, could be used.

Sacace Biotechnologies recommends to use the following kits:

- ⇒ **DNA-Sorb-A** (Sacace, REF K-1-1/A);
- ⇒ **SaMag STD DNA Extraction kit** (Sacace, REF SM007).

Please carry out the DNA extraction according to the manufacturer’s instructions.

## PROTOCOL:

1. Prepare required quantity of tubes or PCR plate.
2. Prepare for each sample in the new sterile tube **10\*N µl of PCR-mix-1**, **5\*N µl of PCR-mix-2** and **0,5\*N µl of TaqF Polymerase**.
3. Add **15 µl of Reaction Mix** into each tube.
4. Add **10 µl of extracted DNA** sample to appropriate tube with Reaction Mix.
5. Prepare for **qualitative run** 1 positive control and 1 negative control:
  - add **10 µl of QS2** to the tube labeled *Cpos*;
  - add **10 µl of TE-buffer** to the tube labeled *Cneg*;
6. For **quantitative analysis** prepare 4 tubes and perform QS1 and QS2\* standards twice.

*\*QS1 and QS2 values are specific for each lot and are reported in the Quant Data Card provided in the kit.*

Close tubes and transfer them into the instrument in this order: samples, negative controls, Standards.

### Amplification:

Create a temperature profile on your Real-time instrument as follows:

Stage	Rotor type instruments <sup>1</sup>				Plate type or modular instruments <sup>2</sup>			
	Temp, °C	Time	Fluorescence detection	Cycle repeats	Temp, °C	Time	Fluorescence detection	Cycle repeats
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	FAM(Green), JOE(Yellow), Rox (Orange)		60	30 s	FAM, JOE/HEX/Cy3, Rox/TexasRed	
	72	15 s	–		72	15 s	–	

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

<sup>2</sup> For example, SaCycler-96™ (Sacace), CFX/iQ5™ (BioRad); Mx3005P™ (Agilent), ABI® 7300/7500 Real Time PCR (Applied Biosystems), SmartCycler® (Cepheid)

## INSTRUMENT SETTINGS

### Rotor-type instruments

Channel	Calibrate/Gain Optimisation...	Threshold	More Settings/ Outlier Removal	Slope Correct
FAM/Green	<i>from 5 FI to 10 FI</i>	0.1	10-20 %	on
JOE/Yellow	<i>from 4 FI to 8 FI</i>	0.1	10-20 %	on
Rox/Orange	<i>from 4 FI to 8 FI</i>	0.1	10-30 %	on

### Plate- or modular type instruments

The threshold line should cross only sigmoid curves of signal accumulation of positive samples and should not cross the baseline; otherwise, the threshold level should be raised. Set the threshold at a level where fluorescence curves are linear and do not cross curves of the negative samples.



## RESULTS INTERPRETATION

The results are interpreted through the presence of crossing of fluorescence curve with the threshold line. To set threshold put the line at such level where curves of fluorescence are linear.

*Ureaplasma parvum* is detected on the FAM (Green) channel, *Ureaplasma urealyticum* on the JOE (Yellow)/Cy3/HEX channel,  $\beta$ -globin gene on the ROX (Orange) channel

### Qualitative analysis

Results are accepted as relevant if positive and negative controls of amplification and extraction are passed.

### Results for controls

Control	Stage for control	Ct FAM (Green)	Ct JOE(Yellow)/HEX/Cy3	Ct Rox(Orange)/TexasRed	Interpretation
NCE	DNA isolation	–	–	–	OK
NCA	PCR	–	–	–	OK
QS2	PCR	Pos	Pos	Pos	OK

- The sample is considered to be positive for *Ureaplasma parvum* if in the channel FAM (Green) the value of **Ct** is different from zero;
- The sample is considered to be positive for *Ureaplasma urealyticum* if in the channel JOE(Yellow)/HEX the value of **Ct** is different from zero;
- Specimens with absent signal in the ROX (Orange) channel are interpreted as invalid.

### Quantitative analysis

#### **Absolute quantification:**

*Absolute quantification* gives absolute quantitative concentration of microorganisms in the clinical specimens put in 500  $\mu$ l of transport medium.

For each patient specimen, calculate the concentration of *U. parvum*, *U.urealyticum* DNA in 1 ml of sample using the following formula:

$$U. parvum, U.urealyticum \text{ reaction x } 200^* = \text{copies DNA/ml}$$

### Relative quantification:

Relative quantification which gives the results of the ratio between copies of *U.parvum*, *U.urealyticum* and the quantity of human cells. The obtained results of the ratio between the concentration of *U.parvum*, *U.urealyticum* and human DNA evaluate the level of the presence of these microorganisms among a population of human cells.

For each patient specimen, calculate the concentration of DNA in  $10^5$  cells using the following formula:

$$\frac{\text{Up (Uu) DNA copies/reaction}}{\text{IC Glob DNA copies/reaction}} \times 2^{*10^5} = \text{Up (Uu) DNA}/10^5 \text{ cells}$$

## PERFORMANCE CHARACTERISTICS

### Analytical specificity

The analytical specificity of the primers and probes was validated with negative samples. They did not generate any signal with the specific *Ureaplasma parvum*, *Ureaplasma urealyticum* primers and probes.

The specificity of the kit **U.parvum/U.urealyticum Real-TM Quant** was 100%.

The potential cross-reactivity of the kit **U.parvum/U.urealyticum Real-TM Quant** was tested against the group control (*Gardnerella vaginalis*, *Lactobacillus spp.*, *Escherichia coli*, *Staphylococcus spp.*, *Streptococcus spp.*, *Candida albicans*, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Neisseria spp.*, *Mycoplasma genitalium*, *Mycoplasma hominis*, *Trichomonas vaginalis*, *Treponema pallidum*, *Toxoplasma gondii*, *HSV*, *CMV*, *HPV*). It was not observed any cross-reactivity with other pathogens.

### Analytical sensitivity

The kit **U.parvum/U.urealyticum Real-TM Quant** allows to detect *Ureaplasma parvum*, *Ureaplasma urealyticum* DNA in 100% of the tests with a sensitivity of not less than 500 copies/ml.











### Linearity

**U.parvum/U.urealyticum Real-TM Quant** is linear from  $10^3$  to  $10^7$  copies/ml.

## TROUBLESHOOTING

1. Weak or no signal of the IC (ROX (Orange) channel) for the clinical samples.
  - Incorrect collection of clinical material. Repeat this step.
  - Problems during DNA extraction.
    - ⇒ 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 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.
2. Weak or no signal of Standards.
  - 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 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.
  - 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
	For <i>in Vitro</i> Diagnostic Use		Version
	Store at	<b>NCA</b>	Negative Control of Amplification
	Manufacturer	<b>NCE</b>	Negative control of Extraction
	Consult instructions for use	<b>C+</b>	Positive Control of Amplification
	Expiration Date	<b>IC</b>	Internal Control

- \* SaCycler™ is a registered trademark of Sacace Biotechnologies
- \* CFX™ and iQ5™ are registered trademarks of Bio-Rad Laboratories
- \* Rotor-Gene™ is a registered trademark of Qiagen
- \* MX3005P® is a registered trademark of Agilent Technologies
- \* ABI® is a registered trademark of Applied Biosystems
- \* SmartCycler® is a registered trademark of Cepheid



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