

**ASSAY NAME: Bacterial_URP4_BR
(Bacterial upper respiratory panel 4 for BioRad)**

Quantity: 100 x 20µL PCR reactions

5-plex assay: *Bordetella pertussis*, *Klebsiella aerogenes*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, and human RPP30 DNA

SKU: PNP-BRP4-D-BR-100 (Bio-Rad)

(RUO). Research Use Only. Not for use in Diagnostic Procedures.

SCOPE OF THIS PRODUCT INFORMATION SHEET (PIS):

The oligonucleotide recipes are optimized for each instrument (BioRad, QuantStudio, MIC). The verification data presented in this PIS were performed using PNP-BRP4-D-BR-100 on a BioRad CFX96. The performance of the other SKUs on their corresponding instrument should be similar. Contact PCRassays.com if you need to use a different qPCR instrument.

CONTENTS

The Bacterial-URP4 kit contains a mixture of primers/probes targeting a hypothetical protein in the *Bordetella pertussis* genome, sugar porter family MFS transporter protein (Protein ID: QEU20225.1) in the *Klebsiella aerogenes* genome, NA⁺/H⁺ antiporter Mnh2 protein, subunits G and F (Protein IDs: UUY59018.1, UUY59019.1) in the *Staphylococcus epidermidis* genome, and an intergenic region in the *Klebsiella pneumoniae* genome. The primers and probes in the bacterial URP4 assay are provided in Tube 1 as a 5X concentrated working solution that detects 4 pathogens and a human extraction control.

Table of Dyes used in this assay:

Pathogen/Target	Dyes	Quencher	Refs.
<i>B. pertussis</i>	FAM	BHQ-1	1,2
RPP30-DNA control	HEX	BHQ-1	7
<i>K. aerogenes</i>	TEX615	BHQ-2	3,4
<i>S. epidermidis</i>	Cy5	BHQ-2	5
<i>K. pneumoniae</i>	Cy5.5	BHQ-2	6

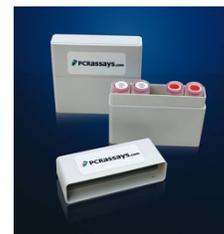
The probes are designed as TaqMan⁸ cleavage mechanism and thus the reaction requires a DNA polymerase with 5'-exonuclease activity.

Assay contents:

Tube 1: Primer/Probe mix (5X) for *B. pertussis*, *K. aerogenes*, *S. epidermidis*, *K. pneumoniae*, and hRPP30DNA.

Tube 2: (Do NOT add to specimen unknowns) Positive control: 5000 copies/µl positive controls of synthetic 500 bp DNA fragments of *B. pertussis*, *K. aerogenes*, *S. epidermidis*, *K. pneumoniae*, and hRPP30DNA.

Tube 3: InhibiTaq Standard qPCR enzyme Mastermix (enough for 100 rxns. with 20 µL total volume). This is a custom formulation from Fortis Life Sciences to the specifications of PCRassays.com.



ASSAY HANDLING

The bacterial URP4 assay is shipped at ambient temperature, and should be stored at -20 °C. The tubes should be kept on ice once thawed. Do not subject the enzyme to multiple freeze-thaw cycles.

Any contamination should be avoided by using appropriate personal protective equipment (PPE), powder free gloves, aerosol barrier pipette tips, and a clean hood.

EXPERIMENTAL

Perform nucleic acid extraction/purification (recommended).

Set up your reaction (20 µL) as follows on ice:

Component	Volume (µL)
InhibiTaq qPCR enzyme mastermix (2X)	10
Primer/Probe mix (5X)	4
Sample	2
Water	4

Notes: To improve assay sensitivity, up to 6 µL of sample can be added (water volume adjusted accordingly) for a total reaction volume of 20 µL. For positive control rxns., add 2 µL of the solution from Tube 2. Molecular biology grade water (NOT included) should be used to prepare the PCR reactions.

A PCR protocol was used for verification on a BioRad CFX96 system, with the following program:

Step	Thermocycling Protocol:
1	Incubate @ 95 °C for 2 minutes
2	Incubate @ 95 °C for 3 seconds
3	Incubate @ 55 °C for 15 seconds
4	Plate Read
5	Go to Step 2, repeat 44× more

RESULT INTERPRETATION

After running the qPCR reaction, perform a regression analysis on the data to determine the quantification cycle, Cq. (Cq is preferred over Ct). Each fluorescence channel with a Cq < 38 cycles and final RFU > 200 (BioRad) is considered “positive” or “+” in the Table below.

<i>B. pertussis</i> FAM TM	<i>K. aerogenes</i> TEX615 TM	<i>S. epidermidis</i> Cy5 TM	<i>K. pneumoniae</i> Cy5.5 TM	RPP HEX TM	Recommended Interpretation
—	—	—	—	—	The PCR reaction failed. Please repeat the experiment.
—	—	—	—	+	The sample contains human RPP30 DNA. The sample doesn't contain bacterial DNA.
+	—	—	—	—	The sample contains <i>B. pertussis</i> DNA. The sample may not contain human RPP30 DNA.
+	—	—	—	+	The sample contains <i>B. pertussis</i> DNA and human RPP30 DNA.
—	+	—	—	—	The sample contains <i>K. aerogenes</i> DNA. The sample may not contain human RPP30 DNA.
—	+	—	—	+	The sample contains <i>K. aerogenes</i> DNA and human RPP30 DNA.
—	—	+	—	—	The sample contains <i>S. epidermidis</i> DNA. The sample may not contain human RPP30 DNA.
—	—	+	—	+	The sample contains <i>S. epidermidis</i> DNA and human RPP30 DNA.
—	—	—	+	—	The sample contains <i>K. pneumoniae</i> DNA. The sample may not contain human RPP30 DNA.
—	—	—	+	+	The sample contains <i>K. pneumoniae</i> DNA and human RPP30 DNA.
+	+	+	+	—	The sample contains <i>B. pertussis</i> , <i>K. aerogenes</i> , <i>S. epidermidis</i> , and <i>K. pneumoniae</i> DNA. The sample may not contain human RPP30 DNA.
+	+	+	+	+	The sample contains <i>B. pertussis</i> , <i>K. aerogenes</i> , <i>S. epidermidis</i> , and <i>K. pneumoniae</i> DNA, and human RPP30 DNA.

VERIFICATION EXPERIMENTS

The bacterial UPR4 assay verification was carried out as a 5-plex assay that simultaneously detects DNA *B. pertussis*, *K. aerogenes*, *S. epidermidis*, *K. pneumoniae*, and human RPP30 DNA, which serves as a positive control assay.

Experiments were performed in triplicate using the experimental procedure given above, but with different samples added to each reaction. The samples used for the verification experiments contained 1×10^4 copies/reaction of synthetic 500 bp DNA constructs (from Twist Biosciences) harboring the regions of interest from the pathogen genomes, human RPP30 DNA gene, and human genomic DNA. **Figure 1** shows the results of these experiments, which indicate that the 5-plex specifically detects the different pathogens.

The limit of detection (LOD) was estimated by performing serial dilution experiments in triplicate (**Figure 2**). For dilution series only target construct was added. The results show a limit of detection (LOD) <10 copies/reaction.

NOTES

¹ FAMTM (Carboxyfluorescein), a trademark of Life Technologies Corporation.

² BHQ-1TM (Black Hole Quencher) is a trademark of Biosearch Technologies, Inc.

³ TEX615TM is a trademark of Thermo Fisher Scientific.

⁴ BHQ-2TM (Black Hole Quencher) is a trademark of Biosearch Technologies, Inc.

⁵ Cy5TM, a trademark of GE Healthcare.

⁶ Cy5.5TM is a trademark of GE Healthcare.

⁷ HEXTM (Hexachloro-fluorescein), a trademark of Thermo Fisher Scientific.

⁸ TaqManTM is a trademark of Roche Diagnostics, Inc.

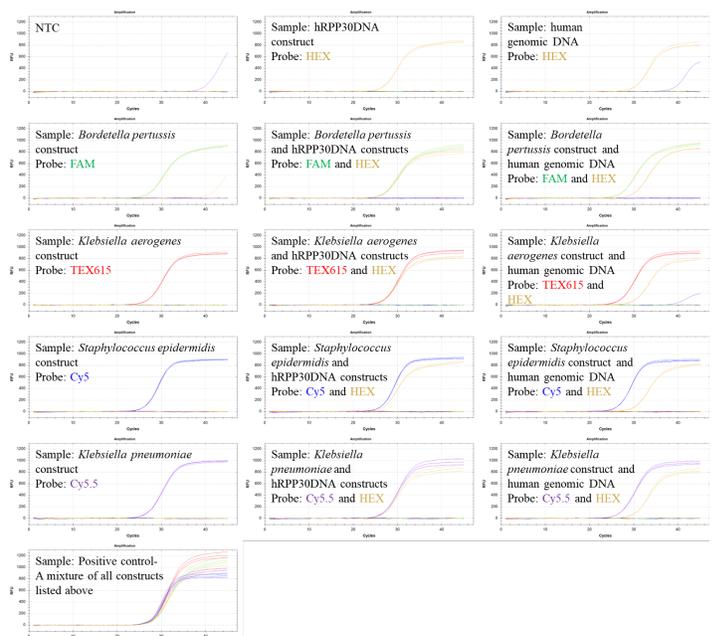


Figure 1: Verification experiments with single targets (given in text boxes for each panel). All sets of probes and primers are present in every reaction, but positive signal is only observed when the target(s) is present, indicating that the amplification is specific. One out of 3 replicates in the NTC shows Cy5 signal, but the Cq >38 so it is considered negative.

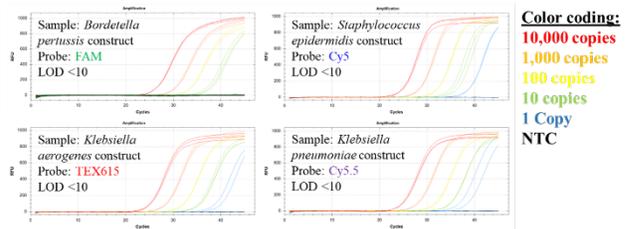


Figure 2: Serial dilution experiments show LOD <10 molecules for the synthetic DNA construct of each target.

Conclusion: The data in **Figure 1** indicate that the 5-plex primers and probes specifically detect and differentiate the pathogens and are also compatible with RPP30 DNA positive control primers. Human genomic DNA doesn't interfere with the detection of the pathogens.

CONTACT US

For assistance, please contact DNA Software using the link:
<https://www.pcrassays.com/contact/>

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