Primerdesign™ Ltd

Bordetella bronchiseptica

Exogenous Ferric Siderophore Receptor (BfrA)

genesig® Standard Kit

150 tests

GENESIG

Kits by Primerdesign

For general laboratory and research use only

Introduction to *Bordetella bronchiseptica*

Bordetella bronchiseptica is a gram negative, aerobic obligate bacterium from the genus *Bordetella* which also consists of *B. pertussis* and *B. parapertussis*. *B. pertussis* and *B. parapertussis* are both known as causative agents of whooping cough in humans [1]. *B. bronchiseptica* was first isolated and identified in 1910 in cases of respiratory disease of canines [2]. *B. bronchiseptica* is both a commensal and opportunistic bacterium that can colonise the respiratory tract and cause diseases in a wide range of domesticated mammals such as kennel cough in dogs [2]. *B. bronchiseptica* was originally named *Bacillus bronchicanis*, and originally isolated and identified from respiratory tracts of dogs infected with distemper [2].

Human infections occur through zoonotic transfer from contact with infected animals and usually occur in immunocompromised individuals [3]. Clinical presentation of *B. bronchiseptica* infection in humans is seen as mostly respiratory diseases such as pneumonia and bronchitis, and in rare cases meningitis can occur [4]. Humans who are in contact with animals that have recently been inoculated with a live attenuated *B. bronchiseptica* vaccine can also become infected with the bacterium [5].

There is a high incidence of *B. bronchiseptica* infection in kennels and pig farms. In dogs, the bacterium overwhelms the respiratory cilia and causes them to lose their beating motion, which allows them to be more susceptible to secondary infections from other opportunistic pathogens [5]. Symptoms of infection in other animals can range from snuffles in rabbits, atrophic rhinitis in swine and pneumonia in guinea pigs)[summarised in 5].

References

1. Goodnow, R. A. 1980. “Biology of Bordetella Bronchiseptica.” Microbiological Reviews 44 (4): 722. https://doi.org/10.1128/mmbr.44.4.722-738.1980.
2. Ferry, N. 1911. “Etiology of Canine Distemper on JSTOR.” The Journal of Infectious Diseases Vol. 8, No. 4. 1911. https://www.jstor.org/stable/30074785?seq=1.
3. Woolfrey, B. F., and J. A. Moody. 1991. “Human Infections Associated with Bordetella Bronchiseptica.” Clinical Microbiology Reviews 4 (3): 243. https://doi.org/10.1128/CMR.4.3.243
4. Radcliffe, C., Lier, A., Doilicho, N., Parikh, S and Kaddouh, F. 2020. “Bordetella Bronchiseptica: A Rare Cause of Meningitis.” BMC Infectious Diseases 20 (1): 1–4. https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-020-05668-2
5. Muhammad, A., Kassmannhuber, J., Rauscher, M., Falcon, A. A, Wheeler, D.W. Zhang, A.A., Lubitz, P., and Lubitz, W. 2019. “Subcutaneous Immunization of Dogs With Bordetella Bronchiseptica Bacterial Ghost Vaccine.” Frontiers in Immunology 10 (JUN): 1377. https://doi.org/10.3389/FIMMU.2019.01377.

Specificity

The Primerdesign genesig Kit for *Bordetella bronchiseptica* (*B. bronchiseptica*) genomes is designed for the *in vitro* quantification of *B. bronchiseptica* genomes. The kit is designed to have a broad detection profile.Specifically, , the primers represent 100% homology with over 95% of the NCBI database reference sequences available at the time of design.

The dynamics of genetic variation means that new sequence information may become avaible after the initial design. Primerdesign periodically reviews the detection profiles of our kits and when required releases new versions.

If you require further information or have a specific question about the detection profile of this kit, then please send an email to enquiry@primerdesign.co.uk and our bioinformatics team will answer your question.

Kit contents

- ***B. bronchiseptica*-specific primer/probe mix (150 reactions BROWN)**

FAM-labelled

- ***B. bronchiseptica* positive control template (for Standard curve RED)**

- **RNase/DNase-free water (WHITE)**

for resuspension of primer/probe mixes

- **Template preparation buffer (YELLOW)**

for resuspension of positive control template and standard curve preparation

Reagents and equipment to be supplied by the user

Real-time PCR Instrument

Extraction kit

This kit is recommended for use with genesig Easy DNA/RNA extraction kit. However, it is designed to work well with all processes that yield high quality RNA and DNA with minimal PCR inhibitors.

oasig™ lyophilised or Precision®PLUS 2X qPCR Master Mix.

This kit is intended for use with oasig or PrecisionPLUS 2X qPCR Master Mix.

Pipettors and Tips

Vortex and centrifuge

Thin-walled 0.1 ml PCR reaction tubes

Kit storage and stability

This kit is stable at room temperature but should be stored at -20°C on arrival. Once the lyophilised components have been resuspended, they should not be exposed to temperatures above -20°C for longer than 30 minutes at a time and unnecessary repeated freeze/thawing should be avoided. The kit is stable for six months from the date of resuspension under these circumstances.

If a standard curve dilution series is prepared, this can be stored frozen for an extended period. If you see any degradation in this serial dilution, a fresh standard curve can be prepared from the positive control.

Primerdesign does not recommend using the kit after the expiry date stated on the pack.

Suitable sample material

All kinds of sample material suited for PCR amplification can be used. Please ensure the samples are suitable in terms of purity, concentration, and DNA integrity Always run at least one negative control with the samples. To prepare a negative control, replace the template DNA sample with RNase/DNase-free water.

Dynamic range of test

Under optimal PCR conditions genesig *B. bronchiseptica* detection kits have very high priming efficiencies of >90% and can detect less than 100 copies of target template.

Notices and disclaimers

This product is developed, designed and sold for research purposes only. It is not intended for human diagnostic or drug purposes or to be administered to humans unless clearly expressed for that purpose by the Food and Drug Administration in the USA or the appropriate regulatory authorities in the country of use. During the warranty period Primerdesign genesig detection kits allow precise and reproducible data recovery combined with excellent sensitivity. For data obtained by violation to the general GLP guidelines and the manufacturer's recommendations the right to claim under guarantee is expired. PCR is a proprietary technology covered by several US and foreign patents. These patents are owned by Roche Molecular Systems Inc. and have been sub-licensed by PE Corporation in certain fields. Depending on your specific application you may need a license from Roche or PE to practice PCR. Additional information on purchasing licenses to practise the PCR process may be obtained by contacting the Director of Licensing at Roche Molecular Systems, 1145 Atlantic Avenue, Alameda, CA 94501 or Applied Biosystems business group of the Applera Corporation, 850 Lincoln Centre Drive, Foster City, CA 94404. In addition, the 5' nuclease assay and other homogeneous amplification methods used in connection with the PCR process may be covered by US Patents 5,210,015 and 5,487,972, owned by Roche Molecular Systems, Inc, and by U.S. Patent 5,538,848, owned by The Perkin-Elmer Corporation.

Trademarks

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The PCR process is covered by US Patents 4,683,195, and 4,683,202 and foreign equivalents owned by Hoffmann-La Roche AG. BI, ABI PRISM® GeneAmp® and MicroAmp® are registered trademarks of the Applera Genomics (Applied Biosystems Corporation). BIOMEK® is a registered trademark of Beckman Instruments, Inc.; iCycler™ is a registered trademark of Bio-Rad Laboratories, Rotor-Gene is a trademark of Corbett Research. LightCycler™ is a registered trademark of the Idaho Technology Inc. GeneAmp®, TaqMan® and AmpliTaqGold® are registered trademarks of Roche Molecular Systems, Inc., The purchase of the Primerdesign™ reagents cannot be construed as an authorisation or implicit license to practice PCR under any patents held by Hoffmann-LaRoche Inc.

Principles of the test

Real-time PCR

A *B. bronchiseptica*-specific primer and probe mix is provided, and this can be detected through the FAM channel.

The primer and probe mix provided exploits the so-called TaqMan® principle. During PCR amplification, forward and reverse primers hybridise to the *B. bronchiseptica* DNA. A fluorogenic probe is included in the same reaction mixture, which consists of a DNA probe labelled with a 5`-dye and a 3`-quencher. During PCR amplification, the probe is cleaved, and the reporter dye and quencher are separated. The resulting increase in fluorescence can be detected on a range of qPCR platforms.

Positive control

For copy number determination and as a positive control for the PCR set-up, the kit contains a positive control template. This can be used to generate a standard curve of *B. bronchiseptica* copy number / Cq value. Alternatively, the positive control can be used at a single dilution where full quantitative analysis of the samples is not required. Each time the kit is used, at least one positive control reaction must be included in the run. A positive result indicates that the primers and probes for detecting the target *B. bronchiseptica* gene worked properly in that particular experimental scenario. If a negative result is obtained, the test results are invalid and must be repeated. Care should be taken to ensure that the positive control does not contaminate any other kit component, which would lead to false-positive results. This can be achieved by handling this component in a post-PCR environment. Care should also be taken to avoid cross-contamination of other samples when adding the positive control to the run. This can be avoided by sealing all other samples and negative controls before pipetting the positive control into the positive control well.

Negative control

To validate any positive findings, a negative control reaction should be included every time the kit is used. For this reaction, the RNase/DNase-free water should be used instead of the template. A negative result indicates that the reagents have not become contaminated while setting up the run.

Resuspension protocol

To mimimise the risk of contamination with foreign DNA, we recommend that all pipetting be performed in a PCR clean environment. Ideally, this would be a designated PCR lab or PCR cabinet. Filter tips are recommended for all pipetting steps.

1. Pulse-spin each tube in a centrifuge before opening.
This will ensure that lyophilised primer and probe mix is in the base of the tube and is not spilt upon opening the tube.

2. Resuspend the primer/probe mixes in the RNase/DNase-free water supplied, according to the table below:
To ensure complete resuspension, vortex each tube thoroughly.

Component - resuspend in water	Volume
B. bronchiseptica primer/probe mix (BROWN)	165 µl

3. Resuspend the internal control template and positive control template in the template preparation buffer supplied, according to the table below:
To ensure complete resuspension, vortex each tube thoroughly.

Component - resuspend in template preparation buffer	Volume
B. bronchiseptica Positive Control Template (RED) *	500 µl

* This component contains a high copy number template and is a VERY significant contamination risk. It must be opened and handled in a separate laboratory environment, away from the other components.

qPCR detection protocol

1. **For each DNA sample, prepare a reaction mix according to the table below:**
   Include sufficient reactions for positive and negative controls.

Component	Volume
oasig or PrecisionPLUS 2X qPCR Master Mix	10 µl
B. bronchiseptica primer/probe mix (BROWN)	1 µl
RNase/DNase-free water (WHITE)	4 µl
Final Volume	**15 µl**

2. **Pipette 15 µl of this mix into each well according to your qPCR experimental plate set-up.**

3. **Prepare DNA templates for each of your samples.**

4. **Pipette 5 µl of DNA template into each well, according to your experimental plate set-up.**
   For negative control wells use 5µl of RNase/DNase-free water. The final volume in each well is 20 µl.

5. **If a standard curve is included for quantitative analysis, prepare a reaction mix according to the table below:**

Component	Volume
oasig or PrecisionPLUS 2X qPCR Master Mix	10 µl
B. bronchisepica primer/probe mix (BROWN)	1 µl
RNase/DNase-free water (WHITE)	4 µl
Final Volume	**15 µl**

6. Preparation of standard curve dilution series.

a) Pipette 90 µl of template preparation buffer into 5 tubes and label 2-6
b) Pipette 10 µl of Positive Control Template (RED) into tube 2
c) Vortex thoroughly
d) Change pipette tip and pipette 10 µl from tube 2 into tube 3
e) Vortex thoroughly

Repeat steps d) and e) to complete the dilution series

Standard Curve	Copy Number
Tube 1 Positive control (RED)	2 x 10^5 per µl
Tube 2	2 x 10^4 per µl
Tube 3	2 x 10^3 per µl
Tube 4	2 x 10^2 per µl
Tube 5	20 per µl
Tube 6	2 per µl

7. Pipette 5 µl of the standard template into each well for the standard curve according to your experimental plate set-up.
The final volume in each well is 20 µl.

qPCR amplification protocol

Amplification conditions using oasig or PrecisionPLUS 2X qPCR Master Mix.

	Step	Time	Temp
	Enzyme activation	2 min	95 °C
Cycling x50	Denaturation	10 s	95 °C
	DATA COLLECTION *	60 s	60 °C

* Fluorogenic data should be collected during this step through the FAM channel.

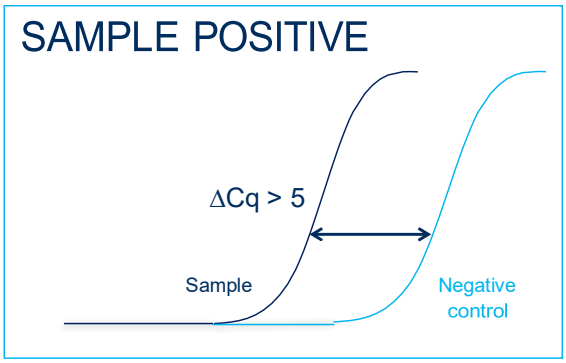
Interpretation of results

Target (FAM)	Positive control	Negative control	Interpretation
+	+	-	POSITIVE QUANTITATIVE RESULT calculate copy number
-	+	-	NEGATIVE RESULT

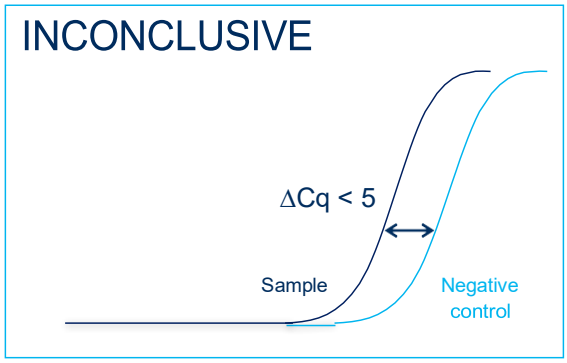
+ / -	+	≤ 35	EXPERIMENT FAILED due to test contamination
+ / -	+	> 35	*
+ / -	-	+ / -	EXPERIMENT FAILED

Positive control template (RED) is expected to amplify between Cq 16 and 23. Failure to satisfy this quality control criterion is a strong indication that the experiment has been compromised.

*Where the test sample is positive, and the negative control is positive with a Cq > 35, the sample must be reinterpreted based on the relative signal strength of the two results:



If the sample amplifies > 5 Cq earlier than the negative control, then the sample should be reinterpreted (via the table above) with the negative control verified as negative.



If the sample amplifies < 5 Cq earlier than the negative control, then the positive sample result is invalidated, and the result should be determined inconclusive due to test contamination. The test for this sample should be repeated.