bKIT *Bifidobacterium bifidum* HA-132

Real-Time PCR assay

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Introduction

Current *Bifidobacterium* classification trace back to 1924, when Orla-Jensen[1] suggested its separation from the genus *Lactobacillus*. Following this categorization, *Bifidobacterium bifidum* was proposed as type species of the genus. Nowadays, many efforts focus on the correlation between taxonomic classification with traditional procedures and DNA molecular methods. Consistently with this trend, traditional culture approaches are increasingly assisted by DNA molecular methods[2]. Among these, Real-Time PCR emerged for its sensitivity, rapidity, reliability, specificity and repeatability making it a well-established method for the detection, quantification, and typing of different microbial agents in the areas of clinical and veterinary diagnostics and food safety[3].

([1]) ORLA-JENSEN (S.): Classification des bactéries lactiques. Lait, 1924, 4, 468-474.
([2]) Mianzhi Y, Shah NP. Contemporary nucleic acid-based molecular techniques for detection, identification, and characterization of Bifidobacterium. Crit Rev Food Sci Nutr. 2017 Mar 24;57(5):987-1016. doi: 10.1080/10408398.2015.1023761. Review.PubMed PMID: 26565761.
([3]) Kralik P, Ricchi M. A Basic Guide to Real Time PCR in Microbial Diagnostics: Definitions, Parameters, and Everything. Front Microbiol. 2017 Feb 2;8:108. doi: 10.3389/fmicb.2017.00108. eCollection 2017. Review. PubMed PMID: 28210243; PubMed Central PMCID: PMC5288344.

Principle

SYBR® Green Real-Time PCR (qPCR) assay for the detection of *Bifidobacterium bifidum*. The product is intended for research purpose only.

NHPRA validation

In the validation trials performed by NHPRA (Natural Health Product Research Alliance) the following strains were tested: *Bifidobacterium breve* HA-129, *Bifidobacterium bifidum* HA-132, *Bifidobacterium longum* HA-135, *Bifidobacterium infantis* HA-116 and *Bifidobacterium longum* RO-175. Moreover, assay performances were assessed in mixtures containing the DNA of the strains listed above. All DNA solutions tested were normalized to the concentration of 1 ng/µL before use. All target and non-target DNA sample solutions were successfully classified. For more details, contact us at support@hyris.net.

bKIT *Bifidobacterium bifidum* HA-132 packaging

Part Number: bKTPR-BBHA132.01-50

qPCR Master Mix (1 tube)	50 tests
Positive Control (1 tube)	10 tests
Negative Control (1 tube)	10 tests

Part Number: bKTPR-BBHA132.01-100

qPCR Master Mix (2 tubes)	2 x 50 tests
Positive Control (1 tube)	20 tests
Negative Control (1 tube)	20 tests

Storage

-20°C. Avoid prolonged exposure to light and repeated freeze and thaw cycles.

Shelf life

If the bKIT is correctly stored, at constant-temperature freezer, its performance is guaranteed until the shelf life indicated on the tubes.

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Additional material/reagents required

- DNA extraction tools and reagents
- Nuclease-free water
- Gloves
- Pipettes
- bCUBE® instrument or other Real-Time PCR instrument (*) with filters calibrated for SYBR® Green.
- bCUBE® sample loading cartridge or, if using other Real-Time PCR instrument, samples loading support according to the instrument specifications.

(*) This assay was especially developed to be used in association with the bCUBE® instrument, available from Hyris Ltd, but can be used also with any other compatible thermal cycler.

DNA extraction

In the validation trials performed by NHPRA the DNA was extracted using NucleoSpin® Food (MACHEREY-NAGEL) and normalized to the concentration of 1 ng/µL.. For more details, contact us at support@hyris.net.

Reaction Set-Up

a. Thaw all the bKIT components by placing the tubes on ice.
b. Gently mix the tubes content by swirling the tubes.
c. Spin the tubes to let the content down.
d. In new tubes, one for each sample, including the Negative Control and the Positive Control of the bKIT, prepare the Reaction Mix as shown in the table below:

Components	Volume
DNA sample (normalized to the concentration of 1 ng/µL) or Positive Control/Negative Control	2 µl
qPCR Mastermix	18 µl
Total Volume	20 µl

Cartridge set-up

The procedure described is for the bCUBE® cartridge, but, if using a different Real-Time PCR instrument, the same procedure can be adopted for other loading sample supports with minor modifications.

1. Samples set-up

Samples of the following types must be prepared to be loaded on the cartridge:
Positive Control for *Bifidobacterium bifidum* HA-132.
Negative Control for *Bifidobacterium bifidum* HA-132.
Sample(s) to be tested.

2. Cartridge Loading

a. Load the sample prepared as described in the previous section.
b. Carefully seal the cartridge with adhesive film in order to avoid any contamination.
c. Load the cartridge onto the bCUBE®, then start the run.

Method set-up

Set up the run method using the following conditions, depending on the instrument you use.

1. On the bCUBE®

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a. Login on the bAPP.
b. Set-up "New Analysis" and Select the "*Bifidobacterium bifidum* HA-132 1.x" from the "Global recipes" list.
c. Specify the "Well types" for each of the loaded sample as follows (**Fig. 1**):
"PosCtrl" for the well loaded with *Bifidobacterium bifidum* HA-132 Positive Control.
"NegCtrl" for the well loaded with *Bifidobacterium bifidum* HA-132 Negative Control.
"Sample" for the wells loaded with samples under analysis.

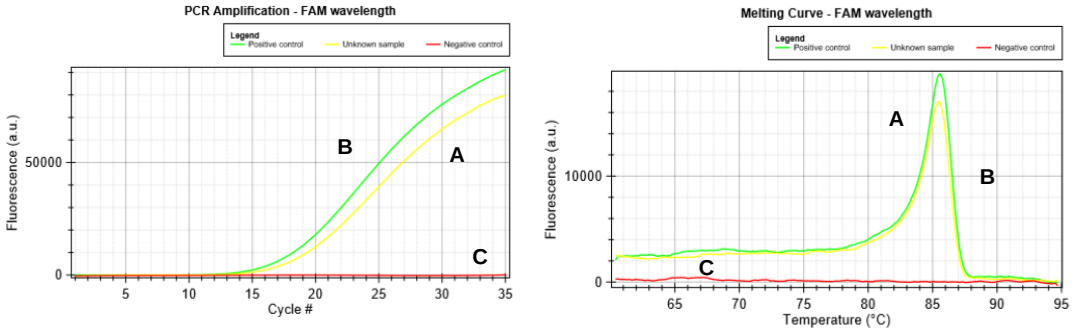
Fig 1. Cartridge set-up
An example of cartridge set-up on the bAPP for one replicate of a sample to be analyzed is shown.

2. <u>On a compatible Real-Time PCR instrument</u>
Please, contact us for the protocol set-up on the instrument.

Reading the results

1. <u>On the bCUBE®</u>

a. The presence of the target *Bifidobacterium bifidum* HA-132 in the Positive Control or in the sample under analysis will generate an amplification curve **(Fig. 2a)** and a melting curve with a specific melting peak **(Fig. 2b)**.



a **b**

Fig.2. Amplification and melting plots
In the plots, the amplification curve (**Fig. 2a**) and the specific melting peak (**Fig. 2b**) of a *Bifidobacterium bifidum* HA-132 containing sample (A), a Positive Control (B), and the Negative Control (C) are shown.

b. At the end of analysis each well will be labelled depending on the "Well type" as described in the table below and samples classification will be shown on the pdf report of the analysis (**Fig. 3**).

Well type	**Possible labels**	
Positive Control (PosCtrl)	**OK**	**KO**
Label meaning	Amplification curve and specific melting peak present	Amplification curve and or specific melting peak absent

HYRIS GLOBAL DIAGNOSTICS

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Well type	Possible labels	
Negative Control (NegCtrl)	OK	KO
Label meaning	Amplification curve and specific melting peak absent	Amplification curve and or specific melting peak present

Well type	Possible labels		
Sample	Present	Absent	Indeterminate
Label meaning	*Bifidobacterium breve* HA-129 is present in the sample	*Bifidobacterium breve* HA-129 is absent from the sample	The test is not conclusive and should be repeated (**)

(**) If the "Indeterminate" classification persists, contact us at support@hyris.net.

Results for target *Bifidobacterium bifidum HA-132*		
Positive control	(PosCtrl)	OK
Unknown sample	(Sample)	Present
Negative control	(NegCtrl)	OK

Fig.3. Analysis results table
The results table, as reported in the pdf report of the analysis, is shown.

2. On a compatible Real-Time PCR instrument
Please, contact us for results interpretation.

Troubleshooting

1. Results show no amplification, or anomalous amplification curves

Possible causes	Corrective actions
Evaporation of the sample due to inadequate sealing of the plate/strips	Repeat the test using the appropriate materials and tools to seal correctly the plate/strips
Consumables are not appropriate for the method	Repeat the test using consumables recommended by the supplier of the Real-Time PCR instrument
The quality of nucleic acid extracted is low	Repeat the extraction step. Ensure that the method of extraction has been performed correctly. In any doubt, contact us.

2. No amplification curve is observed for the Positive Control

Possible causes	Corrective actions
The Positive Control provided with the assay was not added into the reaction well	Repeat the test adding the Positive Control. If the problem persists, contact us.

3. An amplification curve with a specific melting peak is observed for the Negative Control

Possible causes	Corrective actions
Contamination of the Negative Control or the qPCR Master Mix with target-positive DNA	Repeat the test by applying appropriate quality procedures to prevent contamination. Correctly seal the cartridge or plate/strips. If the problem persists, contact us.

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