

BKV/JCV TaqMan PCR Kit
Product# TM39350

Product Insert

Intended Use

Norgen's BKV/JCV TaqMan PCR Kit is designed for the detection of BKV/JCV specific DNA in a real-time PCR based on the use of TaqMan® technology. This kit is designed for research use only and not for use in diagnostic procedures.

Background Information

The BK virus (BKV) is a member of the polyomavirus family. It has been suggested that this virus may be transmitted through respiratory fluids or urine, since infected individuals periodically excrete virus in the urine. It is thought that 1-10% of renal transplant patients progress to BK virus nephropathy and up to 80% of these patients are reported to have lost their grafts. The onset of nephritis can occur as early as several days post-transplant to as late as 5 years. This virus can be diagnosed by BKV blood & urine testing, in addition to carrying out a biopsy in the kidneys. PCR techniques are now widely used to identify the virus. The JC virus (JCV) is a type of human polyomavirus and is very common in the general population, infecting 70 to 90% of humans; most people acquire JCV in childhood or adolescence. The initial site of infection may be the tonsils, or possibly the gastrointestinal tract. The virus then remains latent in the gastrointestinal tract and can also infect the tubular epithelial cells in the kidneys, where it continues to reproduce, shedding virus particles in the urine. JCV can cross the blood-brain barrier into the central nervous system, where it infects oligodendrocytes causing fatal progressive multifocal leukoencephalopathy (PML) by destroying oligodendrocytes. The JC and BK viruses are very similar, with their genomes sharing 75% homology. It is however important to differentiate between the viruses due to the differences in pathology and especially the invariably fatal outcome of PML which is only caused by the JC virus.

Product Description

Norgen's BKV/JCV TaqMan PCR Kit is designed for the detection of BKV/JCV specific DNA in a real-time PCR based on the use of TaqMan technology. This kit is designed for research use only and not for use in diagnostic procedures. The detection of BKV/JCV specific DNA is based on TaqMan PCR providing a simple, reliable and rapid result for the detection of BKV/JCV infection. Norgen's BKV/JCV TaqMan PCR Kit includes a PCR control to monitor for PCR inhibition, and to validate the quality of the sample and the detection result. The BKV/JCV TaqMan PCR Kit comprises Master Mix for the target and PCR control detection, Primer & Probe Mix, as well as a positive control and a negative control (nuclease-free water) to confirm the integrity of the kit reagents. Positive signals for BKV and JCV will be detected simultaneously, but can also be distinguished by different channels (FAM for BKV and Cy5 for JCV).

Norgen's BKV/JCV TaqMan PCR Kit was developed and validated to be used with the following PCR instruments:

- Qiagen Rotor-Gene Q
- BioRad CFX96 Touch™ Real-Time PCR Detection System
- QuantStudio™ 7 Pro Real-Time PCR System

Kit Components

Component	Product # TM39350 (100 preps)
MDx TaqMan 2X PCR Master Mix	2 x 700 µL
BKV/JCV Primer & Probe Mix	280 µL
BKV/JCV Positive Control	150 µL
Nuclease-Free Water (Negative control)	1.25 mL
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Storage Conditions and Product Stability

- All kit components should be stored at -20°C upon arrival
- Repeated thawing and freezing (> 2 x) of the Master Mix and Positive Control should be avoided, as this may affect the performance of the assay. If the reagents are to be used only intermittently, they should be frozen in aliquots.
- All kit components can be stored for 2 years after the date of production without showing any reduction in performance.

Customer-Supplied Reagents and Equipment

- Appropriate Real-Time PCR Instrument with FAM and HEX filter channel
- DNA Purification Kit
 - The kit is compatible with all DNA purification kits that yield high quality, inhibitor-free DNA
 - **Recommended Purification Kit:** Norgen's Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit (Cat. 55100)
- Disposable powder-free gloves
- Benchtop microcentrifuge
- Micropipettors
- Sterile pipette tips with filters
- PCR tubes
- Vortex mixer
- PCR reaction preparation station (Optional)

Quality Control

In accordance with Norgen's ISO 9001 and ISO 13485-certified Quality Management System, each lot of Norgen's BKV/JCV TaqMan PCR Kit is tested against predetermined specifications to ensure consistent product quality.

Warnings and Precautions

- Norgen's BKV/JCV TaqMan PCR Kit is intended for research purposes only. It is not intended for diagnostic use.
- Follow universal precautions. All specimens should be considered as potentially infectious and handled accordingly.
- Ensure that a suitable lab coat, disposable gloves and protective goggles are worn when handling specimens and kit reagents.
- Use sterile pipette tips with filters. Use proper pipetting techniques and maintain the same pipetting pattern throughout the procedure to ensure optimal and reproducible values.
- As contamination of specimens or reagents can produce erroneous results, it is essential to use aseptic techniques. Pipette and handle reagents carefully to avoid mixing of the samples.
- Do not use supplies and equipment across the dedicated areas of i) specimen extraction, ii) reaction set-up and iii) amplification/detection. No cross-movement should be allowed between the different areas. Personal protective equipment, such as laboratory coats and disposable gloves, should be area specific.
- Store and extract positive material (specimens, controls and amplicons) separately from all other reagents and add it to the reaction mix in a spatially separated facility.
- Dispose of unused kit reagents and specimens according to local, provincial or federal regulations.

- Do not substitute or mix reagents from different kit lots or from other manufacturers. Do not use components of the kit that have been stored for more than 2 years.
- The presence of PCR inhibitors may cause false negative or invalid results.
- Potential mutations within the target regions of the BKV/JCV genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.
- Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.
- Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

Instructions for Use

A. Sample Preparation

Purified DNA is the starting material for Norgen's BKV/JCV TaqMan PCR Kit. The quality of the DNA template will have a major impact on the performance of the BKV/JCV detection test. The user must ensure that the method used for DNA purification is compatible with TaqMan PCR. We recommend the use of **Norgen's Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit (Cat. 55100)**. Norgen's Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit (Cat. 55100) have been fully validated with Norgen's BKV/JCV TaqMan PCR Kit.

If using a different spin column based sample preparation procedure that includes ethanol-based wash buffers, a column drying step consisting of centrifugation for 3 minutes at 20,000 x g (~14,000 RPM), using a new collection tube, is highly recommended prior to the elution of the DNA. This will help to prevent the carry-over of any ethanol into the purified DNA, as ethanol is known to be a strong inhibitor of PCR. **Ensure that any traces of ethanol from the sample preparation steps are eliminated prior to the elution of the DNA.**

B. TaqMan PCR Assay Preparation

Notes:

- Before use, suitable amounts of all TaqMan PCR components should be completely thawed at room temperature, mixed by gentle vortexing or by pipetting, and centrifuged briefly.
- Work quickly on ice.
- The amount of MDx TaqMan 2X PCR Master Mix provided is enough for up to 128 PCR reactions (96 sample PCR, 16 positive control PCR and 16 no template control PCR).
- For every TaqMan PCR run, one reaction containing BKV/JCV Positive Control and one reaction as no template control must be included for proper interpretation of results.
- The recommended minimum number of DNA samples tested per TaqMan PCR run is 6.
- To avoid any contamination while preparing the TaqMan PCR assay, follow the order outlined in Tables 1, 2 and 3 below to prepare the Negative Control, Detection Assay and Positive Control:
 1. Prepare the PCR Negative Control (Table 1)
 2. Prepare the PCR BKV/JCV Assay (Table 2)
 3. Prepare the PCR Positive Control (Table 3)
- To further avoid contamination, add the components to the PCR tubes in the order shown in the tables below (ie: 1) Nuclease-free water; 2) MDx TaqMan 2X PCR Master Mix; 3) Primer & Probe Mix; and 4) the Sample DNA or Positive Control).

1. For each TaqMan PCR set, prepare one no template control PCR as shown in Table 1 below:

Table 1. TaqMan PCR Negative Control Preparation

PCR Components	Target detection (with MDx TaqMan 2x PCR Master Mix)
Nuclease-Free Water	8 μ L
MDx TaqMan 2X PCR Master Mix	10 μ L
BKV/JCV Primer & Probe Mix	2 μ L
Total Volume	20 μ L

2. Prepare the PCR reaction for sample detection as shown in Table 2 below.

Table 2. TaqMan PCR BKV/JCV Assay Preparation

PCR Components	Target detection (with MDx TaqMan 2x PCR Master Mix)
Nuclease-Free Water	5 μ L
MDx TaqMan 2X PCR Master Mix	10 μ L
BKV/JCV Primer & Probe Mix	2 μ L
Sample DNA*	3 μ L
Total Volume	20 μ L

* The recommended amount of sample DNA to be used is 3 μ L. However, a volume between 1 and 5 μ L of sample DNA may be used as template. Adjust the final volume of the PCR reaction to 20 μ L using the Nuclease-Free Water provided.

3. For each PCR set, prepare **one** positive control PCR as shown in Table 3 below:

Table 3. TaqMan PCR Positive Control Preparation

PCR Components	Target detection (with MDx TaqMan 2x PCR Master Mix)
MDx TaqMan 2X PCR Master Mix	10 μ L
BKV/JCV Primer & Probe Mix	2 μ L
BKV/JCV Positive Control (PosC)	8 μ L
Total Volume	20 μ L

C. BKV/JCV TaqMan PCR Assay Programming

1. Program the thermocycler according to the program shown in Table 4 below.
2. Run TaqMan PCR assay.

Table 4. BKV/JCV TaqMan PCR Program

PCR Cycle	Step	Temperature	Duration
<i>Cycle 1</i>	Step 1	95°C	3 min
<i>Cycle 2 (40x)</i>	Step 1	95°C	15 sec
	Step 2	60°C	30 sec

D. BKV/JCV TaqMan PCR Assay Interpretation

Table 5. Interpretation of Assay Results

FAM (BKV)	Cy5 (JCV)	HEX (PCR validation)	Result
+	+	+	BKV Positive JCV Positive
+	+	-	BKV Positive JCV Positive
-	+	+	BKV Negative JCV Positive
+	-	+	BKV Positive JCV Negative
-	-	+	BKV Negative JCV Negative
-	-	-	PCR inhibited

For results obtained that are not covered in Table 5, please refer to the Frequently Asked Questions.

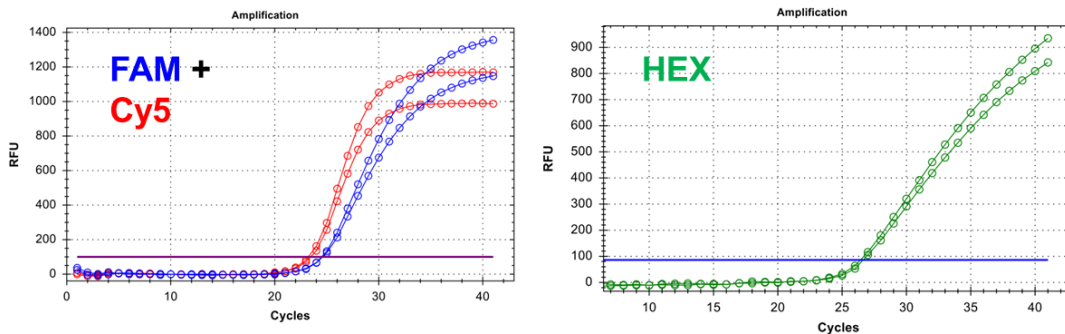


Figure 1. Example of TaqMan PCR Positive result. Both PCR signals (FAM and Cy5) above the baseline from FAM, Cy5 and HEX channel indicate the successful PCR.

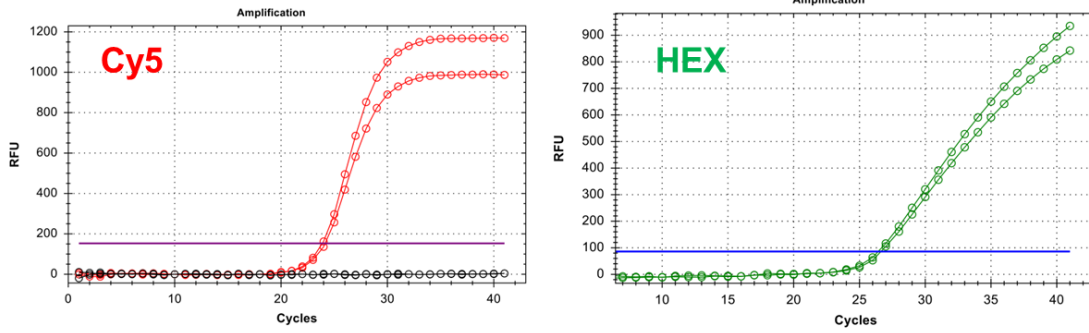


Figure 2. Example of TaqMan PCR Positive (Cy5) result. Both PCR signals above the baseline from Cy5 and HEX channel indicate the successful PCR.

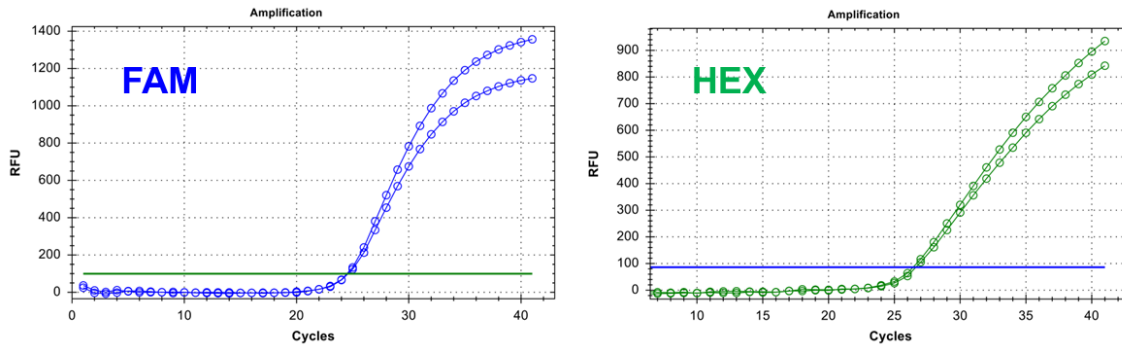


Figure 3. Example of TaqMan PCR Positive (FAM) result. Both PCR signals above the baseline from FAM and HEX channel indicate the successful PCR.

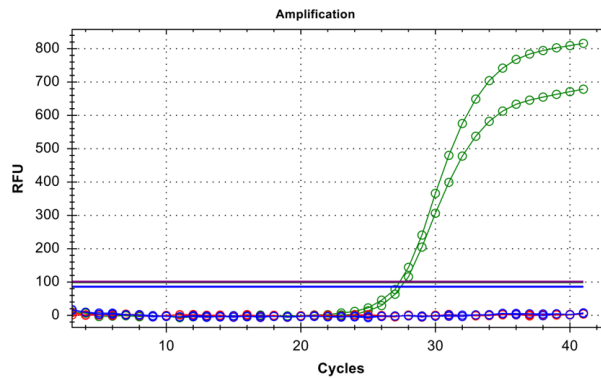


Figure 4. Example of TaqMan PCR Negative result. No target DNA was detected in FAM and Cy5 channel but amplification signal from HEX indicates the successful PCR.

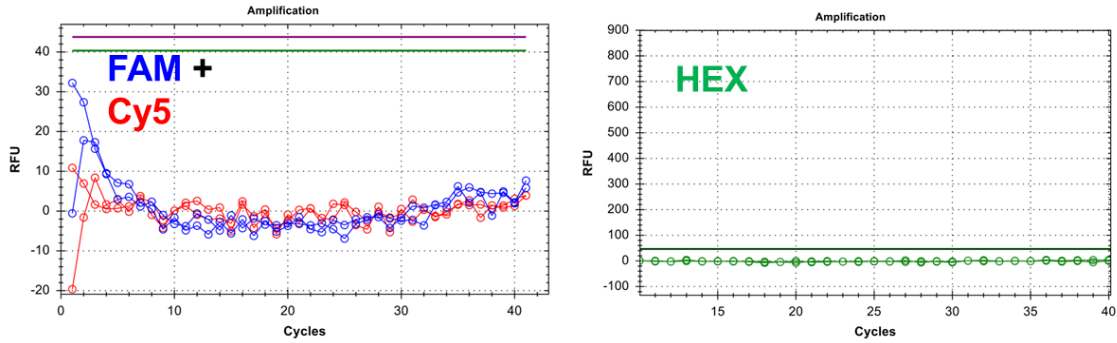


Figure 5. Example of TaqMan PCR inhibition result. No signal from FAM, Cy5 and HEX channel was detected. It is suggested to repeat the sample preparation using recommended kit for DNA purification.

E. BKV/JCV TaqMan PCR Assay Specificity

The specificity of Norgen’s BKV/JCV PCR Detection Kit is first and foremost ensured by the selection of the BKV/JCV -specific primers, as well as the selection of stringent reaction conditions. The BKV/JCV primers were checked for possible homologies to all microorganisms in GenBank published sequences by sequence comparison analysis.

Frequently Asked Questions

1. **How many samples should be included per PCR run?**
 - Norgen’s BKV/JCV TaqMan PCR Detection Kit is designed to test 96 samples. For every 6 samples, a non-template control (Nuclease-Free Water) and a Positive Control must be included. It is preferable to collect and test 6 samples at a time.
2. **How should it be interpreted if no PCR control signal (HEX) is detected while the target specific signals (FAM and Cy5) is detected in the positive control?**
 - Tested samples(s) can be considered BKV and JCV positive. It could happen when too much target DNA template was added due to the preferential amplification on the target.
3. **How should it be interpreted if the target specific signals (FAM and Cy5) and/or the PCR control signal (HEX) are detected in the negative control?**
 - It could happen when there are carryover contamination and PCR inhibition. Repeat the assay using fresh aliquots and clean pipette tips.
4. **How should it be interpreted if no target signals (FAM and Cy5) is detected in positive control?**
 - It could happen when the positive control was not added. Repeat the assay.

Related Products	Product #
BKV/JCV TaqMan Probe/Primer and Control Set	TM39310
Plasma/Serum Cell-Free Circulating DNA Purification Mini Kit	55100

Technical Support

Contact our Technical Support Team between the hours of 8:30 and 5:30 (Eastern Standard Time) at (905) 227-8848 or Toll Free at 1-866-667-4362.

Technical support can also be obtained from our website (www.norgenbiotek.com) or through email at techsupport@norgenbiotek.com.

Product Use Restriction

Norgen's BKV/JCV TaqMan PCR Kit is designed for the detection of BKV/JCV specific DNA in a real-time PCR based on the use of TaqMan technology. This kit is designed for research use only and not for use in diagnostic procedures.

Norgen's BKV/JCV TaqMan PCR Kit is intended for use by professional users such as technicians and biologists experienced and trained in molecular biological techniques including PCR.

Good laboratory practice is essential for the proper performance of this kit. Ensure that the purity of the kit and reactions is maintained at all times, and closely monitor all reagents for contamination. Do not use any reagents that appear to be contaminated.

Ensure that appropriate specimen collection, transport, storage and processing techniques are followed for optimal performance of this test.

The presence of PCR inhibitors may cause false negative or invalid results.

Potential mutations within the target regions of the BKV/JCV genome covered by the primers in this kit may result in failure to detect the presence of the pathogen.

The respective user is liable for any and all damages resulting from application of Norgen's BKV/JCV TaqMan PCR Kit for use deviating from the intended use as specified in the user manual.

All products sold by Norgen Biotek are subjected to extensive quality control procedures and are warranted to perform as described when used correctly. Any problems should be reported immediately. The kit contents are for laboratory use only, and they must be stored in the laboratory and must not be used for purposes other than intended. The kit contents are unfit for consumption.

TaqMan is a registered trademark of Roche Molecular Systems, Inc

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