Test Definition: PBKQN

BK Virus DNA Detection and Quantification, Plasma

Overview

Useful For

Detection and serial monitoring of BK virus-associated nephropathy in kidney transplant recipients using plasma specimens

Detection and serial monitoring of BK virus-associated hemorrhagic cystitis in organ transplant recipients

Highlights

This assay detects and quantifies the level of BK virus (BKV) DNA present in the plasma of kidney transplant recipients who are at risk of developing BKV-associated nephropathy leading to decreasing kidney function and eventual kidney failure. The assay is calibrated to the First World Health Organization International Standard for BKV DNA.

Method Name

Real-Time Polymerase Chain Reaction (PCR)

NY State Available

No

Specimen

Specimen Type

Plasma EDTA

Shipping Instructions

1. Ship specimen frozen on dry ice only.
2. If shipment will be delayed for more than 24 hours, freeze plasma at -20 to -80 degrees C (up to 84 days) before shipment and then transport on dry ice.

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Lavender top (EDTA)
Submission Container/Tube: Plastic vial
Specimen Volume: 1.5 mL Plasma
Collection Instructions: Within 2 hours of collection, centrifuge and aliquot plasma into a plastic vial.

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-General Request (T239)
-Microbiology Test Request (T244)

-Renal Diagnostics Test Request (T830)
-Kidney Transplant Test Request

Specimen Minimum Volume

Plasma: 0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma EDTA	Frozen (preferred)	84 days	
	Refrigerated	6 days	

Clinical & Interpretive

Clinical Information

BK virus (BKV) is a circular, double-stranded DNA polyomavirus with genome of approximately 5 kilobases. The polyomavirus family includes 13 known members, including the JC virus (JCV) and SV40. BKV shares about 75% of its DNA sequence with JCV. Nearly 80% of adults worldwide have antibodies to both viruses, indicating prior infection or exposure.

Initial infection with BKV is usually acquired in childhood, mostly asymptomatic or manifesting as a mild flu-like illness. After primary infection, BKV establishes latency in the kidney and bladder of the infected individual. In the setting of immunosuppression, the virus reactivates and begins to replicate, triggering renal tubular cell lysis and viruria. As the reactivation progresses, the virus multiplies and crosses into the bloodstream, causing viremia and invading the kidney graft. In patients with kidney transplants, reactivation of BKV typically reaches peak incidence at 3 months posttransplantation with BK viral replication in the kidney graft, causing BKV-associated nephropathy (BKVAN), which manifests as kidney dysfunction that may result in eventual loss of the transplanted kidney. Reactivation of BKV in the bladder can lead to hemorrhagic cystitis. Currently, there are no US Food and Drug Administration-approved antiviral agents or treatments for BKVAN or BKV-associated hemorrhagic cystitis. The main treatment is to decrease immunosuppression, with risk of acute rejection of the kidney graft.

After BK reactivation, the virus is first detectable in the urine, with viremia developing several weeks later. Quantitative BKV DNA in the plasma is the most widely used and preferred test for the laboratory diagnosis of BKVAN and BKV-associated hemorrhagic cystitis, as BKV viremia has higher positive predictive value (50%-60%) than BKV viruria for the diagnosis of BKVAN. Serial monitoring of BKV DNA level in plasma is recommended to guide optimal immunosuppressant dosing regimen. In those with BKVAN, clearance of BK viremia is a sign of resolution of the

nephropathy.

Reference Values

Undetected

Interpretation

The quantification range of this assay is 22 to 100,000,000 IU/mL (1.34 log to 8.00 log IU/mL), with a limit of detection (95% detection rate) at 22 IU/mL.

An "Undetected" test result indicates the absence of BK virus (BKV) DNA in the plasma.

A test result of "<22 IU/mL (<1.34 log IU/mL)" indicates that BKV DNA is detected in the plasma, but the assay cannot accurately quantify the BKV DNA present below this level.

A quantitative value (reported in IU/mL and log IU/mL) indicates the level of BKV DNA (ie, viral load) present in the plasma.

A test result of ">100,000,000 IU/mL (>8.00 log IU/mL)" indicates that BKV DNA level present in plasma is above 100,000,000 IU/mL (8.00 log IU/mL), and the assay cannot accurately quantify BKV DNA present above this level.

An "Inconclusive" result indicates that the presence or absence of BKV DNA in the plasma specimen could not be determined with certainty after repeat testing in the laboratory, possibly due to polymerase chain reaction inhibition or presence of interfering substance. Submission of a new specimen for testing is recommended if clinically indicated.

Cautions

A single "Undetected" test result does not necessarily rule out the presence BK virus (BKV) infection or reactivation. Serial measurement (eg, once weekly) of BKV DNA in plasma is recommended to determine the BKV replication status in a given transplant recipient.

Clinical Reference

1. Bechert CJ, Schnadig VJ, Payne DA, Dong J. Monitoring of BK viral load in renal allograft recipients by real-time PCR assays. Am J Clin Pathol. 2010;133(2):242-250. doi:10.1309/AJCP63VDFCKCRUUL
2. Hirsch HH, Randhawa P; AST Infectious Diseases Community of Practice. BK polyomavirus in solid organ transplantation. Am J Transplant. 2013;13 Suppl 4:179-188. doi:10.1111/ajt.12110
3. Hirsch HH, Randhawa PS; AST Infectious Diseases Community of Practice. BK polyomavirus in solid organ transplantation-Guidelines from the American Society of Transplantation Infectious Diseases Community of Practice. Clin Transplant. 2019;33(9):e13528. doi:10.1111/ctr.13528
4. Muhsin SA, Wojciechowski D. BK virus in transplant recipients: current perspectives. Transplant Research and Risk Management. 2019:11:47-58. doi:10.2147/TRRM.S188021

Performance

Method Description

The cobas BK virus (BKV) assay is an FDA-approved, in vitro nucleic acid amplification test for the quantification of BKV DNA in human EDTA-plasma using either the cobas 6800 or 8800 system for fully automated viral nucleic acid extraction (generic silica-based capture technique) and automated amplification and detection of the viral RNA. This dual-target polymerase chain reaction (PCR) assay amplifies 2 highly-conserved target regions within the BKV genome (small t-antigen and VP2 regions) for real-time detection and quantification by 2 target-specific TaqMan probes. A non-BKV armored DNA quantitation standard (DNA-QS) is introduced into each specimen during sample preparation to serve as internal control for nucleic acid extraction and PCR amplification and detection processes. Fluorescent reporter dye-labeled TaqMan probes hybridized to the complementary BKV target sequences and DNA-QS sequence undergo hydrolysis during PCR amplification step to generate fluorescent signal detected in 3 different dye channels. Concentration of the BKV DNA in a patient's plasma sample is determined by a ratio of the intensity of the fluorescent dye from the cleaved BKV target sequence probes to that of the DNA-QS target probe detected throughout the PCR process.(Package insert: cobas BKV - Quantitative nucleic acid test for use on the cobas 6800/8800 Systems; Roche Molecular Systems; Doc rev 2.0, 02/2021)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
1 to 3 days

Specimen Retention Time
30 days

Performing Laboratory Location
Mayo Clinic Jacksonville Clinical Lab

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
87799

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BK Virus DNA Detection and Quantification, Plasma

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
PBKQN	BKV DNA Detect/Quant, P	32284-2

Result ID	Test Result Name	Result LOINC® Value
614567	BKV DNA Detect/Quant, P	32284-2