

## Quantitative PCR Assay for BK Polyomavirus Viral Load

The UNC Hospitals Molecular Genetics Laboratory performs real-time, quantitative PCR to determine BK viral load in urine and blood specimens. The test is used primarily to monitor BK viral load in renal transplant patients who are at risk of developing BK virus-associated nephropathy (BKVAN).

### Background & Clinical Significance

BKV is ubiquitous in the general population, with infection occurring the first decade of life. After a typically sub-clinical primary infection in early childhood, BKV establishes latency in renal tissues. There is some evidence that latency may also be established in lymphocytes. Reactivation of BKV can result during immunosuppression after pregnancy, AIDS therapy, or the transplant of an organ (particularly kidney) or bone marrow. The introduction of potent immunosuppressive drugs in the past decade has led to the emergence of BKV-associated nephropathy (BKVAN) in as many as 8% of kidney transplant recipients. BKVAN is characterized by persistent graft dysfunction and frequent graft loss. The mainstay of therapy is reduction of immunosuppression to allow the host to mount a successful antiviral immune response. Treatment with low-dose cidofovir has been useful in a number of cases reported. BKV infection has also been associated with other kidney involvement such as interstitial nephritis, hemorrhagic cystitis and ureteral stricture in non-immunocompromised patients.

Quantitative PCR for BKV in patients who have undergone renal transplantation can aid in the diagnosis and monitoring of BKVAN. Studies have shown that serial monitoring by quantitative PCR for BKV from the urine and/or blood can predict which patients are at risk for development of BKVAN and is useful to follow response to therapy. Patients who have  $>10^4$  copies/mL BKV in plasma or  $>10^7$  copies/mL BKV in urine have been shown to be at risk for development of BKVAN, although serial monitoring may be more useful than detection of a single time point. Quantitative PCR for BKV may also be useful for monitoring bone marrow transplant patients who are at risk for hemorrhagic cystitis.

### Laboratory Testing for BK Viral Load

Testing is performed on DNA extracted from blood (3ml, EDTA), separated Plasma (1ml), or Urine (1ml). Serum is also accepted. Whole blood should be shipped on a cold pack. Plasma and urine samples should be shipped frozen. All samples should be shipped for overnight delivery. DNA is extracted from the sample and amplified by PCR. Amplification is highly specific for BKV, targeting a conserved region of the BK VP1 gene. PCR products are detected and quantified on an ABI 7900HT real-time instrument. Results are reported as BK copies/ml sample. The assay has a linear range from 250 copies/ml to  $2.5 \times 10^9$  copies/ml of plasma or urine.

### References:

1. Limaye, A., et al, (2001), *Quantitation of BK virus load in serum for the diagnosis of BK virus-associated nephropathy in renal transplant recipients*, J.Inf.Dis., 183:1669-72.
2. Biel, S., et al, (2000), *Rapid quantification and differentiation of human polyomavirus DNA in undiluted urine from patients after bone marrow transplantation*, J.Clin.Microbiol., 38 (10): 3689-3695.
3. Randhwawa, PA, et al (2004) *Correlates of quantitative measurement of quantitative BK polyomavirus (BKV) DNA with clinical course of BKV infection in renal transplant patients*. J.Clin.Microbiol., 42(3):1176-1180, 2004.

### Questions?

Call the UNC Molecular Genetics Laboratory at (919) 966-4408 or Dr. Karen Weck at (919) 966-4314.

E-mail, [karen\\_weck@med.unc.edu](mailto:karen_weck@med.unc.edu) or

Website: [http://labs.unchealthcare.org/directory/molecular\\_pathology/index\\_html](http://labs.unchealthcare.org/directory/molecular_pathology/index_html)