Polyomavirus BK replication in renal transplant recipients: combined monitoring of viremia and VP1 mRNA in urine

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Monitoraggio della replicazione del polyomavirus BK nel trapiantato renale mediante valutazione combinata del DNA su siero e del VP1 mRNA su urine

SUMMARY

Introduction. Human polyomavirus BK (BKV) is worldwide distributed, with a seroprevalence rate of 70–90% in the adults. Following primary infection, BK remains latent in the renourinary tract as the epidemiologically most relevant latency site, and in B cell, brain, spleen and probably other tissues. Reactivation may occur in both immunocompetent subjects and immunocompromised patients. In renal transplantation, in the context of intense immunosuppression, viral replication may determine BKV-associated nephropathy (BKVAN) with interstitial nephritis and/or ureteral stenosis in 1–10% of the patients and leading to graft failure and return to haemodialysis in 30 to 80% of the cases (5).

Screening of BKV replication represents the basic strategy to predict early the onset of BKVAN and may allow for earlier intervention with reduced allograft loss (3, 4).

Nowadays, replication of BKV is monitored by quantification of BKV-DNA in serum and urine (2).

The aim of this study was to evaluated the role of BKV VP1 mRNA in urine as a marker of viral replication in renal transplant recipients.

METHODS

531 kidney transplant recipients were studied. BKV-DNA was evaluated using a commercial Real Time PCR Kit (BKV Q-PCR Alert Kit, Nanogen Advanced Diagnostics, Milan, Italy) and VP1 mRNA was quantified by a standardized home made RT-Real Time PCR (1) and then normalized on the number of urinary cells, in order to define VP1 mRNA as a marker of active replication of the virus.

RESULTS

Results are summarized in Table 1. Briefly, 45/531 (8.5%) and 68/531 (12.8%) patients were positive to BKV-DNA on serum and on urine, respectively. A diagnosis of BKVAN was placed in two patients. Viral replication, based on VP1 mRNA, was present in 11/531 (2.1%) patients, in particular 5/102 (4.9%) in the first year post-transplantation; two of them (40%) with BKVAN. VP1 mRNA was observed in all cases, except 5, associated with viremia and in all cases with viruria. No significant difference was found between VP1 mRNA in the two patients with nephropathy and those without. Considering receiving operating characteristics, the VP1 mRNA was not higher than viremia, despite combined measurements between viremia (cut-off 16000 copies/ml) and the VP1 mRNA (cut-off >10000 copie/10^3 cells).

CONCLUSIONS

VP1 mRNA could be a complementary test together with viremia and viruria for the monitoring of BKV replication, although further studies will be needed in order to define a possible role in the therapeutic management of kidney transplantation.

Table 1. *Results on the comparison between BKV viremia and VP1 mRNA.*

	Samples N=1082	Patients N=531	Patients with BKVAN N=2
BKV-DNA (>10^3 copies/ml)	84 (7.8%)	45 (8.5%) >1.6 x 10^4 copies/ml in 11 cases (2.1%)	>1.6 x 10^4 copies/ml in both cases
VP1 mRNA (>10^3 copies/10^3 cells)	26 (2.4%)	11 (2.1%) mean: 95681.5 copies/103 cells 5 (0.9%)	>10^5 copies/10^3 cells >105 copies/103 cells in both cases

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