DETECTION OF PROXIMAL TUBULE INVOLVEMENT BY BK POLYOMAVIRUS IN KIDNEY TRANSPLANT RECIPIENTS WITH URINARY SEDIMENT DOUBLE-IMMUNOSTAINING

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Background: The diffusion of BK polyomavirus (BKPyV) from renal medulla to cortex will result in the progression of BK polyomavirus-associated-nephropathy (BKPyVAN). Proximal tubule involvement and wide extent of SV40-T expression are associated with poor graft outcome. At present, there is a lack of non-invasive detection to assess the extent and depth of BKPyV infection in renal tissue. Our previous study found that double-immunostaining with anti-Homogentisate 1, 2-dioxygenase (anti-HGD) and anti-SV40-T helps to diagnose BKPyVAN. This study was designed to identify BKPyVAN with a higher degree of infection in kidney transplant recipients by urinary sediment double-immunostaining technique.

Methods: A total of 72 urine sediment samples from 72 patients of biopsy-proved BKPyVAN were evaluated by automatic double-immunostaining with anti-Formimidoyltransferase cyclodeaminase (anti-58KG) (a proximal renal tubule marker) antibody + anti-SV40-T or anti-HGD (a renal tubule marker) antibody + anti-SV40-T. Graft tissue from 72 patients was evaluated whether proximal tubule cells were infected by double-immunostaining with anti-RCC and anti-SV40-T. Clinicopathological characteristics were compared.

Results: Of the 72 patients, 22 (30.6%) had both 58KG(+)/SV40-T(+) cells and HGD(+)/SV40-T(+) cells (group A), 44 (61.1%) had only HGD(+)/SV40-T(+) cells (group B), 1 (1.4%) had only 58KG(+)/SV40-T(+) cells (group C), and 5 (6.9%) had only 58KG(−)/ HGD(−)/SV40-T(+) cells (group D). 14 patients in group A (77.8%), 3 patients in group B (16.7%), 1 patients in group C (5.5%) and no patients in group D were identified as proximal tubule infection. Correlation analysis showed that 58KG(+)/SV40-T(+) cells were correlated with proximal tubule infection (P<0.001). Extent of SV40-T in graft tissue was significantly higher in patients with 58KG(+)/SV40-T(+) urinary cells than those with 58KG(−)/SV40-T(−) urinary cells (21.0% vs. 13.2%, P=0.002), while the mean Banff scores for tubulitis (t), interstitial inflammation (i), tubular atrophy (ct), interstitial fibrosis (ci) and the median level of BK viral load in urine and plasma were similar (P=0.05). In addition, the PPV, NPV, sensitivity, and specificity of 58KG(+)/SV40-T(+) cells for diagnosing proximal tubule infection with BKPyV were 65.2% (95% confidence interval (CI): 42.8-82.8%), 93.9% (95% CI: 82.1-98.4%), 83.3% (95% CI: 57.7-95.6%), 85.2% (95% CI: 72.3-92.9%) respectively.

Conclusions: Double-immunostaining with anti-58KG or anti-HGD and anti-SV40-T antibodies helps to assess the extent and depth of BKPyV infection in renal tissue.

Keywords: BK polyomavirus; BKPyVAN; double-immunostaining; kidney transplantation

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