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Characterization of the hepatitis B virus DNA detected in urine of chronic hepatitis B patients

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Background

Detection of human hepatitis B virus (HBV) DNA in the urine of patients with chronic hepatitis B infection (CHB) has been reported previously, suggesting urine could provide a potential route of horizontal HBV transmission. However, it is not clear whether the HBV DNA detected in urine is indeed full-length, infectious viral DNA. The aim of this study is to assess the potential infectivity of urine from patients with CHB and to correlate HBV DNA detection in urine with clinical parameters, such as serum viral load and HBeAg status.

Methods

Urine from 60 CHB patients with serum viral loads ranging from undetectable to 108 IU/mL were analyzed for HBV DNA and serum immune markers. HBV DNA was detected from total urine DNA and size fractionated urine DNA (separated into ≤1 kb and > 1 kb fractions) by PCR analysis of six regions of the HBV genome.

Conclusion

We conclude that urine from CHB patients with healthy kidney function should not contain full length HBV DNA, and therefore should not be infectious.

Results

Twenty-seven of 59 (45.7%) patients with HBV serum viral load (≥20 IU/mL) contained at least 20 copies per mL of fragmented HBV DNA in urine detected in at least 1 of the 6 PCR assay regions. Only one patient contained HBV DNA detected by all six regions, and was found to have evidence of blood in the urine. Sixteen of 25 urine samples with high viral load (> 105 IU/mL) and 11 of 34 urine samples with low viral load (< 105 IU/mL) contained detectable HBV DNA. Twelve of 27 (44.44%) patients with detectable HBV DNA in urine were HBeAg positive, and only 5 of these HBeAg positive patients were in the group of 33 (15.15%) patients with no detectable HBV DNA in urine. By Fishers' exact test, HBV DNA in urine is significantly associated with high serum viral load ($P = 0.0197$) and HBeAg ($P = 0.0203$).