A preliminary attempt to analyze the gene expression of DNA polymerases in bladder cancer

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Bladder cancer is the eighth most prevalent cancer in Sri Lanka with a high rate of recurrence and morbidity. The diagnosis of bladder cancer is performed using cystoscopy which is an invasive and uncomfortable procedure. The diagnosis is subsequently confirmed by histopathology. During follow-up, patients undergo routine cystoscopy-based examinations to monitor the disease for recurrence. The primary objective of this preliminary study was to analyze the gene expression of DNA polymerase beta (*POLB*) and DNA polymerase delta 1 (*POLD1*) in bladder cancer with the aim of validating their use as liquid biomarkers. Midstream urine samples were collected from healthy volunteers and patients prior to bladder tumor resection following informed consent. The samples were processed immediately to extract mRNA from the exfoliated urothelial cells. The difference in gene expression of POLB and POLD1 between healthy and cancerous states were analyzed using two-step reverse transcriptase quantitative PCR (qPCR). The fold difference in their expression was calculated against the reference gene glyceraldehyde-3-phosphate dehydrogenase (*GAPDH*). The POLB gene showed an overexpression in patients affected with bladder cancer. The mean fold difference in patient samples was 6.67 compared to the 1.19 of healthy samples. The results were significant at a $p < 0.05$. The data obtained for POLD1 were inconclusive. The study demonstrates the overexpression pattern of POLB in the exfoliated urothelial cells in patients with bladder cancer. These findings validate the potential of utilizing POLB expression as a biomarker in non-invasive diagnostic and prognostic tests for bladder cancer. This study is the first of its kind to analyze gene expression of bladder cancer cells in Sri Lanka.

Keywords: *Bladder cancer*, *DNA polymerase beta*, *DNA polymerase delta, Gene expression*