



Serum Dickkopf-1 levels as a clinical and prognostic factor in patients with bladder cancer

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ABSTRACT. Dickkopf-1 (DKK-1) is a secreted protein that inhibits Wnt signaling. However, the clinical significance and prognostic value of serum DKK-1 levels have not been previously investigated in bladder cancer in Chinese patients. Blood samples were taken from 94 consecutive patients diagnosed with bladder cancer and 60 healthy control subjects. Serum DKK-1 expression levels were measured by enzyme-linked immunosorbent assay according to the manufacturer's directions. The Kaplan-Meier method was used to estimate survival, and the log-rank test was used to test differences between the survival curves. Multivariate survival analysis was performed for all parameters deemed significant in the univariate analyses using the Cox regression model. The mean serum DKK-1 level in patients with bladder cancer was 35.91 ± 16.09 ng/mL, which was significantly higher than that in healthy individuals (9.08 ± 5.21 ng/mL, $P < 0.001$). Furthermore, serum DKK-1 levels were correlated significantly with lymph node metastasis ($P = 0.021$), distant metastasis ($P = 0.013$), and TNM stage ($P = 0.008$). Kaplan-Meier analysis using the log-rank test indicated that high serum DKK-1 levels were linked to poorer survival (33.4 vs 70.1%; $P = 0.007$). Multivariate analysis revealed that serum DKK-1 levels represented an independent prognostic factor for overall survival

(hazard ratio = 2.365, 95% confidence interval = 1.873-8.881, P = 0.029). High serum DKK-1 levels may be associated with tumor progression and poor prognosis in bladder cancer and may be used as a potential biomarker to predict the prognosis of patients with bladder cancer.

Key words: Dickkopf-1; Bladder cancer; Prognosis; Biomarker