Urinary biomarkers for the early diagnosis of kidney cancer - Abstract

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To test the hypothesis that increased tumor expression of proteins such as aquaporin-1 (AQP1) and adipophilin (ADFP) in patients with renal cancer would result in increased urine AQP1 and ADFP excretion.

Prenephrectomy and postnephrectomy (pseudocontrol) urine samples were collected from 42 patients with an incidental radiographically discovered renal mass and presurgical presumptive diagnosis of kidney cancer from July 8, 2008, through March 10, 2009. Also enrolled were 15 control patients who underwent nonrenal surgery and 19 healthy volunteers. Urine AQP1 and ADFP concentrations normalized to urine creatinine were determined by sensitive and specific Western blot assays.

Mean +/- SD preexcision urine AQP1 and ADFP concentrations (76 +/- 29 and 117 +/- 74 arbitrary units, respectively) in patients with a pathologic diagnosis of clear cell (n=22) or papillary (n=10) cancer were significantly greater than in patients with renal cancer of nonproximal tubule origin, control surgical patients, and healthy volunteers (combined values of 0.1 +/- 0.1 and 1.0 +/- 1.6, respectively; n=44; P<.001). The AQP1 and ADFP concentrations decreased 88% to 97% in the 25 patients with clear cell or papillary cancer who provided postnephrectomy follow-up urine samples. In patients with clear cell and papillary carcinoma, a linear correlation (Spearman) was found between tumor size and preexcision urine AQP1 or ADFP concentration (r=0.82 and 0.76, respectively; P<.001 for each).

Urine AQP1 and ADFP concentrations appear to be sensitive and specific biomarkers of kidney cancers of proximal tubule origin. These biomarkers may be useful to diagnose an imaged renal mass and screen for kidney cancer at an early stage.

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