

## **Risk factors for renal dysfunction in type 2 diabetes: u.k. Prospective diabetes study 74.**

Retnakaran, Ravi. Cull, Carole A. Thorne, Kerensa I. Adler, Amanda I. Holman, Rury R.

Diabetes. **55(6)**:1832-9, 2006 Jun.

Not all patients with type 2 diabetes develop renal dysfunction. Identifying those at risk is problematic because even microalbuminuria, often used clinically as an indicator of future renal dysfunction, does not always precede worsening renal function. We sought to identify clinical risk factors at diagnosis of type 2 diabetes associated with later development of renal dysfunction. Of 5,102 U.K. Prospective Diabetes Study (UKPDS) participants, prospective analyses were undertaken in those without albuminuria (n = 4,031) or with normal plasma creatinine (n = 5,032) at diagnosis. Stepwise proportional hazards multivariate regression was used to assess association of putative baseline risk factors with subsequent development of albuminuria (microalbuminuria or macroalbuminuria) or renal impairment (Cockcroft-Gault estimated creatinine clearance <60 ml/min or doubling of plasma creatinine). Over a median of 15 years of follow-up 1,544 (38%) of 4,031 patients developed albuminuria and 1,449 (29%) of 5,032 developed renal impairment. Of 4,006 patients with the requisite data for both outcomes, 1,534 (38%) developed albuminuria and 1,132 (28%) developed renal impairment. Of the latter, 575 (51%) did not have preceding albuminuria. Development of albuminuria or renal impairment was independently associated with increased baseline systolic blood pressure, urinary albumin, plasma creatinine, and Indian-Asian ethnicity. Additional independent risk factors for albuminuria were male sex, increased waist circumference, plasma triglycerides, LDL cholesterol, HbA(1c) (A1C), increased white cell count, ever having smoked, and previous retinopathy. Additional independent risk factors for renal impairment were female sex, decreased waist circumference, age, increased insulin sensitivity, and previous sensory neuropathy. Over a median of 15 years from diagnosis of type 2 diabetes, nearly 40% of UKPDS patients developed albuminuria and nearly 30% developed renal impairment. Distinct sets of risk factors are associated with the development of these two outcomes, consistent with the concept that they are not linked inexorably in type 2 diabetes.