UKPDS IX: Relationships of urinary albumin and N-acetylglucosaminidase to glycaemia and hypertension at diagnosis of Type 2 (non-insulin-dependent) diabetes mellitus and after 3 months diet therapy

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Summary
In 672 newly-diagnosed, Type 2 (non-insulin-dependent) diabetic patients without urinary infection, aged 51 (9) years, mean (1 SD), 28% of patients had raised albuminuria, defined as albumin excretion greater than 25 mg/l and 66% raised urinary N-acetylglucosaminidase excretion defined as greater than 300 mo h^{-1} l^{-1} (both urinary analytes corrected by linear regression on urinary creatinine to 10 mmol/l). In a univariate analysis, urinary N-acetylglucosaminidase and albumin excretion correlated with each other ($r_s = 0.42$, $p < 0.001$), and with fasting plasma glucose ($r_s = 0.46$ and $r_s = 0.27$, $p < 0.001$, respectively). The association of urinary albumin and N-acetylglucosaminidase remained significant after taking the fasting plasma glucose levels into account, partial $r_s = 0.34$, $p < 0.001$. After 3 months of dietary therapy BMI decreased from 29.7 (5.9) kg/m^2 to 28.8 (5.8) kg/ m^2, fasting plasma glucose levels from 12.2 (3.8) mmol/l to 9.8 (3.8) mmol/l, and systolic blood pressure from 143 (21.8) mmHg to 131 (20.3) mm Hg, $p < 0.001$ for each variable. There were concomitant decreases in urinary N-acetylglucosaminidase, geometric mean (1 SD interval), 397 mol h^{-1} l^{-1} (216 to 728) to 291 mol h^{-1} l^{-1} (160 to 528), $p < 0.001$ and in albumin excretion 16 mg/l (5 to 51) to 13 mg/l (4 to 40), $p < 0.001$. The decrease in urinary N-acetylglucosaminidase, but not the decrease in urinary albumin excretion, was associated with the initial degree of glycaemia and the decrease in glycaemia in response to diet. Urinary albumin excretion correlated with systolic blood pressure at diagnosis ($r_s = 0.23$, $p < 0.001$) and was higher in both treated and untreated patients with hypertension, $p < 0.001$, whereas urinary N-acetylglucosaminidase excretion was associated with hyperrglycaemia and hypertension, whereas urinary N-acetylglucosaminidase was primarily associated with hyperglycaemia.

Key words
Urine albumin excretion, plasma glucose, urine N-acetylglucosaminidase excretion, blood pressure, type 2 diabetes, UK Prospective Diabetes Study