

ABSTRACT

Aims: The thesis deals with the biomarkers of early renal injury, namely albuminuria and neutrophil gelatinase-associated lipocalin (NGAL). The aims in the case of albuminuria were the implementation of HPLC method, comparing HPLC with immunoturbidimetric (IT) method and monitoring the relationship to the diagnosis of diabetes mellitus. The aim of urinary NGAL (and eventually other markers) examination was to verify its reliability in the prediction of acute kidney injury (AKI).

Methods: We investigated albuminuria in fresh urine samples in the groups of 636 diabetics and 456 nondiabetics using the HPLC method (Agilent 1200, Agilent Technologies, USA) and immunoturbidimetrically (Cobas Integra 400, Roche Diagnostics); we studied the correlations and relationships between albuminuria and glycosylated hemoglobin HbA_{1c}. We investigated urinary NGAL by chemiluminescent microparticle immunoassay (Architect i4000, Abbott) in children's groups: 1) after renal transplantation (N = 15), 2) with acute or chronic kidney disease (N = 28); and in adult patient's groups: 1) after cardiac surgery (N = 10) and 2) post angiography (N = 41).

Results: Albuminuria determined by HPLC was statistically significantly higher than albuminuria determined by IT. We excluded nonspecificity of the HPLC method. Results indicate that the main cause of the differences between the methods is the presence of immunounreactive albumin and indicate a higher diagnostic sensitivity of the HPLC method for the detection of pathological albuminuria. Total albuminuria can be estimated from IT-determined albuminuria using one of three correction formulas, depending on the diagnosis of diabetes mellitus (diabetics type 1, type 2, and nondiabetics). There was no correlation between HbA_{1c} and albumin-related parameters. Urinary NGAL concentrations have been able to diagnose AKI infants who have exceeded the AKI cut-off values many times. In children after renal transplantation, urinary NGAL failed to distinguish acute rejection from non-rejection causes of AKI. In adult patients after cardiac surgery, renal complications did not correspond to the urinary NGAL increase, a more suitable initial marker was urinary NGAL corrected for urinary creatinine. In adult patients after angiography, there was a statistically significant increase in urinary NGAL, α -1-microglobulin and NAG; there were no significant changes in serum creatinine and cystatin C concentrations or albuminuria.

Conclusions: Our studies mainly highlight the discrepancy between the IT and HPLC method for the assessment of albuminuria and the significance and possible difficulties of NGAL examinations in the AKI diagnostics.