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The clinical relevance of cell-free nuclear and mitochondrial DNA at early postoperative period in kidney transplant recipients

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Objectives : Recent studies showed the level of cell-free nuclear and mitochondrial DNA is related to disease prognosis and severity in various clinical conditions such as malignancy, myocardial infarction, and acute kidney injury. This study aims to evaluate the clinical relevance of cell-free nuclear and mitochondrial DNA at two weeks after kidney transplantation.

Methods : From January 2011 to February 2015, urine and plasma samples of 85 renal transplant recipients who underwent protocol graft biopsy at two weeks after kidney transplantation, were collected. Plasma and urinary cell-free DNA were measured by quantitative PCR; primers for LPL and ND1 sequences were used for the detection of nuclear and mitochondrial DNA, respectively. Medical records of patients including age, sex, serum creatinine, urine protein-to-creatinine ratio, pathologic findings of protocol graft biopsy, donor's information were reviewed and analyzed.

Results : Patients with acute tubular necrosis (ATN) in pathologic diagnosis of protocol biopsy showed significantly higher level of plasma cell-free nuclear DNA than the patients with no pathologic abnormality (P=0.025) and CNI toxicity (P=0.017). The level of plasma cell-free mitochondrial DNA was also higher in patients with ATN compared to patients with no pathologic abnormality (P=0.035). Urinary cell-free mitochondrial DNA was higher in renal transplant recipients with delayed graft function than the recipients without delayed graft

function (P=0.029) and higher in living-donor transplantation than deceased-donor transplantation (P=0.005). In addition, renal recovery time after kidney transplantation correlated with the level of urinary cell-free mitochondrial DNA (r=0.409, P=0.0001).

Conclusions : The level of plasma cell-free nuclear and mitochondrial DNA is associated with the pathologic findings of ATN at 2-week protocol biopsy and urinary cell-free mitochondrial DNA is associated with the presence of delayed graft function, donor category, renal recovery time at early postoperative period in kidney transplant recipients.

Keywords : Kidney transplantation, cell-free DNA