Non-Invasive Method to Diagnose and Predict Kidney Transplant Rejection

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Technology description

This invention describes a 3-gene molecular signature which provides a non-invasive method of diagnosing and predicting acute cellular rejection (ACR) from urine samples of kidney transplant patients.
Acute rejection is a strong risk factor for late allograft failure and can be effectively treated by immunosuppressive drugs. ACR is currently diagnosed with a kidney biopsy taken only after signs of kidney injury. Noninvasive screening that foretells acute rejection prior to clinically detectible loss of kidney function will reduce rejection associated graft damage.
The Clinical Trials in Organ Transplant 4 study (CTOT-04) was a multicenter, NIH-sponsored project to investigate whether certain mRNA levels in urinary cells are diagnostic of ACR. The study collected urine samples from 485 kidney graft recipients at least 11 times over the year post transplant, measured the urinary levels of 8 different mRNAs and correlated that data with biopsy rejection diagnoses. A 3-gene signature of CD3ε mRNA, IP10 mRNA and 18S rRNA levels discriminated ACR biopsies from biopsies without rejection and showed a sharp rise in repeat urine samples during the weeks prior to an ACR biopsy. This signature is diagnostic and prognostic of kidney allograft rejection with a specificity of 78% and a sensitivity of 79% and was effectively validated with an external validation set.

Application area

Diagnostic and prognostic of acute cellular rejection of kidney transplantation
Method to monitor the efficacy of immunosuppressive therapy in maintaining a stable kidney allograft
Method to direct immunosuppressive therapy for patients with kidney allograft

Advantages

Offers an accurate, noninvasive alternative to the standard kidney biopsy
Makes regular non-invasive monitoring of transplant health feasible
Enables early intervention and reduction in kidney injury

Institution

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