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Immunologic monitoring through biomarker

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Kidney transplantation is believed the treatment of choice for patients with end-stage kidney disease, on account of prolonged survival and improved quality of life. After kidney transplantation, however, allograft dysfunction is not an uncommon complication, which in some cases leads to allograft loss. Allograft biopsy is currently considered the gold standard for the diagnosis of allograft dysfunction. The diagnosis of rejection in a kidney transplant recipient is suspected when a patient presents with allograft dysfunction, such as elevated serum creatinine or proteinuria, and requires confirmation on a kidney biopsy. However, neither elevated serum creatinine nor proteinuria is sensitive or specific. The allograft biopsy is an invasive procedure, reactive, and continuous monitoring is unrealistic. Therefore, new biomarkers of early and late graft dysfunction are needed in renal transplants to improve the management of complications and prolong graft survival. A wide range of potential diagnostic and prognostic biomarkers, measured in different biological fluids (serum, plasma, urine) and in renal tissues, have been proposed for allograft dysfunction. Organ transplantation can be refined to genome transplantation because organ transplantation is the transplantation of different genomes to the recipients. Before clinical manifestation such as an increase in serum creatinine or histologic change in graft biopsy, preclinical injury processes are accompanied by molecular biologic changes such as mRNA, proteome, and metabolome. These changes can reflect the subclinical injury process and predict ongoing clinical rejection. The development of Omics technology and expanding knowledge of new tools, such as extracellular vesicles and donor-derived cell-free DNA, has led to the increased availability of a wide range of new potential biomarkers. And so, a lot of potential biomarkers for diagnosis of T-cell mediated rejection, antibody-mediated rejection, chronic allograft dysfunction, and Polyomavirus-associated nephropathy are reported over the last decade. Given the variety and complexity of injuries a kidney allograft may experience, it is likely that no single technology will suffice. Consequently, a

combination approach using multiple biomarkers is likely needed. However, in general, their application in clinical practice is currently being restrained by several drawbacks (long turn-around time, difficult to measure and interpret, low accuracy and reproducibility, lack of standardization and proof of cause and cost-effectiveness, and poor prognostic performance). Despite these limitations, these new biomarkers represent the cornerstone of precision medicine, which aims at integrating traditional clinical information and tailoring medical care to select the best treatment for an individual recipient. Prospective studies are needed to assess whether the introduction of these new sets of biomarkers into clinical practice could actually reduce the need for renal biopsy and ultimately improve graft survival.