Kidney-Derived Proteins and Chronic Kidney Disease.

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Abstract

Because chronic kidney disease (CKD) has few objective signs, it is difficult to diagnose it early with existing methods. As a result, new biomarkers for the early diagnosis of renal failure are required. We focused our search for new CKD biomarkers on kidney-derived proteins that could correctly reflect the organ's disease state. To uncover putative marker proteins, we used a proteomics analysis on renal inflow and efflux blood from the same person. Proteomics research was used to discover proteins in the incoming blood. Because the plasma C1q level was significantly elevated in the renal efflux of donors, we chose complement C1q as a candidate from among the identified proteins. Furthermore, the plasma concentration of C1q increased significantly in a mouse model of diabetic nephropathy in concert with increases in blood glucose and urine protein content. We also discovered that a rise in C1q in CKD patients' plasma was linked to a drop in their estimated glomerular filtration rate. Overall, our findings imply that concentrating on kidney-derived proteins is a promising technique for discovering new CKD biomarkers, and that C1q has the potential to be a renal function biomarker.

Keywords: Kidney, Chronic kidney disease, C1q, Urinary protein, Disease.

Introduction

Chronic kidney disease (CKD) is a global public health problem that affects millions of individuals. In CKD, kidney function declines gradually and irreversibly. Renal replacement therapy, such as dialysis and kidney transplants, is required for patients who acquire end-stage renal disease. Because the therapeutic goal of CKD is to eliminate the need for renal replacement therapy, early identification of renal dysfunction and rapid elimination of the causes of failure are crucial [1]. On the other hand, the number of people with CKD is continuously increasing year after year, and this trend is expected to continue. This is due to the fact that CKD has few symptoms, making early detection difficult with present methods. The glomerular filtration rate (GFR) is a measurement of how much plasma is filtered from all of the glomeruli in the kidney per unit time, is used to assess renal function in general [2]. Every day, physical variation in protein and albumin levels in the urine, which are test items in urinalysis, are detected, resulting in a high number of false positives and making it difficult to diagnose CKD precisely. Renal function has already deteriorated to roughly when blood creatinine levels above the reference haematological value, therefore it is difficult to detect renal function decrease early on. Early identification of CKD is a critical unmet medical need not just for predicting and preventing CKD progression, but also for enhancing patient survival and lowering associated morbidities [3].

Many attempts have been made to develop biomarkers for CKD diagnosis by comparing different protein expression levels in blood or urine between healthy people and patients. However, narrowing down the protein or proteins unique to the disorder is challenging since establishing whether protein level differences are caused by renal failure or simply by individual variances such as inherited characteristics and environmental background is difficult [4]. We focused on kidney-derived proteins, which are supposed to be able to sensitively reflect the condition of the kidneys, to uncover CKD biomarkers that accurately reflect renal function. We also hoped that by comparing renal inflow and efflux blood samples collected from the same individual to identify kidney-derived proteins, we would be able to reduce interindividual variations, which have been a problem in proteome analysis. We looked for CKD biomarkers by concentrating on kidney-derived proteins and validating the expression changes of the proteins we found in a renally dysfunctioned animal model [5].

Conclusion

Because C1q may accelerate aging-associated arteriosclerosis, increased levels of C1q in patients with CKD may contribute to the aetiology of CKD and its pathophysiology, including the advancement of CVD. C1q's potential utility as a biomarker for CKD's chronic inflammatory pathology is supported by previous findings as well as our current findings. Our findings suggest that concentrating on kidney-derived proteins is a good method to uncover new CKD biomarkers, and that C1q could be used as a renal function biomarker.

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