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Omics (GWAS) Research in CKD

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Chronic kidney disease (CKD) is a progressive condition that affects >10% of the general population worldwide, amounting to >800 million individuals. CKD is a disease that continues to increase in the ranking of causes of death with each passing year, from 36th in 1990 to 12th in 2017. In particular, the Global Burden of Disease Study predicts that if current trends continue, it will become the fifth leading cause of life loss worldwide by 2040. In Korea, 12% of the total population (1 in 7-8 people) suffers from chronic kidney disease.
Although the rate of deterioration of kidney function varies greatly from person to person, kidney function usually deteriorates over 5 to 10 years, and eventually end-stage renal disease (ESRD) occurs. ESRD requires a kidney transplant or lifelong dialysis. Therefore, there is a need for a system that can diagnose and manage patients with high risk of deterioration or rapidly deteriorating in the early stage of chronic kidney disease.
Our research team determined that because genetic susceptibility factors are involved in the rapid deterioration and poor prognosis of CKD patients, it is possible to select patients with high or rapid deterioration risk of CKD. Both environmental and genetic susceptibility factors are involved in the rapid deterioration and poor prognosis of CKD patients, but CKD patients with individual genetic susceptibility factors show much faster deterioration even when exposed to the same environmental factors, resulting in ESRD rapidly.
In fact, our research team's genome-wide association study (GWAS) results confirmed that the system using genetic factors is possible to predict and select patients with high risk of rapidly deteriorating renal function among chronic kidney disease patients at an early stage. Moreover, in additional CKD studies using epigenome, metabolome, and metagenome, additional markers related to CKD exacerbation were identified through each and multi-omics analysis.
Based on our experiences for CKD, in this symposium, I will discuss the importance of why omics research should be conducted in CKD research. And I will present how to show the results, how to interpret them, and what more results to produce for future clinical use. Since there is a specific gene that affects deterioration in chronic kidney disease patients, if it is well identified, it is possible to predict and select patients with a high risk of rapid onset using genetic factors, which eventually contributes to reduce the mortality rates.