



Gwangju Institute of Science and Technology

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Professor Jihwan Park's joint research team presents new treatment possibilities for chronic kidney disease with new technology that looks at tens of thousands of cells one by one

- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Life Sciences Professor Jihwan Park conducted international research with the University of Pennsylvania in the United States and the Barcelona Institute of Technology in Spain to discover the key regulators that play an important role in the process of developing normal kidney disease and chronic kidney disease and presented the possibility of a new treatment for chronic kidney disease.
 - The research team analyzed the kidney, which is one of the organs composed of the most complex cell types in our body, through the latest single cell analysis technology* at the individual cell level and identified important cell types in the development of chronic kidney disease and differentiated these cells. Estrogen Related Receptor Alpha (ESRRA), which plays a central role in regulating and metabolism, was discovered.

* single-cell analysis technology: One experiment can analyze the expression of all genes in tens of thousands of individual cells and has recently been considered one of the most important next-generation technologies in the field of biology and medicine.



- Chronic kidney disease is a disease commonly associated with diabetes and high blood pressure, and the number of patients worldwide is increasing rapidly to about 800 million. In particular, when it develops into final-stage renal disease, there is no treatment other than dialysis and kidney transplant, which causes great pain to the patients and their families, and the socioeconomic cost of disease is high. Once chronic kidney disease begins to progress, there is no cure or treatment to stop or reverse the disease, so the development of a new therapy is urgent.
- The research team conducted a single-cell analysis of human chronic kidney disease-induced animal models and renal organ analogues* and discovered a number of incorrectly differentiated proximal tubular epithelial cells in the kidney. They also found problems with the lipid metabolism process.
 - * renal organ analogue: A kidney-specific cell aggregate made by culturing human induced pluripotent stem cells, which can be used as a model similar to an actual kidney.
 - Estrogen-related receptor (ESRRA) is a key regulator that regulates the differentiation and lipid metabolism of these proximal tubular epithelial cells, and it was confirmed that chronic kidney disease can be controlled by inhibiting or overexpressing this gene.
- Professor Jihwan Park said, "The greatest significance of this research is that it identified key cell types and regulators of chronic kidney disease by combining the latest technologies such as single cell analysis technology and renal organ analogues. For the future, it has confirmed the possibility of developing drugs that are specifically effective for specific cell types by controlling gene expression."
- Professor Jihwan Park participated in this research as first author and corresponding author with support from the National Research Foundation of Korea's New Researcher Support Project, and the paper was published in *Cell Metabolism*, an international journal of metabolism, on January 5, 2021.

