Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care
KSN SEOUL, KOREA 2026
The 46th Annual Meeting of the Korean Society of Nephrology
THE KOREAN SOCIETY OF NEPHROLOGY
Jun 11 (Thu) – 14 (Sun), 2026
COEX, Seoul, Korea

Abstract Type : Oral presentation
Abstract Submission No.: A-0365
Abstract Topic : Basic Research

Drug Screening Using Human Kidney Organoids for Autosomal Dominant Polycystic Kidney Disease Enabled Effective Drug Repurposing

Jeongeun Lee[1], Sun Ah Nam[1], Sua Kim[1], Jin Won Kim[1], Min Ji Lee[1], Yong Kyun Kim[2]
[1]Department of Cell Death Disease Research Center, The Catholic University of Korea, Catholic Medical Center, Korea, Republic of
[2]Department of Internal Medicine-Nephrology, The Catholic University of Korea St. Vincent's Hospital , Korea, Republic of

Objectives : Human kidney organoids are widely heralded as a drug-screening platform to develop new therapies for kidney disease. However, large-scale drug screening using organoids has been limited due to the complexity of their 3D structures and limit of standardization. Furthermore, these platforms are remained to be validated for in vivo experiments. Here, we established human kidney organoids platform recapitulating autosomal dominant polycystic kidney disease (ADPKD) and performed a large-scale drug screening using FDA-approved drug library and validate the therapeutic effect of the candidate drugs in vivo experiments.
Methods : The polycystic kidney disease genes PKD1 and PKD2 were inactivated by CRISPR-Cas9 gene editing. PKD1 and PKD2 mutant organoids exhibited efficient and reproducible cyst formation. The primary screen was performed with a library of 2,570 FDA-approved drugs and identified two candidate drugs. To validate in in vivo experiment we generated tamoxifen-induced, Cre-mediated pkd1 deletion mouse (Rosa26-Cre^{ERT}; $Pkd1^{fl/fl}$ mouse) and treated the drugs for 6 months.
Results : After the primary screening desloratadine as an antihistamine and duloxetine as a selective serotonin reuptake inhibitor were selected, which effectively suppressed cystogenesis in PKD1-/- and PKD2-/- organoids. Desloratadine regulated B-Raf, p38-MAPK, and ERK phosphorylation, while duloxetine regulated GSK-3β, β-catenin, and mTOR phosphorylation. The combination treatment of desloratadine and duloxetine revealed the synergistic effect of suppressing cystogenesis in vitro. Rosa26-Cre^{ERT}; $Pkd1^{fl/fl}$ mouse increased the expression of the histamine receptor and decreased the serotonin receptors in proximal tubular cells, which were recovered by the combination treatment of desloratadine and duloxetine. The combination treatment of desloratadine and duloxetine decreased cystogenesis as well as renal fibrosis in vivo resulting in improvement kidney function. The combination treatment also decreased the hepatic cystogenesis.
Conclusions : Our data provide the evidence of human kidney organoids as the effective drug screening and repurposing platform, which can be applied to develop novel therapies for kidney diseases.