Kidney organoids derived from ADPKD-specific human induced pluripotent stem cells.

We are looking to out-license the technology for its commercialization.

Background

Autosomal dominant polycystic kidney disease (ADPKD) is the most common genetic disorder affecting 1:400-1,000 people in the world. 85% of ADPKD is caused by mutations in PKD1, and PKD2 mutations are responsable for the rest. ADPKD is characterized by multiple cyst formations in the kidney which impair the organ function and may lead to kidney failure. Currently no treatment is available for ADPKD. Although many disease models have been proposed for ADPKD, genetically relevant human models suitable for high throughput drug screening are still lacking.

Technical Summary

The researchers developed an ADPKD model based on kidney organoids derived from induced pluripotent stem cells (iPSCs). iPSCs were derived from ADPKD patients and induced to differentiate into kidney cells forming organoids with cystic structures.

➢ Uretetic bud organoids are generated

In addition to cyst-forming nephron organoids (Shimizu et al. 2020), the researchers established a method of generating ureteric bud (UB) organoids and managed to induce cystogenesis in them too (Kuraoka et al. 2020, **Fig. 1**). This is important because large cysts in patients with ADPKD tend to originate from collecting ducts rather than nephron tubules.

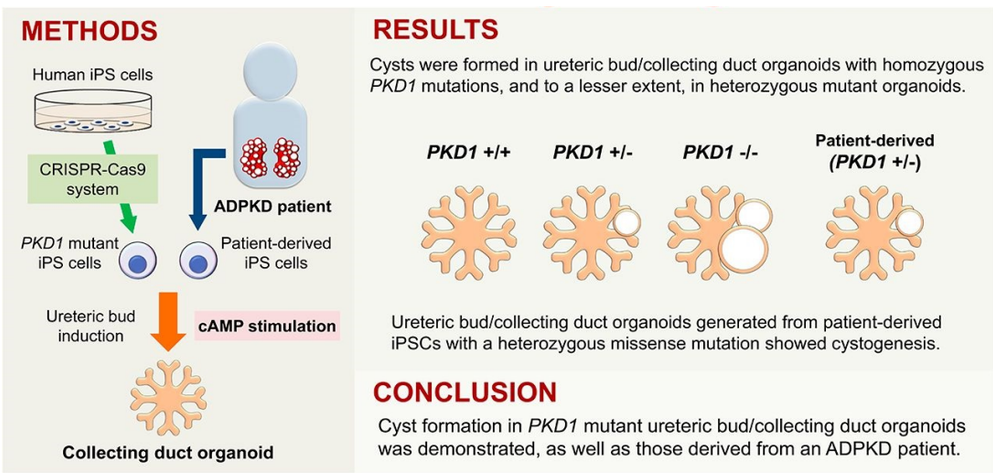

Figure 1. Overview of the UB organoid generation study.

➢ High throughput drug screening can be performed

Conventional nephron organoids lack the UB/collecting duct lineage therefore failing to recaputulate the disease. Because the organoids are obtained from patient-derived iPSCs, our model is applicable to various *PKD1* alleles observed in patients. Moreover, the researchers confirmed that these organoids can be used as screening platforms for ADPKD therapeutic candidates. Therefore, the system can be used as an accurate ADPKD model for, but not limited to, high throughput drug screening.

Development Status

- ADPKD model has been validated to have predictive value for drug screening

Applications

- ADPKD disease modeling
- Drug discovery and screening
- Regenerative medicine for kidney diseases

Intellectual Property

- Licensing

※Patent granted

Publications

Shimizu T, Mae S-I, Araoka T, Okita K, Hotta A, Yamagata K *et al.* A novel ADPKD model using kidney organoids derived from disease-specific human iPSCs. *Biochem Biophys Res Commun* 2020; **529**: 1186–1194.

Kuraoka S, Tanigawa S, Taguchi A, Hotta A, Nakazato H, Osafune K *et al.* PKD1-Dependent Renal Cystogenesis in Human Induced Pluripotent Stem Cell-Derived Ureteric Bud/Collecting Duct Organoids. *J Am Soc Nephrol* 2020; **31**: 2355–2371.

SOCIETY ACADEMIA COLLABORATION FOR INNOVATION (SACI)
Kyoto University Division

215, 2/F, International Science Innovation Building
Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto
606-8501 JAPAN

Email: gtcunit@mail2.adm.kyoto-u.ac.jp
Phone: +81-75-753-5692