



HUMAN KIDNEY ORGANOIDS · PRECLINICAL NEPHROLOGY

The human kidney, three-dimensional and in a dish

Kidney organoids close the gap between monolayer 2D cell culture and animal testing. Grown from human stem cells, they reproduce the cellular architecture of the human kidney, glomeruli and renal tubules included.

Traditional methods versus kidney organoids

Cell culture, 2D

GENETICS

human, but frequently immortalized or transformed tumour lines

STRUCTURE

flat, a single cell type

PREDICTIVE POWER

low for complex kidney function

Animal models

GENETICS

animal-derived, often poor translation to humans

STRUCTURE

complex organism, but divergent renal architecture

PREDICTIVE POWER

Limited: many drugs still fail in human clinical trials

Kidney organoids, 3D

GENETICS

Human origin, healthy or patient-specific diseased

STRUCTURE

3D, multiple cell types incl. podocytes and tubular cells

PREDICTIVE POWER

High: recapitulates human metabolic and transport pathways

Two applications, one platform

01 Nephrotoxicity screening

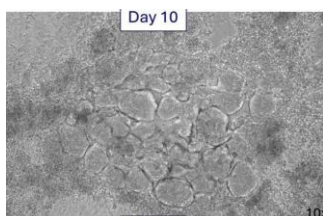
- The kidney filters and excretes, so it takes the hit first: organoids reveal drug-induced damage early
- Human transporters such as OAT1/3 are expressed, so cisplatin and nephrotoxic antibiotics act as they do in patients
- Candidates that would damage the human kidney are dropped before the clinic

02 Disease modelling

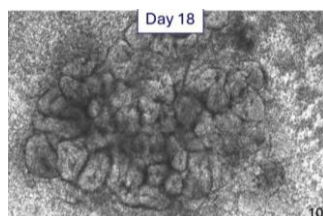
- CRISPR/Cas9-edited stem cells give rise to diseased mini-kidneys
- ADPKD organoids form the typical fluid-filled cysts: drug effects can be read out directly
- Rare and hereditary indications: Alport syndrome, congenital nephrotic syndrome, Fabry disease

From hiPSC to kidney organoids in 3 weeks

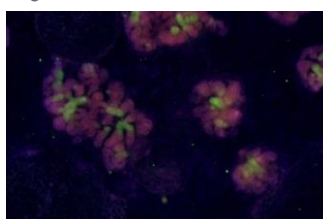
Human kidney 3D organoids differentiated in-house from control hiPSC lines recapitulates the native kidney's architecture, verified by live-cell morphology, targeted immunofluorescence and sequential biomarker panels.



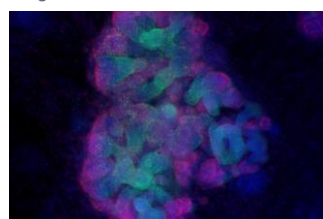
Brightfield, 10×



Brightfield, 10×



Nephron (green)/E-Cad (red)/HOECHST (blue), 4×



WT1 (green)/E-Cad (red)/HOECHST (blue), 10×

		Day -3	Day 6	Day 10	Day 18	Day 20
Intermediate mesoderm / metanephric mesenchyme	SALL1					
	EYA1					
	SIX2					
Podocytes	NPHS1					
	NPHS2					
	PODXL					
Proximal tubules	SLC3					
Distal tubules	ECAD					
Mesenchyme	VIM					
Endothelium	CD31					

z-score of log2 fold changes, normalized to TBP, relative to day -3 (baseline)

Gene expression (z-score)

-2 0 +2 green = below baseline red = above baseline

Nephron lineages appear in sequence: mesenchymal progenitors first, podocyte and tubular markers from day 10 onwards.

What we can run for you

Organoid generation: differentiation of hiPSC lines (yours or ours; control and patient-specific)

Screening and safety: nephrotoxicity panels with reference toxins; CRC and repeat-dose design

Read-outs and reporting: morphology (brightfield/immunofluorescence), biomarkers, qPCR marker panels