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Promoting Sustainable Kidney Health: The Asia-Pacific and Beyond

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Kidney Organoids Uses and Limitations

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Robust stem cell-based organoid models open a new avenue for understanding human organ formation and disease pathogenesis. Human pluripotent stem cell-derived kidney organoids recapitulate multiple spatiotemporal processes of morphogenesis observed in the developing human kidney, but manifest only rudimentary function of the in vivo kidney. One significant limitation associated with the current generation of organoids is that generic cell types, including vasculature, neurons, and immune cells, are underrepresented. Our laboratory is interested in developing methodologies for the generation of kidney organoids that harbour a comprehensive repertoire of cell types in an effort to better understand and interrogate the collective behaviours of this multicellular system. We wish to reconstruct the close-to-native tissue microenvironment and intercellular crosstalk that are critical for structural sophistication, functional maturation, and pathogenesis. To accomplish this, we are employing multidisciplinary experimental frameworks, including multicellular self-organization, genetic perturbation, high-resolution imaging, and single cell analysis.

Keywords: Kidney organoid, Differentiation, Disease modeling, Stem cell