

Towards functional kidney organoids

Citation for published version (APA):

Schumacher, A. (2023). *Towards functional kidney organoids: Insights from kidney organoid and fetal kidney development*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20230926as>

Document status and date:

Published: 01/01/2023

DOI:

[10.26481/dis.20230926as](https://doi.org/10.26481/dis.20230926as)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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Propositions

accompanying the dissertation

Towards Functional Kidney Organoids:

Insights from Kidney Organoid and Fetal Kidney Development

by Anika Schumacher

1. Listen with curiosity. Speak with honesty. Act with integrity. — Roy T. Bennett
2. Single cell RNA sequencing of human kidneys reveals a large variety of renal phenotypes, yet there is more to be discovered on the dynamics of cellular differentiation during nephrogenesis. — this thesis
3. Ultrastructural features of developing human nephrons can describe cellular maturity and phenotype to guide organoid research. — this thesis
4. iPSC-derived kidney organoids exhibit features of diabetic nephropathy, which is unknown in human development and is a potential cause of the culture limitations. — this thesis
5. Tissue clearing is a valuable tool to allow the study of 3D cultures in 3D; to draw accurate conclusions it should be mandatory in their assessment. — this thesis
6. Culturing kidney organoids in physiological hypoxia enhances microvasculature formation and might, in combination with other vascularization strategies, support the development of vascularized kidney organoids. — this thesis
7. Cellular metabolism is the next point of attention for organoid research since cell culture media composition and culture environment need to be adjusted to the complexity and size of multicellular 3D cultures such as kidney organoids.
8. Stem cell-derived kidney organoids have a long path to clinical impact given their immaturity and incorrectness compared to kidney organoids from adult cells.
9. Organoid research needs to fuse with immunological research to better mimic nephrogenesis and to better understand potential rejection after transplantation.
10. The findings of this thesis provide deeper insights into human and organoid nephrogenesis and will help with the creation of more advanced and functional kidney organoids. — this thesis
11. The bigger the challenge, the greater the resistance, the greater the growth. — author of this thesis