Technology Offer

Next-Generation Liver Assembloids Recapitulating Human Liver Architecture

Periportal liver assembloids with functional bile drainage and fibrosis modeling

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This technology offers a method to generate multicellular periportal liver assembloids combining hepatocytes, cholangiocytes and portal mesenchyme to recreate periportal architecture, bile drainage and fibrotic-like states for mechanistic studies and drug testing in cholestatic and fibrotic liver disease.

Background

Liver diseases are a global health challenge due to the liver's complex architecture and the limitations of existing laboratory models. Conventional 2D cell cultures and single-cell organoid technologies fail to capture the multicellular composition, tissue organization, and cell–cell interactions critical for accurate disease modeling and drug development. The periportal region, central for bile flow, has proven especially difficult to replicate, impeding mechanistic studies, drug discovery, and translational efforts. Existing models are typically composed of only one or two cell types and lack functional bile network formation and dynamic cell–cell interaction, resulting in insufficient physiological relevance for advanced research and development purposes.

Technology

Researchers from the Max-Planck-Institute of Molecular Cell Biology and Genetics in Dresden have developed a next-generation, multicellular liver assembloid technology, that reconstructs the architecture and function of the human periportal liver region in vitro. This novel assembloid system integrates primary hepatocytes, cholangiocytes, and mesenchymal cells through a stepwise assembly, generating 3D tissue that models periportal liver architecture and directional bile drainage. Cell composition is precisely controlled, enabling advanced studies of disease states, genetic manipulation, and fibrosis modeling.

Advantages

- Fully recapitulates multicellular and functional liver tissue architecture
- Enables mechanistic research, drug screening, and toxicity studies with superior physiological relevance
- Allows for detailed fibrosis and genetic disease state modeling
- Supports high-throughput analysis and customizable experimental setup

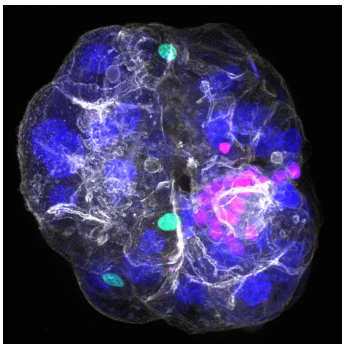

Figure 1 Mouse liver periportal assembloid, with the three component cell types visualized: cholangiocytes in pink, portal fibroblasts in green, and hepatocyte nuclei in blue; all cell borders are visualized in white.

Example applications include modeling bile transport disorders, fibrosis induction, and targeted drug testing in realistic microenvironment. We are seeking partners for licensing or collaboration to adapt and further develop this technology for broader clinical, pharmaceutical, and research applications.

We are open to license agreements and co-development options.

Publication

- Dowbaj, A.M. et al.; Mouse liver assembloids model periportal architecture and biliary fibrosis (Nature, 2025); https://doi.org/10.1038/s41586-025-09183-9
- Yuan, Lei et al.; Human assembloids recapitulate periportal liver tissue in vitro (Nature, 2025); https://doi.org/10.1038/s41586-025-09884-1

Patent Information

An EP application EP25169082 was filed in 2025.

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