Human Liver Tissue Engineering - From Organoids to Tissues

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'*Human Liver Tissue Engineering – From Organoids to Tissues*'

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End-stage liver diseases cause more than two million deaths yearly worldwide. Currently, the only effective treatment for end-stage liver diseases is liver transplantation. While less than 10% of patients obtain a suitable donor liver for transplantation, many patients are dying on the waiting list. Therefore, there is an urgent need to find alternatives for donor livers for transplantation.

In the PhD dissertation "Human Liver Tissue Engineering- From Organoids to Tissues", Shicheng Ye et al. describe his achievements towards creating mini liver tissues that can be explored for transplantation purposes in the future. Part I of the thesis focuses on developing animal-free and well-defined hydrogels for liver organoids, a source for major liver cell types. These hydrogels are promising to expand and differentiate the liver organoids into functional liver cells. In Part II, Shicheng established two bioreactor-based methods for large-scale and rapid production of liver organoids. These two methods bridge the gap between tedious static organoid culture in hydrogel droplets and the need for a large number of organoids for liver tissue engineering. In Part III, Shicheng developed a strategy to create mini liver tissues with multiple different liver cell types in well-defined hydrogels and under dynamic fluidic stimuli. To conclude, the achievements made in this thesis can be applied as advanced in vitro models for fundamental studies, including liver development and disease modelling and are a foundation for translational research and possible clinical applications in the future.