

ORGANTRANS

Controlled Organoids Transplantation as Enabler for Regenerative Medicine Translation

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Liver disease

OrganTrans Peces for engandet stransplantation

- 2 million deaths per year worldwide
- Liver transplantation is the only effective treatment for various diseases of the liver
- 10% of global transplantation needs are met
- Demand for livers is projected to increase by 23% in the next 20 years

ORGANTRANS target conditions

- Patients with chronic end-stage liver diseases
- Patients with residual healthy tissues





Live cancer

Cirrhosis



Fatty liver





DISRUPTIVE SOLUTION THAT ENABLES THE 3D PRINTING OF TISSUE-ENGINEERED CONSTRUCTS



- **1**. Cell source
- 2. Spheroid production
- 3. Spheroid sorting
- 4. Materials
- 5. Vascularization
- 6. Biofabrication
- 7. Maturation of bioconstruct
- 8. In vitro & In vivo testing

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Organ**Trans**

1. Cell source: adult stem cells

- Optimal cell ratio's of co-cultures
- Supporting cells composed of bone marrow mesenchymal stem cells and endothelial cells





Organ**Trans**

2. Spheroid production using the SPHERICALPLATE 5D technology



• Self-assembling of hepatic (stem) cells into standardized spheroids

• Establishing Roadmap for technical cGMP implementation









3. Spheroid handling & quality control



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4. Material based on synthetic 3D hydrogel

- ✓ Biofunctional ✓ Custom architecture ✓ Tunable porosity ✓ Cell spheroid protection
- Printability
- ✓ Controlled degradation ✓ Tunable stiffness ✓ Vascularization



DWI Leibniz-Institute for Interactive Materials

Rice JJ*, Martino MM*, De Laporte L*, Tortelli F*, Briquez PS, Hubbell JA. Engineering the regenerative microenvironment with biomaterials. Adv Healthc Mater. 2013, 2: 57.



5. Vascularization

- Introduction of endothelial cells
- Vascular architecture





3D printed liver bioconstructs with perfusion-competent vasculature





6. Biofabrication





7. Bioreactor for tissue maturation







Biomonitoring (optical oxygen sensing, etc)

Integrated microfluidics for continuous perfusion rgan**Trans**



8. In vitro & in vivo testing





Contact





CSem









Thank you for your attention!



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