FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Development of Three-dimensional Structured Innovative-human Normal and Disease Tissue Models at Single Cell Level	
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1. Background of research

In a pharmaceutical research, *in vitro* cell experiments and *in vivo* animal experiments have been performed for the test of drug effect or toxicity. However, it is difficult to evaluate the drug effect to human through the animal experiments due to the difference between human cell and animal cell. Furthermore, it is also difficult to assay the drug effect to tissues or organs through *in vitro* cell experiments because our tissues are three-dimensional (3D) constructs consisting of multiple types of cells.

2. Research objectives

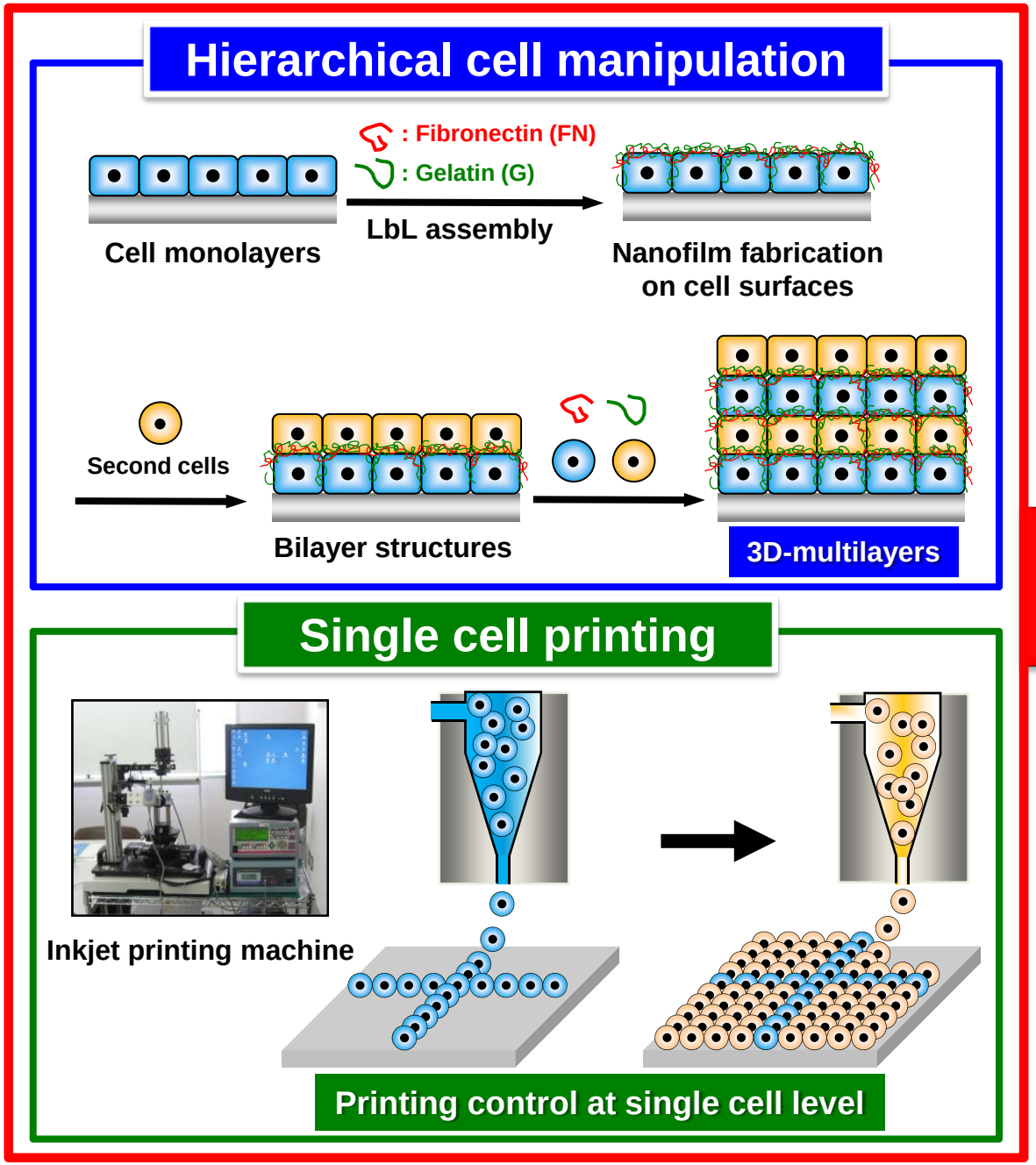
Development of novel technology to create 3D-human normal and disease tissue models by single cell manipulation of multiple types of human cells.

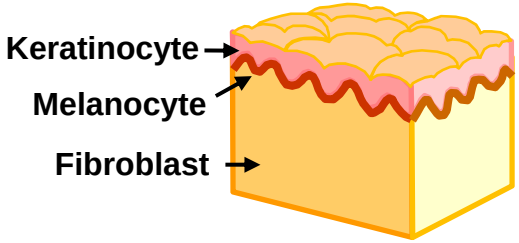
3. Research characteristics (incl. originality and creativity)

Combination of the researcher's original technologies "hierarchical cell manipulation technique" and "single cell printing technique" would provide 3D-human normal and disease tissue models manipulated at single cell level.

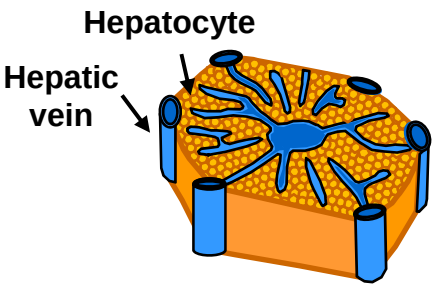
4. Anticipated effects and future applications of research

Since the tissue models fabricated by this project are composed of only human cells, the drug effect will be evaluated precisely as compared to *in vitro* cell experiments and *in vivo* animal experiments. The reduction of *in vivo* animal experiments is expected. Furthermore, these tissue models would be useful as an implantable tissues in tissue engineering field. The diseased tissue models will be powerful tool for new drug discovering research. The findings and applications of this project contribute to medial and pharmaceutical industries.

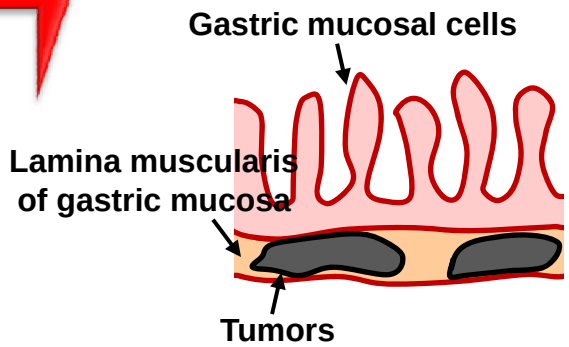




Skin models



Hepatic lobule models



Scirrhous carcinoma

3D-human normal and disease models for innovative drug assays