

A New Approach for 3D Tissue & Organ Fabrication Inspired From Orthopedic Surgery

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Fabrication of transplantable 3D tissue or organ in vitro is one of the major goals in regenerative medicine. Several scaffold-free systems have been developed to avoid potential side effects caused by scaffold mainly used to build three-dimensional tissue construct. They seemed to be still unable to produce fine structures without contamination from exogenous biochemical materials.

Inspired from bone fracture treatments in orthopedic surgery, we established a simple method to fabricate 3D scaffold-free cell construct. This method use spheroids and temporal fixator which enable placement of various types of three-dimensional cells into desired xyz positions without need of hydrogels or biochemical reactive materials. We also developed a robotic system for scaffold-free cell construction. The prototype can handle two different type of cells and able to fabricate 10 mm³ scaffold free cell construct. Due to its simplicity and scalability, this unique system is considered easy to clinically introduce.

Near future, with combination of the robotic technology and the bio technology, we may be able to build living organs for autologous transplantation. And this multi-cell construct may be useful research tools for drug development.