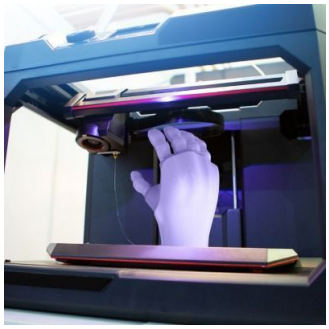
HealthManagement
Promoting Management and Leadership

New Rapid 3D Printing Technique Paves Way for Life-like Organs



The goal of efficiently fabricating full-sized replacement human organs and tissues for use in transplant surgeries is one step closer to fruition. A team of researchers from the University of Buffalo have developed 3D-printing technology that is able to recreate life-sized organs and limbs such as a human hand in less than 20 minutes.

Engineers fine-tuned the use of stereolithography for 3D printing of organ models that contain live cells. This novel new technique, described in a recently published paper, is capable of printing the models 10-50 times faster than the previous models, in mere minutes instead of hours.

Conventional 3D printing involves a lengthy process, which can take six or seven hours to print a model of a human part, such as a hand, and causes cellular stress and injury inhibiting the ability to seed the tissues with live, functioning cells.

This new ultra-fast printing process enhances cell survival and can print a small model of a human hand in minutes instead of hours.

The FLOAT method developed by the SUNY Buffalo group, led by Rougang Zhao, PhD, Associate Professor of Biomedical Engineering, takes a different approach that minimises damage to live cells. The team also published a video that demonstrates how their FLOAT rapid bioprinting method works.

“This is a significant step towards the printing of biologically active 3D tissues," explained David Rampulla, Ph.D., director of the NIBIB program in Synthetic Biological Systems. “This new technique combines a hydrogel mix that is very cell friendly with the rapid printing process, which spares cells from being suspended in a cell-damaging environment for an extended period. The combination has allowed the team to introduce live cells into their 3D printed tissues with the vast majority of cells remaining alive and functional.”

The engineering team has successfully used the new method to print tissues containing inner branching networks that mimic blood vessels. This is an integral step to move from small models of organs to full-sized replacement organs in the future. “To keep alive cells that are deep inside a full-sized printed organ is one of the many challenges in creating functional replacement organs,” explained Zhao. “We found that our method performed well in terms of creating branched, vessel-like networks to facilitate delivery of nutrients to cells embedded throughout the printed tissue.”

The next step for researchers is to increase the size of the printed tissues while maintaining both structural integrity and cell viability. This important work brings the goal of printing replacement organs closer to reality, a biomedical advance that could save countless lives lost due to a shortage of donor organs.

Reference: Anandakrishnan N, Ye H, Guo Z, et al. Fast Stereolithography Printing of Large-Scale Biocompatible Hydrogel Models [published online ahead of print, 2021 Feb 15]. *Adv Healthc Mater*. 2021;e2002103. doi:10.1002/adhm.202002103

Photo: iStock

Published on : Sat, 15 May 2021