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3D BIOPRINTING TO CREATE ARTIFICIAL BLOOD VESSELS, ORGAN TISSUE

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

A researcher prepares liquid droplets containing human cells before a bio- 3D printing with laser | Photo Credit: REUTERS

Scientists have developed a 3D printing technique that can recreate the complex geometry of blood vessels, and could one day be used to produce artificial arteries and organ tissues. A study, published in the journal *Nature Communications*, outlines a layer-by-layer printing method that features fine-grain, programmable control over rigidity.

“The idea was to add independent mechanical properties to 3D structures that can mimic the body’s natural tissue,” said Xiaobo Yin, an associate professor at University of Colorado (CU) Boulder in the US. “This technology allows us to create microstructures that can be customised for disease models.”

Hardened blood vessels are associated with cardiovascular disease, but engineering a solution for viable artery and tissue replacement has historically proven challenging. To overcome these hurdles, researchers found a unique way to take advantage of oxygen’s role in setting the final form of a 3D-printed structure.

“Oxygen is usually a bad thing in that it causes incomplete curing. Here, we utilise a layer that allows a fixed rate of oxygen permeation,” said Yonghui Ding, a postdoctoral researcher at CU Boulder. By keeping tight control over oxygen migration and its subsequent light exposure, researchers have the freedom to control which areas of an object are solidified to be harder or softer — all while keeping the overall geometry the same.

“This is a profound development and an encouraging first step toward our goal of creating structures that function like a healthy cell should function,” Ding said. As a demonstration, the researchers printed a small Chinese warrior figure, printing it so that the outer layers remained hard while the interior remained soft. The tabletop-sized printer is currently capable of working with biomaterials down to a size of 10 microns, or about one-tenth the width of a human hair.

The researchers are optimistic that future studies will help improve the capabilities even further. The findings could lead to better, more personalised treatments for those suffering from hypertension and other vascular diseases.

According to the World Health Organization, India is the most depressed country in the world, followed by China and the U.S. The stigma and misconceptions associated with mental health add to the problem. Some views

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