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Biomedical applications of 3D printing technologies FREE

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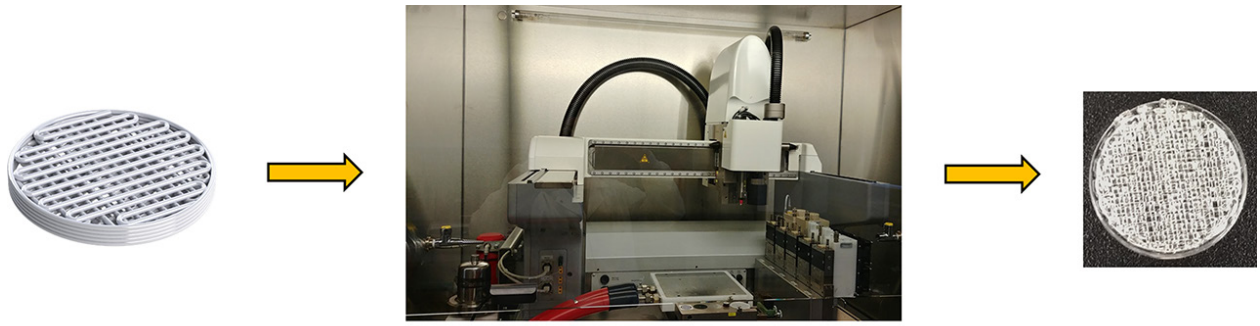
A new review paper outlines the growing popularity of 3D printing in biomedical research applications, such as medical implants and bioreactor culture platforms.



3D printing has exploded in popularity throughout the last decade for a wide range of applications, including rapid prototyping, mass customization, and manufacturing. Recent years have also seen the development of biomedical research applications of 3D printing in instances where traditional approaches fall short.

A new review article highlights several applications of 3D printing technologies for clinically motivated research, such as pharmaceutical delivery, bioreactor culture platforms, acellular scaffolds, imaging modalities, and organ-on-a-chip systems. The authors note that more than 20 active or recruiting clinical trials involve a 3D-printed component, and continued investigation into 3D printing technologies will help determine its capabilities and limitations.

One category of applications that has garnered great interest is medical implants. Traditional implants for bone are manufactured out of metal in set sizes, so anyone needing one of these implants would have to settle for whichever size was the closest fit. 3D printing offers the opportunity for implants that are made to custom fit an individual's anatomy based on data from imaging scans. Researchers can match material choices, fabrication systems and specific elements of an individual's physiology to create custom implants for orthopedic, dental and craniofacial applications.

A second group of applications focuses on the fabrication of bioreactors and alternative culture systems, which may offer a more realistic biomimetic environment for cells. A 2D environment remains the most common way to grow cells, but 3D printing can create 3D culture platforms with parameters such as porosity, substrate roughness, and curvature. The technique also allows for great flexibility in compounding multiple components like polymers, metals and ceramics to mimic the mechanical and chemical properties of native tissues.

Source: "3D printing in cell culture systems and medical applications," by Max J. Lerman, Josephine Lembong, Greg Gillen, and John P. Fisher, *Applied Physics Reviews* (2018). The article can be accessed at https://doi.org/10.1063/1.5046087.