



3D Bioprinting to Create Artificial Blood Vessels

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.

- 3D printing (also known as **additive manufacturing**) is a manufacturing process through which three-dimensional (3D) solid objects are created.
- It enables the creation of physical 3D models of objects using a series of additive or layered development framework, where layers are laid down in succession to create a complete 3D object.

Recent Development in 3D bioprinting

- The idea behind 3D bioprinting was to add independent mechanical properties to 3D structures that can mimic the body's natural tissue. This technology allows the creation of microstructures that can be customized for disease models.
- Hardened blood vessels are associated with cardiovascular disease and 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.
- 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 an encouraging first step towards the goal of creating structures that function like a healthy cell should function.
- 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 researchers are optimistic that future studies will help improve the capabilities even further. The findings could lead to better, more personalized treatments for those suffering from hypertension and other vascular diseases.

Potential of 3D printing

- Car and aircraft manufacturers have taken the lead in 3-D manufacturing, using the technology to transform design and production. For eg. Boeing is using 3D-printed titanium parts in the construction of its 787 Dreamliner airliner, The U.S. and Israeli air forces are already using 3D printers to manufacture spare parts etc.
- In medical sciences, 3D printing is being used to customize implants and this technology could soon revolutionize dentistry. In the future, organs and body parts may be created using 3D printing techniques.
- In fashion, Nike, Adidas, and New Balance are using 3D printing to create prototypes faster than ever, and create customized shoes. In 2018, Nike revealed it had made the first 3D-printed textile upper in performance footwear, called Flyprint.
- In the construction industry, companies around the world are making breakthroughs in 3D-home printing. Using layers of concrete, homes can be built in 48 hours, which are stronger than the regular cinder block and only a fraction of the price.

