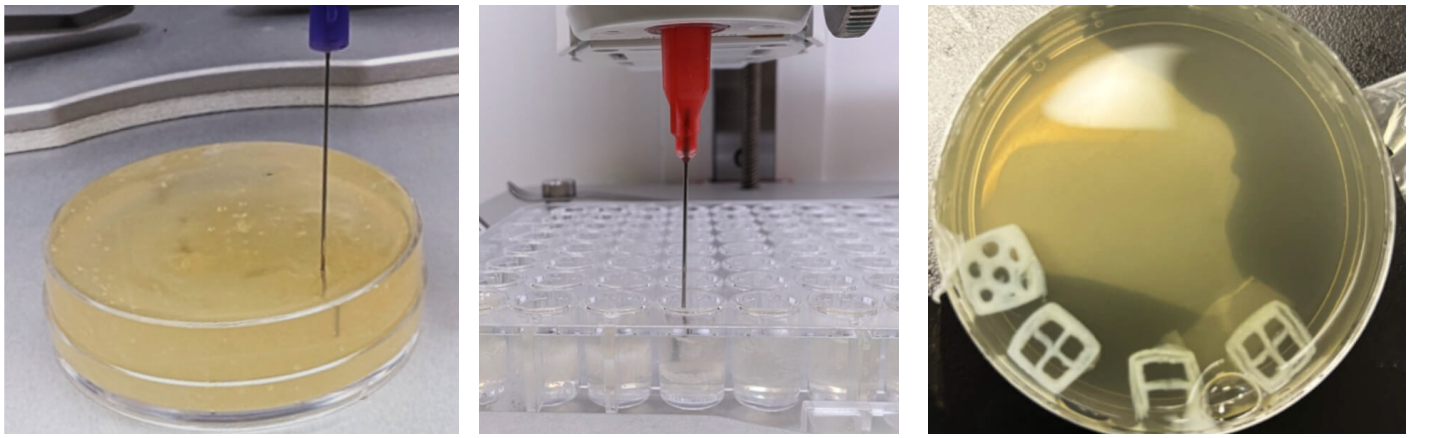
LifeSupport FRESH 3D Printing and Bioprinting (Page 1 of 2)

3D bioprinting is an advanced technique in regenerative medicine and tissue engineering that enables the fabrication of scaffolds and tissue constructs with precise geometries and complex architectures. It uses bioinks, materials composed of living cells and biomaterials, to create structures that aim to mimic natural tissues. However, despite major advancements in the development of bioinks, limitations in definition and printing of biologically relevant structures have arisen given the low mechanical properties of several natural polymers.

FRESH™ (Freeform Reversible Embedding of Suspended Hydrogels) is a specialized bioprinting method designed to overcome the limitations of printing soft hydrogels that cannot maintain shape under gravity. This process involves printing bioinks inside a temporary support bath such as LifeSupport™.

LifeSupport was commercialized by **FluidForm Bio™** and developed for scaled up production by Viscus Biologics under a partnering agreement. In this collaborative venture, both partners worked together to develop a scalable process that yields a cytocompatible support bath suited for extrusion-based 3D bioprinting techniques and compatible with most commercially available 3D Bioprinters such as **CELLINK BIO X™** or **Lulzbot® Bio**. Available in a research grade sterile format, LifeSupport can be provided both in individual units (enough to fill a small petri dish) or in bulk.



Fibrillar collagen printing in LifeSupport™ in a petri dish (left), VitanatiV™ Intestine ECM in a 96-well plate (middle), and released VitanatiV™ ECM structures after LifeSupport melting at 37 °C (right).

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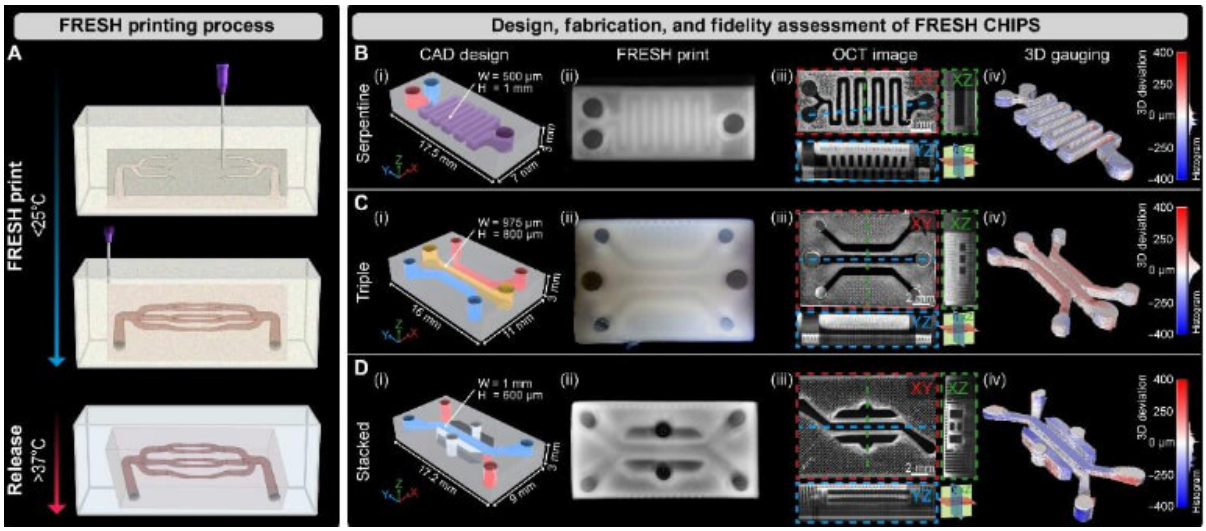
LifeSupport™ 3D bioprinting bath support is composed of gelatin microparticles and enables the printing of soft hydrogels that would otherwise collapse under gravity. It provides:

- Structural integrity during printing, preventing deformation of hydrogel-based constructs.
- A reversible medium, meaning it can be easily removed after printing without harming cells, material, or compromising biocompatibility.
- A stable environment for high-resolution and complex 3D shapes, essential for tissue engineering and regenerative medicine.
- High fidelity that supports intricate designs and fine details in tissue scaffolds.
- Versatility for compatibility with various bioinks, including collagen and ECM-based materials, such as VitanatiV™ ECM bioinks.
- Biocompatibility so it is safe for living cells during and after the printing process.

These characteristics make FRESH bioprinting in support baths like LifeSupport a perfect tool to boost your research in tissue engineering and regenerative medicine in different applications:

- Fabrication of larger tissue structures or organs,
- 3D bioprinting of vascularized structures, and
- 3D printing of microphysiological systems (MPS) including perfusable structures.



FRESH™ bioprinting of perfusable MPS systems.

Image adapted from Daniel J. Shiwarski et al. Sci. Adv. 11, eadu5905 (2025).

Visit our **website** to learn more about our **VitanatiV ECM biomaterials**, **design services**, and **contract manufacturing** capabilities.

References

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