August 17, 2020

More Efficient Drug Screening with 3D Bioprinting

Taking a drug to market is a competitive, costly and challenging process involving preclinical laboratory and animal testing before the even more time-consuming and expensive four phases of human clinical trials, which can take as many as 7 to 15 years at price tags as high as $5.5 billion. Even if 10 viable drug compounds are identified for human trials, only 1 out of 9 will actually make it to market. Given this high attrition rate, can bioprinting save valuable time and resources by better identifying viable compounds in order to move only the most promising drugs to clinical trials?

Limitations of animal models for drug screening

During the initial stages of drug discovery, often referred to as preclinical trials, new chemical entities (NCEs) are monitored to determine the life cycle of the compounds inside and outside of the targeted system (pharmacokinetics) and their chemical reactions (metabolism). Because of the ethical issues surrounding human trials and their high costs, a significant number of these early tests are performed on animals.

While the transition from preclinical animal testing to clinical human trials has improved thanks to better research tools and the rise of artificial intelligence in target identification, there is still a real need for improved preclinical screening because animal testing often fails to recapitulate the complexity of the human metabolism, leading to false positives and negatives that do not accurately reflect the toxicity of drugs to human systems.

3D cell cultures are more relevant

Given the limitations of animal models, it is no wonder that scientists have turned to human organ models. But although human cells have long been cultured in 2D, in recent years, a paradigm shift has led more and more scientists to recognize the importance of working with human cells in the 3D environments afforded by bioprinting in order to produce more physiologically relevant models. Combining the automation of cell culturing in 3D bioprinting with carefully tailored biomaterials, known as bioinks, has made it possible to grow, feed and maintain human organ models in larger quantities and in a lot less time, reducing time and labor spent on these tasks. Laboratory robotics can also now pick and place cell culture reagents or other NCEs and liquid samples in high numbers, enabling higher throughput screening and running a variety of other laboratory tasks more efficiently.

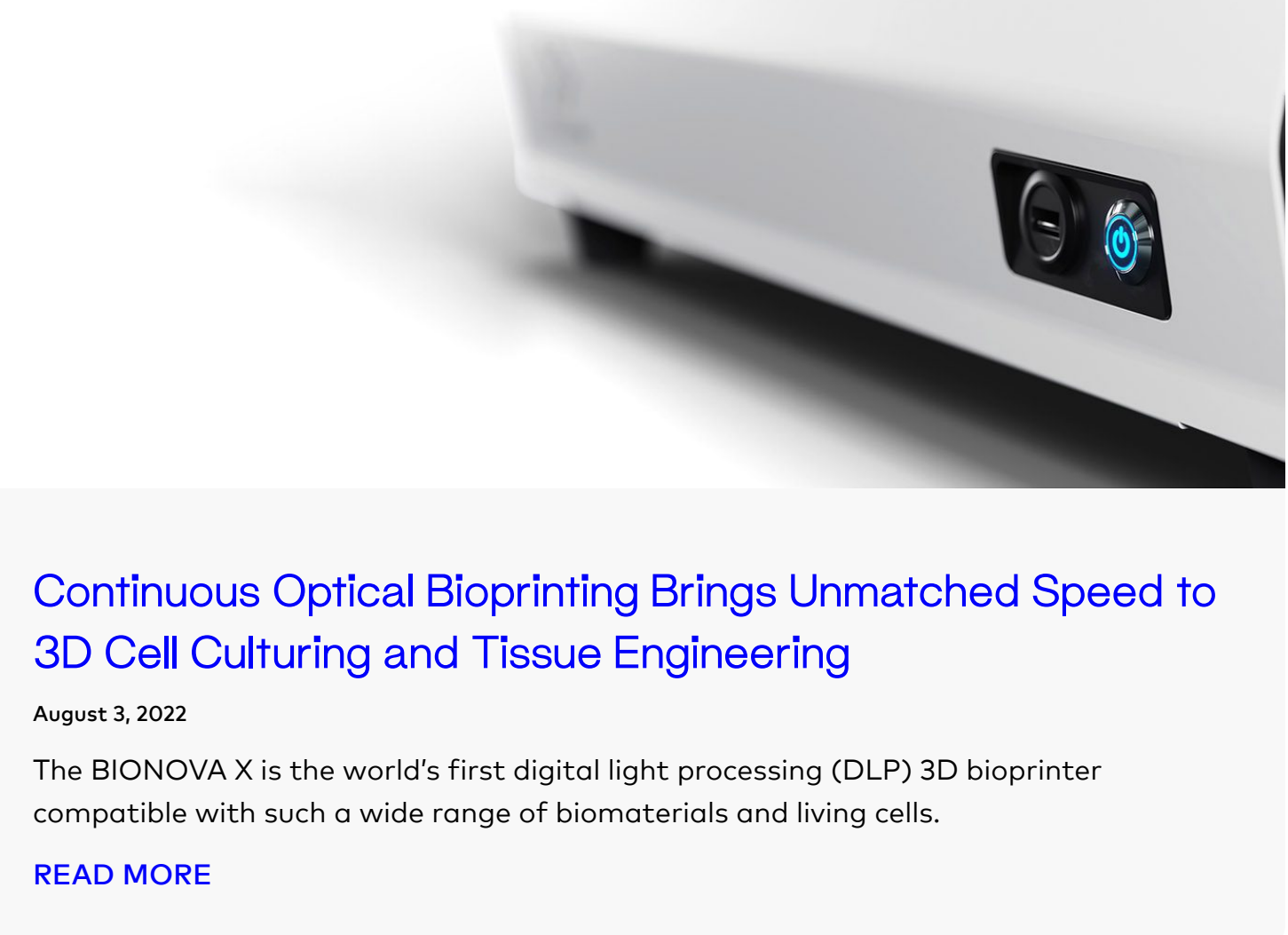
Bioinks better mimic ECM

Bioinks are another powerful tool that help researchers advance their drug discovery research. Tissue-specific bioinks improve cell adhesion and differentiation, helping with the formation of human organoids. Proteins and other biological factors can also be added to more accurately recreate extracellular matrices (ECM) and better simulate *in vivo* microenvironments. Furthermore, with multiple methods of crosslinking (chemical, light, thermal), the stiffness of constructs can be modulated to better serve specific cell types, like cartilage or bone tissue.

Learn more

Bioprinting's more relevant human organ models can save the drug industry time and money by more efficiently identifying viable compounds in the initial stages of drug development. Conceivably only the most promising compounds would move on to costly human clinical trials. The technology's growing influence means that scientists continue to validate more and more applications. Dive deeper into how the bioprinting industry is changing drug screening and development. Watch our webinar on 3D bioprinting for COVID-19 studies or read our application note, which discusses the effectiveness of testing drug efficacy in 2D and 3D.

More from Our Blog



Continuous Optical Bioprinting Brings Unmatched Speed to 3D Cell Culturing and Tissue Engineering

August 3, 2022

The BIONOVA X is the world's first digital light processing (DLP) 3D bioprinter compatible with such a wide range of biomaterials and living cells.

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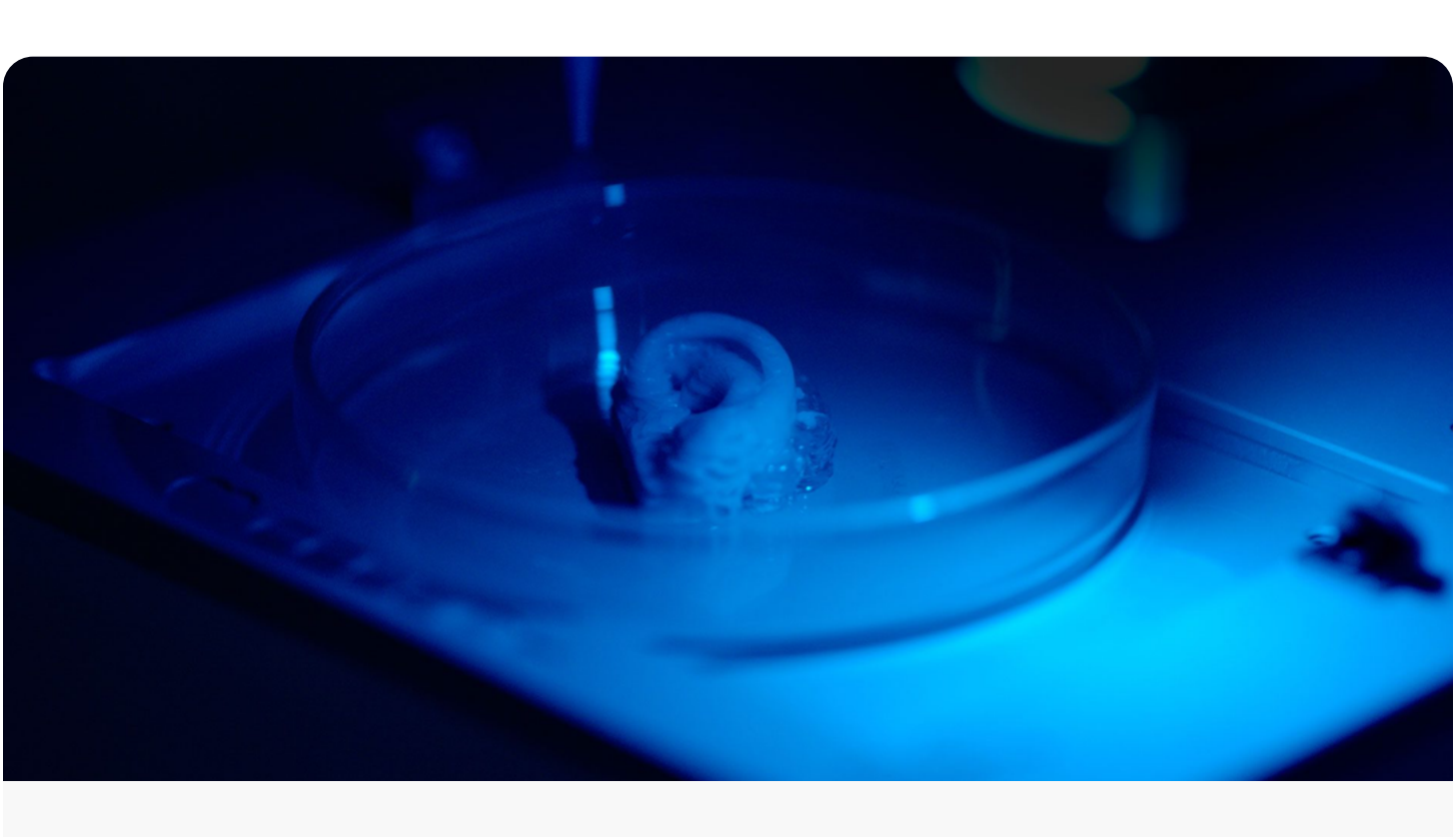

Bioprinted Ear Successfully Transplanted into Patient

June 6, 2022

Share on facebook Share on twitter Share on linkedin A huge day for bioprinting as doctors were able to transplant an ear bioprinted utilizing the

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The Ultimate User Guide to Bioprinting Neural Tissue

May 2, 2022

Whether you are new to bioprinting or a first-time BIO X user, the recently published "Protocol for Printing 3D Neural Tissues Using the BIO X Equipped with a Pneumatic Printhead" is a must-read.

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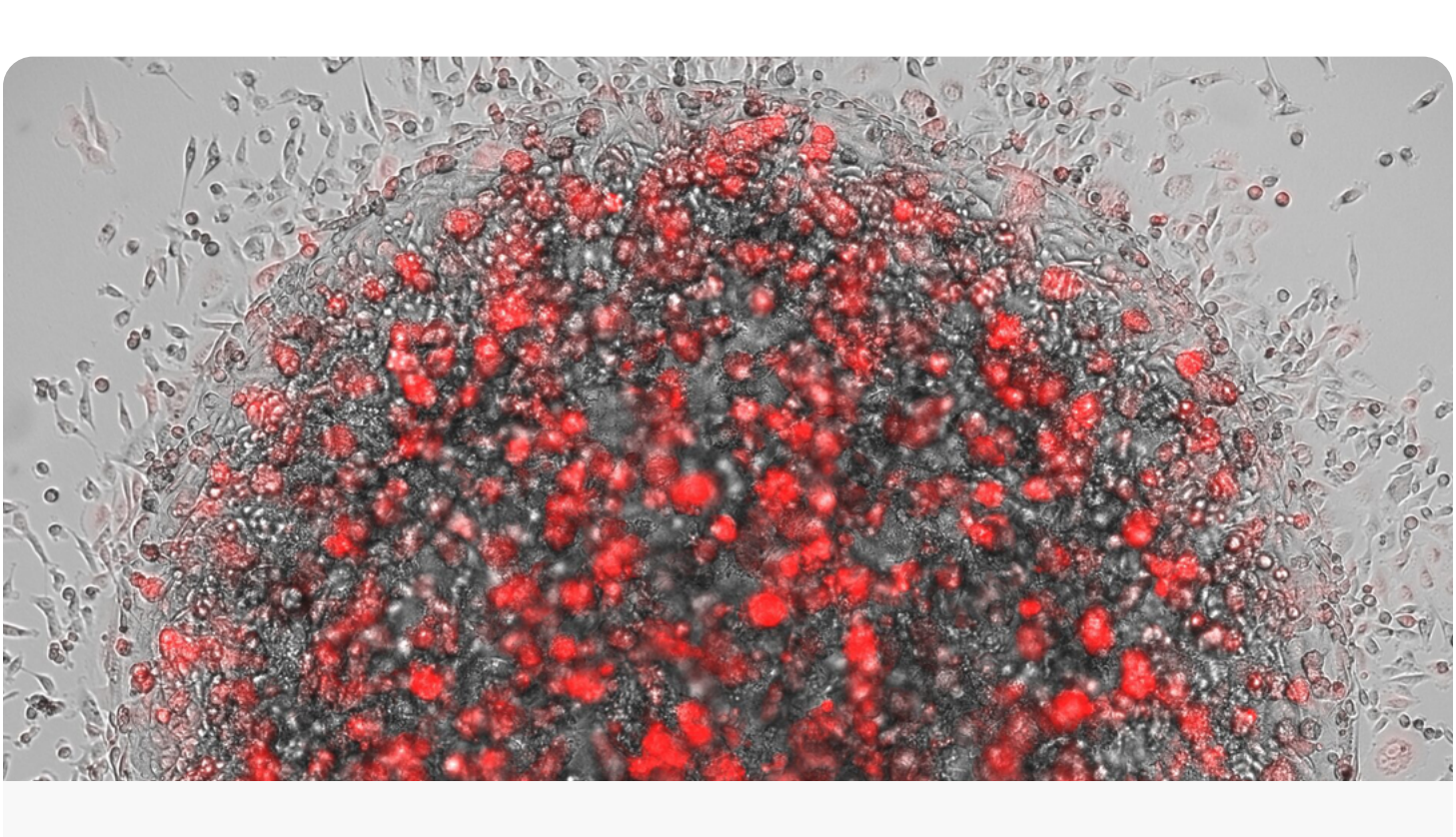

Got collagen?

April 7, 2022

Being the most abundant protein in mammals has earned collagen a special status in tissue engineering labs. But recent global supply chain disruptions have made finding a reliable supplier a truly Herculean race against time.

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Let There Be Light! How the Lumen X+ Is Redefining Bioprinting Capabilities

October 8, 2021

By better replicating the in vivo cellular environment, the transition from 2D cell culturing to 3D set off a chain reaction of scientific advances in many research

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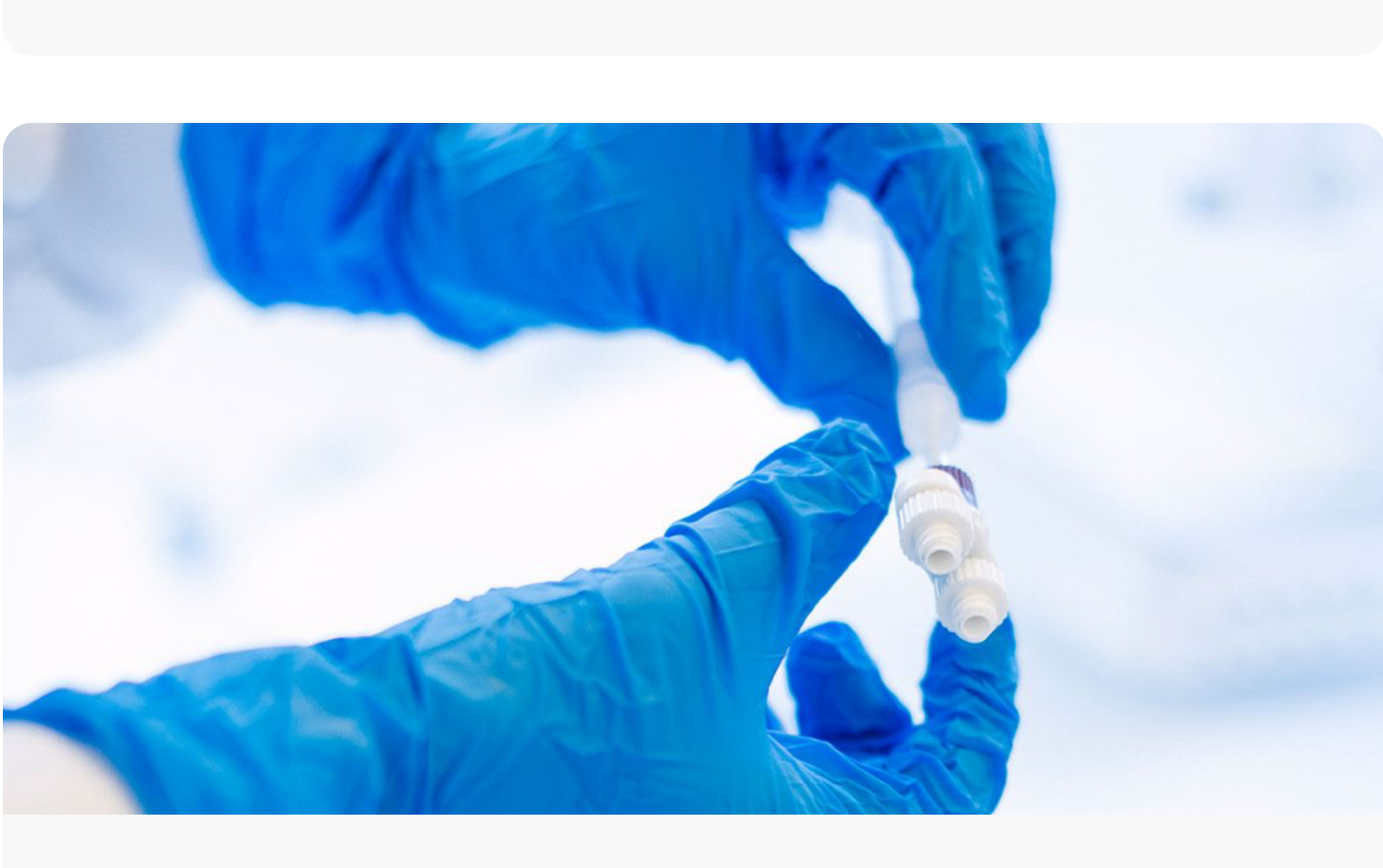

Commitment to Biomaterial Quality

September 2, 2021

We offer a wide range of bioinks and biomaterials to ensure the viability of cells before, during and after bioprinting. Each optimized formulation confers the

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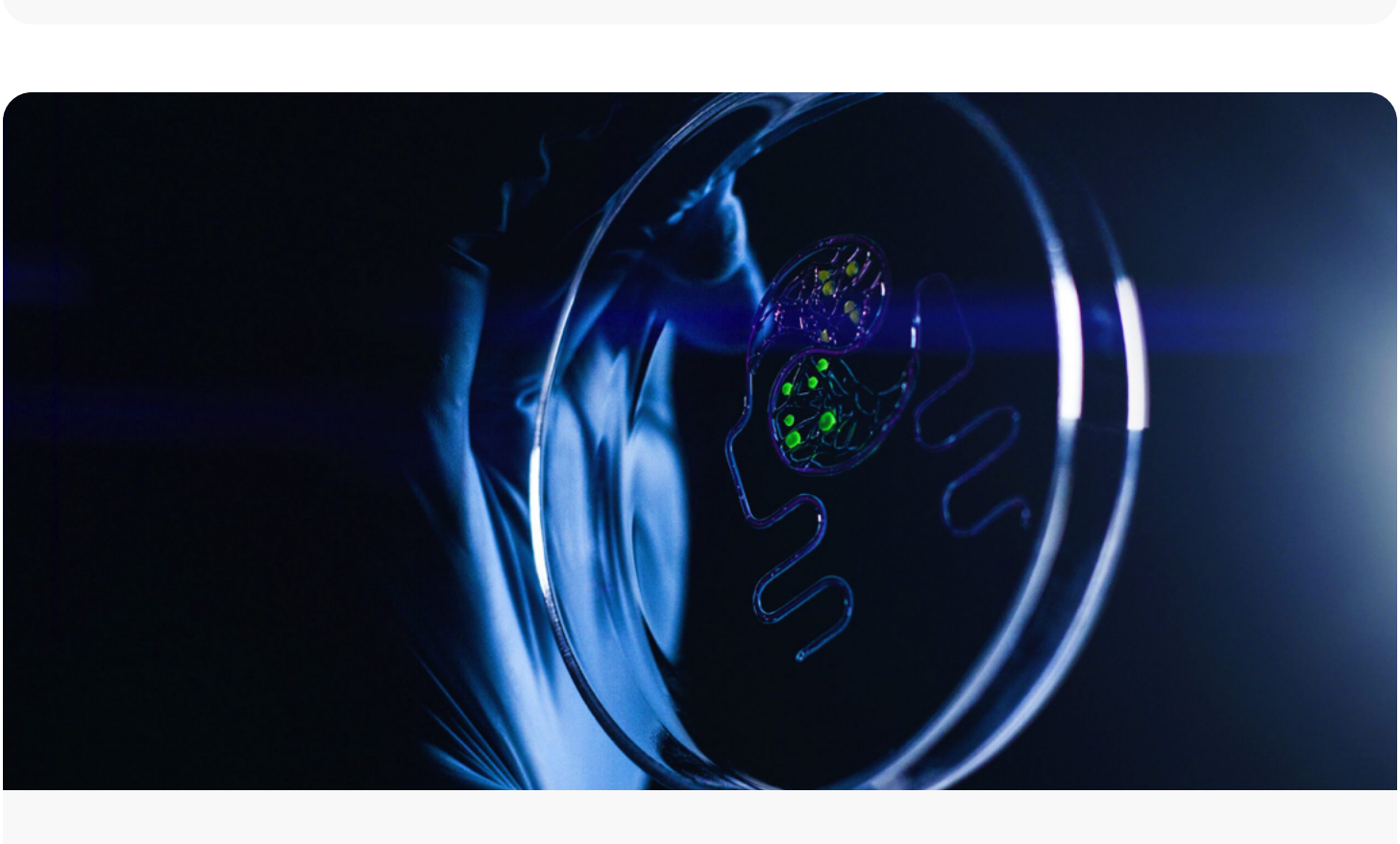

Creating More Complex Constructs with Coaxial Bioprinting

July 13, 2021

Introduction Multimaterial bioprinting is used to achieve complex structures composed of two or more hydrogels that are able to modulate mechanical, chemical or biological properties.

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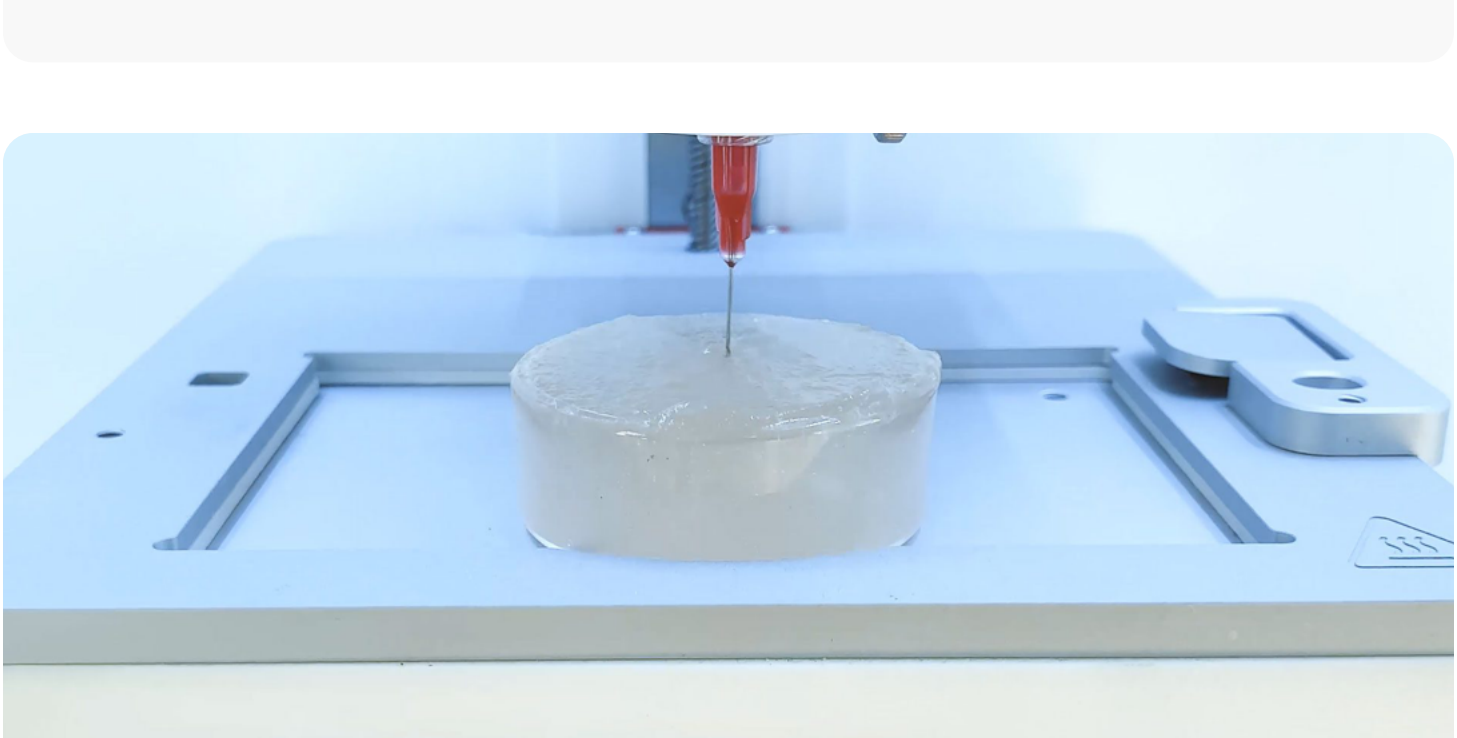

Enabling More Complex Geometries with FRESH Bioprinting

June 18, 2021

FRESH, or Freeform Reversible Embedding of Suspended Hydrogels, was originally developed as a 3D bioprinting method to address the many limitations faced when using soft

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3D Bioprinters Are Advancing Cancer Research

March 19, 2021

Although the past decade has yielded significant reductions in the cancer death rate around the world, cancer is still the second leading cause of death globally, accounting for about 10 million deaths in 2020.

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5 reasons to upgrade to the BIO X™ or BIO X6™

March 1, 2021

When it comes to your bioprinting needs, CELLINK have got you covered. Whether you're just getting started, or looking to take your bioprinting to the

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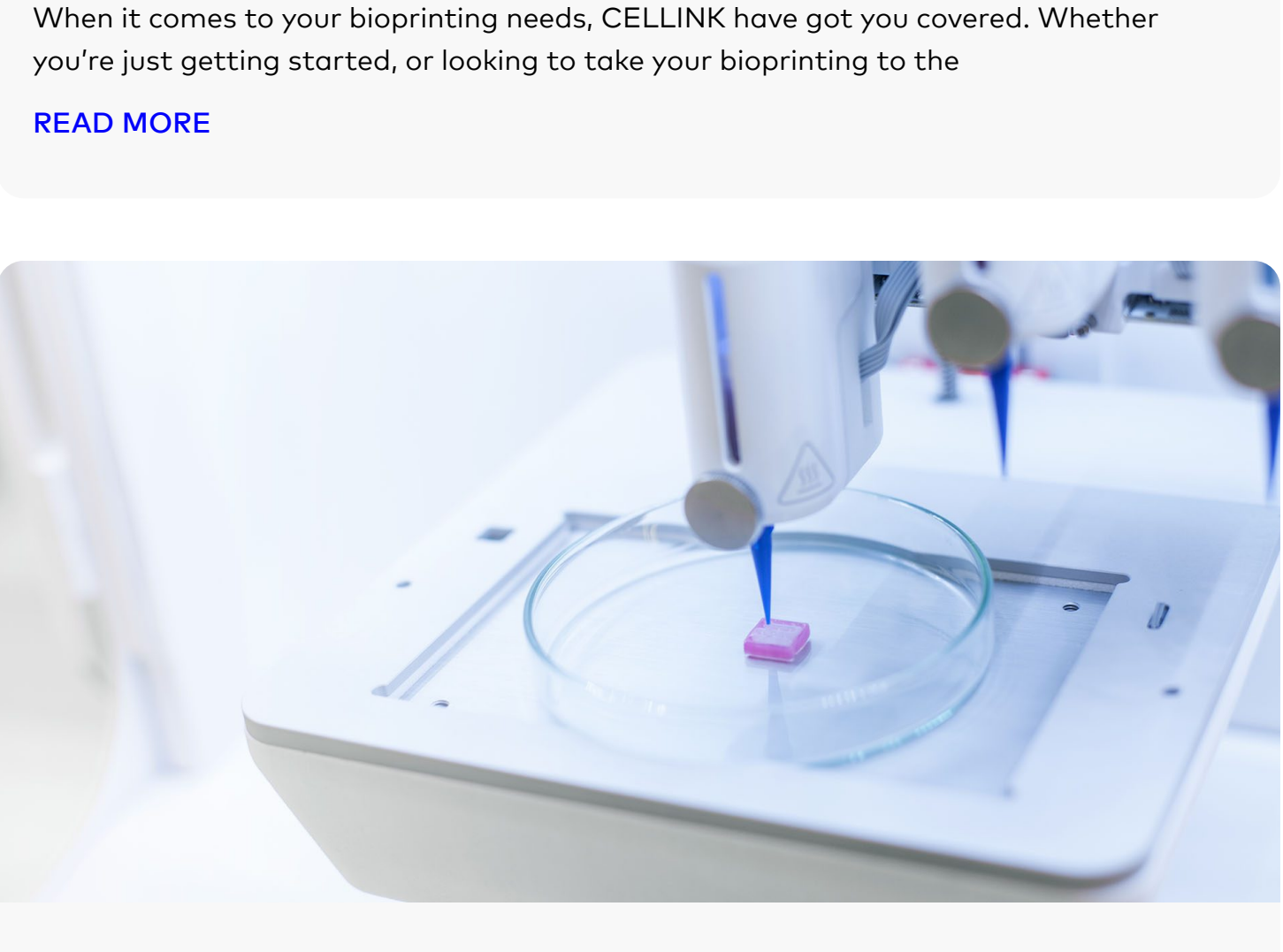

Evaluating Liver Toxicity in Bioprinted Mini Livers

February 19, 2021

The development of a functional 3D liver model requires synergy of multiple liver-specific cells to create a physiologically relevant microenvironment. CELLINK's BIO X™ provides an

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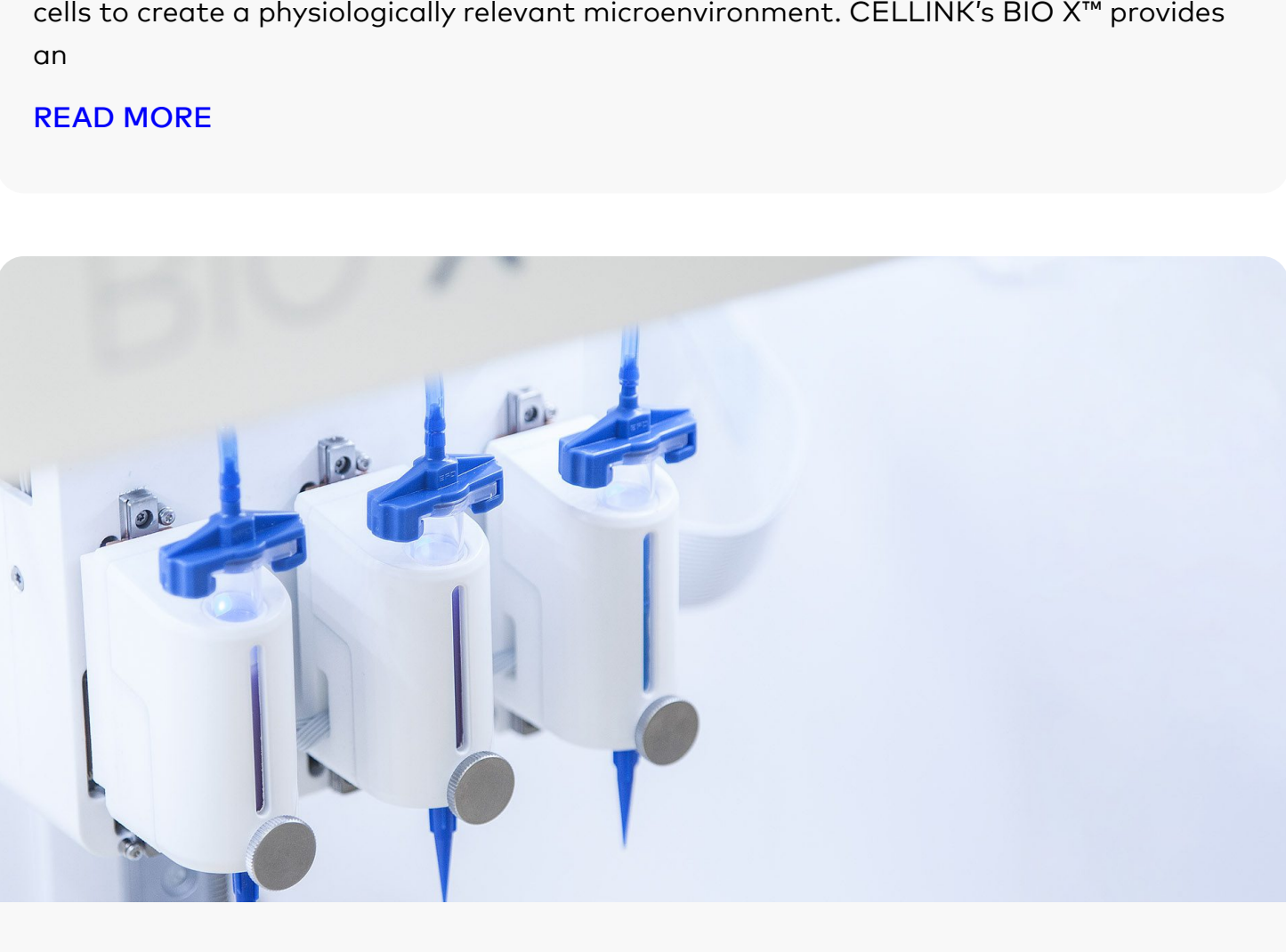

More Relevant 3D Lung Cancer Models

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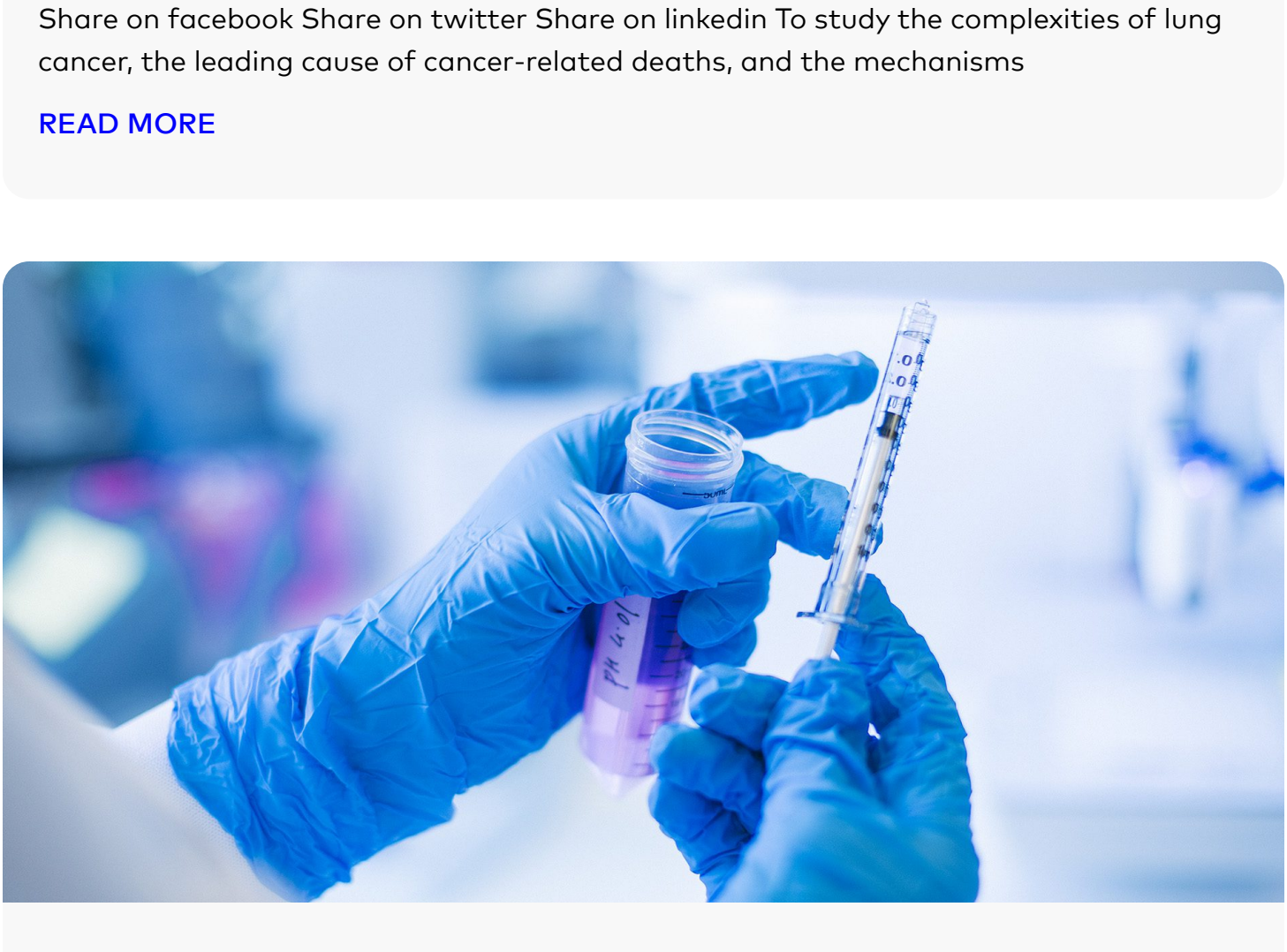

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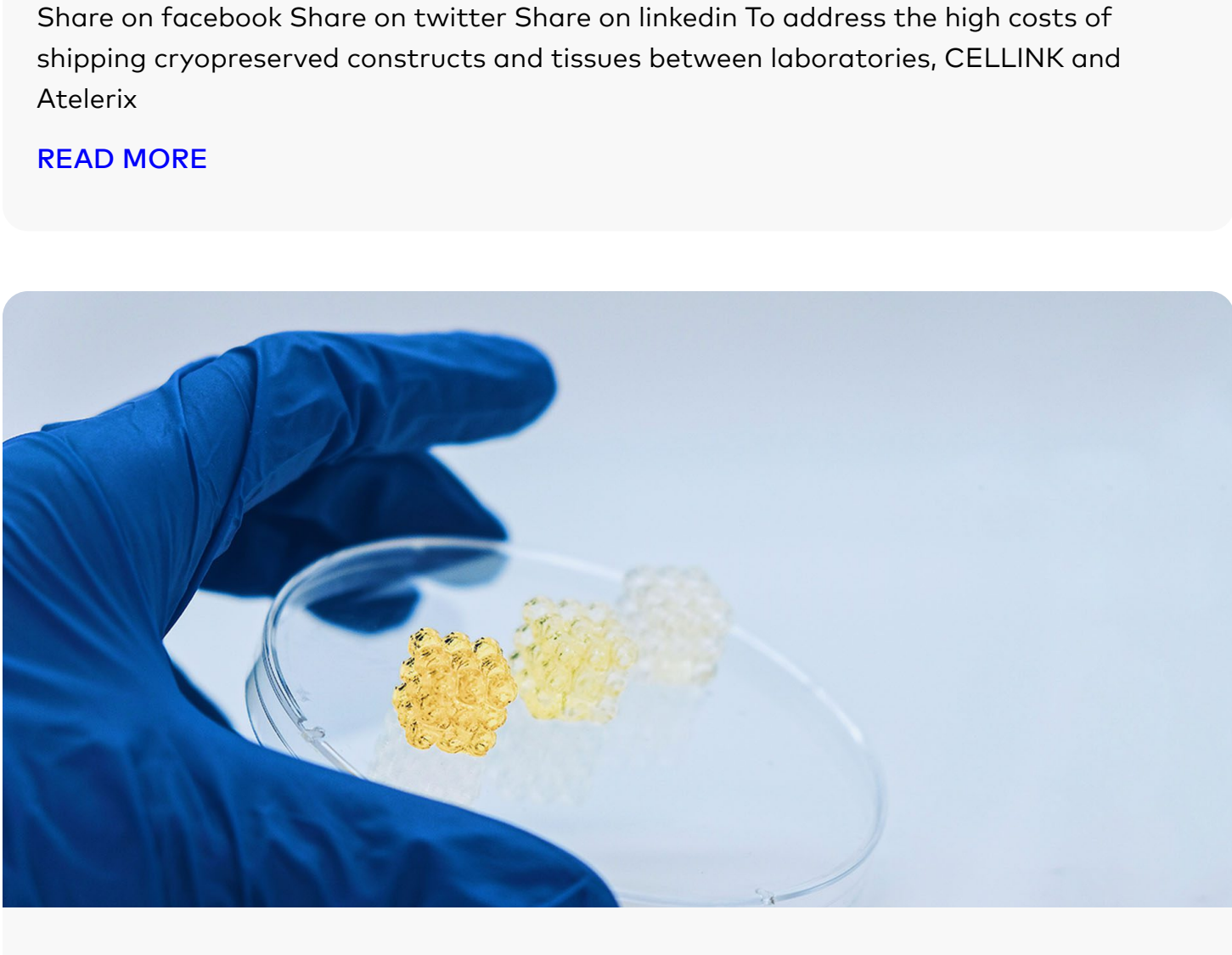

Extrusion vs. DLP 3D Bioprinting – Explanatory comparison

November 6, 2020

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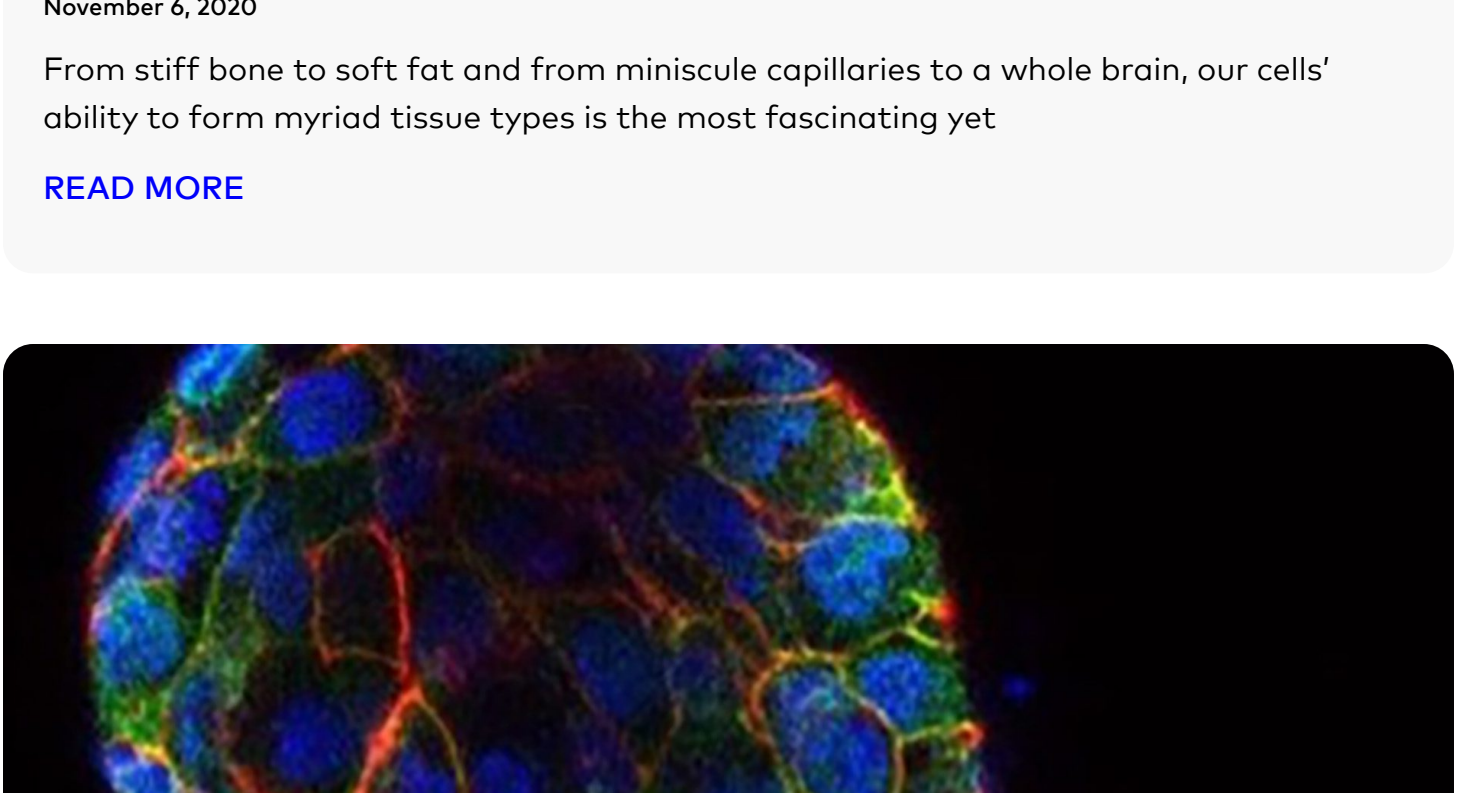

What are spheroids and why are they important?

October 27, 2020

Spheroids are three-dimensional (3D) cell cultures that arrange themselves during proliferation into sphere-like formations. They got their name in the 1970s when hamster lung cells grown in suspension were observed arranging themselves into perfect spheres. With two-dimensional (2D),

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