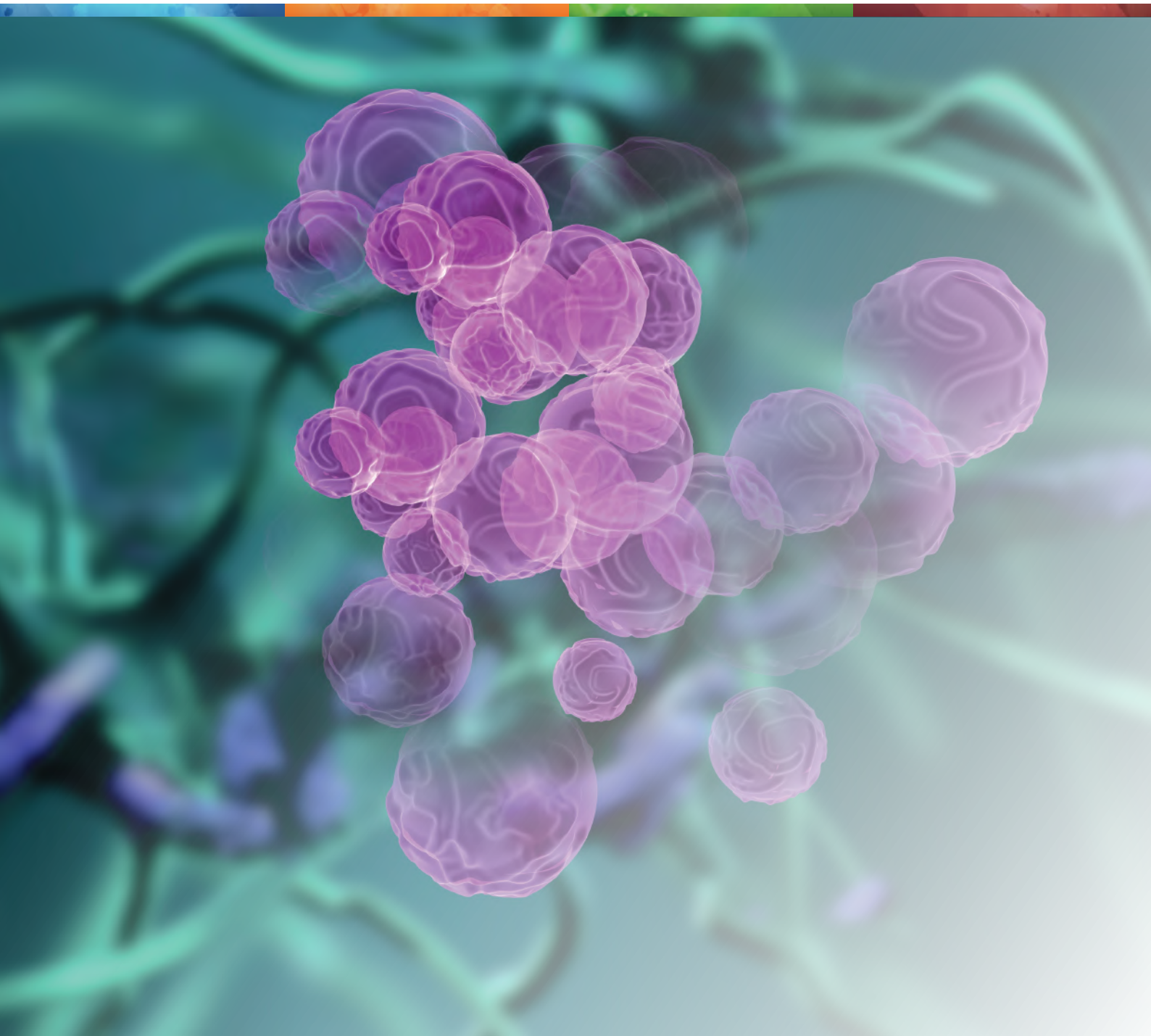
Microbiology Cell Biology Biotechnology Process Control

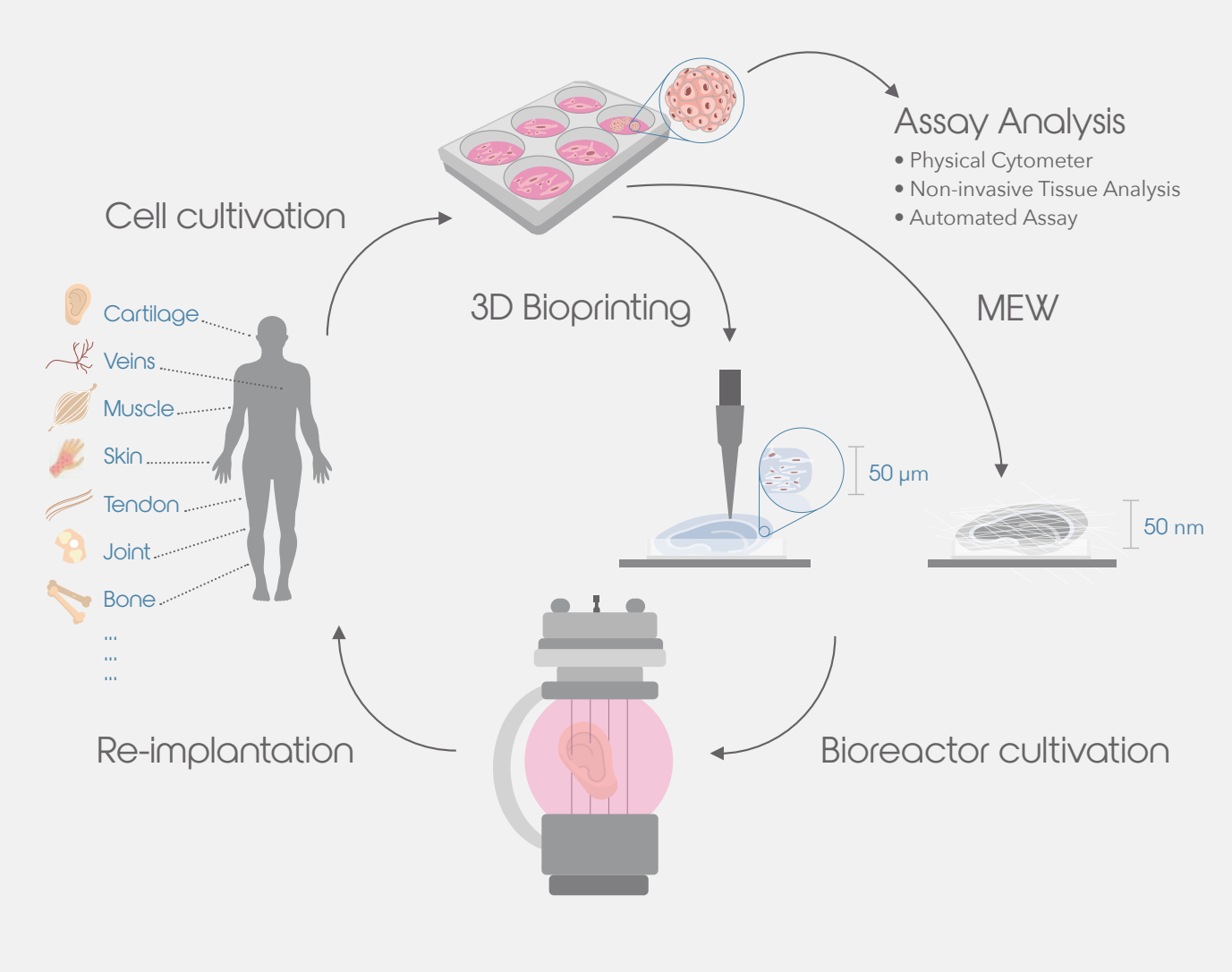
I&L Biosystems

Products for 3D Cell Culture

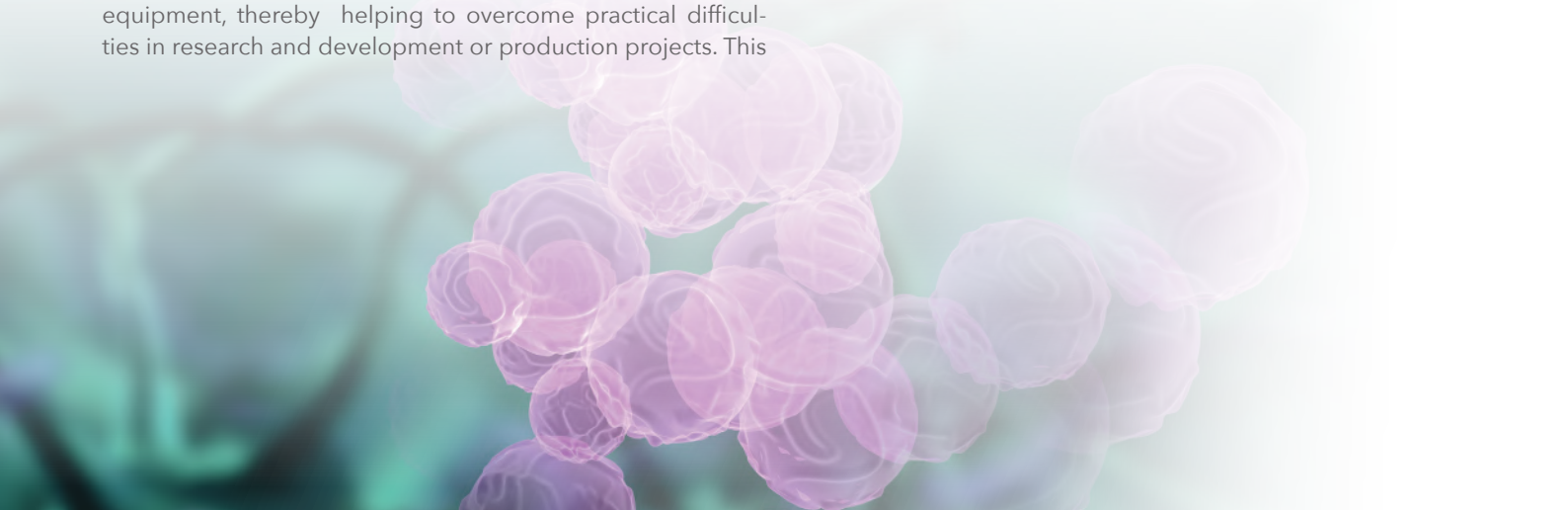


Making science real in 3D Cell Culture

Culture of mammalian cells in laboratories is classically performed in two-dimensional setups. During the last decade, the technological advances in in vitro cell based assays have resulted in an increasing trend to change to 3D-cell culture methods. Three dimensional systems Have been shown to mimic the complex spatial structures of different tissues in the mammalian body, helping to increase accuracy of cell-based screening assays. Further development in 3D cell culture assays have shown great promise in regenerative medicine and potential application in the generation of articial organs and tissues to overcome the shortage of donated organs and tissues in the near future.



Despite numerous advantages, the 3D culturing process can be challenging as continuous supply of gas and nutrition can not be guaranteed with standard cell culture equipment. I&L Biosystems is offering a complete range of 3D cell culture equipment, thereby helping to overcome practical difficulties in research and development or production projects. This includes products for the construction of scaffolds, ready-to-use cell culture plates, bioassays, bioprinting and visco-elasticity measurement. Here we present seven of our 3D cell culture product lines.



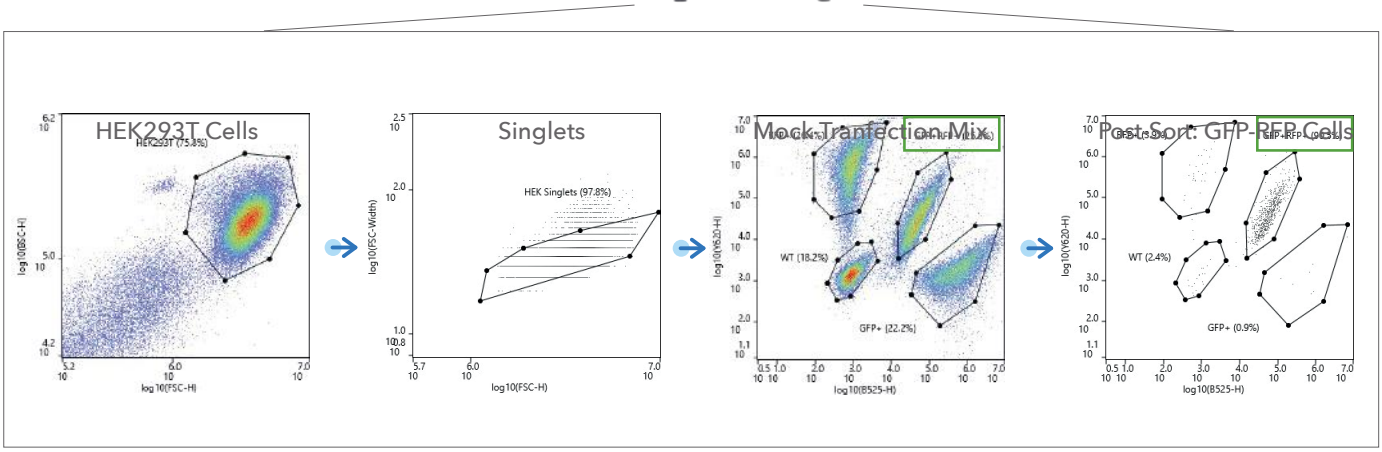
NanoCellect® Biomedical Inc
WOLF® Cell Sorter

Gentle sorting for healthy cells

The NanoCellect WOLF® is a microfluidic-based cell sorter for benchtop use which you can also place into a sterile tissue culture hood. With its patented piezo actuator and low sorting pressure (<2 psi), cells can be very gently bulk sorted into tubes in a 2-way manner. The optional N1 Single Cell Dispenser allows single cell dispensing into 96- or 384-well plates. Cross contamination and sample carryover are eliminated through the use of sterile and disposable fluidics. Use of low sorting pressure greatly improves post-sort cell viability and significantly increases the number of colonies; making the WOLF® effective in sample preparation and cloning. With the WOLF G2 Nanocellect combines a 2-laser system in 3 different configurations (405/488 nm, 488/561 nm and 488/637 nm) and up to 9 fluorescence channels with the known advantages of gentle cell sorting from the WOLF.

- Low sorting pressure: high post-sort cell viability and genomic integrity
- Sterile and disposable microfluidics: a faster process and no cross contamination
- 2 lasers and up to 9 optical parameters
- N1 Single Cell Dispenser: single cell sorting into 96- or 384-well plates
- Suitable tool for sample preparation, cell line development and cloning applications

Dual expressor HEK293T cells for cell line development



CellDynamics
W8

Characterization of 3D cell models

The W8 is a non-invasive flow-based system able to simultaneously measure weight, mass density and size of sphere-like 3D cell models. The physical characterization is based on the gravimetric method of a microfluidic technology with an image-based analysis. The W8 has high accuracy and precision, allowing the measurement of small cell cluster to organoids within a size range of 50-500 µm. In addition, the sorting of a target sub-population is possible.

- Determination of size, weight and mass density in a few minutes
- Automated sample tracking during analysis
- Sorting of a target sub-population
- Microfluidic technology with image-based analysis
- High accuracy and precision

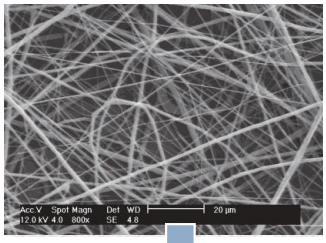
Nanofiber Solutions Inc.

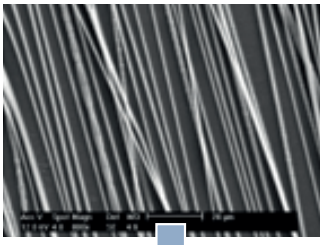
Standardised 3D Scaffolds

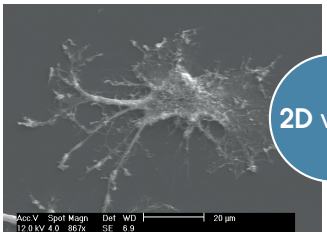
Nanofiber Solutions™ are 3D cell culture surfaces for culturing, high-throughput, real-time imaging and quantification. Nanofibers mimic the 3D topography found in vivo providing a realistic environment for all types of cells. They use either aligned or randomly oriented polycaprolactone (PCL) nanofibers integrated into standard multi-well cell culture dishes.

NanoECM™
extracellular matrix

NanoAligned™
white matter, central nervous system, cardiac tissue, skeletal muscle

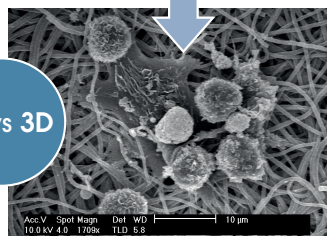




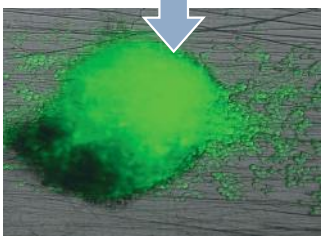


Umblical cord stem cells cultured standard tissue culture polystyrene

2D vs 3D



Umblical cord stem cells cultured on Nanofiber Solutions' nanofibers to maintain stem cell phenotype while allowing higher expansion rates



Human brain tumor biopsy showing migrating tumor cells along the aligned nanofiber

- 6-, 24-, 96- or 384-well plates
- Optically transparent, compatible with light/visible microscopy
- 700 nm diameter polycaprolactone (PCL) fibers
- NanoHep™ (300 nm diameter) increases viability and enzyme expression for hepatocytes
- Fiber layers on the bottom of the plate is ~20 microns thick
- Polymers will not degrade
- Polymers can be coated with extracellular matrix proteins such as laminin, collagen, fibronectin, poly L-Lysine, ligands, etc. with simple lab protocols
- Cells are easily removed using Trypsin-EDTA, or Accutase
- Plates are plasma surface treated and ready to use directly out of the package
- Each plate is UV light, gamma irradiated or e-beam treated and are shipped sterile.

Automated 3D Cell-Based Assays

The Pu·MA System 3D allows media, metabolite or reagent exchanges in a specially designed flow chip to automate assays for your 3D cell models, organoids and spheroids. Fluid movements are precisely pneumatic controlled. The assays take place in a protected chamber that eliminates all temperature and mechanical perturbations of the 3D cell models during fluid transfers and incubation steps.

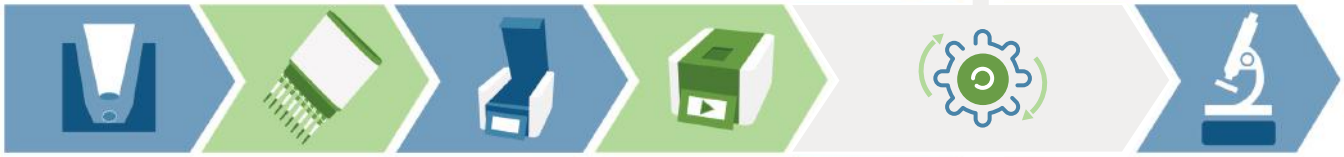
- 8-32 samples per run
- 1-5 days processing time
- 10-20 µL reagent volume
- Compact system fits any standard cell culture incubator
- Compatible with high content imaging and plate reader systems
- Compatible with Matrigel

Immunofluorescence staining

In situ cell lysis and Supernatant Sampling

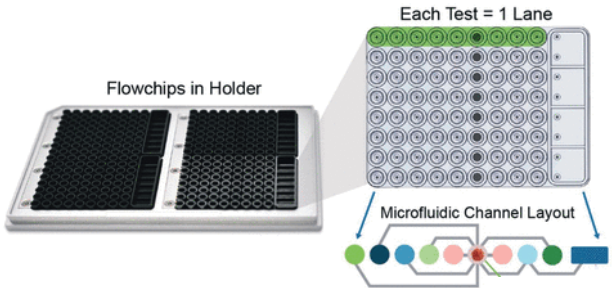
Staining for Cell viability Markers

Sequential Drug Addition

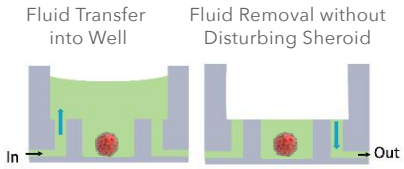


Load Cells | Load Reagents | Place Plate in System | Press Play | Automated « hands-off » steps for complex assay protocols | Ready for Analysis

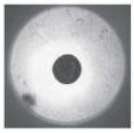
Perform *in situ* media exchanges, compound additions and supernatant sampling



Protected sample chamber to prevent cell damage

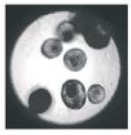


Single Organoid

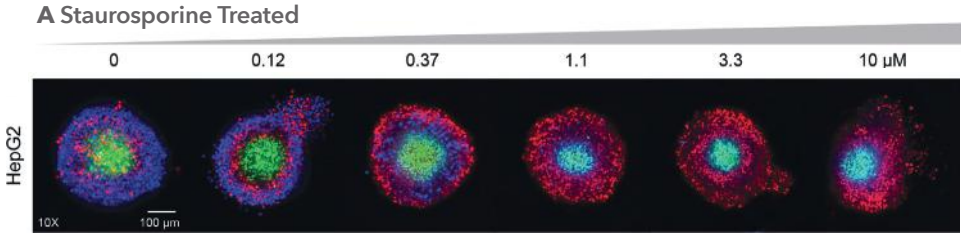


Two Organoids

Multiple Organoids

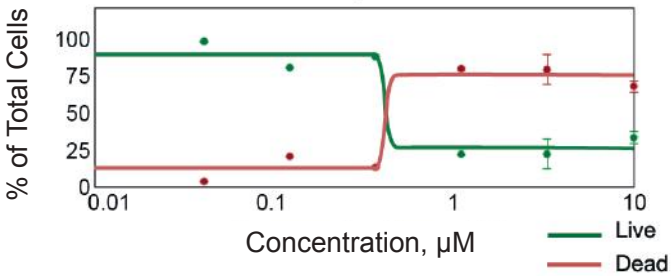


A Staurosporine Treated

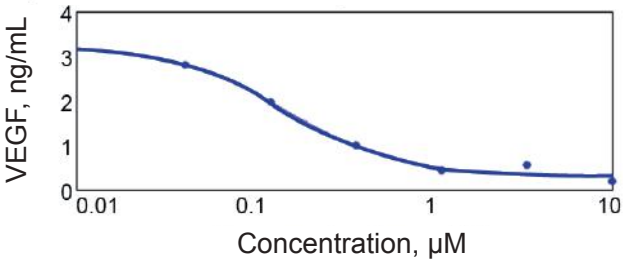


Toxicity analysis with HepG2 spheroids
A Confocal imaging of HepG2 spheroids treated with increasing concentrations of Staurosporine (0 to 10 µM) and stained with nuclear stain (Blue), cell viability dye (Green), cell death stain (Red). B Percentage cell number live versus dead cells upon treatment . C In situ secreted factor analysis by measuring VEGF levels from the media sampled after spheroid incubation with Staurosporine treatment.
from: Application Note - Protein Fluidics

B Live/Dead Analysis



C In Situ Secreted Factor Analysis



Erbi Biosystems, Inc.
Breez™ bioreactor

Microbioreactor

The only mL-scale platform that offers a fully automated, continuous perfusion culture for cell line and process development.

- Sterile, single-use microbioreactor cassettes with fully integrated fluidics
- Cell retention filter for continous perfusion, cell concentration/washing and media exchange
- Provides mixing, gas transfer and monitoring of pH, DO, temperature, CO_2, and cell density
- Supports multiple cell types including CHO, T-Cells, yeasts, bacteria, and more
- Maintain high cell densities (>250M CHO cells / ml) over 30 days
- 2 mL working volume, 50 µL sample size
- 4 liquid and 3 gas inputs per reactor

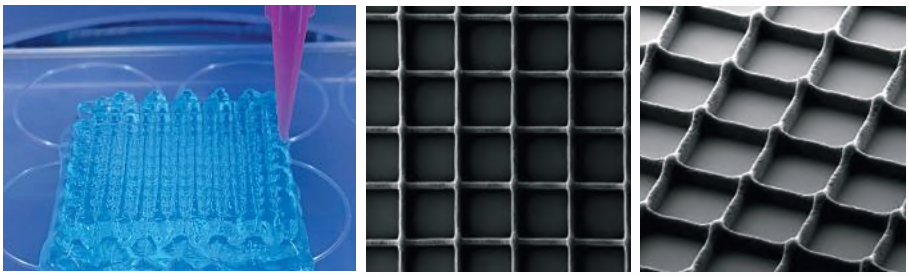
Axolotl Biosystems
Axo A3, A6 and MEW

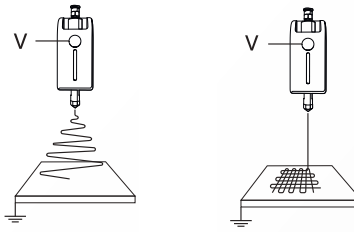
3D Bioprinter

3D bioprinting, electrospinning and melt electro writing in the same platform to create scaffolds with any type of polymers and inner structure.

- **Air pressure: 0 – 800 kPa**
- **xy resolution per µstep: 1.25 µm**
- **z resolution per µstep: 1.25 µm**
- **Printhead temperature: 3°C – 265°C**
- **Printbed temperature: from -10°C to 60°C**
- **Photocuring system: 365 / 395 / 405 nm**
- **Layer resolution: < 10 µm**
- **UV-C sterilization**
- **Petri dish, culture plate, PE isolated plate**

HD Camera Toolhead | UV Curing Toolhead | UV Laser Toolhead | Heated Printhead | Melt Electrowriting Toolhead | Cooled Printhead





Electrospinning | Electrowriting

Rheolution Inc.

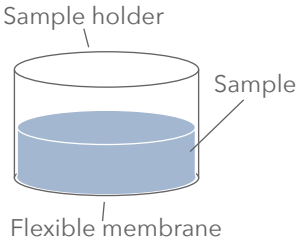
ElastoSens™ Bio – Soft Matter Analytics

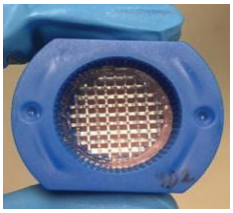
Real-time & Non Destructive Viscoelasticity Testing

ElastoSens™ Bio is a benchtop instrument that precisely characterizes in real-time the viscoelastic properties of soft materials without contact and without destroying samples. Samples are contained into removable sample holders that can be disconnected, stored out of the instrument and re-connected for re-testing as many times as required. You can remotely monitor and analyze your test with the Soft Matter Analytics™ tablet.

1. Sample loading

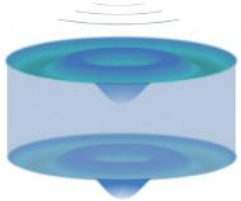
Pour or directly print your sample into the sample holder





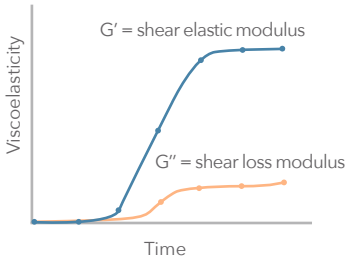
2. Vibration

Contact free vibrations are applied to the sample. Sample resonance is captured by a laser and ultrasounds



3. Data processing & Display

Raw data is processed and viscoelasticity is displayed in real time



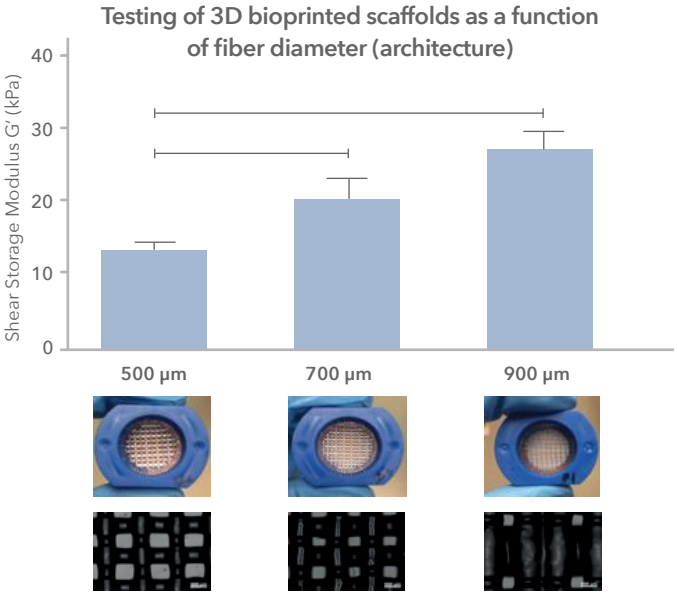
Enables retesting of your sample

Peltier temperature advanced control 4 °C - 70 °C

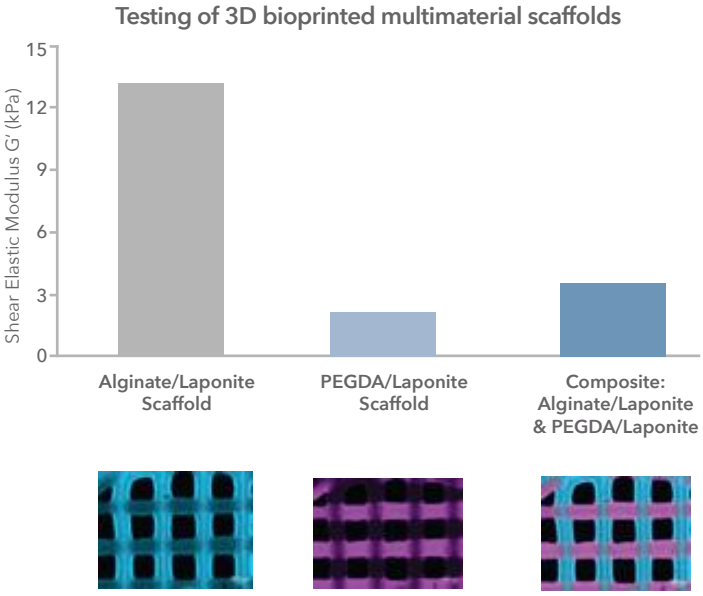
3 Built-in photostimulation sources 365nm, 385nm, 405nm

Built-in gas entries for environmental control

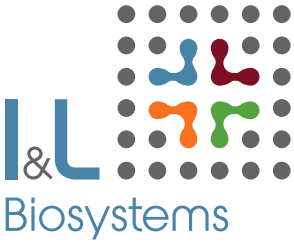
Bio - Mode



Viscoelastic properties of 3D bioprinted scaffolds with different fiber diameters (different porosity) were assessed. Viscoelasticity was processed via the shear elastic modulus (G')



Viscoelastic properties of 3D bioprinted scaffolds with either a single material or composite materials were assessed.



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Present across Europe