SNAPS

applied
technologies

Laser-Induced-Side-Transfer technology (LIST)

The potential of bio-printing opens up promising new possibilities for the healthcare sector in terms of disease modeling, drug testing and implant manufacturing. LIST technology is also expected to be able to artificially produce brain cells in the future.

Laser-assisted bio-printing is able to cover a wide range of bio-ink viscosities without having a strong impact on cell viability and function, while still maintaining high reproducibility and print resolution. LIST bioprinting technology represents a modified process for laser bioprinting of cells. The unique feature is that the technology overcomes potential barriers such as donor preparation challenge, ink viscosity or cell viability.

In the application, a transient microbubble develops at the distal end of a glass microcapillary with low-energy nanosecond laser pulses. Once this microbubble expands, a microbeam droplet loaded with cells is secreted onto a platform below.

The application area of the LIST technology can also be adapted to 3D drug screening models or even artificial tissue fabrication. To make the bioink, the research team uses DRG spinal ganglion neurons from the peripheral nervous system of mice. The neurons are released into the bioink solution and loaded into a square capillary above the biocompatible platform. The resulting 3D-printed samples are briefly incubated, washed and incubated again for another 48 hours.

The results of the research reveal that more than 4/5 of the cells were able to survive for two more days after printing. It also showed that the less energy the laser had to use, the higher the viability, as it is more likely to leave damage to the cells. The research also brings out that while 3D bioprinting did not affect the survival of DRG neurons, there was a reduction in neurite growth. Moreover, it has been proven that the printed neurons are also capable of communicating with the surrounding cells by releasing peptides.

INNOVATIVE TECHNOLOGICAL APPROACH

- **Participating research institutions:**
  University of Montreal, Concordia University, Federal University of Santa Catarina
- **Application areas:**
  3D drug screening

  Production of artificial tissue

  3D bioprinting of neurons and brain cells

  Cell transplantation
- **Advantages:**
  Reduction of animal testing

  More accurate test results through testing on human tissue

LIST-Bioprinting

After the world's first 3D-printed tongue for drug and food testing was produced by British researchers in 2020, the developers of the LIST technology would like to push ahead with cell research as soon as they receive the necessary approval. The main focus will be on drug discovery, supporting drugs for nerve restoration, for example.