



CELL-PRESERVING SINGLE CELL TRANSFER

Task

In various medical studies worldwide, different bioprinting methods are being investigated for the research and production of artificial tissue. One promising method is laser-induced forward transfer (LIFT), in which single cells can be printed in a hydrogel matrix. For this purpose, a metallic absorber (e.g. titanium) has to be evaporated by means of laser radiation in order to transfer material. This results in metallic nanoparticles whose influence on living cells is unknown.

Method

Since the LIFT process is currently based on the vaporization of a metallic absorber, Fraunhofer ILT is investigating whether other substances can be used as absorbent material. To ensure a sufficiently high laser absorption, the institute is testing a tunable laser-beam source for the LIFT process. For Chinese hamster ovary (CHO) cells embedded in a 5% gelatin gel, single-cell transfer into 96-well microtiter plates was studied and the growth rate determined.

Results

The results of the new LIFT process show that CHO cells can be transferred reliably. The transferred single cells survive and proliferate to more than 95 percent. In comparison, the same cells proliferate at only 60 percent when transferred with ultraviolet laser radiation and a titanium absorber layer.

Applications

The use of new absorbers and tunable laser beam sources in the LIFT process opens up new opportunities in the area of tissue engineering through targeted single-cell transfer. In biotechnology, single cells are used when cell clones need to be produced. The absence of metallic absorbers makes it possible to combine LIFT with other analysis methods and to establish new process chains.

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3 Transferred live cells after seven days.