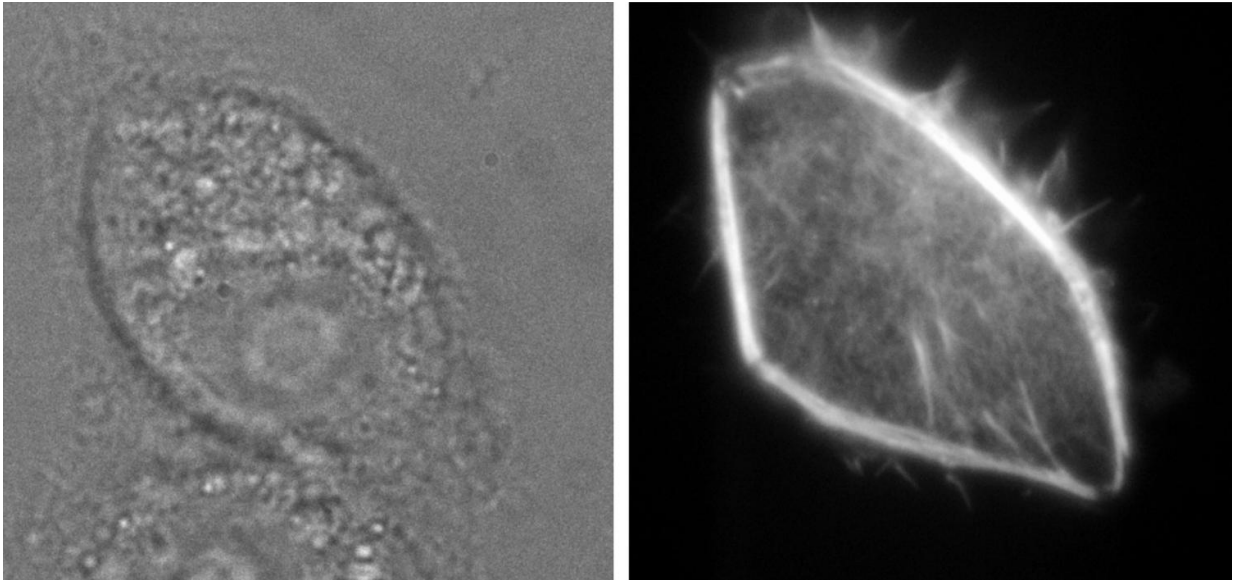


Nanoinjection increases survival rate of cells

March 1 2017



A glass pipette injects fluorescent molecules into a kidney cell (left photo). A few seconds later, the molecules light up revealing new details (right photo).
Credit: Bielefeld University

How do tumours grow? And how do bacteria transform harmless substances into medical agents? When biophysicists want to understand what is happening in living cells, they have to introduce fluorescent probes or other foreign molecules. There are several ways to overcome the cell wall without causing the cell permanent harm. Physicists at Bielefeld University have developed a particularly gentle method for this: nanoinjection. In a new study to be found in *Scientific Reports*

published by *Nature*, they show that with this method, nine out of ten cells survive being injected with foreign molecules.

One of the most well-known methods for studying bacterial, plant, and animal [cells](#) is fluorescence microscopy. When using this method, proteins or other structures in a cell are stained with the help of [fluorescent probes](#). These [molecules](#) are fluorescent. Light excitation makes them glow, thereby illuminating the labeled structures inside the cell. 'The method works very well on fixed, that is non-living cells,' says Professor Dr. Thomas Huser, head of the Biomolecular Photonics research group. 'However, the problem is that much of what we want to know can be gained only from living cells.'

Dr. Simon Hennig adds: 'Living cells impede the intrusion of most fluorescent probes.' The physicist is working in Huser's research group. To overcome this resistance when delivering fluorescent probes into the cells, he has developed the method of nanoinjection. He uses a minute hollow glass pipette to deliver the fluorescent molecules to [individual cells](#). The process is controlled by a computer. An instrument specially developed for nanoinjection inserts the pipette into the cell. The tip of this glass capillary is much smaller than that used in usual microinjection. Moreover, the process prevents the cell from increasing in size, because only the molecules are transferred and not the liquid in the pipette as well. 'The method is so precise that we can even deliver the molecules to the nucleus of a cell,' says Hennig.

The new study confirms that the method can be used to inject many types of probes and that it is very well tolerated by the cells. 'This proof was necessary, because previous techniques such as microinjection harm the cells so much that most do not survive the treatment,' says Hennig. His colleague Matthias Simonis tested the nanoinjection [method](#) on more than 300 cells and compared the results with those of microinjection. The main finding was that 92 per cent of the cells survived nanoinjection

compared to 40 per cent for microinjection. 'The analyses also confirmed that these treated cells proliferated normally,' says Hennig. According to the physicist, proliferation is not just a sign of a healthy cell. It also opens up new possibilities for experiments. For example, a negative influence of the injection can be ruled out in advance. This allows researchers to study the injected cells without having to take the effect of the injection into account as well. Hennig views nanoinjection as a particularly promising way of studying, for example, how [single cells](#) react with each other.



Nanoinjection has been developed by Dr. Simon Hennig at Bielefeld University. Using this new method, nine out of ten cells survive being prepared for microscopic studies. Credit: Bielefeld University

More information: Matthias Simonis et al, Survival rate of eukaryotic cells following electrophoretic nanoinjection, *Scientific Reports* (2017).
[DOI: 10.1038/srep41277](https://doi.org/10.1038/srep41277)

Provided by Bielefeld University

Citation: Nanoinjection increases survival rate of cells (2017, March 1) retrieved 16 July 2024
from <https://phys.org/news/2017-03-nanoinjection-survival-cells.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.