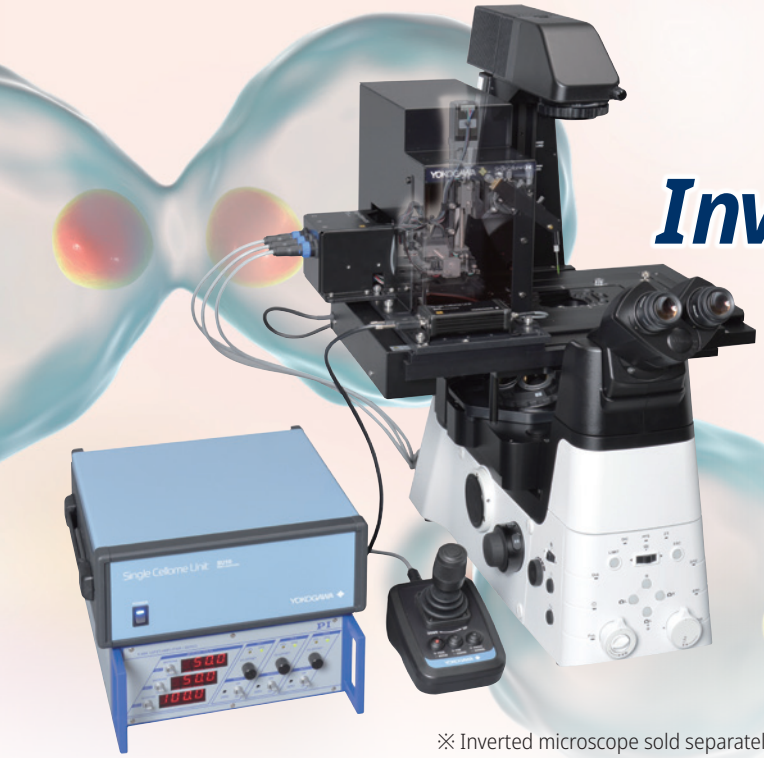
Single-cell Analysis Solution
Single Cellome™ Unit
SU10



※ Inverted microscope sold separately

Minimally Invasive Intracellular Nano-Injector

Outline

This system component automates the penetration and injection of single cells using a nanopipette.

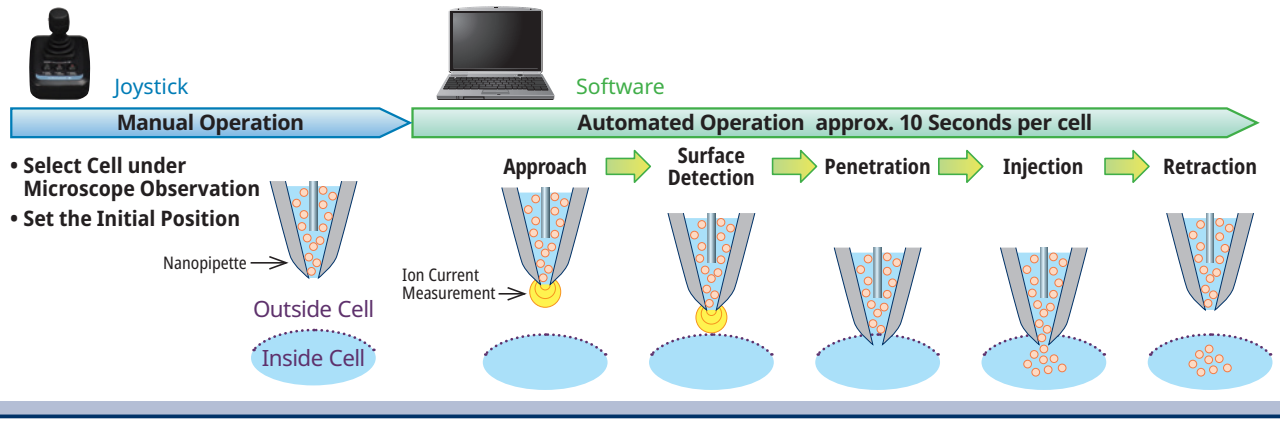
Its low invasiveness enables manipulation of live single cells.

The system integrates with multiple manufacturers' inverted microscopes.

Features

Low Invasiveness	Glass pipette with tip size of ***under 100 nm***
Automated Penetration	Automated cell surface detection and penetration (Z direction movement)
Automated Injection	Automated, controller volume injection using electro-osmotic flow
High Success Rate	Approx. 95% success rate of injection*
Singe-Cell Targeting	Enabled injection of selected cells under microscope observation
Rapid Injection	Capable of injecting one cell every 10 seconds*

Injection Process



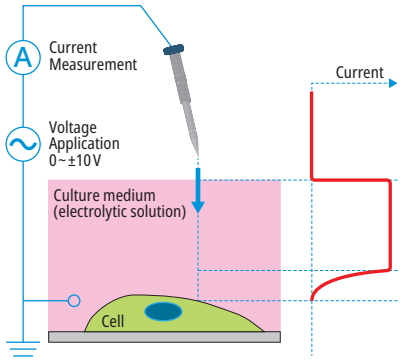
* Experiment by Yokogawa

Core Technologies

Automatic Cell Detection and Penetration

The ion current measurement detects the nanopipette tip as it approaches a cell's surface.

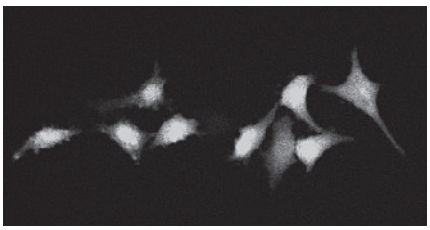
Automatic depth penetration can be controlled at a speed which minimizes damage to the cell



Fast Injection with High Success Rate

By automating the steps to penetrate the target cell, an injection speed of approximately 10 seconds has been achieved.

Fluorescence was observed in 208 out of 220 (94.6%) HeLa cells where the fluorescent protein was injected (experiment by Yokogawa)

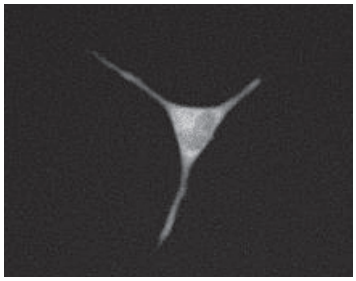


Left:

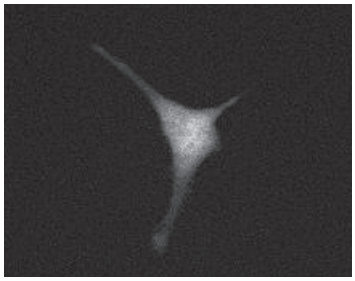
Injected RFP into HeLa cells observed fluorescence inside the target cells

Low-Invasive Injection

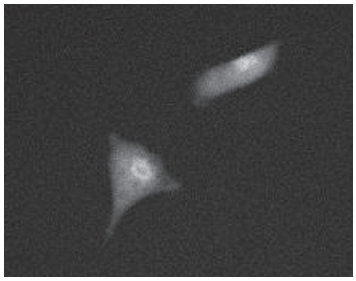
The extremely small tip diameter of the nanopipette minimizes damage to the target cell.



Immediately after injection



One hour later



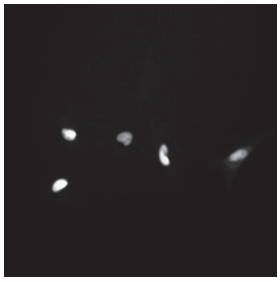
One day later

Left:

RFP was injected into the HeLa cells, and sequentially observed with fluorescence

Injection into the nucleus and the cytoplasm

Supports injection into the selected cell's nucleus or cytoplasm



Injection into the nucleus

Injection into the cytoplasm

Left:

FITC-labelled dextran solution (molecular weight 70,000) was injected into HeLa cells for fluorescence observation

Application Example

- Direct injection of substances such as vector and genome editing tools (CRISPR/Cas9) into the nucleus
- Efficacy/toxicity evaluation of drug candidate molecules
- Other physical injection of reagents and proteins

※ Function to aspirate intracellular substances is under development

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