Microfluidic Array for Capturing and Pairing Cells for Immunotherapy, Diagnostics, and Research (#8587)

Simplifies the study of interactions between different types of cells

Interactions between different cell types can now be studied without the need for labor-intensive manipulations. This technology, developed by researchers at Georgia Tech, is a microfluidic device that automatically traps microscale particles, such as cells, in chambers where they can then be imaged using light or fluorescent microscopy. Due to its unique design, this device allows controllable pairing of different ratios of cells. This device and method enable interactions between defined numbers of each cell type to be observed in real time.

This technology provides the ability to study cell-cell interactions, which is of particular interest in the field of cellular therapies for cancer treatments. Beyond studying cells, the technology can also be adapted for assessing other microscale objects of interest such as embryos, worms, or microparticles.

Benefits/Advantages

- **Simple**: Requires no valving or active components
- **Adaptable**: Can be modified to study any number or type of cells
- **Precise**: Provides the ability to pair cells with exact ratios in a deterministic manner

Potential Commercial Applications

- Analytical tool for commercial manufacturing of chimeric antigen receptor T-cell (CAR T-cell) therapy and other cell therapies for treating cancer and other diseases
- Biomedical Research tool
    - Immunotherapy
    - Immuno-oncology
    - Other indication fields
- Diagnostic tool

Background/Context for This Invention

Used to observe cells and their interactions, current microfluidic technologies pair only one cell of one type with one cell of a second type, or pair higher numbers of cells but cannot do so in a controlled and reproducible manner. Current non-microfluidic technologies also do not provide the ability to precisely pair two or more cells and cell types and observe those cells and their interactions at a single cell level and with exact ratios in a deterministic manner. This Georgia Tech innovation addresses those limitations.

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More Information

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Publications

Dynamic mitochondrial migratory features associated with calcium responses during T-cell antigen recognition, Analytical Chemistry, August 1, 2019

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/microfluidic-array-capturing-and-pairing-cells-immunotherapy-diagnostics-and-research

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot