A Novel High Throughput Method for Automated Single-cell Identification and Capture in vitro

Technology #17274-18080

Applications

This system incorporates methods for an automated *In vitro* single-cell identification and recovery at a high throughput. Scarce or abundant cells of interest from biological samples, e.g., a biological fluid, tumor biopsies, punch biopsies, skin samples, cytobrushes, lavages, fine needle aspirates, cerebrospinal fluid, synovial fluid, blood, sputum, urine, etc., can be recovered with high viability for further analysis. This technology can be employed to advance the understanding of clinical responses to the growing number of experimental interventions targeting tissue in the fields of cancer immunotherapy, autoreactive bowel disorders, allergy, infectious disease, multiple sclerosis, neuroimmunological disease, HIV etc.

Problem Addressed

Bulk measurements can mask characteristics of individual cells or subsets of cells. Such individual cells and small subsets of cells may contribute significantly to biological processes, yet may not be identical to the population average measured by existing techniques. In addition, interactions between individual players may not be resolved if only an average behavior is studied. As a result, traditional methods may draw a misleading picture of dynamic responses of cells to the given perturbations of their biological environments, necessitating development of technologies for single-cell analysis.

Conventional slide-based cytometry can efficiently provide capture of all cells in the sample in a first step, preventing cell loss during cell staining and data acquisition. However, current methods of acquiring images of the captured cells, such as laser scanning slide cytometry and multi-parameter confocal microscopy, have (1) lagged on the number of channels available on state-of-the art flow cytometers and (2) are costly, which restrict their availability primarily to core facilities.

There is a need for the development of efficient methodologies for the single-cell recovery on large tissue areas while maintaining cellular viability for further functional characterization.

Technology

This technology platform involves an elastomeric array of thousands of nanowells where cells in suspension can be single-cell identified by automated epifluorescence imaging and recover by micromanipulation. This platform has the ability to (i) image large areas of tissue samples and biopsies for increased throughput, (ii) have a large spectral depth (e.g., 10-30 color channels for 10-30 markers), (iii) automatically scan large areas for scarce cells, (iv) pick the scarce cells, (v) maintain cell viability for further functional characterization (cells can be kept alive during

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processing), and/or (vi) provide dynamic and secretory measurements of individual cells, all in a single device. In contrast to conventional systems, which take days for identifying cell types and relevant information, this technology incorporated a software capable of analyzing cells in real time providing results and information in under 20 minutes.

Advantages

- High throughput single-cell identification and recovery
- Automatically scans large areas of tissues for scarce cells
- Maintains cell viability by optimized sample handling and data collection under a short period of time
- Multispectral cytometry (e.g., multicolor slide cytometry) with a range of 10-30 color channels for 10-30 markers
- Integrated software identifies cells in real time

Intellectual Property

IP Type: Granted US Patent

IP Title: Systems, methods, and apparatus for in vitro single-cell identification and recovery

IP Number: 10,078,778

IP Type: Granted US Patent

IP Title: Systems, methods, and apparatus for in vitro single-cell identification and recovery

IP Number: 9,953,209

IP Type: Granted US Patent

IP Title: Systems, methods, and apparatus for in vitro single-cell identification and recovery

IP Number: 10,776,608

IP Type: Published US Patent Application

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IP Type: Copyright Software

Categories For This Invention:

Medical Devices
Diagnostic
Other (Medical Devices)
Life Sciences
Biotechnology
Clinical Applications
Diagnostics

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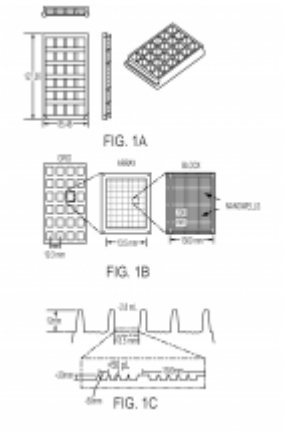

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