Method for Diagnosing Allergic Reactions  
Technology #13528

Applications

This technology is a method for detecting single cell immune responses with potential applications as a research tool or diagnostic for allergic reactions, autoimmune diseases, or tumor immunomodulation.

Problem Addressed

Immune responses require coordination of many heterogeneous cell populations. Recent advances in single cell surface and intracellular protein analysis have highlighted the importance of assessing immune responses at the single cell level. However, given the diffusible nature of secreted proteins, inter-cellular signaling proteins remain difficult to detect and analyze. Since secretion of effector cytokines and antibodies is a common output for immune cells, there is a need for improved methods of detecting single cell secreted proteins. Previous attempts at developing assays to detect secreted proteins from single cells had very poor sensitivity and could only detect one or two proteins at a time. This technology is a highly sensitive, multiplexable technique for detecting proteins secreted from single cells.

Technology

This technology uses micro-machined wells to facilitate detection of secreted proteins from single cells. First, cells are stimulated with immunomodulatory growth factors or allergens. Next, single cells are seeded into the micro-machined mold in sub-nanoliter volumes of culture medium. This array of cells is then inverted and incubated on a substrate coated with detection antibodies, which recognize and capture pre-defined secreted proteins. The substrate is then stained with fluorescent antibodies against the captured secreted proteins and imaged with a computerized microscope. Importantly, the cells can be retained in the wells for staining of surface marker proteins, RNA isolation, or expansion of cell clones. This technology is highly sensitive, and displays up to two fold greater sensitivity than other single-cell secretion detection methods. Additionally, this technology can be multiplexed to simultaneously detect many secreted proteins from each individual cell.

Advantages

- Sensitive method for detecting secreted proteins from a single cell
- Multiplexed detection
- Cells are retained alive and can be used in other downstream analyses

Categories For This Invention:

- Life Sciences
- Clinical Applications
- Immunology
Inflammatory Disease
Diagnostics
Protein
Microarray
Research Tools
Protein & Protein Chemistry
Screening Assays

Intellectual Property:
Method for diagnosing allergic reactions
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9,244,080

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Publications:
On-chip activation and subsequent detection of individual antigen-specific T cells.
Analytical Chemistry
2010
High-throughput secretomic analysis of single cells to assess functional cellular heterogeneity
Analytical Chemistry
2014

External Links:
Love Lab
https://love-lab.mit.edu/