Method for Assessing Cytotoxicity of Single Cells
Technology #13546

Applications

This technology is a method of assaying the cytotoxic capacity of single immune cells such as cytotoxic T-cells or natural killer cells with potential applications as a research tool in immunology and immuno-oncology.

Problem Addressed

The immune system keeps the body clear of infectious viruses, bacteria, and fungi. Additionally, the immune system itself has recently been employed as a therapeutic tool against cancer by inducing a patient’s own immune system to attack and kill tumor cells. Cytotoxic immune effector cells, such as T-cells and NK cells, trigger cell death in infected or tumorigenic cells through cell-cell interactions. Previously, the only methods available to study immune cell-target cell interactions relied on pooled immune cell populations, but the vast heterogeneity of immune cell populations limits the biological relevance of these methods. This technology is a novel method of analyzing cytotoxicity with single-cell resolution.

Technology

This technology uses sub-nanoliter microwells seeded with immune effector cells and target cells to assess the cytotoxic capabilities of individual immune cells. Firstly, immune cells and target cells are seeded in a 1:1 ratio into an array of microwells. Each microwell with a single immune cell and single target cell is monitored for cell death via fluorescence microscopy, and the entire microwell plate can be assayed for immune cell activation by incubating on a glass plate functionalized with antibodies against secreted immune-modulators. Importantly, individual immune cells remain viable, and the immune cells with cytotoxic capacity can be isolated for downstream assays such as RNA analysis or clonal expansion. This technology can be used to study NK cell activation, or to identify and assay rare T-cell clones that are reactive against infected cells or tumor antigens.

Advantages

- Assay cytotoxic cells with single-cell resolution
- High throughput analysis of individual cell-cell interactions
- Analysis, isolation, and expansion of individual cytotoxic T-cells or NK cells

Categories For This Invention:

- Life Sciences
- Clinical Applications
- Immunology
Infectious Disease
Oncology
Research Tools
Screening Assays

**Intellectual Property:**
Compositions and methods for assessing cytotoxicity of single cells
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9,244,071

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**Publications:**
A high-throughput single-cell analysis of human CD8+ T cell functions reveals discordance for cytokine secretion and cytolysis
Journal of Clinical Investigation
2011

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