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Combined Single-Cell Measurement of Cytokine mRNA and Protein in Immune Cells

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Protocol Information

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Summary: A key feature of immune cells, such as T cells, is their rapid responsiveness to activation. The response rate of T cells depends on the type of signals they receive, and the signal strength. Studying the underlying mechanisms that define responsiveness, however, is confounded by the fact that immune cells do not uniformly respond to activation. Tools that measure gene products on a single cell level therefore provide additional insights in T cell biology. Here we describe Flow-FISH, a high-throughput assay that allows for the simultaneous measurement of cytokine mRNA and protein levels of the gene(s) of interest by flow cytometry. We present several possible applications of Flow-FISH in human and murine T cells that - with minor adjustments - should also be applicable for other gene products and cell types. This is a post-peer-review, pre-copyedit version of an article published in Methods in Molecular Biology, and is currently in press.

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