Expanding live-cell barcoding applications with mass cytometry using cadmium- and platinum-labeled antibodies

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Introduction

Mass cytometry, driven by CyTOF® technology, uses antibodies labeled with selectively chosen metal tags, enabling real-time identification of diverse immune cell subtypes and their sub-populations. The advent of the antibody labeling method for 7 cadmium (Cd) and 6 platinum (Pt) isotopes (Zunder et al. 2015) is a significant breakthrough in mass cytometry, enabling characterization of single cells at 37 parameters. The time penalties afforded by these additional tags are mitigated by adding antibody barcodes to the multiplexed sample and support new applications for innovative research discoveries.

Materials and methods

Mixed-metal 35-plex live-cell barcoding

• Three valsartanization Cd isotopes were selected (106Cd, 110Cd, 111Cd, and Dy) in a 1:1:1 mixture to label CyCD45 antibodies, increasing multiplexing power to 35 metal isotopes.

Results: Mixed-metal 35-plex in PBMC

Effective debarcoding of the highly multiplexed FCS file

Debarcoded sample analysis reveals consistent data quality

Live-cell barcoding with the Maxpar Direct Immune Profiling Assay

• Whole blood from 2 healthy donors (Canadian Blood Services) were stimulated with PMA/ionomycin for 4 hours in triplicate (Figure 6A).

Automated analysis by Maxpar Pathsetter illustrates immune profiles of each barcoded sample

Conclusions

• Live-cell barcoding analyzes with 35 Cd/Pt/110Cd barcodes, accessing multiplexing power to 35–42 samples or more.
• The added flexibility in tag selection for a combination of Cd, Pt, and Y isotopes empowers mass cytometry of live-cell experiments and improved data consistency for large studies.
• Live-cell barcoding can be expanded to other applications including whole blood from healthy donors stained with high-dimensional antibody panels such as the Maxpar Direct Immune Profiling Assay.

References


Acknowledgments and ethics statement

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